

**Doctoral Dissertation
Academic Year 2019**

**Local Techniques and Knowledge on Building and City,
and Their Transformation since the 19th Century,
in Mekelle and its Surrounds, Tigray Region, Ethiopia**

**Graduate School of Media and Governance
Keio University**

Nobuhiro Shimizu

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Abstract

This dissertation tends to be a comprehensive study on the history of building and city in Mekelle and its surrounds, Tigray Region, Ethiopia. The topics are primarily discussed from the perspective of local techniques and knowledge. On the basis of understanding locally inherited techniques and knowledge on building and city, their transformation since the latter half of the 19th century is clarified. To gain a good understanding of them, both physical buildings, urban spaces and people who developed the local techniques and knowledge were analyzed. Therefore, the author carried out the following research activities in the field: measurement and observation of historically important buildings, observation of a course of construction process on masonry techniques, interview research with local builders, and interview and mapping research on the process of the current settlement's urbanization. The discussion is organized to illuminate not only visible buildings and spaces themselves, but also the relationship with less-visible environmental and social issues.

Through a series of surveys, it becomes clear that previous local techniques and knowledge of both building and city were connected with agricultural ones. Through the local people's continuous interactions with the local environment, they gradually achieved various environment-adapted techniques and knowledge on agricultural, building and urban issues. However, these have transformed since the latter half of 19th century, due to the introduction of building tools and materials from abroad, and the urbanization accompanied by population growth, urban sprawl and congestion, and newly introduced urban master plan. While local builders acquired the skills to apply and improved newly introduced tools and materials, the agri-building and agri-urban connection has weakened. New local techniques and knowledge consistent with the current environmental and social situation should be sought now.

Keywords

*Tool and material, Builder, Urban formation, Urbanization,
Mekelle, Tigray, Ethiopia*

博士論文 令和元年度（2019 年度）

エチオピア・ティグライ州・メケレ周辺における 建物・都市をめぐるローカルな技術と知識、 およびそれらの 19 世紀以降の変容

慶應義塾大学大学院 政策・メディア研究科

清水 信宏

論文要旨

本論文は、エチオピア・ティグライ州・メケレおよびその周辺の建物と都市の歴史に関する総合的研究である。特に、ローカルな技術・知識に着目して議論を行なう。まず建物・都市それぞれのローカルに受け継がれてきた技術・知識に関する理解を深めた上で、それらが 19 世紀以降どう変容をしたのかについて明らかにする。実際に存在する建物や都市空間のほか、実際にローカルな技術・知識を育んできた人々に着目することで、より相応しい理解を目指していく。そのために筆者は、フィールド調査を通じ、歴史的に重要な建物の実測と観察・一連の建設プロセスの観察・ビルダーへのインタビュー調査によるローカルな建物に関する技術・知識の解明・マッピング調査とインタビュー調査による集落の都市化プロセスの解明を行なった。議論は、目に見える建物や空間そのものだけでなく、目には見えにくい環境や社会との関係性を視野に入れて進められる。

一連の調査活動を通じて、かつての建物・都市に関するローカルな技術・知識が、農業に関するそれらとそれぞれ密接な関わりを持っていたことが明らかになった。ローカルな人々は、環境との相互作用を繰り返しながら、周囲の環境に適応した農業・建物・都市に関する技術・知識を徐々に発展させてきた。しかしながら、これらの技術や知識は 19 世紀後半以降、新たな工具や材料の外国からの流入、人口増加・都市域の拡大と過密化・都市計画マスタープランの採用を伴った都市化の進展によって、変容を遂げた。ローカルなビルダーは、新たに流入した工具や材料に関する技術を身につけ、またそれを更に改良していったが、一方で農-建物・農-都市の技術的な関連性の希薄化が進んだ。現在の環境的・社会的な状況を反映した新たなローカルな技術・知識を構築していくことが今求められている。

キーワード

工具と材料、ビルダー、都市形成、都市化、メケレ、ティグライ、エチオピア

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Acknowledgement

Dear Ethiopians,

This is a kind of record of my ten-year personal journey, namely experiences of field surveys, reading books, and conversation with local people, in a logical form. Through the first visit to Ethiopia, I conceived that there is something important to consider urban and building future in here, and I have sought it until now. However, now I understand that “it” has melted when I try to put “it” into writing. Now I’m thinking that the one that is continuously melted is the one called “topophilia.” Nevertheless, I have attempted to write down the clues to understand “something important” in this dissertation. The main topic of this dissertation is the potentials of local techniques and knowledge on building and city. I am happy if you get the message of my respect to Ethiopian culture and re-find the fascination of local culture. Hopefully, I sincerely hope that the discussion will contribute to making a better building and urban future for Ethiopia.

Though this dissertation only focuses on the issues of the specific areas, Mekelle and its surrounds in Tigray, my respects are meant for all the Ethiopian culture. Through my trip in Ethiopia, I was really fascinated with the cultural diversity of Ethiopia. Though I have heard unhappy news, specifically on political matters recently, I would like to believe the saying of my Ethiopian friends: “We are Ethiopians.” I hope peaceful Ethiopian future, which is enabled by respecting different culture each other. Yes, you are Ethiopians. At the end, I would like to note that this dissertation was written by considering the way to pay and express my respect to the local culture.

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Lastly, my deepest appreciation goes to my parents, who gave me a place to go back in my hometown, Tokyo. It is an honor for me to be your son. Actually, a long journey is possible because of the place to go back.

July 14, 2019

@ SFC, my sincere campus that has given many chances and experiences to me.
I hope that the air of this campus covered with generosity and freedom will be continuous in the future, too.

Nobuhiro SHIMIZU

Notes for Readers and Maps

Transliteration and Transcription

In this dissertation, the transliteration / transcription system that is recommended by ITYOPIS: Northeast African Journal of Social Sciences and Humanities (Editorial office is placed in Mekelle University) is chosen to transliterate and transcript local language (Tigrinya) and Ge'ez. This system is suitable to type by use of computer keyboard because of non-use of special characters.

ITYOPIS Standard	e	u	ī (i)	a	ē (é)	i (î)	o	wa	ye
	h	ሀ	ሁ	ሂ	ሃ	ሄ	ህ	ሆ	
	l	ለ	ሉ	ሊ	ላ	ሌ	ል	ሎ	ሏ
(h)	ḥ	ሐ	ሑ	ሒ	ሓ	ሔ	ሕ	ሖ	ሗ
	m	መ	ሙ	ሚ	ማ	ሜ	ሞ	ሟ	ሟ
	s	ሠ	ሡ	ሢ	ሣ	ሤ	ሥ	ሦ	ሧ
	r	ረ	ሩ	ሪ	ራ	ራ	ሮ	ሮ	ሮ
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(ch')	č	ጠ	ጠ	ጠ	ጠ	ጠ	ጠ	ጠ	ጠ
(p')	p	ጸ	ጸ	ጸ	ጸ	ጸ	ጸ	ጸ	ጸ
	ts	ጸ	ጸ	ጸ	ጸ	ጸ	ጸ	ጸ	ጸ
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	p	ፐ	ፐ	ፐ	ፐ	ፐ	ፐ	ፐ	ፐ

from ITYOPIS – Northeast African Journal of Social Sciences and Humanities (NEAJ)

However, concerning following words, another form is chosen because it is more popular in written form:

Haile Selassie I (correct written form: Hayle Sillasé I); Mekelle (correct written form: Megele); Menelik II (correct written form: Mīnīlik II); Tigray (correct written form: Tigré); Yeha (correct written form: Yīhe).

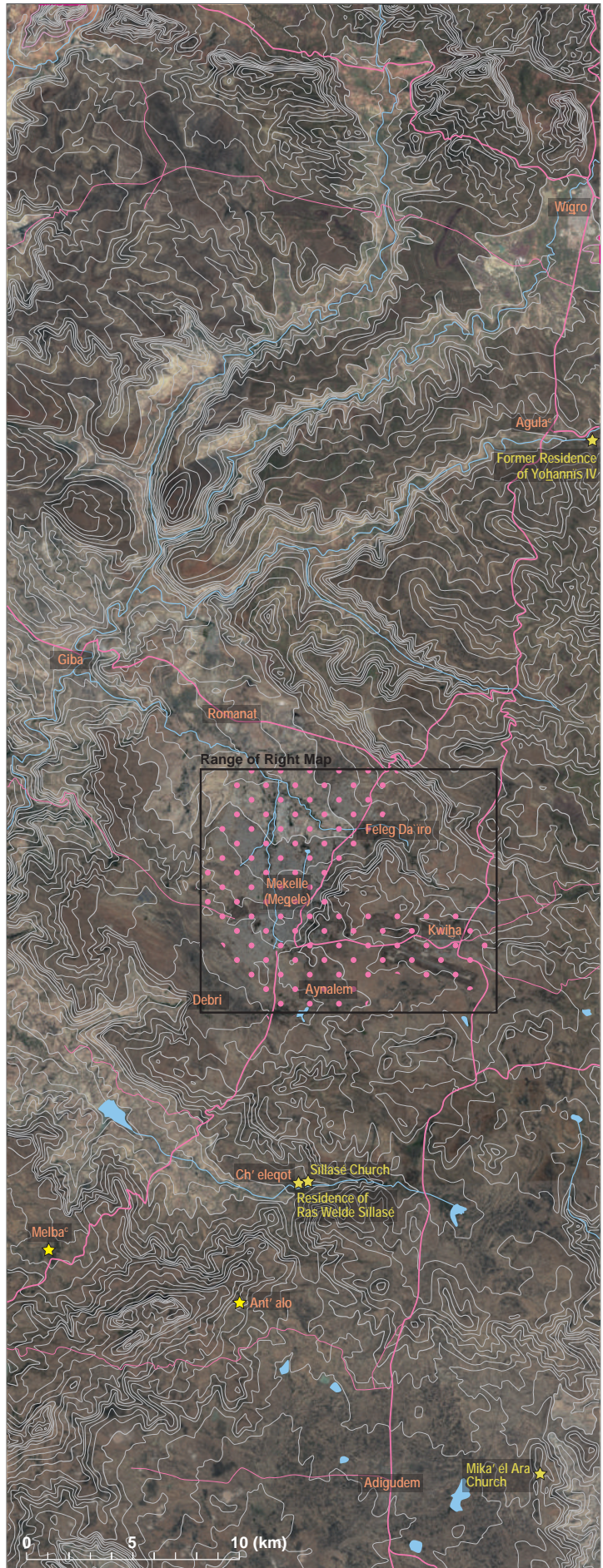
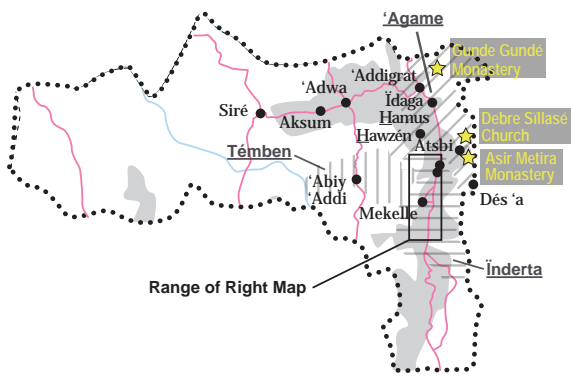
List of Abbreviations

A. O. I.	Africa Orientale Italiana
CAT	Cultural Association of Tigray
ARCCH	Authority for Research and Conservation of Cultural Heritage
CAT	Cultural Association of Tigray
CSA	Central Statistical Agency, Ethiopia
EiABC	Ethiopian Institute of Architecture, Building Construction and City Development
EPRDF	Ethiopian People's Revolutionary Democratic Front
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (former GIZ)
IPHC	Institute of Paleo-environment and Heritage Conservation , Mekelle University
MCSPPR	Mekelle City Structure Plan Revision
NUPI	National Urban Planning Institute, Ethiopia
SDGs	Sustainable Development Goals
UN	United Nations
UN-HABITAT	United Nations Human Settlements Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization

List of Titles

The following explanation of each title refers to Bustorf (2014).

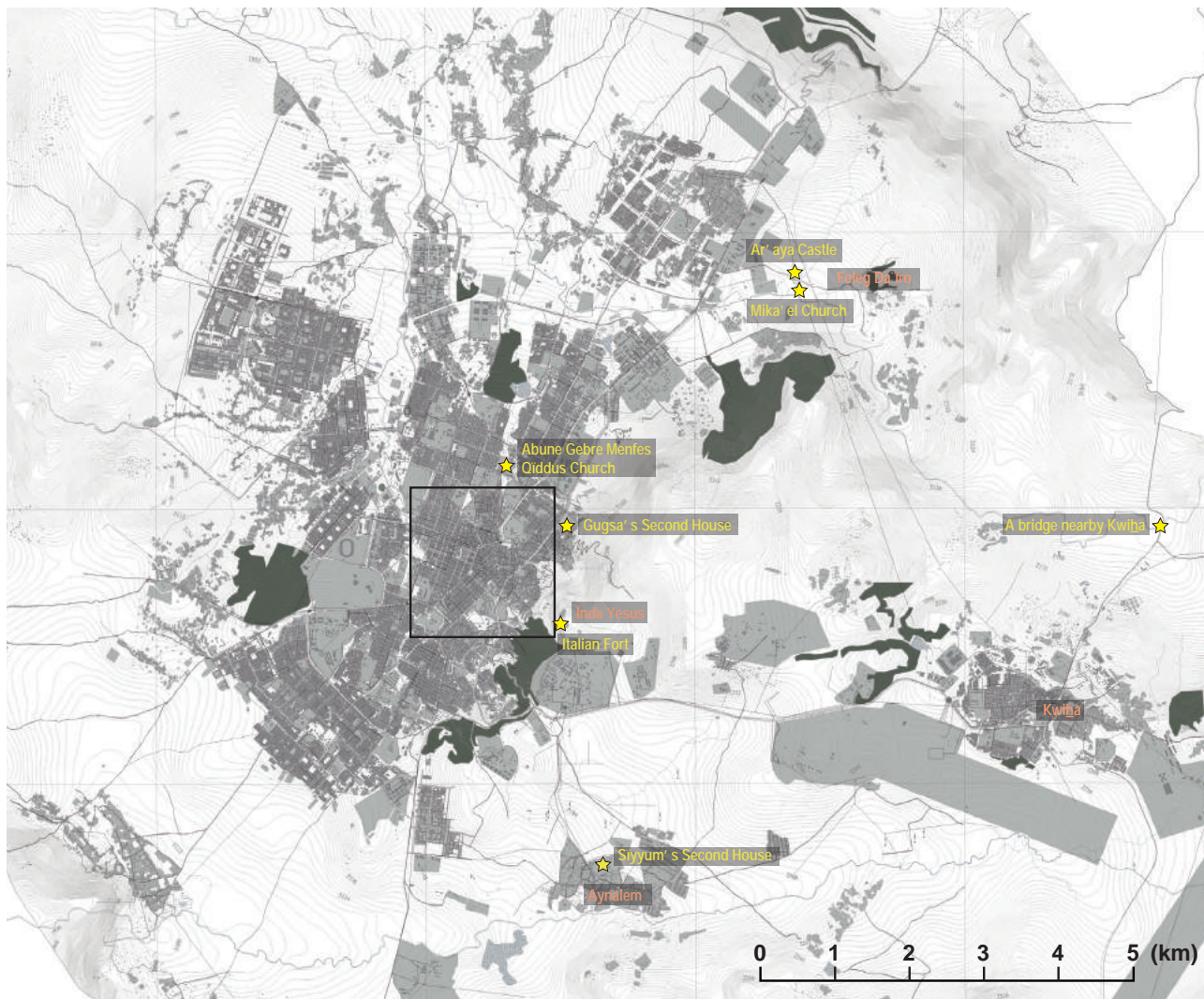
<i>balambaras</i>	‘head of <i>amba</i> ,’ military title applied to commanders of <i>amba</i> -fortifications, local governor.
<i>balgeda</i>	title for the chief of a salt caravan.
<i>basha</i>	military and administrative title from Turkish <i>paşa</i> .
<i>bej̄irond</i>	chief of the craftsmen and guardian of the throne and the crown, royal treasurer.
<i>blattén-géta</i>	‘lord of pages,’ court title.
<i>degḡiyat</i>	high military title of a ruler in Eritrean highland.
<i>dejjazmach</i>	high military title.
<i>fitawrari</i>	military title and rank for a commander of the royal army.
<i>grazmach</i>	‘leader of the left-wing,’ military rank below <i>qeññazmach</i> .
<i>qeññazmach</i>	‘leader of the right-wing,’ rank of a military commander between <i>grazmach</i> and <i>dejjazmach</i> , applied also to administrators.
<i>ras</i>	a title of a ruler ranking directly below <i>nīgus</i> (hereditary title for a sovereign ruler).



LEGEND	
★	Targeted Building
—	Contour Line (40m span)
■	Altitude above 2,000m
●●●	Urban Area of Mekelle
—	Road
—	River

Map 2
Approximate Area of
Mekelle and its Surrounds

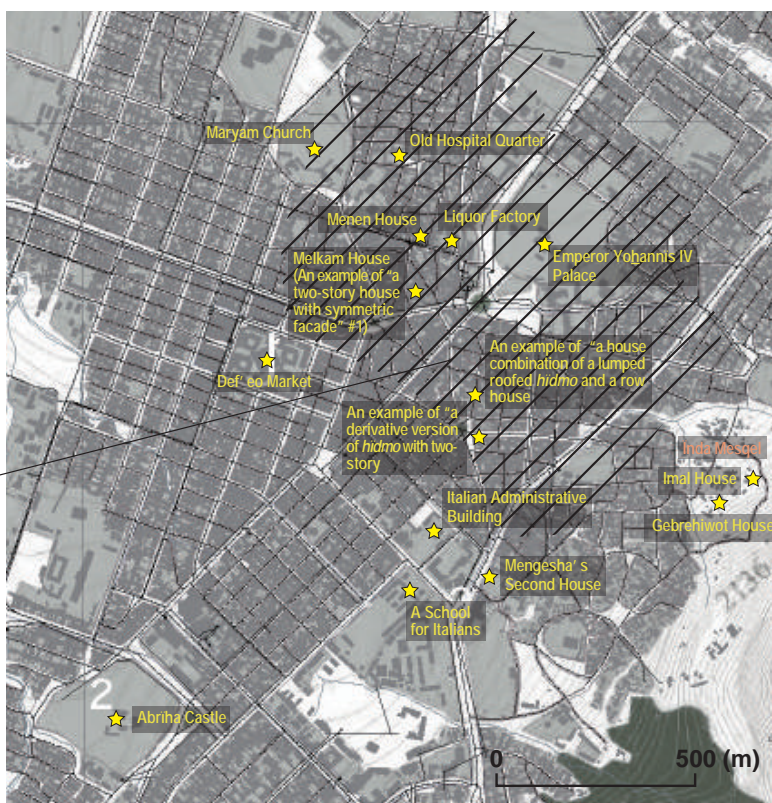
[Source of Map] Google Map



Map 3
Area of Mekelle City
in the Present Day

[Source of Map] Mekelle City Administration (2016)

Approximate Area of
Central Mekelle



Map 4
Central Mekelle
and its Surrounds

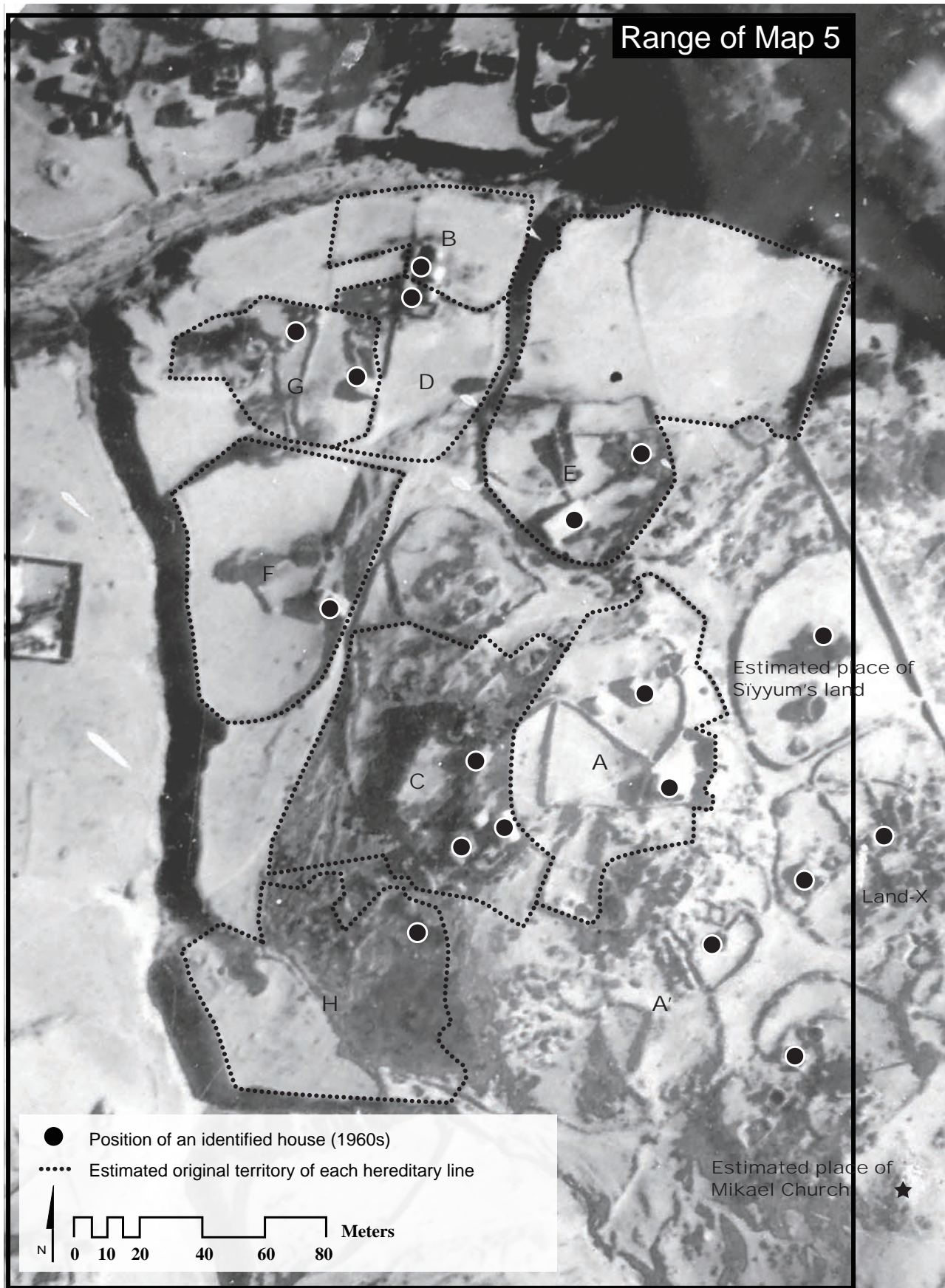
[Source of Map] Mekelle City Administration (2016)

Map 5 Present Map of İnda Mesqel



Map 6 Aerial Photo of Īnda Mesqel Taken in 1960s

[Source of Aerial Photo] Collection of Abraha Castle Hotel



Introduction

1. Background

Ethiopia is one of the least urbanized countries in the world. The urbanization level in 1950 was at only 4.6 %, and 19% even in 2014 (United Nations 2017). The economy has strongly depended on subsistent agriculture, and the lack of agricultural surplus for the provision of food for city dwellers contributed to the stagnation of population increase (Gascon 2010). However, the country is rapidly urbanizing now. The urban population was 18 million in 2014, and projected to reach 52 million (32.1 %) in 2040.

The tendency of rapid urbanization is commonly found in other Sub-Saharan African countries. According to United Nations (2017), the urban population, which was 19 million in 1950 (urbanization level = 10.7 %), became 346 million in 2014 (37.4 %), and projected to reach 854 million in 2040 (50 %). Urbanization of the Sub-Saharan African countries is characterized by the existence of primate cities (cities which exceed 40 % of their country's urban population), and high rate (47 %) of the urban population who live in cities of 300,000 inhabitants or less (UNESCO 2016).

Accommodation of this population shift is an essential issue. On the other hand, the demand for basic infrastructure such as paved road, electricity, water supply, and affordable housing are pressing issues that often goes against the local context. For example, in Addis Abeba, Ethiopia's capital city with a population of over three million, communal living has morphed through the development of the residential block, and sanitization of urban spaces displaces people and pushes their intangible heritage to the margin (*Ibid.*). To establish appropriate urban development, local context should be taken into account as well.

A key characteristic of Ethiopian cities is the ten-fold difference in size between Addis Abeba and the next larger cities with approximately 300 thousands population (Arup *et al.* 2016). Most of these secondary cities are the capital of each region, which were founded with the new Federal restructuring in 1994. Mekelle, the specific targeted city of this dissertation, is the regional capital of Tigray, and a good example of a secondary city in terms of population: the population in 2007 was 215,914, and it was projected to reach over 600,000 in 2023/24 (Central Statistical Agency 2013). Therefore, studying the case of Mekelle gives a good example to seek adequate urbanization processes of the same sized Ethiopian and other Sub-Saharan African cities, albeit the difference in local context should be noted.

Though Ethiopia is considered a less urbanized country, there were several "city-like" places from the past. However, a clear and definitive explanation of the Ethiopian "city" has not yet been defined, mainly due to the lack of available sources such as historical maps, cadastral data and written documents. From the limited sources such as descriptions by successive Western visitors, the characteristics of Ethiopian "city" must be considered. This is the first step to clarify local techniques and knowledge on "city," the locally inherited thoughts to form the "city." The specific targeted city of this dissertation, Mekelle, started to develop from the latter half of 19th century. On the actual site of Mekelle, there used to be five hillside settlements and four flatland settlements before the initial "urban" formation (Okazaki 2009; Tadesse 2001). Throughout the development process until now, a unique masonry city has been formed in Mekelle.

In Tigray Region, masonry culture has been nurtured since ancient times, by application of locally available stone materials. It is remarkable that such buildings with locally available materials have been able to be seen even in the present. The appearance is well harmonized with local environment and landscape. A house built by local builders who used natural materials with the support of existing tools is generally called “traditional house” and the applied technique is generally called “traditional technique.” However, “tradition” is sometimes a misleading word. According to Oxford Living Dictionary, it means “the transmission of customs or beliefs from generation to generation, or the fact of being passed on in this way.” “Traditional technique” is more like the latter, which is familiar with convention or routine. Hobsbawm (1983) pointed that the function of convention and routine networks are more technical and makes the following remark: “they are designed to facilitate and readily definable practical operations, and are readily modified or abandoned to meet changing practical needs.” That is to say, when “traditional technique” is discussed, what is currently recognized as “tradition” does not always correspond to the technique applied in the past. When questing the past from the aspect of “traditional technique,” we need to find out the fore-passed transformation from the present status of the “tradition.” Therefore, in this dissertation, the word “local” is applied as far as possible instead of “traditional.” It should be emphasized that such a building has been generally a fruit of ceaseless efforts of the local builders from the previous generations who have interacted with locally available materials and tools. Concerning “traditional” or local buildings of Tigray, the local building techniques and knowledge, namely the way of using and assembling building materials and tools and of realizing a building as a conception, have not been well studied so far.

Presently, introduction of modern construction techniques everywhere in the world has started to reshape the original locality-oriented landscape. In Mekelle and its surrounds, this is no exception. Buildings constructed using local techniques and knowledge are becoming a less popular choice when building new buildings. In parallel with the change in construction method, the required techniques and knowledge for builders have also changed. As a result, the number of local builders who have adequate local techniques and knowledge has decreased and they are becoming older. Therefore, clarifying local building techniques and knowledge is becoming urgent. Furthermore, the demolition of such historically important buildings, which was implemented also in Mekelle, is hard to ignore, too. It has led the degradation of locality-oriented unique townscape on an urban scale as well as the decrease of individual buildings on a building scale.

Nevertheless, this tendency has conversely raised the significance of heritage. For example, the United Nation’s Sustainable Development Goals (SDGs), “strengthen effort to protect and safeguard the world’s cultural and natural heritage (target 11.3)” was set in 2015. Furthermore, in Mekelle University, Department of Heritage Conservation was established in Institute of Paleo-environment and Heritage Conservation, in 2007. This is the first African established academic institute that specializes in a particular subject (Embassy of Japan in Ethiopia 2009). The establishment was supported by Riichi Miyake, a professor of Keio University at that time, and the author was also employed in this department as a lecturer between 2013 and 2015.

For heritage maintenance, the role of local builders is essential: UNESCO (2016) recommended the framework including mobilization of local population to affirm their belonging to the community

and reinforce local economic networks linked to crafts and conservation. In regard, the UNESCO report indicated the potential of partnership between authorities and local custodians with the example of Timbuktu's mausoleum (Mali) in 2013, a project which was progressed by cooperation with mason's corporation. Furthermore, it is also essential to create a fundamental database on local building techniques and knowledge by collecting the information from local builders.

Availability of local techniques and materials is not limited to just heritage conservation and management practices now. Smith (2011) remarked as follows: "understanding and utilizing local knowledge are critical for successful design" in reference to the case of The Millennium School Bamboo Project, which was carried out in the Philippines. The project realized a building that withstood typhoons by using the locally grown and sustainable material of bamboo. Another example, the Handmade School project carried out in Bangladesh by architect Anna Heringer and Eike Roswag, is remarkable, too. The project realized a building using locally available resources such as earth and bamboo with local low cost labors (Fig. 1): "The project's main strategy is to communicate and develop knowledge and skills within the local population so that they can make the best possible use of their available resources. Historic building techniques are developed and improved and the skills passed on to local tradesmen transforming in the process the image of the building techniques (Heringer *et al.* 2010)." The author also empirically learnt that using local materials contributed to realizing low cost buildings and promoting local people's participation in the construction work, through the participation in the project Manawhari Learning Center carried out in Myanmar in 2013, which was headed by Hiroto Kobayashi. The building consisting of imported veneer boards for structure and local materials such as woven bamboo for finishing was designed to enable easy building maintenance and construction using only hammers and saws (Fig.2; Kobayashi Maki Design Workshop *et al.*: website).

In Ethiopia, there are several such projects applying locally available stone materials, too. Above all, the Ethiopian cobblestone road construction project commenced in 2007 with the support of Germany is remarkable. It saw the construction of approximately 350 km of stone pavement roads and pedestrian footpaths in more than 140 cities within three years (GIZ 2012). This project contributed to small-scale and economical urban infrastructure improvement, ease of maintenance, creating employment for the poor, and community participation. Moreover, the resulting townscape in Mekelle is in harmony with local masonry buildings along the street (Fig.3). Another remarkable project is Gheralta Lodge, of which buildings are inspired by the typical local house discussed in this dissertation (Fig.4). This accommodation opened by Italians, Enrica and Silvio Rizzotti, has been popular with foreign tourists presently. In addition, locally available stone material is actively applied in several recent buildings such as the Archaeological Museum in Wukro, which was designed by Nedelykov Moreira Architekten and completed in 2015, and a building of Institute of Paleo-environment and Heritage Conservation, Mekelle University, which was designed by Keita Aoshima and completed in 2014 (Fig.5, 6; Nedelykov Moreira Architekten: website). If the future strategies are based on the local reality, the application of local materials, techniques and knowledge should be taken into account.



Fig.1 Handmade School in Bangladesh, *photo by Herbst, K. (Heringer et al. 2010).*



Fig.2 Manawhari Learning Center in Myanmar, *photo by author.*



Fig.3 Cobblestone in Mekelle, *photo by author.*



Fig.4 Gheralta Lodge, *photo by author.*



Fig.5 Archaeological Museum in Wigo, *photo by author.*



Fig.6 A building of IPHC in Mekelle University Arid Campus, *photo by Aoshima, K.*

2. Targeted Area

Ethiopia, which comprises various ethnic groups, languages, and cultural groups, is an inland country of Eastern Africa. In the northern highlands of Ethiopia, Orthodox Christianity has played an important role and the base of the Ethiopian Empire was placed. Among several regions existing in Northern Ethiopia, Tigray Region, the northernmost region of Ethiopia, is a main target of this dissertation (Map 1). In addition, to consider the urban context of Tigray, the adjacent part of Eritrea, namely Eritrean highland, is also taken into account, because they are generally recognized as the same cultural area before the Italian occupation. Both of the areas were located on the route between the Red Sea area and the inland center of Ethiopian highland, and the same language is spoken. Tigray Region is divided into seven zones: South, Southeast, East, Central, West, Northwest, and Mekelle Special Zone. The “traditional” or local house discussed in this dissertation, which share the common planning and other characteristics, is found in Southeast Zone, specifically in Enderta District, and Mekelle Special Zone, which is surrounded by Enderta. These areas where the specific local house discussed in this dissertation is often found is called *İnderta*, or *İnderta Province* (Map 1, 2). Though the province system does not exist in the present administrative structure, the word is applied to indicate the approximate area of the previous territory of the local rulers until the imperial period, in this dissertation. *İnderta* is placed in the eastern edge of Ethiopian highlands, next to lowlands of Afar Region. Mekelle, which is located in *İnderta*, is a present regional capital of Tigray Region (Map 3). This city is the main targeted city of this dissertation. Though the detailed urban history and recent urbanization process will be discussed from the next chapter, it should be mentioned here that the development started in the latter half of the 19th century, namely before the Italian occupation period. In this dissertation, the area developed until the beginnings of Italian occupation period is called central Mekelle (Map 4).

The general history of Northern Ethiopia, especially of Tigray, is reviewed here. To trace the masonry history of Tigray, the review should begin from when small groups of people from South Arabia, who were good at farming and masonry techniques, started to settle in present Tigray, perhaps in the second quarter of the last millennium BC. The people on both sides of the Red Sea worshipped the sun and moon. This period, namely the period before the Aksumite civilization began, is called the Pre-Aksumite period, in this dissertation. Yeha is the most famous site of this era. Next, Aksumite Kingdom, of which capital was Aksum, emerged between the 2nd or 1st century BC (Sernicola 2017). Though the Kingdom originally occupied only a small area around Aksum, it gradually expanded into the area of Northern Ethiopia including the Red Sea area. Trade was beneficial to the Kingdom which reached its peak in the 4th century. In that century, Christianity was embraced as an official house of worship by King Ezana in 333. Christianity has played an important role in Ethiopian history since then. The Kingdom progressively broke down from the 7th century, and became no more the capital site of the Kingdom. Though the reason of decline is not clear, over-population, soil erosion and suffering trading activities from the fight with Arabs can be thought as possible reasons (Last *et al.* 2008). The devastation of the Aksumite Dynasty became crucial due to the conquest by a legendary queen named Gudit, around the 10th century.

In the midst of expanding Christian Ethiopia toward the south, Tigray came to lose its position as

a political center, despite its legacy as the Kingdom's origin. Around the 10th century, a new line of rulers known as Zagwe Dynasty, of which base was placed around present Lalibela, gained power. Next, in the 13th century, Zagwe Dynasty was overthrown and the Solomonic Dynasty started. The kings of the Solomonic Dynasty claimed that they were descendants of Menelik I, the son of biblical King Solomon and the legendary Queen of Sheba. The core of the dynasty was in Shewa until the 16th century, and around Lake Tana since then. Between 1529 and 1541, Northern Ethiopia including Tigray was sorely devastated by the campaign of Ahmad Grañ, who attempted to invade Ethiopian highlands from the east to spread Islam. He demolished many church buildings of Northern Ethiopia at that time. However, the invasion ended due to the defeat by the union of Ethiopia and Portuguese. Since then, the relationship between them was temporarily enhanced. Though there was no fixed capital at that time, the first fixed capital Gonder was established in the 17th century. This topic is discussed in chapter I.

Though Gonder served as the economic, cultural and political center of Ethiopia, it declined in the middle of 18th century and was followed by the separated tendency of each province. The provincial rulers came to fight each other to take control of the country as the "King of Kings," that is, the "Era of Princes" started. The ruler who defeated the majority of other provincial rulers and warlords in the middle of 19th century at the end was Emperor Tewodros II. He sought to re-establish the country and reform its administration and church system. The former capital Gonder was abandoned and Debre Tabor became a new capital under him. However, his life ended in 1868, half way through his conquest, due to the defeat by British expeditionary forces in Maqdala.

The next "King of Kings" is Yohannis IV whose origin was Tigray. After he had overwhelmed other provincial rulers of Tigray, he became a rival of Tewodros II. He owed much to the British who had given him a large gift of arms as a reward for his neutrality during the campaign at Magdala (*Ibid.*). After he was crowned as the Ethiopian emperor in 1872, he put his energy into defending Ethiopia against the invasion of foreign enemies, and successfully achieved several victories. During his reign, the political center of Ethiopia was transferred to Tigray, and the development of Mekelle was initiated, too.

After the death of Yohannis IV in 1889, Menelik II whose origin was Shewa seized power and became the Emperor of Ethiopia. The political center of Ethiopia was again relocated to the south: he controlled over many regions of Ethiopia at that time from Addis Abeba, the present capital city of Ethiopia. Furthermore, he extended the Ethiopian territory further south, by a series of occupation. In the north, namely Tigray, he defeated Italian forces in the first Italo-Ethiopian war of 1895/96 jointly with Mengesha Yohannis, a son of Yohannis IV, and attained success to make Italians force back. He was successful in keeping the independent status of Ethiopia.

However, the independent status was finally overthrown by Italy headed by Benito Mussolini through the second Italo-Ethiopian war of 1935/36, in the period of Haile Selassie I, the last emperor of Ethiopia. Since then, Ethiopia was occupied by Italians until 1941. After the Italian fascist troops were defeated by Ethiopian, British, and other Allied forces, the Emperor Haile Selassie I returned Ethiopia in 1941. His period lasted until his deposition in 1974.

In 1974, a revolution took place in Ethiopia, and Derg headed by Mengestu Haile Mariam ruled Ethiopia until 1991. It embraced communism, and lands, all "extra" housings and so on are nationalized. The changes of land tenure system affected the urban transformation at that time, as discussed

in chapter IV. Several major rebel groups against Derg regime formed the union named Ethiopian People's Revolutionary Democratic Front (EPRDF) in 1989, and assumed power by ousting Derg regime. As a result, The Federal Democratic Republic of Ethiopia, the present regime of Ethiopia, was established in 1991. This new government, consisting of semi-autonomous ethnically based regions, promoted privatization and followed the path of mixed economy (*Ibid.*). Though Eritrea was also originally involved as one of the regions, it became independent in 1993. Recently, rapid economic development has been progressing.

In the period of Solomonic Dynasty, domestic provincial rulers of Tigray competed with one another, and any attempt for unification ended in tentative control. For example, Mika'el Sihul took power and governed Tigray largely from 'Adwa in the middle of 18th century. However, after his death, Welde Sillase (ca. 1733 - 1815) dominated Northern Ethiopia including Tigray in the 1790s and the early years of the 19th century. Remarkably, he was from Inderta and his political centers were also placed in Inderta. He acquired firearms through cooperative dealing with the Turks on the coast (Henze 2000). He was the first regional ruler to have close contact with Europeans, and had hopes of gaining British support (*Ibid.*). The descriptions by such visitors are important to understand the site situation at that time, as discussed in chapter I. Nevertheless, after his death, the ruler of Tigray was replaced with Sebagadis, and Inderta was no longer the capital site of Tigray. The political history from the end of 19th century, namely after Yohannis IV's period, was complicated. Therefore, several important personages including Yohannis IV are listed as follows:

- Yohannis IV (between 1831 and 1837 – 1889; r. 1872 - 1889):

Though it is known that he, the original name Kasa, was a son of a ruling class of Tembén province, not much is known of the first half of his life. It is known that he visited the imperial court of Tewodros II in 1864-65, and he rebelled against the rule of Tewodros II after his return (Bairu 2014). He had attained full control of Tigray and Eritrean highlands by the Battle of Magdala in 1886, and he received a large gift of arms from Britain as a reward for his neutrality during that campaign. After the death of Tewodros II, he refused to acknowledge Tewodros II's brother-in-law as the new emperor (*Ibid.*). He defeated the latter, and was crowned as the Ethiopian emperor in Aksum in 1872. After he became the emperor, he fought with foreign enemies to keep independence. He defeated Egyptians in the battle of 1875 and 76, and furthermore, Alula, Yohannis IV's commander of the north, attained success to defeat Italians that had seized the port of Massawa and begun to advance inland, in 1887. However, at last, he was killed by one of the Dervish snipers from Sudan, in 1889 (Last *et al.* 2008). He was an eager supporter of the Orthodox Church, and contributed to establishing or revitalizing churches through his life. Though he did not have a fixed capital at the beginning, he started to establish Mekelle as his capital from approximately 1880. Because he was obliged to travel elsewhere, his beloved son Ar'aya Sillase Yohannis, who died in 1888, usually resided there (Pankhurst 1985). Nevertheless, Yohannis IV frequently returned to Mekelle, especially after the completion of the palace construction in 1884 (*Ibid.*).

- Mengesha Yohannis (1868 - 1906; r. 1889 - 1906):

He was a son of Yohannis IV. To be exact, he was recognized by Yohannis IV as his son just before

his death, though he was considered the Emperor's nephew. He inherited a considerable number of armaments and soldiers from Yohannis IV, and had a political ambition to become an emperor (Tsegay 2007). However, in 1894, he dropped his claims and became a governor of Tigray under Menelik II. He took an important role in the first Italo-Ethiopian war of 1895/96 to defend the northern borders and organize and render the local armies of Tigray (*Ibid.*). Mekelle was his chief town (Pankhurst 1985). In 1898, he rebelled the emperor, but failed. He was confined and died as a prisoner in 1906 (Tsegay 2007).

- Abriha Ar'aya (1873 – 1917; r. 1902 – 1909?):

He was a son of Ar'aya Sillasé Dimsu, a person who was a maternal uncle of Yohannis IV and a governor of İnderta. He was sent to Italy in 1888, and returned to Ethiopia just after the first Italo-Ethiopian war. In 1902, the central government appointed him governor of much of eastern and southern Tigray (Tsegay 2003-2). Perhaps afterward, he established his castle in Mekelle. Though he was loyal to the central government until 1906, he was dismayed by the appointment of Siyyum Mengesha as a governor of Tembén and its surrounding areas (*Ibid.*). In 1909, he protested against another appointed overlord of Tigray and was defeated. After his release in 1911, he won the favor of the next ruler, however, he did not come back to Mekelle anymore.

- Siyyum Mengesha (1887 – 1960; r. 1914 – 1919? and 1941 - 1960):

He was a son of Mengesha Yohannis. He was in rebellion by 1902, but defeated by Abriha Ar'aya. Later, he joined protests of Abriha this time, but it again unsuccessfully ended as mentioned above (Rubinkowska 2010). In 1914, he was appointed as a governor of Tigray, however, his area was lessened and became only western Tigray from 1919. Perhaps, this designation was due to the policy of the central government that aimed to weaken potential northern opposition. Another line of Yohannis IV's family such as Gugsu Ar'aya was a constant rival (*Ibid.*). On several occasions, he supported the Shewa's central government, and fought on the northern front (and then joined the army in the south) in the second Italo-Ethiopian war of 1935/36. During the Italian occupation period, he stayed in fairly good terms with Italians, however was never regarded as being fully trustworthy (*Ibid.*). He was appointed as a governor of Tigray by Italians in 1941 and was allowed to move from Addis Abeba to 'Adwa. Afterward, he joined the British this time and fought to liberate Ethiopia from Italian occupation (*Ibid.*). After the liberation, he was perceived as a greater threat to the central government. While he was nominally appointed as governor of Tigray, he was only allowed to stay in the capital (*Ibid.*).

- Gugsu Ar'aya (1882 – 1933; r. 1918? - 1933):

He was a grandson of Yohannis IV, and a constant rival of Siyyum Mengesha as mentioned above. In 1918, he was appointed as the regional ruler of Tigray by Haile Selassie I, and showed loyalty to him (Erlich 2005). In 1928, he was appointed governor of eastern Tigray, and placed his capital in Mekelle. However, he was dead of disease in 1933 (*Ibid.*).

- Mengesha Siyyum (1927 -; r. 1960 - 1974):

He is a son and a successor of Siyyum Mengesha. He became a governor of Tigray after the death of Siyyum. Until a revolution taking place in 1974, he was a governor of Tigray.

3. Objective

This dissertation tends to be a comprehensive study on the history of building and city in Mekelle and its surrounds. Especially, the topics are discussed from the perspective of local techniques and knowledge. On the basis of discussion on local techniques and knowledge of city and building, their transformation since the latter half of the 19th century is clarified in this dissertation. The discussion is organized to illuminate not only the physical building appearance and urban formation, but also the relationship with less-visible issues on environmental and social background. Through the discussion, it is aimed to show the value of building and urban heritage remaining in Mekelle and its surrounds, and to demonstrate the attitude to understand the local techniques and knowledge of the different disciplines in a more integrated way. In this regard, objectives of this study are listed as the following points:

(1) Clarifying the techniques and knowledge applied in initial “urban” formation of Mekelle

It is aimed to extract the initial “urban” formation techniques of Mekelle, from the spatial aspect. This is approached by the comparison with spatial characteristics of other Tigray’s major sites, namely “city-like” sites, and with the local settlement techniques and knowledge of Tigray. To clarify the characteristics of Tigray’s other major sites, not only the review of general history, but also more spatial issues such as the natural setting of the site and the spatial layout in regard to the topography should be analyzed. To clarify the local settlement techniques and knowledge, the relationship with agricultural ones is important because the majority of Tigray’s people were, and still are, farmers. Especially, the relationship between land use and local agriculture is remarkable. Based on these analyses, whether the characteristics of other major sites and local settlement techniques and knowledge correspond with the case of Mekelle or not is analyzed. Through these comparative analyses, the “urban” characteristics of Tigray and Mekelle’s uniqueness can be extracted.

(2) Clarifying the techniques and knowledge applied in local buildings of Mekelle and its surrounds

It is aimed to clarify the local building techniques and knowledge of Mekelle and its surrounds, by reviewing Tigray’s masonry building history and analyzing building preparation and construction process of local house building. The knowledge on building materials is essential to understand local building, because it is made from locally available materials. How to apply and assemble the materials is important to understand building techniques and knowledge. Therefore, the review of Tigray’s building history is carried out from the perspective of construction methods. On that basis, the building preparation and construction process is analyzed by focusing on house building. Building preparation process consists of material collection and planning, and building construction process consists of foundation work, masonry wall construction, ceiling and roof construction and indoor wall plaster. Through the analysis, easiness or difficulty of material collection, planning method, tools applied and detailed local knowledge on materials become clear. Furthermore, the related issues such as rank of houses, meanings of house construction in the community, and occupational ability or builder’s role are also discussed.

(3) Clarifying the transformation process of city and buildings of Mekelle and its surrounds

The local techniques and knowledge applied in the “city” and buildings were transformed gradually since the latter half of the 19th century in Mekelle and its surrounds. Whether they were replaced with new ones, or were applied even in the 20th century, is discussed in a chronological manner. Based on the results of concrete changes on city and building, the social and environmental background of the transformation is considered. On the building scale, when new building materials and tools were introduced and how construction methods changed are discussed in particular. On the urban scale, how the city of Mekelle was spatially expanded and densified are key. To understand the densification process, a series of changes on land tenure system should be reviewed.

This study contributes to constructing a platform for future heritage conservation on building and city, from the perspective of local techniques and knowledge. Furthermore, it is aimed to make a comment on the alternative way of the urban development process, which has often diminished local context. The way to apply the unique and attractive features of the site for the site-oriented and sustainable development should be sought now. This dissertation aims to provide the hints to find the unique and attractive features of Mekelle and its surrounds, by clarifying the local context of building and city.

4. Methodology and Research Activities in the Field

To clarify the local techniques and knowledge, not only physical buildings and spaces, but also people who made them should be analyzed. On a building scale, measurement and observation of buildings enables the clarification of building materials applied, construction method, and building plan, while interview with local builders, namely people who make buildings, enables clarification of the use of materials and tools, detailed knowledge on materials, planning methods, and builder's occupational ability. On an urban scale, the analysis of physically appeared urban formation consisting of parcels of land, streets, and buildings, enables clarification on the relationship between such elements of urban formation and layout of the parcel. Furthermore, the analysis of a series of urban master plan enables clarification on the level of spatial extension and the aim of the city administration. On the other hand, interview with local land-right-holders enables clarification on the family history of each hereditary line, land inheritance, and social and familial situation of interviewees. By comparing such information with past aerial photos, clarification of spatial transformation becomes clear. In this regard, the following activities were carried out through a series of field works between 2009 and 2018 intermittently:

(1) Measurement and observation of historically important buildings

In Tigray, or even in Mekelle and its surrounds, many historically important buildings have not been researched in detail. In particular, masonry buildings later than the 15th century have not been well studied before, because the attention on the study of building history has been paid more to earlier times and rock-hewn churches. Therefore, the study on masonry building history must be started with the documentation of the buildings.

In 26 sites, 23 of which were built in the 19th or 20th century, the author measured buildings through a series of field works between 2010 and 2018 intermittently. A series of drawing and photos are important and fundamental documents to analyze, or more practically conserve and reuse, each building. In this dissertation, four are dealt with to analyze the church buildings of Tigray, eight are dealt with to show the variation of "traditional" or local house and the local building techniques, and the other fourteen are dealt with to analyze the building transformation happening in the 19th and 20th century. Especially, the technical issues such as the way of materials applied and construction method are the points of observation in this dissertation.

Concerning this research activity, it should be noted that the work of one documented site, Old Church of Asir Metira Monastery, was carried out as the preliminary survey for a conservation project. The author participated in the project in collaboration with the Cultural Association of Tigray, Mekelle University, and Japanese team headed by Riichi Miyake. The outcome of this activity is summarized in this dissertation.

(2) Observation of a course of construction process

A course of construction process such as digging stones from quarry, shaping each stone, and piling up stones is observed. At Mekelle, the author observed the workflow of the above-mentioned cobblestone project in 2009. Due to the project disposition, the observed flows were limited only to the process of digging and shaping stone pieces. Therefore, the author collaterally added the project

case carried out in Gunde Gundé Monastery as the analysis subject. Despite the site being out of Īnderta, namely Mekelle and its surrounds, the basic process and tools used are similar, and consistency was maintained with the results of interview research mentioned below.

In the project of Gunde Gundé Monastery carried out in 2014, a restoration of outdoor masonry walls was undertaken. This restoration work was carried out as a preparatory project toward a restoration of the main church building. The author participated in the site management work. A series of activities of Gunde Gundé Monastery Restoration Project has progressed by the collaboration of Cultural Association of Tigray, Mekelle University, and Tigray Agency of Culture and Tourism. In addition, Japanese team headed by Riichi Miyake has cooperated in this restoration project, too. The work of Japanese team including measurement and building observation work is helpful to consider the masonry building history of Tigray, too.

(3) Interview with local builders to clarify the local building techniques and knowledge

Though the observation of workflow gives a clear image of local building techniques, it is not certain if the same techniques have been utilized in the past, and furthermore, it cannot unveil the fundamental terminology on the local buildings, building preparation process, and detailed local knowledge such as material features and tool names. Therefore, interview research was carried out through a series of field works between 2012 and 2016 intermittently. The author interviewed thirteen local builders in Mekelle and its surrounds with experience on “traditional” or local building construction. Among them, an in-depth interview was conducted with ten builders. The interview questions covered the whole building preparation and construction processes and fundamental terminology on local buildings: typical plan of “traditional” or local house, name and function of buildings and spaces on each parcel, building elements, and each spatial component of local house, hierarchy of local house types, types of anthropometric unit, material collection process, planning process without drawing, builder’s occupational ability, name and use of tools, detailed knowledge on used materials, and other technical devisal at the time of construction. Through the interview, it becomes clear that the tools were often introduced from abroad. Therefore, alternative tools or processes from earlier time are also questioned. The extracted information is sometimes verified through the comparison with building appearance. Such visual distinctions can give one criterion to judge building age in Mekelle and its surrounds. The builder’s answer often varied. To respect each answer as far as possible, the analysis is carried out through comparing the answers and seeking reasonable interpretation. The decision by a majority is not always correct.

(4) Field survey of a currently urbanized settlement

The author carried out the research activity in Īnda Mesqel, one of the original hillside settlements of Mekelle, to clarify the settlement formation process and actuality of current urbanization process. As discussed in later chapters, specifically in chapter I and IV, Īnda Mesqel is a good example to examine the issues because it has kept original spatial formation of the past most explicitly among all the original settlements of Mekelle, and the number of inhabitants has been increasing now. The settlement, which is located on the hillside, has not yet been equipped with roadway and pathways have not been paved. Although electricity is available in all residences, a private water tap is available only in four households in the settlement. People residing in the same parcel usually share a water

tap, and some people are forced to go to their neighbors and collect it. Īnda Mesqel has already been absorbed into the urban area due to its closeness with the city center of Mekelle.

A main field survey at Īnda Mesqel was undertaken in 2014, separately from the preliminary survey of 2010 and 2011, and supplemental survey in 2018. According to the results of field survey in 2014, there is the existence of 53 parcels, 67 land-right-holders, and 193 residing households (Map 5). Of which 25 land-right-holders do not engage in salaried jobs (including housekeepers and retirees), and other occupants are found: five land-right-holders as teachers, four as drivers, four as public officers, and others. However, the number of parcels has grown to 53 as the result of continual land division by inheritance and selling, though recent regulation of minimum plot size of 140 m² is expected to deter further division of parcels (Fig.7).

The preliminary survey extracted the original eight hereditary lines that had occupied the land of Īnda Mesqel (Fig.7). The author interviewed with descendants of each hereditary line as the first research activity. The interview questions are composed of each hereditary line's family history, accession of land-right, parcel boundary, and building attribution such as building age and use. The interview research clarified that there were eight hereditary lines, whose ancestors often served successive Tigray's governors as *blattén-géta*, *grazmach* and *deggīyat*, originally (Fig.7). By analyzing the interview results in combination with existing maps of the settlement, which was made by the author as second research activity, the settlement formation process and current urbanization process are attempted to be clarified (Map 5). Furthermore, an aerial photo taken in 1960s is helpful to analyze the past spatial situation of the settlement in the reconstructive way (Map 6).

Through these several different field activities, the author attempts to clarify the local techniques and knowledge on city and building, by taking the interaction between people and environment into consideration. In addition, the discussion incorporates preceding study material, which includes related academic disciplines. The major preceding study used in this dissertation is introduced in the next section. The methodology of this dissertation demonstrates the way of clarifying building and urban formation history in the area where available sources, especially texts, are not abundant.

5. Chapter Constitution and Preceding Study

At the end of introduction part, the contents and important preceding studies of each chapter are explained (Fig.8).

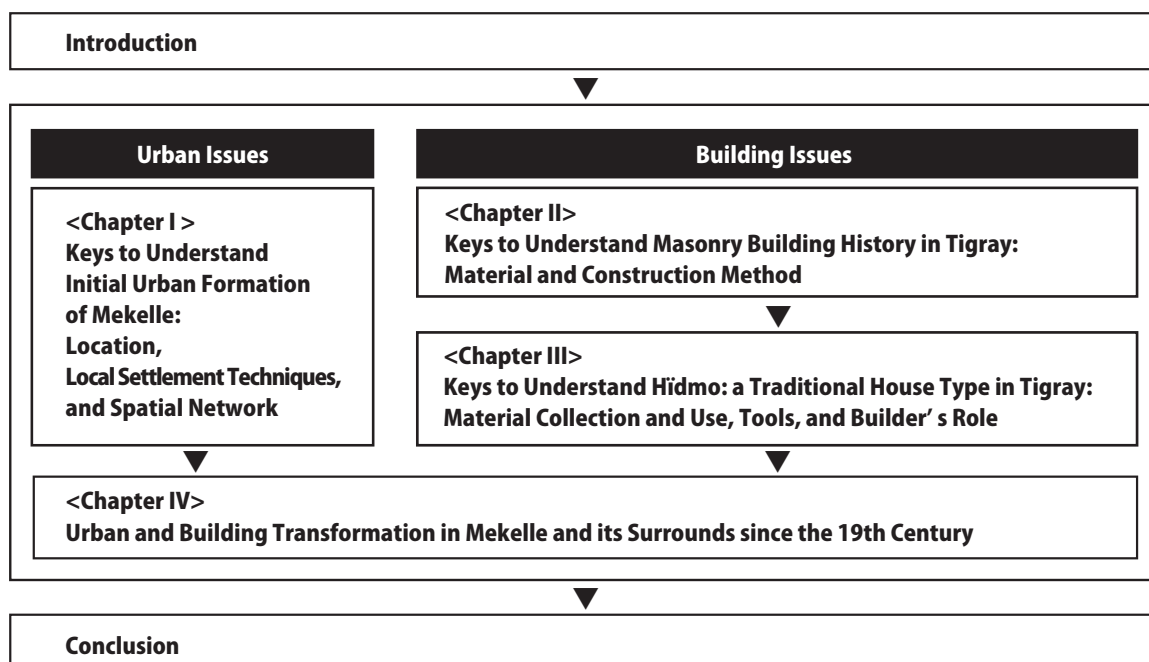


Fig.8 Chapter constitution of this dissertation, *made by author*.

In chapter I, the issues on urban scale are discussed. The aim of this chapter is to understand the initial urban formation of Mekelle, this dissertation's specific targeted city where development started in the latter half of the 19th century. However, as Ethiopia did not have a fixed capital until the establishment of Gonder in the 17th century, a clear and definitive explanation of "city" is difficult. Therefore, the spatial characteristics of a "city" are vaguely known. Before the case of Mekelle is discussed, characteristics of a "city" in Tigray should be hypothesized.

To find the hypothesized characteristics, two analyses are carried out at the beginning in chapter I. The first analysis is finding locational and spatial characteristics of Tigray's "city." At first, the urban history of northern Ethiopia from moving capital, namely the moving camp of Ethiopian emperors, to fixed capital Gonder is reviewed. On the basis of that, major sites, namely "city-like" sites, of Tigray and Eritrean highland are introduced. By describing these issues from the aspects of natural setting of the sites and spatial layout that is strongly related with topography, locational and spatial characteristics are hypothesized. To understand the concept of the nomadic capital tradition and to decide which sites should be chosen for this analysis, Pankhurst (1982, 1985) is very helpful. The books entitled "History of Ethiopian Towns" provide detailed explanations on major sites by aggregating numerous descriptions of successive foreign visitors. However, in spite of the title of books, he did not define what exactly an Ethiopian "town" or "city." We should find the common characteristics of the Northern Ethiopian, or more specifically Tigray's and Eritrean highland's, "cities" from his descriptions on each major site. Furthermore, sketches drawn by successive foreign visitors such

as Salt (1809) and Acton (1868) are also helpful to understand the site's appearance at the time of their visit. This first analysis is a first step toward better understanding of the "city" in Ethiopia.

Secondly, the characteristics of "city" in Tigray are analyzed by comparing rural settlements and major sites. Because the majority of Tigray's people were, and still are, farmers, the characteristics of rural settlements are explained in association with agricultural techniques and knowledge. To understand the history and techniques of agriculture in northern Ethiopia, McCann (1995) is helpful. Furthermore, Corbeel *et al.* (2000) provides essential insights to understand the relationship between soil knowledge and spatial layouts of the rural settlement. Based on them, more social issues in regard to land tenure systems, social hierarchy and local household concept are reviewed. Concerning land tenure systems, Crummey (2000, 2005, 2007) and Ambaye (2015) provide basic knowledge. In regard to social hierarchy in rural settlements, McCann (1995) again gives important perspectives. Furthermore, the analysis carried out by Bauer (1977) through his field experience in the specific settlement of İnderta gives significant ideas to understand the concept of local household and land inheritance. By identifying distinctions between the rural settlements and major sites, similarities and differences are analyzed. When the similar characteristics between them are found, the "urban" characteristics can be recognized as the application of the rural settlements. On the other hand, the differences show the unique points of a "city." In this way, "urban" characteristics of Tigray can be hypothesized. Such an analysis comparing "urban" and rural spatial characteristics was not carried out in the preceding study.

Based on these two analyses, the case of Mekelle, especially at the time of initial "urbanization," is analyzed. In Okazaki (2009, 2011, 2014-1 and 2014-2), the "urban" formation of present central Mekelle is well discussed from a spatial perspective. Furthermore, successive foreign visitors' descriptions aggregated by Pankhurst (1985) again help to find the clues to understand Mekelle's initial "urban" formation. In addition, the author clarifies the concrete spatial formation process of İnda Mesqel, one of the original settlements of Mekelle, through field work. The results that connect each hereditary line's family history with spatial mapping is helpful to understand how the existing lands were occupied gradually by the ancestors of each hereditary line. Based on these materials, whether the hypothesized "urban" characteristics of Tigray correspond with the case of Mekelle or not is discussed. Through the analysis, how to locate Mekelle in the "urban" history of Tigray, which was not discussed adequately in the preceding study, is discussed.

In chapter II and III, the issues of building scale are discussed.

Chapter II discusses Tigray's masonry building history, which dates back over 2,000 years. First of all, the main building materials used in Tigray, namely stone and wood, are introduced. Concretely, the geological setting of Tigray and availability of wooden materials, which is strongly related to the deforestation in Tigray, are reviewed. Concerning stone materials, the preceding studies on the geological history of Ethiopia by Williams (2016), and each site's explanation from the geological perspective by Asfawossen *et al.* (2008) are helpful. To review the availability of woods, the analysis by aggregating successive foreign visitors' descriptions carried out by Pankhurst (1995), pollen and charcoal analysis carried out by Darbyshire *et al.* (2003) and descriptions on forest destruction and forest management of the 20th century by Girma (2017) are significant. In Tigray, traditional or local houses are built by use of these locally available materials. Therefore, in the next, a general

introduction of Ethiopian traditional or local house types is carried out, in reference to Naigzy (1971). The basic construction method of *hīdmo*, the specific targeted house type of this dissertation, is explained in detail here.

Based on these premises, masonry building history in Tigray is reviewed. However, even the general history of Tigray's masonry buildings has not been well studied before. Until now, the study on the building history of Tigray has progressed mainly in the archaeological field, which was initiated by Littmann *et al.* (1913) at the beginning of the 20th century. In later archaeological surveys, the attention has been paid more to earlier times such as Pre-Aksumite and Aksumite period. Concerning the buildings of Pre-Aksumite and Aksumite period, Phillipson (1998) provides essential information. Questioning masonry building history of Post-Aksumite period is fundamentally difficult work due to the small number of surviving examples before the 19th century. Concerning Post-Aksumite buildings, the study has been mainly carried out in the field of rock-hewn churches, which have more surviving examples. Therefore, masonry buildings of the Post-Aksumite period tended to be considered in association with rock-hewn churches in the preceding study. The most essential study on this issue is Buxton (1947, 1971). Regardless of these difficulties to illuminate the masonry building history, Phillipson (2009) recently attempted to frame the history of Ethiopian church buildings until the 14th century, by analyzing both built churches and rock-hewn churches. In addition, Lepage *et al.* (2005) provides remarkable information about several church buildings. In this chapter, church building history mainly until 14th century was initially reviewed. In addition, the author makes a hypothesis on the issue of Gunde Gundé Monastery, of which restoration project the author has participated in, from the perspective of church building history.

Afterwards, a newly appeared type of built churches since the 15th century, named “rectangular built church with ambulatory” in this dissertation, is discussed. Though this type of built church is the most dominant in the surviving examples, current analysis covers only the documentation of several buildings by Littmann *et al.* (1913), Juel-Jensen *et al.* (1974) and Plant (1985). The author adds four examples, where the author carried out building measurement, to these. One of them is the Old Church of Asir Metira Monastery, of which measurement was carried out as the preliminary survey for a restoration project. Throughout the project, the restoration planning, meaning restoring the building back to its original condition in the drawing, was carried out by Japanese team headed by Riichi Miyake, and the author participated it. In this dissertation, by analyzing all the documented examples of newly appeared “rectangular built church with ambulatory,” the characteristics of masonry buildings since the 15th century are analyzed from the perspective of construction method, planning, and timber openings and brackets. On the basis of that, this new type of church since the 15th century is compared with the preceding masonry buildings until 14th century to clarify the alive techniques that have been inherited from the past and lost techniques through history.

Though chapter II attempts to clarify masonry building history in a chronological way, it has limitations due to the small number of surviving examples. In chapter III, masonry building is analyzed from another perspective, namely the existing local building techniques and knowledge extracted by interviews with local builders. Specifically, the building technique and knowledge applied in the planning and construction of *hīdmo* house situated in Īnderta, southeastern part of Tigray, is discussed in this chapter.

As a premise to discuss building technique and knowledge, fundamental issues of *hīdmo*, such as parcel layout, typical plan, spatial components of the typical *hīdmo* house, and building elements, are introduced at the beginning. The results of interview research with local builders clarify related terminology. Based on these fundamentals, this chapter mainly focuses on the process to construct one house.

The process is divided into two parts: building preparation process and building construction process. Local builder has a comprehensive understanding of the building process. Therefore, the results of interview with local builders provide essential information to clarify them. Firstly, building preparation process consisting of material collection and planning is analyzed. In addition, builder's occupational ability, which is related to the builder's role in the society, is discussed, too. By clarifying the difficulty level in stone and wooden material collection, the meanings of *hīdmo* construction in the local community can be discussed. And, the building planning method without drawings makes other relevant discussion points such as anthropometric unit, planning variations depending on the building capacity, and dimension methods. There are currently no preceding study on these topics, though the analyses of Lyons (2007) that discussed the role of *hīdmo* as active political locales in the local community and Bauer (1977) that discussed *hīdmo* in relation to household organization provide important insights. To discuss dimension methods applied in *hīdmo* house, the results of building measurement are helpful.

Secondly, the building construction process consisting of foundation work, masonry wall construction, ceiling and roof construction and indoor wall plaster, is discussed. By clarifying this process, technical issues such as the type of building tools used and other devisal at the time of building construction, and detailed material knowledge are unveiled. Concerning these topics, there was no preceding study, too. Nevertheless, knowledge of soil for agricultural production discussed in Corbeel *et al.* (2000) again provides important insights to consider the choice of soil, which is applied in the roof of *hīdmo* house. The author clarifies the building construction process by observation of workflow and analysis of interview research with builders. Furthermore, the results of the interview research are sometimes confirmed by the appearance of existing *hīdmo* house. Through the interview research with builders, it becomes clear that the existing construction techniques sometimes stem from abroad. In that case, the alternative way applied before the foreign influences is questioned. Therefore, this study reconstituting the past techniques from the inherited builders' knowledge is one that quests the building history in a retrospective way. This is contrary to the approach applied in chapter II. Therefore, the results are helpful to quest general masonry building history of İnderta, too.

Based on the local techniques and knowledge on building and city that are clarified in chapter I, II and III, their transformation process in Mekelle and its surroundings since the 19th century is discussed in chapter IV. First of all, the reasonable understanding of local techniques and knowledge on building and "city" before the transformation is found by reviewing the previous three chapters. On the basis of that, how the locally inherited techniques and knowledge were changed as time passed is analyzed. The discussion is carried out in a chronological manner, by dividing the periods into three: until Emperor Yoḥannīs IV period (-1889), Post-Yoḥannīs IV and Italian occupation period (1889-1941), and Post-Italian occupation period until now (1941-). After each period's discussion finishes,

every point of “urban” and building changes is finally analyzed from the perspective of major topics discussed in the previous three chapters.

To find the changes, the author has attempted to observe and measure the buildings located in Mekelle and its surrounds. The analysis from the perspective of building construction method and materials is helpful to find the changes of the building. Furthermore, by observing masonry walls, suggestive ideas to clarify when each tool was introduced from abroad are provided. To find the changes on the urban scale, function and plan of each building is helpful. Furthermore, concerning spatial and social changes of central Mekelle, namely transformation of the historical area of Mekelle, Okazaki (2009, 2011, 2014-1 and 2014-2) provides essential information. In addition, how Īnda Mesqel, a local hillside settlement in Mekelle, has urbanized recently is clarified by analyzing the results of field work. This analysis on settlement’s urbanization is organized along the following scales: settlement, parcel, building and resident. By comparing the urbanization process between central Mekelle and Īnda Mesqel, of which distinction can be found in the location and the time of development, plurality of the ongoing urbanization process is clarified.

Chapter I

**Keys to Understand Initial Urban Formation of Mekelle:
Location, Local Settlement Techniques, and Spatial Network**

1. “City” of Northern Ethiopia

1-1. Difficulty in Understanding the Ethiopian “City”

Aksum, an ancient capital located in present Tigray region, progressively developed from approximately the middle of the 1st millennium BC, and emerged as the capital of a powerful polity between the 2nd or 1st century BC (Sernicola 2017). The Aksumite Kingdom dominated over Adulis, the seaport of the Kingdom located in present-day Eritrea, and reaped the essential economic and political benefits. At Adulis, since at least the middle of 1st century AD, a lot of goods from the Mediterranean area, including Egyptian clothing, wraps from Arsinoe, cloaks, cotton, and linens as well as glass, brass, copper, iron, silverware and goldware, wine from Laodicea and Italy, and olive oil, was imported, and exchanged for obsidian, ivory, tortoise shells, rhinoceros horns, hippopotamuses leather, monkeys, gums, emeralds and slaves from the internal regions (*Ibid.*). Aksum was the inland hub of the trade between the Ethiopian highland and the Red Sea area. Favorable environmental and climatic conditions, especially the abundance of water resources, productive soils generated from volcanic rocks, and the occurrence of a relatively stable humid phase over the whole of Tigray between the 5th century BC and the 5th century AD, were contributory factors of the development (*Ibid.*). It enabled the establishment of a lasting economic system based on mixed agricultural products and domesticated livestock, and the ability to invest their economic surplus to control the procurement and long-distance distribution of African goods and products (*Ibid.*).

Though a series of archaeological surveys in Aksum clarified the existence of burial areas, cathedral, reservoir, elite structures and domestic / industrial occupation, the morphology of the site or spatial layout at that time remains unknown (Phillipson 1998). Structures made from stones in Aksum in that period are introduced in the next chapter. The only site where the ensemble of the unearthed ruins in part has been clear is Metera, in southern part of present-day Eritrea (Fig.1-1). Metera was located along the route from Aksum to Adulis, and was settled in both pre-Aksumite and Aksumite periods, from about the 5th century BC until 7th century AD, with a long hiatus. The excavations during the 1960s revealed the substructures of several buildings that could be identified as elite residences and churches, surrounded on all sides by ordinary houses, and constructed in stone with loam mortar. Furthermore, an outline of the site layout of approximately 6th or 7th century AD showed that the site was not surrounded by defensive walls (Anfray 2007).

The stability of Aksum progressively broke down from the 7th century and it was no longer the capital site of the kingdom. The political core of the weakened kingdom shifted to the southeast, of which sites are characterized by the smaller size than before and existence of the remains of churches with monolithic pillars (Phillipson 1998). After the decline of Aksumite Kingdom, subsequent monarchs moved their political centers further south, out of present-day Tigray.

The capital of Zagwe Dynasty was located in a mountainous place called Adefa, which was located on the north of present-day Lalibela, though the physical traces seem to have disappeared presently (Fiaccadori 2014; Finneran 2007). Though the achievements of the rock-hewn churches in Lalibela are often recognized as a further development of Aksumite culture, the period is rather characterized by the disappearance of a permanent capital and decline of “urban” culture, from the perspec-

tive of “urban” history, in reality (Takaste 2006). The diminishing role of the Red Sea Coast trade to the eastern Mediterranean may have been the cause. The main outlet to the sea for trades was shifted from the Red Sea area on the north to Zeyla in the present-day Somaliland at that period (*Ibid.*).

In the 13th century, Zagwe Dynasty was overthrown by Yikunno Amlak (r. 1270-1285), and the Solomonic Dynasty started. The decline of “urban culture” still progressed, that is to say, the monarchs did not have a fixed capital, and moved from one region to the other. Though this moving capital tradition is discussed in the next section, it is a remarkable fact that the dynasty did not have a fixed capital until the establishment of Gonder in the 17th century.



Fig.1-1 View of Metera, from Anfray (1967).

In this way, the clues to understand spatial characteristics of a “city” in northern Ethiopia are very scarce. In addition, the lack of available sources such as historical maps, cadastral data and written documents increases the difficulty to approach it. Though their own Ge’ez script in northern Ethiopia exists, Ethiopians did not describe the past situation of their living environment in written form. Still now, a clear and definitive explanation of traditional Ethiopian “city” has not been identified. Nevertheless, Pankhurst, one of the pioneering scholars of Ethiopian studies, wrote a book, entitled “History of Ethiopian Towns” by aggregating numerous descriptions of successive foreign visitors and other oral histories (Pankhurst 1982, 1985). The focus is directed to the years since 15th century, namely the period of Solomonic Dynasty. Though his descriptions are detailed and attempt to clarify the history of each major site, he still sometimes seems to avoid using the term “city” or “town,” perhaps intentionally. For example, there is an excerpt as follows: “Political, and lesser extent commercial factors, nevertheless led to the emergence over the centuries of a succession of military camps, embryonic or static capitals, and trading centres (Pankhurst 1982)”. This quotation could be understood in the following way: the fact that no ruler dared to not have a fixed capital made it difficult to define the term “city” or “town.” Nevertheless, thanks to his explanation of each site, it becomes clear that the major sites in history can be recognized in relation to the existence of political rulers. Therefore, explaining each major site’s rise-and-fall in association with each ruler’s rise-and-fall makes the understanding clearer. The major sites, which is called “city” in this dissertation, in Tigray will be introduced later.

Pankhurst (1982) connoted that Gonder, the first fixed capital of Solomonic dynasty established in the 17th century, can be called a “city” as follows: “Gondar came to be known as a city of forty-four churches (Pankhurst 1982).” However, the “city” was already abandoned in a ruinous state in the early 19th century. The decline of the imperial power in the middle of the 18th century caused civil wars called “Era of Princes” which continued until the middle of the 19th century. It was the period that each provincial ruler of Ethiopia aimed to become the “King of Kings.” For each ruler, this era saw difficulties to secure their political center. As such, Pankhurst again avoided to use the term “city”

or “town”: “several seats of provincial government had likewise declined as a result of the demise of the ruler ... Such settlements ... were thus mere shadows of their former selves (Pankhurst 1985).”

The initiation of development of Mekelle, the main focus of this dissertation, started after the era of “King of Kings,” namely latter half of the 19th century, under Yohannīs IV, the Ethiopian emperor at that time. However, the above-mentioned ambiguity of the “city” in northern Ethiopia makes it difficult to find spatial characteristics of the site, or even to decide the points in question. Therefore, in this chapter, the issues on Mekelle will be discussed after introductory descriptions on moving capital tradition in northern Ethiopia, major sites of Tigray and adjacent Eritrean highland, and traditional settlement techniques in Tigray. The resulting findings on Mekelle are helpful to search for the clear and definitive explanation of northern Ethiopian “city.”

1-2. Moving Capital Tradition

The Solomonic Dynasty did not have a fixed capital until 17th century, and the camp of the empire invariably moved, albeit the monarchs did not always accompany it. They often preferred to travel in lesser number of places and stopped at the monasteries by the way (Pankhurst 1961). Though such moving capitals were, according to the review of Ludolf (1684), pitched in the “fertile and most plentiful country” of Shewa, the imperial core was pushed northwards on the periphery of the Lake Tana in the 16th century, due to the campaign of Ahmad Grañ and the subsequent migration of the Oromo people in Shewa (Pankhurst 1961).

“*Ketema*” is a word meaning a “town” presently. Therefore, the central part of Mekelle is generally called “*ketema*” even now. This word is strongly related with the moving capital tradition. Namely, the word was applied to point to the Ethiopian royal itinerant military camp (Stylianoudi *et al.* 2007). To search for a clear understanding of northern Ethiopian “city,” clarifying the characteristics of moving capital provides essential hints.

The essential reasons of the capital moving were the need to move about to fight first one enemy and then another, to find firewood which was often insufficient to allow of prolonged residence in any one place, and to avoid the shortage of food (Pankhurst 1961, 1982). According to Almeida, the Portuguese missionary of the 17th century, the capitals were forced to move to another place where there was firewood because the sites where plenty of firewood had been found at the beginning became to be bare in a few years (Pankhurst 1982; Beckingham *et al.* 1954). He cited the lack of methods in cutting down forests and groves. Furthermore, Pankhurst (1982) mentioned that “the royal retinue and army was so considerable that it could not remain in any one locality for more than four months, nor return to the same place in less than ten years because of the resultant shortage of food” in reference to the report of Florentine trader Corsali in 1517 (Alvares 1558). Therefore, the site where “there is a store of Wood and Grass, chiefly near some River or Lake, to prevent want of Water” was selected for the places of a moving capital (Pankhurst 1982; Ludolf 1684).

Almeida mentioned that the emperor’s camp was “royal city and capital of the empire.” Accordingly, the term “city” was thought to be deserving because of “the multitude of people and the good order that was observed in choosing its site, particularly in the rainy season (Pankhurst 1961)”. Ac-

According to Alvares, the Portuguese missionary of the 16th century, Ethiopian royal camps were “always situated on a plain” and the emperor’s tents would be “pitched on the highest ground (Pankhurst 1982; Alvares *et al.* 1961).” Almeida mentioned that the emperor’s tents were located “on the bulge of a not very high hill,” too (Pankhurst 1961; Beckingham *et al.* 1954). The location of the royal camp is suggestive to understand the Ethiopian “city” because the term of *ketema* originally meant “extremity, top or summit” (Stylianoudi *et al.* 2007). After the site is decided, “The First Camp-Master” fixed “the Pole in the Earth with the Royal Banner at the Topp; upon the sight whereof, they that measure for the Nobility, set up their Masters Lodging. After them the Common Souldiery, and others that follow the Camp either for Victuals, or else upon business. And thus in a few hours time the whole Camp appears in the same Order as it was before. For every one knows his place and his proportion, there being never any alteration of the Order, but the same Streets and Lanes, the same distance of Tents, so that were it not for the variation of the Prospect, other Mountains, other Rivers, and another Face of the Country, you would think your self still in the same place (Ludolf 1684),” That is to say, Ethiopian emperors fixed the capital’s orderly spatial patterns, though they did not fix the place. Concerning the concrete spatial pattern, Stylianoudi *et al.* (2007) summarized in a well-organized way as follows:

The traditional organization of the royal ketema followed a characteristic patterns: it was circular and concentric, around two perpendicular axes often oriented to the cardinal points, the main axis being east-west. In the centre, or the inner circle, screened by curtains or a fence, were the emperor’s quarters. The inner circle also housed the royal chapel(s) and clergy, the royal kitchen and some other services for the emperor alone. The inner circle had 13 gates (one being the main gate), each meant for different groups of dignitaries and called by a special name. The gates were watched by numerous royal guards; the inner circle could be entered by special pages and a very limited number of dignitaries, courtiers and members of the royal family ...

Another row of curtains delimited the second, or outer circle. This space accommodated the compounds of the royal spouses ... the queen mother and princes and princesses. Tents of high-ranking courtiers and officials ... and ecclesiastics ... were located as well. ... All the court and state dignitaries were divided into dignitaries of the left and right; the centre was symbolically indivisible and occupied by the emperor. The outer circle had the same number of gates as the inner one, and was also strictly guarded. Owing to the structure of the core of the ketema, the emperor’s exact whereabouts were known to a very limited number of people, which made any attempt on his life very difficult, with conventional weapons or magic. In view of the frequent periods of political instability and mutiny, the constant concern of the emperors in the ketema was security, mostly depending upon the loyalty of pages, guards and courtiers.

The space outside the circles was occupied by the tents of vassals and their retainers and families. There were also such institutions as prisons, market places and churches. A long tent ... stood in the middle of a vast open space nearby, functioning as a space for administering justice. The emperors kept with them lions, the symbols of the Solomonic dynasty.

Apart from royal centre, there were secondary camps organized around the compounds of the respective chiefs ... the vanguard led by a fitawrari, the central part led by a dāḡḡazmač (dejjazmach), left and right wings led by a grazmač and qāññazmač (qeññazmach) respectively ... Royal officials

moved within the ketema, transferring orders.

The market space existed in front of the tent of the emperor, though it sometimes happened that the plain is so big and flat that the market square is very far off from the tent of the emperor. According to Alvares, “from the King’s tent to this market all is open space in the middle, that is, there is no tent in it, only the two churches, that is, that of the justices and lions, and that of market square; and these churches and lions are a long way off from the other tents (Alvares *et al.* 1961).” The market church was the place of worship for the merchants as were Christians, for most were in fact Muslim (Pankhurst 1982). In the moving capital, there were no fewer than thirteen churches, which were carried by the priests (Pankhurst 1961).

The camp followers included more various people such as taverners, bakers, prostitutes and smiths. The space for smiths, of which craft works required a very big space, and one for prostitutes was apart from where strangers are lodged who come to sell, buy and trade with the emperor’s court (Alvares *et al.* 1961). A large majority of people were common people, both men and women, young people, and poor, some of them in skins, others in poor cloths, while one tenth of the inhabitants were well-dressed (Pankhurst 1982).

In this way, each moving capital was followed by innumerable and various people and occupied immense spaces. The frequent capital moving was carried out by transportation of the tents and wooden huts with minimum effort and cost. The common people had to “carry with them all their property, which all consists of pots for making wines and porringers for drinking. If they move short distances, these poor people carry with them their poor dwellings, made and thatched ... and if they go further they carry the wood, that is some poles (Alvares *et al.* 1961).”

Concerning the population of each moving capital, Almeida insisted as follows: “when ten thousand soldiers march, the number in the encampment is usually over thirty thousand souls, and when the Emperor marches with his entire force the whole multitude is over a hundred or a hundred and twenty thousand (Beckingham *et al.* 1954).” According to Stylianoudi *et al.* (2007), the population could reach some 40,000 and probably more, only a portion of these people being soldiers, in reference to Alvares *et al.* (1961). In addition, there were innumerable horses, mules, donkeys in the moving capital.

1-3. From Moving Capital to Fixed Capital

In spite of the moving capital tradition, there were several attempts to establish a fixed capital. The first example of such an attempt was Debre Bīrhan, established by Zer’a Ya’īqob (r. 1434-1468) who realized immense power, unification and centralization of the government in the 15th century. Debre Bīrhan, meaning “mountain of light,” was located in a fertile and well-watered part of his home province of Shewa (Pankhurst 1982). It is remarkable that the locational characteristics were in common with the moving capitals. He commanded his followers to establish themselves, and ordered them to prepare his house. Furthermore, he built a magnificent church, and carried out many reforms on the religion and government. However, his son and successor, Be’īde Maryam I (r. 1468-1478), rejected to inherit the place and left. In the next 16th century, another attempt was carried

out by Emperor Gelawdewos (r. 1540-1559), after the defeat of Ahmad Grañ in 1543. He established a town in Wag, and he settled refugees who were displaced by the incursions of Oromos and “provided for the needs of all” (*Ibid.*). To build a fine and tall tower, “Frank” and Egyptian engineers as well as Syrian and Armenian artists participated. In the “town,” water was said to have flowed, and vines, fig-trees and pomegranates prospered through it (Pankhurst 1982; Conzelman 1895). A garden laid out nearby was irrigated. However, the place did not last long, too.

The second half of the 16th century and the first quarter of the 17th century witnessed a major transition from the moving capitals to the more stable capitals (Pankhurst 1982). The first example of the transitional capital was Īnfraz, located in the mountainous area overlooking the northeastern shore of Lake Tana. Though the site was visited several times by Emperor Minas (r. 1559-1563), the brother and successor of Gelawdewos, it became more popular during the period of his son and successor, Emperor Serse Dīngīl (r. 1563-1597). His frequent visits, especially in the rainy seasons, resulted in the emergence of a larger settlement. By 1586, not only a fortress with an “admirable exterior,” but also more or less permanent dwellings for the soldiers and a passage existed (*Ibid.*). His masonry palace was an important project because it showed the preface of transition from the moving capital to the fixed capital. This building, mentioned in the next chapter, is regarded as a model for the earliest building at Gonder (Pankhurst 1982; Mathew 1947). Though Īnfraz also became a commercial center of importance, it was abandoned after the rainy season of 1589. Afterwards, the capital of Serse Dīngīl was moved to Ayba, north of Īnfraz. He constructed another palace in Ayba, and remained there for the rest of his reign (Pankhurst 1982). However, the castle was not the one that is comparable with Īnfraz. While Ayba declined after the emperor’s death, the importance of Īnfraz as a commercial center was kept until at least the end of the next century. According to Poncet, French physician who visited Īnfraz in 1700, Īnfraz had “better built houses”, and stood in a “more pleasant” and “finer situation” (Pankhurst 1982; Foster *et al.* 1949). Because of the trading activities, there was a considerable Muslim population there.

In the period of Emperor Susīnyos (r. 1607-1632), Gorgora, placed on the northwestern shore of Lake Tana, became his main camp. In Gorgora, there were two areas: one was the original settlement on the mainland, and the other is the settlement to the west on a nearby peninsula, which was strategically better situated. The latter one was established by the Emperor and called New Gorgora. By 1612, the imperial court was situated in Gorgora. According to the report of an unknown Armenian traveler of 1612, the capital was “a great city” and the Emperor was visited by “great troops of men daily ... some days 2,000, some days less” (Pankhurst 1982). In 1619, when the Emperor leaned towards the Roman Catholic faith, the establishment of a stone church was arranged, and the construction was completed in 1629. Around the church, many smaller buildings, including several fine buildings were duly erected. From the existence of fine buildings and arranged location, it becomes clear that the place was planned as a capital rather than a military camp (*Ibid.*). However, Gorgora was a short-lived place due to the unhealthy climate. For example, the settlement suffered greatly from a fever epidemic during the rainy season of 1618 (*Ibid.*). The Emperor decided to move his center from Gorgora to Danqaz, a more elevated site to the north of Gorgora.

As the earlier camps, Denqez soon developed into a populous military settlement after Emperor Susīnyos established himself in the year of 1617-1618. The palace, claimed by Almeida that “wonder

... and something that had been never been seen nor yet imagined,” was the one of which construction was participated by the Indian person named Abd al-Kelim (Pankhurst 1982; Beckingham 1954). Pankhurst (1982) indicated that founding a “city” was “a thing he (Emperor Susinyos) had for many years wished to do”, and described the favorable position of the settlement and imperial quarter and population of Denqez when Almeida visited there, as follows:

Emphasising the favourable position of the place which, had it been in Europe, could have been said to be “truly adapted and made by nature for a fine city”, he declared that the locality contained “many springs and streams”, as well as meadows on which all kinds of cattle fed, while wheat and barley were “sown and reaped everywhere”. Though the area was “not well stocked with trees”, this was “not the soil’s fault, but the inhabitants’, for every day they cut down for their houses and for fuel”, and “none of them” had “the energy or the will to plant a single one”.

The Emperor’s “city or camp”, as Almeida called it, was situated on a “not very high hill” in the centre of the raised portion of land. It possessed “as many as eight or nine thousand hearths” – which could suggest a population in excess of 50,000 – but, as the houses were “all of wood, or stone and mud, and thatched”, and “nearly all round”, the general appearance was “more like a mountain of ricks than a city”. Some better buildings were, however, by then in existence, for the monarch’s initiative in building a palace had been followed by “some of grandees” who had also made “houses of stone and lime”.

It is remarkable that the favorable position is recognized as the place where enough water resources, woods, and agricultural products are available, and this is in common with moving capital’s feature. Furthermore, the ruler’s parcel location of both moving capital and “city or camp” is characterized by the place on a “not very high hill”, too. That is to say, the knowledge on location of the transitional capital and ruler’s parcel was inherited from the moving capital tradition.

Subsequently, the Emperor Susinyos spent the years of 1628-29 and 1629-30 in Denqez without leaving the site and the site became more like a static capital (Pankhurst 1982). However Denqez was soon abandoned after the death of Susinyos. Fasiledes (r. 1632-1667), the son and successor of Susinyos, relocated his capital to Gonder.

Gonder, located 30km northwest of Denqez, was an Ethiopian capital for over two centuries. The development was initiated by the construction of Fasiledes Palace, which started around 1635/36 (Fig.1-2). The buildings of Gonder are explained in chapter II. The essential distinction between Gonder and previous transitional capitals is that other buildings were erected in the neighborhood after the period of Fasiledes by subsequent monarchs such as Yohannis I (r. 1667-1682), Iyasu I (r. 1682-1706), Dawit III (r. 1716-1721) and Iyasu II (r. 1730-1755) (Fig.1-2). From the description of Bruce who visited Gonder in 1770s, Pankhurst estimated the population of some 60,000 to 70,000 people (Pankhurst 1961; Bruce 1805). This was the biggest urban center on the Horn of Africa.

As the previous moving and transitional capitals, Gonder, surrounded by mountains, has water resources, woods, and agricultural products. Pankhurst (1961) mentioned that most of the ordinary houses were surrounded by two or more trees in reference to Bruce (1805), and the markets of Gonder abounded partly due to the prosperity of agriculture in the vicinity of capital. There was

pecially from the perspective of locational and spatial matters, the books written by Pankhurst (1982, 1985) again give essential insights.

(a) Aksum

The Solomonic Dynasty emperors wished to emulate Aksumite predecessors and opted for formal coronation in Aksum. Furthermore, the site played an important role in the time of frequent battles: asylum people carried their valuables to Aksum to store safely.

In the 16th century, Aksum was the only significant place of Ethiopia: Alvares described the place as “a very good” and “large” town with “very good houses such that there are none like them in the whole of Ethiopia” (Pankhurst 1982; Alvares *et al.* 1961). According to Alvares, the settlement was “situated at the head of a beautiful plain, and almost between two hill”, and there were abundant water resources with no less than 72 springs and very good wells (*Ibid.*). However, Aksum suffered from the campaign of Aḥmad Grañ afterward. The site was a place of devastation in the early 17th century (Pankhurst 1982).

The city started to be rebuilt in the period of Fasiledes in the 17th century. Though Bruce said that the place was full of “very extensive” ruins, he mentioned that the site consisted of “about six hundred houses” at the same time. The site was still a settlement of some importance, and the inhabitants, according to Pankhurst’s estimation, engaged solely in religious matters and others were involved in agricultural production activity. The abundant water resources were still alive and water was irrigated to the gardens of the place where a “little fruit” grew (Pankhurst 1982; Bruce 1805).

After the decline of imperial power of the Solomonic Dynasty, Aksum was taken over by the rulers of Tigray from the end of the 18th century. In the early 19th century, the place became smaller and the number of houses was 300 or 400 in reference to Ferret and Glinier (Pankhurst 1982; Firret *et al.* 1847-48). According to Pearce, many wells had been hidden or covered with rubbish both in the city and the nearby plain, in the early 19th century (Pankhurst 1982; Pearce 1831). Nevertheless, richly cultivated vast fertile plain was still alive.

Shitara (2008) analyzed the spatial formation in the hillside residential area of Aksum from the documentation by Littmann *et al.* (1913) and A.O.I. Accordingly, each parcel of land could be accessed from the main street through the cul-de-sac (Fig.1-4). In the parcel, there were one or more circular thatched buildings (Fig.1-5). Each parcel with courtyard was fenced with bamboo canes, and many houses were inhabited by churchmen (Pankhurst 1985; Castro *et al.* 1915).

(b) Dībarwa

Dībarwa is located on the right bank of the Mareb River some 30 km south of Asmara between the Ethiopian interior and the Red Sea port of Massawa. The development was initiated as the center of Bahīr Negash, or ruler of the sea province, perhaps in the 16th century, and it became the most active commercial center of the region. The site with a population of 2,000 or so, was “situated on a very high rock above a river, upon which are situated the King’s houses,” as other major sites in Ethiopian interior (Pankhurst 1982; Alvares *et al.* 1961). The site consisted of “stone houses, flat roofed”, and “many villages of cultivation, with numerous herds, all in the sight of the city” (*Ibid.*).

The development was several times disrupted due to the campaign of Aḥmad Grañ in 1535 and intrusion of Ottoman Turks that seized Massawa in 1557. Because it was a large trading site situated in

a country abounding between highland Ethiopia and the Red Sea area, it became the site of a three-sided struggle between Ethiopian Emperors, Bahir Negash, and Ottoman Turks. Nevertheless, the site maintained the principal position in the region as the capital of Bahir Negash throughout the 17th century (Pankhurst 1982). The settlement was divided into two towns, the higher Christian area and the lower Muslim area (*Ibid.*). However, as 'Adwa grew as the principal center of Mika'el Sihul who took a power of Tigray in the 18th century, Dibarwa lost its importance.

(c) 'Adwa

Though the history of 'Adwa dates back to early Aksumite period, the development started in the 17th century. The establishment of Gonder led to reorientation of trade route and 'Adwa became the transit point of the route between Gonder and Massawa, as Dibarwa. When Mika'el Sihul took power and established himself as an independent chief in the middle of 18th century, he governed Tigray largely from 'Adwa (*Ibid.*). According to Bruce, 'Adwa was the place where "every body must go in their way from Gondar to the Red Sea" (Pankhurst 1982; Bruce 1805). The trading activities enabled him to gather wealth and acquire firearms which contributed to the development of the site. Finally, he seized control of Gonder, too. Concerning the population, Bruce indicated the existence of 300 houses, when he visited the site in 1769. This translates to a population of approximately 1,900 at the time (*Ibid.*). According to him, the settlement was "situated on the declivity of a hill, on the west side of a small plain surrounded everywhere by mountains" and Maryam church stood on a hill on the south-south-west of 'Adwa. The mansion house of Mika'el Sihul was situated "upon the top of the hill", however, it was "not distinguished from any of the others in the town except by its size" (*Ibid.*). These locational features on churches and ruler's house remind the ones of Gonder, which had multi-stratified networks between them.

Though Ras Welde Sillasé whose base was in İnderta took power in the early 19th century, the importance of 'Adwa remained a major commercial center. At the time of the second visit of Salt, who visited Ethiopia twice in 1805 and 1810, he estimated that the number of inhabitants was at maximum 8,000. That is, more than double the people lived in this place in two generations from the visit of Bruce (Pankhurst 1982; Salt 1814). However, as Ant'alo and Ch'eleqot located in İnderta were developed, which were discussed later, the population of 'Adwa began to decrease. Ruppell

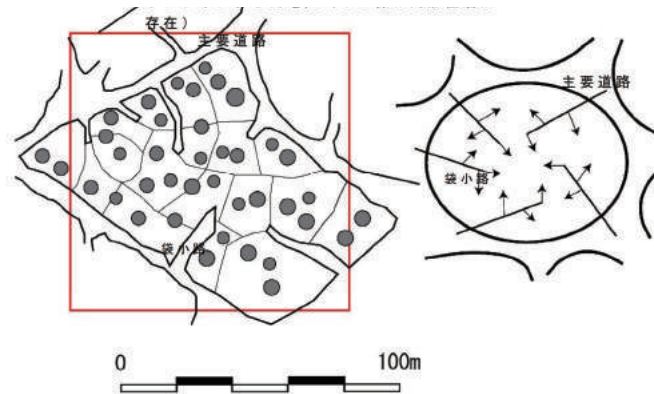


Fig.1-4 Model of relationship between street and each parcel in Aksum, from Shitara (2008).



Fig.1-5 View of Aksum in 1906, from Littmann et al. (1913).

described the site condition with many abandoned and partially destroyed houses, and estimated a population of only 3,500 in the 1830s (Pankhurst 1982; Rüppell 1838-40). Nevertheless, it should be noted that these permanent inhabitants were joined on occasion by numerous courtiers, soldiers and camp-followers: the total population of 'Adwa was, according to d'Abbadie who visited Ethiopia in the middle of the 19th century, as much as 10,000 (Pankhurst 1982; d'Abbadie 1868). That is to say, characteristics of the moving capital tradition should be taken into account to consider the major sites of Tigray, too.

Salt described the site's appearance that multitudes of trees were thickly planted in each parcel, and a courtyard of many parcels were "cultivated with considerable care: the town itself being plentifully supplied with water from three streams, which take their course through the valley below" (Pankhurst 1982; Salt 1814). Concerning the houses existing, Salt mentioned that all were of "conical form", however, according to Parkyns who visited Ethiopia between 1843 and 1846, the existence of "square and flat-roofed" buildings were described, too (Pankhurst 1982; Salt 1814; Parkyns 1853). Church took an important role for the site's social life: the churches of Maryam, Mika'el, Gebr'iel, and later Medhané Alem formed the nucleus of 'Adwa and the population were clustered around them (Pankhurst 1982). On the other hand, trading activity in 'Adwa was almost entirely in the hands of Muslims.

After Yoḥannīs IV ended the internal conflict of Tigray in the 1860s, 'Adwa, which was seriously affected by the fighting, became the principal residential place for him. The population, according to Dufton (1867), recovered to "about 10,000 citizens" in 1860s. On the other hand, Cosson (1877) remarked the uncertainty of the population of 'Adwa in 1873: "when king is there, there may be 20,000 people; when he goes away, his army, and nearly all who can, follow him, and perhaps not more than 4,000 inhabitants remain". The situation of 'Adwa in the latter half of the 19th century was sketched by Acton and Bianchi (Fig.1-6, 7: Acton *et al.* 1868; Bianchi 1884). From Acton's sketch, the following locational and spatial characteristics are confirmed: "urban" location surrounded by mountains, habitats situated in the hillside, and existence of water streams. Furthermore, from Bianchi's sketch the following are confirmed: existence of a church on the hill, existence of both circular conical-roofed buildings and rectangular flat-roofed buildings, existence of trees, and existence of walls enclosing each parcel. These characteristics are overlapped with the descriptions of visitors in the previous era. The roads in 'Adwa were extremely narrow, of which width was scarcely more than a meter or some even less (Vigoni 1881), and "winding and artless", which made



Fig.1-6 'Adwa in 1860s, from Acton (1868).



Fig.1-7 'Adwa in around 1880, from Bianchi (1884).

visitors get lost easily (Simon 1885).

However, due to the famine and typhus of the late 1870s and death of Yohannis IV in 1889, 'Adwa fell into decline. At the end of the 19th century, Italy's colonial ambitions grew in Northern Ethiopia. And finally in the first Italo-Ethiopian war of 1895/96, the site suffered from considerable damage. Woods and gardens were seriously damaged: many of the trees were cut down for firewood, and former neat gardens were gone and choked up with rank weeds and vegetation (Pankhurst 1985). Nevertheless, 'Adwa again recovered after the war rapidly. Though the site was no longer the capital of all Tigray, it became the seat of a provincial government. Furthermore, it enjoyed commercial revival, and re-developed to become a major commercial and religious center in the province. The market activities were carried out in the large open space below the settlement (*Ibid.*). As commercial relationship with Eritrea increased, the goods of Italian origin also increased. As a result, in the first decades of the 20th century, a significant amount of modernization happened in 'Adwa.

(d) Dġsa

Dġsa, located 35 km east of Dġbarwa, stood on a mountain surrounded by a deep valley (*Ibid.*). The site was once a part of the country of Bahġr Negash and inhabitants were mainly Muslims. In the 18th century during the conflict between Bahġr Negash and Mika'el Sġhul, people declared their independence, however, it failed due to the attack of the latter. Mika'el Sġhul encamped upon the edge of the valley to obstruct the way to water resources of the valley below. While higher areas were good sites for defense, logistics to acquire water was difficult. In the latter half of the 18th century, the site consisted of a higher area where supporters of the local governor occupied and a lower area where Christians lived in (Pankhurst 1982; Bruce 1805). Afterwards, Dġsa still maintained some economic importance because it was located on the trade route between Ethiopian and the Red Sea area. It was the "frontier post" where Ethiopian merchants obtained guides to lead them down to the coast. Though the site was under Christian rule, the majority of inhabitants were Muslims in the middle of the 19th century (Pankhurst 1982; Lefebvre *et al.* 1847).

Salt drew the sketch of Dġsa in 1805 (Fig.1-8). From the sketch, it becomes clear that a church was situated on the hilltop, and habitats were located in the hillside. According to him, the houses were "flat-roofed, and without windows ... the houses are built round a hill commanding an extensive prospect of the mountains of Tigrġ, and country around" (Pankhurst 1982; Anneslay 1809).

(e) Ant'alo and Ch'eleqot

Rebellion of *Dejjazmach* Kġfle Iyesus, whose base was in Ĩnderta, against Mika'el Sġhul led to the decline of the latter. The son of Kġfle Iyesus, Welde Sġllasġ, took power of Tigray afterwards, and established his new capitals, Ant'alo and Ch'eleqot, in the late 18th century. However, he did not fix his capitals at those two sites only: according to Pearce (1831) who accompanied Salt's 1805 mission and remained in Ethiopia afterwards and served



Fig.1-8 Dġsa in 1805, from Salt (1809).

Ras Welde Sillasé until death of the latter, “the *Ras* amused himself by changing his residence every twenty days or month to his favourite towns and country seats, namely, Antalo (Ant’alo), Ch’eleqot (Ch’eleqot), Mocculla, Fellegdarro, Gibba, Lama, and Guravdeukduc in Wojierrat” when the country was in a state of tranquility. And in those places, “he kept his feasts and fasts, with the greatest comfort.” From these descriptions, it becomes clear that he preferred changing places to settle. Such a lifestyle reminds the moving capital tradition or the case of ‘Adwa. Furthermore, it should be remarked that “Moculla” points “Mekelle”, the specific target of this dissertation, and “Fellegdarro” points “Feleg Da’iro”, the site located 5 km northeast of existing Mekelle’s city center. That is, the site around Mekelle had acquired a certain level of importance at that time. The introduction of Mekelle is set aside for another section, and Ant’alo and Ch’eleqot are introduced in this section.

Due to the locational reason, Ant’alo served as a natural fortress for hundreds of years (Pankhurst 1982). In the late 18th century, Ant’alo became the place of residence of *Dejjazmach* Kifle Iyesus, and he was succeeded by *Ras* Welde Sillasé who became a ruler of Tigray in 1790. Afterwards, Ant’alo was developed as the virtual capital of the province. Ant’alo was selected as one of the capitals because of its mountainous position, which contributed to strengthening defenses (Pankhurst 1982). This locational feature is confirmed by a sketch drawn by Acton in 1868 (Fig.1-9). On the other hand, according to Salt, the site was “ill calculated for a capital” as it was “very difficult of access” and inconvenient in that water could be procured only at “a considerable distance from the dwelling houses” (Pankhurst 1982; Annesley 1809). Indeed, Salt described there are no trees “to be seen in the whole extent, except a few small ones that surround the two churches in the vicinity of the town” around the site (Annesley 1809). In spite of these inconveniences, the site became the governmental and commercial center. According to Salt, Welde Sillasé usually spent time at Ant’alo in the rainy season, and the important ceremonies such as receiving the annual taxes, reviewing the troops, and appointing and dismissing officials were carried out even in the dry season (Pankhurst 1982; Annesley 1809). Concerning trading activities, Pearce (1831) mentioned that the site was visited by caravans from both Shewa and Massawa.

Rapid growth of Ant’alo is confirmed by the description of Salt: the site consisted of “upwards of one thousand” circular houses with “conical thatched roofs” by 1805 (Pankhurst 1982; Annesley 1809). From this number of houses, Pankhurst (1968) estimated the population of approximately 6,000 or 7,000 at that time. In addition, according to Holland and Hozier, square shaped buildings with flat roofs could be found, too (Pankhurst 1982; Holland *et al.* 1870). The settlement was built on “uneven rising ground in the valley” below the hill (Pankhurst 1982; Annesley 1809). Such a settlement location is confirmed by Acton’s sketch, too (Fig.1-9). Ant’alo was spatially divided into three separate areas: two easterly ones were inhabited by the Christians and the other one was by Muslims (Pankhurst 1982; Holland *et al.* 1870). The market was located in the very center of towns, not on the outskirts (Pankhurst 1982; Pearce 1831).

While Ant’alo was the governmental and commercial center of Welde Sillasé, Ch’eleqot, located 10 km north of Ant’alo, was rather religiously important. The site was situated in a river valley, and the whole area was fertile (Fig.1-10). Situated along the river is Sillasé Church, constructed at the end of the 18th century, as introduced in chapter II. Furthermore, the parcels of land in Ch’eleqot possessed well-constructed and well-kept gardens with olive, juniper, citron and citrus trees, as well as many vines (Pankhurst 1982; Lefebvre *et al.* 1847). The streets were “narrow and stony” (Pankhurst



Fig.1-9 Ant'alo in 1860s, from Acton (1868).



Fig.1-10 River in Ch'elegot, photo by author.

1982; Markham 1869). There were both circular and rectangular buildings, and they were covered with thatches of long grass grown in the neighboring part of the valley (Pankhurst 1982). In the early 19th century, a population of approximately 3,000 is estimated (Pankhurst 1968; Firret *et al.* 1847-48).

However, after the death of Welde Sillasé in 1816, both sites started to decline. These sites became ordinary villages, though Sillasé Church in Ch'elegot is famous even in the present. Due to the rise of *Dejjmach* Sebagadis of 'Agame, a chief from an entirely different family, the capital was again moved to 'Addigrat.

(f) 'Addigrat and Atsbi

'Addigrat is a short-lived Tigray capital under *Dejjmach* Sebagadis, who became a ruler in 1818. However, Sebagadis preferred to make frequent use of other places to reside in, as other Ethiopian or Tigray's rulers. The site, lying to the east of a broad and well-watered plain surrounded by mountains, was strategically good (Pankhurst 1982). The inhabitants obtained much of their provisions from this land: Holland and Hozier described that the site was "a fertile district" (Pankhurst 1982; Holland *et al.* 1870). Indeed, Shepherd pointed out that the low-lying areas were "under cultivation" though the elevated areas were "rocky and almost barren" (Pankhurst 1982; Shepherd 1868). 'Addigrat developed into a significant trading center, as well as a governmental center, and a population of approximately 1,600 is estimated when Sebagadis was alive (Pankhurst 1985). Concerning the site's appearance, the sketch by Acton (1868) gives hints (Fig.1-11): a parcel of land on the hill existed, and both rectangular house with flat roof and circular house with conical roof are found. After the death of Sebagadis in 1831, the site lost political and commercial prosperity and fell into a ruinous state. However, during the Italian occupation period, 'Addigrat again increased its commercial and administrative importance due to the



Fig.1-11 'Addigrat in 1860s, from Acton (1868).

strategic location at the junction of the crossroads between 'Adwa in the west, Asmara and Massawa in the north, and Mekelle in the south (Tsegay 2003-1).

Atsbi, on the high plateau of 'Agame, was an important place because salt caravan from 'Afar depression passed through and there was a production site of sulphur, which was used for the production of gunpowder, in 'Afar. Sebagadis imposed taxes on salt, and he built a church and a palace in Atsbi in return (Pankhurst 1982). Though the wealth of Atsbi was plundered and burnt after the death of Sebagadis, the site survived afterwards. The settlement was a "clean and spacious house" that gave an impression of "ease and prosperity" (Pankhurst 1982; Firret *et al.* 1847-48).

(g) Asmara

Asmara is the capital city of Eritrea presently. The written records on Asmara dates back to the late 14th or the early 15th century. According to Almeida, the settlement was located in a high place though less mountainous than other inland sites in the 17th century (Pankhurst 1982; Beckingham *et al.* 1954). Asmara became the headquarters of one of the local chiefs in the middle of 19th century, and the development progressed after Emperor Yohannis IV defeated Egypt in 1875. It was initiated by the arrival of *Ras* Alula, Yohannis IV's governor of the province, in around 1883 or 1884, and the establishment of his camp on a hilltop just above the present settlement of Asmara (Pankhurst 1985). The population increased to approximately 5,000 in 1884, when Wylde visited (Pankhurst 1985; Wylde 1888). However, according to the British envoy Smith visiting the site in 1886, the site was "nothing more than a collection of huts inhabited almost entirely by the soldiers of *Ras* Alula" (Pankhurst 1985; Smith 1890). There was no street layout and regularity, and it was haphazard on two low hills or mounds above the ordinary plateau level (Pankhurst 1985; Wylde 1888).

The modernization of Asmara started after the occupation by Italian forces in 1889. Asmara became the new capital of Eritrean colony in 1897, and grew as an administrative and commercial center. In 1902, the first town planning was approved, and modern "European" town with a governor's palace, both Orthodox and Roman Catholic churches, a business quarter, some restaurants and cafes, and barracks for Italian and colonial troops was gradually formed (Locatelli 2003). The water supply was improved by the digging of a number of wells, and a modest supply of drinking water became available (Pankhurst 1985). Legal segregation between Europeans and local people was established by the Italian decree of 1916 (*Ibid.*). The population, which was estimated to be only approximately 2,000 Ethiopians or Eritreans in 1892, increased to approximately 5,000, including approximately 300 Europeans, mostly Italians, by the turn of the century. In 1922, it became approximately 9,000, of whom 2,400 were merchants and 1,700 foreigners, mainly Italians and Indians (*Ibid.*).

1-5. Characteristics of Major Sites in Tigray and Eritrean Highland

Though the books written by Pankhurst (1982, 1985) did not conclude the locational and spatial characteristics of the major sites in Tigray and Eritrean Highland, several common characteristics can be extracted from the descriptions of each major site.

First of all, each major site's rise-and-fall corresponded with the ruler's rise-and-fall. That is, the administrative and commercial center of Tigray and Eritrean Highland was moved when the influ-

ential ruler was dead or changed. Each ruler such as Mika'el Sihul, Welde Sillasé, and Sebagadis tended to have multiple sites to live in, and preferred to change their place of residence more or less. Therefore, the population of the major sites in Tigray and Eritrean Highland was unequal depending on whether the rulers were present at the sites or not. From the descriptions of 'Adwa, Ant'alo, Ch'eleqot and 'Addigrat, this tendency can be confirmed. These features are similar to predate moving capital tradition of a series of Ethiopian emperors.

As for the location of major sites, a mountainous place was preferred, as confirmed in the cases of Aksum, 'Adwa, Ant'alo and Addigrat at least. Remarkably, the mountainous location was considered more important than access to water resources in the case of Ant'alo. Welde Sillasé, the ruler in the frequent battles, selected the site of "natural fortress" in spite of the scarcity of water resources. However, the sites where rich natural resources such as water, fertile soils and trees were available were usually selected as the major sites of Tigray and Eritrean Highland. Existence of river(s) or other water resources is confirmed in Aksum, Dībarwa, 'Adwa, Dīgsa, Ch'eleqot and Addigrat. And, in regard to food production or fertility, for which water resources and fertile soils are essential, the descriptions of Aksum, Dībarwa, 'Adwa, Ch'eleqot and Addigrat mention it. Though Ant'alo seemed to not be a suitable site for food production, Ch'eleqot, another Welde Sillasé's capital site, perhaps took that role instead of Ant'alo. The existence of the parcel with various trees and well-kept garden, which is mentioned in cases of Aksum, 'Adwa and Ch'eleqot, is also remarkable. The garden was sometimes irrigated.

The habitats of the major sites in northern Ethiopia were usually in the rugged landscape, as confirmed by the following remark of Pearce: when he visited plane "town" in 1811, he mentioned that "like most of the towns in Abyssinia, it has no walls, but stands in the plane, whereas the Abyssinian in general upon height (Pearce 1831)." On one of hills in the site, the ruler's parcel and his houses were likely to be situated. This feature is found in Dībarwa, 'Adwa, and Asmara before the Italian occupation. From the hilltop position, it should be possible to overlook the surrounding area, and defense of the site became easier. In addition, the hilltop position could be allocated for churches, too, as shown in 'Adwa and Dīgsa. On the lower side of hills, areas in the middle of hillside were suitable place for local people to reside. As such examples, Aksum, 'Adwa, Dīgsa, Ant'alo, and Asmara can be raised. Remarkably, these characteristics on the locational and spatial allocation of major sites, namely mountainous location, areas that were rich in water resources, and allocation of ruler's parcel in the hilltop, are in common with the predate moving capitals, transitional capitals and Gonder of northern Ethiopia.

In addition to the above, several similarities between Gonder and 'Adwa, both of which were administrative and commercial centers, can be seen. Firstly, several hilltops, which were occupied by the ruler's residence and church(es), had visual and acoustic contacts each other. The network of the vantage points should be taken into account to consider a "city" of northern Ethiopia. Secondly, several settlements, often located in the hillside, were clustered and centering on churches. Churches took an important role for the social life in northern Ethiopia, as discussed in the next section. Thirdly, there were no urban planning, and roads were narrow and winding. Before the Italian occupation period, urban planning did not exist in northern Ethiopia. The logic for the "urban" formation, or formation of the major sites, other than making roads should be searched for. These are important points to search for the spatial characteristics of the "city" in Tigray.

2. Rural Settlement in Tigray

2-1. Techniques and Knowledge on Agriculture and Settlement Formation in Tigray

As long as the modern urban planning process was absent in Tigray, considering the similarity and differences between “urban” formation and rural settlement formation can give clues to understand spatial characteristics of “city” or major sites of Tigray. This is the first step to identify the definitions of the Ethiopian “city.” In Tigray, the greatest parts of the population were, and still are, farmers (Smidt 2010). Therefore, in this section, rural settlement techniques are discussed in association with agricultural techniques and knowledge. Concerning the agricultural history of Ethiopia, McCann (1995) gives essential insights.

Ox plow, which should have been brought from South Arabia sometime before the first millennium AD, is the essential feature of northern Ethiopian agriculture (*Ibid.*). Oxen yoked to plow, an agricultural tool locally called *mahresha*, draw the ground, and break but do not invert the soil (Fig.1-12, 13). The *mahresha* is designed to break the soil’s surface at a fairly shallow angle. Such ox plow techniques was already applied in the environs of Aksum in the Aksumite period. Highland farms also historically kept ancillary livestock: sheep or goats for food, savings, and small-scale exchange; donkeys for marketing and transportation; chicken for food and exchange (Fig.1-14). The resulting annual cereal crop and livestock became the base of Ethiopian highland’s economic context (*Ibid.*).

Ethiopian highlands were a production site of a wide variety of crops such as barley, wheat, sorghum, teff, and finger millet. Above all, teff, which requires intensive seedbed preparation only possible with the ox plow, is the highest prized food with the longest storage period and the most valuable livestock fodder in Tigray. Therefore, it has the highest exchange value and became a symbol of elite status, too. According to linguistic reconstruction research, cultivation of teff and eleusine took place on highlands as early as 7,000 years ago, and highland farmers later added Near Eastern cereal crops such as wheat and barley in the 3rd millennium BC (*Ibid.*).

Ox plow farmers controlled drainage and soil erosion through contour plowing and the use of drainage furrows. Highland irrigation consisted of small-scaled gravity-fed stream from small upper stream or springs. When Salt visited Ethiopia in 1810, he mentioned: “The productiveness of the

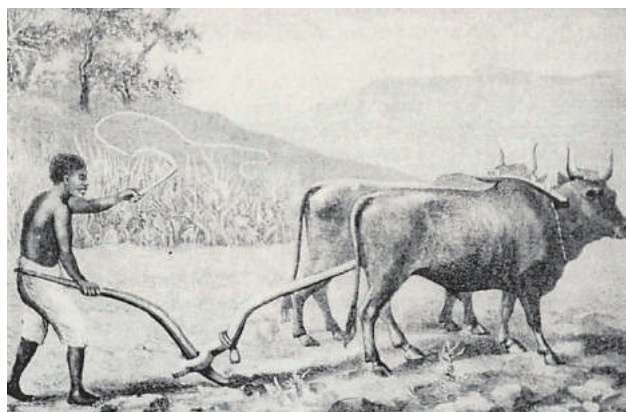


Fig.1-12 Ox plow cultivation in around 1860, from McCann (1995).

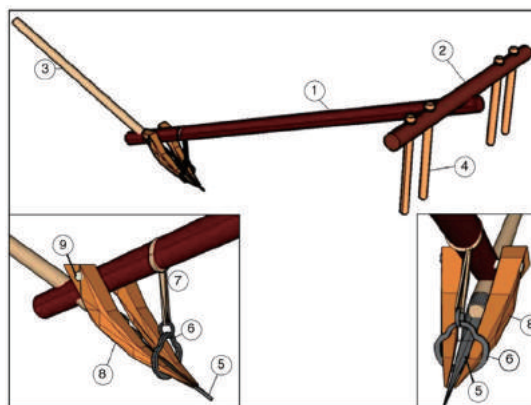


Fig.1-13 *Mahresha*, from Mouazen et al. (2007).



Fig.1-14 Donkeys used for transportation, *photo by author.*



Fig.1-15 Scene of terrace making nowadays, from *Strecker (2018).*

soil must be considered in great measure as owing to the industry of the inhabitants and their skill in irrigating the land, the effect of which, where a constant supply of water can be procured, prove highly beneficial. The common mode here consists in digging small channels from the higher parts of the stream, and conducting them across the plain (Salt 1814).” Not only irrigation, but also terraces were built by highland farmers. Farmers perhaps built many terraces by piling stones slowly over several years on individual plots rather than as a collective community enterprise (McCann 1995). A recent film made by Strecker (2018) described such an impressive scene of terrace making in present day (Fig.1-15). Sometimes terraces were made by putting materials other than stones, such as weeds and bushes (Corbeel *et al.* 2000). The primary purpose of terraces is, though it has been still under some debate, moisture retention and (or) preventing erosion (McCann 1995). Historically, these irrigated agriculture and terracing, which were early South Arabian forms, coexisted in Yeha dating from 700 BC to 300 BC (*Ibid.*). Existence of irrigated agriculture reminds that the garden of several parcels in the major sites of Tigray was irrigated. Furthermore, the existence of stone terraces is suggestive to consider traditional house building in Tigray because both of them are built by piling up stones.

In this way, the supply of water is an important factor to decide the site of farmlands. Furthermore, it affects the existence of suitable soils for agriculture, too. According to Corbeels *et al.* (2000) who accessed local agricultural knowledge of southeastern part of Tigray, the classification of soil potential is closely related with topography, taking soil depth and water holding capacity into account. Local farmers found that the most fertile soil with high water-holding capacity appears at the bottom of the valley or natural terraces, which could be along the river. People made a stone terrace from the bottom of the hill little by little, and formed farmlands gradually. Therefore, farmlands were often situated in the lower side of slopes in Tigray.

In Tigray, habitats, or people’s residences, are often located in the upper hillside, as shown in the sketch drawn by Salt (1809) at the beginnings of 19th century, albeit it drawn in the adjacent Eritrean highlands (Fig.1-16). Indeed, in the sketch, habitats situated in the hillside and the green, which implies the existence of water, situated in the lower side of a slope are depicted. When above mentioned agricultural knowledge is taken into account, the habitats’ location can be recognized as the outcomes of empirical knowledge on local agriculture. That is to say, people settled on upper hillsides to reserve the bottom of the slope for farmlands. From the text of Salt (1814), it is implied



Fig.1-16
Abha, a rural settlement in present Eritrea,
drawn in 1805, from *Salt (1809)*.

that habitat's development went from upper hillside: when he dropped into Dīgsa in 1810 for the second time, after the first visit carried out in 1805, he mentioned that “no great changes appeared to have taken place ... except that a few additional huts or caves had been constructed in the lower town ... I observed some labourers busily engaged in excavating and forming one of these singular habitations” (Fig.1-8). Furthermore, the sketch of Fig.1-16 depicts existence of a church-like building at the upper left, though it is not readily confirmed at first glance. In fact, such a church location is typical in the Ethiopian Orthodox church, as symbolized by Debre Dammo Monastery, the oldest monastery in Ethiopia dating from the 6th century, which is situated on the flat-topped mountain. Remarkably, these arrangement features of hilltop church and hillside habitats are in common with above-mentioned features of major sites of Tigray. When the sketches of a rural settlement (Fig.1-16), Dīgsa (Fig.1-8), and ‘Adwa (Fig.1-7) are compared, the similar layout is easily confirmed.

Each parcel in the hillside habitats is, as confirmed in the sketch of Fig.1-16, spatially characterized by the existence of a certain sized courtyard. From the sketch, it becomes clear that people found level land-pockets in the slope, and settled down. Sometimes, or even frequently, they might level the land to make a suitable living environment. This process reminds us of terraced agriculture, therefore, the author calls such a hillside parcel, of which courtyard is enclosed by the natural terrain or artificial wall, “terraced enclosure”. Because the shape of the terrain is always curvilinear in nature, the shape of the parcel is also likely to be curvilinear. In Asmara, the same concept was described in text: according to Raffray, a visitor in the latter half of 19th century, the buildings of Asmara usually backed on a small hillock, and were dug in the soil and covered by terraces that were on a level with the higher ground. The cave-like buildings were closed in front by a wall, usually made of stones, and the terrace extending a little beyond it formed a kind of simple courtyard, or verandah (Pankhurst 1985; Raffray 1876). In the case of Īnderta, as discussed in chapter III later, there are several buildings in one parcel and the main building is usually made of stones. Though “terraced enclosure” located in the hillside is often seen in Īnderta and Eritrean highlands in this way, it is more difficult to find in ‘Agame. The reason is related to the geomorphology of the area as discussed in chapter III. Interestingly enough, at least in Īnderta, the concept of “terraced enclosure” was applied in the

flatland settlement, too. That is, each parcel of the settlement is curvilinear in spite of the flatland location and the concept to make roads cannot be extracted (Fig.1-17).



Fig.1-17
Melba', a rural settlement
located in the flatland,
after Google Map.

2-2. Land Tenure System and Rural Social Hierarchy in Northern Ethiopia

The parcel enclosed by the wall is the characteristics of both rural settlements and major sites in Tigray. The clear demarcation implies the significant meaning of land ownership in the local community. To understand the old land tenure system of northern Ethiopia, two types of land-rights, named *g'ilt* and *rist*, should be explained at the beginning. While *g'ilt* is the right to collect taxes and tribute from the tributary peasants living on the property regularly to exercise administrative and judicial authority, *rist* is an inheritable right to use a land, which is conditional on the payment of taxes or tributes (Crummey 2007).

A land right of *g'ilt* originated from the monarch. In the period of Solomonic Dynasty, it became an important source of continuity in the social and political spheres. The extant grants were most conspicuously used for the founding of royal churches. While land was given as *g'ilt* to churches, it was often held, on the church's behalf, by individuals who performed service functions for the church in return (Crummey 2005). While *g'ilt* was not transferable by inheritance or by sale as a matter of principle, *rist* was an inheritable right, but not possible to sell to non-family members. *Rist* rights were claimed by a member of a kin from members of his / her generations of the same ancestor. A farmer could claim a plot of land as long as he could trace his decent. The *rist* holders had to pay land tax shared between the local *g'ilt* holders and the central state and tithe to the state (Ambaye 2015).

The Ethiopian Orthodox Church was the biggest beneficiary of state land grant. Church lands were often free from payments of tributes and land taxes. Even in the 19th century, Emperor Yohannis IV was a generous grantor of land to churches and monasteries. He was one of the last emperors who drew heavily on models derived from Gonder's old land-right system (Crummey 2000). According to Crummey (2007), Emperor Haile Selassie attempted to replace *g'ilt* with the direct payment of taxes to representatives of the central state between 1940s and 1960s. Nevertheless, until the coming

of the revolution in 1974, the church was said to be controlling one third of the land in the country (Ambaye 2015).

Though this land tenure system tells the general rules on land ownership in northern Ethiopia, neither the imperial state nor local *g'ilt* holders retained any degree of control over farm level decisions regarding production, such as what crops to grow, what tools to use, or adaptation of techniques of irrigation and terracing (McCann 1995). That is, the royal lands tended to be devolved to localized tenure as *rīst* that was controlled by farmers themselves. According to McCann (1995), pre-date arrival of ox plow and resulting labor efficiency and productivity contributed to underwriting the large bureaucratic political and ecclesiastical hierarchies of northern Ethiopia. Farmers transferred tax revenues to the local representatives of the state in the form of tithes, rent, land taxes, and obligation to feed and house guests during special feast days or on military campaign.

Within the rural economy of northern Ethiopian highlands, oxen were the economic resource or the form of capital. The breeding, purchase, borrowing, and maintaining of oxen determined household patterns of land use, debt, labor allocation, and cropping strategies. That is, households controlling oxen could obtain either labor or land on favorable terms, through a network of social cooperation, rental agreements and labor exchange (*Ibid.*). On the pattern of flow of oxen and labors, food also flew from resource-rich households to resource-poor ones vertically, rather than horizontal channels such as kinship and neighborhood. In this way, whether the household owned oxen or was forced to rent oxen, was a major determinant of rural economic class. Unless households owned oxen or had access to them, land had little economic meaning (*Ibid.*). These debt relationships between farmer's households formed the basis of rural class. These relationships were variable, therefore, the capital was not long termed and labor investment was not based on the land itself, and land allocation was relatively fluid (*Ibid.*). Concerning these instabilities, not only vulnerability of agricultural products or oxen themselves due to a change in annual climate or house animals' health, but also non-permanence of agricultural structures should be taken into account: short-lived irrigation required annual labors and agricultural terraces was made slowly over time.

2-3. Land Inheritance and Household in Rural Tigray

As a social ideal, children could expect to establish a new, single-generation estate at marriage through inheritance, borrowing, and strategies of accumulation characteristic of young households in the growth stage. The land right of *rīst* allowed individuals to claim land use rights through male or female ancestors who were linked with an original settler (*Ibid.*). Though the land inheritance could be claimed through the female line of ancestors, women's claims on land, oxen, and capital equipment were weak, in spite of legal recognition. As such, gendered technical practice on agriculture should be taken into account: the plow was guided by men alone while reaping was carried out by females (*Ibid.*).

However, according to Bauer (1977), one's children rather wished to separate from the parent's household and become a head of one's own household, at least in Īnderta located in southeastern part of Tigray, because a social status of a household was, in one sense, enhanced by one's own achievement. The achievement of one's father was not inheritable, and his own achievements had

an essential meaning to keep his status in such a rural community. Initially, a young married couple was expected to reside near the groom's parents or another sponsoring household, and moved away within a few years after marriage. They could live anywhere they wished, including neo-locally. Due to the resulting dispersal of children, the junior generation was more likely to take over the management of the parent's land. At last, "when replacement has been completed with the death of the original household head, the original household ceased to exist (*Ibid.*)". This concept of the society, Bauer (1977) called it "individualism," might have even sometimes led to demolition of the whole settlement. Swedish team who visited Mekelle in 1967 described the countryside landscape as follows: "the landscape is rich in abandoned, ruined houses, which lends it a sublime dimension (Carlson *et al.* 1971)" (Fig.1-18).

On the other hand, this tendency of "individualism" motivated ox plow households to move to new areas opened by political expansion. Along the periphery of the expanding ox plow complex, local property systems based on *rīst* was encouraged by new landlords or by the annual cropping regime (McCann 1995). The low population density in Tigray enabled land to be allocated to rural people regardless of lineage and logarithmic increase of land-right-holders. In this way, land allocation practice in the rural areas was neither uniform nor static over time (*Ibid.*).

Concerning the local community in Tigray, local churches took an important role. One gained membership in the state and ecclesiastic hierarchies by being a member of the local church congregation, and gained access to the state through the village headman who is the state's lowest officer (Bauer 1977). Tax collection and seeking justice were carried out through him. Furthermore, until the Italian occupation period, recruiting to perform military functions was done through him, too (*Ibid.*). Such prestigious families of the rural community might have often lived on the hilltop or upper hillside: when Salt visited "the lady in command of the district" at the beginning of the 19th century, he "had to traverse a steep pass which led us into a fertile valley, and soon afterwards to a lofty hill on which stood the mansion" of her (Salt 1814). To maintain the relationship between familial ties including brothers and sisters, Christianity took an important role, too. Every Christian person had, and still has, their own saint depending on his / her birthday, and each household head celebrated the day of the saint by preparing a meal of bread and beer to which he invited those persons who grew up in the same household with him and with whom he still has good relations (Bauer 1977).

Bauer (1977) explained the social relationship of the rural community by dividing the levels into four. The first level was parish. Because establishing residences required the participation in the parish as mentioned above, all households within the community had a relationship with all other households in this level. The next level of social relationship was ward. When ward, which was usually divided by the location, is different, social interaction was also



Fig.1-18 A ruined village near Mekelle in 1967, from Carlson *et al.* (1971).

separated. Bauer (1977) empirically found that “fellow ward members should be on good terms with one another” while members of different wards were “likely to be at odds with one another,” through his living experiences in his targeted rural village in Īnderta. The third level of social relationship was neighborhood. Neighbors had mutual rights and duties in supporting one another’s important ceremonies such as baptisms, marriages and funerals by assisting with preparations. The last level of social relationship was feasting associations. This is the membership separated from daily hierarchical relations, and the actual relationship was often crosscutting the other neighborhood, ward and parish levels.

2-4. Hypothesis on Similarity and Distinction of “City” and Rural Settlement in Tigray

By comparing major sites with rural settlements in Tigray, “urban” characteristics of Tigray can be hypothesized as the unique points of major sites can be recognized as the “urban” characteristics that rural settlements do not possess.

The definitive distinction between major sites and rural settlements is the occupation of residents. In the rural settlements, the major residents are of course farmers, who belonged to parish. Though Christianity took an important role also in the major sites, there was the ruler and his family members, retainers under the ruler, traders who were often Muslims, and people of other occupations in the major sites. Therefore, when the major site flourished, a larger number of people resided there and people’s occupations were more varied than the rural settlements. However, the population fluctuated more easily in major sites because its rise-and-fall often corresponded with the ruler’s rise-and-fall. Major sites often flourished as the trading centers. Rulers expected and received revenues in customs fees and market taxes from the movement of middle and long distance trade across the zones of its direct authority, as well as taxes and tributes from the farmers (McCann 1995). On the other hand, in the rural settlements, the population was smaller but more stable. The fluctuation was usually caused by the farmers’, which usually happened at the time of marriage and death.

From the perspective of location and layout, it is difficult to identify the distinction between major sites and rural settlements. Both of them were likely to be located in the place where rich natural resources such as water and fertile soils were available. The existence of rich natural resources was confirmed by the existence of irrigation. However, irrigation was situated in each parcel in the case of major sites, while it was of course situated in farmlands in the case of rural settlements. Furthermore, the layout of hilltop church and hillside habitats was common, too. In the case of rural settlements, farmlands were often placed in the lower side of slopes. The formation of both major sites and rural settlements is like an aggregation of curvilinear shaped parcels with courtyards. There was no urban planning, and roads were narrow and winding.

The locational distinction perhaps found that major sites were usually situated in the mountainous place. This locational characteristic was helpful to strengthen defenses. Indeed, necessity for defense was smaller in rural settlements than major sites of ruler’s base. Another distinction is that there were ruler’s parcel or palace in the major sites. This was often situated on one of the hills in the major site.

Furthermore, the existence of the network of vantage points should be taken into account in the case of major sites. Though both major sites and rural settlements had characteristics of the hilltop church, there were often more than one church and ruler's parcel or palace in the major site. If these several vantage points formed multi-stratified visual and acoustic network, it is helpful to strengthen the defenses of the major site. On the other hand, a rural settlement can be recognized as the closed society that was clustered centering on a church located in the hilltop. In this meaning, major sites can be spatially recognized as the aggregation of several settlements, each of which has visual contact each other, albeit other facilities such as ruler's residence and markets existing in the major sites.

3. Initial “Urban” Formation of Mekelle

In the previous sections, spatial characteristics of major sites or “city” of Tigray were searched for by comparing several major sites of Tigray and Eritrean highland, and comparison of major sites and rural settlements in Tigray. Based on them, the case of Mekelle, the specific target of this dissertation, is discussed in this section. To understand the urban history of Mekelle, Pankhurst (1985) again gives essential information. Furthermore, a series of studies by Okazaki (2009, 2011, 2014-1 and 2014-2) provides valuable insights on urban formation history in the present central Mekelle, namely in the old town of Mekelle. In addition, the author carried out a field survey in Īnda Mesqel, one of the original settlements located in hillside. By taking these materials, Mekelle’s initial urban formation and “urban” characteristics of Tigray are examined in detail more.

3-1. Before Becoming a “City”

As other major sites of Tigray, the site of Mekelle is surrounded with “high mountains” of north-east, east and southeast (Fig.1-19). The present built-up area is located in the flatland on the bottom of mountains (Map 3). Though it was not perhaps mentioned in any record prior to 19th century, it became one of the favorite places of *Ras* Welde Sillasé, as mentioned above. In his period, Salt drew a sketch of this site, and described as follows: “the view of the village *Muccullah* from the bottom of the hill is extremely picturesque (Annesley 1809)” (Fig.1-20). Another description by Salt clearly explains that natural setting of Mekelle coincided with local settlement techniques of Tigray: “After passing several more hills, we came in sight of *Muccullah*, in the vicinity of which, on the top of a hill, is a large church, that forms a very conspicuous object across the plain. The land about the town is in a high state of cultivation; the soil consists of a rich black roam (*Ibid.*)” The mentioned hilltop church, named Īnda Yesus, is drawn in his sketch (Fig.1-20). *Ras* Welde Sillasé preferred to visit this church (Salt 1814).

76 years after Salt’s sketch, another French visitor, Gabriel Simon, drew a sketch of Mekelle in 1881 (Fig.1-21). In spite of the limited number of trees and water streams drawn in his sketch, he described its fertile and well-watered situation in writing. Though many parts of water streams are exhausted today, the original locations of water streams can be estimated from the existing map (Fig.1-22). By this time, both Yohannīs IV and his son Ar’aya Sillasé had residences in Mekelle (Pankhurst 1985; Simon 1885). A large circular structure at the center of Fig.1-21 corresponds to this residence. From this sketch, it is clear that the royal parcel was situated on the small hilltop at the bottom of higher hills. In addition, the strategic importance was enhanced by the fact that there was “a very good unfailing spring of water in the garden” while “a small stream” ran “within fifty yards of the main gate”



Fig.1-19 Mekelle surrounded with mountains, photo by author.



Fig.1-20
Mekelle in 1805,
after Salt (1809).

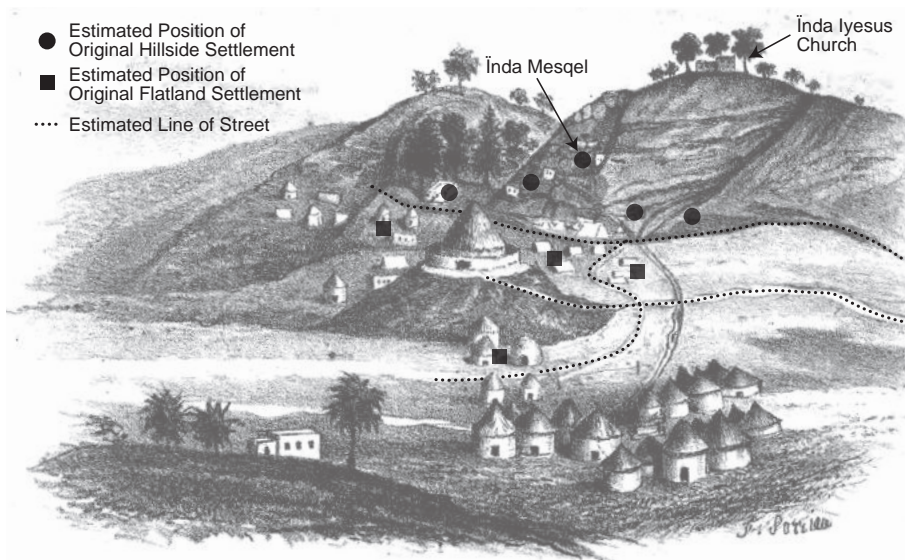


Fig.1-21
Mekelle in 1881,
after Simon (1885).

(Pankhurst 1985; Wylde 1901). Importantly, the water stream is poured from the hill of Īnda Mesqel, the specific targeted hillside settlement of this dissertation.

People settled in such a favorable environment. Before the initiation of development in Mekelle, there were nine settlements, five in the hillside and four in the flatland, in the site of Mekelle (Okazaki 2009; Tadesse 2001). Existence of both hillside and flatland settlements is indeed confirmed by Simon's sketch (Fig.1-21). Furthermore, Salt's sketch of Fig.1-20 shows the existence of settlement-like habitats in the hillside, too, though whether it is really a settlement or church school dormitory is not clear. Okazaki (2009) identified each settlement's exact place from the name of the settlements and mapped it (Fig.1-22). From the comparison between the location of original settlement and water stream, strong physical relationships can be found. That is, original settlements are likely to be situated along water streams (Fig.1-22).

Through comparisons between Simon's sketch and the position of water stream, the physical con-

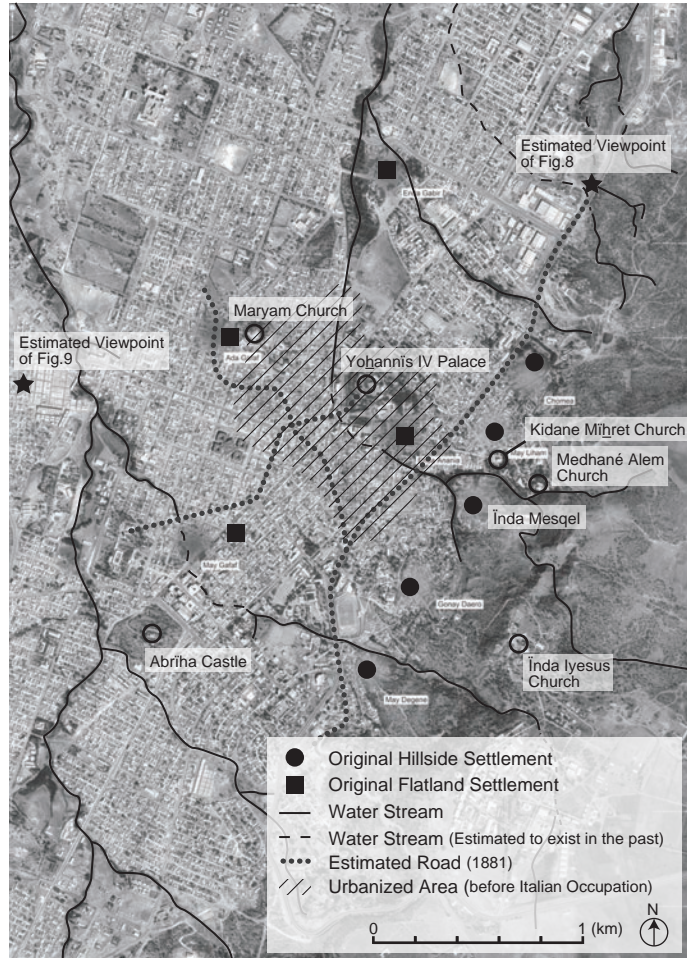


Fig.1-22
 A map of Mekelle to show initial "urban" formation, after Okazaki (2009); other sources: Mekelle City Administration (2016), Simon (1885).

dition of Mekelle at that time can be clarified to some extent (Fig.1-21, 22)¹. The comparisons clarified that the position of drawn water streams in Fig.1-21 differs from the actual state by and large, and several habitats were drawn in where the original settlements did not exist by Simon. Of all such sketched habitats, the most conspicuous ones are a group of circular buildings sketched in the lower right of the sketch (Fig.1-21). It might have been the habitats for the troops under the royal family. Furthermore, the comparison clarified the hypothetical street network. Accordingly, one street was extended from the royal parcel to the south, and another perpendicular street running from east to west existed in front of it (Fig.1-22). Besides the two, a street running from south to north, which still exists today, had already appeared at that time.

However, in spite of the existence of the ruler's parcel and some street network, Simon who drew the sketch of Fig.1-21 mentioned that the site condition was still no more than a "village" (Pankhurst 1985; Simon 1885).

¹ Whether each line drawn in the sketch is water stream or street is difficult to identify. The author identifies it by taking topography into account, because water runs from the upper areas to the lower. The viewpoint of Salt's sketch is estimated from the physical relationship of two high hills. The hill with İnda Yesus is located in the recess of foreside hill. Concerning the view point of Simon's sketch, it is estimated from the position of two high hills, royal parcel, and water streams. When reconstructing the position of street, not only existing street network, but also analysis of Okazaki (2009) is referred.

3-2. How Did Mekelle Become a “City”?

If Simon’s impression is respected, when did Mekelle become a “city”? Because the site’s development was initiated by Emperor Yoḥannīs IV, clues can be found by tracing the relationship between the site, himself and his family members in this section.

When Yoḥannīs IV decided to establish his new palace in the latter half of the 19th century, there were five places he considered, ‘Adwa, Aksum, Témben, Kwiḥa and Mekelle (Okazaki 2009; Tadesse 2001). Although Yoḥannīs IV, his name before coronation was actually Kassa, had originated from Témben, the people of Témben refused him to construct his palace due to the fear that their farmland would be taken over in order to build his palace and that the soldiers of Yoḥannīs IV would take their wives. Finally, he decided to build his palace in Mekelle due to the favorable attitude of the local people (*Ibid.*). The oral tradition collected by some Bayru *Tafla* that his mother Sīllas, whose place of birth was Īnderta, had spent a night in Mekelle after her wedding can be raised as one of the reasons to decide to place his palace there (Pankhurst 1985).

The interview research with residents of Īnda Mesqel, carried out by Riichi Miyake and the author in 2010, strengthens this idea. The family history of the earliest settler among the original hereditary line of Īnda Mesqel, namely <family-A> in Map 5, is suggestive.² Accordingly, the informant’s ancestor originally lived in Wello, south of Tigray. When he escaped due to murder, he occasionally met Mīrcha, the father of Yoḥannīs IV, and the ancestor decided to settle in the site of Īnda Mesqel. The first settler of Īnda Mesqel arranged the marriage between Mīrcha and Sīllas, and Yoḥannīs IV was conceived here. Afterwards, his son also served Yoḥannīs IV as *blattén-géta* (Fig.7). Though the credibility of this family history is not certain, the story corresponds to the above-mentioned legendary story, and explains the reason for the mutual favorable attitudes between Yoḥannīs IV and the local people.

Before the coronation of Yoḥannīs IV as “King of Kings” in 1872, he ordered the construction of a church in the name of the Savoir of the World, namely Medhané Alem, in Mekelle and inspected it in the end of 1871. According to his chronicle, the country around the church was “exactly like paradise and had sweet water pouring out of the springs on its right and left, and front and back at all times” (Pankhurst 1985). Furthermore, he gave a “magnificent hall to be the house of God,” installed a *tabot*³ in the church of Kidane Mīḥret (*Ibid.*). The location of Medhané Alem Church is exemplar of typical layout of other major sites and local settlements, on a higher part of the slope that is placed at opposite side of Īnda Mesqel across a water stream (Fig.1-22). And Kidane Mīḥret Church is placed at the bottom of the hill where Medhané Alem Church is located.

Though Emperor Yoḥannīs IV traveled widely throughout his domains in his period due to frequent battles, he had a particular regard for Mekelle. His entrusted son *Ras* Ar’aya Sīllasé resided in Mekelle at that time. As mentioned above, both of them had residences in Mekelle by 1881, however, the condition at that time was no more than a “village”. One of the triggers of development could be found at the time of the replacement of the imperial palace. In 1880 or 1881, Emperor Yoḥannīs IV ordered Giacomo Naretti, an Italian craftsman who served the emperor, to build a new palace (Sacchi

² Unfortunately, the key informant died in 2014.

³ The term of *tabot* is applied “interchangeably in the Ethiopian Church both to wooden and stone plaques that symbolically represent the Mosaic Tablets of the Law and to receptacle in which such are housed (Phillipson 2009).”

2012). The palace was “already much advance” by 1882, and Yohannis IV achieved full occupation by 1884 (Pankhurst 1985; Zewde 1975). The palace’s parcel was located on the small hilltop of the flatland and enclosed by high masonry walls (Fig.1-23). The main building of the palace, which is remaining even today, had magnificent appearance, due to the participation of Naretti and other foreigners (Fig.1-24). This historically significant palace building is discussed in chapter IV. In addition, there were several buildings including guardhouses at the gate, in the parcel of the palace (Pankhurst 1985; Wylde 1901). This “strong fortification” was helpful to strengthen the defenses at that time (*Ibid.*). Within the parcel, there was “a very good unfailing spring of water in the garden,” and “a well-kept lawn with many shady trees, and some good orange, lime, peach and myrtle bushes” (*Ibid.*). It reminds the descriptions on the parcel appearance in several other major sites of Tigray.

Taking advantage of this new palace construction, aristocrats and warriors under Emperor Yohannis IV and his family members migrated around this palace. Furthermore, on the west side of the palace, there was an area inhabited by the Muslim community (Okazaki 2009; Tadesse 2001). From this fact, Okazaki (2014-2) estimated the introduction of strong economic and trading activities at that time. Especially, Mekelle was, and still is, famous for the trade of salt, mined in the lowlands of present Afar region and carried by the camel caravan managed by local Afar pastoral tribesmen (Miyake *et al.* 2012-2). Though *Ras* Ar’aya Sillasé died in 1888 and Emperor Yohannis IV also died in 1889, Mekelle continuously grew under another Emperor’s son, *Ras* Mengesha Yohannis, because he made Mekelle the “chief town” (Pankhurst 1985; Wylde 1901). In 1890s, Mekelle was the “largest salt market” in all Ethiopia (Sacchi 2012). When it is reminded that the development of Gonder, the first fixed capital “city” of Ethiopian imperial state, was distinguished with predate moving capital tradition or transitional capitals by the continuous use by more than one emperor, this continuity of governing body by generation can be recognized as one of the criteria to distinguish “city” from a settlement, though *Ras* Mengesha Yohannis was not Ethiopian emperor. In a set of apartments within the royal parcel, *Ras* Mengesha Yohannis transacted the whole of his business of state (Pankhurst 1985; Wylde 1901). In the middle of the last decade of the 19th century, Mekelle “perhaps consisted of about 500 enclosures with four to six houses in each; giving six inhabitants to a house would bring its permanent population up to about 15,000” (Wylde 1901). However, Mekelle suffered con-

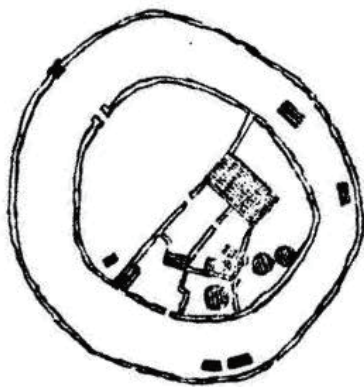


Fig.1-23 Plan of the parcel of Emperor Yohannis IV Palace, from Cavaglieri (1947). Fig.1-24 A main building of Emperor Yohannis IV Palace in 1886; from Smith (1890).

siderably from the battle between Emperor Menelik II's and Italian forces in 1894/95, and famine. The majority of the trees in the gardens had been cut down for defensive purposes and for firewood (*Ibid.*).

The transformation process afterwards is discussed in chapter IV. Therefore, several notable events related to the initial development are described in this section. At first, Abriha Ar'aya, who was appointed governor of much of eastern and southern Tigray by the central government in 1902 and made Mekelle his capital, ordered to construct his castle on a hill located in the south part of Mekelle (Fig.1-22, 25). Because he was challenged by Siyyum Mengesha, the son of Mengesha Yohannis who lived in Yohannis IV Palace, he decided to build his castle in an area away from built-up areas at that time. Local tradition claims that the hill was artificially landed up to face Yohannis IV Palace. The building analysis of Abriha Castle is carried out in chapter IV. Afterwards, especially in 1920s and 1930s, Mekelle witnessed remarkable growth. Though the detail is discussed in chapter IV, it should be mentioned here that a new church named Maryam Church was established between late 1910s and early 1930s on the west of Yohannis IV Palace (Fig.1-22). The location is again on a small hilltop in the flatland, as other major sites of Tigray (Fig.1-26).



Fig.1-25 Aerial photo of Abriha Castle in around 1930s, from Okazaki (2009): collection of Cultural Association of Tigray.



Fig.1-26 View from around the entrance of Maryam Church, photo by author.

3-3. Hypothesis of a Rule on Initial “Urban” Formation

The built up area in 1930s, namely the eve of the Italian occupation, was clarified by Okazaki (2009, 2014-2) from the analysis of aerial photo taken in the occupation period (Fig.1-27). Accordingly, the residential areas of aristocrats and warriors under the rulers' or governors' family members were allocated along the water stream aside Yohannis IV Palace, and stretched in the shape of an “L” on the south, southwest and west side of the palace (Fig.1-22). Okazaki (2009, 2011, 2014-1, 2014-2) clarified that several noble families' familial history and status of historic buildings in their parcels, through a series of field surveys, too. On the other hand, from the aerial photo of Fig.1-27, it becomes clear that several curvilinear parcels were dispersed loosely on the north side of the palace. Such a loosely dispersed arrangement consisting of curvilinear parcels was more dominant at the phase of initial urban formation, as confirmed by the engraving of Mekelle dated 1896, namely just after the battle between Emperor Menelik II and Italy (Fig.1-28).

While the process of built-up area's densification from the loosely dispersed arrangement is set

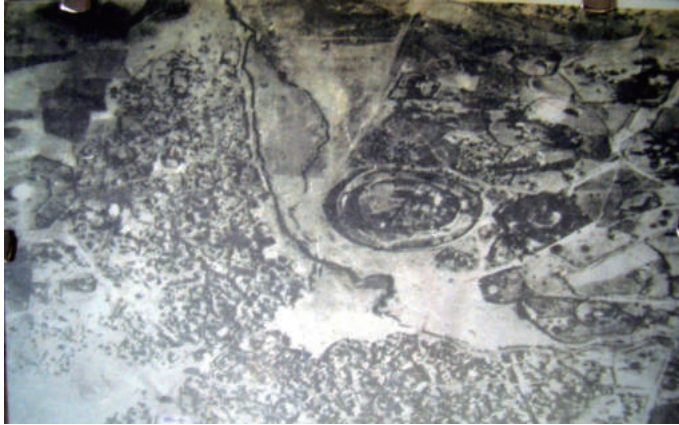


Fig.1-27 Aerial photo of Mekelle taken in Italian occupation period, from Okazaki (2009): collection of Cultural Association of Tigray.



Fig.1-28 Engraving of Mekelle, from "L'illustration", No. 2758, 4 January, 1896.

aside for chapter IV, the rule of the allocation of each parcel should be considered here. The following description of Wylde (1901) gives essential hints: the majority of houses around the palace were "built on several minor hills." That is to say, it is hypothesized that people, more precisely aristocrats and warriors, found out the micro terrain, and settled down at the initial phase of development. The shape of each parcel became curvilinear to follow the terrain, as with "terraced-enclosure" practice in the rural settlements (Fig.1-16). In this kind of "urban" formation process, the emphasis is placed on how individuals occupy each territory, while the planning of street network is not so rigorously reflected. This is an essential and distinctive feature when compared with modern urban planning strategy. Nearby the palace, a two-storied residence that shows this feature still remains (Fig.1-29). This residence has

still been conspicuous because it stood on a heavy foundation in a topographically higher place than the surrounding (Fig.1-30). According to the author's interview with the house owner, her father serving under Gugsu built it before the Italian occupation. The analysis of the building is carried out in chapter IV.

In nearly every parcel, there was "a large garden with an irrigation channel to it," at least before the battle of 1894/95 (Pankhurst 1985; Wylde 1901). Each garden was maintained by "several men," whose jobs were to look after these streams, to keep them in repair, and to turn the water on to the gardens when necessary (*Ibid.*). The fact that such a job was not performed in the rural settlements should be taken into account to consider the "city" as well.

3-4. Network between Vantage Points

Before the development initiated by Yohannis IV, the site of present Mekelle consisting of nine small settlements was no more than a minor place without any remarkable settlements, though the site became a preferred seat of provincial rulers in the early 19th century. Spatially, the settlements were built around a network of water streams (Fig.1-22). People were conscious of the natural environment such as location of water, and settled accordingly. To what extent these settlements had on



Fig.1-29 An example of a house built on a minor hill of the flatland in 1920s or 1930s, *photo by author*.

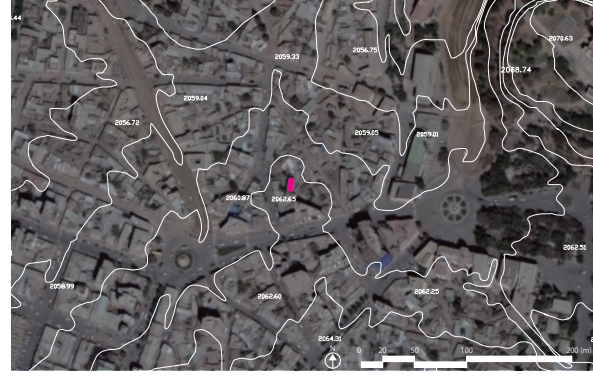


Fig.1-30 A map with contour line (2m span) showing the site of Fig.1-29 house, *after Google Map*.

social relationships with each other is not clear. Nevertheless, the author's interview research clarified that land belonging to the relative of an ancestor of <family A> in Īnda Mesqel has existed in the neighboring hillside settlement of Īnda Mesqel since the 19th century. This might have been the result of the dispersal of one's children, which was motivated by the tendency of "individualism" following the local beliefs of the household in the rural area. Considering the above-mentioned closed feature of rural settlements, the relationship between original nine settlements in present Mekelle seemed not so strong, though the discussions between settlements of upper and lower water stream should have been essential to live daily life.

After the development was initiated, a new thought on the relationship between hillside and flatland settlements or areas was added. That is, how to physically secure the site became an important issue. Emperor Yohannis IV sited his palace on the small hilltop of the flatland. The palace enclosed by high walls was secured by the built-up area, which was located on the south, southwest and west sides of the palace, and his aristocrats and warriors resided there. The orientation of the built-up area is reasonable because the flatland was physically open to those sides from the palace. In the background, namely on the northeast, east and southeast sides of the palace, there were high mountains. To control the whole of Mekelle, the way of defenses should be considered from a broader perspective. In short, strategic network between hillside and flatland areas was essential to secure Mekelle.

Īnda Mesqel was located in a strategically important place. From the sketch of Simon, it becomes clear that the settlement was located at the highest place of all original settlements (Fig.1-21). A broad view westward is still available from Īnda Mesqel, and water stream poured into the front of the palace (Fig.1-31). The existence of a key family that has a family history relating to Emperor Yohannis IV is suggestive to understand the Emperor's multi-tiered defense strategy. That is, while flatland settlements physically guarded the palace, hillside areas kept an eye on the broader horizon. The



Fig.1-31 View from Īnda Mesqel, *photo by author*.

churches such as Īnda Yesus and Medhané Alem, which had a close relationship with a series of rulers, should have contributed to enhancing this defense strategy.

As progressing the development, other elements such as Abriha Castle and Maryam Church, both of them are located on a small hilltop in the flatland, was added as vantage points. The development process of Mekelle can be recognized as the process of multiplication of visual and acoustic networks, as with the development of Gonder, the first fixed capital of Ethiopian imperial state.

3-5. A Case of Īnda Mesqel, One of the Original Settlements Located in Hillside

3-5-1: Background to Discuss Īnda Mesqel

As discussed in the previous section, Īnda Mesqel, one of the original settlements of Mekelle, is situated on the hillside looking down on a water stream pouring into central Mekelle, which is now almost exhausted. As mentioned in the introduction, the existing eight hereditary family lines had started settling down since the 19th century gradually (Fig.7; Map 6: A-H corresponds with the original hereditary lines). Though the results of interview research enable the reconstructive analysis clarifying how and when each parcel of land was gradually occupied by the ancestors of key informants, the original condition of Īnda Mesqel before the beginnings of the 20th century is only vaguely known.

Īnda Mesqel is a legendary settlement where the messengers visiting Egypt in 1382-91 arrived with Holy Cross (*mesqel* means “cross”). Furthermore, at one point in time, a certain Mika’el Church existed in this settlement. However, it disappeared due to the church removal during the reign of Yohannis IV (Okazaki 2009). Though the scale of the church is vague, it is said to be located at the highest part of the hill (Map 6). In the upper hillside, the settlement was previously spread more, local people claimed. This is confirmed by the aerial photo taken in the 1960s (Map 6: Land-X). However, no further detail of this site exists. Compared with upper hillside, the condition of the lower part of the settlement might have been less densified.

As mentioned in the introduction, the subsequent settlers of Īnda Mesqel were closely related with successive governors of Tigray. Therefore, the word “settlement” may not be entirely correct for Īnda Mesqel. However, the physical condition of Īnda Mesqel rather resembled that of rural settlements until 1990s, as confirmed by aerial photos taken in 1960s (Map 6). This idea is strengthened by the key informant’s statement. According to key informant of <family C, G and H> (hereafter referred as [C, G, H]), farming activity could be seen normally in their childhood. As a result, the area of Īnda Mesqel was designated as rural in the Derg period. Even in the Mekelle Development Plan of 1993 (National Urban Planning Institute 1993), the proposed land use totally ignored this place, despite being situated within the city boundary and designated as “residential” in existing land use. That is to say, Īnda Mesqel was developed under the rural framework until the 1990s. These are the reasons why the word “settlement” is applied for Īnda Mesqel. In this chapter, the settlement formation since the 19th century, which was led by the migration of each key informant’s ancestors, is discussed.

⁴ While one informant said that the land belonged to Mirch’a, another said that it belonged to Mengesha Yohannis.

3-5-2: Settlement Formation Process since the 19th Century and Topographic Hierarchy

The existing hereditary lines' land occupation in Īnda Mesqel was initiated in the 19th century by <family A> that has passed down above-mentioned interesting family history related to the origin of Mekelle. He occupied the land of upper hillside (Fig.1-32: A). By the reign of Emperor Yohannis IV, this family had become powerful. Accord-

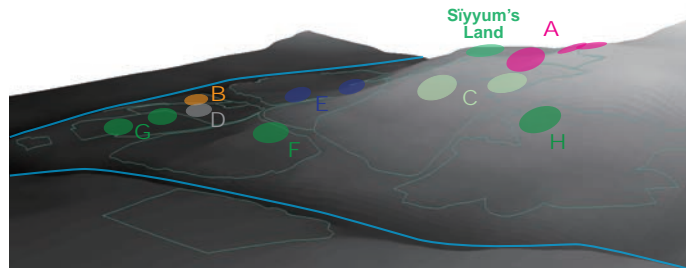


Fig.1-32 Formation process of Īnda Mesqel, *made by author*.

ing to [A], the ancestor was titled *blattén-géta* in the period of Emperor Yohannis IV, and occupied broader land in days past (Table 1: A; Map 6: A'). In the period of Emperor Yohannis IV, <family B> also started to settle down in the lower part of the settlement (Fig.1-32: B). The allocation of lower land should be due to his title *balgeda*, as this title was not related to aristocrat or warrior (Table 1: B).

The interview research has clarified that Īnda Mesqel had a close tie with Siyyum (Table 1: C, F, G, H). Concerning this close tie, the mention of Okazaki (2014-2) is remarkable: “those who fought for the resistance against Italy and those who suffered from the occupation, such as soldiers and civilian victims of the occupation, were granted land, either rural or urban, as the reward for their contribution and even as compensation”. This must have been realized in Īnda Mesqel, too. The close tie was as much as to set a parcel belonging to Siyyum here, though it has become vacant land (Map 6)⁵. This parcel of Siyyum was formed below the land of <family A> (Fig.1-32; Map 6). Though when the allocation happened is unknown, the family history of <family C> provides clues for consideration. Accordingly, his great-great-grandfather, serving as a skilled smith since Emperor Yohannis IV period, fought bravely in the first Italo-Ethiopian war of 1895/96 with Siyyum, and later acquired a title *bejirond* (Table 1: C). He was allocated the land below <family A's> land, perhaps in the first Siyyum period, namely around the beginnings of the 20th century (Fig.1-32: C). This story leads to the deduction that close ties between Siyyum and this settlement had already started since at least in his earlier period, namely prior to Gugs'a's period. On the other hand, the other three hereditary lines related to Siyyum were of second Siyyum's period, as mentioned later.

At almost the same time with the migration of <family C>, taking into account the key informant's generation and age, <family D> was likely to have come into existence in the lower land, albeit the detail is not clear (Fig.7; Fig.1-32: D). Subsequent settler was <family E> in the Gugs'a's period, namely around 1920s. The land between higher and lower parcels at that time was allocated to him (Fig.1-32: E). The land occupation of Īnda Mesqel was completed with the immigration of the remaining three families, namely <family F, G and H>, in the second Siyyum's period. They were given the land as a reward for their services in some battle, perhaps in the second Italo-Ethiopian war of 1935/36, and moved to Īnda Mesqel (Table 1: F, G, H). Spatially, the remaining lower lands were allocated for <family F> and <family G>, whereas another surface was allocated for <family H> (Fig.1-32: F, G, H).

From this settlement formation process, two spatial tendencies can be extracted. First, the land occupation was progressed from the upper to the lower. And secondly, the upper land tended to be

⁵ This is extracted through the interview research.

occupied by aristocrats or warriors. These two tendencies correspond with above mentioned rural settlement features. Though Siyyum was a member of the royal family and the rank was higher than <family A>, the spatial layout did not follow the second tendency. That is, preceding land occupation must have been acknowledged as a *fait accompli*.

When the formation of each parcel is observed, it becomes clear that the practice of “terraced enclosure” is basically applied in Īnda Mesqel. That is to say, people live in the level land-pockets in the slope and the shape of each parcel is curvilinear following the topography (Fig.1-33; Map 5, 6). Among the land of each hereditary line, steeply sloped lands such as <family A>, <family C> and <family H> consisted of aggregation of several terraces (Fig.1-33; Map 6). The gap of different levels is treated by stone piles for making vertical walls, like the above-mentioned terraced agriculture (Fig.1-34). This suggests that people technically formed “terraced enclosure”, in such a way as to form a terraced agricultural field, too.

At the point of 1960s, the location of house buildings in each parcel followed local agricultural knowledge, too. When the land of each hereditary line is observed, it becomes clear that house buildings tended to be located at the upper side of the parcel in 1960s, perhaps to reserve the bottom of slope for farmlands (Map 5, 6). Considering above-mentioned key informants’ statement that farming activity could be found in the past, the vacant land of the lower side shown in Map 6 should be farmlands. This way of land use relating to the agricultural knowledge has been obscured by recent urbanization. After the fall of Derg, the “settlement” has been transformed in accordance with population and building increase. How Īnda Mesqel is transformed is discussed in chapter IV by clarifying concrete changes happening in each parcel.

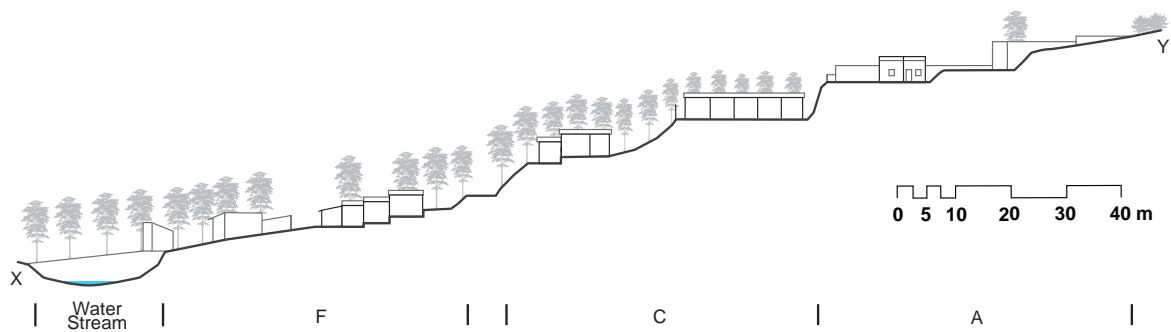


Fig.1-33 Land section of Īnda Mesqel (X-Y corresponding with of Map 5), *made by author*.



Fig.1-34 Stone piles applied in the gap of parcels in Īnda Mesqel, *photo by author*.

3-6. Considering Tigray's "City" Again

The above-mentioned spatial characteristics of the initial "urban" formation of Mekelle were usually in common with the ones of Tigray's other "cities," which often corresponded with rural settlement formation. That is to say, the hypotheses discussed in the previous sections were strengthened by the case of Mekelle. In this section, this issue is summarized.

First of all, the following locational characteristics were confirmed:

- The site with rich natural resources such as water resources and fertile soils that enabled enough agricultural production was preferred as the site of "city" including Mekelle and rural settlement. This was a common characteristic between "cities" and rural settlements in Tigray.
- The site of "city" was surrounded with mountains. This is confirmed from the case of Mekelle, too. This should be understood as a reason why there were no "city" walls in every Tigray's "city".

Next, topography was an essential factor to select the location of habitats and churches:

- In Mekelle, habitats were placed both hillside and flatland. The existence of hillside habitats was the characteristic found in both "cities" and rural settlements. A "city" might have been recognized as the aggregation of several settlements located in both hillside and flatland.
- Churches were often located in the hilltop in both "cities" and settlements. In Mekelle, İnda Yesus Church was built on the hilltop before the initiation of "urban" development. Furthermore, in the period of Emperor Yohannis, Medhané Alem Church was established in the higher part of the hillside. In the case that a church was built in the flatland, it tended to be established on a small hill, as confirmed by Maryam Church of Mekelle.
- The spatial layout of hilltop church and hillside habitats was the essential characteristic of rural settlement formation to reserve the bottom of slope for farmlands. Therefore, the existence of this layout in "urban" areas can be recognized as the application of the rural settlement knowledge and techniques.

The following two tendencies should be taken into account to consider the process of hillside settlement formation:

- The land occupation was progressed from the upper to the lower.
- The upper land tended to be occupied by people with higher status.

Each parcel had the following characteristics:

- A parcel located in the hillside followed the terrain. Therefore, the shape of each parcel was curvilinear. These characteristics, called "terraced-enclosure" in this dissertation, were common features both in the "cities" and rural settlements.
- Even in the flatland, these thoughts tended to be applied in Mekelle and its surrounds. In the case of the built-up area of Mekelle, it was applied by finding out the micro terrain.
- In each parcel of "cities," various trees and well-kept garden that was sometimes irrigated, often existed. This is confirmed in the case of Mekelle, too. The technique of irrigation was recognized as the application of agricultural technique developed in the rural settlements.

In this way, the distinctions between “city” and rural settlement in Tigray, namely the definitions of “city,” seem to be difficult to determine. In other words, it is hypothesized that “urban” formation techniques of Tigray were often the application of the rural settlement’s techniques. Nevertheless, several distinctions can be also extracted from the comparison between “city” and rural settlement of Tigray:

- There was a ruler’s parcel or palace in the “cities.” It was often situated in the hilltop.
- People’s occupation in the “city” was more various. In particular, trading activities were usually performed in the “cities.” In Mekelle, a job type to maintain a garden could be found, too. On the other hand, people usually engaged in farming activity in the rural settlements.
- The population of “city” was larger than rural settlements. However, the “urban” population easily fluctuated depending on the ruler’s political power. Rise-and-fall of “cities” of northern Ethiopia corresponded with the ruler’s rise-and-fall. Therefore, when a site was used by more than one ruler continuously, the place seemed to take on the status of fixed “city,” as confirmed in Gonder and Mekelle. On the other hand, the population in the rural settlements was smaller, but more stable.
- In case of a “city,” existence of visual and acoustic networks between vantage points, which often consisted of churches, a ruler’s parcel or palace, and important families’ parcels, should be taken into account. The multiplication of the networks was helpful to strengthen the defenses of the “city.” On the other hand, a rural settlement was more of a closed society that was clustered around a church. Nevertheless, even in the rural settlements, the spatial network between upper and lower water stream could be found, as confirmed by the case of Mekelle before “urban” development took place.

These are recognized as part of the criteria to decide whether a certain place was possible to be called a “city” or not. When other “city-like” places were examined, these points should be considered.

4. Conclusive Summary

Major sites of Tigray and Eritrean highland, located between Ethiopian highlands and Red Sea area, became the administrative and commercial center of the regional rulers. Therefore, each major site's rise-and-fall often corresponded with the ruler's rise-and-fall. As the location of major sites, mountainous place and the sites where rich natural resources such as water, fertile soils and trees were available were usually selected. On each hill of the site, where it is possible to overlook the surrounding area, a ruler's parcel or church(es) were likely to be situated. These locational characteristics are in common with predate moving capitals of Ethiopian emperors, later transitional capitals, and the first fixed capital Gonder. Furthermore, these vantage points occupied by a church and a ruler had visual and acoustic contacts with each other, in Gonder. The habitats were often situated in the hillside. There was no urban planning before the 20th century, and roads were narrow and winding.

In both the rural settlements and major sites of Tigray and Eritrean highland, similar locational characteristics and spatial layouts were approved. Furthermore, to form each parcel, the concept of "terraced enclosure" was commonly confirmed. That is to say, the site where rich natural resources were available was preferred and the spatial layout consisting of hilltop church and hillside habitats was adopted, in both rural settlements and major sites. Therefore, identifying the distinction between them seems to be a difficult issue. Nevertheless, several distinctions between them can be found, too: the population, people's occupation, whether a ruler's parcel existed or not, whether a mountainous position is preferred or not, and whether visual and acoustic networks between vantage points existed or not. The major sites can be spatially recognized as the aggregation of several settlements, each of which has visual contact each other. These are hypothesized distinctions between rural settlement and "city" in Tigray and Eritrean highland.

From the analysis of initial "urban" formation of Mekelle, the specific target of this dissertation, the above-mentioned characteristics of "city" are confirmed from every aspect. As "urban" formation processes progressed, the visual and acoustic networks between vantage points became multi-stratified gradually at the phase of initial development. In chapter IV, how the above-mentioned characteristics of "city" have been transformed in Mekelle is analyzed. The emergence of modern urban planning that was introduced from Italy in the occupation period is an essential aspect to consider. The analysis will be carried out from a spatial perspective, by dividing the urbanization process into urban sprawl and urban densification.

Chapter II

**Keys to Understand Masonry Building History in Tigray:
Material and Construction Method**

1. Natural Setting and Building Materials

1-1. Geological Setting

In Tigray, masonry walls are made from local stones. Therefore, type, color and texture of stones varies depending on the location, such as limestone in Mekelle, sandstone in Hawzén, and slate in Gunde Gundé. For example, as mentioned later, the masonry wall of Gunde Gundé comprising of thinner stones randomly piled up is impressive. Furthermore, softness (or hardness) of the rock usually affects the accessibility of stone materials and appearance of masonry walls. Namely, stones in some places are easy to deal with, namely easy to take or (and) shape, while ones in other sites are more difficult. In this way, knowledge on physical characteristics of the specific site gives important insights to understand local masonry walls of Tigray. Therefore, basic geological knowledge of Tigray is examined in this section. To review the formation process of the ground in Tigray, we must refer back to the period before the emergence of the existing African continent. Williams (2016) explained the geological history of Ethiopia clearly. The essence is summarized below.

By approximately 540 million years ago, all the ancient cratons¹ that form the cores of today's southern continents (South America, Africa, India, Antarctica and Australia) came together and formed a supercontinent known as Gondwana. In the process, Arabian-Nubian Shield, which has become the basement rock of Tigray, was formed by the concentration of oceanic type rocks. This Precambrian² basement exposed in the far north of Tigray and Eritrea mainly consists of metamorphosed volcanic rocks and ocean sediments with numerous granite intrusions (Fig.2-1).

During the next Palaeozoic era,³ much of the area experienced glacial deposits, and Precambrian basement rocks were overlaid by tillite (fragments of material carried and dumped by glaciers) and sandstone (deposition of sand in melt-water lakes and streams): they are respectively known as 'Īda-ga 'Arbi Tillite and Īntich'ew Sandstone (Fig.2-1). According to Asfawossen *et al.* (2008), Īntich'ew Sandstone, the yellow to white, fine-grained to coarse-grained, massive to well-bedded calcareous sandstone with silty beds and some ferruginous layers, has friable and kaolinthic features.

A little before 250 million years ago, in the Mesozoic era,⁴ cracks formed across some parts of the supercontinent, and land between the cracks subsided to form a rifted basin (Fig.2-2). Rivers flowed into the basins, carrying sediment that was eroded from the basement rocks and depositing it. Overtime (approximately 50 million years), the layer of sand became hardened and cemented to sandstone. This is known as Addigrat Sandstone (Fig.2-1). The stone type with grey or red color and fine-grained to course-grained texture has well-sorted, friable, and cross-bedded features (Asfawossen *et al.* 2008).

Around 180 million years ago, the eastern part of Gondwana began to separate from Africa, and sea-floor spreading commenced in what was to become the Indian Ocean. The water of this new ocean gradually extended and the rifted basins are flooded and overflowed. As the sea continued to

1 Craton means “a large stable block of the earth's crust forming the nucleus of a continent (Oxford Living Dictionaries).”

2 Precambrian era is the earliest era spanning from approx. 4.6 billion years ago to approx. 541 million years ago.

3 Palaeozoic era spans from approximately 541 million years ago to approximately 252 million years ago.

4 Mesozoic era spans from approximately 252 million years ago to approximately 66 million years ago.

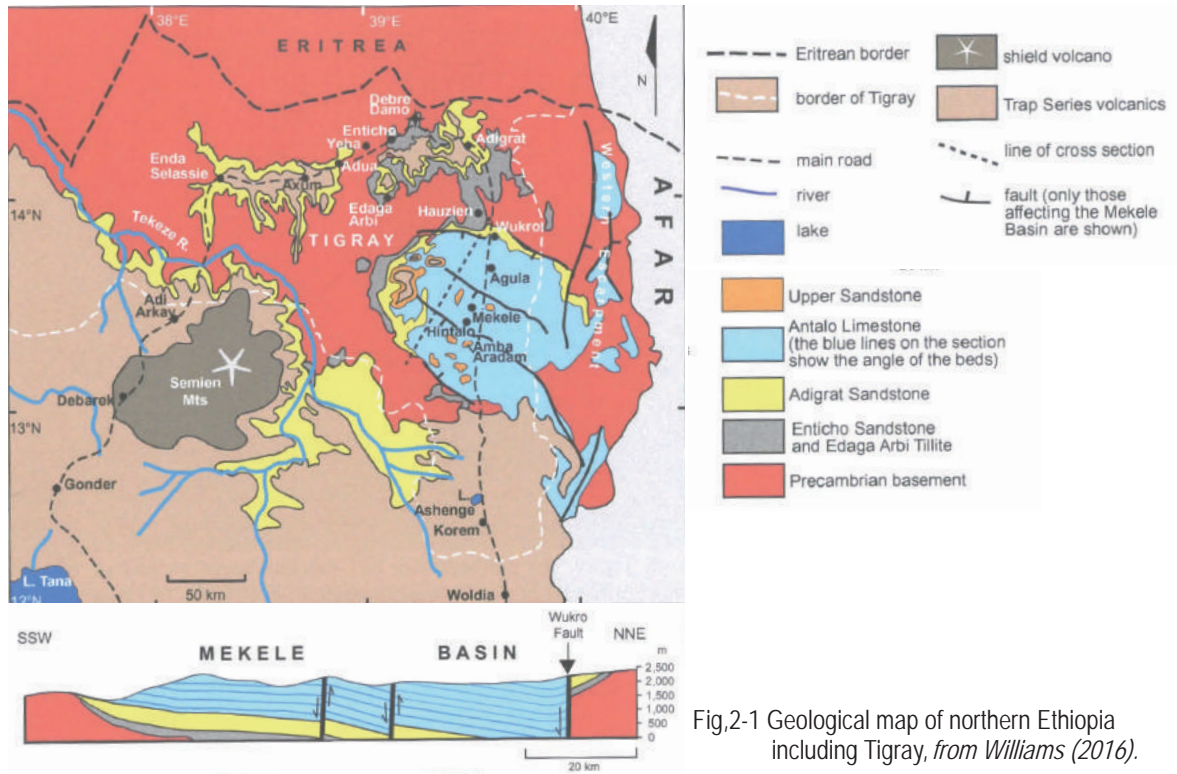


Fig.2-1 Geological map of northern Ethiopia including Tigray, from Williams (2016).

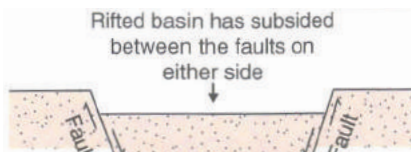


Fig.2-2 Cross section through a rifted basin, from Williams (2016).

move in and deepen, thick layers of limestone were deposited, some by chemical precipitation of carbonate minerals dissolved in the seawater and some from the shells of organism living in the sea. This is known as the Ant'alo Limestone (Fig.2-1). The white (or rarely black) limestone is finely crystalline to lithographic, well-bedded, fossiliferous and typically well indurated (Asfawossen *et al.* 2008). This was dissolved by water and inter-bedded with yellow marl and sandy limestone. The Ant'alo limestone is in places overlaid by fine-grained and thinly-bedded Agula^c Shale, which comprises variegated shale, marl, and clay, interlaminated with finely crystalline black limestone and some thin beds of gypsum and dolomite.

The sea began to retreat approx. 150 million years ago. Dry land was once more exposed and rivers flowed over it into the retreating sea. And, as is the case of 'Addigrat Sandstone some 100 million years earlier, layers of sand deposited. This new sandstone is called Upper Sandstone to distinguish it from the former one (Fig.2-1). According to Asfawossen *et al.* (2008), it is a white to pink, medium-grained to coarse-grained, immature and clastic sandstone inter-bedded with silt, shale, mudstone, laterite beds and quartz conglomerate lenses. In this way, the Mesozoic part of geological history of the targeted area is recorded as a kind of sandwich of sandstone – limestone – sandstone.

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Around 40 million years ago, in the Cenozoic era⁵, head of Afar Plume⁶ reached the base of lithosphere⁷. It spread out sideways and pushed up the overlying lithosphere into a broad dome, which

⁵ Cenozoic era spans from approx. 66 million years ago to the present day.

⁶ Plume means "a localized column of hotter magma rising by convection in the mantle, believed to cause volcanic activity in locations away from plate margins (Oxford Living Dictionaries)".

⁷ Lithosphere is a concept to discuss the large-scale movements of the earth. It indicates crust plus uppermost mantle.

is often referred to as the Afro-Arabian Dome. As the dome rose, molten rock (lava) poured through cracks in the lithosphere and solidified to form the volcanic rock. These layers of volcanic rock, which consist mainly of basalt, are known as Trap Series. Though the ground of Tigray is not covered much by these thick layers of volcanic rock, many parts of Western Highlands and Yemen are covered by it (Fig.2-1). In Tigray, the lava flows have mostly eroded away.

Uplift, the outpouring of Trap Series volcanics and the formation of big shield volcanoes are keys to understand the process of subsequent continent formation. The African Plate, Arabian Plate and Somali Plate became integrated, and gradually moved northwards toward the Eurasian Plate. As a result, Gulf of Aden formed 18 million years ago and penetrated westward to the African landmass, the Red Sea trough that started to sag possibly as long as 25 million years ago continued to widen, and the Arabian Peninsula was rotating anti-clockwise as it pulled away from Africa. Subsequently, sometime between 15 and 10 million years ago, due to the precedent sea-floor spreading in the Gulf of Aden and formation of trough along the Red Sea, the African continent itself began to split. From Ethiopia to Mozambique, strips of land sagged to form troughs, and fractured to form rift valleys.

Williams (2016) divided the area of Tigray, save the area where Precambrian basement rocks and Trap Series Volcanic rocks are exposed, into three: Mekelle Basin, the area between Hawzén and Addigrat, and the area between Addigrat and İnda Sillasé (Fig.2-1). Mekelle Basin, the specific targeted area of this dissertation, is filled with Palaeozoic and Mesozoic sedimentary rocks, over a basin-like depression with the basement. Above all, Ant'alo limestone and Agula^c Shale is dominantly available, and upper sandstone is exposed in places (Fig.2-1). North of the Mekelle Basin, namely the area between Hawzén and Addigrat, is overlaid with the İntich'ew and Addigrat Sandstones, though the area exposing Precambrian basement is large, too. The pinnacles and mesas carved out of white and red sandstones, remnants of what was once a sandstone plateau that has now been eroded away, forms an impressive landscape (Fig.2-3). The area between Addigrat to İnda Sillasé is a long ridge of sandstone, partly capped by basalt that is probably the northernmost remnant of the Trap Series volcanics.

When entering Mekelle Basin from the south, one can see that the building with masonry wall has increased in the area. Indeed, the surface of Mekelle Basin is often exposed by softer sedimentary rock, except for scarce thorny bushes and shrubs. On the other hand, the area on the south of



Fig.2-3 Landscape of Hawzén, photo by author.

Mekelle Basin is covered by harder Trap Series basalt. According to Asfawossen *et al.* (2008), the basalt in the volcanic mountains result in relatively thicker fertile soil. Eritrean highland is covered by Precambrian basement mainly consisting of low-grade metamorphic rocks (slates, phyllites, chloritic and seritic shists), Palaeozoic tillites, sandstones, granites and quartz, and Cenozoic basalt (Fig.2-4; Schlüter 2006).

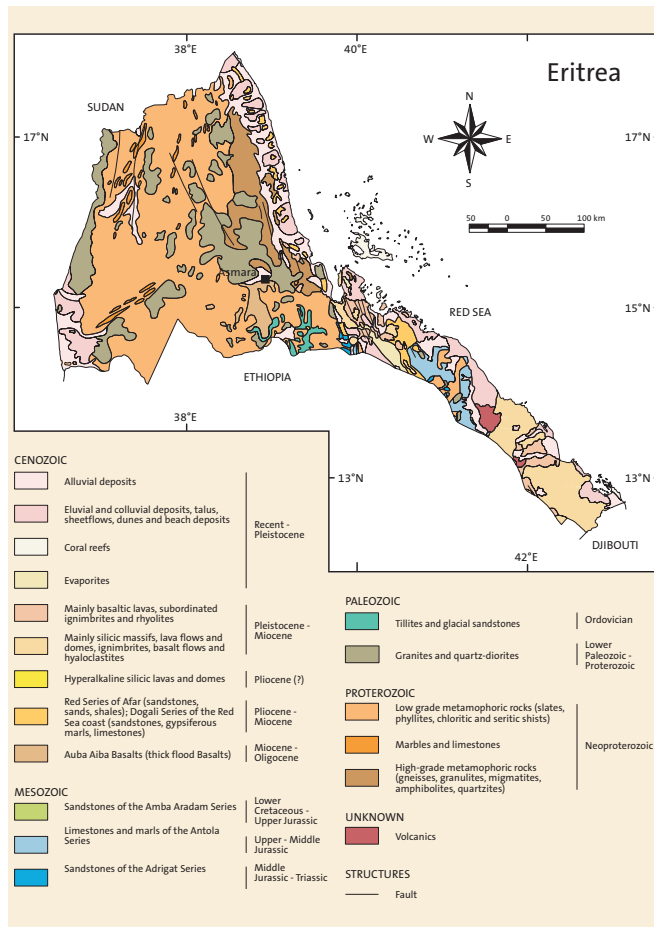


Fig.2-4 Geological map of Eritrea, from Schlüter (2006).

1-2. Deforestation and Available Woods in the Northern Ethiopia

Tigray's climate is drier than other parts of Ethiopia and has a unique landscape often consisting of bare rock with minimal natural vegetation. Indigenous species such as *tsehüdi* (*Juniperus procera*) and *awli'i* (*Olea Africana*) are rare currently. According to McCann (1995), juniperus forests of the central and northern highlands perhaps once covered as much as 15 percent of Ethiopia. However, less than 1 percent of the original forest area remains today, and few remnants of indigenous forests are found in scattered remote locations presently. The most famous forest for juniperus today is Dés'a, located on the edge of the escarpment in Eastern Tigray around 40km away northeast of Mekelle (Fig.2-5). Dés'a forest covers about 120,000 hectares of land and is presently designated, demarcated, and registered as a state forest to develop forest resources, protect genetic resources, and conserve the ecosystem, by the federal body (Girma 2017). Therefore, taking woods from the forest without permission is prohibited presently. There is another forest



Fig.2-5 Dés'a, a famous place for indigenous forests, photo by author.

that juniperus has existed in Hugumburda, located in the east of Lake Hashinge.

Concerning forest's history of northern Ethiopia, Darbyshire *et al.* (2003) carried out pollen and charcoal analysis of sediment cores from two lakes named Lake Hayq (approx. 240km away south of Mekelle) and Lake Ardibbo, which are located in Wello Province. The site is indeed out of Tigray, however, the indigenous species are shared with those in Tigray. At least, the research results provide important ideas to consider the environmental history of Tigray. According to the survey carried out by Darbyshire *et al.* (2003), the timeline of forest clearance and regrowth in the survey area is concluded as follows:

The natural, pre-disturbance vegetation of the area was Podocarpus-Juniperus forest. At about 500 BC, following Semitic immigration to northern Ethiopia, the forests were cleared and replaced by a secondary vegetation of Dodonaea scrub and grassland that persisted for 1800 years. Grasslands were dominant from about AD 1200 to 1400, probably as a result of further intensification of grazing, perhaps exacerbated by drought. Juniperus forest, with Olea and Celtis, then expanded from AD 1400 to 1700, possibly because of drought-induced depopulation followed by increased rainfall. Deforestation and soil erosion has again intensified during the last three centuries.

It is remarkable that Juniperus forest, which was recognized as a traditional species, was in fact re-generated as recently as the 14th and 18th centuries in the survey area. It is hypothesized that “dry conditions during the ‘Medieval Warm Period’ of the twelfth to fourteenth centuries, combined with anthropogenic pressure on the vegetation, caused land degradation and possibly a decline in the human population of the area. Increased rainfall during the sixteenth to eighteenth centuries then allowed Juniperus forest regeneration, favoured by less intensive human impact (*Ibid.*).”

Concerning re-deforestation from approximately 18th century, McCann (1995) raised two reasons. One is the influence of plow. Due to extension of farmlands, dry evergreen forests and grasslands and a large part of the moist evergreen forests changed to open farmlands and pasture. The maturation of the ox plow economy and its extension ironically caused shrink of open pastureland and forest, and resulting a shortage of livestock forage. The other reason is regional climate change happening in the middle of the 19th century. Warmer temperatures might have reduced rainfall and increased evaporation of moisture, albeit the evidence is not rich.

The widespread absence of forest in northern Ethiopia of 17th and 18th centuries is noted by a series of foreign explorers, too. According to Pankhurst (1995) who aggregated Western travelers' description, shortage of wood was reportedly a major factor leading to institutions moving capitals in the 16th and 17th centuries. In addition, Almeida noted in the 17th century that there was at the time “not much woodland” in the country, and the shortage was not due to the soil, but the inhabitants who cut down trees for their houses and for fuel but did not replant (*Ibid.*). Such overcutting without proper management systems must have encouraged the repeated deforestation.

On the other hand, according to Pankhurst (1995), more important towns of the past were relatively well-wooded. For example, he indicated that “most of the houses of 18th century Gonder were thus surrounded by a multitude of *wanza* (*Cordia abyssinica*)”, and ‘Adwa was “likewise graced by

many trees” in reference to Bruce. The richness of woods in ‘Adwa is confirmed by Salt, the British traveler in early 19th century, too: ‘Adwa “presented a striking appearance on account of the multitude of *Wanza* trees ... thickly planted in the enclose around the houses.” However, most of these woods were destroyed at the time of the Battle of ‘Adwa in 1896.

While many trees were evidently planted in the urban areas where there was a considerable demand for timber and firewood, little or no afforestation took place in the countryside where the need for wood was less pressing. As a result, deforestation of the countryside seemed to progress gradually. The seriousness of deforestation in the 19th century Ethiopian and Eritrean highland is confirmed by Pankhurst (1995), too:

The Asmara plain was thus described by the scholarly French traveler Arnauld d’Abbadie as treeless, and with very little bush, while Adwa suffered, according to his compatriot Guillaume Lejean, from a great shortage of timber. Tegré ... widely deforested – so much so that when Robert Napier and his men passed through it on their expedition against Emperor Téwodros in 1867-68 they found it remarkably difficult to obtain wood. One British officer reported that the erection by his compatriot of a telegraph line near Sän’afé was “much impaired” by want of poles, while another declared that “not a single tree” was “met with which could be used for telegraph poles.” The situation was no better at Addegrat...

In the 19th century, centuries of overexploitation rendered the northern highlands an ecological disaster and, in some cases, caused irreversible environmental damage (Girma 2017). Emperor Menelik II (r. 1889-1913) took advice from his foreign advisors and imported a new fast-growing species of trees. The country transplanted several species of eucalyptus trees from Australia, and issued a proclamation in 1904 ordering the national wide planting of this species. The tree was responsible for the resurrection of not only his new capital Addis Abeba, but also other old wooded towns such as Gonder and ‘Adwa.

During the Italian occupation period, wide-scale deforestation resumed. The Italians gave forests to private owners and allowed agriculture, urban encroachment, and other forms of forest destruction, without enough efforts to improve or protect the forest resources (Girma 2017). Furthermore, during the post-Italian period, especially 1960s and 1970s, continued rapid and extensive deforestation ensued due to the demand for building materials, fuelwood, and charcoal, which was driven in part by urbanization. Some species such as *zigba* (*Podocarpus garcillior*) and *tsehidi*, which once covered much of the highlands, were removed to the point that they all but disappeared from the countryside (*Ibid.*). How to conserve, protect and grow forests, which is owned by each state presently, is an important issue now.

1-3. Introduction of Ethiopian Local House Types and Construction Method of *Hidmo*

Ethiopia is a diverse country in terms of climate, topography, ethnicity and language. In response to the different natural, social and cultural context, there are diverse traditional house types. Naigzy (1971) introduced several traditional or local types of housing in Ethiopia. He classified them into three in accordance with the motions in time of construction work (Fig.2-6): 1) Piling (by use of stones or blocks); 2) Twining or tying (Fig.2-7; tying building elements together by rope, plant twigs or other suitable tying materials); 3) Weaving (Fig.2-8; by use of bamboo and grass). While a weaving process house without distinction between roof and wall is easier to relocate due to its lightness of weight, a heavy piling process house is difficult to relocate. On the other hand, fixing openings is more applicable in the piling one. In this way, a piling process house is more suitable for people with a settled lifestyle such as farmers. Though Fig.2-6 appears to show that the house types which evolved from a weaving one to twining or tying, and piling, the difference in the motions in time of construction work should be seen as an indication in the different attitudes as a response to their respective surrounding environment and lifestyle.

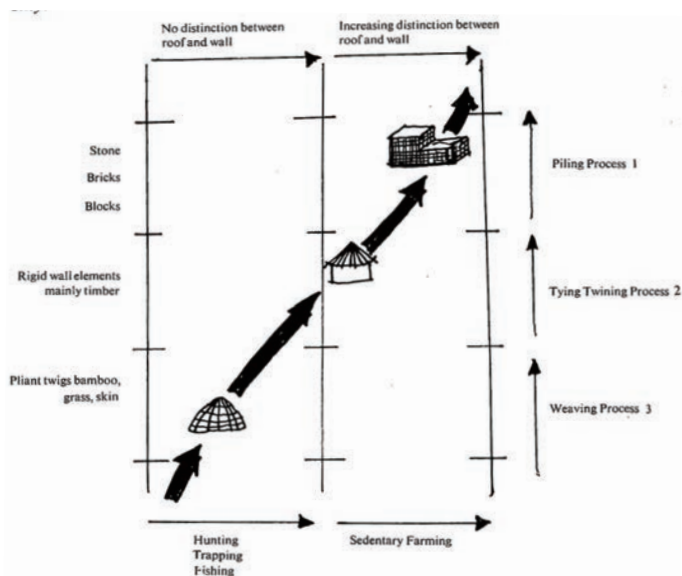


Fig.2-6 Classification of local housing types in Ethiopia by the motions in time of construction work, from Naigzy (1971).

Distribution of house type in northern Ethiopia is characterized by the existence of piling process houses (Fig.2-9). Concerning Tigray region, Naigzy introduced two examples of house types, named “Tigré farmer’s house” and “Tigré chief’s house.” “Tigré farmer’s house,” locally known as *hidmo*, is the specific targeted house type of this dissertation. Though the detailed building elements and material use are discussed in chapter III, basic construction method of *hidmo* is explained here (Fig.2-10, 11):



Fig.2-7 A local housing type by twining or tying process, photo by author. Fig.2-8 A local housing type by weaving process, from Naigzy (1971).

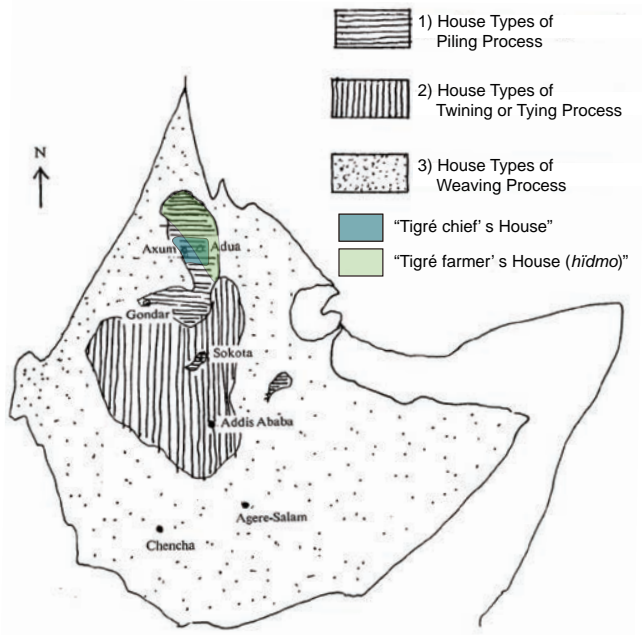


Fig.2-9
Distribution of each housing type, after Naigzy (1971).



Fig.2-10
External appearance of *hidmo*, photo by author.



Fig.2-11
Internal appearance of *hidmo*, photo by Higuchi, R.

- The walls are stone masonry wall, and muds are mainly used for joint material (Fig.2-10). The shape of a house is usually rectangular.
- One or two timber pillars are often set up inside the building (Fig.2-11).
- A timber beam is put on the short side of the building, and upper beams of timbers, which are usually placed in alternating twos, are put between the timber beam and a wall (Fig.2-11).
- Wooden planks that fill voids between upper beams, or upper beam and a wall, consist in the ceiling of a house (Fig.2-11).
- Soil and other materials placed on the ceiling structure consist in a flat, in reality slightly aslope, roof of a house.

On the other hand, another house type of Tigray, called “Tigré chief’s house” by Naigzy, is a two-storied circular house made of stones with a thatched conical roof (Fig.2-12). The plan shows the existence of a rectangular core area in the circular outline (Fig.2-13). The conical roof is assembled in the upper floor after a king post is set on the center of a beam bridging over the rectangular core (Fig.2-14).

Hidmo is distributed around Southeastern, Eastern and several parts of Central Tigray and adjacent areas of Eritrean highland, while “Tigré chief’s house” is dominant in other areas of Central Tigray including Aksum and ‘Adwa (Fig.2-9). Presently, *hidmo* cannot be found nearby Aksum.



Fig.2-12 External appearance of "Tigré Chief's House" relocated to EiABC in Addis Abeba, photo by author.

However, in Hawelti, the Pre-Aksumite archaeological site located in a broad fertile plain approximately 10km southeast of Aksum, a clay model resembling *hidmo* was found (Fig.2-15). The model projecting beams, a door, and windows, is tentatively dated to the late 1st millennium B.C. (Contenson 1963; Fattovich 2007). It implies that *hidmo* existed nearby Aksum at a time in the past. Furthermore, in Hawelti, a clay with a cylinder hut and a conical top was found, too (Fig.2-16; Contenson 1963). That is to say, both of the traditional, or local house types are estimated to have over a 2000-year-old history.

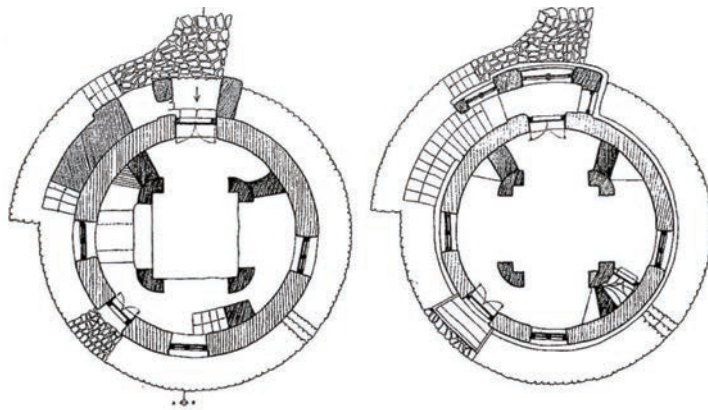


Fig.2-13 Plan of "Tigré Chief's House," from Naigzy (1971).



Fig.2-14 Section of "Tigré Chief's House," from Naigzy (1971).

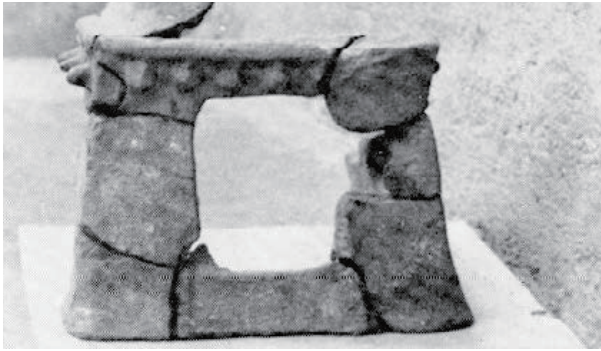


Fig.2-15 A clay model resembling *hidmo* found in Hawelti, from Contenson (1963).



Fig.2-16 A clay model with a cylinder hut with a conical top found in Hawelti, from Contenson (1963).

1-4. Availability of Building Materials (Stones and Woods)

The reason for the vanishment of *hidmo* from Aksum may have been considered from the aspect of deforestation, because it used plenty of wood, especially in the ceiling. We should be reminded of the analysis of Darbyshire *et al.* (2003) that the vanishment of indigenous juniperus forest at about 500 B.C. happened following Semitic immigration to northern Ethiopia. Though the detailed deforestation process is indeed not clear, the wide use of wood as a building material would have contributed to deforestation. In case of a circular house with conical roof, wooden materials can be often saved because its structural elements do not require so many timber materials.

However, it is contradictory that *hidmo* houses, which uses a lot of timber, are found in Tigray region which does not have much vegetation. Nevertheless, it should be taken into account that it is highly likely that Juniperus forest with *Olea* and *Celtics* re-expanded from 1400 to 1700 A.D. after a long break, as mentioned above (*Ibid.*). Viewed from the other angle, there is a possibility that excess use of wooden materials for building construction without proper forest management repeatedly induced serious deforestation. At any rate, the seriousness of deforestation in Ethiopian and Eritrean highland is clear from a series of foreign visitor's description.

On the other hand, stone is easy to collect in Tigray and Eritrean highland. Interestingly enough, the distribution of *hidmo* overlaps with the area of softer sedimentary rocks such as sandstone and limestone (Fig.2-1, 9). Even in other areas where *hidmo* exist, the rocks in the area are easy to split. For example, concerning Eritrean highland, Heldal *et al.* (2000) mentioned as follows: Eritrean highland has "strong traditions of using stone for local housing, especially granite, slate, limestone and volcanic rocks ... granitoids have for a long time been subject to traditional extraction by simple tools for local housing. Both the ongoing quarrying activity and houses in the area bear witness to the excellent splitting properties of these rocks." In addition, the author observed that local slate materials at Gunde Gundé Monastery were split easily by the use of simple tools.

In Aksum, basalt that has a tendency to be cleaved into flat pieces is applied for the foundation, and softer and greyish trachyte, or sandstone is applied for the masonry wall (Naigzy 1971). Therefore, existence of a clay model resembling *hidmo* house nearby Aksum connote that *hidmo* house construction was active at one time, from the perspective of rock distribution. Existence of easily accessible stone site was, and still is, an important environmental condition to realize masonry building construction.

2. Overview of Masonry Building History in Tigray

The masonry building tradition in Tigray dates back to the Pre-Aksumite period. The study on masonry structures of Pre-Aksumite and Aksumite period has progressed in the archaeological field, which was initiated by Littmann *et al.* (1913). However, post-Aksumite masonry buildings have not been studied so far. Concerning post-Aksumite building history, the attention has been paid more to rock-hewn churches. The masonry buildings have been discussed in relation to the rock-hewn churches collaterally. Nevertheless, Phillipson (2009) recently analyzed the history of Ethiopian church buildings until 14th century including masonry ones, by enormous data and sharp observation. In this section, the building history of Ethiopia is considered from the perspective of masonry structures. Through the discussion, it will become clear that above-mentioned geological factors are essential to understand the building history of the region.

2-1. Pre-Aksumite Masonry Structure in Yeha

At some time during the second quarter of the last millennium BC, several cultural practices that were previously unknown began. Due to the strong technical interactions with South Arabia, those features were thought to be brought from South Arabia. Small groups of people from South Arabia may have arrived and settled in favorable and fertile areas of present Tigray and southern Eritrea. Concerning a building, it is characterized by dressed stone ashlar masonry and large monolithic square sectioned pillars (Phillipson 2009). These characteristics were absent from the site attributing to the purely indigenous tradition.

Yeha is the most famous pre-Aksumite site with historically important structures. It is located in a valley surrounded by the plugs and steep-sided domes. The unique landform with pointed hills, steep sided domes and rocky spires, is helpful to protect the place from enemies.⁸ Though desirable building stones were not available in Yeha itself, desirable sandstone blocks could be transported from several kilometers away. Though only a few stones from nearby hills were used in the construction, it was too hard to cut into suitably sized blocks, unlike the more easily worked sandstone (Williams 2016).

One of the earliest examples in Yeha is Grat Be'al Gibri. It is thought that the site was used for religious purposes and characterized by massive monolithic square-sectioned pillars (Phillipson 2009; Anfray 1997). The portico is the only surviving part of the earliest building on the site, which is estimated to be built in the second quarter of the last millennium BC. The establishment of structural sequence is not clear, but it is possible that much of the rough stone works once had a finely finished ashlar facing. Furthermore, the excavation highlighted the use of wood, too: inner-wall beams and inner-wall posts appear in parts of walls (Breton 2015). Though it did not constitute the framework of the walls, its assembly may give cohesion to the masonry. On the other hand, the use of wooden framework is known in contemporary South Arabia. In eastern Hadramawt, an

⁸ Plug means "a steep-sided hill formed from lava which has solidified within a volcanic vent and is then exposed when the surrounding volcano is eroded away (Williams 2016)." The plugs in this area are commonly referred to as the 'Adwa Plugs, and are formed of trachyte and a more unusual volcanic rock called phonolite.

⁹ 'Adwa Plugs contributed to confusing the Italian army at the Battle of 'Adwa in 1896, too.

example that shows regular deep imprints of wooden posts, long-beams and cross pieces was found (Fig.2-17; Seigne 1982). Due to a violent fire destroying the houses, the exact place of original wood pieces hidden by mud-bricks was revealed.

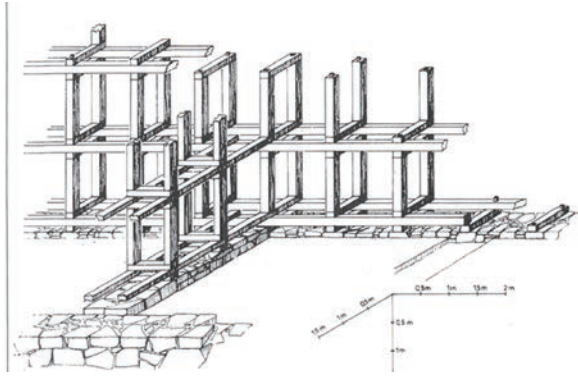


Fig.2-17 Wooden framework in a house in Hadramawt, South Arabia, from Seigne (1982).

In Yeha, another remarkable building named Great Temple, estimated to be erected in around 700 BC, exists. The walls are built from blocks of yellowish calcareous sandstone, 24-28 cm in thickness and up to two meters in length, are well preserved (Fig.2-18). The stones are well dressed and assembled without mortar, in two skins bound together at intervals by stone blocks that pass through the total 1.25 meters thickness of the wall, the filling between them otherwise comprising stone fragments set in mud (Phillipson 2009). The interior was once divided into two parts. The position of the separating wall is traceable from the mortises where their stonework was keyed into the external walls (Fig.2-19). The western part was further divided by four rows of three square-sectioned pillars into a central nave and four narrower aisles (Fig.2-20: a, b). In the westernmost part, a portico, presently only the basal plinths surviving, was attached at one time. There were monolithic pillars, 110 by 65 cm in section and 920 cm height. Though the structure was converted into the church structure (Fig.2-20: c), such Christian features are removed now (*Ibid.*).



Fig.2-18
Great Temple of Yeha
(a: External appearance; b:
Wall from a side), from ARCCH
et al.



Fig.2-19
Mortises in the wall of Great Temple of Yeha, from
Phillipson (2009).

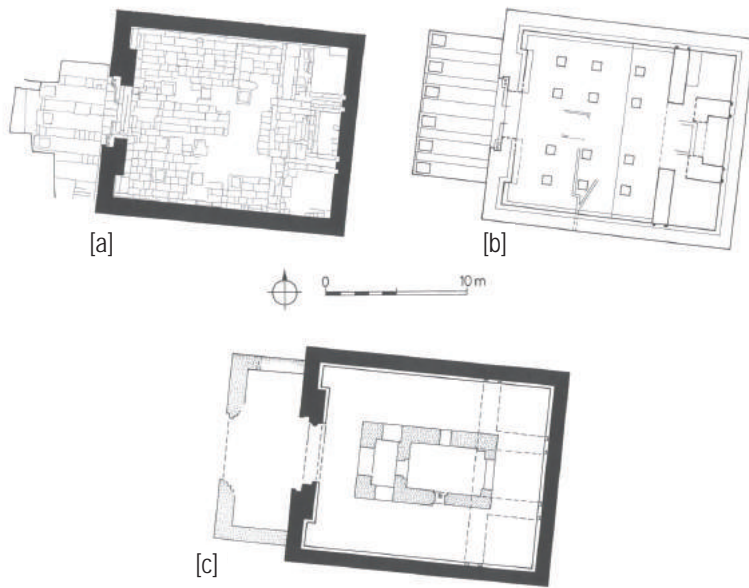


Fig.2-20
Plans of the Great Temple (a: Plan in the excavation time; b: Reconstruction; c: After conversion into the church), from Phillipson (2009).

2-2. Aksumite Masonry Structure

2-2-1. Royal Burials

The great monolithic stelae, called obelisk, were erected to mark rich and elaborate tombs of Aksumite kings until mid-4th century (Fig.2-21). The largest stela measured 30 m high consisting of a single block of stone has now fallen and broken (Fig.2-22). The major rock type of the stelae is syenite with coarse-grained texture. Though this is a similar rock type to the area of Yeha and 'Adwa, the form of rock in Aksum is low and flat-topped. Due to the long and closely spaced horizontal cracks and widely spaced vertical ones in the rock, the rock was preferable for obelisk (Williams 2016). The most famous quarry site is located 4km away from where the stelae exist. In the rock, intended breaks were demarcated by pecked lines, along which were cut series of rectangular sockets (Fig.2-23). Though the tools used in the quarry process have not been identified yet, it is likely that wooden wedges were inserted into the sockets and made to expand by percussion, by the insertion of metal wedges, or by the application of water, thus fracturing the rock (Phillipson 1998). For the transportation of the block of stone, rollers and ramps may have been employed. The motive and lifting power was almost certainly provided by a large human labor force, perhaps assisted by draught animals (Phillipson 2009). It is obvious that enormous manpower and wealth are required to erect obelisks. In six sites of stelae, representation of multi-storey buildings, which gives clues to understand the building construction method at the time, is carved. This issue is discussed when Debre Dammo Monastery's main church

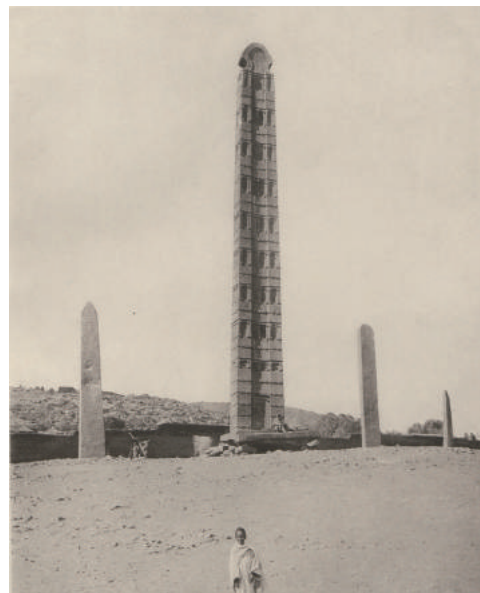


Fig.2-21 Obelisks in Aksum, from Littmann et al. (1913).



Fig.2-22 The largest, but fallen, stela in Aksum, *photo by author.*

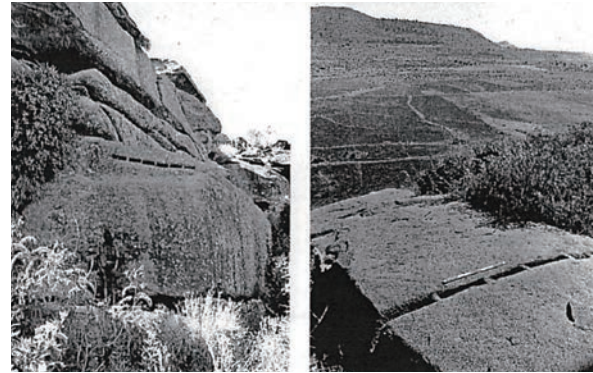


Fig.2-23 Quarry site for obelisk with series of rectangular sockets, *from Phillipson (1998).*

is introduced.

After the adoption of Christianity, royal burials were no longer marked by stelae, though the monumentality of the tombs themselves continued (*Ibid.*). Above all, they developed rock-cut hypogean features. In the ‘Tomb of the Brick Arches’ of the 4th century, the underground tomb was carved from rock, then subdivided into several chambers by means of stone walls incorporating arches (Fig.2-24). Three of them are horseshoe-shaped brick arches. The arch giving access to the tomb is constructed of fired, mold-made, and red-brown bricks (Breton 2015). However, the post-Aksumite examples of brick arches have not been found.

The tombs of King Kaléb and Gebre Mesqel of the 6th century are an elaboration of the ‘Tomb of the Brick Arches’ (Fig.2-25). The underground tombs are approached by a stepped adit of which the roof is made from stones. The tombs are constructed from huge and carefully dressed granite blocks of irregular shape, each of which is individually worked to fit its desired position (Fig.2-26; Phillipson 1998).



Fig.2-24 Interior of 'Tomb of Brick Arches' in Aksum, *from Phillipson (2009).*



Fig.2-25 Plan of the Tombs of King Kaléb and King Gebre Mesqel in Aksum, *from Phillipson (2009).*



Fig.2-26
Walls of the Tombs of King
Kaléb and King Gebre Mesqel
in Aksum, *photo by author.*

2-2-2. Royal Palaces and Houses

The best preserved palace is located in Dungur, less than 2km southwest of the ancient center of Aksum (Fig.2-27). The recessed walls are mainly made from the smaller undressed stones, while finely dressed granite blocks are used at the lower part of corners. In addition, larger sized stones are consciously placed in the higher part of corners. The height of the wall is uniformed by thinner stones or larger granite blocks at intervals, and gradually stepped back with increased height. This method of wall erection is often found in Aksumite structures.

Since the early 20th century, three large elite structures located in the south-eastern part of Aksum, Īnda Mika'el, Enda Sim'on and Ta'aka Maryam, are known. However, at the former two sites, only the central buildings were investigated. Even in Ta'aka Maryam, only small parts have been excavated. According to the reconstruction of Ta'aka Maryam, it comprised a building complex extending over an area some 120 x 80 m in extent, and was approached by grand monumental stairs (Fig.2-28; Littmann *et al.* 1913). A multistory building of 24 m square was placed at the center, and



Fig.2-27
Appearance of Dungur,
photo by author.

surrounded by a series of courtyards. The walls of both the central building and the parcel are often recessed, as in Dungur's case. This feature of recessed wall is expressed in the obelisk, too (Fig.2-21). The way to erect walls is also roughly in common with Dungur, however, wooden materials were inserted into the stonework of Ta'aka Maryam (Phillipson 1998). The way of using wooden materials reminds one of the case of Grāt Be'al Gībri in Yeha.

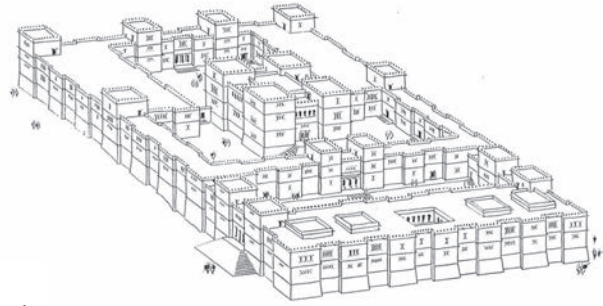


Fig.2-28 Reconstruction of Ta'aka Maryam, from Littmann *et al.* (1913).

Information about the buildings used by lower levels of the socio-economic hierarchy is not clear. However, the walls are likely to be made from small roughly dressed or undressed stones, and without extensive use of timbers (*Ibid.*).

2-2-3. Maryam Tsion Church

Maryam Tsion Church, which is now occupied by the Old Cathedral of Aksum, is located in the center of Aksum. The present church building that was constructed in the 17th century is not the original one. The present church building stands on an extant massive podium, a part of which is near-vertical, recessed and stepped-back stone walls of the Aksumite way (Fig.2-29). According to one estimate, a part of the podium was erected during the 4th century. However, inscriptional evidence suggests that major building work, which was destroyed by Ahmad Gragn around 1535, may have been undertaken under King Kaléb around the beginning of the 6th century (Phillipson 2009; Schneider 1974). The original church was a basilica with two aisles on each side of the nave. That is, the original structure is much larger than the present one, and is concordant with the size of the podium. The well-known proposed reconstruction of the original Maryam Tsion modeled the hypogean basilica of *Béte Medhané 'Alem* at Lalibela (Fig.2-30; Buxton *et al.* 1974).

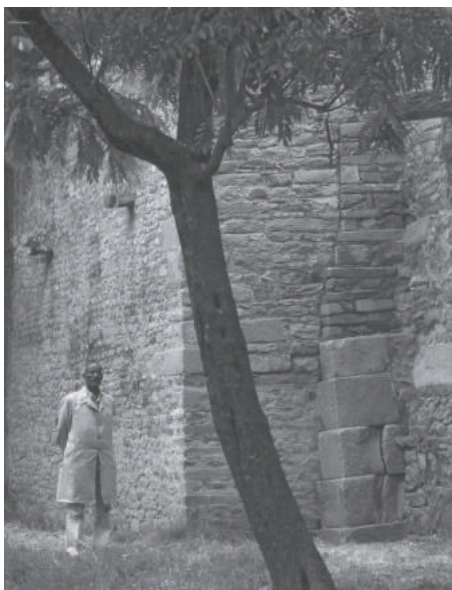


Fig.2-29 South side of the ancient podium of Maryam Tsion Church in Aksum, from Phillipson (2009).

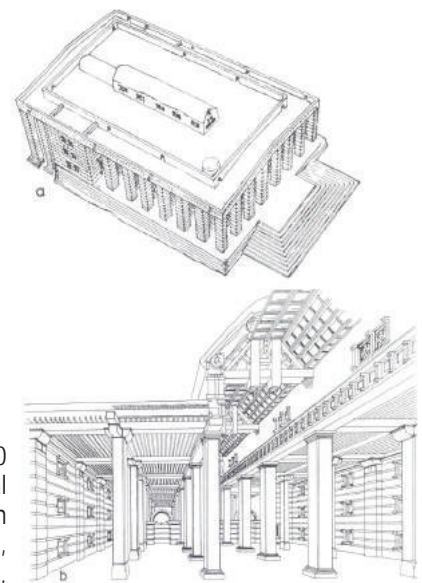


Fig.2-30 Reconstruction of original Maryam Tsion Church in Aksum, from Buxton *et al.* (1974).

2-2-4. Other Issues on the Aksumite Structures

Littmann *et al.* (1913) documented several types of masonry walls (Fig.2-31). The walls are usually stepped back with increased height similar to Dungur and the podium of Maryam Tsion. In some cases, the larger sized stones that are distinct with other parts were used at the corner. The walls are usually built of rubble masonry as shown in case-[a] of Fig.2-31. Concerning the wall in Qohayto, the inner wall section is documented, too (Fig.2-32). Accordingly, smaller sized stones with mud are filled between larger sized ambilateral stones one by one. Lime mortar was known in Aksumite times, however the use was limited to cover the interior walls of the large tombs and to set brickwork.

Concerning roofing, no trace has been recovered by the use of tiles or slates (Phillipson 1998). The only roofing method that is clarified by the archaeological survey is a thatched one, which was layered, pitched and presumably applied over a wooden framework (*Ibid.*). In addition, flat earth-covered roof, which is identical with *hidmo* roof, was continuously applied in the Aksumite period. This method may have been used only on large elite buildings and church buildings.

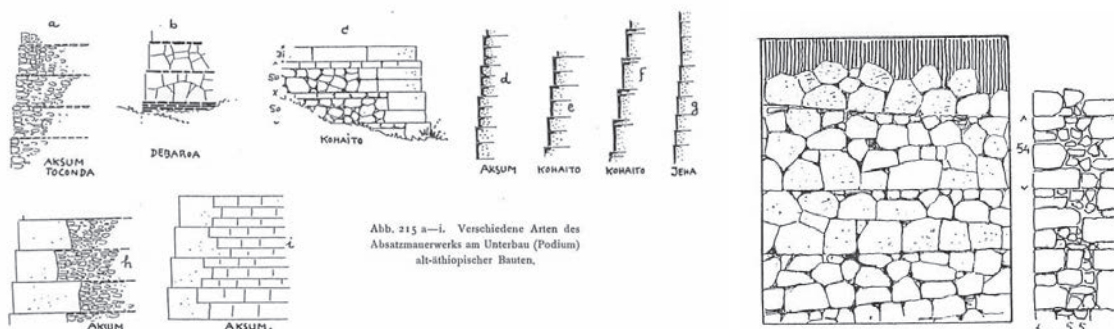


Fig.2-31 Several types of masonry wall in Aksumite site, from Littmann *et al.* (1913). Fig.2-32 External appearance and inner wall section of a wall in Qohayto, from Littmann *et al.* (1913).

2-3. Post-Aksumite Built Churches until 10th Century

2-3-1. Debre Dammo Monastery

Debre Dammo, the oldest monastery in Ethiopia dating from the 6th century, is a reclusive settlement of monks and their acolytes. It is situated on top of mesa that is formed of İntich'ew Sandstone surrounded by vertical cliffs, and the only means of access is to be pulled up by rope (Fig.2-33; Williams 2016). Therefore, the place served as a place where members of a ruling family were confined in order to prevent battles.



Fig.2-33 Cliff of Debre Dammo, photo by author.

There are no surviving remains of church buildings erected in the Aksumite period. Therefore, observing the case of Debre Dammo's main church building can clarify essential features of buildings in Aksumite period as the building construction method is compatible with the Aksumite obelisk's curving (Fig.2-34, 35). That is, similar walls must



Fig.2-34
South wall, main church
of Debre Dammo, *photo*
by author.



Fig.2-35
Curving of the Aksumite
obelisk, *photo* by author.

have been erected in the Aksumite period, too.

According to the analysis of Phillipson (2009), the main church was probably built in the third quarter of the 1st millennium AD, despite repeated structural modifications being applied. The spatial components of the building can be divided into four parts: a westernmost anteroom, a vestibule, a nave and two aisles, and an easternmost sanctuary (Fig.2-36: a). Among these, a westernmost anteroom is not the original. Remarkably, the plan is similar to tombs of King Kaléb and Gebre Mesqel (Fig.2-25) The floor level of Debre Dammo gradually raises as it goes eastward (Fig.2-36: b). The part of the highest floor level area is the sanctuary and the easternmost span of the nave and aisles. Such a platform was often demarcated by a wooden screen, albeit trace of such a screen is not recorded (*Ibid.*).

The recessed wall construction method of Debre Dammo is characterized by the extensive use of timber materials (Fig.2-34). The type of wood used in the Debre Dammo is olive (Phillipson 2009; Matthews *et al.* 1959). In the horizontal direction, a series of timber layers, which contribute to keeping horizontal level, run along the outer and inner faces of the wall. On each timber layer, timber projections with rounded end extend horizontally through a wall. This is locally known as monkey-heads. The timber layers and monkey-heads conjointly make a frame and enhance the strength of the structure, though monkey-heads at Debre Dammo do not pass through to the inner face of wall. Binding between outer and inner walls is provided by the timber frames of doors and windows. From the schematic diagram showing the timber works, it is clear that each timber members are combined together by mortise and tenon (Fig.2-37). Above the door, dentils of vertical wooden planks are inserted (Fig.2-34). These timber elements are expressed in the obelisk, too (Fig.2-35). Between timber layers, rubble stone masonry fills the wall. Larger sized stones are applied at the corner parts (Fig.2-38).

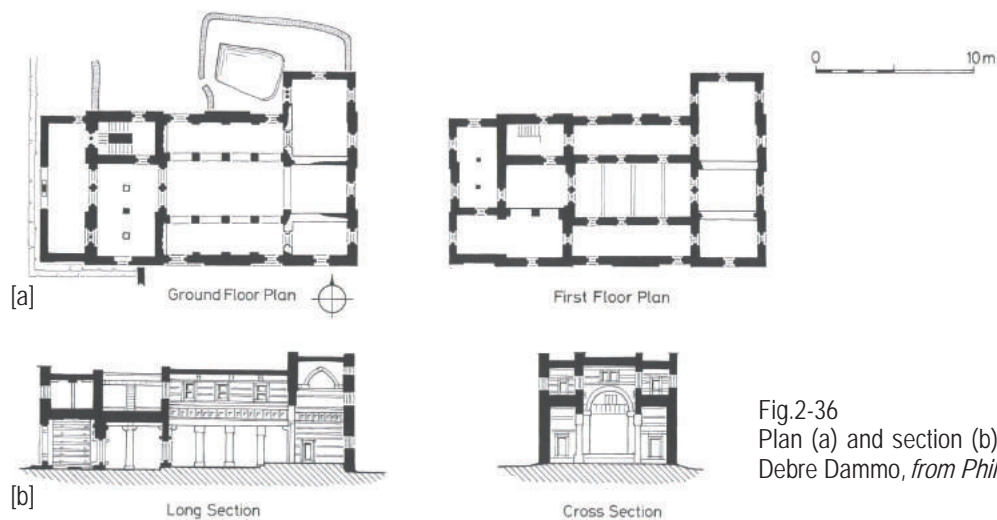


Fig.2-36
Plan (a) and section (b), main church of Debre Dammo, from Phillipson (2009).

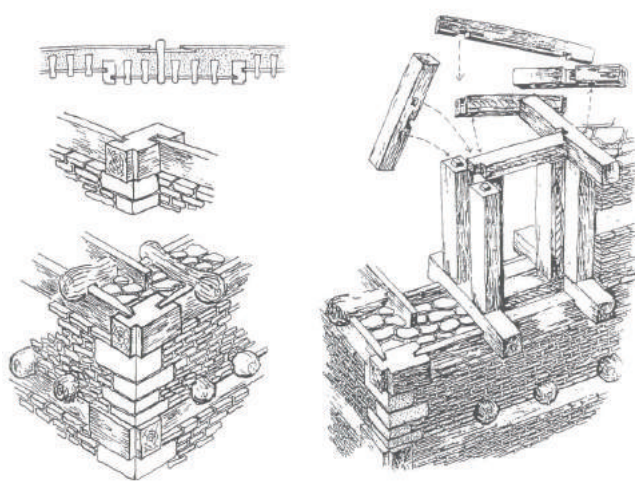


Fig.2-37 Schematic diagram showing the masonry and timber works, left: from Matthews *et al.* (1959); right: from Buxton *et al.* (1974).

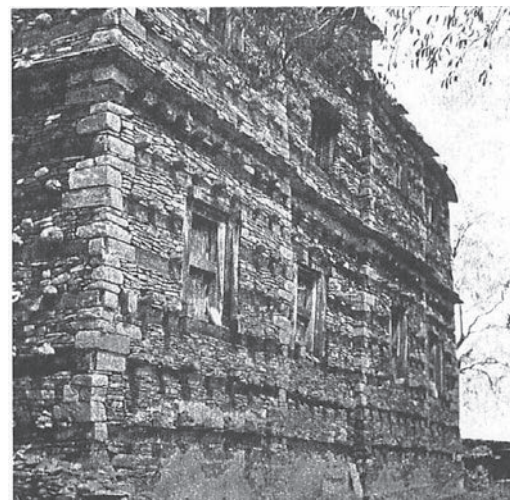


Fig.2-38 East wall, main church of Debre Dammo, from Littmann *et al.* (1913).

There are three pillars in the vestibule (Fig.2-36: a): central one is monolithic with four brackets, and the other two are timber ones (Fig.2-39). Six pillars separating the aisles from the nave are monolithic, with integral capitals in the form of rough cubes and without brackets (Fig.2-40). Above the architraves, timber projected frieze that comprises panels with geometrical decoration is placed. Further above, there are three windows on each side (Fig.2-36: a, b). Indirect illumination comes into the nave through the loft with external windows. The nave is separated from the sanctuary with a timber arch (Fig.2-36: b).

Several types of ceiling methods can be seen in the main church of Debre Dammo. In the anteroom, the ceiling is made of wooden planks arranged in an overlapping lantern pattern (Fig.2-41). Lantern ceiling is a corbelled ceiling formed by placing beams across the corners of a room, with further beams over the resultant angles until no aperture remains (Phillipson 2009). The ceiling of the vestibule is a remarkable coffered construction of square wooden panels with relief carving (Fig.2-42). The nave once had a vaulted timber ceiling, though it was replaced with a flat ceiling by 1948 (Fig.2-43; *Ibid.*). In the sanctuary, the domed ceiling comprising a timber framework is set up (Fig.2-44). Above the dome, the upper wooden ceiling is placed. Remarkably, this ceiling method is in common with *hīdmo* house, or “Tigré farmer’s house,” raised in the previous section. Though the structure is presently covered with corrugated metal sheet, it should have been covered with earthen roof in the past.

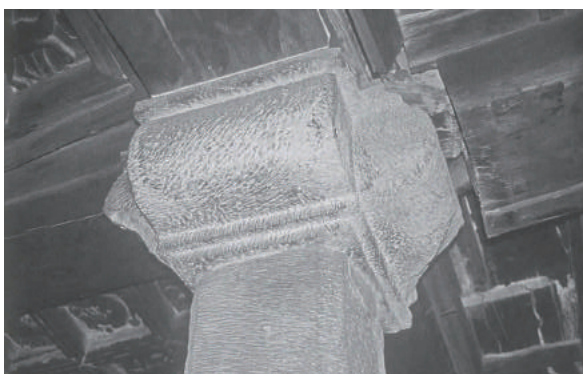


Fig.2-39 A central monolithic pillar with brackets in vestibule, main church of Debre Dammo, from Phillipson (2009).



Fig.2-40 Nave, main church of Debre Dammo, from Phillipson (2009).



Fig.2-41
Lantern ceiling in anteroom,
main church of Debre Dammo,
from Phillipson (2009).



Fig.2-42
Ceiling consisting of coffered construction
of square wooden panels
with relief carving in vestibule,
main church of Debre Dammo,
from Littmann et al. (1913).

2-3-2. Other Built Churches in Tigray until 10th Century

There are only a few surviving examples of the basilica church. This is partly because many buildings suffered from the devastation by Queen Gudit in the 10th century and Ahmad Gran in the 16th century. According to Phillipson (2009), the churches built before the 14th century were probably all based on a basilica plan, despite valuable size and details. Basilica buildings have a longer history before the adoption of Christianity such as Yeha's Great Temple. In the writing of Phillipson (2009), three Tigray's built churches located near Atsbi, named Mika'el Debre Selam, Qirqos Agobo and Zeréma Giyorgis are described (Fig.2-45). According to Phillipson's analysis, these are built later than Debre Dammo, between 8th and 10th century.

These church buildings share the Aksumite building features such as walls with wooden layers and monkey-heads (however, Zeréma Giyorgis has no monkey-heads), openings with timber framework, and Aksumite frieze (Fig.2-46). Furthermore, a timber screen in front of the sanctuary, which is absent in Debre Dammo, remains in these churches. The screen of Mika'el Debre Selam is remarkable due to its arched shape and interwoven design panels on both sides (Fig.2-47).

However, the scale of the building is much smaller than Debre Dammo. Above all, Qirqos Agobo is a tiny basilica approximately 5.5 m long and 4.8 m wide. This conversely indicates that Aksumite features were not reserved only to a few royal monuments or to churches of great monasteries (Lepage *et al.* 2005). The building techniques derived from Aksumite or Pre-Aksumite period were often applied locally, and a number of churches may have been built in a similar way.



Fig.2-43 Old ceiling in nave, main church of Debre Dammo, from Buxton (1947).

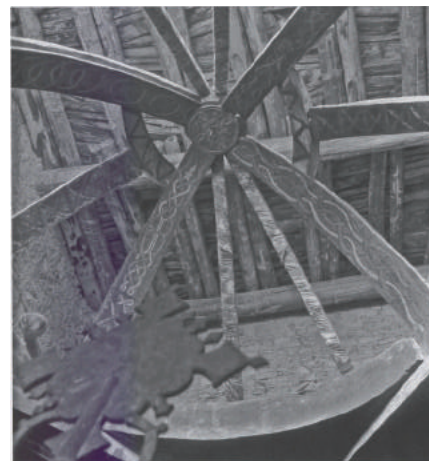


Fig.2-44 Domed ceiling comprising timber framework in sanctuary, main church of Debre Dammo, from Phillipson (2009).

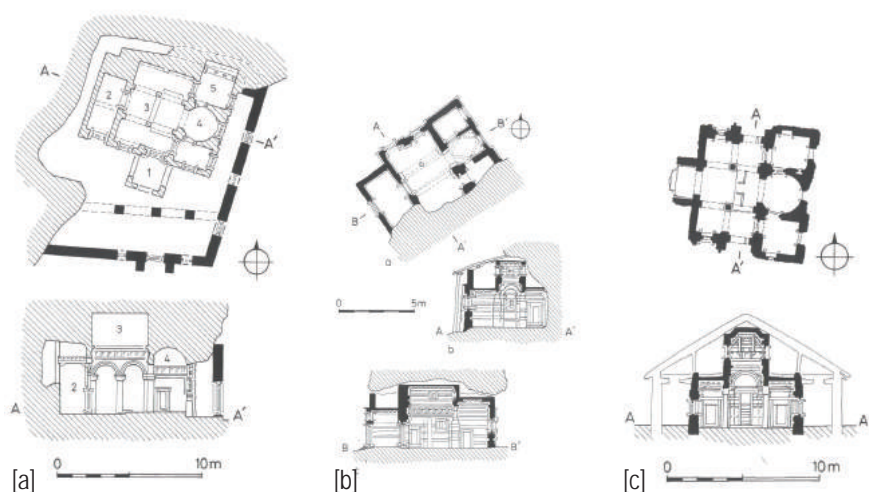


Fig.2-45 Plan and Section of (a) Mika'el Debre Selam, (b) Qirqos Agobo, and (c) Zeréma Giyorgis, from Phillipson (2009).



Fig.2-46 Original external wall, Mika'el Debre Selam, from Phillipson (2009).



Fig.2-48 Ceiling in anteroom, Mika'el Debre Selam, from Phillipson (2009).



Fig.2-47 Internal appearance of nave and timber screen, Mika'el Debre Selam, from Phillipson (2009).



Fig.2-49 Internal appearance of nave with flat paneled ceiling, Qirqos Agobo, from Phillipson (2009).

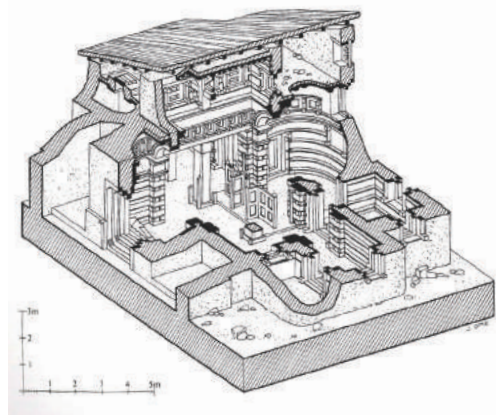


Fig.2-50 Axonometric drawing, Zeréma Giyorgis, from Lepage *et al.* (2005).

Mika'el Debre Selam is located in a cave, therefore, the upper part of its interior space was carved out of the roof of the cave. Arcades separating the aisles from the nave are supported by monolithic pillars, each of which has massive bracket capitals, and a series of Aksumite frieze is placed above the arcades (Fig.2-47). The ceiling of an anteroom is a fine wooden paneled ceiling (Fig.2-48). Flat paneled ceiling is applied in the nave of Qirqos Agobo, too (Fig.2-49). On the other hand, a pillar of Qirqos Agobo is made from timber.

Zeréma Giyorgis had a cruciform layout initially, though two original transepts were demolished (Fig.2-50; Lepage *et al.* 2005). Another unique point of this building is that it has an apse, the area enclosed by a semicircular end wall, in the easternmost part. The sanctuary is separated from the nave with a timber arch supported by the masonry wall with timber brackets (Fig.2-51). Two monolithic pillars support architraves in the nave, and a series of Aksumite frieze is set above it. A series of rafters and queen posts shape the ceiling, and wooden panels are filled between them (Fig.2-52). A lantern ceiling was applied in the ceiling of the transept (Fig.2-53; Lepage *et al.* 2005).



Fig.2-51 Internal appearance of nave, Zeréma Giyorgis, from *Lepage et al. (2005)*.



Fig.2-52 Ceiling of nave, Zeréma Giyorgis, from *Lepage et al. (2005)*.



Fig.2-53 Northern transept with lantern ceiling (now demolished), Zeréma Giyorgis, from *Lepage et al. (2005)*.

In the present Eritrea, a few church buildings with Aksumite features existed, too. For example, Īnda Maryam Church in Asmara, which has been already demolished, was documented by Littmann *et al.* (Fig.2-54). Interestingly, a part of the western entrance is roofed, though it is not clear whether it was the original or not. In Amhara region, a remarkable church named Yimrihanne Krīstos survives in a cave 12 km from Lalibela (Fig.2-55). Yimrihanne Krīstos is a Zagwe ruler in the early 12th century. Though there are no monkey-heads, Aksumite building techniques used in Debre Dammo are abundantly applied in this building.



Fig.2-54 External appearance of Īnda Maryam Church in Asmara, now demolished, from *Littmann et al. (1913)*.



Fig.2-55 External appearance of Yimrihanne Krīstos, *photo by author*.

2-4. Rock-hewn Churches

2-4-1. Rock-hewn Churches in Eastern Tigray

There are many rock-hewn churches in Eastern Tigray. Almost all the churches are carved into cliffs of sandstones (Fig.2-56). The dissected landscape is naturally full of nooks, crevices, steep precipices and heavy cavities. The sandstone is soft enough to be hollowed out. This characteristic is helpful to create rock-hewn church or to enlarge what may have been an existing cave, and to sculpt the interior decorations (Williams 2016). According to Phillipson (2009), establishment of funerary or reliquary churches was already adopted during Aksumite times. The similarity between the

tombs of King Kaléb and Gebre Mesqel and the main church of Debre Dammo, both of which are 6th century origin, reinforces the relationship. One of the earliest examples of rock-hewn funerary or reliquary church in Eastern Tigray is Degum, which was perhaps formed between 6th and 8th centuries.

The majority of rock-hewn churches are based on the basilica plan, too. For example, Medhané 'Alem at 'Addi Getet, which is estimated to be formed in the similar period with the above-mentioned built churches, has a higher nave separated from two aisles by four pillars, two of which westerly are cruciform and the other two easterly are square, supporting the architraves (Fig.2-57). The westernmost portico with four massive pillars is a unique feature of this church.

On the other hand, there are three churches named Abriha we-Atsbäha, Qirqos Wigrö and Mika'el Amba, of which nave and transepts emphasize the cross shape by their greater height. These churches are referred to as the 'Tigray cross-in-square' in Buxton (1971). These large scaled and elaborate type of Tigray's rock-hewn churches are estimated to have been constructed between 8th and 10th century (Phillipson 2009). Abriha we-Atsbäha is one of the best-preserved churches in Tigray that has a nave with two aisles on either side (Fig.2-58). All the five bays in the second row and the nave are increased height than the other parts of the building. Four bays in the second row except the central one have a vaulted ceiling, and the ceiling at the crossing of nave and transepts is cruciform (Fig.2-59). The easternmost nave bay is separated from the rest of the nave by a raised floor, similar to Debre Dammo main church, and has a domed ceiling. That is, the space is regarded as the extension of the sanctuary. Concerning openings, timber frames are set into the rock (Fig.2-58, 59).

The later churches tend to apply arches and domes more frequently. For example, Maryam Wigrö, which is estimated to be formed between 13th and 14th centuries, has a basilica plan and domes are often applied (Fig.2-60). The layout of the ceiling is in an orderly manner and the pillars with bracket capitals supports the architraves. In due course, the layout of the ceiling becomes more random. Concerning this, Buxton (1971) identified two types of churches: the type that is "uniformly basilican, with nave and aisles extending to three or four bays besides which there may be a well-demarcated narthex and on occasion an outer vestibule as well" and the type that loses "any clear

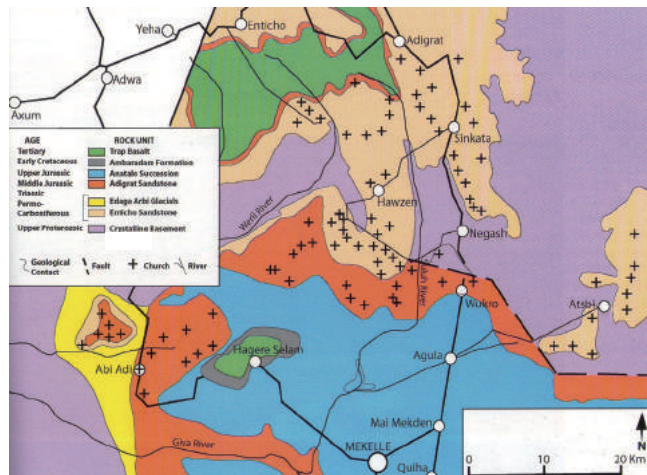


Fig.2-56 Distribution of rock-hewn churches in Tigray, from Asfawossen et al. (2008).



Fig.2-57 Nave and south aisle, Medhané 'Alem at 'Addi Getet, from Phillipson (2009).

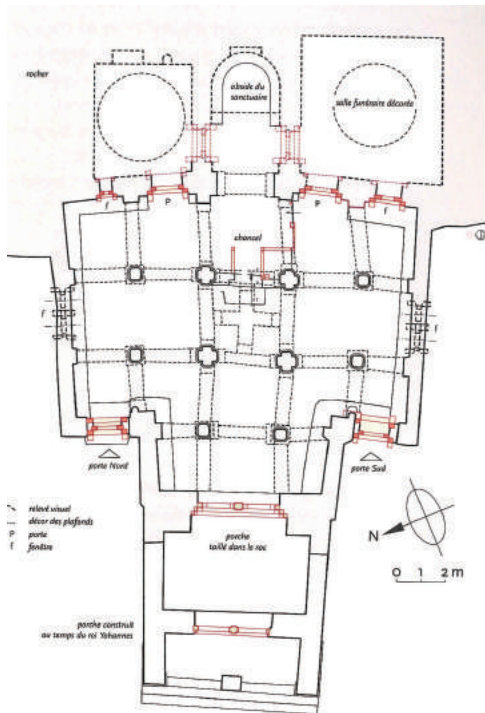


Fig.2-58 Plan of Abriha we-Atsbiha, from Lepage et al. (2005).



Fig.2-59 Transept and crossing, Abriha we-Atsbiha, photo by author.

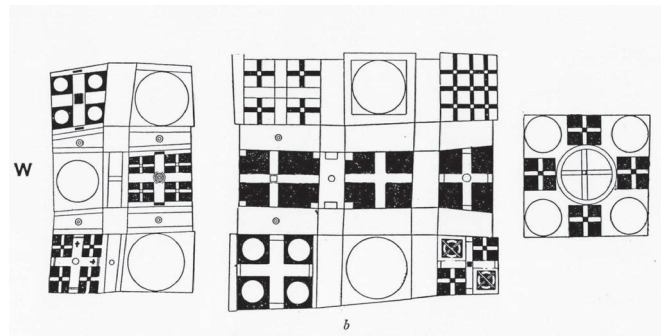


Fig.2-60 Plan of Maryam Wigro, from Mordini (1939).

distinction between aisles and nave, though the latter may be a little higher.” Maryam Qorqor is the former example (Fig.2-61). The nave is distinguished by the higher ceiling with aisles and narthex, and lantern or domed ceilings and arched walls are often applied. The latter example is Debre Tsion (Fig.2-62). Nave, aisles and sanctuary are not distinguished by plan or floor level, and a domed ceiling is preferred (Phillipson 2009; Buxton 1971). This type of rock-hewn church can often be found in Témben (Buxton 1971). The rock-hewn churches in Témben have not well studied much, albeit Plant (1985) introducing several examples of this type of rock-hewn church such as Gebr’el at Weqén and Abba Yohanni with drawings (Fig.2-63).

Though Lalibela is a famous site for the rock-hewn churches, the area is exempt from this dissertation’s target. Nevertheless, several characteristics should be mentioned here. While Tigray’s rock-hewn churches are carved into sandstones, Lalibela’s churches are carved into orange-red tuff, of which the area is only about half a kilometer squared in the surrounding area. The area of Lalibela is dominantly surrounded by Trap Series basalt that is harder to carve. The builders’ or sculptors’ empirical knowledge on geology is clearly understood (Williams 2016).

The rock-hewn churches in Lalibela tend to have free-standing exteriors by carving in a downward direction, while Tigray’s ones are integrated with natural rocks by carving in a horizontal direction (Buxton 1971). The largest church in Lalibela is Bête Medhané ‘Alem, a gable roofed basilica church with a nave and four aisles surrounded by the external colonnades (Fig.2-64). According to the analysis of Phillipson (2009), the church was carved in the period between late 10th and early 12th century. This church became a near-replica of the original cathedral of Maryam Tsion at Aksum.

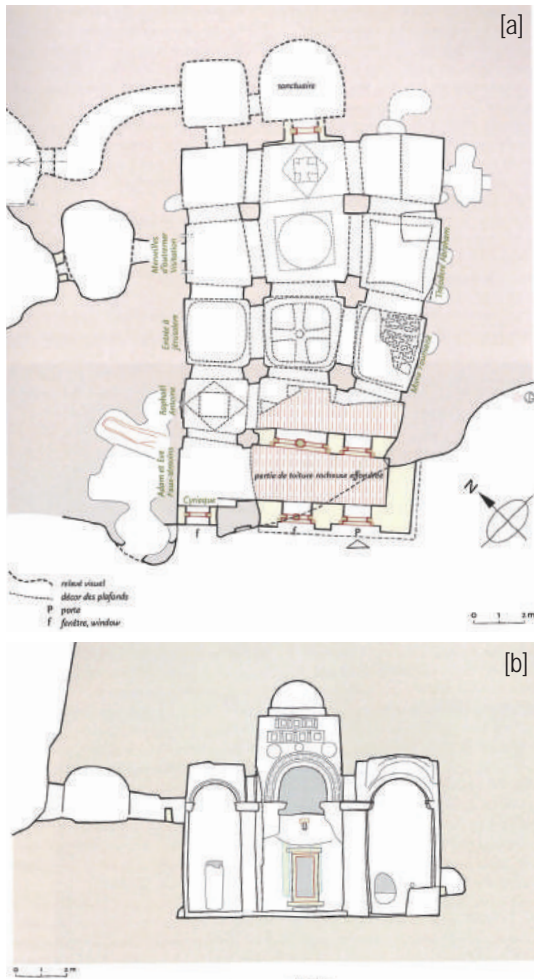


Fig.2-61 Plan (a) and Section (b) of Maryam Qorqor, from Lepage et al. (2005).

In Béte Giyorgis, perhaps the most famous church in Lalibela, the cruciform character is emphasized by its free-standing exterior (Fig.2-65). Though the shape emphasizing the cruciform is not dissimilar to ‘cross-in-square,’ it was carved much later than ‘Tigray cross-in-square,’ estimated in the period linked with King Lalibela between late 12th and early 13th century (*Ibid.*)

2-4-2. Rock-hewn Churches Derived from Built Churches

Most structural or decorative details of rock-hewn churches imitated the ones of Aksumite structures or built churches (Buxton 1947, 1971). For example, the pillars of rock-hewn churches often have cuboid or bracket capitals, as with Debre Dammo’s main church (Fig.2-39, 40, 57, 66). While the bracket’s position of rock-hewn churches in Tigray is always logically correct, logically meaningless brackets are sometimes added for the sake of symmetry in the Lalibela’s churches (Fig.2-67). The capitals support rock-hewn lintels or arches, of which techniques is in common with wall carving. As time passed the arched shape became more preferable, though the reason is not clear. Above the

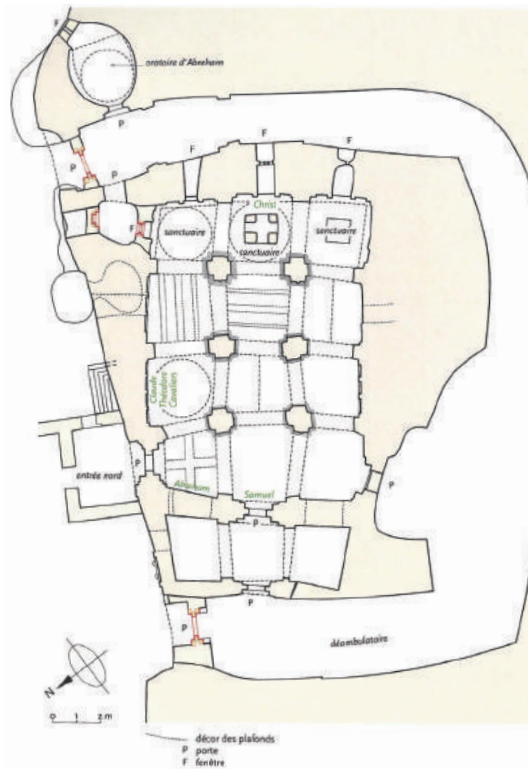


Fig.2-62 Plan of Debre TSION, from Lepage et al. (2005).

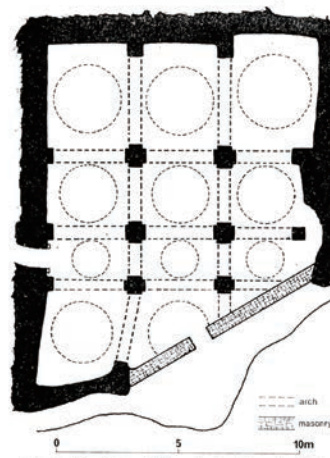


Fig.2-63 Plan of Abba Yohanni in Témben, from Buxton (1971).



Fig.2-64 External appearance of Bête Medhané 'Alem in Lalibela, *photo by author.*



Fig.2-65 External appearance of Bête Giyorgis in Lalibela, *photo by author.*



Fig.2-66 Arches with bracket capitals in anteroom, Maryam Wigro, *from Phillipson (2009).*

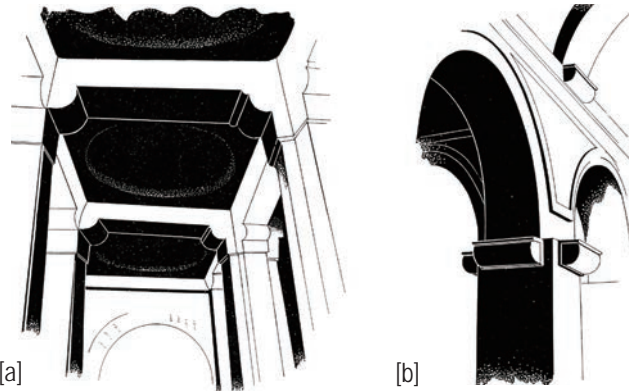


Fig.2-67 Logically correct bracket of rock-hewn church in Tigray (a) and bracket for the sake of only symmetry found in rock-hewn church in Lalibela (b), *from Buxton (1971).*

pillars, a series of Aksumite friezes are carved in spite of the meaningless function (Fig.2-57, 59).

Buxton (1971) introduced six types of ceiling methods found in rock-hewn churches. The first one is crossed-beams: the method to reduce a large square space into four smaller ones (Fig.2-59: the crossing of nave and transepts; Fig.2-60). The second one is parallel-beams: the method of placing beams in parallel (Fig.2-62). The third one is ridged-roofs: the method to make a gabled ceiling by beams, of which a wooden prototype is found in the porch of Debre Me'ar (Fig.2-68). The



Fig.2-68 Wooden prototype of ridged roof found in the porch of Debre Me'ar, *from Buxton (1974).*

fourth one is the lantern ceiling, of which a wooden prototype is found in Debre Dammo's main church and Zeréma Giyorgis as mentioned above (Fig.2-41, 53, 61). The fifth one is domes, of which a wooden prototype is found in Debre Dammo, too (Fig.2-44). The rock-hewn dome does not require special techniques. As mentioned above, this is the preferred way of constructing ceilings in the later period. The last type is coffered-ceiling. The wooden prototype can be found in Debre Dammo's main church, Mika'el Debre Selam, Qirqos Agobo and Zeréma Giyorgis (Fig.2-42, 48, 49, 52). In addition, vaulted roofs seen in Abriha we-Atsbiha should also be listed (Fig.2-59). There is no wooden prototype of this type.

2-4-3. Gunde Gundé: A Built Church Derived from Rock-hewn Churches?

While it is often indicated that the rock-hewn churches imitated Aksumite structures or built churches, there is no preceding study on the possibility that built churches imitated the rock-hewn churches. However, the old church of Gunde Gundé Monastery, named Debre Garzén, might be categorized as such a unique case.

Gunde Gundé Monastery was founded in the 15th century, and became the spiritual center of the Stephanites. It is located in a remote site about 30km east of 'Addigrat, and several hours walking is needed to reach the site even at present times (Fig.2-69). The church building was established around 1452, however it was soon burned at the order of Emperor Zer'a Ya'iqob. Though it was rebuilt thanks to the active help of Abekerezun, the monastery was again persecuted and burned. A further rebuilding of the church was carried out under 'Ízra, in the early 16th century (Beylot 2005). In the latter half of the 16th century, Gunde Gundé was faced with Oromo and Muslim invasions which affected the life of the monastery. The subsequent history is not well known.

The plan of the Debre Garzén is characterized by the sanctuary surrounded by ambulatory, the existence of a big space in front of the sanctuary and the sanctuary consisting of nine domes (Fig.2-70). However, according to Miyake *et al.* (2012-1), the construction process was divided into three, and the present sanctuary originally constituted the whole of the church¹⁰. That is to say, the gates of the actual sanctuary were the gates of the church building originally (Fig.2-71). Though this original structure was built in the 15th or 16th century, it cannot be made out whether it was built in the time of Abekerezun's reconstruction or 'Ízra's one.

Though a detailed survey of the original nine-domed part has not been permitted, there is a photo projecting a dome that was taken at the time of the preliminary survey for the restoration project (Fig.2-72). Accordingly, the dome supported by bracket capitals has a cruciform framework of perhaps timber materials, as with the dome in the sanctuary of Debre Dammo's main church (Fig.2-44). That is, the dome is technically derived from the Aksumite buildings.

The composition of the original nine-domed structure should be considered carefully because it is unique in the Ethiopian built church examples. It reminds us that rock-hewn churches of the contemporary period tend to apply arches and domes more frequently, as mentioned above. Above all, the examples of Témben area are remarkable because they are consisted of domed bays entirely (Fig.2-63). According to Buxton (1971), Abba Yoḥanni was carved in the period of Emperor Gebre Mesqel (r. 1414-1429). Stephanite movement had close contact with this area because the movement started in the area of Tekkezé river, on the margin of Siré (Kaplan 2010). Though the center of the movement shifted to the area of Gunde Gundé later, it is no wonder that the planner of the original Debre Garzén visited the rock-hewn churches in Témben. The author hypothesizes that Debre Garzén imitates the rock-hewn churches of Témben area. Due to the difficulty to carve the local slate rocks, they decided to realize it in built form. Concerning the multi-domed composition of both Debre Garzén and rock-hewn churches in Témben area, Coptic influence is indicated (Miyake *et al.* 2012-1; Buxton 1971). This issue requires more careful analysis in the future.

¹⁰ The author interviewed local people and confirmed it, too. The type of later church plan that sanctuary surrounded by ambulatory is introduced later.

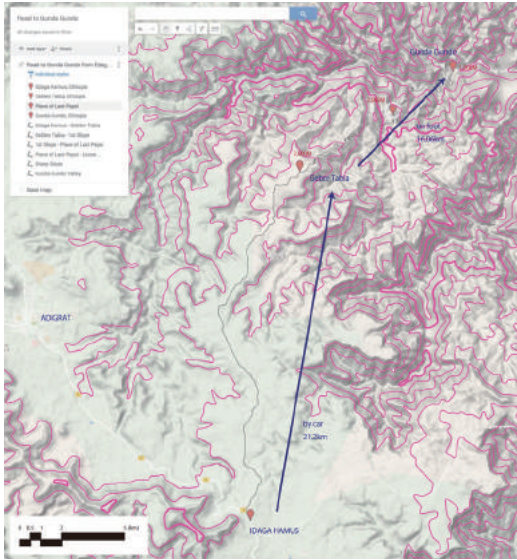


Fig.2-69 The way to Gunde Gundé Monastery from Idaga Hamus, after google map.

Fig.2-71 Internal appearance, Debre Garzén of Gunde Gundé, photo by author.

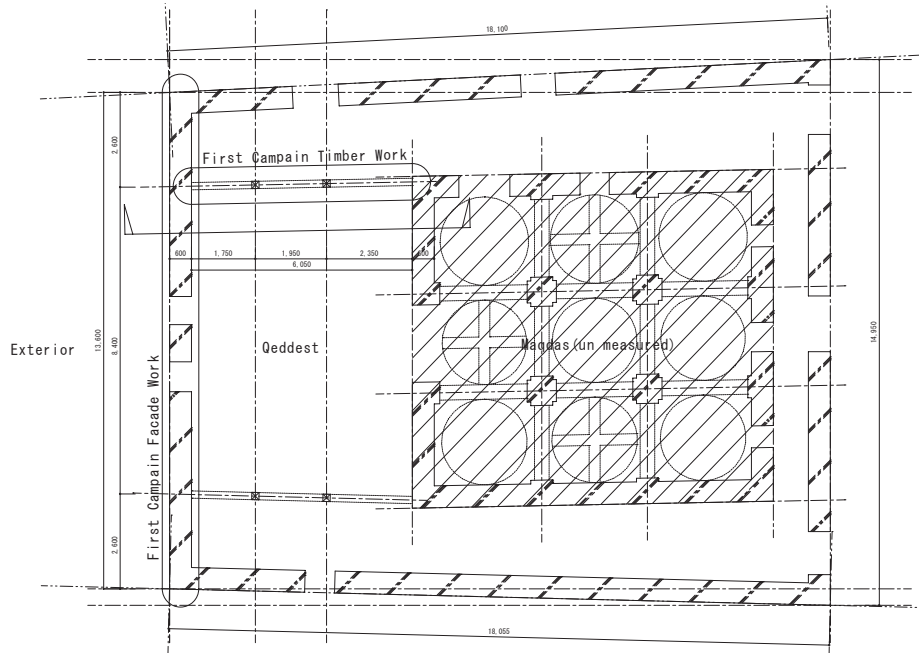


Fig.2-70 Current plan, Debre Garzén of Gunde Gundé, made by Aoshima, K.



[a]



[b]

Fig.2-72 Original dome placed in current meqdes (a) and its internal appearance (b), Debre Garzén of Gunde Gundé, photo by Shitara, T.

2-5. Buildings in Gonder

Though Gonder, located in Amhara Region, is placed out of range of the targeted area of this dissertation, the newly appeared building style applied to royal buildings should be summarized here. In the 17th century Gonder, royal enclosure, which consists of magnificent palaces built by the successive emperors, was formed, and the first fixed Ethiopian capital appeared (Fig.1-2). As mentioned in Chapter I, the construction of the royal enclosure was begun under Emperor Fasiledes. The imposing Fasiledes Palace, of which construction was started in around 1635/36, was expanded by the following successors by constructing new buildings (Fig.2-73).

The predecessor of Fasiledes Palace can be found in Īnfrez, the capital of Serse Dīngīl in the latter half of 16th century, and Denqez, the capital of Fasiledes' father Susīnyos (Fig.2-74). Since the 16th century, there were Turk, Portuguese, Indian and other foreign residents in Ethiopia (Munro-hay 2002). Concerning the palace buildings, engineers from Portuguese India played an essential role. Regarding the palace at Denqez, an Indian engineer named Abd al-Kelim participated as the head of the masons mortar makers (Munro-hay 2002; Pankhurst 1999). In addition, an Egyptian foreman, Sadaqa Nesrani, and other workers from Egypt and Europe assisted the construction project.

Fasiledes Palace, which was built “by masons from India, and by Abyssinians as had been instructed in architecture” in reference to Bruce (1790), consists of a two-storied main body and five towers, four of which in each corner are three-storied and circular shaped, and the other one is four-storied (Fig.2-73). The towers are linked by battlemented parapets. According to Shitara (2008), there are common characteristics between contemporary Portuguese forts in India and Gondarine Architecture, such as existence of the circular towers in the corners and the towers' spherical form on the top. In addition, the technique to make arched openings, which did not exist in Ethiopia at that time, is essential, too. When an arched opening of Gonder's palace is compared with Portuguese fort in Mumbai, the similarity of the appearance becomes clear (Fig.2-75). To realize the construction of such magnificent palaces, discovery of mortar and the earlier building experiences were essential (Pankhurst 1961).

Concerning later buildings of the palace enclosure in Gonder, Shitara (2008) emphasized the enhancement of building techniques of the Ethiopians. Accordingly, Ethiopian engineers who participated the earlier construction projects mastered foreign-derived building techniques and finally realized the palace construction projects by themselves. Above all, an engineer named Welde



Fig.2-73 External appearance of Fasiledes Palace in Gonder, photo by author. Fig.2-74 A palace in Īnfrez, from Shitara (2008).

Giyorgis is remarkable. He is the person who engaged in Iyasu I Palace construction as a head in the latter half of the 17th century. In the reception hall of the upper floor, a series of transverse arches, of which top is filled with timber planks, produced the larger scaled elegant space without pillars (Fig.2-76). That is to say, building techniques in Gonder were developed by Ethiopian builders, though the techniques were initially brought from abroad.

In Tigray, the new Maryam Tsïyon Church in Aksum shared several characteristics with the buildings in Gonder (Chiari 2009). According to local records, the building work was carried out in around 1655 or 1657, the last stage of Emperor Fasiledes period (Pankhurst 1982). From the sketch of Fig.2-77, it becomes clear that arches are used in the openings, and a tower is attached next to the main body. Furthermore, the design of the parapet is similar with Fasiledes Palace. This building has still remained after several changes, including an addition of a western façade. However, generally speaking, the building techniques developed in Gonder did not expand to Tigray.



Fig.2-75 Arches found in Fasiledes Palace in Gonder (a) and Portuguese fort in Mumbai (b), photos by author.



Fig.2-76 Transverse arches found in Iyasu I Palace in Gonder, from *Shitara* (2008).

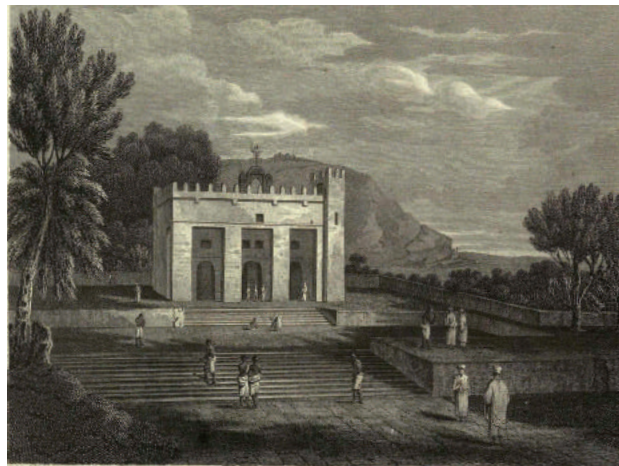


Fig.2-77 Maryam Tsïyon Church in Aksum at the beginning of the 19th century, from *Anneslay* (1809).

3. Built Churches in Tigray since 15th Century

3-1. Emergence of New Types of Church Plan

Since around the 15th century, circular shaped built churches emerged in Ethiopia. Though the origin and genealogy of this new type of built church is still obscure, it is said that the origin is located in the area of Lake Tana. The new planning type is characterized by an enclosed square sanctuary located at the core of the church structure (Fig.2-78: a). The centralized sanctuary arrangement was an independent invention and is unique to Ethiopia (Heldman 2003). Spatially, it can be divided into three parts:

- *Meqdes*. The sanctuary located at the innermost part of the church, to which only priests have access, separated from the rest of the church by doors and/or curtains (Phillipson 2009). *Tabot*¹¹ is kept in *meqdes*.
- *Qiddist*, literally meaning ‘the Holy.’ This area is the principal inner division of a church, and is traditionally reserved for non-officiating priests and for those receiving the sacrament (*Ibid.*).
- *Qiné mahlét*, literally meaning ‘chanting space.’ The outer division of the Ethiopian church. Youths or men who are not ordained but occupy an important place between clergy and layman, and other members of the congregation occupy this area (*Ibid.*).

In Tigray, there are both circular and rectangular shaped churches. Though predate rectangular churches are basilica form ones, those of the later period often have a centralized sanctuary. That is, the sanctuary, or *meqdes*, is often enclosed by ambulatory (Fig.2-79). Basilica form churches

¹¹ The term of *tabot* is applied “interchangeably in the Ethiopian Church both to wooden and stone plaques that symbolically represent the Mosaic Tablets of the Law and to receptacle in which such are housed (Phillipson 2009).”

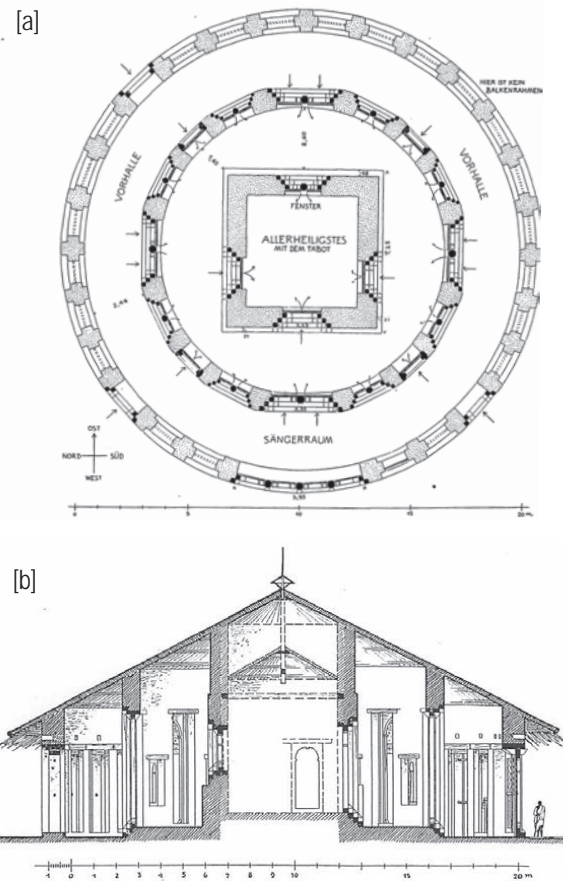


Fig.2-78 Plan (a) and section (b) of Medhané 'Alem Church in 'Adwa, from Littmann et al. (1913).

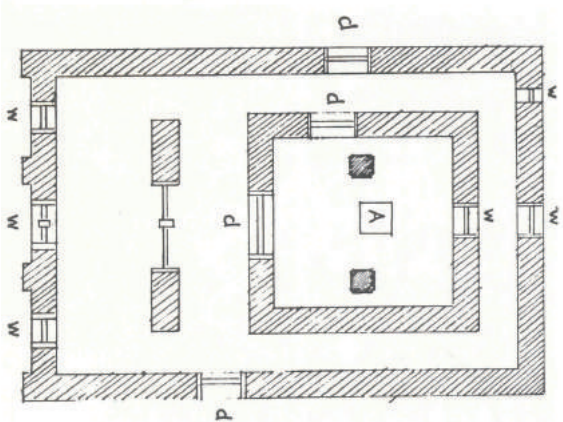


Fig.2-79 Plan of rectangular built church with ambulatory, from Juel-jensen et al. (1974).

that had been dominant in Tigray were replaced with churches with a centralized sanctuary plan from around the 15th century. This newly appeared rectangular built church with ambulatory is unique in Tigray, while a circular shaped built church is dominant outside Tigray.

Therefore, the development of built churches in Tigray since 15th century is an important matter in understanding building history of Tigray. However, it has been rarely discussed until now. Nevertheless, several buildings are individually documented in Littmann *et al.* (1913), Juel-Jensen *et al.* (1974) and Plant (1985). Furthermore, the author has documented a few buildings. Though the current data is not enough to reveal the origin and genealogy of this new type of built church, several characteristics of the church buildings are discussed based on such sources in this section.

3-2. Circular Built Church in Tigray

A type of circular built church is a better example to understand the spatial components divided into three, than a rectangular one. Though the existence of rectangular churches is characteristic of Tigray's built churches since 15th century, there are still many examples of circular ones. To explain the characteristics of circular built churches, Medhané 'Alem Church in 'Adwa and Sillasé Church in Ch'eleqot are taken as examples here.

Medhané 'Alem Church in 'Adwa was built by *dejjazmac* Sebagadis Weldu in the first half of 19th century. The building was documented by Littmann *et al.* (1913) (Fig.2-78). The circular built church is 21.5m in diameter building on a circular podium about 3.6m high. The whole church is covered with a thatched roof in a conical shape, as with "Tigré chief's house" (Fig.2-78: b). Rectangular *meqdes*, which has three timber doors on the west, north and south, and one timber window on the east, is enclosed by circular *qiddist* (Fig.2-78: a). *Qiddist* is again enclosed by circular *qiné mahlét*. The wall between them consists of sixteen timber openings, four of which in each direction are wide doors and other four of which are narrower doors, and masonry pillars between the openings. The exterior wall of the church, with three church entrances on the northwest, southwest and northeast, is surrounded by 27 cruciform pillars. The distance between pillars on the west is increased to almost 6m, and four large timber openings are set up (Fig.2-80). The floor level is switched at the position of each door between *meqdes* and *qiddist*, and *qiddist* and *qiné mahlét*. Therefore, the floor level is the highest in the central *meqdes* (Fig.2-78: b). Though the roof is also the highest in the central *meqdes* due to its conical shape, there is a ceiling in *meqdes* at the lower part.

Littmann *et al.* (1913) documented one well-ornamented timber door set in Medhané 'Alem Church, too (Fig.2-81). The multi-framed door is constituted from one central post and two timber panels. The top corners of each timber and the central post have bracket capitals, each side of bracket capitals and each face of timber panels are finely carved. The innermost frames are arch shaped, and each arch is uniformly ornamented by a few bead-planks.

The other example of the circular church, Sillasé Church in Ch'eleqot was built by *Ras* Welde Sillasé at the end of the 18th century. The basic idea of the plan is same with Medhané 'Alem in 'Adwa (Fig.2-82). Not only spatial components and their shape, but also hierarchical distinction of floor



Fig.2-80 Four large timber ornamental openings on the west wall, Medhané 'Alem Church in 'Adwa, from Littmann et al. (1913).

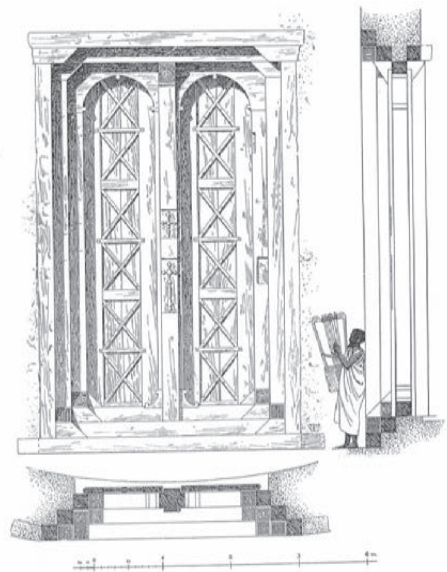


Fig.2-81 Well-ornamented timber opening, Medhané 'Alem Church in 'Adwa, from Littmann et al. (1913).

level, numbers and positions of church entrances, existence of wider openings on the west, and existence of multi-framed timber openings are in common with 'Adwa's one. The unique feature of Sillasé Ch'eleqot is mural paintings covering entire indoor walls. In particular, *Ras* summoned a famous painter from Aksum for the painting in the *meqdes* (Lepage et al. 2005). Even in the multi-framed timber openings with bracket capitals, mural paintings are worked (Fig.2-83). Furthermore, it is remarkable that arches of timber ornamented exterior windows on the west are ogee shaped (Fig.2-84).

Though the conical shaped circular built church is presently covered with corrugated metal sheet, it was originally covered with a thatched one that still exists under the corrugated metal sheet (Fig.2-84). To support the roof smoothly, the square shaped *meqdes* is switched to a cylindrical shape in the upper part. Furthermore, not only masonry walls, but also timber beams set between walls support the structure (Fig.2-85). The lower beams between masonry walls support posts and upper curvilinear beams along masonry walls.

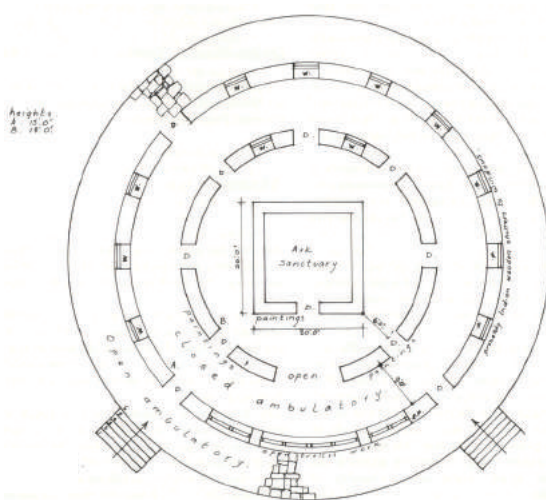


Fig.2-82 Plan of Sillasé Church in Ch'eleqot, from Plant (1985).



Fig.2-83 Multi-framed Timber Window with Mural Painting, Sillasé Church in Ch'eleqot, photo by author.



Fig.2-84 External appearance from the west, Sillasé Church in Ch'eleqot, *photo by author.*



Fig.2-85 Beams, post and ceiling of Sillasé Church in Ch'eleqot, *photo by author.*

In this way, a type of circular built church usually has three spatial components named *meqdes*, *qiddist* and *qiné mahlét*. Uniquely, rectangular shaped *meqdes* (sanctuary) is located at the center, and the other two circular spatial components enclose it. The floor level becomes higher as it goes center. In *qiné mahlét*, there are usually three separated church entrances, each with steps up to the plinth. Traditionally, the entrance on the west is used by priests and other important clergies and laymen, and those on the north and south respectively by male and female members of congregation (Phillipson 2009). The west wider openings are perhaps because of its function of *qiné mahlét*, that is, chanting space needs a light.

3-3. Rectangular Built Church with Ambulatory in Tigray

3-3-1. Examples of Rectangular Built Church with Ambulatory

A type of rectangular built church that has a centralized sanctuary enclosed by ambulatory can be often seen in Tigray and adjacent Eritrean highland (Fig.2-79). The plan consists of eastern *meqdes* and ambulatory, *qiddist* in front of *meqdes*, and westernmost *qiné mahlét*. Several documented examples of this type of church are introduced below.

(a) Old Church of Asir Metira Monastery (nearby Atsbi)

The monastery is located 4km east of Atsbi though the complicated geographical condition requires visitors to take a much longer route through a winding road. In reference to the local tradition, the monastery was established by King Gebre Mesqel in the 6th century (Mitik 2006). However, the monastery is better known as one of the Stephanite sites. After the destruction of Gunde Gundé in the middle of 15th century, members of the Stephanite movement often resided in Dés'a and Menberta (Kaplan 2010). Though many Stephanite sites in these areas were destroyed by Emperor Zer'a Ya'iqob and Be'ida Maryam during the 15th century, Asir Metira flourished at that time under Emperor Zer'a Ya'iqob (Nosnitsin 2013, 2014; Girma 2007)¹². The monastery was closely associated with Gunde Gundé, while Asir Metira was frequently endangered by the Muslims. The monastery was re-established by a certain *abune* Yishaq in the 17th century, and favored by Emper-

¹² Girma (2000) listed 33 Stephanite sites, 23 of which were destroyed at that time.



Fig.2-86
Site plan of
Asir Metira Monastery,
after Google Map.

or Yohannis IV in the 19th century (Nosnitsin 2014). Though the monastery suffered from the new regulation and policy during Haile Selassie I and Derg period, the monastery was recently re-opened as a nunnery by *abba* Gebre Medhin in 1997.

From the above-mentioned historical events, the targeted building is estimated to date back to the 17th century. It is located in the middle of the western slope next to the wheat lands and fields along the river (Fig.2-86). However, it was seriously damaged by a thunder storm in 1992 and suffered subsequent natural deterioration (Fig.2-87). Furthermore, the original church came to be radically transformed into a workshop for textile weaving in recent years, and the inner structure previously used for the space of *meqdes* was totally demolished (Fig.2-88).¹³ The original ceiling and roof were also totally removed, and the targeted building is presently covered with a corrugated metal sheet roof (Fig.2-89). Nevertheless, thanks to the documentation by Plant (1973), several photos taken before the demolition of the inner structure and remaining timber members used as beams and openings,¹⁴ it is possible to re-imagine the original construction of the church to some extent. The characteristics of the targeted building are described below.

The original size of the targeted church is a rectangle of approximately 13.5 x 8.6 m. From the sketch drawn by Plant (1973), it is clear that the building spatially consisted of *meqdes* enclosed by ambulatory, *qiddist* in front of *meqdes*, and *qiné mahlét* separated by a series of timber screens from the *qiddist* (Fig.2-90). There are three church entrances: two on the north, one of which is in *qiné mahlét*, and one on the south. However, only the south one is used presently. Concerning access to *meqdes*, two doors on the west and north were described by Plant. However, from the photo taken before the demolition of the *meqdes*, it becomes clear that there was one more opening in the south

¹³ The monastery decided to build a new church in the upper side of the old church, and the construction was completed in 2008.

¹⁴ The Japanese team led by Riichi Miyake carried out the research activity to reconstruct the original situation of Asir Metira Old Church in response to the request by Cultural Association of Tigray and Mekelle University. The author also participated in the activity. The results of the research activity and detailed reconstruction process are documented in: Miyake, R., Shimizu, N.: Reconstructive Approach for the Medieval Architectural Heritage in Ethiopia: Case of Asir Metira Monastery in Tigray, Conference Proceedings of International Conference of 10th International Conference of the History of Art and Architecture in Ethiopia (proposed title), in printing.



Fig.2-87 Serious crack in the south wall, old church of Asir Metira Monastery, photo by Miyake, R. (taken before the demolition of meqdes).



Fig.2-89 External appearance, old church of Asir Metira Monastery, photo by Higuchi, R.

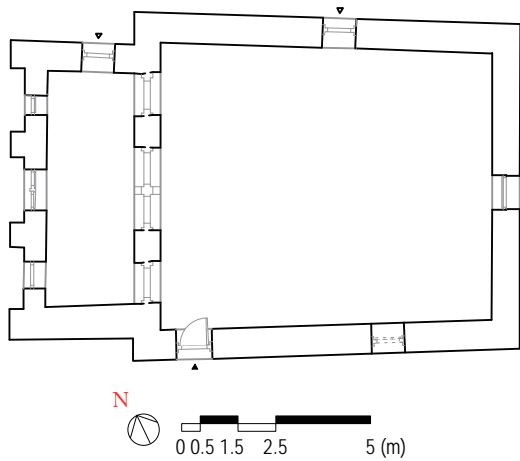


Fig.2-88 Recent Plan, old church of Asir Metira Monastery, made by Miyake, R., Shimizu, N. and Mano, Y.

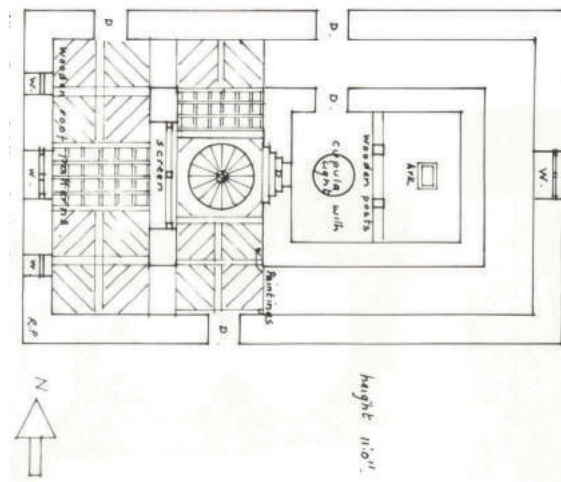


Fig.2-90 Plan in 1970s, old church of Asir Metira Monastery, from Plant (1973).

side, too (Fig.2-91). Indeed, Plant described that “square Maqdas entered by three doors” in the text. On the east wall of *meqdes*, there was one window. The timber panel, namely timber planks filling void of a window, is ornamented by cross-shaped carving, though this is also lost in Plant’s drawing (Fig.2-92). In *meqdes*, there were two pillars, and timber arched screens with bracket capitals were installed (Fig.2-93). Each timber arch was ornamented by three bead-planks, and the sides of the arch and bracket were finely carved. A series of timber screens between *qiddist* and *qiné mahlét*, which still exists, is also arched and with bead-planks and bracket capitals, though the sides are not carved (Fig.2-94). The westernmost wall of *qiné mahlét* consists of four windows: one in the north, two in the center, and one in the south (Fig.2-95). In the north one, the original window, of which panel is ornamented in the same way with the east wall of *meqdes*, still remains. In addition, there is one window on the south that is buried presently, though it is again not drawn in Plant’s sketch (Fig.2-88, 90)

From the photo taken by Plant (1973), it is clear that a tower was situated over the western half of *meqdes* (Fig.2-96). 3-D remodeling of the picture proves that the height is approx. 1.4m above the roof surface. This distinction of the height contributed to giving light to *meqdes* (*Ibid.*). According



Fig.2-91 A top-down view from the northeast, old church of Asir Metira Monastery, photo by Miyake, R. (taken before the demolition of meqdes).



Fig.2-92 Ornamental window in meqdes' wall on the east, old church of Asir Metira Monastery, photo by Mitik G. (taken before the demolition of meqdes).



Fig.2-93 Internal appearance in 1970s, old church of Asir Metira Monastery, from Plant (1973).



Fig.2-94 Timber screen between qiddist and qiné mahlét, old church of Asir Metira Monastery, photo by Higuchi, R.

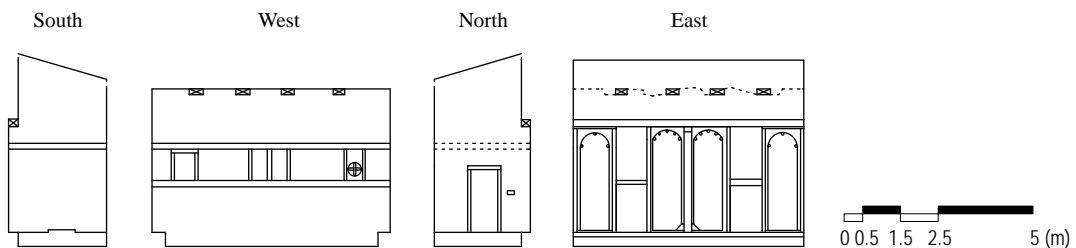


Fig.2-95 Internal elevation of qiné mahlét, old church of Asir Metira Monastery, made by author.

to Plant (1973), a “wooden dome” covers the center of *qiddist* (Fig.2-90). Perhaps, this is a similar dome to the one applied in the Debre Dammo’s sanctuary and Gunde Gundé (Fig.2-44, 72). From the sketch by Plant and the photo taken before the removal of the ceiling, it is clear that a simplified version of lantern roof was applied in the south part of *qiddist*, northern half of north part of *qiddist*, south and north parts of *qiné mahlét* (Fig.2-90, 97). The ceilings of southern half of north part of *qiddist* and central part of *qiné mahlét* were “coffered by cutting the short pieces of wood between the joists (*Ibid.*)” (Fig.2-90). The beams of *qiné mahlét* have been placed in the original position, while the beams of *qiddist* were removed (Fig.2-98). To reconstruct the original church plan, the



Fig.2-96 External appearance from the south in 1970s, old church of Asir Metira Monastery, from Plant (1973).



Fig.2-97 Simplified version of lantern roof applied in the old church of Asir Metira Monastery, photo by Mitik G. (taken before the removal of ceiling).



Fig.2-98 Remaining beams in *qiné mahlét*, old church of Asir Metira Monastery, photo by Higuchi, R.

size of the remaining timber members were taken into consideration (Fig.2-99). According to Plant (1973), these timbers for beams and ceiling were painted in different colors of Venetian red, white and black.

Though the shape of the church is completely rectangular in the sketch by Plant, in actual fact the *qiné mahlét* is slightly smaller than the remaining parts (Fig.2-88, 90). Furthermore, the westernmost wall has four pilasters, though they are omitted in Plant's sketch. From the photo of Fig.2-96, the original external appearance can be clarified. Accordingly, the masonry walls are made from small rubble stones and two layers of stringcourse are installed. Presently, the exterior walls are plastered and the western half of the upper stringcourse is removed (Fig.2-89). On the upper part of the upper stringcourse, there were wooden rainwater gutters projecting well over the walls, though all of them have been removed presently (Fig.2-89, 96).



Fig.2-99 Remaining timber members, old church of Asir Metira Monastery, photo by author.

The results of the reconstruction planning of the church are shown in Fig.2-100. The targeted building's ruined condition presently is all the more regrettable because this was a well-built example of the rectangular built church with ambulatory. Plant also mentioned that the building was

“an important example where traditional methods both in the stone exterior walls and the wooden roof are still be seen.”

(b) Debre Sillasé Church (nearby Atsbi)

The church is located 5km north of Atsbi. According to the documentation carried out by Juel-jensen *et al.* (1974), the plan is not the one with an ambulatory, but the rectangular one that is divided into two (Fig.2-101). There is one church entrance on the south, and three windows on the east, north and west. The westernmost wall has two pilasters. The exterior masonry walls are made from small stones and one layer of stringcourse is installed (Fig.2-102). Furthermore, there is a tower that has an arched window on the east. The arched window is locally rare, because timber framed windows are usually applied in Tigray.

However, the author’s visit to the site in 2018 revealed that the current church building type is the rectangular one with ambulatory (Fig.2-103). According to the local people, the building is older than the time of visit by the Oxford team led by Juel-jensen, and the appearance of the building confirms this, too. It is not clear whether memory of local people is wrong, the Oxford team failed to sort the data, or another Debre Sillasé Church separately from the site the author visited exists in the neighborhood... At any rate, describing the characteristics of the current church building is meaningful in the context to discuss the type of the rectangular built church with ambulatory.

The size of the existing masonry church building, of which the wall is perhaps made from rubble stones, is a crooked rectangular shape of approximately 14.0

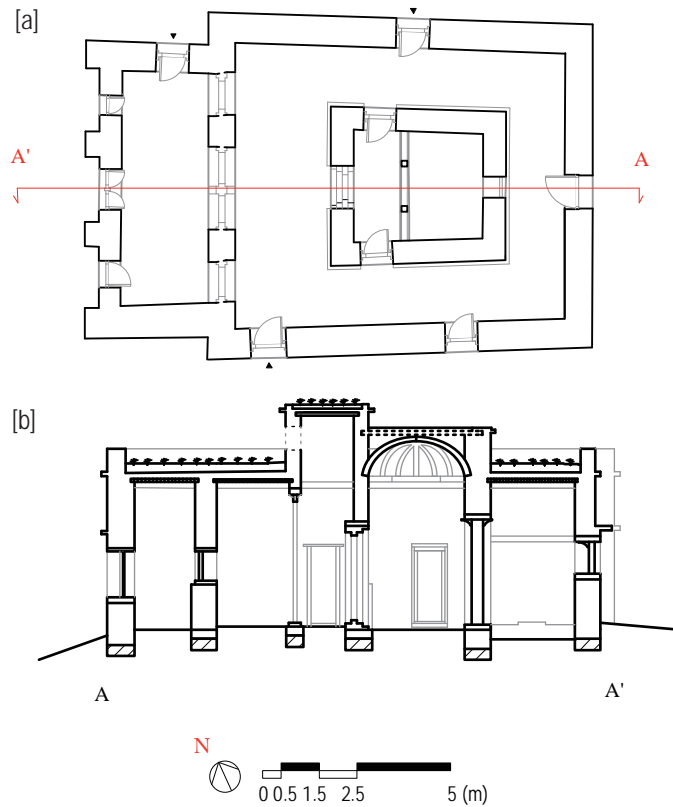


Fig.2-100 Restoration design (a: plan; b: section), old church of Asir Metira Monastery, made by Miyake, R., Shimizu, N. and Mano, Y.

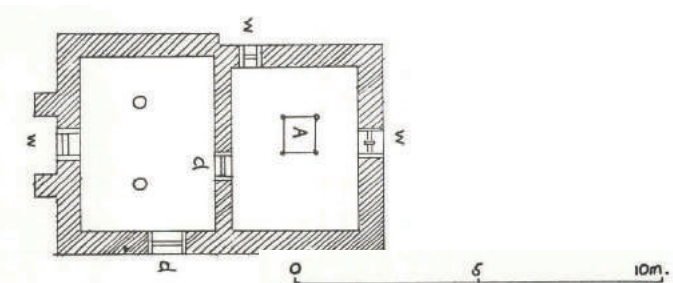


Fig.2-101 Plan of "Debre Sillasé Church," from Juel-jensen *et al.* (1974).



Fig.2-102 External appearance of "Debre Sillasé Church," from Juel-jensen *et al.* (1974).

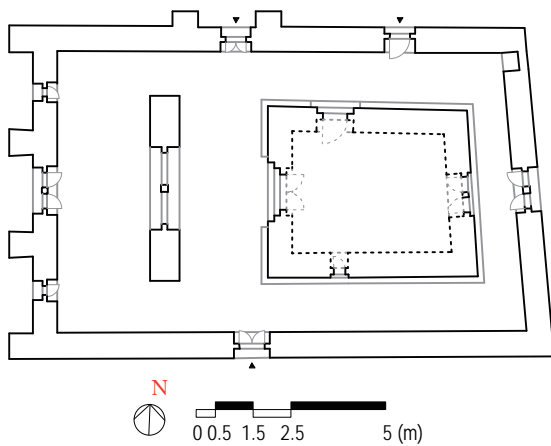


Fig.2-103 Plan of existing "Debre Sillasé Church," made by author.

x 8.8m. The building spatially consists of *meqdes* enclosed by ambulatory, *qiddist*, and *qiné mahlét*. There are three church entrances, one on the south and two on the north. There is no entrance in *qiné mahlét*. Concerning windows, there are two, which are coupled, in the easternmost wall, and four, two of which in the center are coupled, in the westernmost wall. Inside *meqdes* can be accessed from the west or north door. The doors of the *meqdes* are the multi-framed ones with several bead-planks as of circular church's one (Fig.2-104). However, the sides of the timber

members are not carved. Though the author was not allowed to enter inside *meqdes*, the floor level of *meqdes* should be higher than *qiddist*. In addition, there are two windows, which are coupled, on the east wall of *meqdes*, and one on the south wall of *meqdes*. *Qiddist* is separated from *qiné mahlét* by two masonry pillars. Between the pillars, two arched timber screens with three bead-planks each, between which a timber post with bracket capitals is placed, is installed (Fig.2-105). However, a screen is omitted on both sides. Method of ceiling is simplified version of the lantern ceiling entirely, though one in *meqdes* is not clear (Fig.2-106). There are no domes in this church presently.

A tower is seen from the external appearance (Fig.2-107). However, this is a false tower, that is, there is no function. According to the local people, the false tower was built after the upper part of the original walls and roof were removed to cover the corrugated metal sheet roof several decades ago. It is said that there was a tower even before the removal. The masonry wall is inset by one layer of stringcourse, and remarkably a series of monkey head is installed just below the stringcourse (Fig.2-107). Like the Old Church of Asir Metira Monastery, four pilasters are installed in the westernmost wall (Fig.2-103).



Fig.2-104 A door installed in the west wall of *meqdes*, Debre Sillasé Church, photo by author.



Fig.2-105 Timber screen between pillars, which separates *qiddist* from *qiné mahlét*, Debre Sillasé Church, photo by author.



Fig.2-106 Simplified lantern ceiling in *qiddist*, Debre Sillasé Church, photo by author.



Fig.2-107 External appearance from the east, Debre Sillasé Church, *photo by author*.

(c) Mika'el Amba Church (Dera)

The similar plan to Debre Sillasé is drawn by Oxford team as Mika'el Amba at Dera (Fig.2-79). According to Juel-jensen *et al.* (1974), the size of the building is approximately 13.3 x 9.1m. If the Oxford team failed to sort the data, it is believable that this plan shows the plan of Debre Sillasé. However, this type of church was “typical of many others” at that time, therefore it cannot be regarded that they failed to sort before visiting the site. According to Juel-jensen *et al.*

(1974), the ceiling “with a simple square lantern” over the *meqdes*, is typical, too (Fig.2-108). Perhaps, the ceiling of the whole church is constructed using timber materials.

Concerning the interior of the church “Mika'el Amba,” Juel-jensen *et al.* (1974) mentioned: “carved panels are found in the maqdas east window and on planks in the ceiling, while the maqdas has a superbly carved north door. In front of the west door to the maqdas is a stone slab incised with a looped cross design.” Furthermore, two free-standing monolithic pillars approx. 2.5m high with cruciform shafts and Aksumite stepped capitals were put in the *meqdes* (Fig.2-108). In another building in the church enclosure, window panels with “a carved plank incorporated in the door and other fine old carvings of lattice designs” were found (Fig.2-109). On the basis of these facts, Juel-jensen said that this church was built on the site of an ancient church and materials from which were used in the present structure. However, the same was not said for the Debre Sillasé Church when the author visited Debre Sillasé. It is tentatively concluded that the Oxford team did not fail to sort Debre Sillasé with Mika'el Amba.

From the documented plan, it is clear that there are two church entrances on the south and north, and two *meqdes* entrances on the west and north. No entrance is found in *qīné mahlét*. The windows installed count two on the easternmost wall, four, two of which in the center are coupled, on the westernmost wall, and one on the east wall of *meqdes*. Between *qīddist*, and *qīné mahlét*, two elon-



Fig.2-108 Two free-standing monolithic pillars with Aksumite stepped capitals, Mika'el Amba, *from Juel-jensen et al. (1974)*.

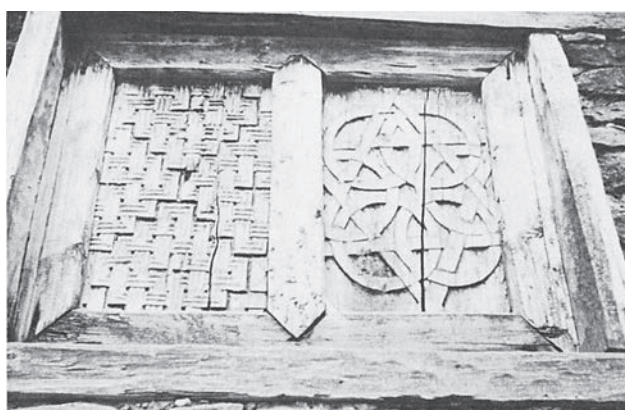


Fig.2-109 Window panels existing in Mika'el Amba, *from Juel-jensen et al. (1974)*.

gated masonry pillars are erected, and two arched timber screens are installed between them. On the westernmost wall, there are four pilasters.

(d) Mika’el Church (nearby Atsbi)

The building is documented in Plant (1985). The church is located in the place “on the plateau by Landrover 20 minutes before reaching Atsbi, on the new road from Wkro (Wigro) to the southwest.” The sketched plan is similar to the one of Mika’el Amba at Dera, though the eastern half of the plan is ambiguous (Fig.2-110).

There is one church entrance on the south, and three windows, perhaps four because the central window is wider than the others in the drawing, on the west. *Meqdes* can be accessed from the west door. In the *meqdes*, there are two circular pillars and they support “flat beam” placed in the east-west direction. *Qiddist* is separated from *qiné mahlét* by two masonry pillars.

However, whether there are screens between the pillars is not clear. From the description of “wooden roof” in the plan, it is thought that the ceiling construction method of this church is wooden like *hidmo* house. Concerning the external appearance, due to the text “typical string courses” in Plant (1985), it becomes clear that there are one or more layer(s) of stringcourse in this building.

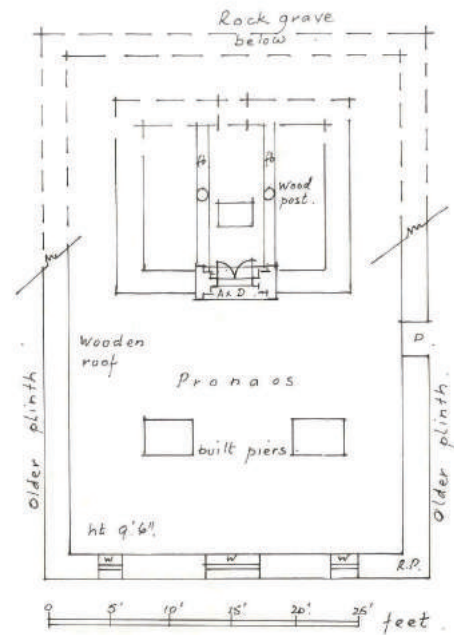


Fig.2-110 Plan of Mika’el Church nearby Atsbi, from Plant (1985).

(e) Mika’el Church (Feleg Da’iro, nearby Mekelle)

The church is located 5km northeast of Mekelle’s city center. Local tradition claims that the church was established in the 6th century, however, collapsed by the Muslims in the 16th century (Bogale unpublished document 1). The church was re-established afterwards. Therefore, the building construction perhaps dates back to the 17th or 18th century. Due to the new church construction a few decades ago, the targeted building was renamed and called Medhané ‘Alem Church presently.

The size of the building is rectangular measuring approximately 17.6 x 11.6 m. Spatially, the inner structure of *meqdes* and *qiddist* are enclosed by ambulatory and *qiné mahlét* is placed on the west of *qiddist* and ambulatory (Fig.2-111). *Qiné mahlét* is separated from ambulatory by the inner pilaster. There are three entrance doors of the church, one on the south and two on the north. The northeast door is smaller than the others. *Meqdes* can be accessed from the west *qiddist* and the south and north sides of ambulatory. On the east wall of *meqdes*, there are two windows, which are coupled. *Qiddist* can also be accessed from the west *qiné mahlét* and south and north sides of ambulatory. Both of the west doors are bigger than the others. Each of them has a central post with a bracket capital of which sides are roughly carved (Fig.2-112). On both sides of a bracket capital, there are multi-framed timber doors that have arched shape, and they are ornamented by three bead-planks. The floor level is the highest in *meqdes*, and the lowest in *qiné mahlét* (Fig.2-113). On the south side of *qiné mahlét*, there are stairs accessing the upper window (Fig.2-114). The westernmost wall of *qiné mahlét* has five windows, three of which in the center are coupled (Fig.2-111, 115). In addition, there

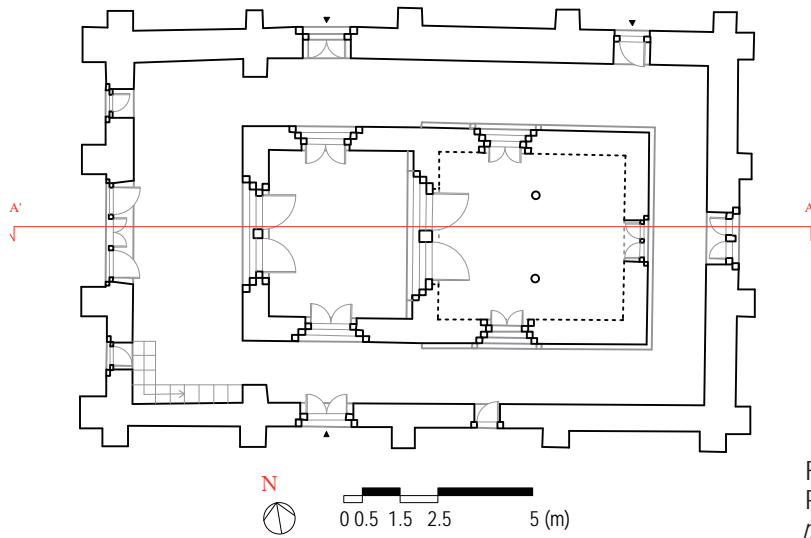


Fig.2-111
Plan of Mika'el Church in Feleg Da'iro,
made by author.

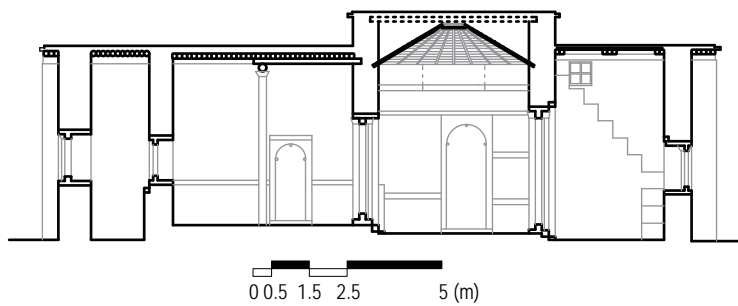


Fig.2-113
Section of Mika'el Church in Feleg Da'iro,
made by author.



Fig.2-112
A timber door between
qiddist and *qiné mahlét*,
Mika'el Church in Feleg Da'iro,
photo by author.



Fig.2-114
Internal appearance of
Mika'el Church in Feleg Da'iro,
photo by author.



Fig.2-115 External appearance from the west, Mika'el Church in Feleg Da'iro, *photo by author.*



Fig.2-116 Ceiling in *meqdes*, Mika'el Church in Feleg Da'iro, *photo by author.*



Fig.2-117 Timber dome installed in *qiddist*, Mika'el Church in Feleg Da'iro, *photo by author.*



Fig.2-118 External appearance from the south, Mika'el Church in Feleg Da'iro, *photo by author.*

are two windows, which are coupled, in the easternmost wall, and one window in the south wall.

In *meqdes*, there are two pillars, one of which is with a bracket capital, and they support a transverse beam placed in the north-south direction (Fig.2-116). The ceiling is filled with wooden materials, which are placed in parallel, after upper beams are placed on the lower transverse beam, as with *hüdmo* house (Fig.2-11, 116). The same method is applied in *qiné mahlét* and ambulatory, too. On the other hand, the ceiling method of *qiddist* is a timber dome, though the shape of timber is not curved but straight (Fig.2-113, 117). Interestingly, the height of the building is the highest in *qiddist* part, in this church (Fig.2-113).

Concerning the exterior, of which the wall is perhaps made of rubble masonry, it is characteristic that pilasters are installed not only in the westernmost wall, but also throughout the whole building (Fig.2-111). The western wall with four pilasters is well organized by a row of windows and timber layers (Fig.2-115). Furthermore, four parapets of coronal shape are put over the pilasters, albeit it looking newer than the original. The parapets of the same shape are put in the eastern wall, too. In the southern wall, one timber layer is placed at the level of the bottom of the windows in the west wall (Fig.2-118). A stringcourse is installed in the whole of the building wall, and wooden rainwater gutters projects in the south and north wall. Though the roof is covered with stones presently, it should have been originally covered with only soils in the past (Fig.2-119).¹⁵

¹⁵ This maintenance method, covering a roof with stones, is commonly applied in the rock-hewn churches. A similar way of maintenance can be found in Abriha we-Atsbäha. However, it is not a traditional way of maintenance.



Fig.2-119 Current roof covered by stones and coronal shaped parapets, Mika'el Church in Feleg Da'iro, photo by author.

(f) Īnda Giyorgis (at Fremona)

The building is documented in Littmann *et al.* (1913). The church is located in Fremona, nearby 'Adwa. The size of the church is a rectangle of approximately 16 x 11 m. The church building spatially consists of a square *meqdes* enclosed by ambulatory, *qiddist* and *qinė mahlét* (Fig.2-120: a). There are five church entrances, three on the south and two on the north. There are two church entrances in *qinė mahlét*. From the elevation, it is clear that each door on the south are multi-framed and arched shape, and the arches are ornamented by a few bead-planks (Fig.2-120: b). *Meqdes* can be accessed from the west, north or south. The west door of *meqdes* is multi-framed, but not arched, with a door resembling the one in the main church of Debre Dammo (Fig.2-121). Windows are installed in the easternmost wall (three), westernmost wall (four, two of which in the center are coupled) and east wall of *meqdes* (one). Concerning the openings, a bracket capital is documented in Littmann *et al.* (1913) (Fig.2-122). *Qinė mahlét* is separated from *qiddist* by the wall, and one can access each other through the center.

Characteristically, there are six timber domes, in *meqdes*, each corner of ambulatory or *qiddist*, and the central part of *qinė mahlét* (Fig.2-120: a). The positions of these domes can be identified from the external appearance (Fig.2-120: b). The roof in other parts is covered with soil, as it is clear from the elevation. The roof can be accessed through the stairs placed in the southeastern part of the building. From the elevation, it becomes clear that the masonry walls, with one layer of stringcourse, are made from rubbles, too. Nevertheless, Littmann *et al.* (1913) mentioned that the masonry walls

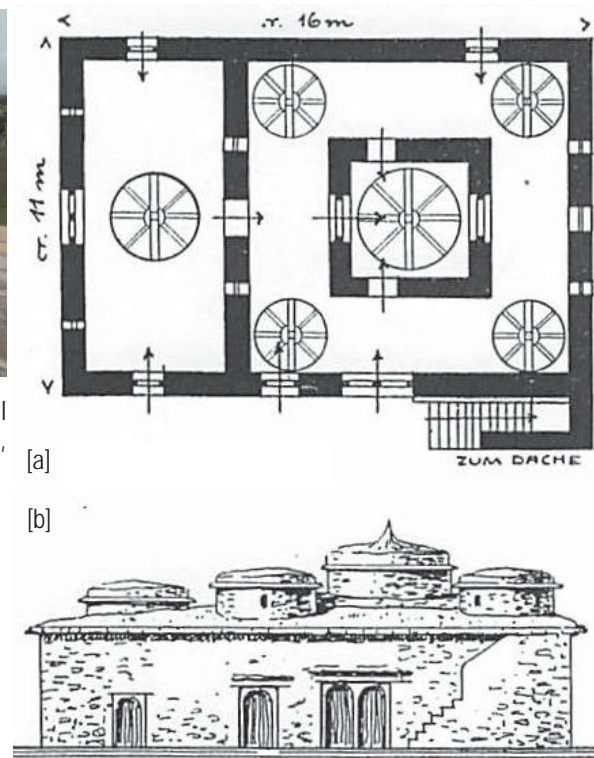


Fig.2-120: Plan (a) and elevation (b) of Īnda Giyorgis Church, from Littmann *et al.* (1913).

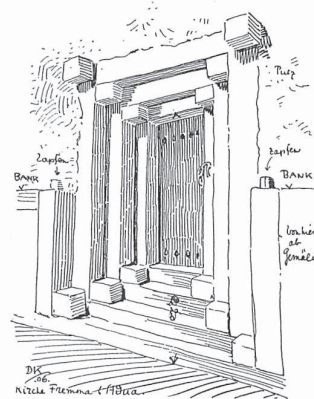


Fig.2-121
A west door of *meqdes* in Īnda Giyorgis Church, from Littmann *et al.* (1913).



Fig.2-122
A bracket capital in Īnda Giyorgis Church, from Littmann *et al.* (1913).

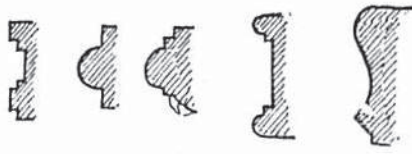


Fig.2-123 Neatly shaped stones used in Īnda Giyorgis Church, from Littmann *et al.* (1913).

contain a series of neatly shaped stones shown in Fig.2-123. According to their analysis, these pieces were remnants of the great fortifications that had been built in the 16th century by Jesuits and the Portuguese.

(g) Īnda Qĭddus Mika'el Church

(at Dscheffa nearby Met'era, Eritrea)

The building is documented in Littmann *et al.* (1913). The church is located in Dscheffa, approximately 5 km south of Matara in Eritrea. The size of the church is a rectangle of approximately 17 x 8 m. Spatially, it consists of rectangular *meqdes* enclosed by ambulatory, *qĭddĭst*, and *qĭnĕ mahlĕt* (Fig.2-124: a). There are two church entrances on the south and north, but none in *qĭnĕ mahlĕt*. *Meqdes* can be accessed from west, south or north. There are no windows in the easternmost wall, while there are four windows, two of which in the center are coupled, in the westernmost wall. *Qĭnĕ mahlĕt* is separated from *qĭddĭst* by two masonry pillars and two pilasters. From the plan, it becomes clear that there are timber screens between *qĭddĭst* and *qĭnĕ mahlĕt*.

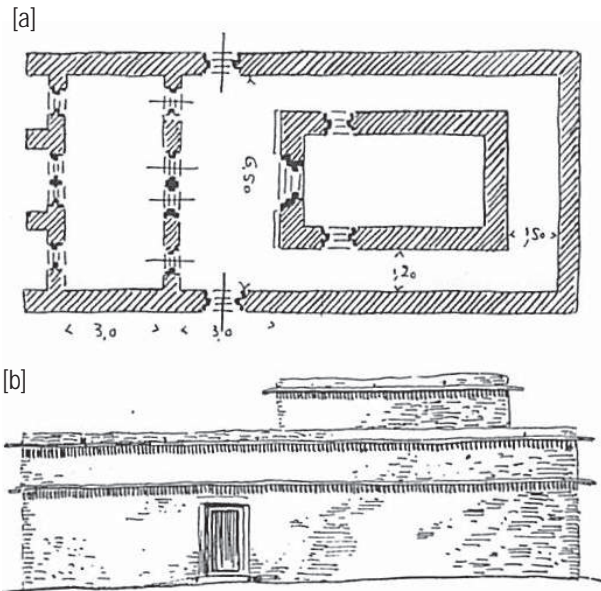


Fig.2-124 Plan (a) and elevation (b) of Īnda Qĭddus Mika'el Church, from Littmann *et al.* (1913).

From the elevation, it becomes clear that the masonry wall with two stringcourses is made from rubbles, and the timber multi-framed door is not arched (Fig.2-124: b). The whole roof is covered with soil like *hidmo* house, and the height of *meqdes* part is higher than other parts. Concerning the westernmost wall, four pilasters are attached (Fig.2-124: a).

(h) Abba Liqanos Church (near Aksum)

Though the church, located in the northeast of Aksum, was documented in Littmann *et al.* (1913), it has already been demolished (Fig.2-125). The size of the church was a rectangle of approximately 13.9 x 9.3 m. From the documentation carried out by Littmann *et al.* (1913), the precise plan of inner structure is not clear. Therefore, the spatial structure of the building is ambiguous, too. If the inner structure contains both *meqdes* and *qĭddĭst*, the westernmost space becomes *qĭnĕ mahlĕt*. In this case, the spatial structure is similar to the one of Mika'el Church in Feleg Da'iro (Fig.2-111, 125). However, if the whole inner structure is *meqdes*, the westernmost space becomes *qĭddĭst*, and *qĭnĕ mahlĕt* does not exist in this case. The author cannot identify which is true.

In the documented plan, three church entrances are drawn: two on the south and one on the north. However, according to the text, there were four before. When the width of the remaining

openings is taken into account, it is perhaps the one in the north wall. The inner structure can be accessed at least from the west. From the documented sketch, whether the northern opening of the inner structure is a door or window is not clear. There are windows in the easternmost wall (four, two of which in the center are coupled), the westernmost wall (four, each two are coupled), the northernmost wall (one or two), southernmost wall (two), and the east wall of inner structure (two, which are coupled) (Fig.2-125). The photo taken from the west clarifies that the wall is characteristically gabled and covered by thatch (Fig.2-126). The windows are multi-framed timber ones with arched shape. In addition, there are three pilasters in the westernmost wall. While the masonry wall is basically made from rubbles, the stones applied in the pilasters are larger.

(i) Renovation of the Church into the Rectangular Church with Ambulatory

As mentioned above, the construction period of Debre Garzén of Gunde Gundé Monastery was divided into three. The original nine-domed structure became the *meqdes* after the expansion of the building. The second phase was the construction of the south, east and north ambulatory walls (Fig.2-70; Miyake *et al.* 2012-1). Where the second phase construction is stopped can be estimated from the existing walls in the south and north because the stone courses are separated in that part (Fig.2-127). The ceiling of the newly built ambulatory is made from timber materials (Fig.2-11, 128). The third phase was construction of a larger space forming “*qiddist*” in the western part of “*meqdes*.” On both south and north of “*qiddist*,” two timber pillars with an ornamental capital are installed (Fig.2-71). Though the whole church is presently covered with corrugated metal sheets, a gabled roof of thatch in *qiddist* and flat roof of soil in the other parts are identified from the photo taken in the past (Fig.2-127, 129). Technically, corbel arches applied in the openings of the extension parts are remarkable, too (Fig.2-130). A similar example of the corbel arch is documented in Giyorgis Dengelat, located in 8km west of ‘Idaga Hamus (Fig.2-131). In this way, the plan of Debre Garzén of Gunde Gundé was transformed into the type of rectangular church with ambulatory, perhaps to accommodate more monks.

The examples of renovating a building into a rectangular church with ambulatory were found at the Great Temple in Yeha and İnda Maryam Church in Asmara, too (Fig.2-20, 54, 132). In these cas-

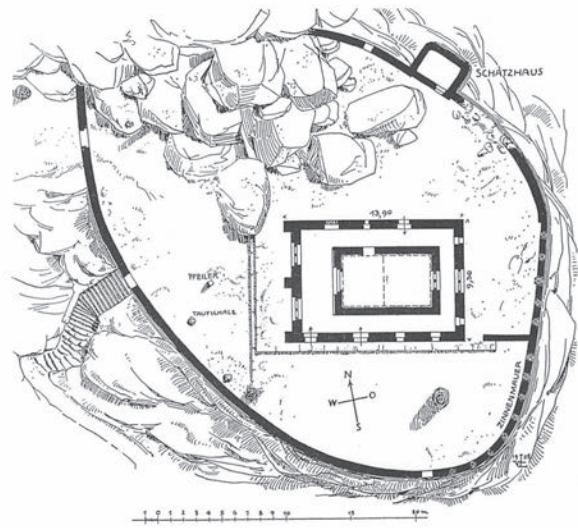


Fig.2-125 Plan of Abba Liqanos Church, from Littmann *et al.* (1913).



Fig.2-126 External appearance from the west, Abba Liqanos Church, from Littmann *et al.* (1913).



Fig.2-127 External appearance from the south, Debre Garzén of Gunde Gundé, *photo by author.*



Fig.2-128 Ceiling method applied in ambulatory, Debre Garzén of Gunde Gundé, *photo by author.*



Fig.2-129 External appearance in the past, Debre Garzén of Gunde Gundé, *from Lepage et al. (2005).*



Fig.2-130 Corbel arches in the east wall, Debre Garzén of Gunde Gundé, *photo by author.*

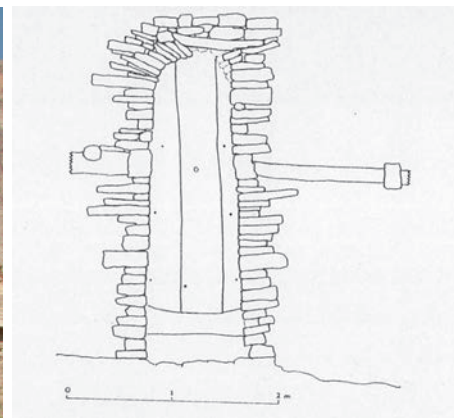


Fig.2-131 A corbel arch applied in Giyorgis Dengelat, *from Juel-jensen et al. (1974).*

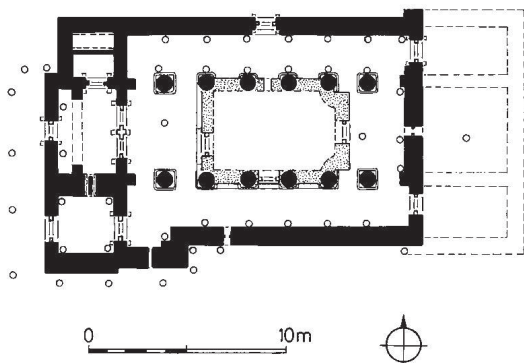


Fig.2-132 Plan of Īnda Maryam Church in Asmara, *from Phillipson (2009).*

es, the adjustment of the plan was not done by extending the original structure, but by adding inner structure to the original larger internal space. However, the added inner structure of the Great Temple was already removed again, and the whole structure of Īnda Maryam was totally demolished.

(j) Abune Gebre Menfes Qïddus Church (Mekelle):

a Rectangular Church with Ambulatory Built in the 20th Century

According to Bogale (unpublished document 2), the church was established by order of Siyyum Mengesha in reference to the interview with a priest Malake Hiwot. Though whether it was erected in his first period (1914-around 1919) or second period (1941-1960) is not clear, it is better understanding that it happened in his first period because he was not in fact in Tigray in his second period. Though the corrugated metal sheet roof and glassed windows should be of recent reconstruction, the walls are said to be the original (Fig.2-133). The size of the building is a well-organized rectangle of approximately 23.1 x 14.2m. Spatially, it consists of *meqdes* enclosed by ambulatory, two-spanned *qïddist*, and *qïné mahlét* (Fig.2-134). There are four church entrances, two on the south and two on the north. *Meqdes* can be accessed from west, south and north. The floor level is the highest in *meqdes*. The easternmost wall has three windows, and the east wall of *meqdes* has two windows, which are coupled. Concerning the westernmost wall, there are five windows, three of which in the center are coupled. *Qïddist* is separated from *qïné mahlét* by two elongated masonry pillars, and two wooden screens are installed between the pillars. In the *qïddist*, other two masonry pillars are placed and the central space of the eastern half has higher ceilings with simplified lantern (Fig.2-135). The height here is the highest in the building. Concerning the exterior, pilasters are installed in whole of the building (Fig.2-134). This church building erected in the 20th century has common characteristics with the above-mentioned older rectangular built churches from the 15th century.



Fig.2-133 External appearance from the west, Abune Gebre Menfes Qïddus Church, *photo by author*.



Fig.2-135
Internal appearance of eastern part of *qïddist*,
Abune Gebre Menfes Qïddus Church,
photo by author.

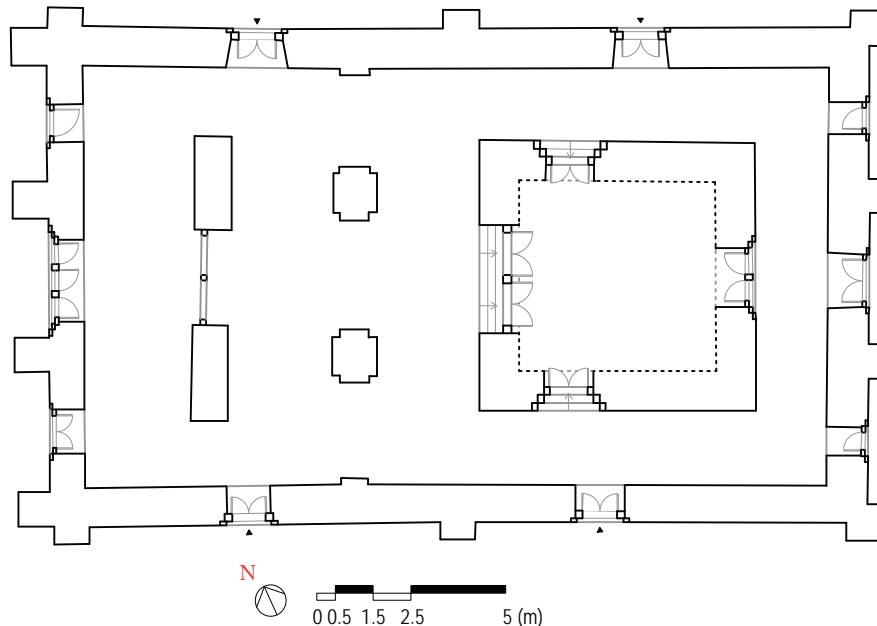


Fig.2-134 Plan of Abune Gebre Menfes Qiddus Church, *made by author.*

3-3-2. Characteristics of Rectangular Built Church with Ambulatory

A type of “rectangular built church with ambulatory” is a built church that consists of *meqdes* enclosed by ambulatory, *qiddist* on the west of *meqdes*, and westernmost *qiné mahlét*. Eight examples documented by the author or other researchers were introduced above [(a)-(h)]. Furthermore, the existence of examples that some other types of buildings were renovated to adapt into this type of building shows that it became a popular church type [(i)]. The popularity has continued until now. The example of Abune Gebre Menfes Qiddus Church, which was built in the 20th century, supports the idea [(j)]. In Table 2-1, the eight examples are compared from the perspective of construction method and planning method. The results show the following characteristics of “rectangular built church with ambulatory.”

- Construction Method

The masonry wall of rectangular built churches with ambulatory is always made from rubbles (Table 2-1: I). In the upper part of the walls, one or two stringcourse(s) is (are) installed (Table 2-1: II). These characteristics are in common with *hüdmo* house, which originates in the Pre-Aksumite period (Fig.2-10). However, the appearance of the walls is distinct from the predate basilica churches in use of wooden materials. That is to say, wooden layer and monkey head that were applied in the predate basilica churches became rarely used in the churches of later periods (Table 2-1: III, IV). Though only one case of each is found, the wooden layer of Mika’el Church in Feleg Da’iro is only placed on the west and south walls and one or two layered, and monkey head of Debre Sillasé Church is just ornamental and only one layered (Fig.2-107, 115, 118). A unique feature of the masonry wall in rectangular built churches with ambulatory is found in the westernmost wall: there are usually four pilasters (Table 2-1: V, Fig.2-115). Pilasters are sometimes installed throughout the whole building, as

Table 2-1: Comparison of documented churches to understand construction method, planning and timber openings and brackets, *made by author*.

Name of Church	Source of Documentation	I: Wall Construction	II: Stringcourse in the Wall	III: Wooden Layer in the Wall	IV: Monkey Head in the Wall
(a) Old Church of Asir Metira Monastery	Measurement results, Plant (1973)	Rubble masonry	2 layers	None	None
(b) Debre Sillase Church (nearby Atsbi)	Measurement results	Perhaps rubble masonry	1 layer	None	1 layer (below stringcourse)
(c) Mika' el Amba Church (Dera)	Juel-jensen et al. (1974)	No record	No record	No record	No record
(d) Mika' el Church (nearby Atsbi)	Plant (1985)	No record	More than 1 layer	No record	No record
(e) Mika' el Church (Feleg Da'iro)	Measurement results	Perhaps rubble masonry	1 layer	W: 2 layers S: 1 layer	None
(f) Inda Giyorgis (Fremona)	Littmann et al. (1913)	Rubble masonry ¹	1 layer	None	None
(g) Inda Qiddus Mika' el Church (Dscheffa, Eritrea)	Littmann et al. (1913)	Rubble masonry	2 layers	None	None
(h) Abba Liqanos Church (near Aksum)	Littmann et al. (1913)	Rubble masonry ²	None (gabled roof)	None	None

¹ However, the masonry walls contain a series of neatly shaped stone pieces, which were estimated to be remnants of the great fortifications that had been built in the 16th century by Jesuits and the Portuguese. ² Nevertheless, the stones applied in the pilasters are larger.

# of Church	V: # of Pilasters in the Westernmost wall	VI: Existence of Pilasters in the Walls Other Than Westernmost One	VII: Basic Ceiling and Roofing Method	VIII: Number and Position(s) of Domes
a	4	x	Timber ceiling (simplified version of lantern, coffered) →Perhaps soil roof like <i>hidmo</i> originally Corrugated metal sheet roof (presently)	1: center of <i>qiddist</i>
b	4	△ Only both sides of a north door	Timber ceiling (simplified version of lantern) →Perhaps soil roof like <i>hidmo</i> originally Corrugated metal sheet roof (presently)	0
c	4	x	<i>Meqdes</i> : "Simple square lantern" →Perhaps timber ceiling and soil roof as <i>hidmo</i>	No record
d	0 ³	x ³	"Wooden roof" →Perhaps timber ceiling and soil roof as <i>hidmo</i>	No record
e	4	○ Whole of the building	Timber ceiling (parallel arrangement) →Perhaps soil roof like <i>hidmo</i> originally Presently, stones are put on the roof.	1: <i>qiddist</i>
f	0	x	Flat roof of soil →Perhaps timber ceiling like <i>hidmo</i>	6: <i>meqdes</i> , each corner of <i>qiddist</i> or ambulatory, central part of <i>qiné mahlé</i> t
g	4	x	Flat roof of soil →Perhaps timber ceiling like <i>hidmo</i>	0
h	3	x	Gabled thatched roof.	0

³ However, it is possible to exist, because drawing of (a) Old Church of Asir Metira Monastery, which is also by Plant, omitted to record pilasters.

# of Church	XI: # and Positions of Church Entrances					XII: # and Positions of External Windows					XIII: # and Positions of <i>Meqdes</i> Windows ³					XIV: # and Positions of <i>Meqdes</i> Entrances ³					XV: # of Pillars or Posts in <i>Meqdes</i>	XVI: # of <i>Qiddist</i> Entrances	
	S	N	W	E	Amount	Q.M. ⁴	S	N	W	E	Amount	S	N	W	E	Amount	S	N	W	E			Amount
a	1	2	0	0	3	1	1	0	4 (1-2-1) ⁶	1	6	0	0	0	1	1	1	1	1	0	3	2 (timber)	-
b	1	2	0	0	3	0	0	0	4 (1-2-1)	2 (2) ⁷	6	1	0	0	2(2)	3	0	1	1	0	2	No record	-
c	1	1	0	0	2	0	0	0	4 (1-2-1)	2	6	0	0	0	1	1	0	1	1	0	2	0 ⁹	-
d	1+ ³	0+	0	0+	1+	0	0	0	3or4 (1-1or2-1)	0	3 or 4	Not clear					0	0	1	0+	1	2 (timber)	-
e	1	2	0	0	3	0	1	0	5 (1-3-1)	2 (2)	8	0	0	0	2(2)	2	1	1	1	0	3	2 (timber)	4 (S, N, W, E) ¹⁰
f	3	2	0	0	5	2	0	0	4 (1-2-1)	3	7	0	0	0	1	1	1	1	0	3	0	-	
g	1	1	0	0	2	0	0	0	4 (1-2-1)	0	4	0	0	0	0	0	1	1	1	0	3	0	-
h	2	1or2	0	0	3 or 4	0or1	2	1or2	4 (2-2)	4 (1-2-1)	11 or 12	0	0or1	0	2(2)	2 or 3	0	0or1	1	0	1 or 2	No record	Not clear

⁴ Q.M.: *Qiné Mahlé*t ⁵ Meaning more than one ⁶ Meaning: # of amount of windows (# of windows on the south - # of windows on the center - # of windows on the north)
⁷ Meaning that two windows are coupled ⁸ In case of (h) Abba Liqanos Church, "*meqdes*" points inner structure. Whether the inner structure consists of *meqdes* or *meqdes* and *qiddist* is not clear. ⁹ Two monolithic pillars are freestanding, that is, they do not support ceiling. ¹⁰ The eastern one is same with western entrance of *meqdes*.

# of Church	IX: Existence of Tower	X: Approximate Building Size	XVII: Existence of Timber Screens between <i>Qiddist</i> and <i>Qiné Mahlé</i> t	XVIII: Existence of Multi-framed Timber Arched Openings or Screens with Bead-planks	XIX: Existence of Bracket Capital(s) and its (their) Position(s)
a	○ Western part of <i>meqdes</i>	13.5 x 8.6 m	○	○	○ Screens in <i>meqdes</i> Screens between <i>qiddist</i> and <i>qiné mahlé</i> t
b	○ However, false one	14.0 x 8.8 m	○ Only the central span	○	○ Screens between <i>qiddist</i> and <i>qiné mahlé</i> t
c	No record	13.3 x 9.1 m	○ Only the central span	△ ¹¹	No record
d	No record	Not clear	No record	No record	No record
e	△ At the position of a dome (<i>qiddist</i>)	17.6 x 11.6 m	-	○	○ Screens between <i>meqdes</i> and <i>qiddist</i> Screens between <i>qiddist</i> and <i>qiné mahlé</i> t One pillar in <i>meqdes</i>
f	○ At the position of domes A part of <i>meqdes</i> is the highest	16 x 11 m	No record	○ ¹²	○ Position is not clear
g	○ <i>Meqdes</i> part	17 x 8 m	○	No record ¹³	No record
h	x	13.9 x 9.3 m	-	○	No record

¹¹ Juel-jensen et al. (1974) mentioned that "carved panels" existed in *meqdes* east window. ¹² In addition, a multi-framed, but not arched, door resembling the one in the main church of Debre Dammo is documented in Littmann et al. (1913). ¹³ Recorded one is not arched. From the elevation drawing, a timber multi-framed door, but not arched, is identified.

shown in Mika'el Church at Feleg Da'iro (Table 2-1: VI, Fig.2-118).

Concerning ceiling and roofing method, the examples of remaining churches including the ones the author measured are often covered with corrugated metal sheets presently. In the targeted area, the original ceiling and roof of the old buildings have been often replaced with it. Furthermore, the documentation results by other researchers always lack sectional drawings. Therefore, the author is forced to presume the original ceiling and roof of the targeted churches from the available data. However, the task is not so difficult because the author's measurement results or other researchers' documentation results confirm the existence of timber ceilings or flat soil roof, other than Abba Liqanos Church of gabled and thatched roof (Table 2-1: VII). When it is known that *hīdmo* house consists of timber ceiling and soil roof, it is reasonable to think that the same ceiling and roofing method was applied in the church buildings, too (Fig.2-10, 11, 97, 106, 108, 116, 118, 120: b, 124: b). The timber ceiling was commonly applied in the predate basilica churches, and the ceiling patterns were imitated in the rock-hewn churches, too (Fig.2-41, 44, 48, 49, 52, 53, 57, 59). Among the patterns to place timbers, simplified lantern ceiling is the most favored (Table 2-1: VII, Fig.41, 53, 106, 108). From the case of Gunde Gundé, the application of soil roof is confirmed, too (Fig.2-129). To run rainwater outside of the roof, rainwater gutters are often installed above the upper stringcourse, as shown in Old Church of Asir Metira Monastery and Mika'el Church in Feleg Da'iro (Fig.2-96, 118).

However, as three raised examples show, the ceiling of a church building sometimes has dome(s) (Table 2-1: VIII, Fig.2-117). This is the characteristic that is not found in the *hīdmo* house. While only one timber dome in *qīddīst* is documented in the cases of Old Church of Asir Metira Monastery and Mika'el Church in Feleg Da'iro, the existence of six domes is recorded in the case of Īnda Giyorgis Church. The predecessor of the similar timber dome can date back to, at least, the main church of Debre Dammo (Fig.2-44). The position(s) of the dome(s) is (are) often visible from the outside (Table 2-1: VIII, Fig.2-118, 120: b). Aside from this, there are buildings that a part of or a whole of the inner structure has higher height, of which appearance is like a tower (Table 2-1: IX, Fig.2-96, 102, 120: b, 124: b). This tower is likely to be placed in the part of *meqdes*.

From these results, it becomes clear that the basic wall, ceiling and roofing methods applied in the rectangular built church with ambulatory are in common with *hīdmo* house and predate basilica churches, albeit several simplifications or distinctions can be found. This is remarkable because it implies that the same techniques and knowledge are commonly applied regardless of building use (house / church) and age. The distinction of the construction method is rather derived from the difference of the building shape. While rectangular buildings usually have timber ceilings and soil roof, ceiling and roof of circular buildings are usually conical shaped and made from thatch.

- Planning

Though the building size of rectangular built church with ambulatory varies, four examples have a relatively similar size of approximately 13 or 14 m by 9 m (Table 2-1: X). In accordance with the spatial relationship between *qīddīst* and ambulatory, there are two planning patterns. In the majority of cases, *qīddīst* is incorporated with ambulatory, that is, there are no partitions between them. In case of the other pattern, as shown in Mika'el Church in Feleg Da'iro, a centralized *qīddīst* placed on the west of *meqdes* is enclosed by ambulatory, too (Fig.2-111).

The entrances of the churches are always placed on the south and (or) north (Table 2-1: XI). In the majority of cases, there are three church entrances, as contemporary circular built churches, though there are the examples of two entrances or more than four entrances. These church entrances are usually situated in ambulatory or *qiddist*, and *qiné mahlét* often has no entrances. While church entrances exist on the north and south sides of the churches, there are windows on the west and east sides (Table 2-1: XII). In particular, the westernmost wall of *qiné mahlét* always has more windows. When there are more than four windows in the westernmost wall, two (or three in case of five) windows at the center are coupled (Fig.2-95, 115). On the other hand, the easternmost wall has, in the majority, one or two window(s). The central part of the easternmost wall is always occupied by window(s), when there is (are) window(s) on that side. The eastern wall of *meqdes* also usually has a window at the center (Table 2-1: XIII). Directly aligned windows on the east side allow the sunlight to come into the *meqdes*, though the amount of light is slight. The centralized *meqdes* can always be accessed from the west (Table 2-1: XIV). Though *meqdes* entrance(s) usually exist north and (or) south besides, the doors on the west are the largest. In the *meqdes*, there are sometimes timber pillars or posts supporting the ceiling and roofing structure (Table 2-1: XV). In the case of Mika'el Church in Feleg Da'iro, of which *qiddist* is separated from ambulatory, both *meqdes* and *qiddist* have entrances connecting to ambulatory or *qiné mahlét* (Table 2-1: XVI). On the westernmost part of *qiddist*, there are usually two masonry pillars, and they divide *qiné mahlét* from *qiddist*. Between the masonry pillars, timber screens are often installed, though both sides of the span between a pillar and a wall usually lack them (Table 2-1: XVII). Concerning the hierarchical distinction of floor level, only one case in Mika'el Church in Feleg Da'iro, can be analyzed out of all the documented rectangular built churches with ambulatory. According to that example, the floor level is the highest in *meqdes*, and the lowest in *qiné mahlét*, as contemporary circular built churches (Fig.2-113). From the fact that the multi-framed timber doors, which are also found in the circular built churches, are applied in other rectangular built churches with ambulatory, it is presumed that the same hierarchical distinction of the floor level is found in other examples, too. Such a hierarchical distinction is commonly found in the predate basilica churches and rock-hewn churches, too.

Between rectangular built churches with ambulatory and contemporary circular built churches, several common characteristics are found: *meqdes* enclosed by *qiddist* or ambulatory that is usually incorporated with *qiddist*, number of church entrances, number and direction of *meqdes*' openings, western walls with more number of openings, and hierarchical distinctions of floor level. From these facts, the type of rectangular built church with ambulatory can be recognized as the derivation of the type of contemporary circular built church.

• Timber Openings and Brackets

While the walls of rectangular built churches with ambulatory are always made from stone materials, doors and windows are always made from timber. Similar to the walls of circular built churches, they are multi-framed, and their innermost frame is arch-shaped. The arch-shaped timber is usually ornamented by a few bead-planks (Table 2-1: XVIII, Fig.2-80, 81, 83, 93, 94, 95, 104, 105, 112, 115, 120: b). There are examples where the innermost frame is not arched (Fig.2-121, 124: b). Such timber openings were applied in the predate basilica churches, too (Fig.2-34, 37, 46). Especially, the one applied in İnda Giyorgis is similar with the one applied in the main church of Debre Dammo

Monastery (Fig.2-34, 121). Though arch-shaped openings are difficult to find, arched-shape timbers can be found in the part of arcades separating aisles from the nave and screen in front of sanctuary (Fig.2-47, 49, 51, 53). The arch shape is often carved in the rock-hewn churches, too (Fig.2-66). On the other hand, the openings applied in *hīdmo* are much more simplified (Fig.2-10). Though they are made from timber, they are not multi-framed and the shape of the frame is not arched.

Above the pillars or posts, a timber bracket is sometimes found (Table 2-1: XIX, Fig.2-93, 98, 105, 112, 116, 122). Concerning this, the predecessors can be found in the predate basilica churches, though it is sometimes monolithic ones (Fig.2-39, 47, 48, 49, 51, 53). In the rock-hewn churches, the shape of bracket is often carved in spite of its lack of function (Fig.2-66, 67). In the rectangular built churches with ambulatory, this bracket tends to be applied in the screens between *qūddīst* and *qīné mahlé*t, and in *meqdes* related positions.

In this way, timber openings and brackets applied in the rectangular built churches with ambulatory is derived from the predate basilica churches, too.

3-4. Alive and Lost Techniques

The basic construction method consisting of rubble masonry wall, timber ceiling, soil roof and timber openings is commonly applied in the rectangular built churches, predate basilica churches, and traditional *hīdmo* houses which have over a 2000-year-old history. This is remarkable because it implies the following two things: the techniques and knowledge of building construction from 2000 years ago are still practiced today, and the same techniques and knowledge are commonly applied in both house and church buildings.

However, the wall construction method of basilica churches until the 8th century is, to be exact, distinct with built churches since 15th century and *hīdmo* house: in the wall of basilica churches, timber layer and monkey head are often inset, though such examples are not found, or much simplified, in the built churches of later periods (Fig.2-34, 46). To understand the absence of timber layer and monkey head in the later period churches, the gradual deforestation in northern Ethiopia from approximately 6th century should be taken into account. About 1200 to 1400, grasslands were dominant in the area of Lake *Hayq* located in Wello Province, next to Tigray. In other words, the timber ceiling method and timber assembling openings were continuously applied in spite of the shortage of wooden materials. Though the technique to make a stone arch was introduced in Gonder in the 17th century, people of Tigray did not (or could not) accept it.

Though masonry techniques using locally available rubble stones have been kept in isolation for over 2000 years in Tigray, dressed block stones that had been applied in the Aksumite buildings, of which examples are found in the tombs of King Kaléb and Gebre Mesqel, were obsolete (Fig.2-26). Moreover, huge stones such as obelisk and monolithic pillars were obsolete, too (Fig.2-21, 22, 39, 40). Considering the fact that cutting, shaping, carrying and placing larger sized stones takes much manpower and time, the loss of techniques on larger sized stones can be recognized as the result of the loss of centralized political power in the post-Aksumite period.

Before the detailed analysis of traditional house type of *hīdmo* is carried out in chapter III, it should be indicated that the currently practiced techniques applied in the church buildings since

15th century are often in common with the traditional houses (Fig.2-10, 11). That is to say, the detailed analysis of the traditional house is, at least to some extent, valid for the church buildings, too. **In the next chapter, *hüdmo*, a traditional house type applied in the rectangular building, is discussed** from the aspect of planning, building elements, construction process and building techniques. Through the discussion, the similarity and distinction between house and church buildings will become clearer.

4. Conclusive Summary

The main materials of Tigray's traditional house are stones and woods. In Tigray and Eritrean highland, stone is an easy material to collect because sedimentary rocks such as sandstone and limestone that are easy to deal with are geologically dominant. On the other hand, wood is a difficult material to collect. Though there is a hypothesis that forest expansion happened from 1400 to 1700, serious cases of deforestation was confirmed from the 17th century by a series of foreign explorers. The indigenous species such as *Juniperus procera* and *Olea Africana* became rare and they have been replaced with transplanted eucalyptus since the end of the 19th century or the beginning of the 20th century.

Hidmo, consisting of stone masonry walls, timber pillar(s) and beams, ceiling structure of wooden planks between beams, and roof-top structure of hard-packed soil, is the specific targeted house type of this dissertation. From the archaeological survey, it is estimated that *hidmo* had already appeared in the later first millennium BC. Its distribution overlaps the area where softer rocks are available.

By tracing the masonry history of Tigray, it becomes clear that the buildings with dressed stones and huge stone monuments such as obelisks, which required much manpower and time, vanished in the Aksumite or post-Aksumite period. This is recognized as the result of the loss of centralized political power in the post-Aksumite period. Furthermore, when the buildings of post-Aksumite period's built churches and the church buildings since the 15th century are compared, the absence of timber materials such as timber layers and monkey heads in the walls in the later period buildings becomes clear. This is recognized as the consequence of deforestation. The remaining church buildings since the 15th century consist of rubble masonry wall, timber ceiling, soil roof and timber openings. Remarkably, this is in common with *hidmo* house, of which building techniques has over a 2000-year-old history. That is to say, it is clarified that the techniques and knowledge of 2000 years ago are still alive, and the same techniques and knowledge are commonly applied in both house and church buildings, by overviewing masonry building history of Tigray. From the perspective of the church plan, a new type of plan that has a centralized sanctuary became dominant since the 15th century. Before that, the basilica plan was dominant.

The application of the same techniques and materials in both churches and houses suggests that the detailed analysis of the house buildings are, at least to some extent, valid for the church buildings, too. In the next chapter, building preparation and construction process of *hidmo* house is discussed. The discussion is helpful to understand the whole building culture of the targeted region.

Chapter III

**Keys to Understand *Hidmo*, a Traditional House Type in Tigray:
Material Collection and Use, Tools, and Builder' s Role**

1. Fundamentals of *Hidmo*

1-1. *Hidmo* House Varying by Location

As mentioned in the previous chapter, *hidmo* is a traditional house type consisting of masonry walls, timber pillar(s) and beams, ceiling structure of wooden planks between beams, and roof-top structure of hard-packed soil (Fig.2-10, 11). Though *hidmo* is distributed in Southeastern, Eastern and several parts of Central Tigray and adjacent area of Eritrean highland, the typical plan differs depending on the area. Naigzy (1971) raised two sub-types named “Eritrean type” and “Adigrat (Addigrat) type.” However, “Adigrat type” should be called “Agame type” because ‘Addigrat is the name of a town and this type of *hidmo* can be found all over ‘Agame province. In addition to these variations, other two sub-types of *hidmo* found in İnderta and in Témben can be counted as other variations (Map 1). Nevertheless, the actual house plan is not always coincident with the name of the province, as the Eritrean type house is sometimes located in ‘Agame province.

Though *hidmo* is a type of a traditional house, the classification between Eritrean and ‘Addigrat (‘Agame) type by Naigzy was depending on not only building plan, but also location and appearance: “The Eritrean type is built into the steep side of a hill or mountain. The casual observer has great difficulty in detecting these houses, particularly from a distance, since they tend to blend completely with the surroundings. The other variety, which is found around the Adi-Grat area, is readily visible even from a distance.” That is to say, the classification of *hidmo* should be considered from a broader scale and context than just the building itself. The issues such as settlement location and parcel layout should also be taken into account. The original landform can be a contributory factor of the difference of the settlement location. Therefore, we should repeatedly pay attention to geological matters. Interestingly enough, the division of four areas on the above roughly overlay the geological mapping (Map 1, Fig. 2-1).

In this paper, specifically the *hidmo* house in İnderta, where Mekelle city is located, is discussed in detail. The province is located in the highlands at approx. 2,000 m altitude and adjoins the western lowlands. *Hidmo* house in other areas will be introduced after the discussion of *hidmo* house in İnderta.

1-2. Fundamentals of *Hidmo* House in İnderta

1-2-1. Buildings and Spaces in Each Parcel of Land

As discussed in chapter I, a settlement in Tigray can often be found in the hillside. People tended to find level land-pockets in the slope, and settled down. This way of parcel formation is similar with the way of terraced agriculture, therefore the author calls this type of enclosure “terraced-enclosure.” In İnderta, such a hillside location can often be found because the Ant’alo limestone area is geologically characterized by gradual terraced slopes (Asfawossen *et al.* 2008). Each parcel of land in İnderta is usually enclosed by a curvilinear wall of piled stones or sometimes wattle. The curvilinear shape in a hillside location is not surprising because the shape of the terrain is always curvilinear in nature. Such a technique or method of land parceling is applied even in flatland settlements (Fig.1-17).

Furthermore, even at the initial phase of Mekelle's urban development, this method was applied by identifying the micro terrain, as discussed in chapter I.

In each parcel of land, several buildings and spaces are dispersed in the courtyard (*mereba*). The existence of an open and uncovered courtyard is an essential characteristic of the local domestic layout of Tigray. One can enter the courtyard through the site's entrance. This entrance is locally called *beri* or *af-gebela* (*af* meaning "mouth" and *gebela* meaning "parcel of land"), although the interview research with builders could not clarify the distinction (Table 3-1).¹

In the entrance, a door(s) is often installed. Fig. 3-1 is an example of such a site located in Romanat nearby Mekelle, which was visited by the author for the interview research. On the parcel of land, the following buildings or spaces are installed:

Table 3-1 Interview result on meaning of "*beri*" and "*af-gebela*," made by author.

# of Builder	Meaning of <i>Beri</i>	Meaning of <i>Af-gebela</i>
1	Parcel' s door.	Parcel' s entrance space.
2	Parcel' s door.	-
3	-	-
4	Parcel' s door.	Parcel' s entrance space.
5	Parcel' s door.	-
6	Parcel' s door.	A space for house animals.
7	Parcel' s entrance without door.	Parcel' s entrance with door.
8	Parcel' s entrance without door.	Parcel' s entrance with door.
9	Parcel' s entrance without <i>af-gebela</i> .	A structure over the entrance.
10	Parcel' s entrance with one door.	Parcel' s entrance with bigger or more than one door.

- (a) The main house(s), where the vast majority of daily indoor activities are conducted (Fig.3-2). Although only one residential house exists in this example, instances with more than one main house for the owner's children or relatives, are normally found. The house is usually a *hīdmo* house.
- (b) *Damīgogo* is the space where injera, the traditional dish of the Ethiopian and Eritrean highlands, is prepared (Fig.3-3). A conically roofed building is usually apparent, because its better ventilation makes it more suitable for cooking.
- (c) *Bét-meadi* (*bét* meaning "house" and *meadi* meaning "the state that food is ready") is a space where other foods are prepared (Fig.3-4). It is often combined with the *damīgogo*. A conically roofed building is usually built here as well.
- (d) This is a space for cattle and other large domestic animals (Fig.3-3). Cattle are used for plowing and paying tribute as well as for food and drink. Therefore, they have a high value and are connected with the household's wealth. The space for them is often covered with a roof. In this example, the animals are unconfined within the courtyard. This is one of the essential reasons why each parcel of land is enclosed by walls. According to the interview research with builders, the space where domestic animals exist, and especially larger ones such as cattle, cows, or oxen, is called *dembe* or *ger* (Table 3-2).²

¹ "*Beri*" is a more popular word to point to the parcel's entrance or door. There were seven builders who knew both of these words. According to two builders, "*beri*" means the door to a parcel of land and "*af-gebela*" means the parcel's entrance space. On the other hand, according to four builders, "*af-gebela*" seems to be an upgraded version of "*beri*." However, specific distinctions in the meaning depend on the builders.

² According to six builders, "*dembe*" and "*ger*" refer to the space relating to domestic animals. Of which four builders said that they are synonyms. A few builders said that the space lies under a roof. However, to indicate a space under a roof, "*gībaza*" seems to be a more popular word.

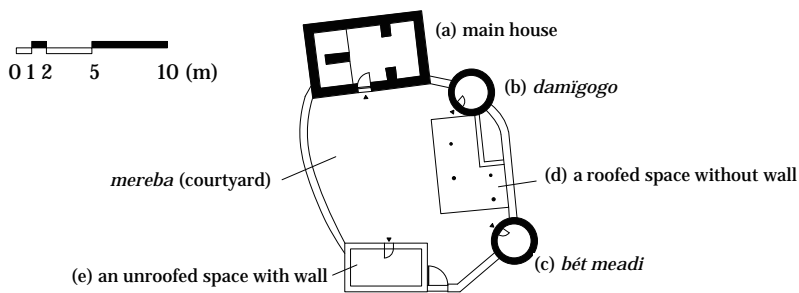


Fig.3-1
An example of parcel of land,
made by author.



Fig.3-2 Main house in the parcel of Fig.3-1, photo by author.



Fig.3-3 Dämigogo and roofed space without walls in the parcel of Fig.3-1, photo by author.



Fig.3-4 The building of *Bét-meadi* in the parcel of Fig.3-1, photo by author.



Fig.3-5 An unroofed space with walls for smaller domestic animals in the parcel of Fig.3-1, photo by author.

Table 3-2 Interview result on meaning of "dembe," "ger" and "gibaza," made by author.

# of Builder	Meaning of Dembe	Meaning of Ger	Meaning of Gibaza
1	A space for house animals in the courtyard.	-	-
2	-	-	-
3	-	-	-
4	A space for house animals in the courtyard.		A house for house animals (especially for cattle).
5	A space without walls where house animals usually exist.	-	A space under a roof and without walls.
6	-	A space under a roof for house animals, especially for cattle.	
7	A space under a roof, for cattle, cow and oxen.		A structure over the entrance.
8	A space under a roof.	A space for cattle, usually under a roof.	A space under a roof, for the reception purpose.
9	A space for cattle.		A space under grass roof.
10	A space for cattle and other house animals. Roof is optional.		A space under grass roof for horse and mule.

(e) An unroofed space with walls for smaller domestic animals. This space is often omitted because these animals are usually kept within the main house (Fig. 3-5).

Other than *dembe* or *ger*, the space for domestic animals can be simply called *inda-mīrakut* (meaning “a space belonging to calves”) or *inda-t’éle-begī’i* (meaning “a space belonging to goat and sheep”). Apart from this residential parcel of land, there is often adjoining farmland. In Tigray, the majority of people were, and still are, farmers.



Fig.3-6 A flat roof placing a sheaf of straw, photo by author.

1-2-2. Spatial Components of *Hidmo* House in İnderta

From the courtyard, one can get a full picture of the main house (Fig.3-2). The masonry walls in Mekelle and its environs are usually made from various type of limestone such as black, white and yellowish-white ones (Asfawossen *et al.* 2008). There is an entrance to the house, called *dege’af* or *afdege* (*dege* meaning “outside”³) positioned in a longitudinal direction. Concerning the orientation of the house, two of the builders interviewed responded that an entrance on the north side is preferable, while one responded that the north or south side is better. On the other hand, five had no opinion. According to two of the builders, the east side should not be open to protect it from strong winds. In İnderta, wind is prone to blowing from the eastern lowlands. One builder also mentioned that the south side should not be open because people do not like direct light and heat, and another mentioned that the west side should not be open because the light is strong in the evening.

The inside of the house feels dark because of the limited number of openings but cool in the daytime and warm in the evening owing to the thick walls, ceilings, and roofing. This construction helps to cut down on strong sunlight during the day and retain warm air in the night. Indoor conditions with corrugated metal sheet roofs in the present day are much less desirable than the traditional *hidmo* roof because the heat is more easily accumulated inside of the house.

With the exception of the rainy season, and especially the harvest season, men often fall asleep on the flat roof at night. According to seven builders, they need to keep watch over their parcels of land, including their farmland, to protect it from thieves and birds. One builder said that sleeping on the roof is due to the existence of insects inside a house. After harvesting crops, the flat roof is used as a location on which to place a sheaf of straw (Fig.3-6). It must be placed out of reach of cattle in the courtyard because it is their food.

The typical plan of *hidmo* houses in İnderta fulfills the demands of the local lifestyle. When referring to the most prestigious version of the *hidmo*, the space can be divided into three components (Fig.3-7). In the case of minimized versions, one or another component is omitted as shown in Fig.3-8. Each spatial component is explained as follows:

³ Both words of *dege’af* and *afdege* are synonyms. Only elements of the words are reversed.

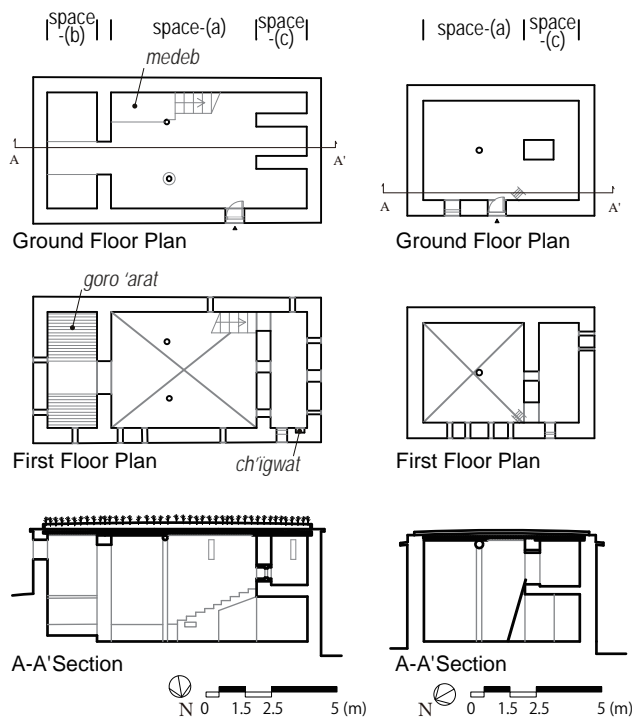


Fig.3-7
The most prestigious version of *hidmo* house, *made by author*.

Fig.3-8
A minified version of *hidmo* house, *made by author*.



Fig.3-9 *Midri-bét*, *photo by Higuchi, R.*



Fig.3-10 *Medeb*, *photo by author*.



Fig.3-11 *Medeb-li'iro*, *photo by author*.

- (a) The space is called *mīdri-bét* (Fig.3-9); *mīdri* means “ground”. This is the central space of the house with an entrance door and serves as a space for living, dining, sleeping, and reception. Related furniture, such as the *medeb* (Fig.3-10), a platform for sleeping or sitting purpose, is set along the walls. A platform for sitting can be called *meqemet'i*, too. These are made with stones and gravel, covered by hard-packed mud. In addition, *medeb-li'ilo*, a shelf built on which to place materials, is often installed (Fig.3-11). These indoor constructions are carried out by females (Lyons 2009).
- (b) This space is separated from space (a) by walls that usually serve for sleeping purposes. In this space, the *medeb* or *medeb-li'ilo* (a platform for sleeping with a shelf between the floor and the platform level) is often fixed, though the author has not seen *medeb-li'ilo* in this position before. Therefore, *medeb* of space (a) is often omitted in case that there is space (b) in the house, though it is not omitted in case of an exemplified house. The length of the wall separating space (a) from



Fig.3-12 Space (a) and (b) separated by short walls, photo by author.

Fig.3-13 Goro-'arat, photo by author.

Fig.3-14 Gotera, photo by author.



Fig.3-15 Meshkot birhan (right) and ch'gwat (left), photo by Higuchi, R.

Table 3-3 Interview result on the name of space (b), made by author.

# of Builder	The name of Space-(b)
1	medeb-li 'iro (guada)
2	mīdri-bét
3	medeb-li 'iro
4	guada
5	mīdri-bét, medeb (in case that medeb is installed)
6	medeb-li 'iro / medeb (in case that medeb-li 'iro / medeb is installed)
7	medeb (because medeb is installed)
8	medeb (because medeb is installed)
9	may-bét na medeb / medeb-li 'iro (in case that those are installed.)
10	medeb (because medeb is installed)

space (b) is sometimes short and those spaces are unified (Fig.3-12). According to the interview research, the names for this space are often confusing (Table 3-3).⁴

In the upper part of the space, *goro-'arat*, the row of logs, is usually hung between the wall separating space (a) and space (b), and the back wall (Fig.3-13). The agricultural implements and other tools are kept here.

(c) This space consists of two stories. The upper room is called a *debri* (meaning upper floor), which often serves as storage space for cereals. Therefore, the *gotera* (box for grain) is sometimes placed here (Fig.3-14). A bigger window is often cut out in this room (Fig.3-15). In addition, *ch'igwat* (a built-in shelf) is often formed by making a void in the wall (Fig.3-15). Stairs (*medeyayb*) or a ladder (*mesalil*) allow access from the ground floor (Figs.3-7, 8).

The lower space below the *debri* has two variations. The majority have a continuous space between the building's wall and the pier-like wall supporting the *debri*, as shown in Fig.3-8. In this case, the space is called a *guaro* and it traditionally serves as a place for livestock, such as

⁴ From the interview results, the way to refer to this space varies depending on the builders. The space is called *medeb*, *medeb-li'ilo*, *mīdri-bét* (same as space (a)), or *guada*. Nevertheless, it might at least be called *medeb* (or *medeb-li'ilo*) in a case where the *medeb* (or *medeb-li'ilo*) is fixed. In addition, when this space is unified with space (a), it is, not surprisingly, also called *mīdri-bét*

Table 3-4 Interview result on the name of ground floor of space (c),
made by author.

# of Builder	The Spatial Name of GF of Space-(c) (in case with a backside space)	The Spatial Name of GF of Space-(c) (in case without a backside space)
1	guaro-bét	wushto-bét (guada)
2		guaro-bét / wushto-bét
3	guaro-bét	wushto-bét
4	guaro-bét	wushto-bét
5		guaro-bét / midri-bét-guaro
6	guaro-bét	don' t know
7	guaro-bét	don' t know
8	guaro-bét	don' t know
9	guaro-bét (wushto-bét)	-
10		guaro-bét



Fig.3-16 Guaro-bét, photo by author.

horses, donkeys, mules, sheep, and chickens (Table 3-4; Fig.3-16). The other variation is that the space is separated into several parts by walls below the *debri*, which meet the building wall at a right angle, as shown in Fig.3-7. This space is more likely to be used as a place to deposit valuable items, such as honey and milk. In this case, the space is often called *wushat'o* (*wushat'o* meaning “innermost space”), although this space exists only infrequently (Table 3-4).⁵

1-2-3. Building Elements of *Hidmo* House in İnderta

To understand how to assemble materials and erect a building, specifying the building's structure into each of its element is helpful. Structurally, the *hidmo* house can be divided into stone masonry walls, timber ceilings and soil roof. Therefore, each element is listed as (a) elements of the walls and pillars, or (b) elements of the ceiling and roofing, as indicated below. On that basis, (c) refers to the list of patterns for placing wooden materials on the ceiling. Here, a *hidmo* house in İnderta was specifically taken as an example and the name of each element was obtained through interviews with the builders in İnderta by the author. The terms used may be sometimes, or often, different in areas of other types of *hidmo* house.

(a) Elements of the Wall and Pillars (Fig.3-17)

a-1) Wall (*mendeq*): Stone is piled up.

a-2) A masonry wall separating space (a) from space (b) is usually called *filatsa* (Fig.3-9, 12; Table 3-5: a).

a-3) A masonry pillar supports the upper floor. According to five builders, it is called *hawelti* or *hawelti-nay-debri* (Fig.3-16; Table 3-5: b); *nay-debri* means “for upper floor.”

a-4) When space (a) has two spans, a timber pillar(s) (*amdi*) is set up (Fig.3-9).

a-5) A door installed in the building is called *ma'itso*.⁶ The height of the door is sometimes lower than body height (Fig.3-18). According to four builders, this is to secure it from horses or

⁵ Three builders did not know the spatial variation of *wushto-bét*, and only three builders could distinguish the meaning of *wushto-bét* from *guaro-bét*. Three builders made no distinction between the two.

⁶ While *afdege* (*dege'af*) points to the whole extent of the entrance, *ma'itso* points specifically to a timber panel of a door.

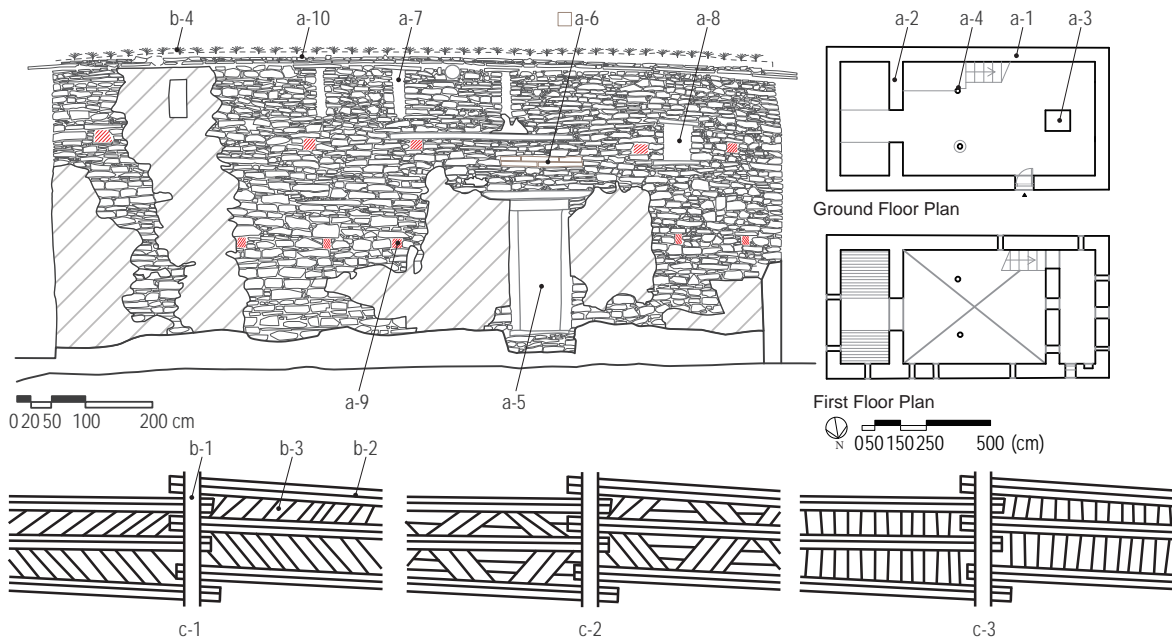


Fig.3-17 Building elements of *hidmo* (drawing is modified from the original to show each element), *made by author*.

Table 3-5: Interview result on the name of each element, *made by author*.

# of Element	Explanation of the Element	Name of the Element (# of builders answered so: cummulative total)
a	Masonry wall separating space (a) from space (b).	<i>filatsa</i> (9); <i>filatsa-medeb</i> (1); <i>hawelti</i> (1); <i>endifti</i> (1)
b	Masonry to support the upper floor.	<i>hawelti-nay-debri</i> (3); <i>hawelti</i> (2); <i>filatsa</i> (1); <i>filatsa-nay-debri</i> (1); <i>filatsa-guaro</i> (1); <i>degahfi</i> (1)
c	Lintel.	<i>metsqeti dege'af</i> (2); <i>metsqeti afdege</i> (1); <i>medefea-geza</i> (1); <i>afdege tedefayt</i> (1); <i>tedefia</i> (1); <i>derkhoyt</i> (1)
d	Eave.	<i>ch'ihmi</i> (4: with grass; 5: regardless of grass/ no grass); <i>tsaf-tsaf</i> (3: without grass); <i>zabeba</i> (1)
e	Stringcourse.	<i>qatsela</i> (6); <i>zabeba</i> (5)
f	Main beam.	<i>gadim</i> (9); <i>rogid medegefi</i> (3); <i>'amdi</i> (1)
g	Roof of <i>hidmo</i> .	<i>ziban-hidmo</i> (6); <i>sa'iri</i> (2); <i>tahadim</i> (1)

a person riding a horse from entering into the house directly. One informant living in the local village mentioned that local people preferred not to entertain elite people, because this required plenty of food and drink. On the other hand, entertaining elite people enhanced the social status of that household in the local community.

Arched doors cannot be found in *hidmo* houses. Although timber is used for a lintel, the term pointing “lintel” is not fixed. The concept of a lintel does not seem to be important for local builders because openings are set up after assembling the timber frame. Builders interviewed expressed it in terms of “*metsqeti dege'af* (*afdege*)” (meaning “spanning entrance”), “(*afdege*) *tedefayt*” (*tedefayt* meaning “opposite”), and so on (Table 3-5: c).

a-6) There is sometimes an eave made by stones over the door (Fig. 3-19). Locally, this is called *ch'ihmi* (Table 3-5: d); meaning “mustache.” According to three builders, *ch'ihmi* refers to an eave only where grass has grown, and it is called *tsaf-tsaf* when it is made only from stones.

⁷ Although one builder responded that this custom to set lower height doors started during the Italian occupation, the example in Fig.3-18 was built before the Italian period.



Fig.3-18 A door lower than body height (1022 mm; left building), *photo by author.*



Fig.3-19 An eave, *photo by author.*



Fig.3-20 How to use *bukko*, *photo by author.*



Fig.3-21 Thinner stones with a large surface area that cover the top of wall, *photo by author.*

- a-7) A thinner window, the lintel of which is stone, is called *meshkot*. This is placed in the upper part of the building (Fig. 2-10). In case of the house shown in Fig.3-7, there are ten *meshkot*, albeit often ones buried by stones. Inside, the room is not well lit.
- a-8) A bigger window, of which the lintel is timber, is called *meshkot bīrhan* (*bīrhan* meaning “light”). This is usually set in *debri*, and is not an illuminated space (a) (Fig.2-10, 3-15). The ground floor usually does not have it. In the case of the house shown in Fig.3-7, two *meshkot bīrhan* are set in *debri*. There are often cases with one *meshkot bīrhan*, such as the house in Fig.3-8. The way to assemble this has much in common with the way to assemble a door (a-5).
- a-9) In the wall of the *hīdmo*, several holes lined up at the same height are often found. Locally, these holes are called *bukko* (meaning “hole”) and are used to set up a scaffold. Builders work on the row of wooden logs bridging the logs below, each of which is inserted into a *bukko* (Fig.3-20). These holes are filled with stones in some cases, but left as is in other cases.
- a-10) The top of wall is covered with thinner stones with a large surface area (Fig.3-21). Locally, this type of stone is called *qatsela*; it forms a stringcourse and keeps water from entering the inside wall. It requires two or more layers because water more easily penetrates through the gap between *qatsela* in the case of only one layer. According to seven of the builders interviewed, a stringcourse, and not just the type of stone itself, is also called *qatsela*. *Zabeba* is perhaps an alternative term of a stringcourse (Table 3-5: e).

(b) Elements of Ceiling and Roofing (Fig.3-17)

b-1) After a timber pillar(s) is (are) set up, a timber beam is put on it (them) on the short side of the building (Fig.3-9). The beam is called a *gadim* (Table 3-5: f) meaning “horizontal.” Three builders suggested the alternative term *rogid medegefi* (meaning “thick supporter”).

b-2) Between a wall and a *gadim*, a series of upper beams, each of which is smaller than the *gadim*, is placed (Fig.2-11). These upper beams are called *serayt*, and they are usually placed in alternating twos.

b-3) The void between the *serayt* (or the *serayt* and the wall) is filled with wooden planks that are usually called *mihuts* (Fig.2-11). It consists in the ceiling of the *hidmo* house.

When finely shaped timbers are applied, the building’s, and furthermore, house owner’s rank in the local community is enhanced (Lyons 2007). Lyons called the ceiling with such timbers “decorated ceiling” as distinguished from the ceiling with unshaped rugged natural woods (Fig.3-22). The pattern of placing the *mihuts* has three main variations as explained below (c-1, 2, 3).

b-4) On the timber ceiling structure, roofing materials of gravel and soil are placed. According to six builders, the roof of the building is simply called *ziban hidmo* (Table 3-5: g); *ziban* meaning “back.” One can understand the reason for *ziban hidmo* (meaning “upper part of *hidmo*”) when the appearance of four-legged animals comes to mind. The type of soil used for roof is discussed later.



Fig.3-22 The ceiling with unshaped rugged natural woods, from Lyons (2007).

(c) Patterns of *Mihuts*

c-1) In the majority of cases, the wooden materials of *mihuts* are placed in a v-shaped arrangement (Fig.2-11). Such a pattern is called *hankeshtay-qirts* (according to six builders, *qirts* means “shape,” by association, another builder called it *hankeshtay mihuts*). Owing to its ordinariness, three builders do not know the name of this *mihuts* pattern.

c-2) In cases of buildings related to the church, the arrangement pattern often becomes cross-shaped (Fig.2-106). This is the one that we called “simplified lantern ceiling” in the previous chapter. Locally, this pattern is called *mesqel-qirts* (meaning “cross-shape”).

c-3) On rare occasions, *mihuts* with a parallel arrangement can be found. Although the majority of builders do not have a way to express this in a single word, two builders called it *tara-mihuts* (*tara* meaning “normal”). When material of the *shambaqo*, a similar material to bamboo, is used for *mihuts*, the arrangement is usually in this pattern. In that case, the *mihuts* is called *shambaqo* (Fig.3-23).

8 As other alternative words, *sa'iri* (according to two builders; this word meaning “grass” is used because grass is often grown on the soil roof) and *tahadim* (according to one builder; meaning “finishing”) are raised.

1-2-4. Circular *Hidmo* House in Īnderta

A *hidmo* house is usually rectangular in shape. The rectangular shaped *hidmo* is often called *mereba'ī*. This house type was previously, namely before the introduction of modern building materials, recognized as the most prestigious house type in Īnderta. On the other hand, one can sometimes find a circular shaped *hidmo* house, called *kībi hidmo* (*kībi* meaning “circle”).



The author measured three cases of *kībi hidmo* through a series of field surveys. Fig.3-23 A ceiling by use of *shambaqo*, photo by author.

Two of the three buildings measured had a similar building plan, which can be understood as a derivation of the rectangular *hidmo* (Fig.3-24, 25). In the center of the circle, of which the radiuses are approximately the same at one span of the rectangular *hidmo*, a wooden pillar is set up. On that pillar a lower beam and upper beams are placed (respectively corresponding to the *gadīm* and *serayt* of the rectangular *hidmo*). The length of the upper beams can be gradually decreased because of the circular shape of the building. Therefore, material collection is easier in a circular *hidmo*. On both sides of the circular room, small rectangular spaces are attached. Components of these attached spaces have a commonality in both measured buildings: in one such space, *goro-‘arat* is hung over, while *medeb* is set up in the other. In this way, *kībi-hidmo* can be recognized as the derivate version of rectangular *hidmo*, although it does not have a two-storied part to it. The other example is a further simplified version without rectangular spaces (Fig.3-26). A wooden pillar is replaced by a masonry pillar, and *goro-‘arat* is assembled under the beam (Fig.3-27).

1-3. *Hidmo* House in Other Provinces

Hidmo house located in other provinces other than Īnderta, namely the ones in Eritrea, ‘Agame and Témben are introduced here.

Concerning *hidmo* house in Eritrea, Volker-Saad (2007) mentioned that the size and aesthetic differ from each other within one village. Therefore, the term of “Eritrean type,” which is noted in Naigzy (1971), is not suitable. *Hidmo* house located in Asmara is shown in Fig.3-28. The space of a house is divided into three. The first one is an entrance called *gebela* or *wegefe*, which is used for “the men’s bedroom, for storing farming tools, for meeting family members publicly, playing with children and as an animal’s rest area (Volker-Saad 2007).” This space is located in the outside but with a roof (Fig.3-29). The second one is *mīdri-bét*, a semipublic space “where guests are received and entertained, where the family takes their meal and where a newly married couple sleeps for the first time (*Ibid.*)” Most of the house works are carried out here and new-born animals and un-threshed grain are also kept in this space. The third one, the innermost and very dark space, is called *wīshate*. In this space, “only women are admitted, a wife her properties and hides herself when she quarrels with her husband. The oven is placed and most of the meals are cooked in *wīshate* (*Ibid.*)” *Wīshate*

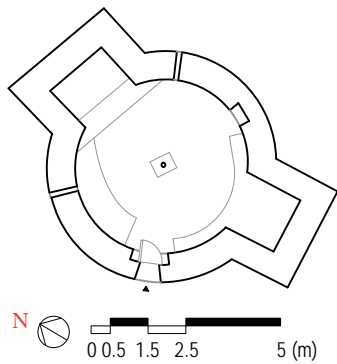


Fig.3-24 Plan of *kibi hidmo* which can be understood as derivation of rectangular *hidmo*, made by author.



Fig.3-25 External appearance of *kibi hidmo* of Fig.3-24, photo by author.

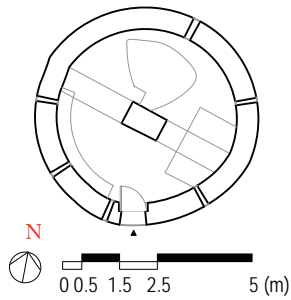


Fig.3-26 Plan of *kibi hidmo* without rectangular spaces on both sides, made by author.



Fig.3-27 Internal appearance of *kibi hidmo* of Fig.3-26, photo by author.

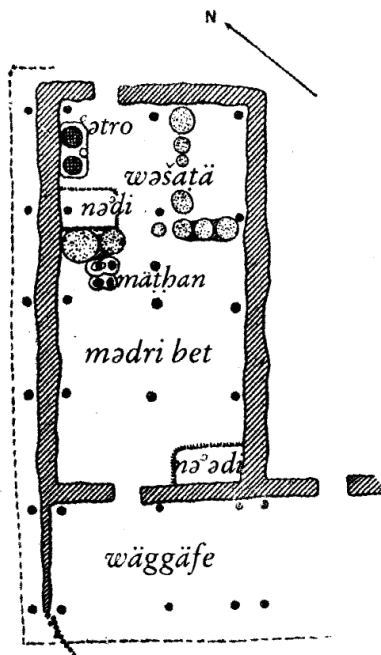


Fig.3-28 A *hidmo* house located in Asmara, from Volker-Saad (2007).



Fig.3-29 External appearance of *hidmo* in Eritrea, photo by Frobenius, L. in 1915

is separated from *mīdri-bét* only by the high granary (*qofo*), made out of mud.

A parcel of land in Eritrea, which often consists of more than one *hīdmo* house that enclose a courtyard called *deggé*, is likely to be placed in the “steep side of a hill or mountain (Naigzy 1971)” (Fig.3-30). The settlement location in the hillside is confirmed by the sketches of Henry Salt who visited Dīgsa and Abha in the early 19th century (Fig.1-8, 16). Geologically, Eritrean highland is likely to be covered by Precambrian basement that is likely to form low rounded hills as well as long elevated ridges and plateaus (Asfawossen *et al.* 2008).

A semi-outside entrance is characteristic of the *hīdmo* in Eritrea, because it cannot be found in Īnderta. Furthermore, a kitchen is placed in the separated building(s) in Īnderta. Interestingly, the meanings of terminologies such as *gebela* and names of spaces such as courtyard are sometimes different between Īnderta and Eritrea.

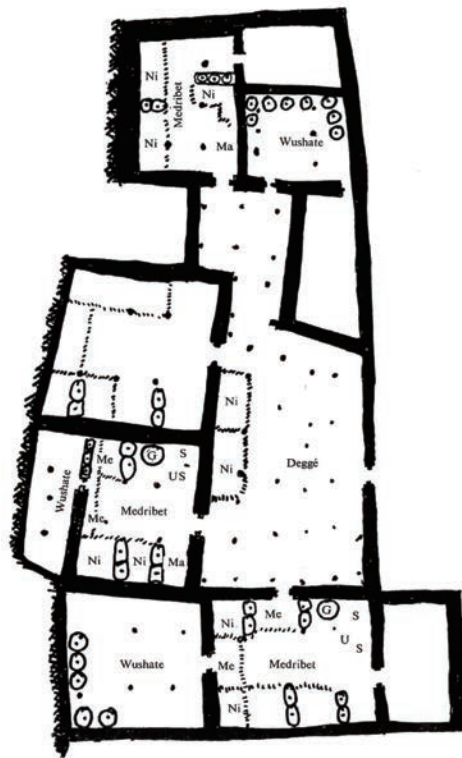


Fig.3-30 A parcel consisting of more than one *hīdmo* house, from Naigzy (1971).

In ‘Agame, rectilinear shaped parcels of land located in the flatland can often be seen, though parcels are likely to be placed at the hillside in Tigray as a whole (Fig.3-31, 32). The reason should be found from the geomorphology of the province. According to Asfawossen *et al.* (2008), Palaeozoic Īntich’ew Sandstone, which often covers ‘Agame Province, tends to form low hills dissected by deep canyons and buttes. Therefore, a terraced slope is more difficult to find than other areas and parcels of land are more likely to be located in the flatland. As a result, the parcel of land is “readily visible even from a distance (Naigzy 1971).”

In the rectilinear courtyard, there is an outside space with a roof (Fig.3-33). One can enter the house from the courtyard. The parcel of land shown by Naigzy is one-roomed, however, the parcel with more than one house can be often found in the province (Fig.3-31).

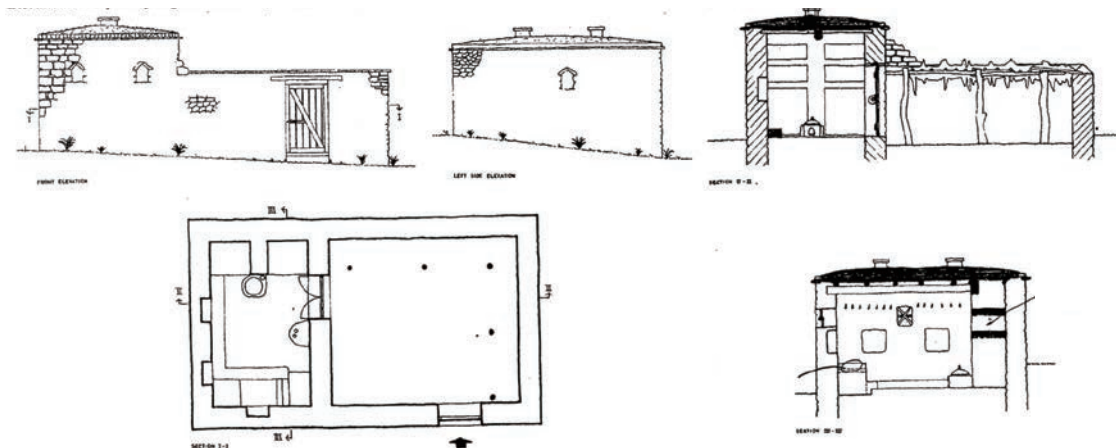


Fig.3-31 A parcel of land and *hīdmo* house in ‘Agame, from Naigzy (1971).

Fig.3-32 Appearance of a parcel in 'Agame, *photo by Kinase, R.*Fig.3-33 Rectilinear courtyard with a roof in a parcel in 'Agame, *photo by author.*

Témben, situated on the west of Īnderta and south of central Tigray, is located on lower altitude land than the surrounding area and the climate is hotter. The land is covered by Mesozoic Addigrat sandstone and Palaeozoic 'Īdaga 'Arbi Tillite of which stones are easy to work with. In 'Abiy 'Addi, the present central town of Témben, two-storied circular *hidmo* houses, which are often replaced with conical corrugated metal sheet roof presently, can be found (Fig.3-34). This house type is recognized as a mixture of *hidmo* and "Tigré Chief's House."

That is to say, this *hidmo* type is the one where the roof of "Tigré Chief's House" is replaced with a flat soil roof. The existence of a rectangular core space inside of the house is shared, too (Fig.3-35). Témben province is the western border where *hidmo* house is distributed, and conical roofed circular house becomes dominant further west.

Fig.3-34 External appearance of *hidmo* house in Témben, *photo by author.*

1-4. Another Local House Type with Conical Roof

According to Naigzy (1971), "Tigré Chief's House," a type of local house of two-storied conical roofed circular building, was usually used as a residence for governors, high priests and soldiers (Fig.2-12, 13, 14). Though stones are used for walls, timber materials are required to assemble windows, doors, lintels, floors, and ceilings (Fig.3-36). The timber works are "indicative of the level which Axumite building practices had attained (Naigzy 1971)." This is the

Fig.3-35 Internal appearance of *hidmo* house in Témben, *photo by author.*

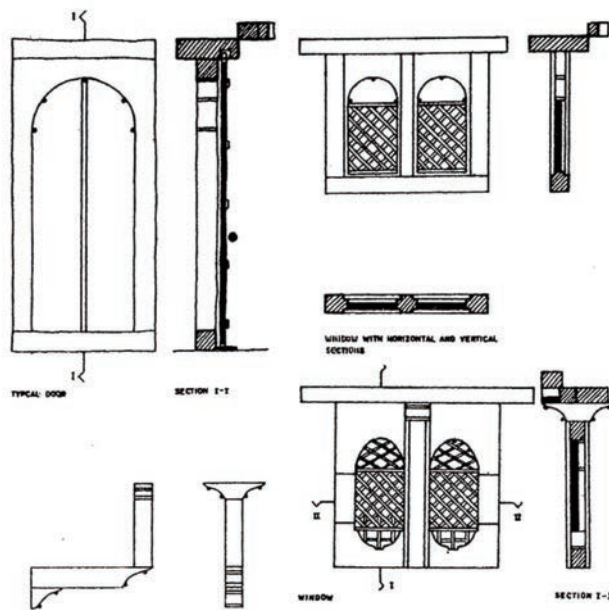


Fig.3-36 Timber works applied in "Tigré Chief's House," from Naigzy (1971).

one discussed in the previous chapter to describe the techniques applied in the church buildings. According to Naigzy, "a tiny opening in the form of a cross called *kasate bīrhan*, which lets in the first light of the morning" is installed in the east wall, and the ceiling at the upper floor is decorated with multi-colored design. In the western part of Tigray, these type of houses frequently existed and was locally called "*seqela*."

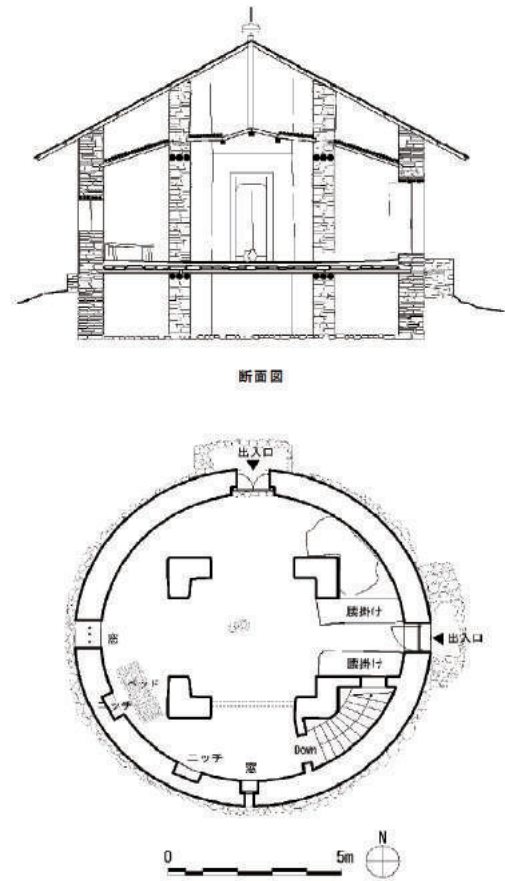


Fig.3-37 A circular shaped house found in Gonder, from Shitara (2008).

However, the word "*seqela*" indicates a different building in Amhara. According to Pankhurst (2005), it is the term for "a long rectangular building" in reference to Alvares, a Portuguese explorer in the early 16th century. Almost a century later, the term came to mean a "palace of the king and grandees," because most houses in that region were circular shaped. That is, in each area of western Tigray and Amhara, *seqela* points a building for the elite people, though the building shape is different.

In Gonder, located in Amhara, there are circular shaped houses with rectangular core inside, too (Fig.3-37). Shitara (2008) reported the existence of three examples of two-storied traditional circular houses, five examples of one-story above ground and one-story below ground, and forty examples of one-storied houses. However, this house type is locally called "*īch'egé bét*" (meaning "house for Superior"), not "*seqela*." Indeed, a series of ornamental details is lacking in the cases of Gonder.

In northern Ethiopia and Eritrea, conical roofed circular houses can be found anywhere, though the majority of them are one-storied. In Eritrea, a circular structure with a conical roof is called "*ag-do*." The walls are made from stones held together by earth and mud. However, there is no rectangular core inside: a wooden pillar in the middle of the room supports the conical roof made out of branches covered by thatch (Volker-Saad 2007). In Amhara, a circular house with conical grass roof used for young couples' or as poor people's dwelling is called *gojjo* (Aspen 2007).

Though the two-storied “Tigré Chief’s House” is difficult to find in Īnderta, one-storied circular conical roofed buildings can often be found. In Īnderta, such a conical and thatched roofed house is less prestigious than *hīdmo* house, and it is called, interestingly enough, *seqela* or *guji*. According to Bauer (1977), there are two types of such house: one is circular shaped house with masonry walls named *seqela*, and the other is the one with wattle-and-daub walls named *guji*. However, according to the interview with local builders, distinction between *seqela* and *guji* is not depending on the wall structure, but depending on the building size. Namely, a bigger one is called *seqela*, and a smaller one is called *guji* (Table 3-6). From the results, approximately 3m in diameter is a border between big and small, though the recognition varies depending on the builders. When the distinction of the words of “*seqela*” and “*gojjo*” in Amhara is taken into account, it is safe to assume that a more preferable structure is called “*seqela*” in Īnderta. In this dissertation, the meanings of “*seqela*” and “*guji*” follow the way of interview results.

Table 3-6 Interview result on size of *seqela* and *guji* in Īnderta, *made by author*.

# of Builder	Size of <i>Seqela</i>	Size of <i>Guji</i>
1	Usually approx. 8m diameter.	Less than approx. 3m diameter.
2	Bigger than <i>guji</i> .	Temporary structure for one or two people.
3	-	-
4	-	-
5	Bigger than <i>guji</i> .	Approx. 3m diameter.
6	Approx. 6m diameter.	Approx. 4m diameter.
7	Bigger than <i>guji</i> .	For temporary use.
8	Approx. 3.5m diameter.	Approx. 2m diameter.
9	Approx. 4m diameter.	Approx. 2.5m diameter.
10	Bigger than <i>guji</i> .	Smaller than <i>seqela</i> .

1-5. Meanings of *Hidmo* House Construction in the Local Community

Though Naigzy (1971) introduced *hīdmo* as “Tigré farmer’s house,” the house type was not directly related to social classes. According to the builders interviewed, *hīdmo* were built by the people who could afford to build, and there was no rule about who can build *hīdmo*. Generally speaking, *hīdmo* is the preferred housing type compared to *seqela* or *guji* in the local context. That is to say, anyone can build *hīdmo* regardless of social class. For example, Bauer (1977) described that a couple normally begins married life with a single wattle-and-daub hut that serves for all household functions, and a new house will be built as soon as possible if the household is successful. A successful man of 35 years old was described by Bauer as follows: “the hut that had been their house when they were first married” was used as a kitchen, and the newly built “well-made *hidmo*-style house shows that he has the ambition to be an important man in the community someday.” In this case, a conical roofed house was chosen at the beginning because the man who decided to build his new house could not afford to build a *hīdmo* house, and he built *hīdmo* house after he became to afford to build it. Such a building hierarchy could be found in the early 19th century ‘Adwa, too. According to Parkyns, “the habitation of the poorer classes” were “principally round, and covered with a conical roof thatched with straw”, while those of the wealthy were “for the most part, square and flat-roofed” (Pankhurst 1982; Parkyns 1854).

Building a *hīdmo* house means a great deal in the local community. Again according to Bauer (1977), “building one’s own house is very important to a Tigray household head. Such a house is a

public statement of the household head's hopes and ambitions with regard to status." Furthermore, Lyons (2007) specifically mentioned "hidmo are also locales of political action where feasts and other forms of hospitality establish and maintain a household's reciprocal rights to and obligations in extra-household alliances ... these events (indicating feasts for weddings and memorial ceremonies) are essential to maintaining or enhancing their status in the community".

Involvement of the community people in the building construction is essential because it is difficult to build a house only by the prospective house owner⁹ and family members alone. When there were workers under him, it is easy to manage. Lyons (2007) reported that "nobles¹⁰ owned slaves (until abolition in 1924) and had the right to order local farmers to build and maintain their houses ... Wealthy farmers and administrators also owned slaves but they paid for the work of masons, carpenters, and other labour".

Concerning general *hīdmo* construction, according to six builders interviewed, neighboring community people helped with the construction work. As well as neighbors, relatives of the prospective house owner helped too. Helping each other with house construction was mutually profitable, however, the extent of participation varied. According to Lyons (2009), "if they can afford to provide helpers with beer and food they are assisted by relatives and friends. The ability to pay for other people's labour enhances the couple's status, but many said that they were too poor to do so." It is easy to imagine that people participated in the construction work more actively when expected returns were higher. Nevertheless, there are specific construction phases which require more workers. For example, the final phase of construction requires soil to be carried and treaded on the roof. According to seven builders interviewed, after the completion of roofing work, the prospective house owner invited the participants and community people for food and drink. If he was rich, meat was served, too. Through this invitation, he might express both gratitude and celebration of the completion of construction at the same time.

From these discussions, it becomes clear why building *hīdmo* matters a great deal in the local community. Namely, thanks to a lot of efforts for *hīdmo* construction, *hīdmo* house may become the house owner's statement on his hope and ambition towards the local community. However, according to Bauer (1977), the fame given by *hīdmo* achievement is not heritable: "Even if the house inherited from a parent is grand, it is a statement not of what its new owner can do but of what his father could do ... A very successful man continues to build until he has a house for each of the functions to which houses are put." This tendency of "individualism," which was discussed in chapter I, suggests that *hīdmo* could be demolished after the person who had built was dead: "The Tigray's desire for separateness is most clearly symbolized by the practice of abandoning a house inherited from one's father to build a house of one's own, even if it is less grand than that of one's father".

9 "Prospective house owner" means a person who is going to build his house as his own property. Traditionally, this person, mainly male, took responsibility to arrange the site, collect materials and organize workforce.

10 Lyons defined the "noble" as one "who is distinct from the monarchy, and often related to the royal family through blood or marriage or had local or hereditary influence in an area" with reference to Pankhurst, R. (1990)

1-6. *Hidmo* Structure Other Than Houses

1-6-1: Distinctions between *Hidmo* House and “*Hidmo* Church”

As discussed in chapter II, the basic construction method between rectangular built church with ambulatory and *hidmo* house is similar. However, when they are compared in detail, several distinctions become clear as follows:

- While the number of stringcourse is sometimes more than one in the church buildings such as Old Church of Asir Metira Monastery, house buildings always only have one stringcourse on the top of masonry wall.
- There are frequently rainwater gutters on the top of the masonry wall in the church buildings, however, there are no rainwater gutters in the house buildings. In case of a house building, rainwater flows down only by a slightly sloped soil roof.
- Multi-framed openings frequently installed in the church buildings are not found in the house building. Though a door installed in a house building is also framed by timbers, it is not multi-framed. Furthermore, the lintel of windows in a house is usually made of a stone. Therefore, the width of windows in the house is small. Nevertheless, timber framed window(s) is (are) often situated in the upper floor of *hidmo* house, too.
- The pilasters that are installed in the church buildings are not found in the house buildings.
- Though timber layer(s) is (are) inset in the walls of church buildings, no examples are found in the house buildings.
- Concerning the ceiling method, *mesqel-qirts*, or simplified lantern ceiling, is applied only in the church buildings. In the case of house buildings, *hankeshtay-qirts* is dominant. In the case of lower ranked *hidmo* houses, unshaped rugged natural woods are used for the ceiling.

1-6-2: *Aderash*

Generally speaking, *aderash* refers to a large hall often used for banquets and festivities. According to Pankhurst (2005), the term of “*aderash*” was used in the Chronicle of Atsé Yohannis I in the 17th century for a royal tent in the Gonder palace compound. Later, the word was applied to refer to a royal throne room, too. That is, the term seems to mean a building type that is more closely related with royal or princely people, historically. The royal or princely *aderash* were found through the author’s field survey, too. Accordingly, there were mainly two structural types of royal or princely *aderash* in Tigray: rectangular “*hidmo aderash*” and circular “*seqela aderash*.” The detailed analysis of each structure will be discussed in chapter IV.

On the other hand, in İnderta, the term of “*aderash*” can be applied for a kind of building in an ordinary village, too. From the interview results with builders, the most prestigious version of *hidmo* (or larger one than that), shown in Fig.2-10, Fig.2-11 and Fig.3-7, can be called so, too (Table 3-7: a). According to the builders interviewed, only the elite who had enough workers or the rich could afford to build it. Thus, few “*aderash*” can be found in a single village. Indeed, the case of the house in Fig.2-10, Fig.2-11 and Fig.3-7 was built by the person titled *blattén-géta* under Emperor Yohannis IV in the latter half of the 19th century.

Table 3-7 Interview results on the meaning of "aderash," made by author.

# of Builder	a: Can the Most Prestigious Version of Inderta Type <i>Hidmo</i> Be Called "Aderash" Locally?	b: Can Inderta Type <i>Hidmo</i> without Space-(b) or Space-(c) Be Called "Aderash" Locally?
1	Yes.	No.
2	Yes.	No.
3	-	-
4	Yes.	Yes.
5	Yes.	No.
6	Yes.	No.
7	Yes.	Yes.
8	Yes.	Yes.
9	Yes.	No.
10	Yes.	Yes.



Fig.3-38 A tent called "aderash" presently, photo by author.

In this case, the *aderash* was usually used for residential purposes. In addition, it could accommodate family members, relatives, and guests together at times and have a space for reception. According to one builder interviewed, when some noble people visited the village, invitation was given in the *aderash*. Perhaps, this is one of the reasons why it can be called *aderash* locally.

However, "*aderash*" is a more difficult term to understand. According to four builders interviewed, a smaller version of *hidmo* can be called *aderash*, too (Table 3-7: b). Furthermore, the meaning of "*aderash*" is more equivocal presently. That is to say, the term has come to refer to a tent structure where funeral, wedding ceremony, public meeting, and other community services are held (Fig.3-38). Perhaps, the general meaning of "a large hall" has contributed to the term's use. According to the builders interviewed, a gathering place for village people was under a big tree in the past.

In this way, the term of "*aderash*" is very ambiguous. In this dissertation, the term is used to point to "a large hall often used for banquets and festivities" simply. The analysis of actual buildings will be carried out in chapter IV.

2. Building Preparation Process of *Hidmo* in Īnderta

In the previous section, fundamental issues of *hidmo* house in Īnderta, such as layout of parcel of land, typical plan, spatial components and building elements, were introduced. However, such introductory descriptions were not enough to understand more detailed planning methods and local techniques and knowledge. In the current and subsequent sections, the process to construct one house is analyzed in a reconstructive way based on the interview results with builders. The process can be divided into two parts: one is a building preparation process consisting of material collection and planning, and the other is a building construction process consisting of foundation work, masonry wall construction, ceiling and roof construction and indoor wall plaster.

As discussed in the previous chapter, the basic construction method between *hidmo* houses and churches is similar, albeit several distinctions exist. Therefore, the analysis of current and subsequent sections is applicable to understand basic techniques and knowledge of local built churches to some extent, too. Furthermore, the discussion will provide clearer images to understand why building a *hidmo* house means a great deal in the local community. Though the discussion is limited to the case of Īnderta, the results are suggestive to understand the cases of other provinces.

2-1. Occupational Ability

In northern Christian Ethiopia, there was a social ranking system ruled by clientele relationships. Only three occupations were desirable for man: a farmer, a soldier or a clergyman. Because getting clients depended on land-rights, craftsmen, such as builders, wooden workers and smiths, could not accumulate land. Therefore, craftsmen were excluded the possibility of having clients. Consequently, the craftsmen were found at the bottom of hierarchical order and were looked down upon (Amborn 2005). Indeed, one of the informant builders said that people did not want their daughter to marry a builder during the time he was young, around the middle of the 20th century. On the other hand, five builders mention that builders have been respected in the local community. This opposite opinion may be due to the varying skills of builders. Furthermore, the clues to understand this gap should be found in the occupation of the interviewees, too. That is to say, four informants interviewed were (are) at once a builder and a priest, and one informant is at once a builder and a farmer. They have (had) another occupation other than a builder. Furthermore, according to Bauer (1977), the priests of the local church in Īnderta were local farmers, not outsiders to be supported by the community. Having more than one occupation was not unusual in Tigray.

The works of building construction requires the various skilled techniques and material knowledge, such as planning, onsite measurement, stone shaping, masonry wall construction, ceiling and roof construction, detailed soil knowledge, assembling wooden materials to make openings, and other related works. If the prospective house owner had enough techniques and knowledge to build a *hidmo* or he was influential or rich enough to own masonry labors, the problems related to the techniques and knowledge can be solved relatively easily. Indeed, Bahru (1991) mentioned that farmers “had to undertake corvée (forced labour) such as farming, grinding corn, and building houses and fences” for *gʷilt* holders. It was no wonder that resource-poor households provided the human re-

sources to build a house for resource-rich households within the social hierarchy of the rural area. However, otherwise, the prospective house owner needed to seek a skilled and experienced builder at the beginning. According to the interview results, the way to find a builder is achieved in three ways: inspecting previous works the builder has done, introduction by an acquaintance, and hearing the builder's reputation. The prospective house owner visited the builder's house. Otherwise, in urban areas, a prospective house owner visited the place where builders gathered.¹¹ According to one builder in the countryside, the prospective house owner in the rural area visited a builder of the same village at the beginning. When the builder was busy or the reputation of another village's builder was high, he asked a different village's builder. After they agreed on payment in a verbal way, planning and construction phases started. Before money was commonly circulated, the form of payment was food, drink, grain, cattle, or other house animals. Presently, the form of payment has of course become money and the amount of money can be based on expected results of works or per diem.

According to interview results, the guild of builders or a strong mentoring relationship among the builders has been absent in the targeted area since the past.¹² Builder's techniques was not recognized as something that should be kept secret, that is to say, anyone who wanted to acquire skills could get access to learn building techniques. According to interview results, an aspirant builder started his career by simple and untrained works under the skilled builders and stepped up gradually. He acquired skills and knowledge through practice, observation of skilled work, and learning from skilled builders. The aspirant builders were usually mobilized to work in the places where higher skill was not required. This is the reason why they engaged in works relating to interior walls at the beginning of their career. Interior walls of *hidmo* house are always covered by plaster, while exterior walls are exposed. Therefore, an aspirant builder is locally called *nay-wishti nedaqi* (inside mason).

Nedaqi is a local terminology meaning a mason who assumes the role of building planning, foundation work, and masonry wall construction. After *nay-wishti nedaqi* acquired enough skills, he became to be acknowledged as *nedaqi*. Though clear criteria between them cannot be identified from the interview results and there was no initiation process to become *nedaqi*, the payment became higher. The period when the word *nedaqi* was adopted is vague from the interview results: while six builders interviewed recognize that *nedaqi* is an old word since before Italian influences, three answered that the word became used since around the Italian period. According to the latter, a mason was simply called *imni-ki'ila* (stone expert) before that.

In addition, there are two other occupational names related to the builder, *hanatsi* and *feleñamo*, though the meaning and when these words were adopted are vague from the interview results. Concerning *hanatsi*, five builders said that it means corrugated metal sheet roofer, while the other five said that it means a wooden expert who makes ceiling, doors or windows (Table 3-8). Remarkably,

11 Builders often gathered in the place called *sīwwa* house, *bino* house or *t'ejj* house. *Sīwwa*, *bino* and *t'ejj* are the names of local alcohol drinks. Generous clients paid a bill for the builders. According to the rural builders interviewed, there was no builders' gathering place in their villages.

12 According to four builders, there were builders' unions in the Derg period. However, the aim of unions was not technical, but to cooperate with each other. According to two builders, one union consisted of ten builders. However, it was not successful. For example, one builder interviewed resigned the union because the payment was the same regardless of skills.

according to three builders of five of the latter, *hanatsi* is a person who specifically makes the wooden ceiling. Concerning the period the word originated from, four builders interviewed mentioned that the word of *hanatsi* did not exist before a time around the Italian period. According to two builders out of the four, a wood work expert was simply called *inch'et-ki'ila* (wood expert) at that time. On the other hand, according to other four builders, *hanatsi* pointed to a wooden expert in the past. The word *feleñamo* is a relatively new word which originated from the Italian or post-Italian period (Table 3-9). Two builders interviewed do not know the word. Though two builders interviewed mentioned that it is an alternative word of *hanatsi*, it tends to mean a wooden work expert who makes doors and windows, not ceiling. According to two builders, *feleñamo* currently means a workshop of wooden furniture using machines. Based on these interview results, the author tentatively concludes as follows: *Hanatsi* originally pointed to a wooden work expert who makes ceiling, windows and doors. He might have simply been called *inch'et-ki'ila*. However, as corrugated metal sheet became more frequently used, the word changed meaning to point to corrugated metal sheet roofer. In parallel, the person who makes windows and doors came to be called *feleñamo*, and it has come to mean the workshop of wooden furniture presently.

Table 3-8 Interview result on meaning of *hanatsi*, made by author.

# of Builder	Meaning of the Word of <i>Hanatsi</i> before Italian Period or Introduction of Corrugated Metal Sheet	Meaning of the Word of <i>Hanatsi</i> after Italian Period or Introduction of Corrugated Metal Sheet
1	The word did not exist. A wooden work expert was simply called " <i>inch' et-ki' ila.</i> "	A wooden work expert who makes a ceiling.
2	A wooden work expert who makes a ceiling (the period is not identified).	
3	The word did not exist. A wooden work expert was simply called " <i>inch' et-ki' ila.</i> "	A wooden work expert who makes a ceiling.
4	A wooden work expert who makes ceiling and openings (the period is not identified)	
5	A wooden work expert who makes church building ceiling.	A wooden work expert who makes church building ceiling.
6	The word did not exist.	Corrugated metal sheet roofer for church buildings.
7	The word did not exist.	Corrugated metal sheet roofer.
8	A wooden work expert who makes windows, doors and artwork in the wall.	Corrugated metal sheet roofer.
9	A wooden work expert.	Corrugated metal sheet roofer.
10	A wooden work expert who makes doors and windows.	Corrugated metal sheet roofer.

Table 3-9 Interview result on meaning of *feleñamo*, made by author.

# of Builder	Meaning of the Word of <i>Feleñamo</i> before Italian Period	Meaning of the Word of <i>Feleñamo</i> after Italian Period
1	The word did not exist. A wooden work expert was simply called " <i>inch' et-ki' ila.</i> "	A wooden work expert who makes doors and windows.
2	The word did not exist. A wooden work expert was simply called " <i>inch' et-ki' ila.</i> "	A wooden work expert who makes doors and windows. The alternative word of <i>hanatsi</i> .
3	The word did not exist. A wooden work expert was simply called " <i>inch' et-ki' ila.</i> "	A wooden work expert who makes doors and windows.
4	don' t know	
5	don' t know.	A workshop of wooden furniture in the downtown.
6	The word did not exist.	Iron sheet roofer for church buildings. The alternative word of <i>hanatsi</i> .
7	The word did not exist.	-
8	don' t know	
9	The word did not exist.	A wooden work expert.
10	The word did not exist.	A wooden work expert who makes doors and windows. <i>Feleñamo</i> tend to use machine.

Though the clarification of each occupational name and meaning remains as a problem to be solved, it is rather remarkable that the name and meaning of each occupation often vary depending on the builders. It can mean that classifying each occupation was not so important for builders. Indeed, at least five builders interviewed have the ability to make wooden ceiling, too. According to one builder interviewed, making a wooden ceiling is the work assumed by *nedaqi*. That is to say, it is assumed that there was only loose classification related to a builder's occupation. If it is thought that building construction was carried out by those who were good at construction work in the community, the classification of a builder's occupation does not seem to be essential. To begin with, people other than a farmer, a soldier or a clergyman could not accumulate land in the past, as discussed in the beginnings of this section. As time went by, the occupational ability has been divided and fixed gradually, after influences of Italians.

2-2. Material Collection

2-2-1. Collecting Stone and Wooden Materials

When a man decides to build his own house, he should begin with material collection. In the local context, this is not the builder's task. Therefore, a prospective house owner was obliged to take command of this task. Though the materials can be purchased in the market presently, it was not possible in the past. When he had alternative laborers, he could order this mission to them. However, in case of building a general *hidmo* house, it was more common that this person collected the materials by himself with other people's help. The way to collect the main materials of *hidmo*, namely stones and woods, is discussed below.

According to nine builders, stones could be collected from nearby their villages, and carried by donkey (or sometimes by people), in the past. Two builders mentioned that it could be collected even in the farmland. There were suitable size stone pieces for masonry wall on or in the ground. That is, it was not necessary to visit distant places to collect stones in the past. However, providing huge number of stones was hard and time-consuming work. According to seven builders, this working process was helped by his family members, his relatives, friends, or (and) neighbors. The prospective owner often served food and drink to the helpers in return. On the other hand, two builders mentioned that the working process was not helped by anyone. Besides, when the prospective house owner had a property of a house that was scheduled to dismantle, the stone pieces were reused for the new house. It was difficult for the prospective house owner to gather all the stone materials on-site at one time in advance of the building construction. Therefore, construction could start when only a portion of the stone materials were collected.

Presently, stones are collected by vendors who come to the quarry site by truck. Indeed, the author succeeded in identifying quarry sites in Kwiha and Debri, both near Mekelle, through a series of field surveys (Fig.3-39; Map 2). Though suitable size stone pieces were available in the past, it is necessary to cut stones in the quarry site presently. Perhaps, this is related to the change of the demand of stones in association with the urban development of Mekelle, which was initiated in the latter half of the 19th century. This change caused the change of the method to obtain stone pieces. Such a techni-

cal issue related to the tools used is discussed in the next section.

As compared with stone, wood is a scarce material in Īnderta, as discussed in chapter II. However, building *hidmo* houses requires plenty of wooden materials for '*amdi* (pillar), *gadim* (lower beam), *serayt* (upper beam) and *mihuts* (ceiling). Though eucalyptus is a dominant species for each member recently, local wood types were of course used before the transplantation



Fig.3-39 A quarry site in Debri nearby Mekelle, photo by author.

of eucalyptus. The most preferred and the highly valued wooden type was *tsehidi* (juniper), due to its superior smooth and fine texture. The interview result on local wooden types for *hidmo* house in the past show that *tsehidi* was the most popular wooden type for *serayt* and *mihuts* (Table 3-10). Though there are builders who said that *tsehidi* was also used for the material of '*amdi* and *gadim*, one builder mentions that standard size of *tsehidi* is a little bit small for them. For thicker and longer wooden member of '*amdi* and *gadim*, *awli'i* (olive) was the most popular wooden type. The reason why *awli'i* was more popular for bigger wooden members can be explained from the perspective of the wood production site, too (Table 3-10). That is to say, *awli'i* is available in relatively accessible sites such as Debri, Giba, around 10km away northwest from Mekelle, and other not-so-distant sites, while *tsehidi* was available only in Dés'a, around 40km away northeast from Mekelle (Fig.2-5; Map 2). Collecting materials of *tsehidi* required 2-5 days trip from Īnderta¹³. Other wooden types that were raised by builders interviewed, such as *tsaddo*, *seraw*, *zigba*, *awoh*, *meritsa* and *ebuk*, were also available in neighboring or not-so-distant site.

The prospective house owners were usually forced to visit areas outside of his village to gather wooden materials, though there were indeed cases where the wooden materials were bought from the people who carried them from their sites. The collection trip had to mobilize many carriers. As the case of stone material collection, his family members, his relatives, friends, or (and) neighbors helped by participating in the material collection trip. Their meals and drinks during the trip must have been served by the prospective house owner. According to interview results, approximately 4 - 8 people were required to take one big log for '*amdi* and *gadim* (Table 3-11). When one piece of material was carried in turn, a larger number of people such as fifteen or twenty should be allocated for one piece. Perhaps, this is the reason why *tsehidi* was sometimes avoided to apply in '*amdi* and *gadim*. That is, it was perhaps often difficult for the prospective house owners to manage the material collection trip to Dés'a. On the other hand, carrying smaller wooden materials were easier than the case of bigger ones. According to interview results, one piece of *serayt* could be carried by 1 - 4 person (people), and materials of *mihuts* were usually carried by donkey (Table 3-11).

Collecting *tsehidi* was difficult work from the perspective of permission, too. Though there is one builder who said that taking *tsehidi* in Dés'a was not difficult work due to the lax security, permission from the local governor was officially required (Table 3-12). Furthermore, agreement from

¹³ The distance between each local village in Īnderta and Dés'a affects the difference of term of trip.

Table 3-10 Interview result on wooden type and its production site in the past, *made by author*.

# of Builder	Wooden Types and its Production Site in the Past ¹			
	'Amdī (pillar)	Gadīm (lower beam)	Serayt (upper beam)	Mihuts (ceiling)
1	awli'ī (Olea Africana ² ; olive) / from Giba tsehīdi (Juniperus Procera ²) / from Dés 'a	awli'ī tsehīdi	tsehīdi	tsehīdi awli'ī
2	tsehīdi (Juniperus Procera) / from Dés 'a	tsehīdi	tsehīdi	tsehīdi
3	tsehīdi (Juniperus Procera) / from Dés 'a awli'ī (Olea Africana; olive) / from around Kokolo			
4	awli'ī (Olea Africana; olive) / from the surrounding	tsehīdi / from Dés 'a awli'ī	tsehīdi	tsehīdi
5	awli'ī (Olea Africana; olive) / from near Giba	awli'ī	awli'ī	awli'ī ebuk / from near Giba ⁴
6	tsaddo (not identified) / from the surrounding	tsehīdi / from Dés 'a	tsehīdi	tsehīdi ⁵
7	awli'ī (Olea Africana; olive) / from the surrounding ³	awli'ī ³	awli'ī	meritsa (not identified) / from around Tēmben
8	awli'ī (Olea Africana; olive) / from the surrounding seraw (not identified) / from neighbor village tsehīdi (Juniperus Procera) / from Dés 'a	awli'ī seraw tsehīdi	ebuk (not identified) / from the surrounding seraw awli'ī tsehīdi	ebuk ⁶ seraw awli'ī tsehīdi
9	tsehīdi (Juniperus Procera) / from Dés 'a zigba (Podocarpus Falcatus ²) / from on the way of Maych' ew awli'ī (Olea Africana; olive) / from on the way of Afar	tsehīdi awli'ī seraw	tsehīdi awli'ī	ebuk / from on the way of Afar tsehīdi
10	tsehīdi (Juniperus Procera) / from Dés 'a awli'ī (Olea Africana; olive) / from neighbor site awoh (not identified) / from near Afar	tsehīdi awli'ī awoh	tsehīdi awli'ī awoh	tsehīdi awli'ī awoh
Amount	awli'ī: 8; tsehīdi: 6; tsaddo: 1; seraw: 1; zigba: 1; awoh: 1	awli'ī: 8; tsehīdi: 8; seraw: 2; awoh: 1	tsehīdi: 8; awli'ī: 6; ebuk: 1; seraw: 1; awoh: 1	tsehīdi: 8; awli'ī: 5; ebuk: 3; meritsa: 1; seraw: 1; awoh: 1

¹ The answer of "eucalyptus" is excluded. Builders agree that eucalyptus is recent material woods.

² The types of wood are identified by referring Azene B. et al. (1993)

³ Awli'ī is used in *hidmo* house. According to the builder, *tsehīdi* produced in Désa is used in case of church building.

⁴ Though *tsehīdi* is the best material, it was rarely used due to its cost.

⁵ The branches of *tsehīdi* which come in time of cutting woods for other timber members.

⁶ *Ebuk* is the most frequent material for *mihuts*.

the church located in the wooden production site was important, too. Two builders said that it was necessary to pay money to the church for agreement. On the other hand, getting agreement in other wooden production site was easier than the case of *tsehīdi*. According to three builders, they took wooden materials after talking with local people and getting agreement through lobbying. According to one builder out of the three, agreement was not required when woods in Īnderta were taken. Nevertheless, taking wooden materials was still a more difficult material to collect than stone. Collected wooden materials were often scraped and shaped before placing the resulting timber materials in the predefined position. Though such issues relating to the techniques and used tools is set aside for the next section, it should be pointed here that scraping and shaping wooden materials required further manpower and time.

The working process of wooden material collection used to be a serious time-and-manpower-consuming task in the past. Above all, taking *tsehīdi*, which was available only in Dés'a, was especially difficult. Therefore, the wooden type tended to be used more frequently in church buildings or houses of influential person in the local community. However, since the early 20th century, the provision of timber and the dominant wooden species changed to eucalyptus. Commercial activities became more active in parallel with urbanization progressing in Mekelle, and the newly transplanted eucalyptus became dominant. The indigenous species such as *tsehīdi* and *awli'ī* are presently prohibited to be cut without permission. Though difficulty of the wooden collection is clearly obvious presently, it might have been relatively easier before deforestation started in approximately 17th or 18th century. When farmers destroyed forests to open farmlands, the fallen woods perhaps could be used for housing materials. As it became more difficult to collect wooden materials, *hidmo* house might ironically have become to be recognized as more prestigious. However, the evidence of this hypothesis is indeed poor.

Table 3-11 Interview result on how to bring wooden material (per one wooden piece), *made by author.*

# of Builder	How to Bring Wooden Material: per one wooden member			
	'Amdi (pillar)	Gadim (lower beam)	Serayt (upper beam)	Mihuts (ceiling)
1	4 people (big); 2 people (small)	8 people	4 people	donkey
2	4 people	4 people	donkey	donkey
3	-	-	-	-
4	-	-	1 person	donkey
5	2-3 people	2-3 people	2-3 people	donkey
6	2 people	2 people	2 people	donkey
7	8 people	8 people	2 people	donkey / people
8	10 people	6 people	2-4 people	donkey / people / camel
9	15 people ^{*1}	20 people ^{*2}	donkey (2 pieces) ^{*3}	donkey / mule / horse
10	4 people	6-8 people	1 person	people

*1 3-4 people bring a material in turn. Therefore, a team of around 15 people was needed.

*2 4 people bring a material in turn. Therefore, a team of around 20 people was needed.

*3 In case of camel, it could bring 4 pieces at one time.

Table 3-12 Interview result on the permission to take wooden materials, *made by author.*

# of Builder	Agreement to Take <i>Tsehidi</i> in the Past	Agreement to Take Other Wooden Materials
1	Permission by a governor was required from the old time.	It was necessary to ask local people and get an agreement.
2	It was necessary to pay money to the church near the production site to get agreement as the custom.	-
3	It was necessary to pay money to the church to get an agreement.	-
4	-	-
5	Agreement from the church was required.	Community prohibited to take wooden materials without local agreement. Lobbying enabled to take them.
6	It was not difficult to take the materials because security was not so strict.	-
7	Permission by a governor was required.	To take materials in Inderta, it was possible to take wooden materials without agreement. In case of materials out of Inderta, talking and lobbying with local people was required.
8	Permission was required. Therefore, the use of <i>tsehidi</i> was limited to the church buildings.	It was possible to take wooden materials without agreement.
9	-	-
10	Permission from the concerning governor was required.	-

2-2-2. Connotative Meanings in Material Collection

Visiting the inside of *hidmo* houses makes the visitor aware of the fact that a lot of wood is used for the ceiling (Fig.2-11). This visual image of *hidmo*, which is filled with wooden materials that are difficult to collect, may have contributed to enhancing the sense of rich image of *hidmo*. *Hidmo* was traditionally considered the most prestigious house type in the targeted area. Furthermore, the rank among *hidmo* houses can be distinguished easily. Firstly, the size of a house is a key decisive factor. To build a larger house, a larger amount of materials are required. Therefore, the construction of a larger house requires more workers. The most prestigious version of *hidmo* house was sometimes called *aderash*, the meaning originating in the royal or princely buildings, as discussed above. How to classify the capacity of *hidmo* house will be discussed later. Secondly, wood type is also an important factor. *Tsehidi*, the most difficult wooden type to collect, was the most favored in the targeted area. Thirdly, scraped and shaped timbers, named “decorated ceiling” by Lyons (2007), increased *hidmo*’s prestige, as mentioned in the previous section. According to Lyons (2007), “decorated ceiling are costly partly because the wood is shaped. Shaping sometimes extends to squaring beams and rafters and cutting small ceiling pieces into flat sections.” Lyons mentioned, with reference to her

targeted villages, that only limited people could build a house with decorated ceiling. However, contrary to Lyons' saying, the author's observation affirms that common people in a village could also afford to realize the decorated ceiling.

Besides, either the owner's authority of ordering labors or his appeal to local community people was connoted in the *hĩdmo* construction. It means that, on the opposite side of the coin, the man who did not have authority could not build prestigious *hĩdmo*, and furthermore, those who did not make effort to participate the local community could not even build general *hĩdmo*. Therefore, the achievement of building *hĩdmo* construction could attain significant status in the local community. Lyons (2007) also concluded regarding decorated ceilings that "the widely held perception that decorated ceilings waste wood and labour is what makes them more meaningful than other ceilings in the production of social inequities and in creating places of authority".

Material collection, especially wooden ones, was a task that required many participants including neighbors or local community people. To consider why building *hĩdmo* meant a public statement in the local community is an important question. That is, through working on the building task together, they came to know each other and the prospective house owner and his household became a member of the local community. In the community with social relationships, helping each other is mutually profitable because it means that one can expect the favor returned when the time comes when he need help. To enhance his and his family's status in the local community, the way of showing gratitude was an important matter. Therefore, the rich served meat in return for the help of the task. The resulting *hĩdmo* house might remind the participants the experiences they shared together from working on the task. Therefore, building *hĩdmo* had a significant meaning in the local community. In this way, *hĩdmo* took an important role to form a local community with social relationships, as well as to create and visualize social hierarchy of the local community.

2-3. Planning

2-3-1. Building without Drawing

After an agreement between a prospective house owner and a builder was issued, the building plan is discussed. However, drawings did not exist to build a *hĩdmo* house. Instead of drawings, there was a type of *hĩdmo* house that was commonly accepted in the local area as the typical plan. Discussion progressed by using related terminology discussed in the previous section. The existence of a house type enabled the realization of commonly acknowledged houses of specific quality. When a builder met the prospective house owner, he decides the plan through simple and verbal communication. According to nine builders, the prospective house owner asked builders to build the house the same way he had built before. Because the prospective house owner had often seen the builder's previous work and there were many similar *hĩdmo* houses everywhere, the discussion was smooth. The interview results proved that the main topics of discussion are house position, construction method (*hĩdmo* / *seqela*), shape (rectangular / circular), and size. To decide the size, anthropometric unit, which is discussed later, was applied. Besides, the prospective house owner's relatives and local elders also gave advice. More detailed issues such as number and position of openings were usually decided by

builders, however, they were different one by one.¹⁴ The builders' knowledge and skills were often inconsistent, because they were self-trained without established builder's circle. It is no wonder that builder's recognition or attitude towards the detail of the house varied. In this way, the planning process of *hidmo* house can be recognized as the adjustment process of the common type shared by the locals, to the building site and the prospective house owner's demand and situation, by way of empirical knowledge.

Each builder had an assured knowledge about the whole construction process. Therefore, it was not such a difficult task for them to give advice regarding both quantity and quality of materials to prospective house owners, who are assigned to provide necessary materials for construction. After checking the collected materials, a builder could easily adjust the initially conceived plan to the case-by-case situation easily. Even during construction, the initial plan could be easily changed. For example, building height could become higher in case more stone pieces were available. On the contrary, construction work could end when stones were exhausted. Builders could start even though the necessary amount of stone pieces required for the whole building are not ready. Anyhow, this kind of flexibility should be taken into account when traditional construction process is compared with the modern one.

2-3-2. Traditional Anthropometric Unit

Building construction in the past was more connected with the builder's sense and body than modern construction methods. From the author's interview research, local anthropometric unit, which was based on the human body, was adopted in the past before metric unit system was introduced. The extracted unit types, which are shown in Fig.3-40, are as follows:

(a) *imet* / *kurona'*

The length between elbow and fingertip, approximately 50cm. This is the most frequently used unit in the past. According to three builders interviewed, this unit was applied to measure the length of a building and material. Furthermore, the builders interviewed often explain other units by this unit. That is to say, this unit can be regarded as the standard unit in İnderta. All the builders interviewed know the word of *imet*, while seven builders raised the word of *kurona'* as an alternative word. The same way of anthropometric measurement named cubit had existed commonly in Ancient Egypt and Mesopotamia, though the direct relationship is not clear.

(b) *may-bét*

This unit was applied to describe the capacity of *hidmo* house. However, the definition varies depending on builders, and it is sometimes vague (Table 3-13). According to two builders, the unit is defined as the number of span, equally with number of *serayt* (upper beams) (Fig.3-41: i). Two builders define it as number of rooms (Fig.3-41: ii). The definition of four builders, namely how many parts *hidmo* is divided into, is similar with this. On the other hand, according to two builders, one *may-bét* means four *imet*. This variance causes confusion in how to understand this unit. However, the last definition is remarkable to interpret this variance, because four *imet* can correspond with the length of one span or the length of one *serayt*. That is to say, it is hy-

¹⁴ If a prospective house owner was interested in such detailed matters, builders took it into account. However, according to the builders interviewed, prospective house owners usually did not care about it.

pothesized that the meaning of *may-bét*, originally invented to express the standard length of one *serayt* with *imet*, transformed to express the number of rooms depending on builders. In this dissertation, *may-bét* is tentatively defined as the number of spans or *serayt*, because this definition can intermediate all the definitions and can express the building size and capacity more reasonably. The definition will be validated and discussed later upon examination of actual measurements of buildings on site by the author.

(c) *sīdri*

The length between thumb and middle finger when fully extended, approximately half the length of one *imet* (25cm). According to two builders interviewed, this unit was used in combination with *imet*, such as the length of *x-imet* and *y-sīdri*. Another builder says that this unit is applied to measure the size of stone. Though one builder did not raise this unit as a commonly applied unit, one builder mentions that this unit was often used.

(d) *sudaro*

The length of one step, approximately two *imet* (1 m). This unit is useful to measure longer lengths roughly. While one builder mentioned that this unit was often applied, two builders mentioned that this unit was rarely applied.

(e) *igri*

Corresponding with one foot, approximately 30cm. Though five builders do not raise this unit as a commonly applied unit, two builders mentioned that the length of two *igri* is suitable for the width of a door. One builder interviewed raises the alternative word of *channa*, meaning a shoe.

(f) *zengi*

A stick of a plant that acts as a guide for a

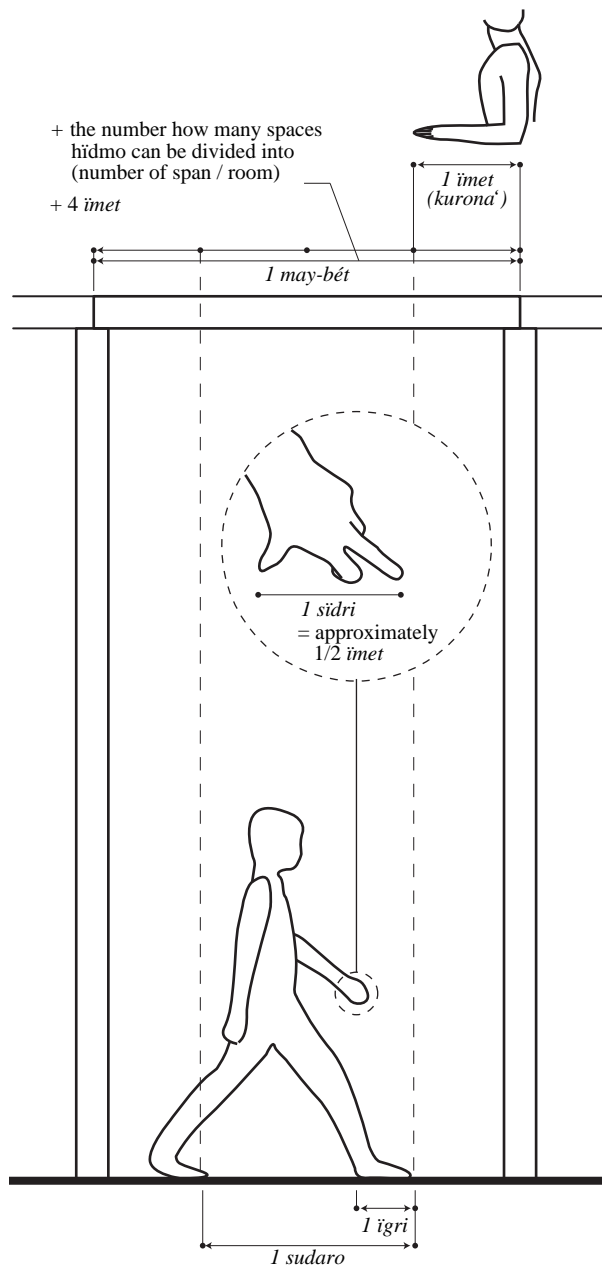


Fig.3-40 Traditional Anthropometric Unit in Īnderta, made by author.

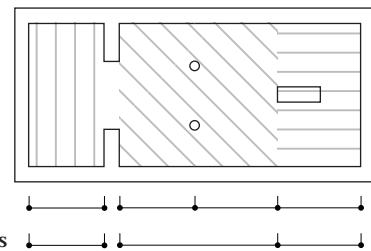


Fig.3-41 Two different ways to count building capacity in accordance with different definition of *may-bét*, made by author.

Table 3-13: Interview result on definition of *may-bét*, made by author.

# of Builder	Definition of <i>May-bét</i> by Each Builder
1	Approximately 2m (namely 1 <i>may-bét</i> means 4 <i>imet</i>).
2	4 <i>imet</i> , or 2m.
3	One span (namely number of beams).
4	Number of span between stone partitions (namely number of rooms).
5	One span (namely number of beams), approximately 5 <i>imet</i> .
6	Number of rooms.
7	Number of classes (namely how many parts <i>hidmo</i> is divided into).
8	Number of classes (namely how many parts <i>hidmo</i> is divided into).
9	Number of classes (namely how many parts <i>hidmo</i> is divided into).
10	Number of classes (namely how many parts <i>hidmo</i> is divided into).

particular length. A builder decides a specific length and cuts the plant into the desired length. The length varies depending on the purpose. However, five builders interviewed did not raise this unit as a commonly applied unit.

2-3-3. Typology of *Hidmo* House in *İnderta* in Accordance with Building Capacity

The most prestigious version of *hidmo* house in *İnderta*, consisting of three spatial components, has been shown before (Fig.3-7). The minified version of *hidmo* omits one pillar or (and) one spatial component (Fig.3-8). According to the builders interviewed, the capacity of *hidmo* house is described by the number of *may-bét*. In Fig.3-42, *hidmo* houses seen in *İnderta* that were observed by the author were categorized in accordance with *may-bét*, namely the “number of spans or *serayt*”¹⁵. The full version of *hidmo* is four *may-bét* which consists of two spanned space (a) and one spanned space (b) and space (c). Three *may-bét* version has two patterns: the majority of patterns is with one spanned space (a), space (b) and space (c), and the other is with two spanned space (a) and one spanned space (c) as shown in Fig.3-8. In two *may-bét* version, a house consists of one spanned space (a) and space (c). In any case, space (a) and space (c) exist. That is to say, *hidmo* house in *İnderta* is characterized by the existence of a two-storied part. Table 3-14 shows the interview results on the number of *meshkot* (thinner window) and *meshkot bīrhan* (bigger window) in accordance with the number of *may-bét*. Though the standard number varies depending on the builders as discussed above, it becomes clear that a larger house has more *meshkot*. *Meshkot bīrhan* is usually set in the upper floor, as mentioned above.

Builders can easily conceive the house plan without complicated discussions with the prospective house owner by use of the unit *may-bét*. Furthermore, misunderstandings between a builder and a prospective house owner might not have been a big issue because the prospective house owner had often seen the builder’s previous work and asked him to build a house the same size he had built before. This “*may-bét* system” is effective in measuring building capacity and plan.

¹⁵ The definition of *may-bét* varies depending on the builders interviewed, as mentioned above. If the definition of “one *may-bét* is equally with 4 *imet*” is adopted, this kind of typology cannot exist. However, according to interview results, builders in any case express the building capacity of *hidmo* house by use of *may-bét* unit regardless of the definition.

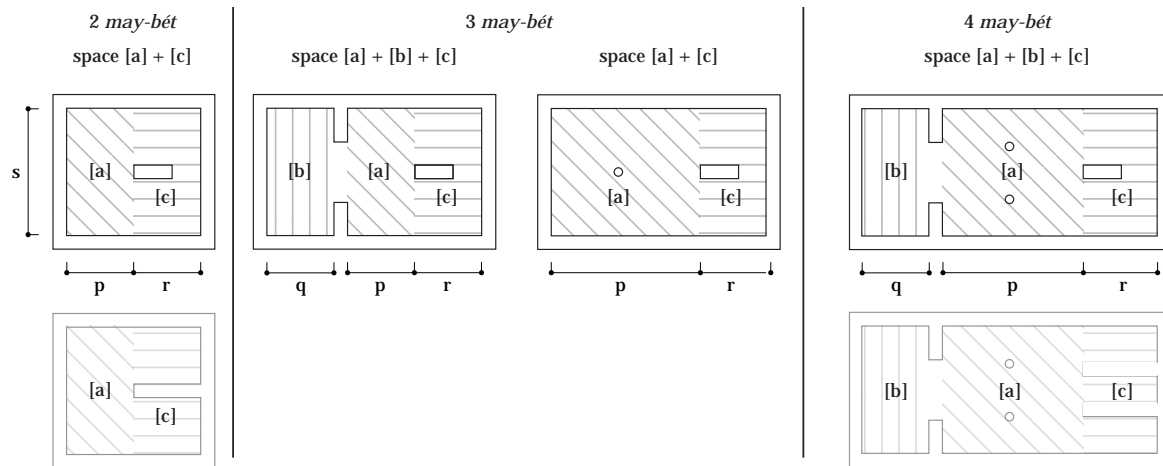


Fig.3-42 Typology of *hidmo* in İnderta in accordance with number of *may-bét*, made by author.

2-3-4. Hypothesized Dimension Method

Following the “*may-bét* system,” which is ruled by longitudinal direction, enabled builders to decide on a rough plan. However, it cannot describe more detailed issues. It does not indicate the actual dimension of *hidmo* house directly, furthermore, it does not relate to the length of shorter direction (“s” of Fig.3-42) and building height. Such a detailed measuring method for the whole plan cannot be identified from the interview results. Therefore, the dimension of *hidmo* house was measured by the author on site (Table 3-15). However, identifying the dimensioning method used by measurement results is difficult because the actual dimension is affected by the size of collected wooden materials, especially of *serayt*. Though one *may-bét* points four *imet* according to two builders, the size of *serayt* must become longer in the case that larger materials are collected, or become shorter in the case that the size of collected wooden materials is shorter.

From the measurement results, it becomes clear that the length of the longitudinal direction in the central space (“p” of Fig.3-42 and Table 3-15: <V>) and the two-storied part (“r” of Fig.3-42 and Table 3-15: <VII>) tends to be longer. The dimension is frequently longer than the estimated original standard size of four *imet*, 200cm. On the other hand, the average length of space (b) (“q” of Fig.3-42 and Table 3-15: <VI>) is closer to 200cm. That is to say, bigger timber materials of *serayt* are preferentially utilized in space (a) or (and) space (c). Longer size materials must have been preferred because it enabled owners to realize larger sized buildings which contributes to enhancing the building’s prestige. The higher number of standard deviation (SD) of <V> and <VII> than <VI> proves this (Table 3-15). That is to say, the length of *serayt* in space (a) and space (c) tends to vary, perhaps due to the different size in the collected wooden materials. Concerning the length of shorter direction (“s” of Fig.3-42 and Table 3-15: <VIII>) and building height (Table 3-15: <IX>), the average length is relatively correlative with the size of approximately 8 *imet*, two *may-bét* in the estimated original definition. The standard deviation is proportionally lower than <V> and <VII>, when

Table 3-14

Interview result on number of *meshkot* and *meshkot birhan* in accordance with number of *may-bét*, made by author.

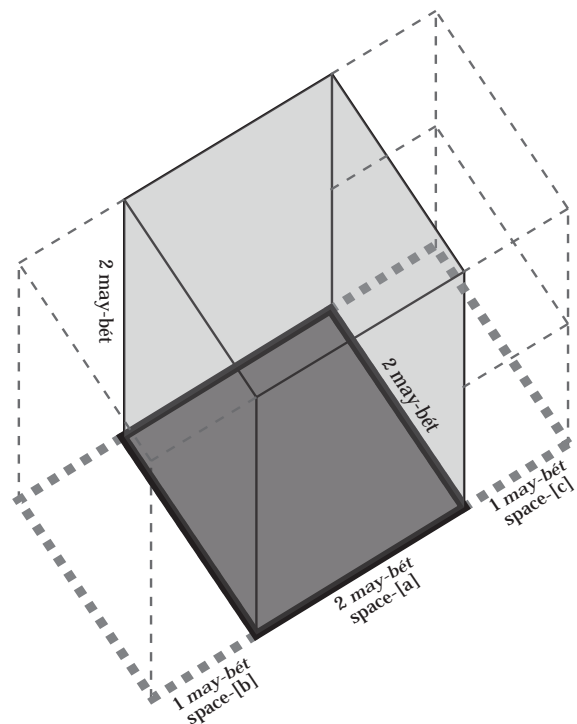
# of Builder	# of Meshkot / # of Meshkot Birhan		
	2 May-bét	3 May-bét	4 May-bét
1	2 / 1	4 / 1	4 / 1
2	3 / 1	6 / 1	6 / 2
3	-	-	-
4	4 / 0	6 / 1 or 0	8 / 1
5	6 / 3	8 / 3	10 / 3
6	10 / 0	13 / 1	17 / 1
7	4 / 0	4 / 3	-
8	10 / 1	14 / 1	-
9	5 / 1	9 / 1	11 / 1
10	4 / 0	6 / 0	8 / 0

Table 3-15 Dimension of *hidmo* house measured by author, *made by author*.

<I>	<II>	<III>	<IV>	<V>	<VI>	<VII>	<VIII>	<IX>	<V>
# of House	# of <i>May-bét</i>	p (cm)	# of Spans in Space-[a]	<III>/<IV> (cm)	q (cm)	r (cm)	s (cm)	Height (cm)	<VIII>/<IX>
1	4	486	2	243	190	193	452	404	1.12
2	4	454	2	227	204	264	462	489	0.945
3	3	386	2	193	-	209	380	400	0.95
4	3	408	2	204	-	253	386	403	0.958
5	3	299	1	299	207	274	412	410	1.00
6	3	226	1	226	196	238	416	402	1.03
7	3	230	1	230	160	N/A	370	400	0.925
8	3	230	1	230	190	200	420	400	1.05
9	3	253	1	253	152	278	455	352	1.29
10	2	280	1	280	-	200	370	350	1.06
11	2	305	305	305	-	184	357	360	0.992
12	2	266	266	266	-	266	435	400	1.09
Ave.	-	-	-	246	186	233	410	398	1.03
SD	-	-	-	33.8	19.7	34.3	35.0	34.6	0.0969

it is taken into account that the average of length of <VIII> and <IX> is almost twice as long as the length of <V> and <VII> (Table 3-15). Namely, the variance in the length of shorter direction and height is smaller than that in the length of longitudinal direction of space (a) and space (c). These are remarkable results because two-spanned space (a) ideally creates a cube in the internal house. That is to say, following the definition of “one *may-bét* is equally with four *imet*,” two-spanned space (a) becomes a cube of two *may-bét* on a side.

This finding suggests the existence of the standard dimension method ruled by the *may-bét* unit in the past. If the estimated original meaning of *may-bét* is accepted, the planning process of *hidmo* house is to be hypothesized as follows (Fig.3-43). 1) Conceiving a rough plan with *may-bét* unit, according to the prospective house owner’s request. 2) Fixing the dimension of the house volume onsite without drawings. The longitudinal direction of space (a) is one or two *may-bét*. The standard length of shorter direction is two *may-bét*, forming a square in case of two-spanned space (a). Next to space (a), space (b) and space (c) are added. The standard length of each is one *may-bét*. In the case of two *may-bét* house or three *may-bét* house with two spanned space (a), space (b) is omitted. In reality, the wall thickness of *filatsa*, a masonry wall separating space (a) and space (b) with approximately one *imet*, must be calculated when

Fig.3-43 Hypothesized standard dimension method ruled by *may-bét*, *made by author*.

space (b) is planned. 3) Piling stones around the house volume. The standard height is two *may-bét*, forming a cube in case of two-spanned space (a).

If this hypothesized dimension method is accepted, the plan of *hĩdmo* house plan can be almost automatically decided. This method, based on the anthropometric unit system, was modified by each builder to adjust the realistic condition such as availability of materials and personal preferences. The diversity from the basic principle of “*may-bét* system” to the actual interpretation depends on this adjustment.

2-4. In Case of Church Buildings

According to six builders interviewed, the construction of local church building begun with requests from the local community. The local community also decided the shape and construction method (rectangular *hĩdmo* / circular *seqela*) of the church. To realize the church building construction, participation of local people was (and still is) essential. People chipped (chip) in money and actively collected building materials. Concerning wooden materials, one builder interviewed mentioned that *tsehĩdi*, the most preferred and highest status wooden type that was produced only in Désa, was actively used for only church buildings, while *awliĩ* was more popular for house buildings (Table 3-10). For the construction, skilled *nedaqi* was assigned. Though the construction method was similar between church and house buildings, church construction required more careful construction. In the case of a church building, the building plan was decided without a drawing, too. According to three builders, the assigned team of *nedaqi* visited another church and measured it to use it as a sample. In this way, church construction projects was seen as the achievement of the local community, while house building was recognized as each prospective house owner’s achievement.

3. Building Construction Process of *Hidmo* in İnderta

In this section, it is aimed to clarify “traditional” techniques and local knowledge on *hidmo*, by shedding light on building construction processes, which consists of digging stones from quarry, shaping each stone, foundation work, masonry wall construction, ceiling and roofing construction, and plastering. Specifically, the used tools and materials and other relevant devisal are focused on. These outcomes make up a fundamental technical basis for future heritage conservation and locality-oriented building design.

In addition to the interview research with builders, the observation of a course of construction process is carried out to clarify “traditional” techniques and local knowledge. At Mekelle, the author observed the workflow of above-mentioned cobblestone project in 2009. Due to the project disposition, the observed flows are limited only to the process of digging and shaping stones. Therefore, the author collaterally adds the project case carried out in Gunde Gundé Monastery as the analysis object, in which a restoration project of an outdoor masonry wall was undertaken in 2014. Despite the site being out of İnderta, the basic process and tools used are similar, and the consistency is maintained with the results of the interview research.

3-1. Digging Stones from Quarry

At the quarry site, the author observed that several tools named *malakino* (iron bar with pointed tip), *biniito* (iron stake) and *medesha* (heavier hammer) are used to extract stones. At first, the *biniito* is driven into the ground by *medesha*, and then, the rock is split by using *malakino* (Fig.3-44: a and b). Next, the collected stone block is smashed by *medesha* into pieces (Fig.3-44: c), and loaded into the truck (at Mekelle) or directly carried to nearby construction site (at Gunde Gundé).

However, these tools were not commonly used in the past. According to local builders, *malakino* started to be used due to Italian influence,¹⁶ and *biniito* started to be used only in the past few decades or so. If so, how did people take stones from the quarry before? According to the builders, stone collection was easier in the past because suitable sized stones existed on or in the ground. People simply picked up or dug them up. Nevertheless, the existence of other alternative tools in the past is indicated (Table 3-16). According to seven builders, *mahresha* (agricultural ox-plow) was converted to take stones, after the tool was outworn (Fig.3-45). Considering plow is a tool to cut furrows in the soil, whether it is utilizable to separate off the rock or not is suspicious. Regarding this, one builder said that cutting approximately 10-20 cm is possible with *mahresha*, while another mentioned that it is difficult to cut. According to the latter, *mahresha* is used to find available stones from under the soil. As another alternative tool, three builders raised the tool named *hankashe*.¹⁷

In regard to *medesha*, eight builders said that it was also started to be used due to foreign influence, though one mentions that it had been possessed by the rich even before. Before *medesha*

¹⁶ However, the word corresponding “*malakino*” cannot be found in Italian, despite the pronunciation resembling Italian one.

¹⁷ *Hankashe* is an iron made tool used to dig the ground to plant a plant or tree. According to builders, it is used for hunting, too.



Fig.3-44 Workflow at quarry (a: Driving *binito* into the rock by *medesha*; b: Splitting the rock by using *malakino*; c: Smashing the stone block into pieces by *medesha*), photo by author.

Table 3-16 Interview result on past tool(s) to take stones, made by author.

# of Builder	1	2	3	4	5	6	7	8	9	10
past tool(s) to take stones	<i>mahresha</i> <i>hankeshe</i> <i>dunksha</i>	<i>merke</i> (<i>dunksha</i>) <i>mahresha</i>	-	<i>mahresha</i> <i>hankeshe</i>	<i>mahresha</i> <i>hankeshe</i>	<i>mahresha</i>	<i>mahresha</i>	<i>mahresha</i>	<i>dunksha</i>	-



Fig.3-45 *Mahresha*, photo by author.



Fig.3-46 *Dimbibilo-tsellim-imni*, photo by author.

became popular, appropriate stone called *dimbibilo-tsellim-imni* (rounding-black-stone) was used (Fig.3-46).

In this way, the method to obtain stones changed due to the introduction of new kinds of tools. As mentioned in the previous section, this is perhaps related with the change of the demand of stones and resulting shortage of suitable size stone pieces. Due to the introduction of *malakino*, taking stones from the quarry became easier and the procurable stone size became bigger. This is verified by the appearance of buildings: the stone size of a house built in 1960s is bigger than the one in the latter half of the 19th century (Fig.3-47).¹⁸

3-2. Shaping Each Stone

Presently, stone materials transported to the construction site are shaped to a desired size before piling up. At first, an outline of stone is scraped by *martello* (hammer) to arrange stone size roughly (Fig.3-48: a). Remarkably, according to ten builders, each stone is scraped in arc shape in case of

¹⁸ House of [a] is the one located in İnda Mesqel. As mentioned above, according to the resident of the parcel that the targeted house exists, his grandfather who served Yohannis IV built it in the latter of the 19th century. A house of [b] was built by the informant himself in 1960s.

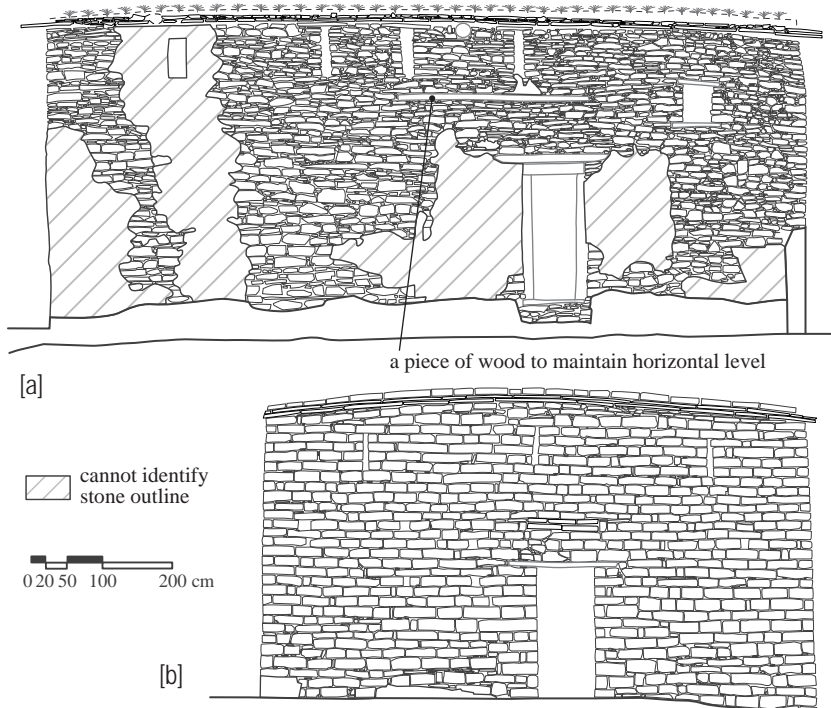


Fig.3-47
Comparison of *Hidmo* Appearance
(a: 19th century's house; b: 1960s'
house), *made by author.*



Fig.3-48 Workflow to shape a stone (a: Scraping a stone outline by *martello*; b: Scraping stone surface by *iskarbélo*; c: Smoothing a stone surface by *t'efit'afa iskarbélo*), *photo by author.*

circular shaped building (Fig.3-49). Next, the stone surface is scraped off with the use of a tool called *iskarbélo* (chisel). There are two types of *iskarbélo* now: one is narrower and the tip is gradually pointed, which is called *iskarbélo* (Fig.3-48: b), and the other is called *t'efit'afa iskarbélo* (flat chisel), which has a wider width and flatter tip (Fig.3-48: c). *T'efit'afa iskarbélo* can also be used to make a stone surface smooth.

By the name of *martello* and *iskarbélo*, Italian influence is suggested: *martello* also means hammer in Italian, and the tool *iskarbélo* has a similar pronunciation to “*scalpello*,” an Italian word that means chisel. The builders interviewed agreed with this assumption. According to builders, *iskarbélo* was introduced from Italy later than the introduction of other tools such as *malakino* and *martello*, at least after the occupation finished. Moreover, *t'efit'afa iskarbélo* started to be used more recently, less than a few decades ago. Indeed, according to author's observation at Mekelle, stones with wholly smoothed surface which is provided by *t'efit'afa iskarbélo* are only found in recent outdoor walls enclosing a parcel of land (Fig.3-50). Usually, such stones have not been used as building material for housing.



Fig.3-49 A circular masonry wall with stone pieces scraped in arc shape, *photo by author*.



Fig.3-50 An outdoor wall enclosing a parcel made from stone pieces with smoothed surface, *photo by author*.

When each stone size was smaller before the tool introduction, there was no need to use such tools because there was no stone surface to scrape. Therefore, it is no wonder that the introduction of *iskarbélo* was later than other tools. Prior to the introduction of *martello* that made scraping a stone in the desired size easier, *dĩmbĩbĩlo-tsellim-ĩmni* was again used when stone was roughly shaped as necessary (Fig.3-46).

3-3. Foundation Work

The author could not observe this process at the site. Therefore, the analysis is carried out on the basis of the interview. After a certain amount of stone materials are collected and building plan is decided, builders at first draw the full-scale plan onsite. To make it precise, proper lengths of *gemed* (thin rope made from local plant) are prepared by use of *ĩmet*, the standard anthropometric unit in Īnderta. On this basis, in case of a rectangular house, four sides and two diagonals of rectangular are drawn with *gemed*, and the apexes are marked with *shekal* (wooden post) (Fig.3-51: a)¹⁹. However, the actual building measurement often shows distortional rectangular shape (Fig.3-52). In regard to this, two builders mention that onsite drawing in previous times was done without any tools. In case of a circular house, *shekal*, tied with *gemed* of which length is radius of the building, is first fixed at the center, and a circle is drawn onsite by revolving around a central *shekal* (Fig.3-51: b). The plan of Fig.3-53 is an interesting case because a central point is different between eastern and western parts of the building. Perhaps, after drawing either part of them and attached rectangular spaces, the previous central point was lost and a new central point was set.

Next, the ground is dug to connect marked *shekal* to construct the foundation. The depth is variable because the work brings to an end when it reaches firm ground. The builders' answer on suitable foundation depth of *hĩdmo* house varied widely from 20cm to 150cm (Table 3-17: a). The depth of church building is deeper than that of *hĩdmo* house (Table 3-17: b). To dig the ground, the tool named *biko* (pickaxe), whose name perhaps derived from Italian word *piccone*, is used presently (Fig.3-54: a). Regarding the prior tool, five builders indicated a tool named *chĩkĩro* (hoe; Fig.3-54:

¹⁹ However, no builders know the ratio of special right triangle such as 1:1:√2.

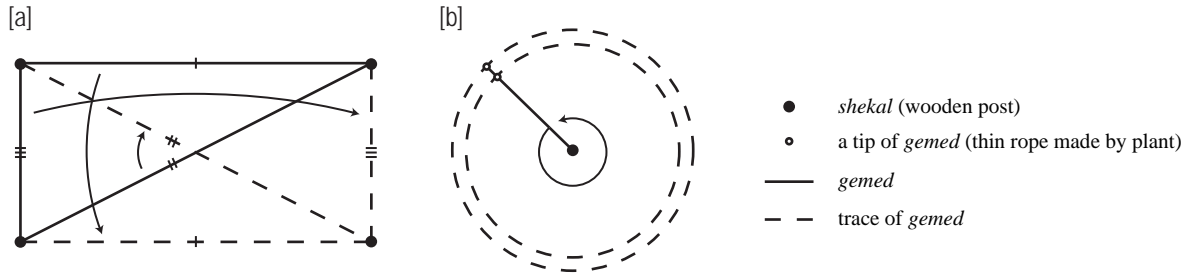


Fig.3-51 The ways to draw full-scale plan onsite (a: in case of a rectangular building; b: in case of a circular building), made by author.

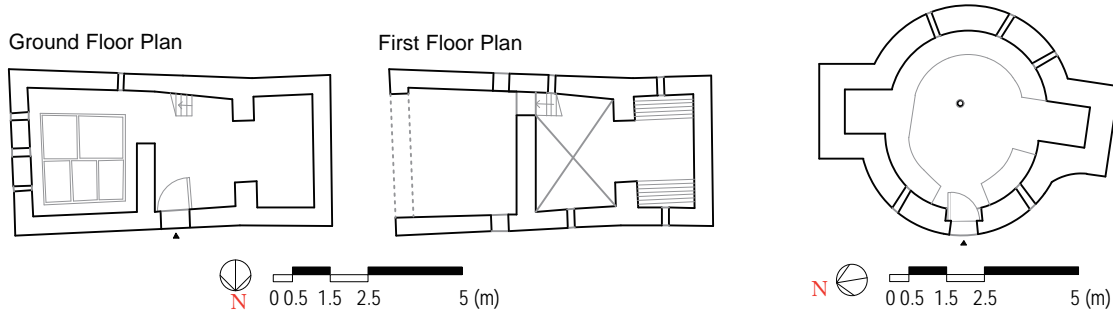


Fig.3-52 An example of a rectangular *hidmo* with distortional shape, made by author.

Fig.3-53 An example of a circular *hidmo* that lost the central point in mid-flow, made by author.

Table 3-17 Interview result on suitable foundation depth of *hidmo* house and church, made by author.

# of Builder	1	2	3	4	5	6	7	8	9	10
a: suitable foundation depth (house)	20cm	50cm	-	80-100cm	firm: 30cm soft: 150cm	70cm	50cm	60-100cm	100cm	100cm
b: suitable foundation depth (church)	200cm	100cm	-	150cm	firm: 100cm soft: 220cm	200cm	100cm	200cm	50-200cm	200cm

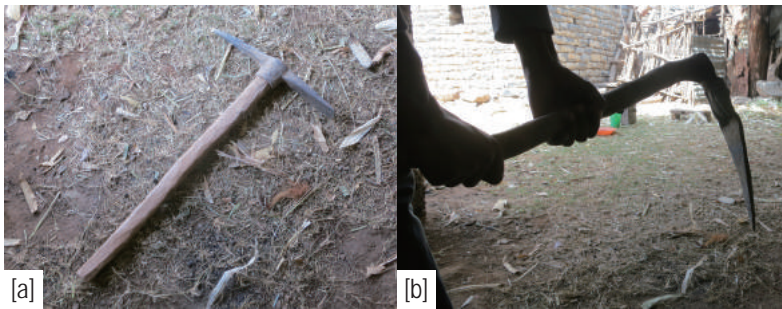


Fig.3-54 Tools to dig the ground (a: *biko*; b: *chikiro*), photo by author.

b). The defining difference between them is that a part of iron is detachable from a grip made from wood in the latter. More fixed *biko* enables to apply stronger force to be applied. According to seven builders, *biko* can be also called *mewaro*. These tools such as *chikiro* and *biko* to dig the ground are not special or unique to the building process as people used the same tools for other purposes such as agriculture.

The foundation work comes to an end by filling ditches with stones (Fig.3-55). According to builders, larger sized stones than the ones for the wall construction are used here. This is confirmed from the case of restoration project at Gunde Gundé by the authors.

3-4. Masonry Wall Construction

3-4-1: Process and Tools on Wall Construction

After the foundation work is finished, the masonry wall is constructed. The wall thickness of *hīdmo* house is, according to builders, 50-60cm (Table 3-18: a). In case of church buildings, according to five builders, it is 10 cm thicker than that of *hīdmo* house (Table 3-18: b). Furthermore, three builders say that the lower part of church building’s masonry wall is thicker than the upper part. Builders gradually pile up stones piece by piece, paying attention to avoiding vertically straight joint lines. To keep horizontal line of the wall, a spirit level (locally called *wīhalik*) is available presently (Fig.3-56: a). However, builders measured the joint lines by eyes only in the past. Nevertheless, it was sometimes maintained by embedding a piece of wood (Fig. 3-47: a). To realize stable structure, keeping vertical line of the wall to avoid incline is important, too. According to one builder, there has been a devisal to drop a small stone that is bound with string from the past (Fig.3-57). Presently, a similar tool of which stone is replaced with metal, named *tumbi* or *binbo*, is available (Fig.3-56: b). However, recent builders are not so much conscious to keep horizontal and vertical lines of the wall.

The corner part of the wall needs more careful construction, and suitable stones are kept for this part. Indeed, this is clear from the building appearance with bigger and un-deformed stones are used in the corner in alternating directions (Fig.3-58). According to a builder, flat and rectangular stones are suitable for the corner stone. To make it right angle, square ruler (locally called *squadro*) is presently available (Fig.3-56: c)

According to eight builders, bigger stones are placed in the lower part of the wall. They are usually not

²⁰ Throughout the site management at Gunde Gundé project, this is confirmed, too. Builders did not use spirit level so much, and sometimes failed to maintain horizontal level. This is a key point to watch out in the site management of main restoration work.

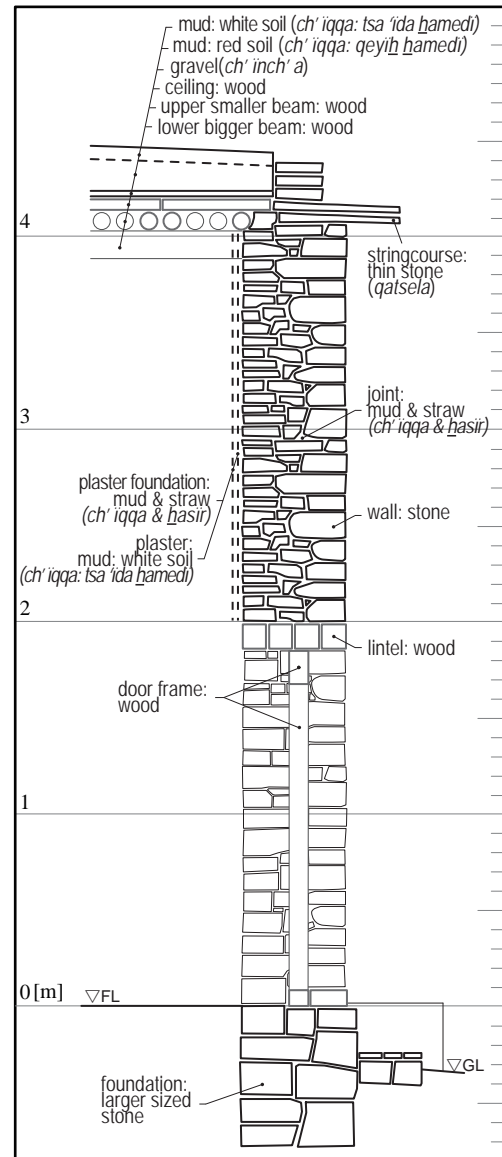
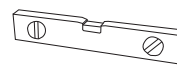


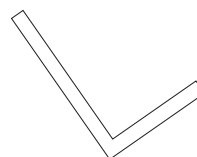
Fig.3-55 Schematic diagram of wall section in the past based on interview results, made by author.



[a]
wihalik



[b]
tumbi / binbo



[c]
squadro

Fig.3-56 Recently available tools for masonry wall construction, made by author.

Table 3-18 Interview result on suitable wall thickness of *hidmo* house and church, *made by author*.

# of Builder	1	2	3	4	5	6	7	8	9	10
a: suitable wall thickness (house)	-	50cm	-	60cm	60cm	60cm	60cm	60cm	50cm	U ¹ : 50cm L ¹ : 60cm
b: suitable wall thickness (church)	-	U ¹ : 50cm L ¹ : 70cm	U ¹ : 50cm L ¹ : 70cm	70cm	70cm	70cm	60cm	70cm	60cm	U ¹ : 60-70cm L ¹ : 100cm

*1 U: Upper part of wall; L: Lower part of wall

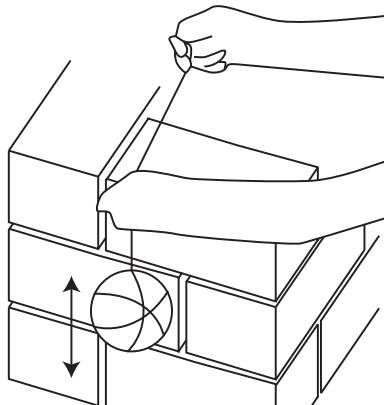


Fig.3-57
A way to keep vertical line,
made by author.



Fig.3-58
Corner part of *hidmo* house,
photo by author.

placed at over height above 1.5m or 2m.²¹ The wreckage of demolished building wall indeed shows that interior stones at lower part of wall are bigger than upper part of wall (Fig.3-59). Furthermore, as confirmed by Fig.3-59, nine builders mentioned that interior stones are smaller than exterior ones. The building appearance of plastered inside walls and exposed outside walls causes this material choice. As discussed above, this fact has affected the ability-based hierarchy, that is to say, aspirant builders have started his career from piling interior stones.

The stones are piled upward by attaching scaffold made from the row of wooden logs bridging over the logs below, each of which is poked into hole of masonry wall (Fig.3-20). When the construction reaches the top, the wall is covered with stones named *qatsela*, a thinner stone with a large surface area (Fig.3-21,²² 55). *Qatsela* with two or more layers forms a stringcourse to keep water from entering the inside wall.

²¹ Nevertheless, as shown in Fig.3-58, there are cases that bigger stones are placed at higher areas. This was due to material stones gradually being replenished during construction.

²² In the case of the Gunde Gundé project, *qatsela* measuring approx. 50cm by 20cm are used, albeit stone sizes vary.

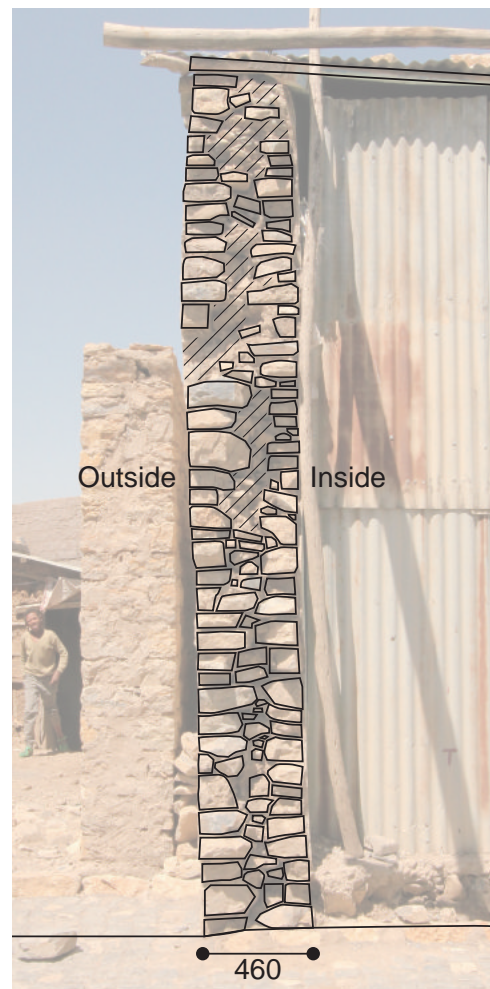


Fig.3-59 Wreckage of demolished building wall,
made by author.

Table 3-19 Interview result on height of applied stones, *made by author*.

# of Builder	1	2	3	4	5	6	7	8	9	10
height of using stone	15cm	10-20cm	15-20cm	10-25cm	10-20cm	20cm	10-15cm	15-20cm	18-20cm	15-20cm

Builders need to have clear idea of the building plan despite not having physical drawings. The masonry wall must be arranged neatly in the circumference of opening, and lintel is placed at the top of opening. Furthermore, the position of two types of built-in furniture, *goro-‘arat* and *ch’igwat* must be taken into account (Fig.3-13, 15).

3-4-2: Differences between Past and Present Masonry Construction

When the author asked about stone sizes, the builders responded by giving the stone’s height in centimeters, such as “*imni ‘aserite-hamushite* (stone fifteen)” or “*imni ‘isira* (stone twenty).” It shows that height is the primary measurement as opposed to width and length when measuring stone size for recent local builders. The interview research is down to the result that available stone height is almost between 10cm and 20cm presently (Table 3-19). The most popular height is 15cm. Though one builder said that 18-20cm is the best, another builder said 20cm is too big.

However, as mentioned above, these stone sizes are the result of masonry tool introduction. Previously, it was difficult to collect prescribed sized stones. The shift of tools should affect the shift of masonry construction method, too. That is to say, the masonry wall of the 19th century *hidmo* without introduced tools is more conscious of how to combine available stones whose size is not uniform, while uniformed sized stones are simply piled up in the one built in 1960s (Fig.3-47). One builder mentioned that stones collected by clients were used without regard to stone size. This attitude to use every size stones should express the reality on the stone size in the past accurately, though builders could request the preferred stone size to the clients.

However, all the responding builders said that the past masonry wall was stronger than the present. Accordingly, this is the issue on the internal part of masonry wall. That is, past masonry wall was stronger because inner and outer stones were interlocked. In regard to this, one builder indicated the preferable type of stone called *sini kilibi* (dog’s tooth), a thin and small stone whose shape is easier to interlock in the internal part. In the restoration project of Gunde Gundé, the authors witnessed the active use of this type of stone (Fig.3-60)²³.

According to builders, recent masonry wall is rather conscious of neat appearance with uniformed sized stones than the strength. Indeed, according to the author’s observation, recent masonry wall of parcel enclose is assembled only by filling gravels and muds between separated ambilateral stones (Fig.3-61).

One builder mentioned that masonry structure was the best in the Italian period. This is suggestive, because it implies that the tool introduction from abroad enhanced the workability and produced technical improvement and adjustment on the one hand, it simultaneously affected the degradation of awareness for the structural strength on the other hand. This tendency progressed behind the fall in number of *hidmo* construction.

²³ Due to the difficult logistics in Gunde Gundé, the restoration strategy is often forced to revert to older ways. On site, only slate stone is geologically available, therefore, thin and small stones are used.

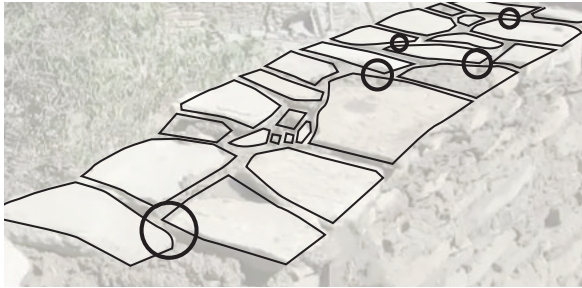


Fig.3-60 Inner and outer stones often interlocked, *made by author.*



Fig.3-61 Recent masonry wall of parcel enclosure, *made by author.*

3-4-3: Masonry Joint Materials

Soil, whose type is locally distinguished by its color by farmers, is a primal material for a masonry joint. To maintain the structural strength, seating each stone in the prescribed position with effective material use is important. Interview research clarifies that *qeyih hamedī* (red soil) is the most preferred soil type for masonry joint (Table 3-20: a). This soil type is usually placed at the bottom of toposequence and agriculturally the most fertile, which has “a high water holding capacity, because of their considerable depth and clayer texture (Corbeels *et al.* 2000).” According to seven builders, a greater deal of joint material was used for stronger structure in the past.

Though three builders mentioned that masonry joint is made only from soil and water (*ch’iqqa*: mud), six responded that *hasir* (straw) is also mixed (Table 3-20: b). According to the builders who responded joint with *hasir*, it should be rested several days after the materials are mixed (Table 3-20: c). Namely, joint material with *hasir* should not be used immediately. Among the *hasir*, *hasir taf* (straw of teff) is the most effective. In regard to this, McCann (1995) has already indicated as follows: *taf* is “the highest prestige cereal food across the ox-plow landscape, yielding the highest exchange value and the longest storage period; it also yields the best building straw and most digestible cattle fodder, and is somewhat drought resistant...” That is, the rank of cereal should be understood from broader perspective than simply a gustatory issue, and building knowledge is also involved in this cycle. In case that *taf* is not available, *hasir ikli* (straw of another cereal such as wheat or sorghum) is used as the alternative. According to one builder, *hasir ikli* is usually used in the *hidmo* house, while *hasir taf* is in the church building. However, the masonry joint material has been gradually replaced with cement, which is available in the market.

Table 3-20 Interview result on joint materials, *made by author.*

# of Builder	<a> preferable soil for joint	 masonry joint material	<c> # of days to keep <i>ch’iqqa</i> before use
1	small powder	<i>ch’iqqa hasir</i>	5-7 days
2	<i>qeyih hamedī</i> (any type <i>hamedī</i>)	<i>ch’iqqa hasir</i>	-
3	-	<i>ch’iqqa hasir</i>	-
4	<i>qeyih hamedī</i>	<i>ch’iqqa hasir</i>	3 days (busy: 1 day)
5	<i>qeyih hamedī</i>	<i>ch’iqqa hasir</i>	3-4 days (busy: 1 day)
6	<i>qeyih hamedī</i>	<i>ch’iqqa</i>	immediately
7	<i>hamekushti</i>	<i>hamekushti ch’inch’a</i>	-
8	any type <i>hamedī</i>	<i>ch’iqqa hasir</i>	a week
9	H*: <i>hamekushti</i> C*: <i>hamedī</i>	<i>hamekushti</i> or <i>ch’iqqa</i>	immediately
10	<i>qeyih hamedī</i>	<i>ch’iqqa</i>	immediately

*H: House building; C: Church building

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qeyih hamedī (red soil); *hamekushti* (ash);
ch’iqqa (mud); *hasir* (straw); *ch’inch’a* (gravel)

3-5: Use of Wooden Materials

Despite the difficulty to collect wooden materials in the targeted area, a number of wooden materials are used in *hīdmo* to assemble openings, pillars, beams and ceiling (Fig.2-11, 3-55). In the wooden production site, people cut woods by using a tool named *mīsar*, and carried them to the construction site (Fig.3-62). According to



Fig.3-62 *Mīsar*, photo by author.

builders, this tool is versatile. It was used as not only an ax, but also a plane, by spinning an

part of the tool 90 degrees. Furthermore, two builders said that it was also used as a hoe to dig the ground during foundation work. Builders scraped and shaped the surface of woods by using *mīsar*, and placed them in the prescribed position of each element such as pillars, all kinds of beams, and ceiling (Fig.3-63: a). While finely shaped timbers were preferred to contribute to enhancing building prestige, unshaped rugged natural woods were used in the lower ranked houses (Fig.2-11, 3-22).

Through the Gunde Gundé project, the author observes how to make a frame for an opening. Though the observation site is out of Īnderta, the interview research confirms that the material treatments are common. The working process begins with shaping each wooden surface by using *mīsar*. The process is followed by making projections at the end of a timber and making holes in another timber. Making a projection is carried out by the same way with wooden scraping by using *mīsar*, and making a hole is now done by used of *īskarbélo* (Fig.3-63: b). According to seven builders, a tool named *mendel* was used before the introduction of *īskarbélo* (Fig.3-64). The frame is assembled by setting a projection in a hole, and embedded in the predetermined position (Fig.3-63: c).

From the examples of basilica church buildings until 10th century such as the main church of Debre Dammo, more sophisticated techniques used to carve woods or to shape woods finely were thought to exist previously (Fig.2-42, 43, 44, 47, 48, 51, 52). However, such techniques were lost gradually in parallel with deforestation and resulted in the decrease of surviving examples. In regard to this, the lack of techniques to produce thin wooden sheets in the early 19th century is indicated by Pankhurst (1995), in reference to British envoy Cornwallis Harris: doors were “rudely fashioned of massive planks and beams, each of which in absence of saws, had involved the demolition of a whole tree.” According to Naigzy (1971), the openings were made through the trial-and-error process with



Fig.3-63 Workflow of wood processing (a: shaping a wooden surface; b: making a hole; c: embedding a door frame in the predetermined position); photo by author.



Fig.3-64
Mendel,
photo by author.



Fig.3-65
An example that
local *hidmo* ceiling and
roof were replaced by
corrugated metal sheet.
photo by author.

simple tools as axe and adze. The irrational use of woods accelerated the waste of woods.

Recently, ceiling method of *hidmo* has become a less popular choice. Instead of it, the replacement of wooden beams and ceiling with corrugated metal sheet roof has progressed. The use of corrugated metal sheet rapidly became dominant all over Ethiopia, combined with pre-existent scarcity of wooden materials. Even the cases that traditional *hidmo* ceiling and roof were replaced with corrugated metal sheet commonly exist (Fig.3-65).

3-6: Use of Soil Materials and Roof Construction

3-6-1: Limestone-tempered White Colored Soil

White colored soil is often used in *hidmo* house for flat roofs and plastering indoor walls (Fig.3-55). Considering the above-mentioned geological feature of the targeted area, this is limestone-tempered soil. This material is likely to be located on the upper portions of a toposequence and can be found near each village in the targeted area (Corbeels *et al.* 2000). Local people commonly know the production site. For example, Lyons (2009) described that both white and red colored soils are collected “from specific sources that are located within one to two hours walking distance from their compounds.” Though white colored soil is agriculturally recognized as the least fertile (Corbeels *et al.* 2000), it has useful features to maintain a building. For instance, it has been traditionally used to protect rock-hewn church from water leaking through the monolithic roofs (Ephrem *et al.* 2018).

Locally, this type of soil is called *nora*. According to Ephrem *et al.* (2018), *nora* is “mixed with water, fine residue of a food grain named *Taf*, *Haser* (*hasir*) and other grains for extended period while mixing it on a biweekly and sometimes weekly to facilitate the fermentation and harmony to get more sticky and improved quality of lime mortar.” From this description, it becomes clear that white colored soil was usually used as is calcium carbonate without the burning process, in the past. However, the author finds one builder who mentioned burnt lime. Accordingly, the burnt white soil called *chewbaredo* was plastered, after mixing with water. Namely, hydrated lime seemed to be used as plastering material since some time in the past, though it is locally less well known. The previous use of the lime has left questions unanswered.

However, the word “*nora*” has become confused presently. According to the interview research, it becomes clear that “*nora*” often means the soil that is available in the market, which passes through the burning process in the factory, too (hereafter referred as fabricated *nora*). This alteration of

meaning is not surprising as the soil type is locally distinguished by color. Presently, raw material of calcium carbonate is sometimes distinguished with fabricated *nora* by calling *tsa'ida hamedī* (white soil) simply. In this paper, the word of “*tsa'ida hamedī*” is applied when calcium carbonate is indicated, to make the discussion clearer.

3-6-2: Flat Roof Construction

After installing timber ceiling structure, roofing materials are placed to prevent leaking of rain and condition temperature and humidity inside of the room (Fig.3-55). Firstly, *ch'inch'a* (gravel), perhaps remnants from stone shaping included, is spread over the ceiling. Next, the roof is finished with a 15 – 30 cm thick layer of soil. The soil type, *tsa'ida hamedī* is preferred to *qeyih hamedī* (Table 3-21: a). In regard to this, one builder related an interesting episode to the author. He found that white stone that is readily available near his village turned out the roofing soil material by clashing (Fig.3-66). According to him, resulting white soil is appropriate as roofing soil instead of *tsa'ida hamedī*, because the packed soil becomes hardened through rainy season (Fig.3-67). This hard-packing feature by mixing with water and stepping is suggestive to understand why *tsa'ida hamedī* is locally more preferred.

Five builders responded that *tsa'ida hamedī* mixed with water is spread over *ch'inch'a* directly, while three builders said that *tsa'ida hamedī* (or fabricated *nora*) is used only as the finishing (Table 3-21: a). In case of the latter, *ch'iqqa* made from *qeyih hamedī* is put over *ch'inch'a*, before *tsa'ida hamedī* finishing. As the finishing material, *hamekushti* (ash) seems to be raised as one option, too: one builder said that it is mixed with the finishing *ch'iqqa*, and another builder said that it is even applied instead of *tsa'ida hamedī*, due to the lack of *tsa'ida hamedī* nearby his village.

Table 3-21 Interview result on soil of *hidmo* roof, made by author.

# of Builder	<a> preferable roofing material and thickness (from upper to lower layer)	 # of days to keep <i>ch'ikka</i> before use
1	<i>ch'iqqa</i> (t ³) & <i>hamekushti</i> : 5cm <i>ch'iqqa</i> & <i>hasir</i> : 10cm <i>ch'inch'a</i>	approx. 1 week 5-7 days
2	<i>ch'iqqa</i> (t) & <i>hasir</i> ^{*2} : 10cm <i>ch'inch'a</i>	approx. 1 week
3	- [<i>ch'iqqa</i> (t)]	-
4	<i>hamekushti</i> <i>ch'iqqa</i> (q ^{*1}) & <i>hasir</i> : 10-15cm <i>kuret</i> (alternative word of <i>ch'inch'a</i>)	3 days (busy: 1 day)
5	fabricated <i>nora</i> <i>ch'iqqa</i> (q): 50cm <i>ch'inch'a</i>	immediately (ditto 5-6 Times) 3-4 days (busy: 1 day)
6	<i>ch'iqqa</i> (t): 15cm <i>ch'iqqa</i> (q): 5cm <i>ch'inch'a</i>	2 weeks 1 week
7	<i>ch'iqqa</i> (t): 20cm <i>ch'inch'a</i>	immediately
8	<i>ch'iqqa</i> (t) <i>ch'inch'a</i>	immediately
9	<i>ch'iqqa</i> (t) & <i>hasir</i> : 20-30cm <i>ch'inch'a</i>	2 days busy: immediately
10	<i>ch'iqqa</i> (t): 20-30cm <i>ch'inch'a</i>	2 weeks

^{*3} t: *tsa'ida hamedī* (white soil) ; q: *qeyih hamedī* (red soil)

^{*4} Sometimes *hamekushti* is also added.

--
ch'iqqa (mud); *hamekushti* (ash); *hasir* (straw);
ch'inch'a (gravel)



Fig.3-66 The site of white stones for roofing soil, photo by author.



Fig.3-67 Flat roof with *tsa'ida hamedī*, photo by author.

The way of roofing consisting of both *qeyih* and *tsa'ida hamedī* seems to be wiser, as *tsa'ida hamedī* is sandier and its water holding capacity is lower than *qeyih hamedī* (Corbeels *et al.* 2000). That is to say, the local way to prevent water leakage can be interpreted as follows: hard-packed *tsa'ida hamedī* physically prevents infiltration as far as possible, and infiltrated water is held by *qeyih hamedī* to prevent it reaching inside the house (Fig.3-55). The interspace between gravels can secure the swollen soil by water. In addition, the soil is placed in the mounded shape, higher in the central part, to let water flow (Fig.3-67).



Fig.3-68 An example of ruined *hidmo* structure covered with plants, *photo by author.*

According to the result of interview research, *ch'iqqa* is better to be rested several days prior to spreading, though two said that it can be used immediately (Table 3-21: b). Remarkably, *ch'iqqa* made from *tsa'ida hamedī* should be rested longer, than the case of *qeyih hamedī*: two builders said that *tsa'ida hamedī* case needs to rest two weeks before use.

Stepping and hardening the soil requires more manpower. Therefore, more people such as house owner's relatives and community people usually participate in this working process. The owner has to prepare food and drink and invite them in return.

In some *hidmo* houses of the targeted area, soil of the roof is covered with plants (Fig.3-68). On the other hand, there are *hidmo* houses of which roof is not covered with plants, such as the house of Fig.3-67. This difference should stem from the difference of the soil type. That is to say, in case of *hidmo* roof covered with *qeyih hamedī*, of which water holding capacity is higher than *tsa'ida hamedī*, the plants grow up more easily. On reduction of it, it might be a good time to re-put *tsa'ida hamedī* again on the roof when the plants start to grow, in case that the roof consists of both of colored soils.

3-7: Indoor Wall Plaster

The process of indoor wall plaster is explained here based on the interview results and preceding study because the author has not observed this working process. According to six builders, the work is carried out by females. In regard to this, Lyons (2009) indicated the existence of gendered technical practice in the targeted area: "men's technical practices are concentrated outside and women's inside the compound" in daily activities. Indeed, foundation and masonry works are done by males.

Lyons explained the plastering process as follows: "first with clay tempered with fine straw, and then with a layer of un-tempered clay." From this description, it becomes clear that the similar material with masonry joint is used for the surfacing coat. As the finishing material for plaster, according to six builders, *tsa'ida hamedī* whose color reflects light more inside the house is used. However, the detailed material treatment varies depending on the builders. While four builders said

that *tsa'ida hamedī* mixed with only water is used, the other two mentioned that *hasīr* is also mixed. In case of mixing *hasīr*, it should be soaked one week before plastering. However, fabricated *nora* has become more popular as plastering material presently. When this is used, it is mixed with only water and soaks a few days before plastering.

3-8: Length of Construction Period

When builders are asked about the length of construction period, they are very confused to identify what this refers to. According to the builders interviewed, the length of construction period varies depending on the situation on a case by case basis. Firstly, whether the prospective house owner was in a hurry to construct a house or not was taken into consideration. If he was in a hurry, he had to find as many workers as possible. However, if he could not prepare compensation in return, he was forced to follow the way that took more time. Even if he found many workers, the workers might have been often absent for some reason. In another instance, construction work was forced to stop when the prospective house owner could not replenish stone materials. As mentioned above, building construction could start before all the stone materials were collected. To discuss the length of construction period, it should be noted that the building construction process is not always seamless.

The interview results on the length of construction period are shown in Table 3-22. The answers vary depending on builders. When the most extreme answers are compared, one builder responded that constructing a two *may-bét* house, which was carried out only by him, his son and his wife, took one year, while one builder responded that construction of 3 *may-bét* house took only seven working days with 10 *nedaqi* and 15 *nay-wishti nedaqi*. The variance stems largely from the difference of answers on working days per week and number of builders per day. As the answer on length of

Table 3-22 Interview result on the length of construction period, *made by author*.

# of Builder	Length of Construction Period
1	2 <i>may-bét</i> house: 1 month (4-5 days / week, 6 working people / day) * However, it is difficult to work 4 or 5 days due to holidays and lack of materials. It can take 10-12 months to complete.
2	3 <i>may-bét</i> house: 9 months (2-3 days / week, 1 <i>nedaqi</i> and 1 <i>nay-wishti nedaqi</i> / day) 2 <i>may-bét</i> house: 6 months (2-3 days / week, 1 <i>nedaqi</i> and 1 <i>nay-wishti nedaqi</i> / day) * If there are more workers, length of construction period can shorten. He finished constructing his 3 <i>may-bét</i> house only in 6 months.
3	2 months (3 working people / day) * People don't work in the saint holidays. Therefore, it is difficult to estimate length of construction period.
4	3 <i>may-bét</i> house: 8 months or more (3-4 days / week, 2 <i>nedaqi</i> and 1 <i>nay-wishti nedaqi</i> / day) 2 <i>may-bét</i> house: 6 months or more (3-4 days / week, 2 <i>nedaqi</i> and 1 <i>nay-wishti nedaqi</i> / day) * Sometimes working days are only 2-3 days per week because of saint holidays. * In case that the all materials and facilities are prepared.
5	3 <i>may-bét</i> house: 30 working days, 2 <i>nedaqi</i> and 2 <i>nay-wishti nedaqi</i> / day
6	3 <i>may-bét</i> house: 7 working days, 10 <i>nedaqi</i> and 15 <i>nay-wishti nedaqi</i> / day
7	3 <i>may-bét</i> house: 4 months (3 days / week, 2 <i>nedaqi</i> and 2 <i>nay-wishti nedaqi</i> / day)
8	2 <i>may-bét</i> house: 1 year (1 <i>nedaqi</i> , his son and his wife) * In case of his own house.
9	3 <i>may-bét</i> house: 1 months (4-5 days / week, 4 <i>nedaqi</i> and 4 <i>nay-wishti nedaqi</i> / day) * People don't work in the saint holidays.
10	3 <i>may-bét</i> house: 2 months (3-4 days / week, 2-4 working people / day) * In case of his own house.

Average working days per a week: 3.58 days (6 builders)

construction period becomes shorter, the answers on working days per a week and number builders per day become higher. The average working days per week were 3.58 days. People did not work on Sundays and saint holidays. It is noted that the size of each stone piece was smaller in the past and therefore the length of construction period must have been much longer.

4. Conclusive Summary

In Īnderta, southeastern part of Tigray, *hīdmo* was the most preferable house type. It was usually applied to the main house of each parcel, and the vast majority of daily indoor activity was carried out in it. Owing to the limited number of openings, the inside of the room is not well lit; however, the thick walls, ceiling, and roof contribute to stabilizing the indoor environment. Though rectangular shaped *hīdmo* was the most preferable, there is the less preferable circular shaped *hīdmo*, too. When people could not afford to build a *hīdmo* house, they were forced to build conically roofed houses named *seqela* or *guji*.

The reason why *hīdmo* house was recognized as the most prestigious house is strongly related to the use of wooden materials. While stone materials, concretely limestone that is easy to work with in Īnderta, were collected from the neighborhood or nearby places gradually, wooden materials were scarce and its material collection was more difficult. The prospective house owners were often forced to go on material collection trips with his family members, his relatives, friends or (and) neighbors. Furthermore, a decisive factor of the rank among *hīdmo* house is also related to wooden materials: size of a house, wooden type to be applied, and whether using scraped and shaped timbers or not. In this way, a *hīdmo* house symbolized the hierarchy of the local community. Building a *hīdmo* house meant a great deal in the local community.

Drawings did not exist to build a *hīdmo* house. Instead of drawing, there was a typical plan that was commonly accepted in the local community. Therefore, if house position, construction method, shape, and size were decided, a building could be planned without drawing. To realize the construction, the anthropometric unit system was used in Īnderta. It enabled the establishment of a *hīdmo* house typology in accordance with building capacity.

From the construction process, locally inherited building techniques and knowledge become clear. At first, the results show that, at a first glance paradoxically, various existing tools were the ones introduced from Italy. Especially, the processes of digging stones from quarry and shaping each stone were affected by the tool introduction. The change of tools caused the change of masonry wall construction method, too. Though each tool was estimated to be introduced from the latter half of the 19th century gradually, the precise date cannot be identified from the interview research, due to the roughness of the image given by interviewee. In the next chapter, clues to formulate such a detailed building history of Mekelle and its surrounds is attempted by examining existing buildings. On the other hand, the building process of ceiling and roof construction was not affected by the introduction of tools. Instead the ceiling and roof of *hīdmo* were replaced with corrugated metal sheet.

Before the introduction of tools and materials, local building techniques and knowledge were more closely related with agricultural ones in the past. The previous tools were often the ones for agricultural use, and the soil knowledge that is essential for the agricultural produce has been applied to the *hīdmo* house construction, too. Furthermore, preferable *hasīr* type for masonry joint corresponds with the rank of cereal.

Chapter IV

**Urban and Building Transformation
in Mekelle and its Surrounds since the 19th Century**

1. Background to Discuss the Transformation

From chapter I and III, it becomes clear that local techniques and knowledge on settlement and building are often connected with agricultural techniques and knowledge from the past. The concrete points of the connection are raised below:

- The preferable location of a settlement was where rich natural resources were available. Such a location was preferred for a “city,” too.
- The arrangement of a settlement was characterized by hilltop church and hillside habitats to reserve the bottom of slope for farmlands, where the most fertile soil was expected. The same arrangement was applied in the “city” of the region.
- Each parcel located in the hillside was formed by way of “terraced enclosure,” namely a way to form a terraced agricultural field.
- Stone piling technique was applied in both agricultural terraces and *hīdmo* house building.
- Next to one’s parcel for residential use, there was (is) often adjoining farmland. In the *hīdmo* house, a space for agricultural tool, named *goro-‘arat*, was (is) usually installed.
- Flat roof of *hīdmo* was (is) useful to place a *sheaf* of straw, because the position was out of reach of cattle, of which food was (is) it, in the courtyard.
- *Mahresha*, an agricultural tool used as ox plow, was applied to take stones after the tool outworn.
- The soil knowledge that was (is) essential for the agricultural produce was applied to the *hīdmo* house construction, particularly in the joint, plastering and roofing materials.
- Preferable material of straw corresponds with the rank of cereal.

It is remarkable that the techniques and knowledge applied in the local settlement was applied in the place of “cities,” too. Furthermore, it should be noted that the same building technologies and knowledge were applied in not only house building, but also church building, as discussed in chapter II. That is, all the buildings in the targeted area were in the hands of the same frame of technologies and knowledge.

The findings that local techniques and knowledge of settlement, “city” and building were strongly related to agricultural ones raise the validity to understand local techniques and knowledge as one of the techniques on the whole livelihoods, regardless of the category such as food and shelter. Local techniques and knowledge should be understood in a more integrated and interrelated way.

The validity of this understanding is strengthened by the discussion on occupational ability in the past. In chapter III, it was pointed out that there was only loose classification related to builder’s occupation in the past. Indeed, interviewees of the author’s research on local building techniques and knowledge often had another occupation in addition to being a builder, such as a priest or a farmer. Furthermore, local farmers had to provide building services to upper status people in the rural area. That is to say, both farming and building works were carried out by the same people in the rural settlements. Local techniques and knowledge on the whole livelihood seemed to be improved through the integrated and interrelated process between agriculture, building and other categories by the local people, who were usually called “farmers.”

In chapter IV, how the techniques and knowledge on “city” and building have been changed in Me-

kelle and its surrounds since the latter half of 19th century is discussed. As implied in chapter I and III, Italy often introduced newly appeared techniques and knowledge to the targeted area. Concerning Italian influences, there are two possible channels. One is via Giacomo Naretti, Italian craftsman who served Emperor Yohannis IV and participated in the palace construction in 1880s. The other channel is Italian colony Eritrea. Though Ethiopia defeated Italy in the first Italo-Ethiopian war of 1895/96, a number of goods reached Ethiopia via Asmara perhaps from 1890s gradually, namely after Italian occupation of Asmara in 1889. Asmara became a capital of Italian colony in 1897 and communication between Asmara and the targeted area increased. Finally Italy defeated Ethiopia in the second Italo-Ethiopian war of 1935/36 and Mekelle was occupied by Italy until 1941. Therefore, the analysis is carried out by dividing into the following three periods: from 19th century to Emperor Yohannis IV period (-1889), Post-Yohannis IV Period and Italian occupation period (1889-1941), and Post-Italian occupation period until now (1941-).

2. From the 19th Century to Emperor Yohannis IV Period (-1889)

2-1. Before Emperor Yohannis IV Period

2-1-1. *Hidmo* or *Seqela*?

Before Emperor Yohannis IV period, it was difficult to find Italian or other influences on “city” and building. The techniques and knowledge applied in the “city” and building were the ones inherited from the past generation.

When two sketches drawn by Salt and Simon, which depict Mekelle’s situation before becoming a “city,” are observed, it is reminded that there were only a few *hidmo* houses in the site at that time (Fig.1-20, 21). The houses drawn in Salt’s sketch of Fig.1-20 are circular thatched *seqela* or *guji* ones located in the hillside, though whether they are farmers’ houses or church school dormitory is not clear. No *hidmo* houses are identified in this sketch. Nevertheless, in the sketch of Simon, several *hidmo* houses can be identified (Fig.1-21). From the observation of the sketch, it becomes clear that hillside areas were more likely to consist of rectangular *hidmo* houses, while flatland areas were more of circular *seqela* houses or tent-like structures. One of *hidmo* houses in the hillside is estimated to be the one situated in İnda Mesqel, documented by the author’s team (Fig.2-10). The period that *hidmo* house increased was the next period, namely at the beginning of 20th century. Before the “urban” development, *seqela* house should have been more dominant.

In other “cities” in İnderta such as Ant’alo and Ch’eleqot, the capitals of *Ras* Welde Sillasé at the beginning of 19th century discussed in chapter I, the same tendency is approved. Concerning Ant’alo, Salt described the situation as follows in his first visit of 1805: one thousand circular houses with “conical thatched roofs” (Pankhurst 1982; Annesley 1809). That is, circular *seqela* houses were dominant at that time. However, in the middle of 19th century, *hidmo* houses existed in Ant’alo, too: Some of the houses in Ant’alo were “circular, with conical roofs of thatch, others square, with flat roofs” (Pankhurst 1982; Holland *et al.* 1870). Indeed, from the sketch by Acton in the middle of 19th century, co-existence of *seqela* and *hidmo* is confirmed (Fig.1-9). On the other hand, from another sketch by Acton, it becomes clear that there were only circular *seqela* houses in a village near Ant’alo (Fig.4-1).

Concerning Ch’eleqot, there is a sketch of Massaja drawn in the middle of 19th century (Fig.4-2). Accordingly, the place consisted of flat roofed rectangular *hidmo* houses. However, whether the sketch really depicted the actual situation is doubtful. If the place really consisted of only *hidmo* houses, such a characteristic urban scape should be written in the text in other visitor’s book, however, such descriptions cannot be found. Other points of distortion on this sketch can be indicated, too. Firstly, the walls enclosing each parcel are omitted. As mentioned in chapter I, well-constructed and well-kept gardens with various types of woods existed in each parcel of Ch’eleqot. Secondly, a church, drawn in the



Fig.4-1 A Village near Ant’alo in 1860s, from Acton (1868).

center of the sketch, was actually larger than this sketch, and the parcel of the church was actually enclosed by walls. From these facts, it is better to think that the sketch was the one expressing the real situation in an exaggerated manner. Though rectangular *hīdmo* houses might have existed in Ch’eleqot at that time, there were circular *seqela* houses, too.

Through the field survey in Ch’eleqot, the author found an example of *seqela* house that was built at the beginning of 19th century (Fig.4-3)¹. The plan of this example clearly follows the circular shaped house with rectangular core inside, which was commonly found in northern Ethiopia and introduced in chapter III, though the shape of an example in Ch’eleqot is distort and imperfect (Fig.2-13, 3-37, 4-4). Structurally, a beam bridges over the masonry walls of the rectangular core, and a king post is placed on that beam (Fig.4-5). Finally, a grass roof covers the spaces between the top of the post and masonry walls, though corrugated metal sheet additionally covers the grass roof presently (Fig.4-3).

Though *hīdmo* seemed to be a less frequent choice before, *hīdmo* houses should have existed since the past. In Melba’, a local settlement near Ant’alo and Ch’eleqot, the author found several old examples through the field survey carried out in 2015. First of all, there were two examples of a rectangular *hīdmo* house (Fig.3-18, 4-6). Though both of them were built in the 1860s or 1870s according to the present house owners, the time of construction could be at the end of the 19th century or at the beginning of the

¹ The date of construction was extracted from the interview with local people. Accordingly, the building was constructed in the time close to the Sillasé Church constructed at the end of the 18th century.

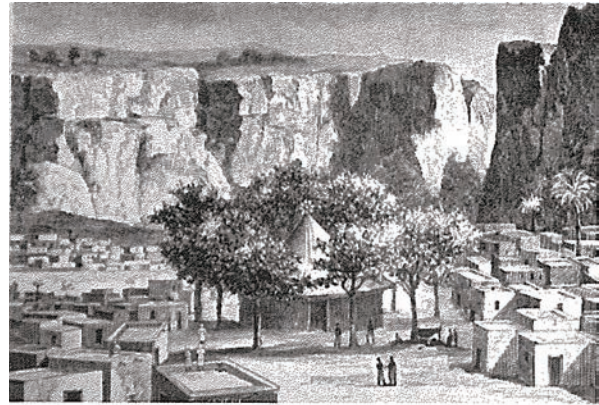


Fig.4-2 Ch’eleqot in the middle of 19th Century, from *Massaja* (1885-95).



Fig.4-3 External appearance of an example of *seqela* house in Ch’eleqot, photo by *Mano, Y.*

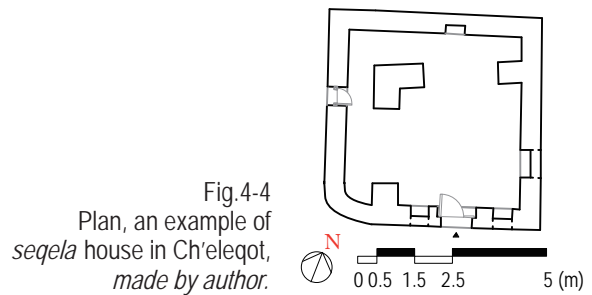


Fig.4-4 Plan, an example of *seqela* house in Ch’eleqot, made by author.



Fig.4-5 A beam bridging over the rectangular core and a king post, photo by *Mano, Y.*



Fig.4-6 External appearance of an example of *hidmo* house in Melba', photo by author.



Fig.4-8 External appearance of an example of a circular *hidmo* house in Ant'alo, photo by Mano. Y.

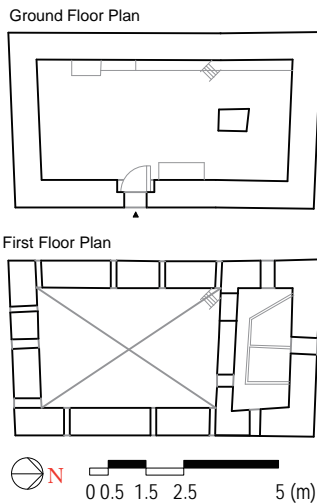


Fig.4-7 Plan, an example of a rectangular *hidmo* house with distortional shape, made by author.



Fig.4-9 External appearance of an example of simple circular *hidmo* in Melba', photo by author.

20th century, namely shortly after the period of Emperor Yohannis IV². The building shape of the rectangle in both of the examples is distorted. Perhaps, diagonals of the rectangle were not measure at the time of foundation work (Fig.3-52: an example of Fig.4-6; Fig.4-7: an example of Fig.3-18). Another example is a circular *hidmo* house that was introduced in chapter III as a derivation of a rectangular *hidmo* (Fig.3-24, 25). Though the detail is not clear, the local interviewee said that it was built at the beginning of the 20th century. In Ant'alo, there is one example of this type of house built in approximately 1960s (Fig.3-53, 4-8). The other old example found in Melba' is the simple circular *hidmo*, which was introduced in chapter III, too (Fig.3-26, Fig.4-9). According to the present house owner (Female, c. 1925-), this house was erected by her husband in approximately 1925. In addition to these *hidmo* types, there were perhaps more *seqela* houses pre 1900, though such examples of old *seqela* houses could not be found in the field survey.

² Concerning a house of Fig.3-18, according to the present house owner (Male, c. 1955-), his grandfather erected it approximately 140–150 years ago (c. 1860s or 1870s). According to the interviewee, the first owner was almost the same age with the first owner of Fig.4-6. According to the present house owner of Fig.4-6 (Female, c. 1965-), her great-grandfather erected it approximately 140–150 years ago (c. 1860s or 1870s). Because the interviewees' age and generation do not corresponded with the construction age, they could have been built at the end of 19th century or at the beginning of the 20th century, namely shortly after the period of Emperor Yohannis IV.

2-1-2. Elite Buildings before Emperor Yohannis IV Period

There were not only church buildings and common houses such as *hīdmo* and *seqela* houses discussed in the previous chapter, but elite buildings, namely buildings erected by ruler's or royal family, also existed. Though it is difficult to find the examples of Tigray before 19th century, there are several remaining examples from 19th and 20th century. The author measured these examples of elite buildings situated in Mekelle and its surrounds through field survey. Therefore, the examples are included as the target of the analysis in chapter IV.

(a) Elite buildings located in Ant'alo and Ch'eleqot

When Salt visited Ant'alo in 1805, he drew two sketches of the residence of *Ras* Welde Sillasé (Fig.4-10, 11). Concerning that residence, Salt mentioned: "the house of the *Ras* is conspicuous from its size, from the different shape of the roof, and from a wall by which it is surrounded (Annesley 1809)." Indeed, from Fig.4-10, it is clear that the shape of each building of parcel is rectangular, and the roof of each is gabled and thatched. In the targeted region, this appearance of building was unfamiliar, because rectangular shaped building was usually a *hīdmo* structure and thatched roofs were usually applied on conical shaped roofs. Fig.4-11 shows the internal appearance of a "great hall." From the sketch, it becomes clear that inner walls were plastered. Timber rafters are placed at regular intervals between a ridge beam and a wall, and the timbers filling the voids between rafters configure a ceiling. Perhaps a thatched roof is placed on it. Salt described the scene of a grand feast held in the hall: "A long table was placed in the middle of the hall, at the upper end of which, in a recess, the floor of which was raised about half a foot above the level of the room, was a couch, with two large pillows covered with striped satin, and behind this stood a lower couch covered with a handsome skin. The *Ras* led the way, leaning on two of his principal chiefs, and took his seat on the higher couch, inviting us at the same time to occupy the couch behind. The chiefs in the mean time ranged themselves on their haunches (for there were no benches) on each side of the table, and behind the *Ras*, crowding in two or three ranks towards the upper end of the room (*Ibid.*)." In the parcel depicted in Fig.4-10, other important ceremonies such as receiving the annual taxes, reviewing the troops, and appointing and dismissing officials were carried out, too.



Fig.4-10 The residence of *Ras* Welde Sillasé at Ant'alo in 1805, from Annesley (1809).



Fig.4-11 Internal appearance of a "great hall" of *Ras* Welde Sillasé's Residence at Ant'alo in 1805, from Annesley (1809).

During Salt's second trip in 1809, he drew a sketch of a residence of Nathaniel Pearce, who served *Ras* Welde Sillasé since the time of first Salt's visit, situated in Ch'eleqot (Fig.4-12). According to Salt, the house "possessed better accommodations than are generally to be met with in an Abyssinian habitation" and he felt himself "perfectly at home" (Salt 1814). Though there were no more detailed descriptions, the circular shaped house with thatched roof looked to be two storied. Perhaps, the building was a similar one with "Tigré chief's house" introduced in chapter II and III (Fig.2-12, 13, 14). Next to this main house, one building, perhaps a storage, kitchen or servant house, is depicted (Fig.4-12). Though this thatched building is smaller than the main house, it possesses stairs, meaning that an upper floor exists.



Fig.4-12 A residence of Nathaniel Pearce at Ch'eleqot in 1809, from Salt (1814).

Through the field survey in Ch'eleqot, one building, appearing old and in a ruinous situation, was found (Fig.4-13). Local tradition claims that this building was a residence of *Ras* Welde Sillasé, though there are no more concrete evidences to confirm. Nevertheless, the building's position situated on the hill is one of the characteristics of higher status people's parcel and the masonry wall is more elegant than another building situated in Ch'eleqot that was built at a similar time (Fig.4-4, 14). The plan of the one-storied circular building has a rectangular core, the same as another example situated in Ch'eleqot (Fig.4-4, 15). The rectangular shaped core is switched to a cylindrical shape in the upper part by a curved timber beam at each corner, as a *meqdes* of a circular built churches or a timber dome (Fig.2-117, 4-16). The remaining long timber on the site was perhaps originally applied for a beam bridging over the core. On the beam, a king post was perhaps placed, and thatched roof should have once covered the structure. The restoration design of the section is shown in Fig.4-17. Though this is a one-storied building, the building can be sorted as a type of "Tigré chief's house." However, from the location and appearance, it is a different building with the one drawn by Salt (Fig.4-12).



Fig.4-13 A circular and ruinous building for *Ras* Welde Sillasé in Ch'eleqot, photo by Mano, Y.



Fig.4-14 Residence of *Ras* Welde Sillasé in Ch'eleqot on the hill, photo by author.



Fig.4-16 A rectangular shaped core switched to a cylindrical shape in the upper part, Residence of *Ras* Welde Sillasé in Ch'eleqot, *photo by author*.

From these analyses of the elite buildings located in Ant'alo and Ch'eleqot, it becomes clear that all the buildings had thatched roofs, and there were no examples of *hīdmo* structure. Though *hīdmo* has been recognized as a more prestigious building than *seqela* in the farmer's society, a different building hierarchy was thought to exist for elite buildings at that time. Perhaps, in the case of elite buildings, building structures such as *hīdmo* or *seqela* were not so strongly related to building hierarchy. The same hierarchy can be applied in case of a church building, because Sillasé Church built by order of *Ras* Welde Sillasé in Ch'eleqot was, as discussed in chapter II, a thatched roofed building, too (Fig.2-82, 83, 84, 85). In the period of *Ras* Welde Sillasé, perhaps there were not so many *hīdmo* buildings.

(b) An elite building located in Feleg Da'iro (Ar'aya Castle)

In Feleg Da'iro, the site located 5 km northeast of the existing Mekelle's city center, one castle-like building remains (Fig.4-18). The castle-like building was situated in the flatland nearby a river stream, of which the other side Mika'el Church exists in the hilltop (Fig.2-118). There is no wall enclosing the parcel presently.

Due to the lack of information in the bibliography, who this building was erected by has not been identified even now. Concerning this question, there are two local claims: Abriha Ar'aya (1873-1917) and his father Ar'aya Sillasé (1880-1889). Abriha was a person who ordered to build Abriha Castle located in Mekelle, which will be discussed in the next section. Though he became a governor of eastern and southern Tigray by the appointment of central government in 1902, his period was only less than 10 years (Tsegay 2003-2). Because of the frequent battles due to political instability in his period, it is estimated to be difficult to build two castles in his period. Furthermore, a strong reason to build his castle in Feleg Da'iro cannot be found, because his capital was Mekelle, which had been already developed in the predate period of Emperor Yohannis IV. On the other hand, Ar'aya Sillasé,

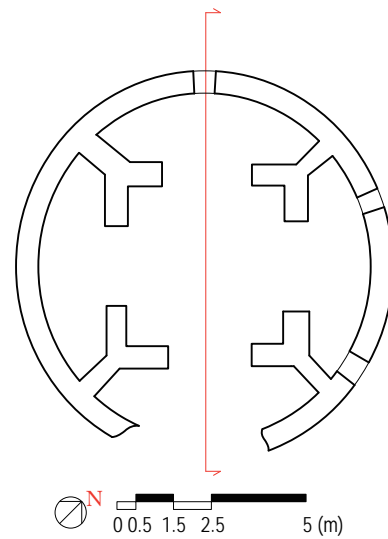


Fig.4-15 Plan, Residence of *Ras* Welde Sillasé in Ch'eleqot, *made by author*.

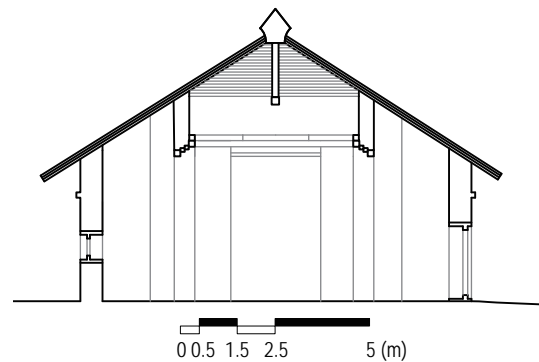


Fig.4-17 Restoration design, Residence of *Ras* Welde Sillasé in Ch'eleqot, *made by author*.

a son of *Ras* Welde Sillasé's nephew and a maternal uncle of Emperor Yohannis IV, was a person who became a governor of Īnderta in his later years (Zewde 2003). Therefore, it seems more likely that the remaining building in Feleg Da'iro was built by order of Ar'aya Sillasé in the eve of, or in, Emperor Yohannis IV period.



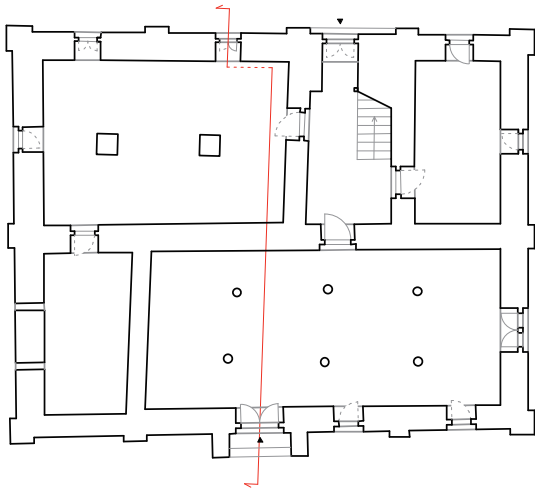
Fig.4-18 External appearance from the east, Ar'aya Castle in Feleg Da'iro, photo by author.

The author measured the building. The detailed analysis based on the results of observation is described below. The rectangular shaped building has two entrances on the east and west (Fig.4-19). The east one with an entrance porch is the main entrance, which leads into *aderash*, namely a large hall (Fig.4-18, 20). A room of *aderash* has a higher ceiling than other rooms on the west side (Fig.4-21). There are six undecorated timber pillars in the *aderash*, and the way to make a ceiling is similar with *hīdmo* house (Fig.4-19, 20). In the upper side of the room, there is one window that enables one to overlook the room from the upper floor (Fig.4-20). A row of horns installed in the wall is decoration that contributes to enhancing the room's prestige (Fig.4-20). From a door on the west, one can enter a stair room, which has the other building entrance (Fig.4-19). On the south of a stair room, there is a room with two undecorated stone pillars (Fig.4-19, 22). The ceiling of this room is also similar with *hīdmo* house (Fig.4-22). Local tradition claims that it was originally a ladies' room, though it is doubtful. In the ground floor, there are two rooms more on the north of a stair room and on the east of the ladies' room (Fig.4-19). The ceiling of these rooms simply consists of row of timbers (Fig.4-23). Such rooms with a less prestigious ceiling should have had a less important function. The former room was, according to local claims, a guards' room, though this is doubtful. The latter room, which is not well lit due to narrow openings, was perhaps storage originally.

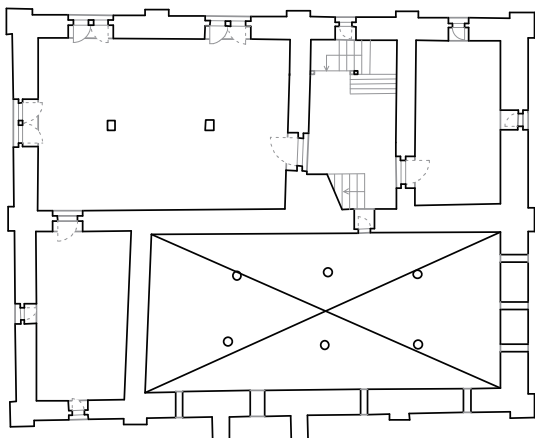
In the first floor, there are three rooms other than a stair room (Fig.4-19). A room on the south of a stair room is the most prestigious in this building from the perspective of decorative characteristics. Two timber pillars, which are placed on the stone pillars in the ground floor, and timber beams on the pillars are well decorated (Fig.4-24). The ceiling method is again same with *hīdmo*, too. From this room, one can enjoy good views toward a river (Fig.4-25). From these characteristics, it is valid to think that this room was used by Ar'aya, a master of this building. Local tradition agrees with this idea. The other two rooms have only an undecorated ceiling consisting of a row of timbers. A room next to the Ar'aya's room was perhaps storage for Ar'aya's property. According to the local tradition, a room on the north of a stair room was a room for the wife of Ar'aya, though there are no more evidences to confirm this. By going upstairs from a stair room in the first floor, one can get access to a terrace, which is situated on a room of *aderash* (Fig.4-19). On the south of the terrace, there is one room. Perhaps, this was a guards' room originally, because a broad view is available from the room.

Concerning the exterior, the walls are of stone masonry. Though the whole joint of walls was covered by cement around a decade ago and it becomes difficult to identify each stone presently, it is possible to know the original state from a photo taken before the maintenance (Fig.4-26). From the photo, it becomes clear that the walls are rubble masonry, similar to other examples of church and

Ground Floor



First Floor



Roof Floor

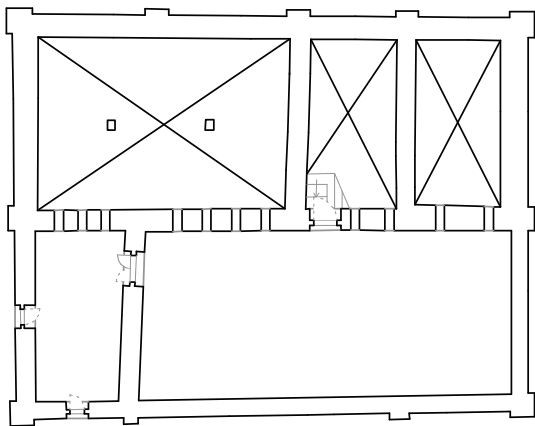


Fig.4-19 Plan of Ar'aya Castle in Feleg Da'iro, made by author.



Fig.4-20 Internal appearance of *aderash*, Ar'aya Castle, photo by author.

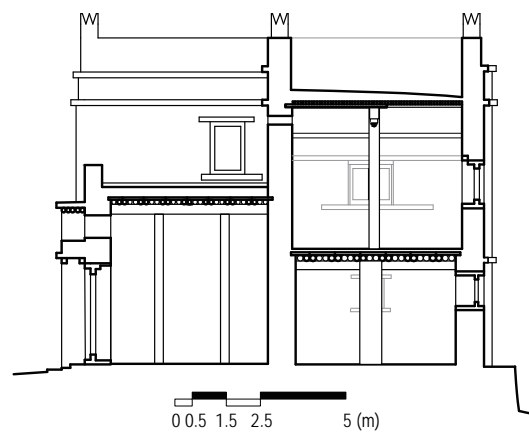


Fig.4-21 Section of Ar'aya Castle in Feleg Da'iro, made by author.



Fig.4-22 A room with two undecorated stone pillars, Ar'aya Castle, photo by author.



Fig.4-23 Ceiling simply consisting of row of timbers, Ar'aya Castle, photo by author.



Fig.4-24 A room with two decorated timber pillars, Ar'aya Castle, *photo by author.*



Fig.4-25 Good view toward a river from the upper floor of Ar'aya Castle, *photo by author.*



Fig.4-26 External appearance from the east before maintenance, Ar'aya Castle, *photo by author.*



Fig.4-27 External appearance from the northwest, Ar'aya Castle, *photo by author.*

house buildings. In addition, other features such as timber openings and existence of stringcourse are in common with church and *hīdmo* house buildings. In the walls, pilasters, which become thinner as they ascend, are installed the same way as other contemporary church buildings (Fig.4-26). Concerning waterproofing, there are wooden rainwater gutters, which are similar with ones found in other church buildings including neighbor Mika'el church (Fig.4-27). The other common feature between Ar'aya Castle and Mika'el Church is the existence of parapets of a coronal shape (Fig.4-26, 27). However, they seemed to be added in the later period because the stone pieces of walls above the terrace appear newer than the ones from lower parts of the walls (Fig.4-26).

Through the analysis, it becomes clear that building techniques applied in this building are the same as local church and *hīdmo* house buildings. It is valid to think that this building was erected by local builders. This is a unique building that local building techniques are fully applied, however, it has fallen into a ruinous state due to the lack of maintenance. The value as heritage and the way of use and maintenance should be considered now.

2-2. Emperor Yohannis IV Period

2-2-1. Elite Buildings Erected by Order of Emperor Yohannis IV

Through a series of field survey, three sites with building(s) erected by order of Emperor Yohannis IV were identified. In this section, the analysis of these buildings, which were newly measured by the author, is carried out.

(a) Former Residence of Emperor Yohannis IV (at Agula')

In Agula', the site located in 25 km northeast of Mekelle beyond the mountain, there are two buildings erected by order of Emperor Yohannis IV (Fig.4-28, 29). The buildings were situated in the flatland nearby a river stream, and there is no wall enclosing the parcel presently. Though whether it was built before or after he became emperor is not clear. In the early 1870s, the area became the home place of him (Smidt *et al.* 2010). The targeted buildings were set up for his residence at that time. However, he stayed there for a short time only, probably because the area did not have enough supply (*Ibid.*). When he moved to his new capital Mekelle, the buildings were donated to a church. However, the buildings fell into a ruinous state afterward (Fig.4-30). Though the buildings were restored recently, they have not been functionally used yet and their condition has worsened presently. The author took measurements after restoration finished.

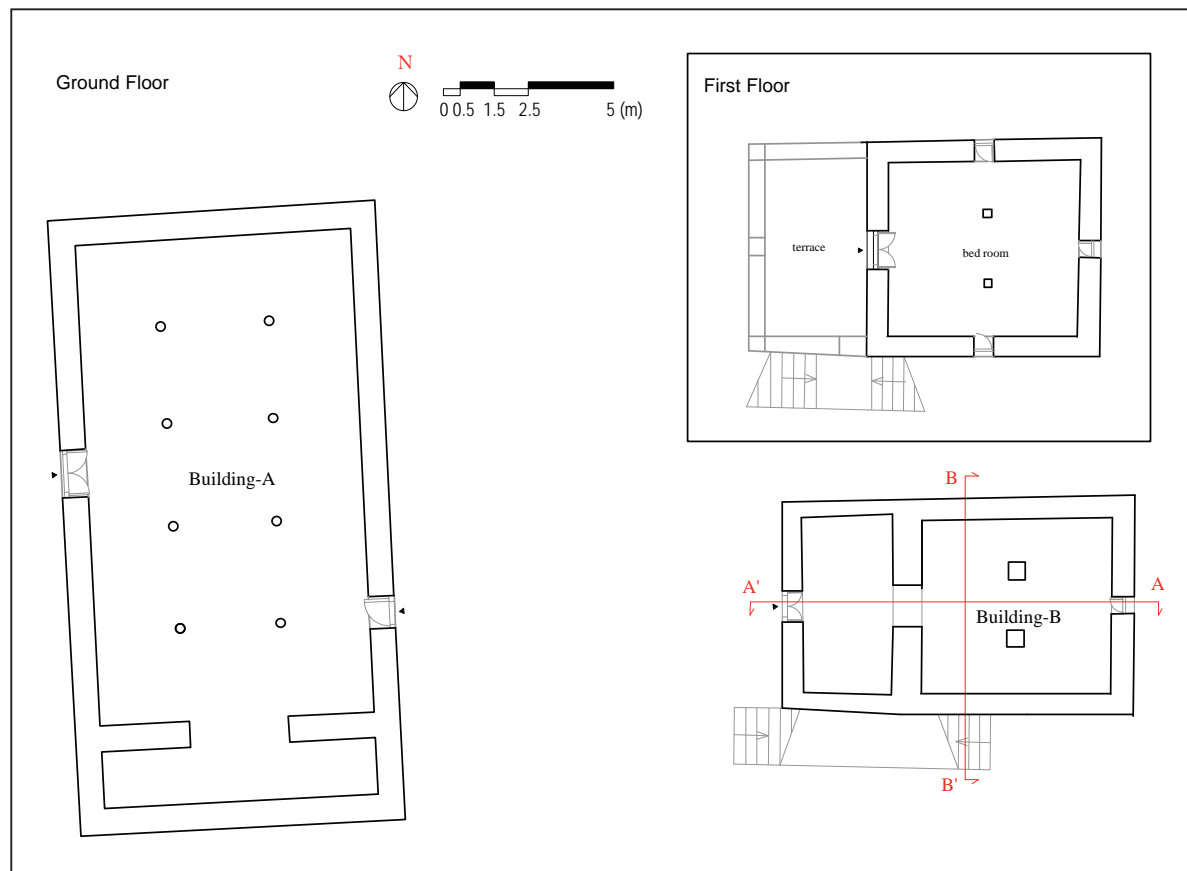


Fig.4-28 Plan of Former Residence of Emperor Yohannis IV in Agula', made by author.

Fig.4-29
View of the buildings of
Former Residence of
Emperor Yohannis IV
in Agula',
photo by author.



Building-A is a building used for *aderash*. Two entrances are situated on the east and west, and the east door faces Building-B. The five-spanned main space has eight timber pillars with bracket capitals (Fig.4-28, 31, 32). The inside is not well lit because windows are small in number and the size is not large. In addition to the main space, there is a one-spanned space with *goro-‘arat*, divided by *filatsa* (Fig.4-28). Perhaps, this space was used for storage. On the pillars, beams are placed on the short side of the building (Fig.4-31). Remarkably, each timber beam bridges the short side of the building, namely approximately 8m, by only one piece of timber (Fig.4-30). A series of upper beams are placed on the beam, and the voids between upper beams are filled with timber planks (Fig.4-32). That is to say, the basic ceiling method is in common with local church and *hidmo* house buildings.

Building-B is a two-storied building used for a residence. The main floor is the first floor. Stairs exist on the south, and it leads into a terrace, of which the front side faces west, namely the side of Building-A (Fig.4-28, 33). From the terrace, one can get access inside. The ceiling method is in common with local church and *hidmo* house buildings (Fig.4-34). Two ornamented timber pillars are remarkable because each side of the bracket is finely carved as some examples of church buildings (Fig.2-83, 93, Fig.4-35). There is no access from the first floor and ground floor. There is one entrance on the west in the ground floor (Fig.4-28, 33). The height of the ground floor is low, approximately 2m, and there are no ornamental features, though rough timber layers are found in the walls (Fig.4-36, 37). There are two rooms in the ground floor and the east room has two undecorated stone pillars. Though the beams and ceilings are of woods as local buildings, the materials are thicker and configuration of the ceiling is more rigid (Fig.4-37, 38).

Though the targeted buildings have been plastered and each piece of stone cannot be seen presently, a photo taken before the restoration gives a clear image of it (Fig.4-29, 39). From the photo of Fig.4-39, it becomes clear that the walls are rubble masonry with a series of stringcourse at the top, same as other local buildings. The openings are timber framed and the arch of the timber panel is often ornamented by bead-planks, especially in building-B, as local built churches discussed in chapter II (Fig.4-40). In building-A, other shaped panels such as a triangular one can be found



Fig.4-30 Internal appearance before restoration, Former Residence of Emperor Yohannis IV (Building-A) , photo by Smidt, W.



Fig.4-31 Internal appearance after restoration, Former Residence of Emperor Yohannis IV (Building-A), photo by Mano, Y.



Fig.4-32 Timber ornamental pillars and ceiling, Former Residence of Emperor Yohannis IV (Building-A), photo by Mano, Y.



Fig.4-33 External appearance from the southwest, Former Residence of Emperor Yohannis IV (Building-B), photo by Mano, Y.



Fig.4-34 Internal appearance of upper floor, Former Residence of Emperor Yohannis IV (Building-B), photo by author.



Fig.4-35 Timber ornamental pillars and ceiling, Former Residence of Emperor Yohannis IV (Building-B), photo by author.

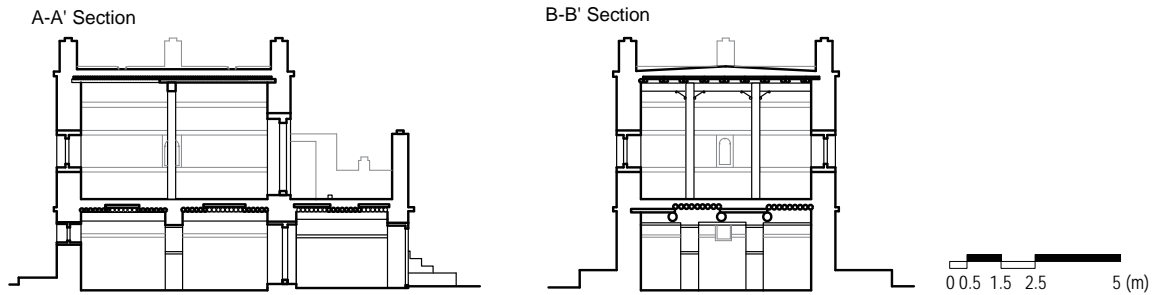


Fig.4-36 Section, Former Residence of Emperor Yohannis IV (Building-B), *made by author.*



Fig.4-37 Internal appearance of ground floor, Former Residence of Emperor Yohannis IV (Building-B), *photo by Mano, Y.*



Fig.4-38 More rigid timber structure of the ground floor, Former Residence of Emperor Yohannis IV (Building-B), *photo by author.*



Fig.4-39 External appearance before restoration, Former Residence of Emperor Yohannis IV (Building-B), *photo by Smidt, W.*



Fig.4-40 A timber arched opening with bead-planks, *photo by author.*



Fig.4-41 A triangular shaped opening found in Building-A, *photo by author.*

(Fig.4-41). Though rainwater gutters were lost before the restoration, they were installed through the restoration activity. Considering local techniques of built churches in the targeted area, this restoration design is valid (Fig.4-33, 39). The present appearance is characterized by the existence of a series of parapets, however, these were not found in the appearance before the restoration (Fig.4-29, 39). Whether it was installed from before or not is not clear. Nevertheless, this shape of parapet might have been possible to realize without newly introduced tools.

In this way, these two buildings erected by Emperor Yohannis IV were made by application of local techniques. It is valid to think that these buildings were realized by local builders. Local tradition claims that the building construction was led by *dejjazmach* Gibre Sillasé, who served the emperor.

(b) Mika'el Ara Church (near 'Adigudem)

The church is situated at the summit of a little hill 7 km east of 'Adigudem and faces the lowland towards the east. The church was consecrated by Emperor Yohannis IV, in gratitude for the help given by the inhabitants of the region during a battle (Tigray Tourism Office: year unknown). In the church, there are mural paintings, of which programs include the ones after Emperor Yohannis IV. Therefore, it is valid to think that the building should have been built in the 1870s or 1880s. The analysis based on the results of measurement and observation by the author is carried out in the below.

The rectangular church building is spatially divided into three: *meqdes*, *qiddist*, and *qiné mahlét* (Fig.4-42). However, there is no ambulatory enclosing *meqdes*. Though this spatial component is in common with the predate basilica church, a part of *qiddist* is too small to be considered a type of church. A church with a similar plan is found in *Abba Päntäléwon* located in Aksum (Fig.4-43). The author estimates that the planner of Mika'el Ara might have modeled after this church.

There are two entrances in *qiddist* on the north and south sides, respectively for male and female members. There are two undecorated stone pillars in the *qiddist* (Fig.4-42, 44). The shape of the stone pillars is basically rectangular, but two corners of each at the sides of the west are absent. The ceiling method is in common with *hīdmo* house, and the timber arrangement is by a pattern of *mes-qel quirtsi* (Fig.4-44). However, each beam is beveled and the resulting shape of the ceiling is slightly gabled (Fig.4-45: a). Nevertheless, the basic techniques applied are same with *hīdmo* house. From a door on the east of *qiddist*, one can get access to *meqdes*. The multi-framed door made from timber is ornamented by five bead-planks, as other built churches discussed in chapter II (Fig.4-45: a). From the fact that the multi-framed timbers make a few steps as other local churches, the floor level of *meqdes* should be higher than *qiddist* (Fig.4-45: b). Though the author was not allowed to enter *meqdes*, there are perhaps two pillars in *meqdes* (Fig.4-42). On the west of *qiddist*, a space of *qiné mahlét* that is separated by two arched timber screens exists. The floor level of *qiné mahlét* is lower than *qiddist*.

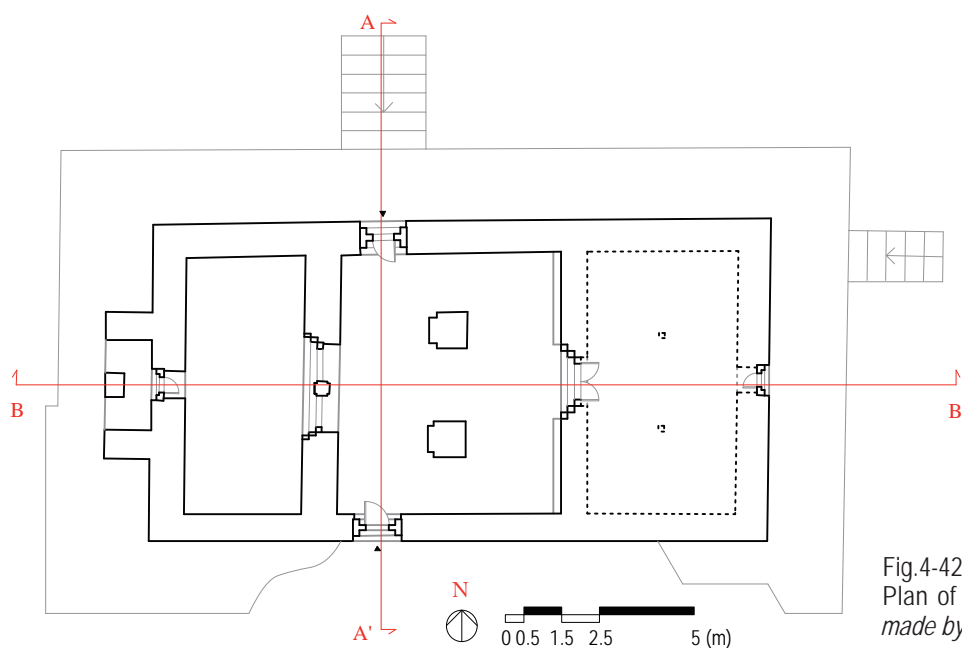


Fig.4-42
Plan of Mika'el Ara Church,
made by author.

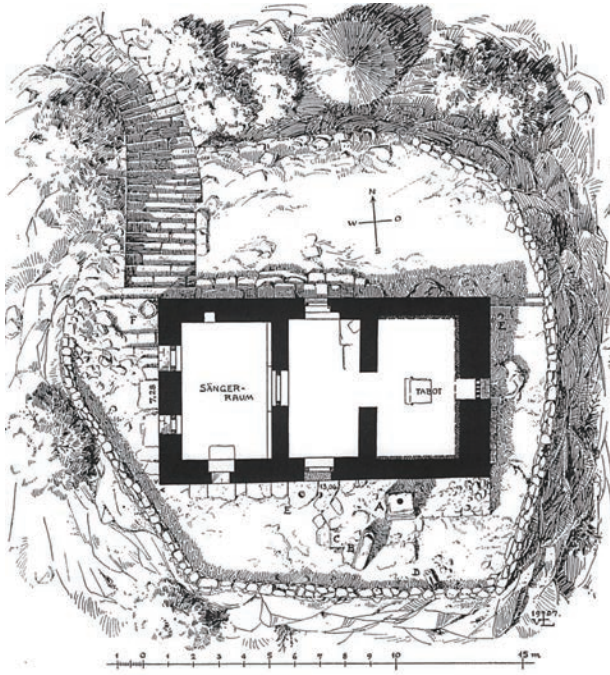


Fig.4-43 Plan of Abba Pântäléwon Church in Aksum, from Littmann et al. (1913).



Fig.4-44 Internal appearance of Mika'el Ara Church, photo by author.

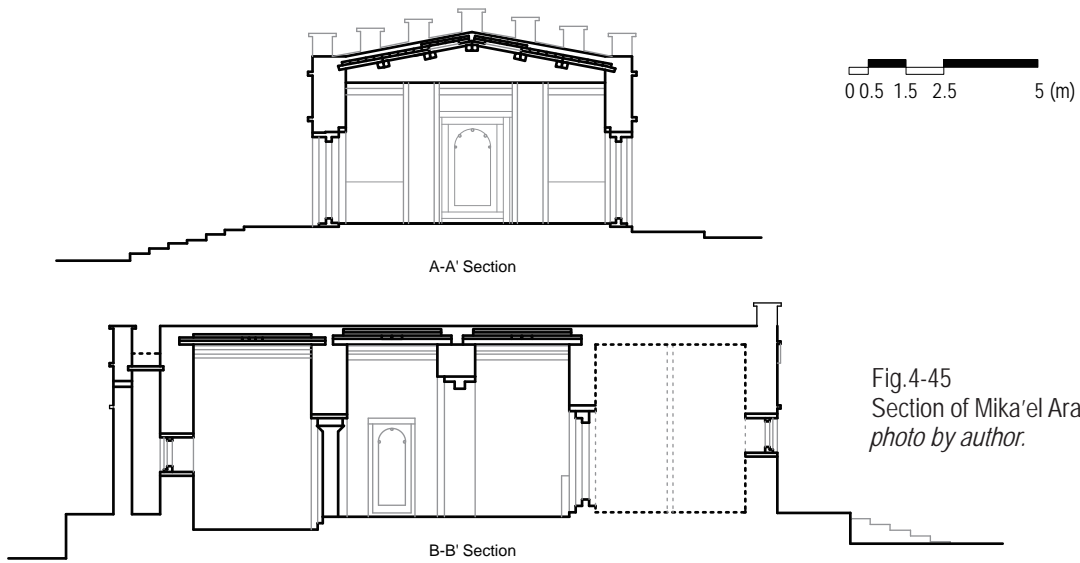


Fig.4-45 Section of Mika'el Ara Church, photo by author.



Fig.4-46 External appearance from the northwest, Mika'el Ara Church, photo by author.

The characteristics of exterior walls, such as the rubble masonry wall, the existence of stringcourse with two layers, and timber openings, are in common with local church and house buildings (Fig.4-46). The existence of windows only in the east side of *meqdes* and the west side of *qiné mahlét* affects the whole darkness inside the building. In the surrounding of the westernmost wall of *qiné mahlét*, there is a porch that emphasizes the symbolic appearance, though there is no entrance in this side. A series of parapets installed on the stringcourse emphasizes the symbolic appearance, too. Though the awareness to add symbolic characteristics is an important feature of this building, the applied techniques are in common with the locally inherited ones. It is valid to think that the building was realized by local builders.

(c) Emperor Yohannis IV Palace (at Mekelle)

As discussed in chapter I, the palace of Emperor Yohannis IV was built in Mekelle. The parcel was situated on the small hilltop of the flatland, and a water stream existed nearby the site. The existence of high walls enclosing the parcel and guardhouses at the gate was helpful to strengthen the defenses (Fig.1-23). In the parcel, there were mainly two buildings, which still remain today (Fig.4-47). The main building is especially symbolic and majestic, which was realized by participation of foreign engineers. Giacomo Naretti, an Italian craftsman from around Aosta in northern Italy, was ordered to build a new palace by the emperor in 1880 or 1881, and the construction was completed in 1884 (Sacchi 2012). Naretti was a retainer of the emperor and he led the construction project of Kidane Mihret Church, too, though it was already replaced with a new church³. The construction of the palace was assisted by Wilhelm Schimper. The majesty of this building is confirmed by the following comments of Harrison Smith who visited this place in 1886: “I was glad of the opportunity of seeing the palace, of which I had heard a great deal ... The new palace caught my eye at once, as it stands conspicuously out among the rude Abyssinian huts of the village (Smith 1890)” (Fig.1-24). Furthermore, Wylde (1901) commented that the building was “far and away the best building I have seen in the country.” The existence of this building caused the emperor to spend much of his time at Mekelle, and, even when obliged to travel elsewhere, frequently returned there (Pankhurst 1985). From 1990s, the building has been used as a National Museum where valuable historical collections such as Emperor’s throne designed and signed by Naretti, the royal beds, ceremonial dresses, and rifles are exhibited (Sacchi 2012). Though the museum was temporarily closed due to the building maintenance including plastering and replacement of timber materials, it was re-opened recently. The other building, which was used as a residence of royal family in the past, is now open to the visitors of the museum, too.

The analysis of the palace buildings begins from the appearance of the main building. In common with the actual external appearance, the building was plastered originally and the limestone walls were obscured in the beginning (Fig.4-47, 48). Thanks to the plaster falling before the most recent maintenance, the masonry walls can be analyzed (Fig.4-49). Accordingly, the basic construction of walls is by rubble masonry. Each piece of stone is small sized, as other local church and house buildings. The following description of Smith (1890) is remarkable to consider the construction of

³ It was a rectangular church with three naves (Sacchi 2012).



Fig.4-47 View of the buildings of Emperor Yohannis IV Palace in Mekelle (after restoration), *photo by author.*



Fig.4-48 View of the buildings of Emperor Yohannis IV Palace in Mekelle (date unknown but approximately at the end of the 19th century or the beginning of the 20th century), *from Pankhurst et al. (1996).*



Fig.4-49 External appearance, main building of Emperor Yohannis IV Palace (date unknown but later than Fig.4-48), *collection of IPHC.*

masonry walls: the masonry walls were “built by natives, under the unceasing superintendence of Naretti.” That is to say, the local builders took an important role to pile up stones, though Naretti’s contribution cannot be ignored. It should be mentioned that the realization of this symbolic and majestic building is made possibly by locally inherited building techniques. Indeed, other local building elements such as a series of stringcourse, timber layers in the walls, and timber openings, are applied in this building, too.

However, a new building technique is found in the main façade of the northwest, too: there are three arches, which are made from stone, in the entrance of porch (Fig.4-50). To realize an arched opening, predetermined sized stone pieces are required. That is, each stone piece must be scraped into desirable shape to realize stone arches. Therefore, it is deduced that the tool *malakino* was used to take stones from quarry and *martello* to shape each stone. The introduction of these tools may have been done at the hands of Naretti. The local name of each tool indeed reminds the Italian pronunciation, as discussed in chapter III. As well as the stone arches, the same tools and techniques should be applied to make a balustrade between two towers of the main façade.

Not only stone techniques, but also wooden techniques must have improved due to the influence



Fig.4-50
Arches installed in the entrance, main building of Emperor Yohannis IV Palace (shortly before the restoration), collection of IPHC.



Fig.4-51 Timber ornamental door with ogee arch applied in the main building of Emperor Yohannis IV Palace, collection of IPHC.



Fig.4-52 View of the buildings of Emperor Yohannis IV Palace (before restoration), collection of IPHC.

of Naretti: according to Smith (1890), “the woodwork was entirely the production of his (Naretti’s) own hands.” Though the timber openings are applied in the local buildings, the ones in this building are more decorative. The exquisite carving and openwork with elaborated and accurate details are remarkable (Fig.4-51). Nevertheless, it is interesting that the application of ogee arch is in common with Sillasé Church at Ch’eleqot (Fig.2-84, 4-51). Furthermore, the careful use of timbers should be noted. For example, each timber is well polished and has a smooth texture. Furthermore, the timber layers are placed at the same level as upper and lower parts of windows. Therefore, the height of openings is fixed and the resulting appearance of a series of timber layers is unified with timber openings (Fig.4-49). In addition, in the upper floor of eastern, southeastern and southern walls, verandahs made from timbers, which cannot be found in other local churches and house buildings, are found (Fig.4-52). These careful or new uses of timber materials, perhaps led by Naretti, contributed to enhancing the majesty of the building.

Not only material usage, but also existence of two towers on the northwest side and a series of

parapets enhances the symbolic and majestic image of the building (Fig.4-48). When the decision was made to add two towers, the planner was obviously aware of the symmetry of the building. However, the original drawing of this building has not been found, that is, the planning should have been carried out without any drawings. The existence of a series of parapets is a characteristic that was found in contemporary elite buildings. Interestingly, a similar parapet's design with this palace building is found in the castle in Barolo in northern Italy (Fig.4-52, 53). Though whether Naretti visited the site before or not is not clear and the material of Barolo's castle is different with Mekelle's one, it is no wonder that he imitated the parapet's design found in his home country.



Fig.4-53 Parapets found in the castle located in northern Italy, of which design is similar with the main building of Emperor Yohannis IV Palace, *photo by author.*

Through a porch on the northwest, one can get access to the inside of the building through a double door made from wood (Fig.4-54). This main entrance leads into *aderash*, of which the space gives a majestic image by largeness of the space with ten masonry pillars and high ceiling. The space covers an area of approximately 20 meters by 10 meters. On the southwestern and northeastern sides, openings were placed at regular intervals. There are four openings on each side, and one of them in the southwestern is a door. As mentioned above, the decorative feature of timber openings is remarkable. Over each opening, there is a small window at the upper part of the wall (Fig.4-55). Each masonry pillar with a height of approximately 7 m has elaborately ornamented timber brackets on both sides (Fig.4-56). On the brackets, a beam is placed between the masonry pillars in the longitudinal direction of the building, and upper beams bridging between the pillars or a pillar and a wall are placed on the beams in the orthogonal direction (Fig.4-57). While each upper beam placed in the center of the building is flat, each upper beam on both sides are slightly sloped. The voids between the upper beams are filled with timber planks. This ceiling construction is similar to local one, though the timber's quality is different and both sides of the upper beams are not sloped in the local buildings. That is to say, Naretti basically applied locally inherited building techniques to realize this majestic space. Considering that the great majority of participants of this construction project are local builders, this strategy is very clever. At the end of *aderash*, a well-built timber throne made by Naretti, which is now moved to the upper floor, was situated, in reference to Wylde (1901), the visitor of Mekelle when Mengesha Yohannis ruled Tigray after the death of Yohannis IV (Fig.4-57, 58). On the southeast of *aderash*, there is one room with two masonry pillars (Fig.4-54). According to Wylde (1901), this was a room where the ruler "receives in private and transects the whole of his business of state." There are two doors open to the outside in this room, and there was "a well kept lawn with many shady trees, and some good orange, lime, peach and myrtle bushes" in the outside (*Ibid.*).

From the south part of *aderash*, one can ascend to an upper floor by well-built timber stairs (Fig.4-54, 57). Interestingly, according to Smith (1890), the emperor had "yet to overcome a dislike

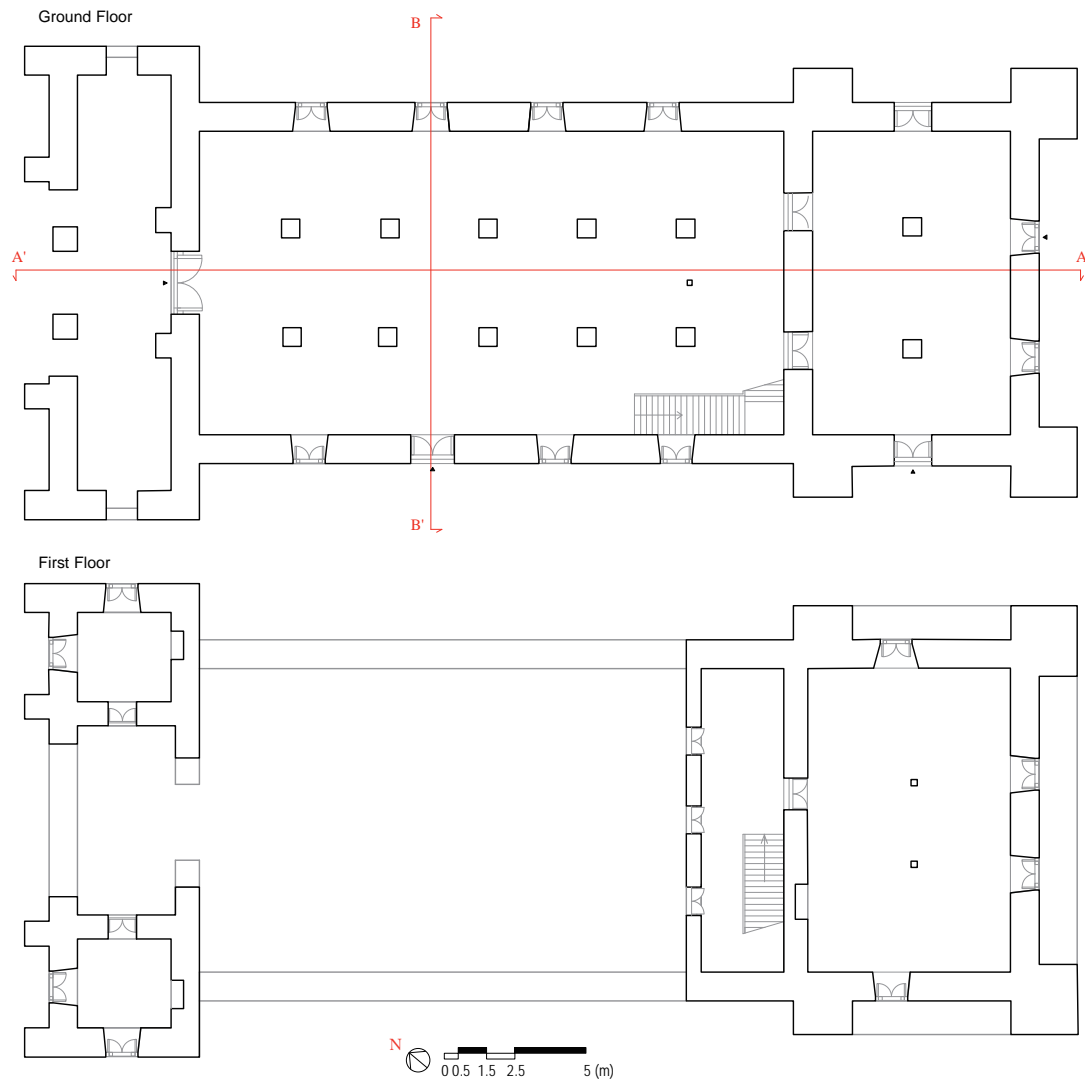


Fig.4-54 Plan, main building of Emperor Yohannis IV Palace in Mekelle, *made by author.*

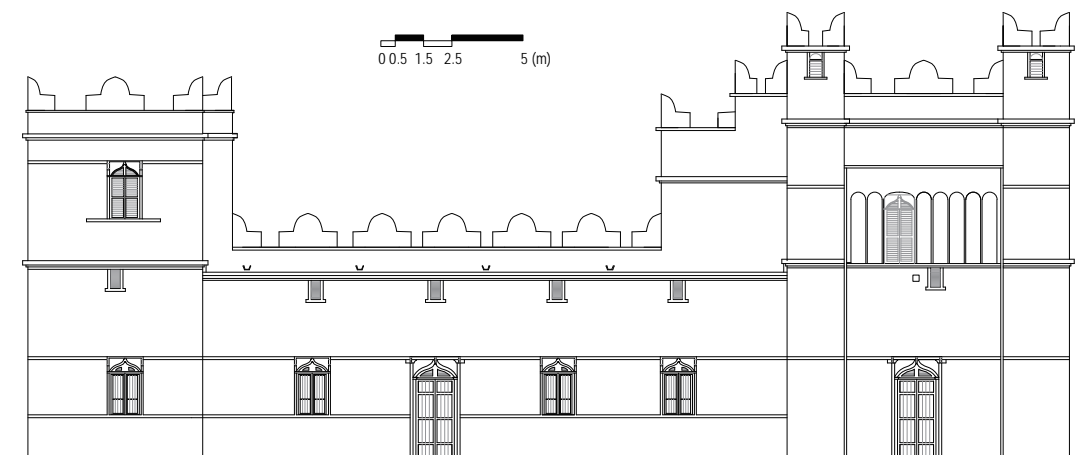


Fig.4-55 Southwest elevation, main building of Emperor Yohannis IV Palace in Mekelle, *made by author.*

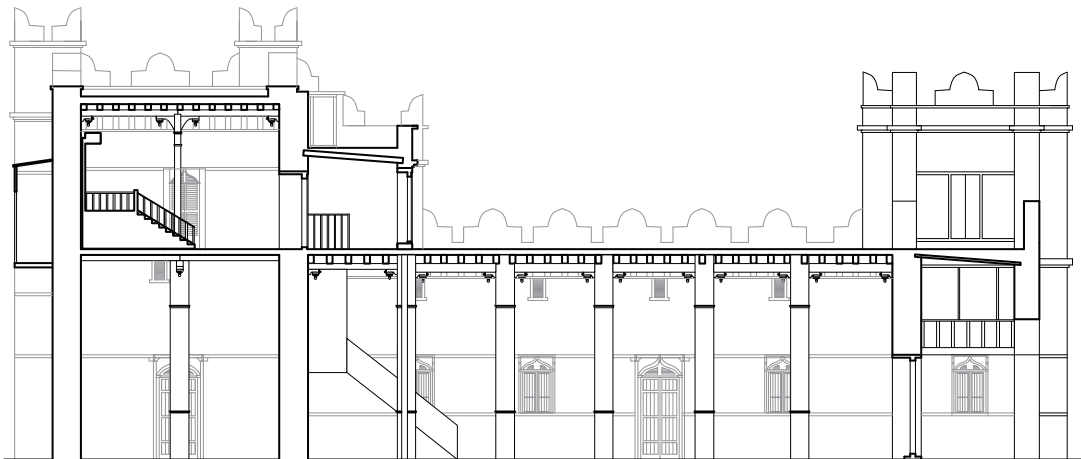


Fig.4-56 Masonry pillars with timber ornament and timber ceiling, main building of Emperor Yohannis IV Palace, *photo by Smidt, W.*

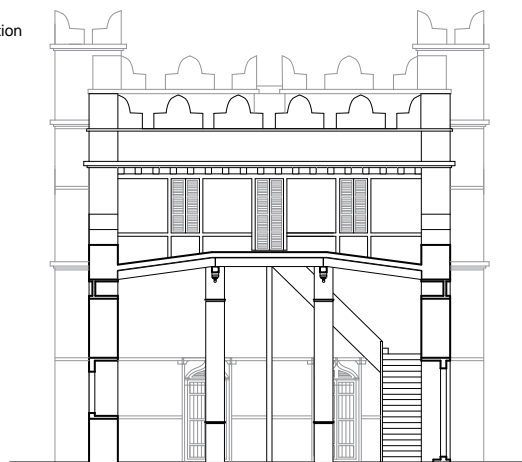


Fig.4-58 A timber ornamental pillar and ceiling in the upper floor, main building of Emperor Yohannis IV Palace, *collection of IPHC.*

A-A' Section



B-B' Section



0 0.5 1.5 2.5 5 (m)

Fig.4-57 Section of main building of Emperor Yohannis IV Palace in Mekelle, *made by author.*

of going upstairs” at the time of his visit. In the upper floor, there is one room with two decorated timber pillars, other than a stair room (Fig.4-54, 57, 58). However, Smith (1890) mentioned that in the upper floor there were “a number of apartments of various sizes, all well lighted and airy.” A well-lit and airy indoor condition is confirmed by the existence of openings on three sides, each of which has an above-mentioned timber verandah. On the other hand, a comment of “a number of apartments of various sizes” is not clear when it is compared with the existing indoor situation. There might have been several partitions in the room. The ceiling construction is basically in common with the one found in *aderash* of this building (Fig.4-57, 58). The roof of *aderash*, namely the northwest of a stair room, forms an outside promenade. According to Smith (1890), “an extensive panorama view of the surrounding country is obtained” from the promenade. Concerning water drainage, there were four rainwater gutters in each wall along the southwest and northeast, and two in the northwest (Fig.4-49, 55). According to a local guide the two towers in the north and west parts of the building beyond the promenade were a room for documents and a room for ark devoting to St. Gabriel, respectively.

The other building in the same parcel is situated on the south of the main building (Fig.4-59). The techniques applied in this two-storied building is similar to local ones: rubble masonry, string-course, timber openings with arch shaped frame with a few bead-planks, timber layers in the walls, and ceiling construction are all similar to *hidmo* house. Though the roofs of the upper floor are presently covered with corrugated metal sheet, these must be a later addition. Nevertheless, the openings at the center of northeast and southwest walls of the upper floor are remarkably arched, albeit the southwest one buried presently (Fig.4-59). The same technique to make an arch of the main building is applied here, too. On the top of the wall, a series of parapets is installed in this building as well. However, the design is simpler than the main building (Fig.4-59). According to Sacchi (2012), the walls were plastered in a similar fashion as the main building.

On the northeast side, there is a staircase presently (Fig.4-60). However, this must be a later addition, because the masonry construction where same sized stone pieces are used is different with the main body of this building. It is valid to think that the building was approached from the southwest side originally (Fig.4-60). The main floor of this building is the upper floor. According to Wylde (1901), the “two separated houses joined by a covered bridge” was resided by Mengesha Yohannis and his wife. From this description, it becomes clear that the present unroofed central space was covered at that time (Fig.4-59). From the measurement result, it becomes clear that the northwest room is larger than the southeast room, and the number of decorated timber pillars is also more in the northwest one (Fig.4-60). Perhaps, the room allocated to Mengesha Yohannis was the northwest one. The ground floor, which has no direct access to the first floor, was “occupied by palace attendants, kitchen and store-houses” when Wylde visited. The three rooms of the ground floor were separated from each other, and there were masonry pillars under the timber pillars of the upper floor (Fig.4-60, 61).



Fig.4-59 External appearance, residential building of Emperor Yohannis IV Palace in Mekelle, *collection of IPHC.*



Fig.4-61 Masonry pillars (ground floor) and timber pillars (upper floor) during restoration, residential building of Emperor Yohannis IV Palace, *photo by author.*

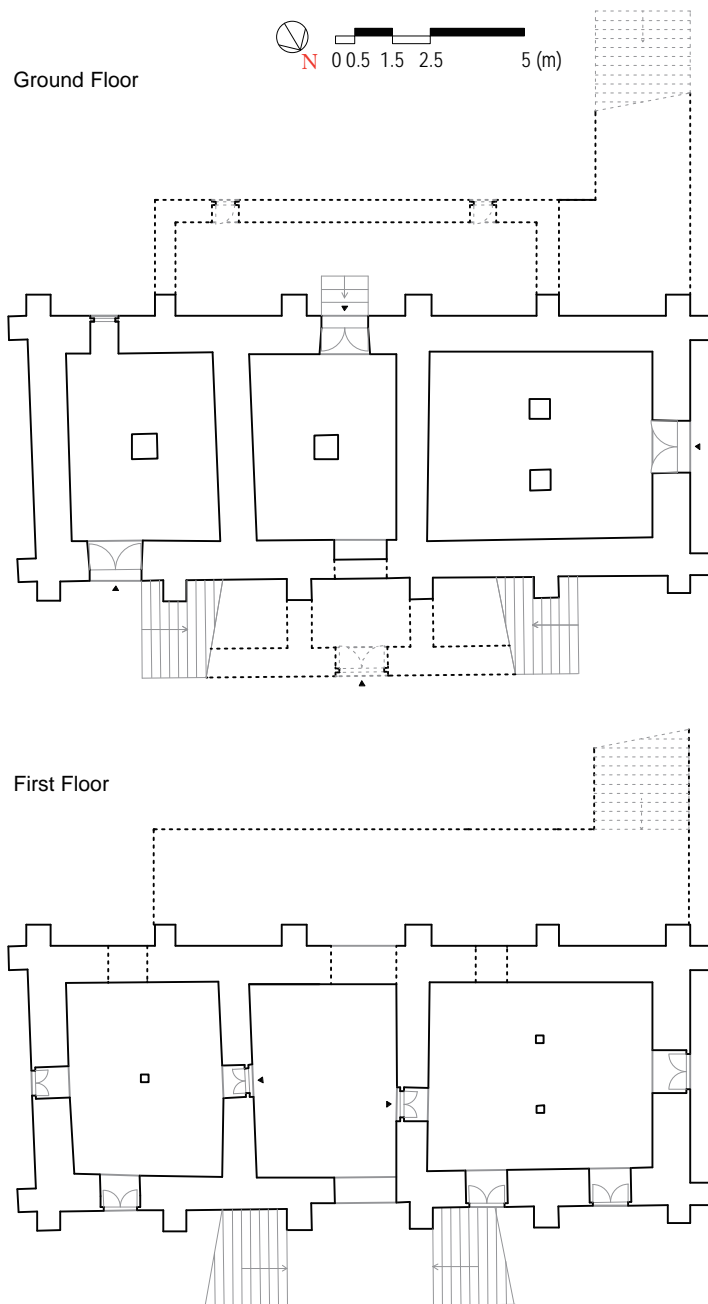


Fig.4-60 Plan of residential building of Emperor Yohannis IV Palace in Mekelle, *made by author.*

2-2-2. A Presage of Changes

As mentioned in chapter I, aristocrats and warriors under Emperor Yohannis IV and his family members migrated to the neighborhood of the palace. Remarkably, the flat-roofed rectangular buildings, namely *hīdmo*, are depicted in the photo taken in the 1890s (Fig.1-28). That is, it is estimated that the builders, who participated the palace construction and honed his techniques through the project, continuously participated in the construction of other houses in Mekelle. In addition, considering that rural settlements had consisted of both *hīdmo* and *seqela* in the past, it is hypothesized that the builder who participated in the palace construction went back to his home settlement and continuously built *hīdmo* houses during his life. In either case, Mekelle, which had been described as “rude Abyssinian huts of the village” in reference to Smith (1890), became a palace city with flat roofed *hīdmo* buildings by taking the opportunity afforded by the palace construction.

On the other hand, an increase in population and buildings means the increase of material consumption, especially stone and wooden materials. Though the development was stagnated by the first Italo-Ethiopian war of 1895/96 and later regional fighting, remarkable re-growth happened in 1920s and 1930s, as discussed above. While the palace construction prepared the technical basis of the “urban” development, the increase of building construction projects could have accelerated the scarcity of materials.

Concerning the scarcity of wooden materials, in addition to deforestation, a series of wars accelerated the seriousness of the situation. As mentioned in chapter I, Wylde (1901) recorded that the trees were cut down for defensive purposes and for firewood during the first Italo-Ethiopian war of 1894/95. Concerning stone materials, introduction of *martello* and *malakino*, which is hypothesized to be introduced by Naretti, was essential. In chapter III, the author discussed that the change of method to obtain stones from picking or digging up stones to splitting a rock is perhaps due to the change of the demand of stones and resulting shortage of suitable sized stone pieces. Introduction of building tools such as *malakino* and *martello* allowed the alternative way to collect local stone materials.

2-3. Innovation in Emperor Yohannis IV Period

The “city” and building of Mekelle and its surrounds did not change radically until Yohannis IV period. The continuity and changes are reviewed here (Fig.4-62).

Until the 19th century, rural settlements are likely to consist of both *seqela* and *hīdmo* houses. *Hīdmo* was a less frequent choice back then than the 20th century. The elite buildings related to *Ras* Welde Sillasé in Ant’alo and Ch’eleqot, which were erected at the beginning of the 19th century, were *seqela* ones, too. The site of Mekelle before the initial “urban” development initiated by Yohannis IV was no exception.

Nevertheless, the buildings erected under Ar’aya and Yohannis IV were basically constructed using *hīdmo*-oriented techniques, though each plan was totally different with a typical *hīdmo* discussed in chapter III. In the functionally important rooms such as a ruler’s room, decorative timber pillars with bracket, which are in common with the ones found in local churches, were often installed. The distinctive feature found in these buildings erected by order of Ar’aya and Yohannis IV is the

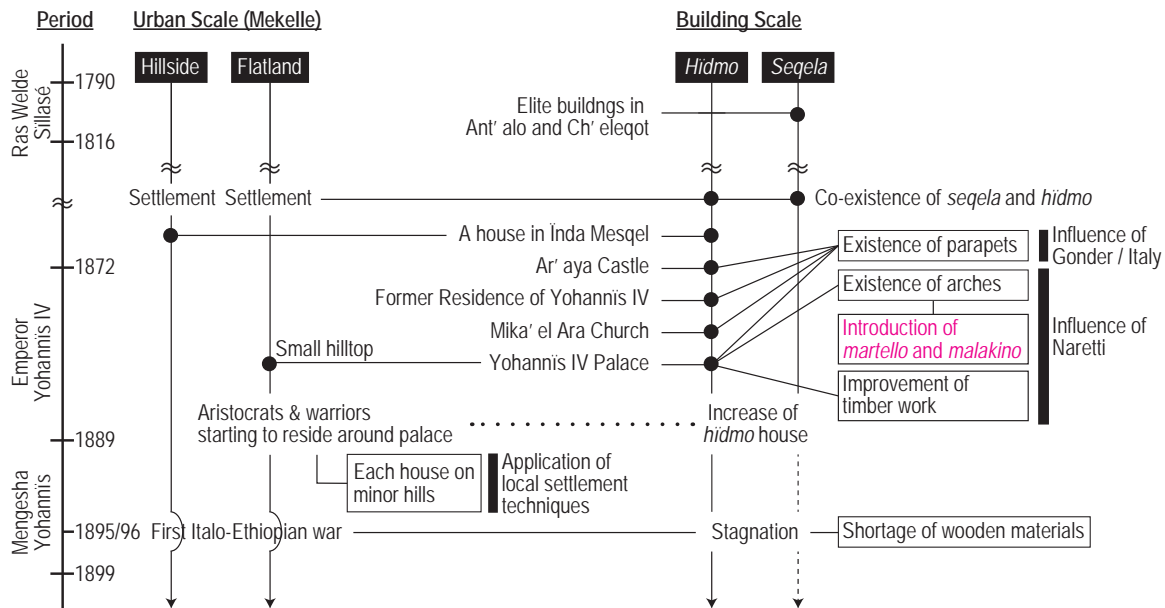


Fig.4-62 The continuity and changes happening until Emperor Yohannis IV period, *made by author.*

existence of a series of parapets on the wall, though whether the parapets of all the buildings were installed from the beginnings or not is vague. Concerning this, it should be reminded that a series of parapets is found in palace buildings in Gonder and Maryam Tsïyon Church in Aksum built in the 17th century. The parapet might have been a sign of power for the rulers.

It is a remarkable result that the symbolic and majestic buildings of Emperor Yohannis IV Palace at Mekelle were realized by using locally inherited building techniques. Perhaps, an Italian craftsman Giacomo Naretti, the chief participant of this construction, studied locally inherited techniques and made a strategy where local builders could fully utilize their expertise. Nevertheless, the influences of Naretti can be found in stone arches and elaborate timber works. The stone arches were realized by the introduction of tools of *martello* and *malakino*. This prepared the technical basis of the later period. On the other hand, the techniques of timber works do not appear to be inherited in the later period, perhaps due to a shortage of wooden materials. Taking advantage of palace construction, *hidmo*-oriented buildings increased in Mekelle and its surrounds. In central Mekelle, the aristocrats and warriors under Yohannis IV started to reside near the palace. Interestingly, each house was likely to be situated on minor hills, following local settlement techniques. The concrete process of “urban” formation and building changes in the later period is discussed in the next section.

3. Post-Yohannis IV Period and Italian Occupation Period (1889-1941)

3-1. “Urban” Development and Newly Appeared Types of Buildings in Mekelle

3-1-1. General “Urban” Development Process of the Period

After the death of Emperor Yohannis IV, the political power was handed down to Menelik II whose origin was Shewa, and the Ethiopian capital was also moved to Addis Ababa, the present capital city of Ethiopia. Mekelle lost its importance as a center of the Ethiopian state. Furthermore, Mekelle declined due to the first Italo-Ethiopian war of 1895/96 and famine. Nevertheless, the history of Mekelle in the 20th century clarifies that Mekelle retained its political importance as the regional administration center of Tigray. In this section, the recovery until Italian occupation period, namely until 1941, is discussed.

The first recovery happened at the beginning of 20th century. As discussed in chapter I, Abriha Ar'aya, a governor of a large part of eastern and southern Tigray appointed by the central government in 1902, made his castle in the south part of Mekelle (Fig.1-22). Because Yohannis IV Palace was resided by his descendant, Abriha decided to build his castle in an area that was away from built-up areas at that time. Not only the castle, but also other facilities such as a new Saturday Market, new churches, butcheries and liquor houses were established in his period (Yohannes *et al.* 2007; Tsegay 2003-2). Furthermore, he attracted various occupational groups including Muslim traders, women service venders, and army retainers (Yohannes *et al.* 2007). However, he was drawn apart from Mekelle in 1909 and lost control over Mekelle.

The next remarkable development was found in 1920s and early 1930s. This development was led by Siyyum Mengesha, a grandson of Yohannis IV who became a governor of Tigray in 1914, and Gugsu Ar'aya, another grandson of Yohannis IV and a governor of Tigray from 1918. The latter made Mekelle his capital after he was appointed as a governor of eastern Tigray in 1928 (Rubinkowska 2010; Erlich 2005). The population became approximately 5,000 in 1935, namely on the eve of Italian occupation (Yohannes *et al.* 2007).

According to Lucchi (2009), the “city” was spatially expanded to the west and north. Nevertheless, as shown in the aerial photo taken in the Italian occupation period of Fig.1-27, the density was much higher in the west part of Mekelle. On the eve of the Italian occupation from 1936, the densely populated built-up area was formed along the water stream on the south, southwest and west side of the Yohannis IV Palace, as mentioned in chapter I (Fig.1-22). Through the development, noble families under the rulers started to reside in the built-up area, and industrial and commercial development also progressed (Okazaki 2009, 2014-2; Lucchi 2009). The establishment of a new church was carried out, too. As mentioned in chapter I, Maryam Church located on a small hilltop in the flatland emerged in this period (Fig.1-26). Furthermore, the existence of foreigners was an important feature in this period, too. According to the author's interview research, the building construction of Maryam Church was carried out by a Greek person, albeit the name of him unknown. In addition, one building the author measured, which was erected in Gugsu's period and located between the Maryam Church and Yohannis IV Palace, was used for a liquor factory managed by a Greek person named Krantis (Map 3).

Not only the central Mekelle, but also outskirts of the “city” was intervened by the rulers. As mentioned in chapter I, Īnda Mesqel, which is located in the strategic hillside of Mekelle, had a close relationship with Siyyum, as well as forming his parcel in the settlement. Furthermore, an aristocrat under Gugsu was allocated the land in this settlement, too. Another important settlement for Siyyum was Aynalem, located on the southeastern mountain of Mekelle (Map 2). The settlement had been resided by the salt trader at the end of 19th century, namely after the first Italo-Ethiopian war. Aynalem became an important center of salt trade, and Siyyum’s second house, which will be discussed in this chapter later, was built (Teshale *et al.* 2012).

After the second Italo-Ethiopian war of 1935/36, Mekelle was occupied by Italy. The Italian colony of eastern Africa, namely Africa Orientale Italiana, had six governorates: Governatorato di Addis Abeba, Eritrea, Amara, Galla e Sidama, Harar, and Somalia Italiana (Fig.4-63). The capitals of each governorate, such as Addis Abeba, Asmara, Gonder, Gimma, Harar and Mogadiscio, were more active in urban and economic development and became the administrative and commercial hub of the region. Through the development, many colonial buildings were constructed, too. However, Mekelle should have been a less important site at that time, because it was incorporated into the governorate of Eritrea, of which the capital was Asmara. Furthermore, from the map of road networks made in 1938, it becomes clear that Mekelle was not on the main road between Asmara and Addis Abeba (Fig.4-63). Though the main road reached Mekelle via Kwiha, situated 8 km east of Mekelle, it was the end of the road network and could not pass toward the north. In Kwiha, several Italian buildings have still remained, though the detailed survey has not been carried out yet (Fig.4-64).

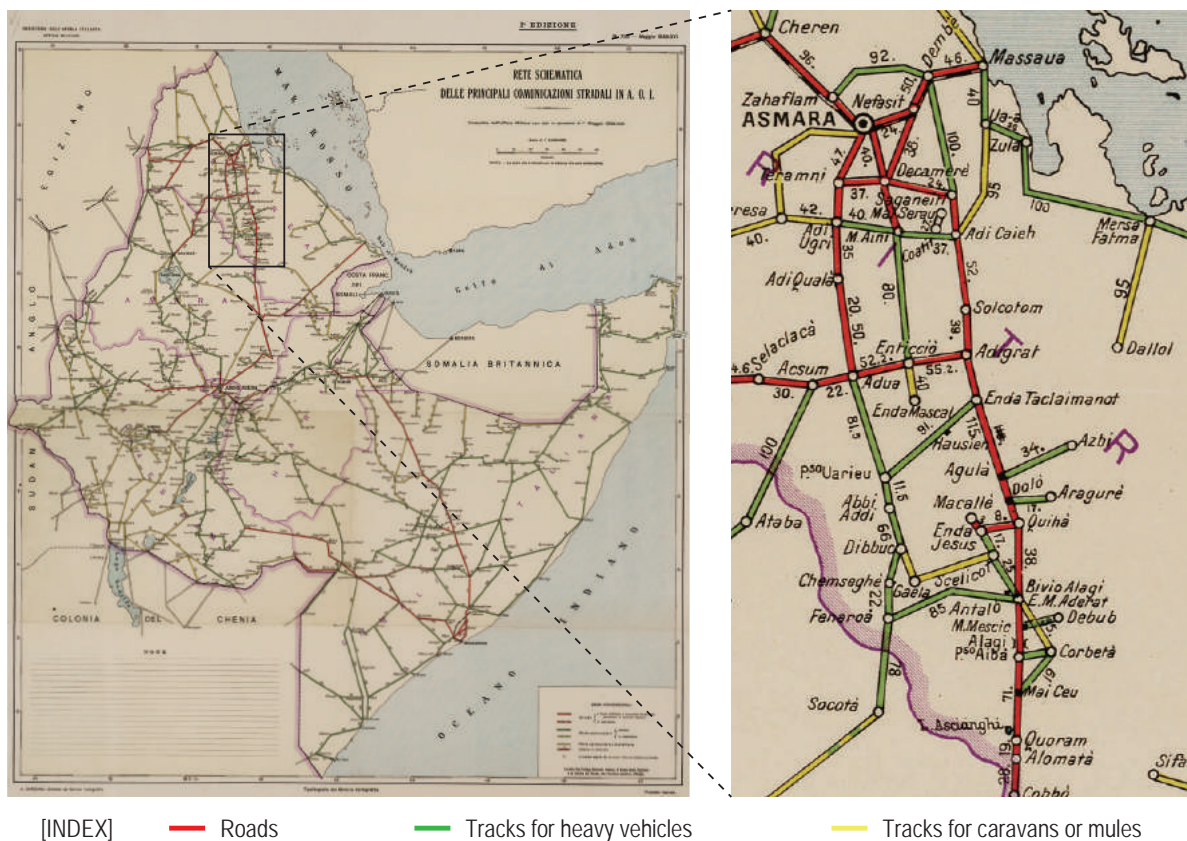


Fig.4-63 Schematic road network in 1938, collection of Istituto Geografico Militare.

In spite of the inconvenient location, the development of Mekelle continued through the Italian occupation period, though not to the extent of each governorate's capital. The Italians built a military airport and a fort, and reorganized roads, telephone lines, offices and residences. Furthermore, they installed modern water pipelines, electricity, clinics, postal services, cinema hall and resort / sports centers (Yohannes *et al.* 2007). The author's field survey clarified several buildings erected in Italian occupation period, which will be discussed later. A series of development activities attracted foreign entrepreneurs such as Greeks, Arabs and Armenians (*Ibid.*). In 1938, the population of Mekelle became approximately 12,000. The urban area was segregated between Italians and local people, as other colonial cities. The concept of segregation is clearly found in the Mekelle's first master plan, called *Piano Regolatore*, which is illustrated in a magazine "*Gli Annali dell'Africa Italiana*" of 1939 (Fig.4-65). According to the analysis of Okazaki (2014-2), a new town was created beyond the "urban" area formed in the predate time. The remaining predate "urban" area was untouched in the master plan, and it was allocated for local people. More detailed analysis will be carried out later.



Fig.4-64 An example of a building in Kwiha erected in Italian occupation period, *photo by author.*

3-1-2. "Urban" Transformation Process and Newly Appeared House Types

As discussed in chapter I, each parcel in the "city" of Mekelle was loosely dispersed on the minor hills of the flatland area. As the "city" grew with population increase, the "urban" area became more dense. Specifically, the densification progressed on the south, southwest and west sides of the palace during the period of Italian occupation (Fig.1-27). Concerning how loosely dispersed "urban" arrangement was transformed into dense "urban" areas, Okazaki (2011) gave the idea of a hypothesized process of "land adjustment" as follows (Fig.4-66):

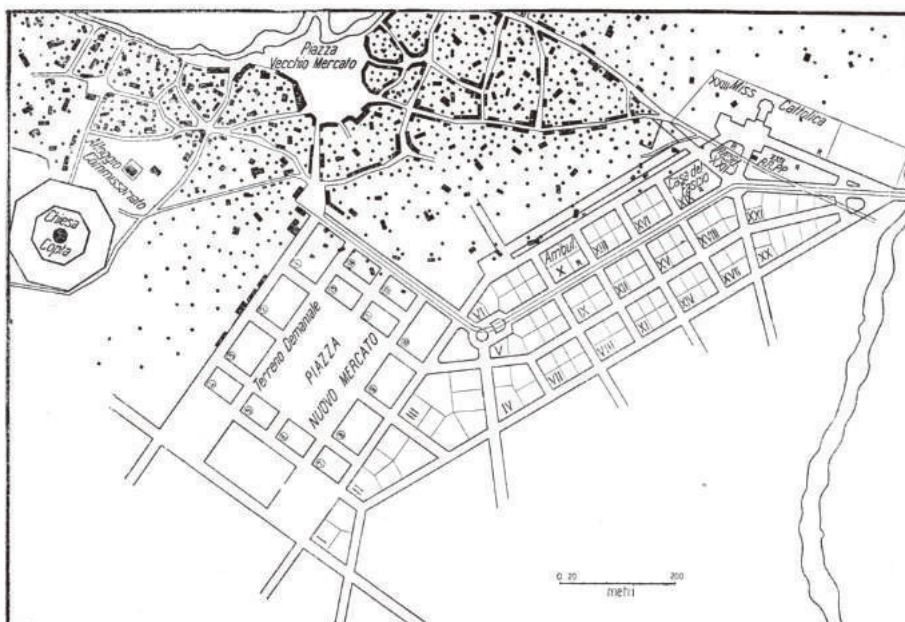


Fig.4-65
Mekelle's first master plan in 1930s, from *Gli Annali dell'Africa Italiana* (1939).

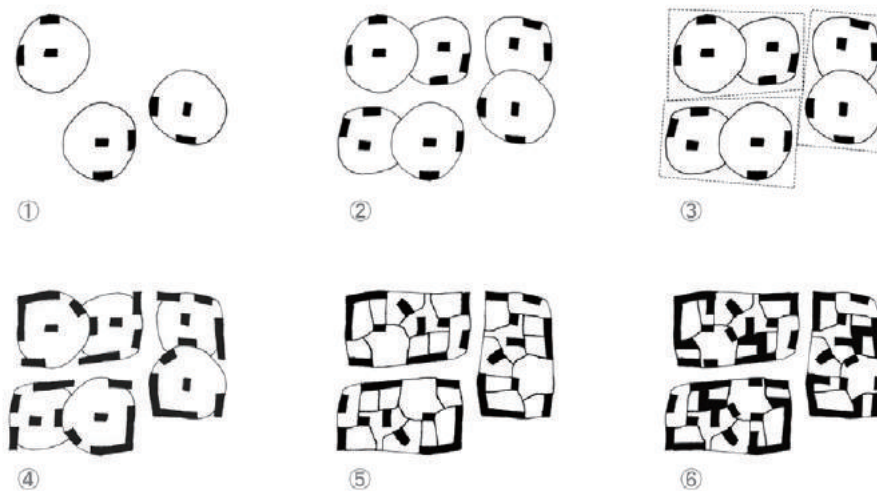


Fig.4-66 "Land adjustment" process, from Okazaki (2011).

1. Group of large-scale residential compounds were generated surrounding the Palace. Each compound stood independently but with close connection to each other. Paths and alleys penetrate the gaps of these compounds.
2. Augmentation of houses and storage buildings occurred within each compound, corresponding to the population increase. Additional buildings filled the spaces between compounds.
3. After the designation of the master plan, land adjustment was introduced within the Old Town, which should be adjusted to a block-and-street type of urban complex.
4. Row house type buildings were constructed along the designated streets.
5. At the same time, the ramification of large compounds happened due to the inheritance of the land parcel among the family members, or by concessions.
6. The process of ramification and the construction of row houses and walls resulted definitively in the block-and-street type of the built-up area.

In parallel to the process of "land adjustment," several types of houses emerged. Okazaki (2011, 2014-2) analyzed the housing typology in central Mekelle based on building measurement, interview with house owners, and documentation carried out by Carlson *et al.* (1971). She successfully identified the following house types situated in the central Mekelle (Okazaki 2014-2):

- (a) A *hīdmo* house with a typical plan, which was discussed in chapter III (Fig.2-10, 11, 3-7). As a derivative, a version with a lumped roof is identified, too (Fig.4-67). The roof of the lower part of the lumped roof *hīdmo* is generally used as a terrace, which is accessed either by an exterior stair or through the upper floor.
- (b) A two-story house. There are two sub-types of this house type. One is a house that can be categorized as another derivative version of *hīdmo* (Fig.4-68). Though the example is two-storied, common spatial components with a typical plan of *hīdmo* house are found. The other sub-type is a much more luxurious type. This sub-type is characterized by the symmetric façade, shape of the window frame, and balcony (Fig.4-69). The balcony is placed in the middle of the upper floor. The roof is usually a hipped one and made from corrugated metal sheet. The example Okazaki

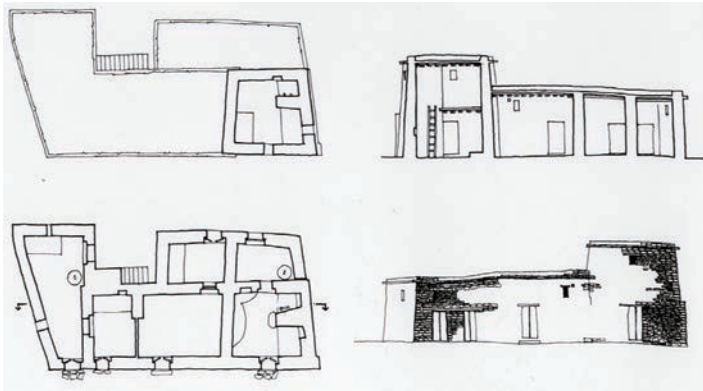


Fig.4-67
An example of a lumped roofed *hidmo*,
from Carlson et al. (1971).

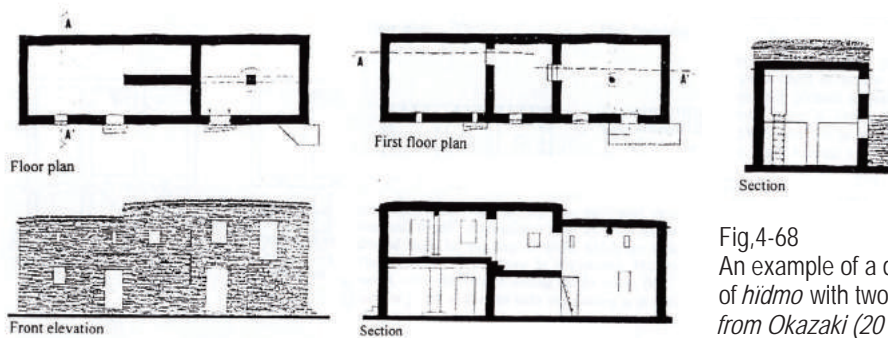


Fig.4-68
An example of a derivative version
of *hidmo* with two-story,
from Okazaki (2014-2).



Fig.4-69 An example of a two-story house with symmetric facade. The marking of "X" found in lower right means that demolition is planned, *photo by author*.

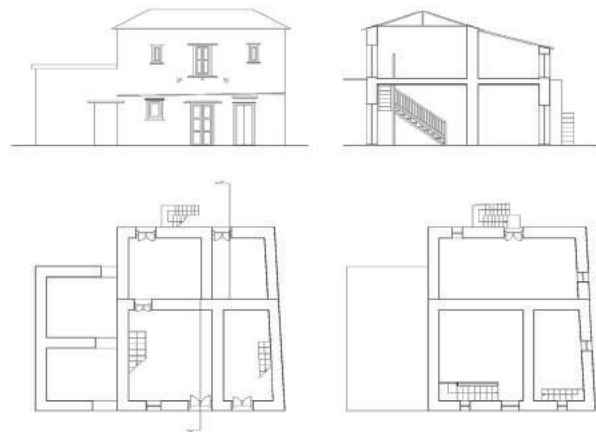


Fig.4-70 Elevation, section and plan of a house of Fig.4-69,
from Okazaki (2014-2).

showed, which was built in 1935 and extended in 1940, is remarkable because the house is located along a street and one can enter inside the house from the street directly through two doors (Fig.4-70). Another example, which was built in the late 1920s or early 1930s and was measured by the author through the field survey, does not have entrances facing to the street. On the other hand, the symmetrical plan is remarkable (Fig.4-71). That is, the plan of two-story house with symmetric façade has several variations.

- (c) A single detached house. This is a smaller sized masonry house, which often has a corrugated metal sheet roof (Fig.4-72, 73). Apart from the symmetric two-story house of the higher rank lords, the middle class warriors constructed their own residences in the form of smaller scale masonry buildings. The example Okazaki showed, which was built in 1898, has two entrances along the street.

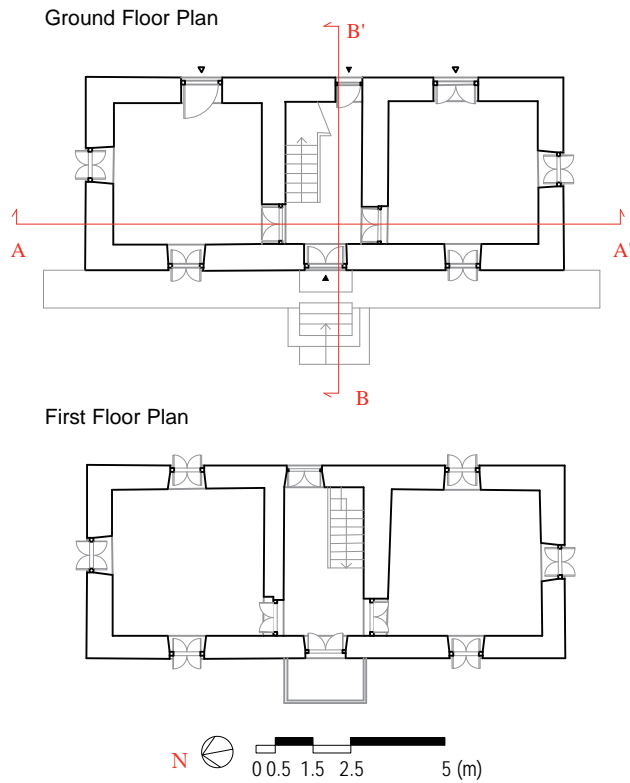


Fig.4-71 An example of a two-story house with symmetric facade and symmetric plan, *made by author.*



Fig.4-72 An example of a detached house, *from Carlson et al. (1971).*

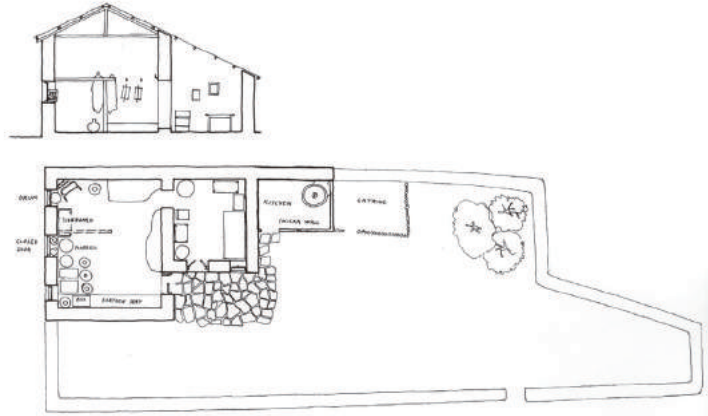


Fig.4-73
Plan and section of a house of Fig.4-72,
from Carlson et al. (1971).

- (d) A row house. A collective housing in the form of row house, which was located alongside a street, was applied to solve the needs of effective land use caused by the densification of “urban” area (Fig.4-74). There are both one-story and two-story row house types. The examples of one-story row house type that Okazaki showed consist of one-room units with a door and a window.
- (e) A circular shaped conical roofed house, which was discussed in chapter III, locally called *seqela* or *guji*. Though this type does not exist in the central Mekelle presently, it was still in use until at least around 1960.
- (f) A villa type. This type was promoted in Ethiopia by the Italian occupation government in the late 1930s. The house based on a square plan is characterized by the existence of a terrace (Fig.4-75). Generally speaking, adoption of this house type was for the luxurious life in a parcel filled with



Fig.4-74 An example of a row house, *photo by author*.

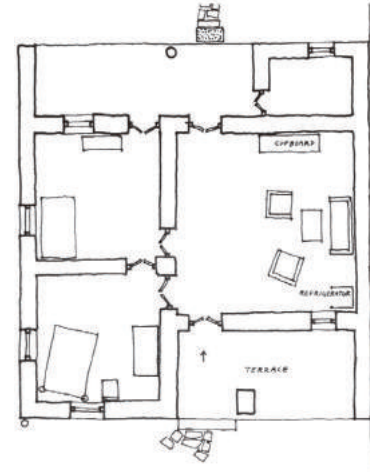


Fig.4-75 Plan of an example of a villa type house, *from Carlson et al. (1971)*.

greenery. It is remarkable that this type could be found even inside the area of local people. The house documented in Carlson *et al.* (1971) consisted of masonry walls with corrugated metal sheet roof, albeit the site is still unknown.

(g) A *ch'iqqqa* house. A simple rectangular house consists of a wattle-and-daub wall and corrugated metal sheet roof (Fig.4-76). Because mud is locally called "*ch'iqqqa*" and house is locally called "*bét*," this type of house is locally called "*ch'iqqqa-bét*." The rank of the house is lower than a masonry house.



Fig.4-76 An example of *ch'iqqqa-bét*, *from Okazaki (2014-2)*.

In addition to the above, there are houses that integrate several house types. An example shown in Okazaki (2014-1), which was erected in 1934, is a combination of a lumped roofed *hidmo* house and a row house (Fig.4-74, 77, 78). The south corner became a tower-like two-story building with shape of an "L."

From the above-mentioned analysis by Okazaki (2011, 2014-2), the following should be pointed out as newly appeared "urban" characteristics of the period. The most remarkable is that a concept of "street" came to take shape through the process of "land adjustment." The process was progressed by the newly appeared house types that often had a house entrance(s) along a street. The oldest example of such houses was erected in 1898, namely two years after the first Italo-Ethiopian war (Fig.4-72, 73). As the concept of "street" was enhanced in central Mekelle, a house type of a row house came to exist. At least in 1934, such a house type had emerged (Fig.4-74, 77). That is to say, the concept of "street" had appeared before the Italian occupation period, namely before the introduction of modern urban planning method. Indeed, in the first master plan made by Italians, the lines like "street" and marks like a row house were drawn in the local people's area (Fig.4-65).

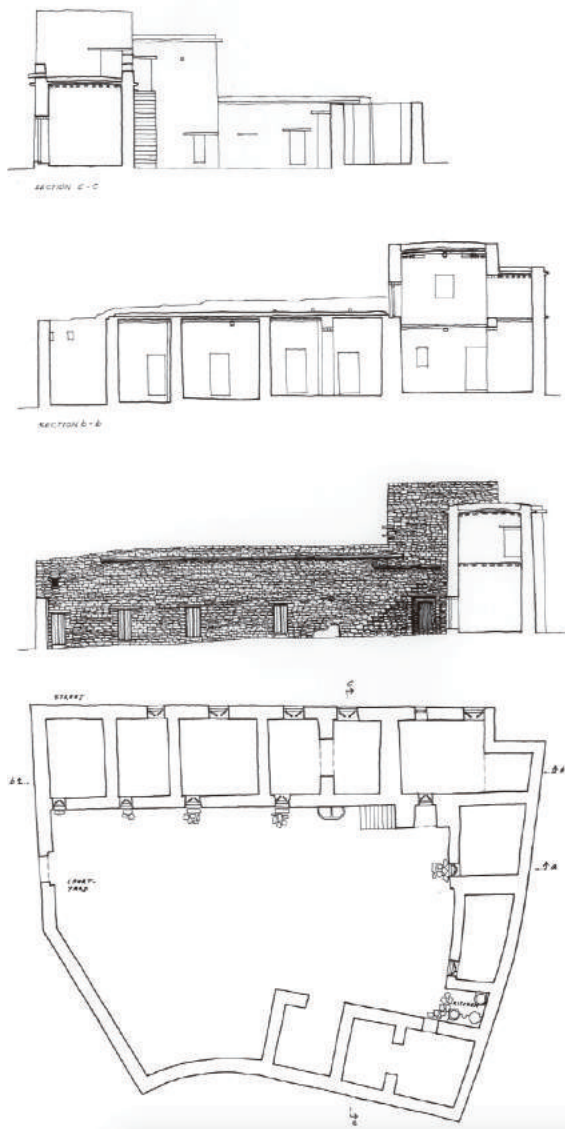


Fig.4-78 An example of a combination of a lumped roofed *hidmo* house and a row house (Fig.4-74, 77), from Carlson et al. (1971).

Fig.4-77 Section, elevation and plan of an example of a combination of a lumped roofed *hidmo* house and a row house (Fig.4-74), from Carlson et al. (1971).

Perhaps, the emergence of this concept was not unrelated to the increase of commercial activities. In parallel to the enhancement of the concept of “street,” the “urban” population and the building construction projects increased in number, and the “urban” area became denser. These tendencies continued even after the Italian occupation period. On the other hand, during this period, such transformations did not happen in other areas apart from central Mekelle, as shown in the case of Īnda Mesqel, which was discussed in chapter I.

As discussed in chapter I, the concept of “enclosed parcel” was more important before the formation of a concept of “street.” The streets had been no more than in-between spaces of each parcel at that time, and inside the house could have been entered only through the courtyard enclosed by the parcel. In spite of the increase of the house building with an entrance(s) enabling to get access to the inside directly in the central Mekelle, a concept of “enclosed parcel” was not lost at the same time. That is, even presently, each parcel in central Mekelle is still enclosed by the parcel walls and a courtyard has been open at the back of streets.

3-1-3. Urban Master Plan Prepared in the Italian Occupation Period

As discussed in chapter I, the “city” of Mekelle before the Italian occupation period was spatially characterized by the strategic network between hillside and flatland, and its development process can be recognized as a multiplication of visual and acoustic networks by newly appeared elements such as Abriha Castle and Maryam Church. Such a development process in the dispersed way was replaced with modern urban planning methods from the Italian occupation period. As mentioned in the above, the first master plan of Mekelle was prepared in advance of 1939 by the Italians (Fig.4-65). The master plan aimed to create spatial segregation between the Italians and local people, and the new town for Italians were created beyond the “urban” area for local people around Yohannis IV palace, which was formed in the former periods. Okazaki (2014-2) analyzed the master plan as follows:

There is a clear distinction between the old indigenous town ... and the Italian new town based on rectangular system. ... The former was not touched as was in the case of Gondar so that the surrounding quarters around the palace with organic street patterns were well maintained ... The plan was based on a zoning system with two major zones: residential and commercial (market). Public facilities were inserted within the residential zone. The layout pattern was typical grid system without any distortion. What differs from other master plans is that there was no main landmark. Perspective was not so counted. According to its land use prescription, Mekelle may have been considered as a large market city, or relaying point from Asmara to Addis Ababa. No strong administrative facility was reserved since Tigray had been annexed to Eritrea and under the direct control of Asmara, capital of Eritrea.

However, several modifications should have been added to the original master plan when construction activities were initiated. Okazaki (2009) analyzed the modified points by overlaying the master plan on the aerial photo (Fig.4-79): 1) The focus of the central axis toward the south was changed to Abriha Castle. An element of visual and acoustic networks, namely a symbolic building erected pre-Italian period, was utilized for the sake of urban planning. 2) The wall-like structure, which cut off the new town from the old one, was canceled. The zones for Italian and local people became more merged in reality. 3) The size of one block became smaller than the plan of 1939, especially in the south part. Therefore, the streets in the northeast-southwest direction (street-[i]) were misaligned between the actual position and plans. On the other hand, a street in the northwest-southeast direction (a present street between Romanat Square and Milano Hotel: street-[ii]) was implemented as a master plan.

Through a series of field survey, the author identified three sites of which building(s) was (were) erected in the Italian occupation period. By plotting those sites in Fig.4-79, the following points become clear: 1) Though “Casa del Fascio,” a building housing the local branch of the Fascist Party of Italy, was placed in a block of non-landmark position on the easternmost of grid in the master plan, the actual Italian Administrative Building was placed in an iconic position at the far end of one of the streets in the northeast-southwest direction, namely street-[i] in Fig.4-79 (Fig.4-80). It means that axial concept was in reality added to the original master plan. The position of this building was placed between local people’s and Italians’ area. 2) In front of the administrative building, a

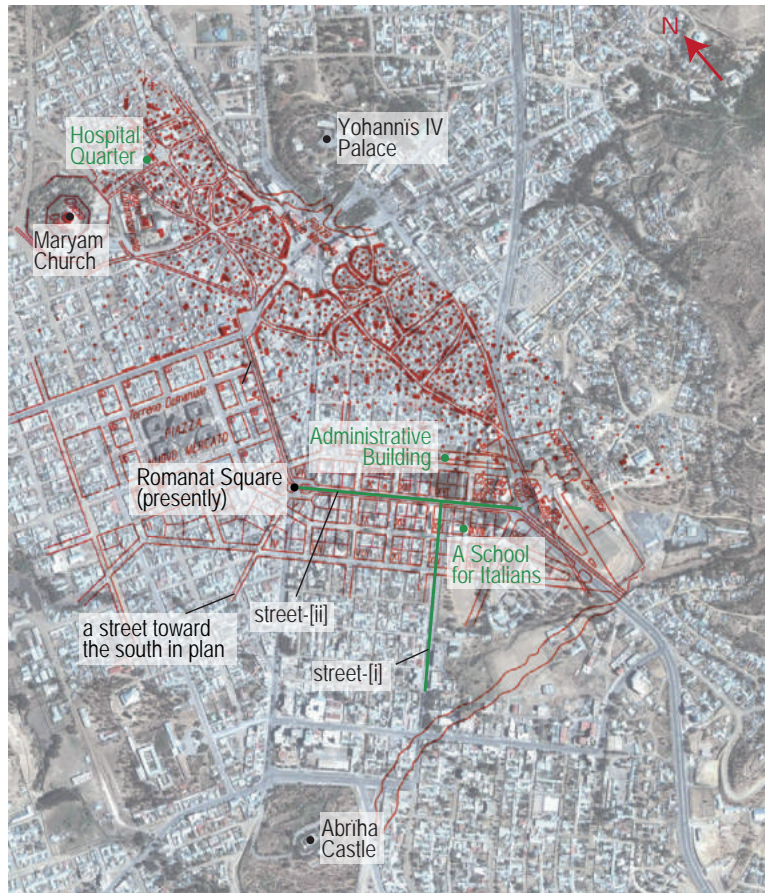


Fig.4-79
The first master plan
laid on the aerial photo
to show its implementation,
after Okazaki (2014-2).

school for Italians, namely *scuola Italiana*, was constructed (Okazaki 2014-2). This was not described in the first master plan. In another site, a school for Ethiopians was established during the occupation period (*Ibid.*). 3) A hospital quarter, which was not described in the master plan, was formed between Maryam Church and Yohannis IV Palace. In the master plan, a land for accommodating commissariat was allocated next to that site. Each above-mentioned building erected in the Italian occupation period will be analyzed later.



Fig.4-80 Italian Administrative Building (presently Supreme Court Building) placed in an iconic position, *photo by author.*

Nevertheless, the Italian occupation period, which ended after only five years, was too short to realize the master plan. Therefore, a degree of the achievement by Italians should have been limited. Perhaps, the implementation of the master plan was carried out especially in the area close to the local people's area. However, the basic framework of the grid was inherited in the post-colonial urban planning. The process of later urban development process with sprawl until now will be introduced later.

3-2. Technical Transformation of the Buildings

In this section, the buildings erected in this period are analyzed to clarify the technical transformation. Not only the buildings the author newly measured and (or) observed, but also the important buildings analyzed in the preceding study are discussed in this section. Through the analysis, new techniques and materials emerging in this period will be discussed in detail.

3-2-1. Buildings Erected in the Post-Yohannis IV Period

At first, the buildings erected in the post-Yohannis period, namely until the beginnings of Italian occupation, are analyzed chronologically.

(a) Italian Fort (at Īnda Yesus)

In 1895, namely during the first Italo-Ethiopian war, a fort was constructed by Italians in Īnda Yesus, a site that a broad view of the “city” is available and a church drawn by Salt existed (Fig.1-20). From the descriptions by Casartelli (2009), the process of fort construction becomes clear to some extent. Accordingly, the construction work was mostly done by natives helped by only a few Italian soldiers. Therefore, it is valid to think that local building techniques were used in this fort construction.

Firstly, it was decided that a masonry church building of 6 m x 8 m x 5 m high, which was sited at the southwest part of the fort, was transformed into a powder magazine, because a space of 1 m width running along three sides of the church was useful for that purpose and the condition of walls were good (Fig.4-81). That is to say, it becomes clear that the church building was a type of built church with ambulatory, which was discussed in chapter II, though the building drawn by Salt looks like a circular one. It might have been rebuilt in the 19th century, though no more references are available. Furthermore, circular enclosure walls, which was stood 3.5 m from the church building was useful as the esplanade. Indeed, such circular enclosure walls were drawn in the sketch of Salt (Fig.1-20). From the photos showing this zone, the condition of the building and enclosure walls becomes clear to some extent (Fig.4-82). Accordingly, the building that was converted from a church into a powder magazine was a flat roofed building, though the stone size

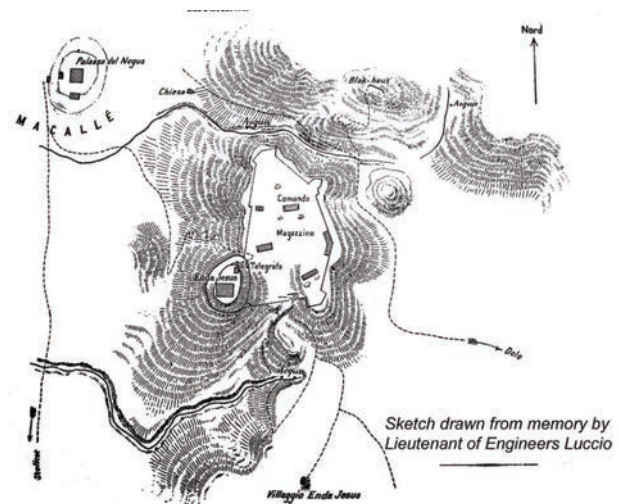


Fig.4-81 Plan of Italian Fort, from Casartelli (2009).



Fig.4-82 A building and enclosure walls of Italian Fort, from Casartelli (2009).

used in the building cannot be identified. Nevertheless, it becomes clear that a wall of *hīdmo* roofed telegraph office, which is seen in the front, is rubble masonry. Remarkably, the size of stone pieces is larger in some parts of the enclosure walls. However, the size was not uniform. Perhaps, stone pieces collected from on or in the ground were used for these walls. Another remarkable description in Casartelli (2009) is about the stone collection method for other walls: they “cleared the field of fire for the Artillery, destroying all buildings in front of the fort and in Enda Jesus (Īnda Yesus) village and retrieved all reusable materials.” In this way, not only local techniques, but also local materials were actively used in this rush construction project.

However, this Italian fort was destroyed by Ethiopians later (*Ibid.*). Therefore, the analysis of the remaining structure is not possible. The fort building that remains is the one rebuilt by Italians in 1935, namely during the second Italo-Ethiopian war. The introduction of this building will be carried out later.

(b) An example of “a single detached house” (at Mekelle)

This is an example of “a single detached house” shown in the above (Fig.4-72, 73). According to interview research carried out by Okazaki (2014-2), the owner clearly remembered the date of construction as “two years after the Battle of Adwa,” namely 1898. The house was erected by the interviewee’s grandfather who was titled *balambaras* under Mengesha Yohānnīs. As mentioned above, the rectangular shaped house with two rooms has a door along the street.

Furthermore, the roof and wall materials, which are identified from the photo of Fig.4-72, are remarkable, too. Accordingly, the gabled roof is covered with corrugated metal sheet. This is the oldest example to use a material of corrugated metal sheet, though whether the corrugated metal sheet was used from the beginnings or not is not clear. The walls are masonry consisting of larger stone pieces uniform in size. That is to say, the stone material collection was carried out by use of the tools *martello* and *malakino*. As mentioned in the previous section, the tools estimated to be applied in the construction of Yohānnīs IV Palace. However, it should be reminded that the use of uniformed sized stone pieces was applied only in the part of arches, and the size of stone pieces was not so large even in those arches, in the palace. Perhaps, local builders improved the technique on use of *malakino* to take larger stone pieces from the quarry. After taking larger sized stones, each stone piece was shaped by *martello*, perhaps in the construction site. This is the oldest example that such larger and uniformed sized stone pieces were applied in the masonry walls. However, the building was unfortunately demolished around 2010 due to the municipality’s decision to widen the street.

(c) An example of “a lumped roofed *hīdmo* house” (at Aynalem)

According to Teshale *et al.* (2012), a lumped roofed *hīdmo* house, which was constructed in the early 1900s by a high ranked priest, exists in Aynalem. The plan is a typical *hīdmo*’s one in Īnderta (Fig.4-83). It is remarkable that large and uniformed sized stone pieces are applied in this house, too (Fig.4-83).

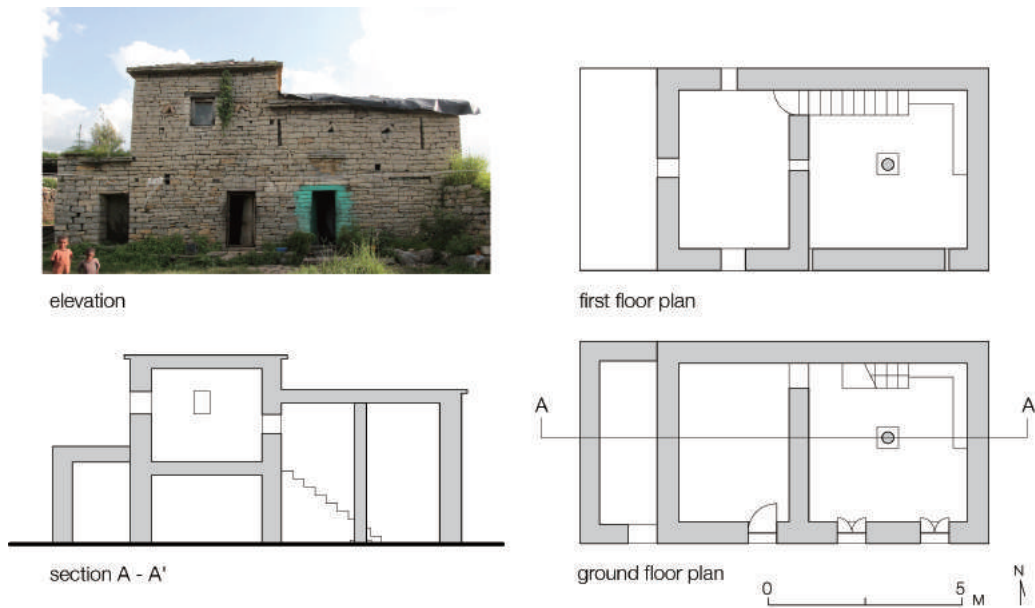


Fig.4-83 An example of a lumped roofed *hidmo* house situated in Aynalem, from Teshale et al. (2012).

(d) Abriha Castle (at Mekelle)

As mentioned above, Abriha Castle was erected in the south part of Mekelle, which was an untouched land at that time. Local tradition claims that the hill was artificially landed up to face to Yohannis IV Palace. Though the precise construction date is not clear, the construction was perhaps carried out when he was a governor of this area. Considering that he was appointed as a governor in 1902 and a domestic battle happened in 1909, it is valid to think that the construction date was 1900s. The original plan of the castle is not clear, because it was converted into a hotel in approximately 1960. Therefore, the author analyzed only the parts of the original structure in this section. The condition after the conversion, namely the present condition, will be analyzed in the next section.

The aerial photo taken before the conversion revealed the original part of the building (Fig.1-25, 4-84). The building is two-story, and the walls of the original part are stone masonry with two stringcourses (Fig.4-85). That is to say, the basic wall construction method was in common with the local church and house buildings. On the walls, a series of parapets was installed as other predate elite buildings, though the shape of each is semicircle, of which shape cannot be found in the predate ones (Fig.4-85). In addition, pilasters are installed in each corner and central parts of the walls (Fig.4-84, 85). The remarkable feature is found in each opening: shape of all the openings is arched (Fig.4-85). Though each opening is presently covered with cement, the arched opening must be a feature from the beginning as confirmed by the photo taken around the Italian occupation period (Fig.4-86). Considering that arched openings were only applied in the main entrance in Yohannis IV Palace, it becomes clear that the techniques to make arched openings were improved at the time of castle construction. The stone pieces of the castle are larger than Yohannis IV Palace, however the size is not so uniform, especially in the upper parts (Fig.4-87). Though the techniques to prepare the uniformed sized stone pieces were available at the time of construction, the techniques were not wholly applied in this building. Perhaps, the construction project was rushed.

From the old photos, it becomes clear that another circular building existed next to the main

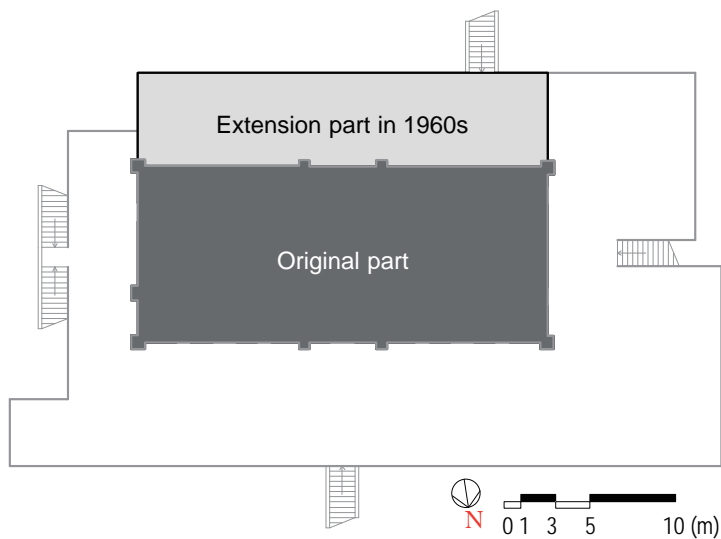


Fig.4-84
Original part and extension part of
Abriha Castle in Mekelle,
made by author.



Fig.4-85 External appearance of Abriha Castle, *photo by author.*



Fig.4-86 Previous state of Abriha Castle (c. 1935), *Istituto Nazionale Luce A. O.*



Fig.4-87
A wall of the original part,
Abriha Castle,
photo by author.

building (Fig.1-25, 4-86). In the same place, there is a circular shaped building still now (Fig.4-88). Though the stone pieces of the wall is obscured presently and whether the existing building is the original one or not is not clear, each opening is remarkably arched as the main building. From the photo of Fig.4-86, it becomes clear that the walls were not covered at that time. That is, the present ceiling and roof structure, which are supported by a central pillar that is branched into several upper braces, are not original(Fig.4-89). In addition, as confirmed by the photo of Fig.4-86, there was a masonry gate structure, of which front stairs were installed, at one time. However, it has been already demolished.

In spite of its majestic appearance, the castle buildings became obsolete after Abriha left Mekelle due to his defeat in 1909. Until the conversion project carried out in approximately 1960, the castle and its surrounding areas were ignored in the development process.

(e) Siyyum's Second House (at Aynalem)

According to local claims, a building situated in Aynalem, which is on the property of Mekelle Institute of Technology presently, was erected by Siyyum Mengesha as his second house (Fig.4-90). However, no more historical information on this building is available. The reign of Siyyum divided into two: before and after the Italian occupation period. Considering that Aynalem became an important center of salt trade in the early 20th century, it is better to understand that the strong relationship between Siyyum and Aynalem began in the first period starting from 1914. The author estimates that this building was erected in the late 1910s.

The two-story building is characterized by the existence of a verandah made from timber on the east side (Fig.4-90). Though such a feature cannot be found in Mekelle's earlier or contemporary buildings other than the main building of Yoḥannis IV Palace, it could be found in earlier or contemporary buildings in Addis Abeba, such as Taitu Hotel and Menelik II Palace (Fig.4-91). The idea to make a verandah in the upper floor might have been inspired by such buildings, though no more evidence is available. The façade on the other side of the building on the west is more symmetrical, though windows on the south part are absent (Fig.4-92). In addition, at the center of the upper floor, there is a verandah. Though the wall construction method is not clear from the existing appearance due to



Fig.4-88 A circular shaped building in the parcel of Abriha Castle, *photo by author.*



Fig.4-89 Internal appearance of a circular shaped building in the parcel of Abriha Castle, *photo by author.*



Fig.4-90 External appearance from the east, Siyyum's Second House in Aynalem, *photo by author.*



Fig.4-91 Taitu Hotel in Addis Abeba, *photo by author.*



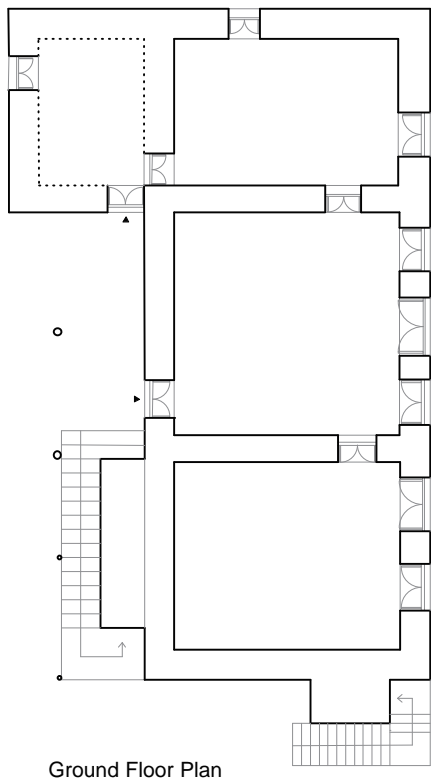
Fig.4-92 External appearance from the west, Siyyum's Second House in Aynalem, *photo by author.*



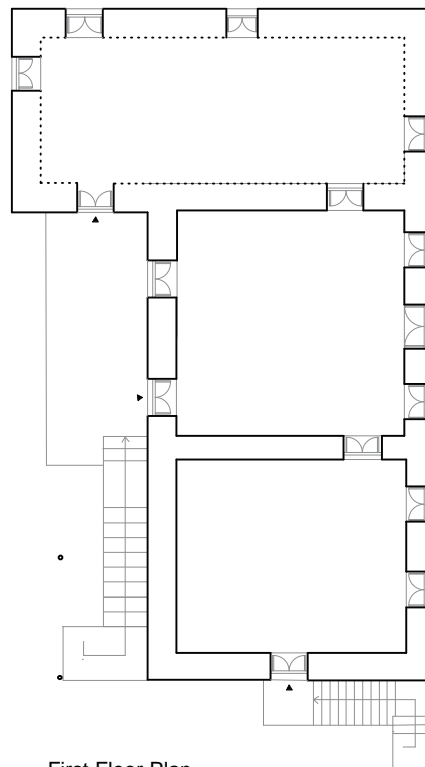
Fig.4-94 Ceiling of ground floor, Siyyum's Second House, *photo by author.*



Fig.4-95 Ceiling of upper floor, Siyyum's Second House, *photo by author.*



Ground Floor Plan



First Floor Plan

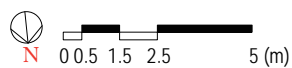


Fig.4-93 Plan of Siyyum's Second House in Aynalem, *made by author.*

plastering, perhaps it is of stone masonry (Fig.4-92). For each lintel of openings, timbers are used, as predate local buildings. However, there is no stringcourse in the building, and the hipped roof is made from corrugated metal sheet, as Taitu Hotel in Addis Abeba (Fig.4-90, 91, 92).

Concerning inside the building, there are four rooms in the ground floor and three rooms in the upper floor (Fig.4-93). The ceiling of the ground floor is made from timber, modeled on the local *hidmo* house (Fig.4-94). On the other hand, the upper floor ceiling consists of wooden panels (Fig.4-95). Perhaps, there are beams in the upper side of the ceiling panels, and wooden panels, beams, and rafters under the corrugated metal sheet roof are combined with timber posts. The detailed explanation of this ceiling and roof method will be carried out when Liquor Factory is described later.

This is an interesting building because local and non-local elements are integrated. In particular, a feature of the large verandah on the upper floor, which has a similar flavor with earlier buildings in Addis Abeba, is only found in this building in Mekelle and its surrounds.

(f) Maryam Church (at Mekelle)

As mentioned above, Maryam Church was established on the west of Yohannis IV Palace before the Italian occupation period. While Lucchi (2009) mentioned that establishment of the church was in the first *Sıyyum* period, another local tradition claimed that it was in Gugsä period. In any case, the church was established between the late 1910s and early 1930s.

The existing church building is octagon shaped built church, of which the planning method follows the circular built church (Fig.4-96). According to local claims, this building was erected at the time the church was established. This is confirmed by a postcard, perhaps from the Italian period, which is titled “Macallé – Tempio Copto” (Fig.4-97). Local tradition claims that the building construction was carried out by a Greek engineer, albeit the name is unknown. Though the detailed survey including measurements has not been carried out, several findings can be pointed out from the building observation and the postcard. The church building stood on the podium, which is covered with corrugated metal sheet roof extended from the main building (Fig.4-96). The inner part of the building is higher than the outer part, and each side of the inner part’s wall has one rectangular window in the



Fig.4-96 External appearance of Maryam Church, *photo by author*.

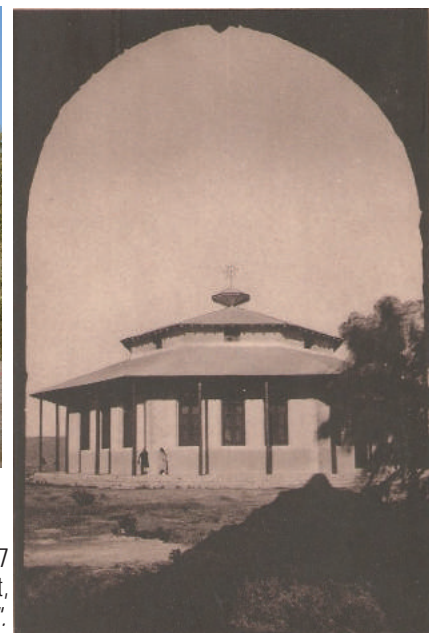


Fig.4-97
External appearance of Maryam Church in the past,
postcard "Macallé - Tempio Copto".

center. The whole of the building is covered with corrugated metal sheet roof. From the postcard photo, it becomes clear that corrugated metal sheet was applied as a roof material from the beginnings, albeit the corrugated metal sheets are replaced with new ones presently (Fig.4-97). Because the whole wall has been plastered since the time the postcard photo was taken, the materials applied to the wall construction, perhaps stones, cannot be identified. Each opening of the outer walls is remarkably arch shaped. Though each opening surround and each corner of the walls were ornamented with white-colored larger stones or cast stones, they cannot be identified in the postcard photo (Fig.4-96, 97). It is estimated that cast stones were added at some point in the past, perhaps recently.



Fig.4-98 A bishopric house next to Maryam Church, *photo by author.*

Next to the church parcel, there is a parcel that bishopric house is situated (Fig.4-98). Remarkably, the characteristics of the two-story buildings such as corrugated metal sheet roof, arch shaped opening, and application of cast stones are in common with the church building. Perhaps, the time of building construction and addition of cast stones were the same with the church building. The walls of the bishopric house consists of relatively small sized stone pieces, and the stone size is not so uniform. It is valid to think that the walls of church buildings were constructed in a similar way.

Both an octagon shaped church building and a rectangular bishopric house have an elegant appearance with symmetrical facades. The participation of a Greek engineer is not surprising.

(g) Gugsa's Second House (at Mekelle)

On the northeast of central Mekelle, which is a place one original hillside settlement named Chomea was situated, there are two buildings belonging to Gugsa Ar'aya in reference to local claims. Accordingly, it was his second house, however, no more information on these historical buildings is available.

One building (Building-A) is a circular building, which was used for perhaps the *aderash* (Fig.4-99). There are twelve timber pillars with bracket capitals, and they support the ceiling and roof structure (Fig.4-100, 101, 102). Though the ceiling is now covered with some sort of cloth, it is clearly a conical shaped *seqela's* roof. At the same level with the top of the pillars, the ceiling is placed horizontally (Fig.4-101). On the ceiling, there is a corrugated metal sheet roof presently (Fig.4-99). Perhaps, this corrugated metal sheet was added in the later period. Though the circular walls are plastered, a flaked part of the plaster makes it clear that the walls consist of stones. On the walls, there are two entrance doors and four windows (Fig.4-100).



Fig.4-99 External appearance of Building-A of Gugsa's Second House, *photo by author.*

The other building (Building-B) is small two-story house building without any pillars (Fig.4-103). Perhaps, this was a guesthouse, though

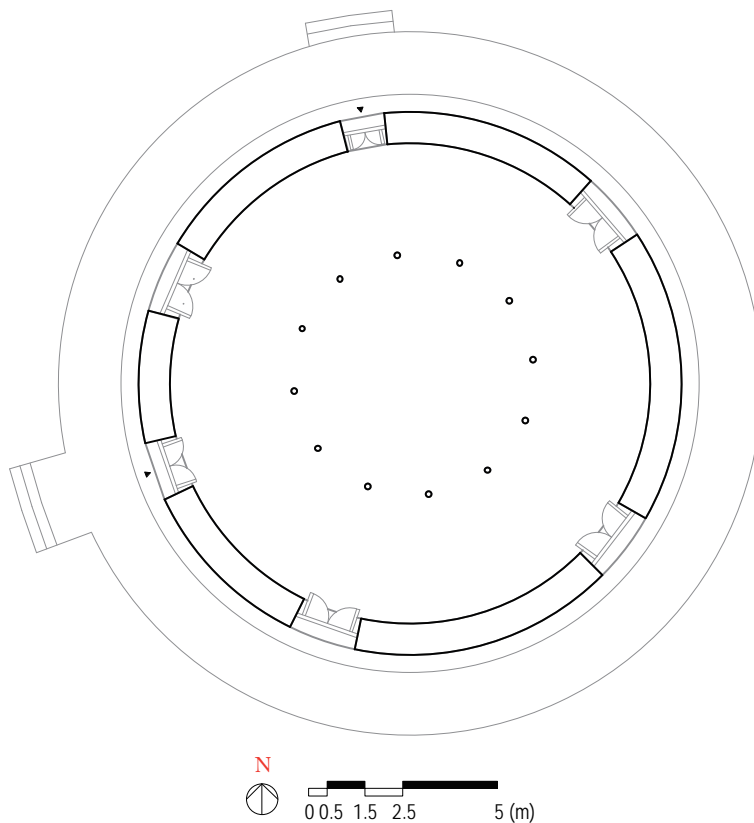


Fig.4-100
Plan of Building-A of
Gugsa's Second House,
made by author.



Fig.4-101 Internal appearance, Building-A of Gugsa's Second House, *photo by author.*



Fig.4-102A timber pillar with bracket capital, Building-A of Gugsa's Second House, *photo by author.*

there is no evidence. The building is in a ruinous state without any cover. The ground floor with two entrances is separated into two by a wall in the center (Fig.4-103). While the northwest part is lower in height and there is an upper floor, the southeast part is higher in height and there are curved and largely ruined stairs enabling access to the upper floor (Fig.4-104). The upper floor has one door: perhaps there was a verandah or stairs outside though it has been already lost. Though there is no ceiling or roof presently, a beam bridging the walls still remains (Fig.4-105). From the existence of a beam, it is estimated that the original roof was a conical shaped grass one applied in the *seqela*. Perhaps, there was once a king post at the center or a beam. The condition of the interior walls are not good: the rubble masonry walls consisting of small sized stone pieces have many cracks presently (Fig.4-104). The exterior walls are covered with cement, which is obviously plastered in later periods (Fig.4-106).

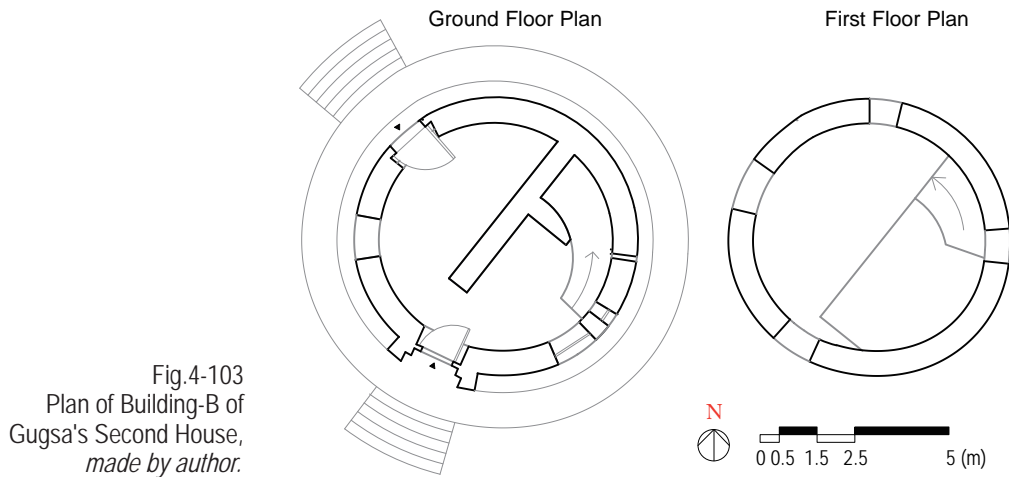


Fig.4-103
Plan of Building-B of
Gugsa's Second House,
made by author.



Fig.4-104 Presently ruined stairs, Building-B of Gugsa's Second House, *photo by author.*



Fig.4-105 A beam, Building-B of Gugsa's Second House, *photo by author.*

In the two buildings of Gugsa's second house, the locally inherited building technique of *seqela* was applied. Perhaps, this is because the purpose of this site was simply refreshing and the buildings did not need to show the symbolic and majestic characters.

(h) Liquor Factory (at Mekelle)

There are one two-story building and one adjoining one-story, but large, building on the west of Yoḥannīs IV Palace (Fig.4-107). The buildings are in the postcard perhaps of Italian period, which is titled "Macallé – Truppe Indigene" (Fig.4-108). At that time, there were no buildings between the buildings and the palace, therefore the photo taking troops' parade in front of the palace depicted these targeted buildings, too (Fig.4-109). The existence of these buildings during the Italian occupation period means that the targeted buildings were erected before the occupation. The locals agree with this assumption: accordingly, it was erected in Gugsa's period by a Greek man named Krantis. He managed a liquor factory in this parcel. After the occupation period, the business was closed and the one-story building was



Fig.4-106 External appearance, Building-B of Gugsa's Second House, *photo by author.*



Fig.4-107 External appearance from the side of street, Liquor Factory, *photo by author*.



Fig.4-108 External appearance in the past (perhaps Italian occupation period), Liquor Factory, *postcard "Macallé - Truppe Indigene"*.



Fig.4-109 External appearance in the past (perhaps Italian occupation period), Liquor Factory, *postcard "Truppe che sfilano davanti ad un Ghebi"*.

converted to a cinema, named Cinema Adowa. The cinema was closed in c. 1991, and the building was converted for government use. Nevertheless, in c. 2001, the cinema was re-opened as Cinema Barok. However, the cinema has closed again, and there is no use presently. A part of the two-story building is currently used as a charity clinic (Senay Tegibar Metegagez Charity Association), as of February 2018.

When a photo taken in present day is compared with an Italian postcard of perhaps 1930s, it becomes clear that the original roof of one-story building is different with the present one (Fig.4-107, 108). Perhaps, the current RC roof was covered when Cinema Adowa was open, namely during the post-Italian occupation period. The original roofing method looks like the common *hīdmo* roof. From the comparison, it becomes clear that new two-story part was attached to the south of one-story building (Fig.4-110). Though there has been no inside connection between the two buildings presently, one can get access into each other through an arched opening, which has been buried presently (Fig.4-110, 111).

The one-story building is presently a one-room building with a huge room, which was used as a cinema in the past (Fig.4-112). The floor is gently sloped, and the RC roof with uniform spanned RC beams is found. The opening on the south, which was perhaps originally a building entrance, is connected with an extended part. The extended part is two-storied (Fig.4-110). However, the

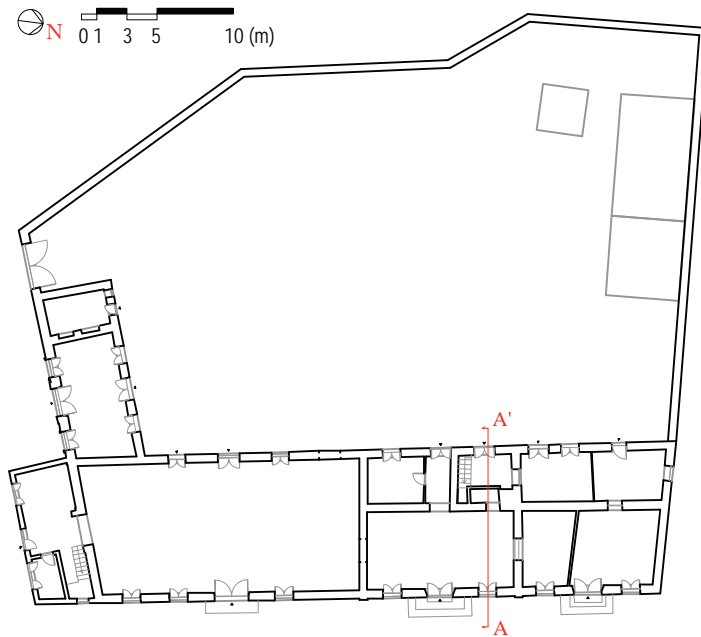


Fig.4-110
Plan of Liquor Factory,
made by author.



Fig.4-111 Presently buried arched opening, Liquor Factory,
photo by author.



Fig.4-112 Internal appearance of the part which was converted into cinema, Liquor Factory, *photo by author.*

original plan of the one-story building is not clear from the present condition. It is improbable that a one-room building without any pillars was realized by ceiling and roof method of *hidmo* from the beginning. Generally, the following two possibilities can be assumed: one-room building was realized by application of a series of pillars and the building was divided into several rooms by erecting walls. At any rate, the existence of a large room to some extent should be estimated, because the building was used as a liquor factory.

The two-story building has eight rooms or spaces in the ground floor and five rooms in the upper floor presently (Fig.4-110). However, because several walls of the ground floor are non-structural partitions, it is valid to think that there were only five rooms in the ground floor in the past. A room at the center on the west side is a stairs room. Each original room of the ground floor has one or two building entrances, and the rooms are connected through the indoor doors each other. The walls of the upper floor are, of course, erected on the walls of the ground floor. The wide and open upper floor has sixteen, originally eighteen, openings, and one of which, originally two of which, is a door (Fig.4-110, 113). Perhaps, the doors were originally connected to the verandah, though such a feature cannot be found from the postcard (Fig.4-109). From this two-story building's



Fig.4-113 Internal appearance of upper floor of Liquor Factory, *photo by author.*



Fig.4-114 The slab structure composed by timber members (photo taken from the ground floor), Liquor Factory, *photo by author.*

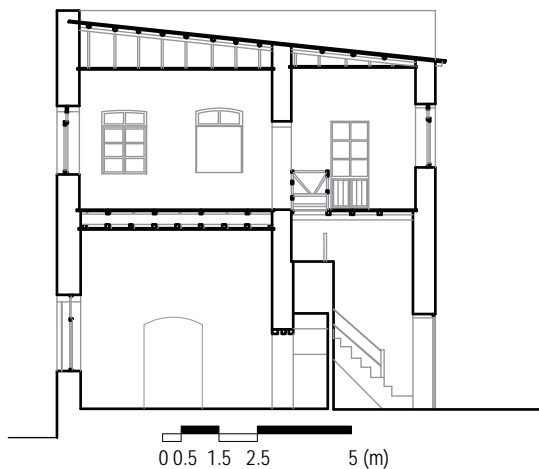


Fig.4-115 Section of Liquor Factory, *made by author.*



Fig.4-116 Roof structure exposed by ceiling unfastened, *photo by author.*

characteristic that a building is separated into several rooms, it is estimated that the building was used as office rooms.

From the current condition of the two-story building, the ceiling and roofing method can be clarified to some extent. Ceilings of both ground and upper floors are of wooden panels, the same one as the upper floor of Siyyum's Second House (Fig.4-95, 111, 113). Judging from a part where a panel is removed, the structure between the ceiling of ground floor and timber floor slab of upper floor can be seen (Fig.4-114). Accordingly, there is a thick horizontal timber beam, thin horizontal timber frames on ceiling panel, and thin horizontal beams under timber floor slabs. These timber materials are connected each other by thin vertical timbers. That is to say, it is understood that a series of thick timber beams support the ceiling of ground floor and the floor of upper floor (Fig.4-115). Concerning the upper floor, there are parts where ceiling panels are removed (Fig.4-116). From observing this part, it becomes clear that the roof of this building is covered with corrugated metal sheet, and a series of rafters bridging walls supported the ceiling panels by thin vertical timbers (Fig.4-115). The same method should be applied in Siyyum's Second House, too.

The main façade on the east with three entrances is obviously conscious of the view from the street (Fig.4-117). The façade is visually divided into three parts, and each of them has a symmetric appearance. All the openings are of flattened arch, consisting of stone pieces (Fig.4-118). Most of

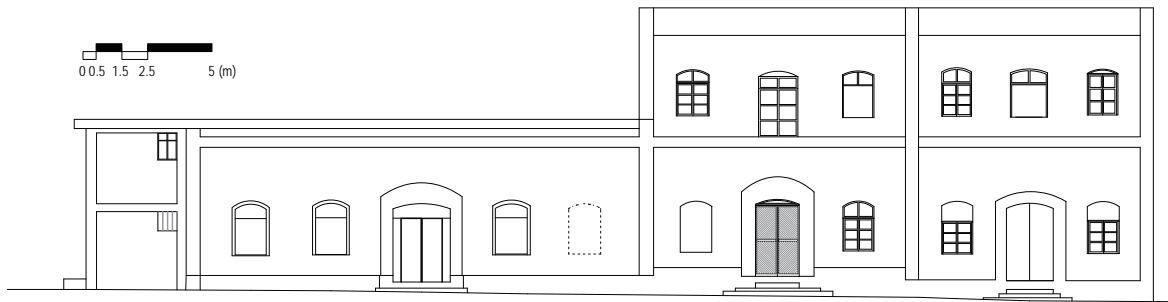


Fig.4-117 Elevation of Liquor Factory along the street, *made by author.*



Fig.4-118
External appearance of
Liquor Factory from the
street, *photo by author.*

the existing windows are made of glass. If these are the original ones, these are one of the earliest example. The size of masonry wall's stone pieces is not so large, and it looks un-uniform, though the detailed observation is not possible due to plastering. In addition, several timber beams between the ground and upper floors are seen from the outside. From the street, the corrugated metal sheet roof is obscured due to its higher wall. The other side of the buildings is connected to the courtyard, though the original boundary of the parcel is not clear (Fig.4-110). Though the façade is not visually divided and the position of doors destroys the symmetric appearance, the basic construction method of stone masonry and flatten arched openings is in common with the façade along the street (Fig.4-119).

There are other buildings in the southwest part of the parcel (Fig.4-110, 120). Though they look to be connected at first glance, the stone pieces of the walls seem to be separated, and there is no access between each other internally. It is not clear whether the central one, consisting of one door at the center, two windows of both sides, and three windows in the upper side, is from the original or not (Fig.4-120). From the appearance of similar masonry construction methods with similar flattened arched openings with west buildings, they can be considered the original. However, the RC roof with several RC beams, which is in common with the present one-story building's one, is certainly from a later period (Fig.4-121). On the other hand, the southwest building is perhaps not original, because the color and size of stones and the height of roof are a little bit different with other buildings (Fig.4-120).

These buildings of the liquor factory are remarkable, because they show the newly appeared characteristics of this period. For example, new materials such as corrugated metal sheet and



Fig.4-119 External appearance of Liquor Factory from the courtyard, *photo by author.*



Fig.4-120 External appearance of southwest part of Liquor Factory, *photo by author.*

wooden panels were actively applied. Furthermore, predate introduced building tools to make arched openings were applied, too. On the other hand, basic techniques applied in the masonry walls are remarkably local. In addition, considering the view from the street is also the important feature that begun in this period. It is suggestive that such buildings with newly appeared building function were managed by a foreigner.

(i) An example of “a two-story house with symmetric façade” #1 (at Mekelle)

This is a house introduced in chapter I as the example to show that the initial “urban” formation was carried out by finding out the micro terrain. The parcel is situated on the west of Yohannis IV Palace, and the targeted house stood on a heavy foundation in a topographically higher place than the surrounding (Fig.1-29, 30). According to the owner of this house, the targeted building was erected by the father of an interviewee who was born in c. 1936 and grew up in this house. The interviewee’s father served as *deggiyat* under Gugsa, and the building was erected in his period, namely between 1928 and 1933.

The building can be accessed from the courtyard of the parcel, and there is no access from the street. The main façade of this house is symmetrical and there is a balcony at the center of the upper floor (Fig.4-122). The walls are covered with cement and it is difficult to identify each stone piece. However, the size of stone pieces do not appear small. Though the cement plaster is drawn in the arched shape, the real masonry work is not arched. All the openings have timber lintels, and no stone arches. What is remarkable is the existence of glass windows. If they are the original ones, they are some of the earliest examples. The walls do not have any stringcourses, and they are covered with a hipped roof made from corrugated metal sheet (Fig.4-122). From the house entrance at the center of the ground floor, one can get into the house. The plan is also symmetrical in this house (Fig.4-71). The central room with a house entrance is the stairs room, and there are two rooms on both sides of the stairs room. One can get access to each room of the ground floor from the backside,

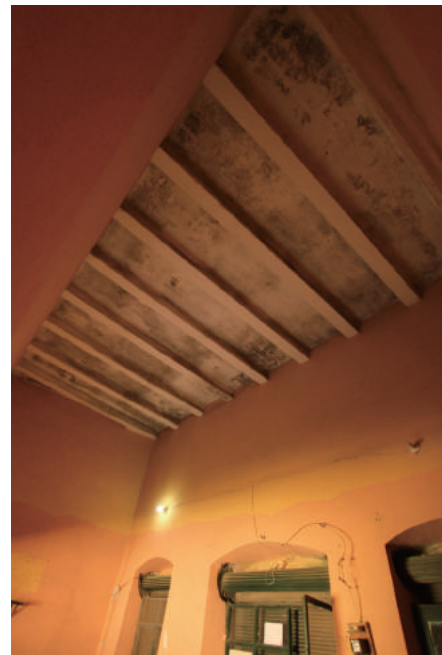


Fig.4-121 RC roof installed in the southwest part of Liquor Factory, *photo by author.*



Fig.4-122 External appearance of an example of a two-story house with symmetric façade (Fig.4-71), *photo by author.*



Fig.4-123 Ceiling of ground floor of an example of a two-story house with symmetric façade (Fig.4-71, 122), *photo by author.*



Fig.4-124 Section of an example of a two-story house with symmetric façade (A-A' and B-B' corresponding with Fig.4-71), *photo by author.*

too. The plan of the upper floor is similar to the one on the ground floor, though there is no access from the outside and there is a balcony over the main entrance (Fig.4-71).

The ceiling of the ground floor consists of timber beams and slab (Fig.4-123, 124). Presently, a series of tiles is put on the timber slab of the upper floor (Fig.4-125). In the stair room of the upper floor, there is no ceiling and the corrugated metal sheet roof is clearly visible (Fig.4-124, 125). Two rafters and a beam make a triangle, and other upper beams between rafters and corrugated metal sheet make the plate for nail. Though it is estimated that the same roof method is applied in the other rooms of both sides, the roof is obscured with wooden ceiling panels (Fig.4-126).

This example shows that newly introduced materials such as corrugated metal sheet and wooden panels were already applied in the local aristocrat's house, even from before the Italian occupation. By combining such materials with local masonry techniques, a house type of two-story house, which was introduced above, was realized.

(j) An example of “a house of a combination of a lumped roofed *hidmo* and a row house” (at Mekelle)

This is a house shown by Okazaki (2014-1) and Carlson *et al.* (1971). The L-shaped building erected in 1934, just before the Italian occupation, is a combination of a lumped roofed *hidmo* house and a row house (Fig.4-74, 77, 78). The existence of row house shows that the concept of “street” had been already grown at that time.

Though other examples show that new materials such as corrugated metal sheet and wooden panel had been introduced at that time, local *hidmo* ceiling and roof methods are applied in this house (Fig.4-74, 78). Nevertheless, the uniformed sized stone pieces, which became a feature after new tools were introduced, are applied in this building. This is a unique building because such masonry walls with uniform sized stone pieces are realized by small sized stone pieces.



Fig.4-125 A stair room in the upper floor, an example of a two-story house with symmetric façade, *photo by author.*

(k) An example of “a two-story house with symmetric façade” #2 (at Mekelle)

This is a second example of “a two-story house with symmetric façade” introduced by Okazaki (2014-2). It was built in 1935 and extended in 1940 (Fig.4-70). However, it was unfortunately demolished in around 2010. Though the main façade is similar with the above-mentioned house of the same sub-type, the differences between them are found as follows: two openings of ground floor are doors in this example and the main façade faces to a street in this example (Fig.4-69, 122). The stone pieces of the walls are large and relatively uniform (Fig.4-69). These should be ones taken from a quarry. In spite of its symmetric façade, the building plan is not symmetric in this building (Fig.4-70). This is the essential difference with other examples of the same sub-type house.



Fig.4-126 An upper floor room with wooden panels, an example of a two-story house with symmetric façade, *photo by author.*



Fig.4-127 External appearance of an example of a derivative version of *hidmo* with two-story (Fig.4-68), *from Okazaki (2014-2).*

(l) An example of “a two-story house of derivative version of *hīdmo*” (at Mekelle)

This house was built before the Italian occupation, and extended in 1943 during the post-Italian period. It is an example of a two-story house, too. However, the main façade is not symmetric, and local *hīdmo* ceiling and roof method is applied (Fig.4-68). From the plan, spatial components that are in common with typical *hīdmo* house can be found. There is no direct access from the street. Though the building walls have been totally plastered by cement presently, a photo taken before plastering remains (Fig.4-127). Accordingly, each stone piece is large and size of stone pieces are relatively uniform.

3-2-2. Buildings Erected in the Italian Occupation Period

Next, buildings erected in the Italian occupation period, namely between 1936 and 1941, are described below.

(a) Italian Fort (at Īnda Yesus)

In 1935, namely during the second Italo-Ethiopian war, the Italian fort was rebuilt at the same place as the former one, which was destroyed after the first Italo-Ethiopian war by Ethiopians. According to Casartelli (2009), the aim of rebuilding was more political and psychological rather than strategic. This building still exists.

The size of the new fort is smaller than the old one (Fig.4-128). The north, east and south of the main building are enclosed by walls. The basic wall structure is masonry consisting of relatively large and uniformed stone pieces. Remarkably, each opening is framed by concrete, and the roof is also made from it. For now, this is at least one of the oldest examples that concrete material is applied.

(b) A Bridge nearby Kwiḥa

To the north of Kwiḥa, there is a bridge that was established by the Italians (Fig.4-129). Because a map from 1938 shows that a road between Agula‘ (Agula) and Kwiḥa (Quiha) had already been open, it is certain that the construction of the bridge was completed prior to 1938. The road, which is made from RC, is supported by a masonry structure. Therefore, this is also one of the oldest examples where concrete is applied. Furthermore, the masonry structure is also remarkable because the height of relatively large stone pieces is perfectly uniformed. It is interesting that such a masonry wall was completed approximately 50 years after the introduction of tools, namely *martello* and *malakino*. In addition, the holes between stone pieces in regular interval are remarkable, too. Perhaps, these are *bukko*: as discussed in chapter III, this is a local technique used to set up a scaffold. From the existence of *bukko*, it is estimated that Italians observed local masonry techniques carefully and applied the technique adaptively. Because the workers should have been mostly Ethiopians, such adaptive strategy was effective at that time.



Fig.4-128 External appearance of Italian Fort, *photo by author*.



Fig.4-129
A bridge nearby Kwiḥa,
photo by author.

(c) Italian Administrative Building (at Mekelle)

The targeted building is situated in the area between the new town planned by Italians and local people's area, along a street of northwest-southeast direction that was drawn in the Italian master plan (Fig.4-79, 130). As mentioned above, the building is placed in an iconic position at the far end of a street of northeast-southwest direction (Fig.4-80). According to local claims, the building was erected as an administrative building in the Italian occupation period. Though the building was continuously used for administrative purposes, it has become the supreme court of Tigray presently.

Though the material of walls is not clear due to plaster, it is remarkable that each opening is not a timber lintel or stone arch: RC members are used in the periphery of openings (Fig.4-131). The author estimates that the stone masonry walls are combined with these openings framed by RC member. Such an opening could not be found in the pre-Italian buildings. And, it should be indicated that the introduction of RC framed openings enabled the installation of glass windows more accurately (Fig.4-131). A series of glass windows is found in the wall of the southeast (Fig.4-132, 133). Perhaps the existence of a series of large windows is a reason why a series of buttresses are installed in this side.

Though the structural stone pieces cannot be seen, there are light grayish stones with smooth surfaces at the periphery of the main façade's opening (Fig.4-130, 134). The existence of stone pieces of which surface are smoothed is remarkable because it implies the use of *iskarbélo*, namely chis-



Fig.4-130 External appearance from the southwest, Italian Administrative Building, *photo by author.*



Fig.4-131 A wall of Italian Administrative Building, *photo by author.*

el. That is to say, it is estimated that the tool of *iskarbélo* was introduced in the Italian occupation period. The light grayish stones are applied not only in the periphery of openings, but also in a series of layers on a main façade's wall (Fig.4-130).

Passing through the roofed main entrance, one can get into the inside of the building from three positions (Fig.4-132). While two of them are connected with rooms directly, the other one is connected with the corridor (Fig.4-135). The existence of the corridor is a new feature in this period which is not found in the predate period. Through a series of corridors, one can get access to each room in the building (Fig.4-132). Other than the main entrance, there is one entrance in the southwest part of the building, too (Fig.4-132). In addition to the ground floor, there is a floor under the ground floor to the north, which can only be accessed from the outside (Fig.4-132).

The ceiling and roof of the roofed outside space is remarkable because it is not made from wooden panels and there are sixteen holes (Fig.4-134). According to an analysis by Keita Aoshima, a Japanese architect who was a lecturer at Mekelle University in the year of 2008/2009, corrugat-

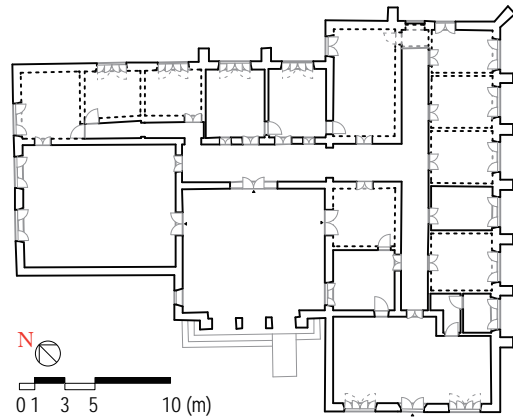


Fig.4-132 Plan of Italian Administrative Building, *made by author.*



Fig.4-133 External appearance from the south, Italian Administrative Building, *photo by author.*



Fig.4--134
An entrance porch of
Italian Administrative
Building, *photo by author.*

ed metal sheet roof is combined with a series of steel materials, which are applied as the ceiling structure but hidden. This ceiling of steels are covered with some sort of panel and plastered. The holes in the roof are perhaps for lighting purpose. Other than this roofed entrance, the ceilings consist wholly of wooden panels, and the whole building is covered with a corrugated metal sheet roof (Fig.4-135). That is to say, the common ceiling and roof method with pre-Italian period's examples are applied in this building, too. The rainwater running along the corrugated metal sheet is received by a series of rainwater gutters presently, though whether it is the original one or not is not clear (Fig.4-131, 133).

(d) A School for Italians (at Mekelle)

As mentioned above, a school exclusively for Italian children, namely *scuola Italiana*, was constructed in front of the Italian administrative building in the Italian occupation period (Fig.4-79). After the occupation period, it was taken over by the municipality, and given the name of "Atse Yohannes IV Elementary School" (Okazaki 2014-2; Mulubrhan 1995).

Though a detailed survey including measurement has not been carried out yet, several remarkable points can be identified through the observation of the building. The symmetric and symbolic main façade with a two-story part and two one-story parts on both sides is impressive (Fig.4-136). In both sides of the two-story part, there are long vertical windows, each of which has stairs inside. One-story parts on both sides are used for classrooms with natural light (Fig.4-137). The exterior walls are masonry ones of large and uniformed sized stone pieces, with glass windows framed by RC member (Fig.4-138). The ceilings of the building consist of wooden panels (Fig.4-137). As other predate or contemporary buildings using wooden panels as ceiling material, the roof material is corrugated metal sheet, though it is hidden from the appearance of main façade (Fig.4-138). In the room where the ceiling panels are removed, timber triangles with trusses, which were placed over ceiling panels originally, can be seen (Fig.4-139).



Fig.4-135 A corridor with wooden panels, Italian Administrative Building, *photo by author.*



Fig.4-136 External appearance of a School for Italians, *photo by author.*



Fig.4-137 Internal appearance of a School for Italians, *photo by author.*



Fig.4-138 A wall of a School for Italians, *photo by author.*



Fig.4-139 Roof structure exposed by ceiling unfastened, a School for Italians, *photo by author.*

(e) Old Hospital Quarter (at Mekelle)

According to Okazaki (2009), a two-story building situated between Maryam Church and Yohannis IV Palace was an old hospital building (Fig.4-140). However, more detailed historical information on this building is not available. In the parcel that this building is situated, four old buildings remains as of February 2018 (Fig.4-141). The space enclosed with these buildings forms a courtyard (Fig.4-142). In three buildings (Building-A, B and D) out of the four, there are ornamental stairs in front of the entrance (Fig.4-143). Presently, these buildings have been used for residential purpose. The results of observation and measurement research are described below.

Building-A is a two-story building situated on the east of the parcel (Fig.4-140). The plan of this house follows the idea of a two-story house with symmetric façade (Fig.4-144). It can be understood as the larger version of the example of predate same sub-type's house of Fig.4-71. In both sides along the street and courtyard, there were entrances, though the one along the street is buried presently (Fig.4-140, 141). On the ground floor, there are four rooms other than central stairs room (Fig.4-144). While two rooms on the north are separated, two rooms on the south are connected and access from the stairs room is only possible from the southwest room. On the other hand, there are only two rooms on both sides of central stairs room in the upper floor (Fig.4-144).



Fig.4-140 External appearance from the street, Building-A of Old Hospital Quarter, *photo by author.*



Fig.4-142 A courtyard of Old Hospital Quarter, *photo by author.*

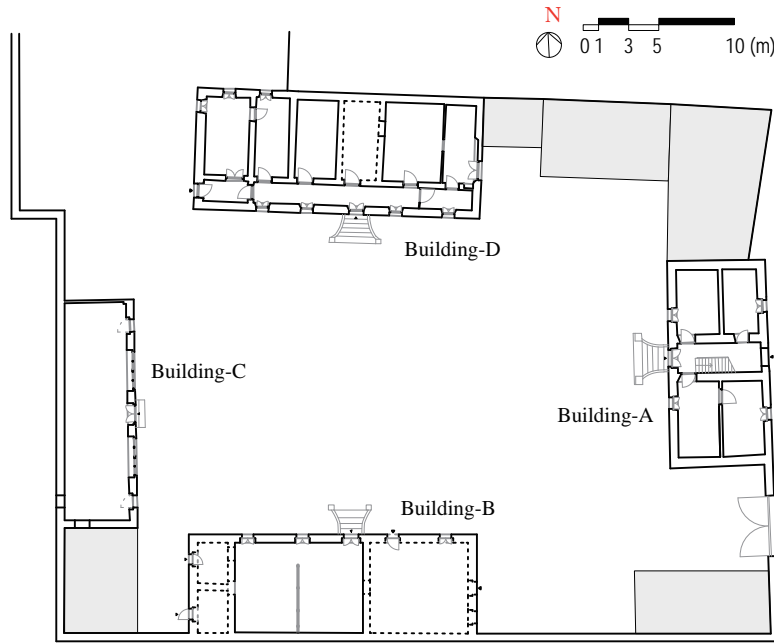


Fig.4-141
Plan of Old Hospital Quarter,
made by author.

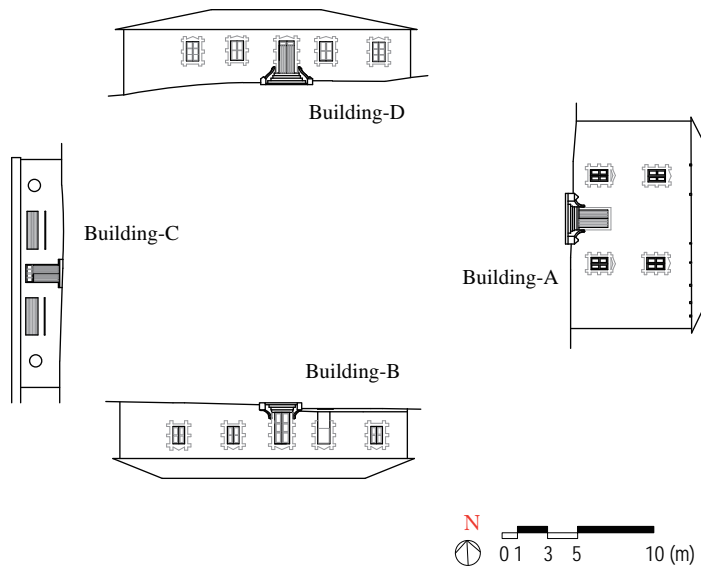


Fig.4-143
Elevation of Old Hospital Quarter,
made by author.

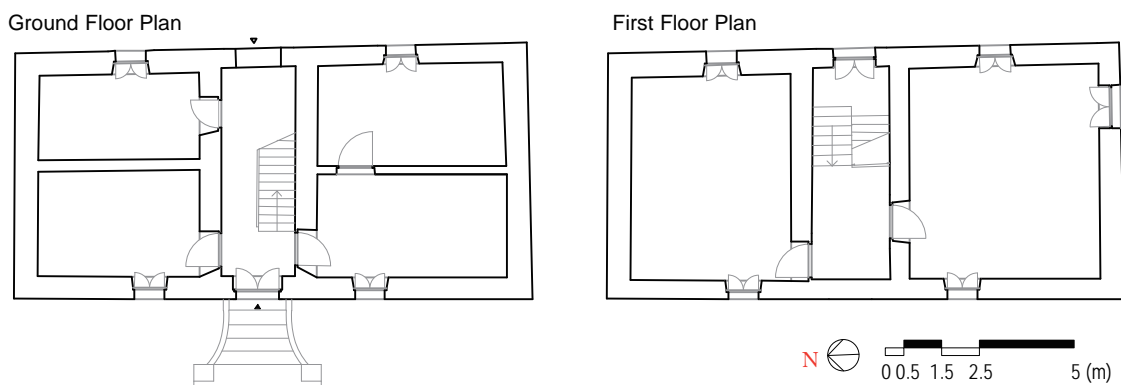


Fig.4-144 Plan, Building-A of Old Hospital Quarter, *made by author.*



Fig.4-145 Photo of Mekelle and Italian soldiers, *from Okazaki (2009); collection of Bettmann.*

Okazaki (2009) found that the building was in the photo taken in the Italian occupation period (Fig.4-145). Therefore, it is estimated that this building was precisely erected prior to the occupation period. Indeed, in the Italian master plan, a plot exists at the present building location of this house (Fig.4-79). However, from the silhouette of the building in the photo, elements other than basic structure seem to be absent at that time, though the image is grainy (Fig.4-145).

The basic construction method of this building is basically in common with another example of two-story house with symmetric façade. The stone pieces can be seen from the flaked part of plaster (Fig.4-146). Accordingly, the size of stone pieces is relatively large and uniformed. Furthermore, there is a timber layer on the wall in the level of lintel of openings (Fig.4-140, 146). From this, it is estimated that each opening has timber lintels, though it is obscured due to the arch-shaped molding. Nevertheless, the existence of an opening framed by timber materials is confirmed in one window on the west wall (Fig.4-147). The ground floor ceiling consists of timber beams and slab, as the

other example of two-story house with symmetric façade (Fig.4-123, 148). From the existence of a thick beam under the ceiling, one can estimate that there were originally no walls under the beam, and the space, which is presently divided into two, was one-roomed. On the other hand, the ceilings on the other side of the rooms are presently molded and the original ceilings are obscured. In the upper floor, the ceilings of rooms are molded presently, too (Fig.4-149). Therefore, the original ceiling structure, or whether it is original or not, cannot be identified. The author estimates that the ceiling was originally a wooden paneled ceiling due to the status of other buildings in the pre-Italian occupation period. A hipped roof is covered with corrugated metal sheet (Fig.4-140).



Fig.4-146 A wall of Building-A of Old Hospital Quarter, *photo by author.*



Fig.4-147 A window from the side of courtyard, Building-A of Old Hospital Quarter, *photo by author.*



Fig.4-148 Ceiling of ground floor, Building-A of Old Hospital Quarter, *photo by author.*



Fig.4-149 Molded ceiling of upper floor, Building-A of Old Hospital Quarter, *photo by author.*



Fig.4-150 A wall of Building-A of Old Hospital Quarter, *photo by author.*



Fig.4-151 External appearance from the courtyard, Building-A of Old Hospital Quarter, *photo by author.*

Presently, the walls of building-A have uniquely decorative features. Firstly, the walls are plastered in the whole façade, and molding is found in arch-shaped opening's frames and some sort of symbols (Fig.4-140, 146). Especially, the white-colored molding shaping an arch is conspicuous (Fig.4-150). Furthermore, an upper well-decorated verandah at the center of house, which was lost in the photo taken in the Italian occupation period, is also a remarkable feature enhancing the image of symmetry and majesty (Fig.4-145, 150). While the façade along the street has a wealth of decorative features, the façade facing the courtyard is less decorative (Fig.4-151). Nevertheless, in each frame of openings, moldings with a common design is found. Furthermore, the curved and ornamental stairs in front of the entrance is also remarkable.

From these analysis and observation of building-A, the author estimates that this building was originally erected just before the Italian occupation period by use of techniques and materials that were commonly applied in contemporary buildings. And in the Italian occupation period, the decorative features such as molding in the walls and ceiling, upper verandah, and curved and ornamental stairs, were added, when the other three buildings were newly erected in the parcel.

The other three buildings, namely building-B, C and D, should have been built in the occupation period, as confirmed by Fig.4-79 that shows that there are no plots at the present building location of these buildings.



Fig.4-152 External appearance from the courtyard, Building-B of Old Hospital Quarter, *photo by author.*



Fig.4-153 A collapsed situation of Building-B before reinforcement, Old Hospital Quarter, *photo by author.*

Building-B is a rectangular building with curved and ornamental stairs in front of the central entrance (Fig.4-152). Though a door is presently installed in the second opening from the east, this was originally the window (Fig.4-141). Instead of the north side, there was one entrance on the east side before, though it is presently buried. In addition, the westernmost two rooms did not exist when the building was first erected (Fig.4-141, 152). Therefore, the building originally had a symmetric façade on the north side.

During the author's visit in 2016, the ceiling of this building had collapsed (Fig.4-153). Ironically, the original ceiling and roof construction method can be understood from the devastated condition. Accordingly, the ceiling was made of wooden panels, however, the original beams which should be placed over the ceiling are absent. Because the wooden panels are combined with timber rafters under the corrugated metal sheet roof directly, namely not via beams, the ceiling could not stand and finally collapsed. Currently, the jerry-rigged partition supporting timber triangle is installed. The construction method of walls is stone masonry. Each opening framed by a molding, of which motif is in common with building-A's one along the courtyard, has a timber lintel (Fig.4-151, 152). However, most of walls are presently obscured with the plaster.

The one-roomed building-C is an experimental building, which is characterized by circular and horizontally long windows (Fig.4-141, 154). Detailed observation of the circular windows show that the circular windows are brick framed (Fig.4-155). In addition, brick material is used in the north wall, which is thinner than the other sides (Fig.4-141, 156). Though the size of the brick is not perfectly fixed, it is perhaps approximately 50-60 mm by 130-140 mm by 240-250 mm in reference to the author's measurement. Concerning the horizontally long window, it uses perhaps RC member for the frame, because wooden lintel in this size is difficult (Fig.4-157). The roof is penthouse roof made from corrugated metal sheet, and ceiling material is not applied inside (Fig.4-158).

The use of brick is a unique feature of this building. There are no other such examples in Mekelle. Nevertheless, the author found one building that partly applies brick as a wall material in Kwiha (Fig.4-159). The use of brick is found in other Italian colonial cities such as Addis Abeba and Gonder. Perhaps, the existence of available stones in nature and skilled masonry techniques in Mekelle and its surrounds contributed to the realization of urban development without use of brick material. Or, the less important position of Mekelle as an administrative and commercial hub might be thought as the reason why introduction of new materials is limited in Mekelle.



Fig.4-154 External appearance from the courtyard, Building-C of Old Hospital Quarter, *photo by author.*



Fig.4-155 A circular window with brick frame, Building-C of Old Hospital Quarter, *photo by author.*



Fig.4-156 Brick-used northside wall, Building-C of Old Hospital Quarter, *photo by author.*



Fig.4-157 A horizontally long window installed in Building-C, Old Hospital Quarter, *photo by author.*



Fig.4-158 Internal appearance of Building-C, Old Hospital Quarter, *photo by author.*

As building-A and building-B, the building-D has a symmetric façade with openings, each of which frame is molded, on the side of courtyard, though the balance of symmetry is damaged by the position of openings (Fig.4-160). In front of the entrance at the center, curved and ornamental stairs exist. The building entrance is connected to a corridor, and there are five rooms on the north of the corridor, presently (Fig.4-141). Though both sides of corridor are separated presently, there should have been no partition before. The easternmost room is divided into two by thin partition walls presently. In this room, a canopy for a bed is installed (Fig.4-161). This existence of a canopy enhances the possibility that this parcel was used for the hospital originally. On the westernmost part, there are two rooms under the ground floor, which can be accessed from the west side.

The roof is a hipped roof with corrugated metal sheet (Fig.4-160). Though the ceiling structure cannot be understood from the appearance due to the plaster, perhaps it has consisted of wooden panels. However, whether there are beams over the ceiling materials or not is not clear.

3-3. Essential Changes of “City” and Buildings of the Periods

In the periods of post-Yohannis IV and Italian occupation, various essential changes on “city” and buildings happened (Fig.4-162). In both “urban” and building scales, the construction of Yohannis IV Palace in the former period made the basement of the changes. On the “urban” scale, the building construction was followed by the formation of “urban” area around the palace. This is the area formed before the Italian occupation, which is called central Mekelle in this dissertation. Though Abriha made a castle and several facilities in the south part of Mekelle, it came to be ignored after his period. On a building scale, the introduction of tools of *martello* and *malakino*, which is identified by the existence of stone arches in the palace, is essential. As discussed in chapter III, introduction of *martello* and *malakino* enabled the realization to provide the larger sized and uniformed sized stones. However, in the palace construction, those had not been realized yet.

Providing the larger sized and uniformed sized stones was realized within only 15 years of palace construction. The use of newly introduced tools was perhaps improved by the local builders. Afterward, such stones were continuously applied in the building in Mekelle and its surrounds, though the largeness and uniformity were sometimes lost or reduced in some cases. Perhaps, the reduction of the largeness and uniformity was caused by the need to shorten construction duration as a result of rapid urbanization. On the other hand, the arched openings, which were applied in Yohannis IV Palace firstly, were continuously applied in the non-house buildings such as Abriha Castle, Maryam Church and Liquor Factory in the post-Yohannis IV period. However, interestingly, the examples that stone



Fig.4-159 A building located in Kwiha that bricks are partly applied, *photo by author*.



Fig.4-160 External appearance from the courtyard, Building-D of Old Hospital Quarter, *photo by author*.

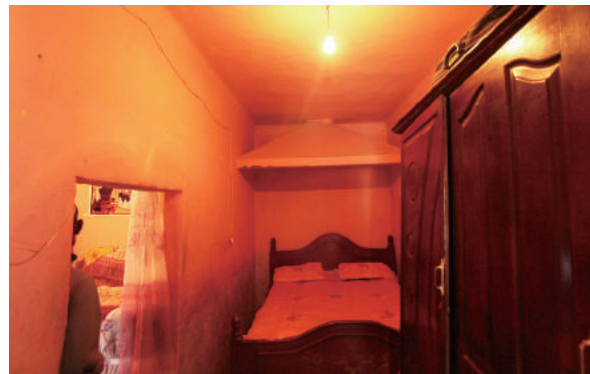


Fig.4-161 A canopy for a bed found in Building-D, Old Hospital Quarter, *photo by author*.

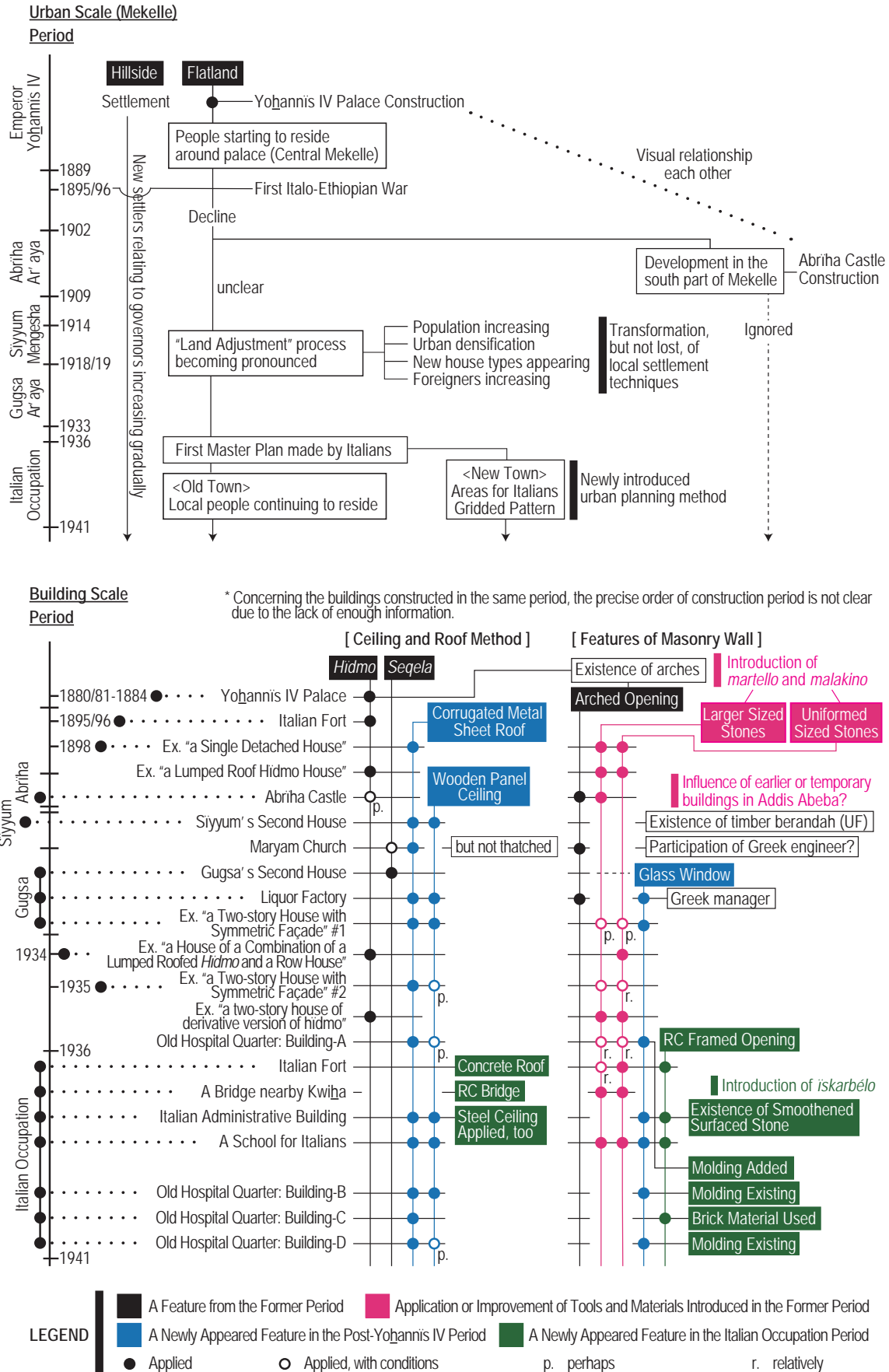


Fig.4-162 The continuity and changes happening in the periods of post-Yohannis IV and Italian occupation, *made by author*.

arches are applied were lost in the Italian Occupation Period.

At the end of the 19th century, a material of corrugated metal sheet applied for roof construction was introduced in Mekelle, perhaps from Asmara that became the new capital of Eritrean colony in 1897. This corrugated metal sheet roof is often applied in combination with wooden panel ceiling, which was a newly introduced material, too. Local *hīdmo* roofed house was gradually replaced with the houses that these newly introduced materials are applied in. Nevertheless, the houses with local *hīdmo* roof were continuously built in central Mekelle, at least until before the Italian occupation.

Not only the materials applied, but also the house planning changed post Yohannīs IV period. Though there was a typical plan of *hīdmo* in the past as discussed in chapter III, several house types such as a two-story house with symmetric façade, a single detached house and a row house emerged in the central Mekelle. The important feature of these new house types is that they often had a house entrance(s) along a street. That is to say, the concept of “street” came to take shape, as population increase and urban densification progressed in Mekelle.

Central Mekelle was continuously resided by the local people in the Italian occupation period. Italians made a master plan for Mekelle, and decided not to touch the old town that had been formed in the former period. The master plan was based on the segregation policy between Italians’ and local people’s area, and a new town for Italians with gridded pattern was created beyond the old town.

Concerning the building material, it should be firstly pointed out that RC member was often applied in the Italian occupation period. Especially, it was often applied in the opening’s frame, instead of a timber lintel. Furthermore, it is remarkable that stone pieces of which surface is smoothed are found in the Italian administrative building, because it implies that the tool of *iskarbélo* was introduced in this period. In addition, as shown in building-A, B and D of Old Hospital Quarter, ornamental molding started to be applied in this period.

Though brick was experimentally applied in building-C of Old Hospital Quarter, it did not become popular in Mekelle. Application of local stone material was preferred more in Mekelle. This should have been an effective approach for Italians, because the building construction work was mostly carried out by local people even in the occupation period. The locally available building techniques, including the techniques improved by the local people with introduced tools previously, were actively applied. Remarkably, from the example of a bridge nearby Kwiha, the local technique to make a scaffold was also applied. This infers that the Italians studied local building techniques as well. Such an “adaptive” approach was found in another part of Tigray, too. According to Gresleri *et al.* (2009), the building of Fig.4-163, situated in ‘Addigrat, was used as the governmental building. Though the detailed history of this building is unknown, the building appearance is similar with Ar’aya Castle, which was erected in the period before or during Yohannīs IV period. Though arched openings were applied in this building, the basic construction was typically a local one.

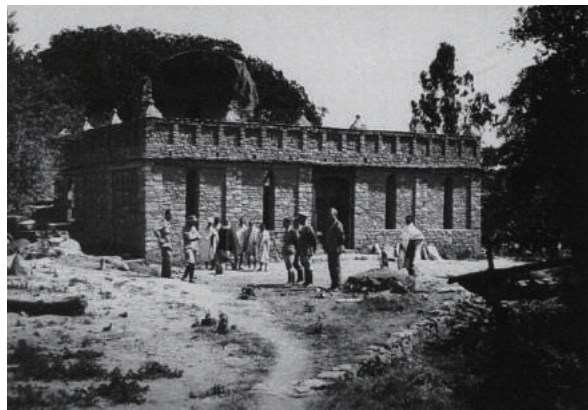


Fig.4-163 A government building in ‘Addigrat in 1936, from Gresleri *et al.* (2009).

The changes happening in the periods discussed in this section made a basis for the next period. The “adaptive” approach of Italians, which was based on the locally inherited masonry techniques, should have been helpful for local people to progress the technical development smoothly. In the next section, the issues on post-Italian period until now will be analyzed.

4. Post-Italian Occupation Period until Now (1941-)

4-1. Changes of the City until Now

4-1-1: Spatial Extension of Urban Area

After the Italian occupation ended, the population of Mekelle has increased (Fig.4-164). Though the increase had been gradual until the fall of the Derg, it has been rapidly increasing since then. The population recorded as 96, 938 in 1994 reached 215,914 in 2007, and it is projected to reach over 600,000 in 2023/24 (Central Statistical Agency 2013). Mekelle is presently a good example of a secondary city of Ethiopia. In response to the population increase, how the city has been spatially sprawled or densified is discussed in this section first.

After the end of occupation, Mekelle became the site of Weyyane Rebellion, a revolt against the central imperial government headed by Emperor Haile Selassie I, in 1943. Therefore, according to Thomas Pakenham who visited Mekelle in 1954, the site was “a bleak town in a bleak landscape” and the visitor “was disturbed by the atmosphere ... Many of buildings were in ruins: and there were no new buildings to compensate as there had been in Gondar” (Sacchi 2012). Nevertheless, the development of Mekelle surely progressed, until when an aerial photo was taken in 1960s (Fig.4-165). After the end of Italian occupation, the segregation policy had been abolished, and the new town created by the Italians was taken over by Ethiopian residents and merchants (Okazaki 2014-2). From the aerial photo, it becomes clear that the master plan made by Italians exerted decisive influences on the expansion of the built-up area toward the vacant space on the south, and the area between old and new towns (*Ibid.*). Though the area of Abriha Castle had been ignored at that time, the building was converted into a hotel in c. 1960, and the axial street toward Abriha Castle from the present Romanat Square was extended in the later period (Fig.4-165, 166). In front of Yohannis IV Palace, a square was constructed from 1971 by covering the river (*Ibid.*). At some time since then

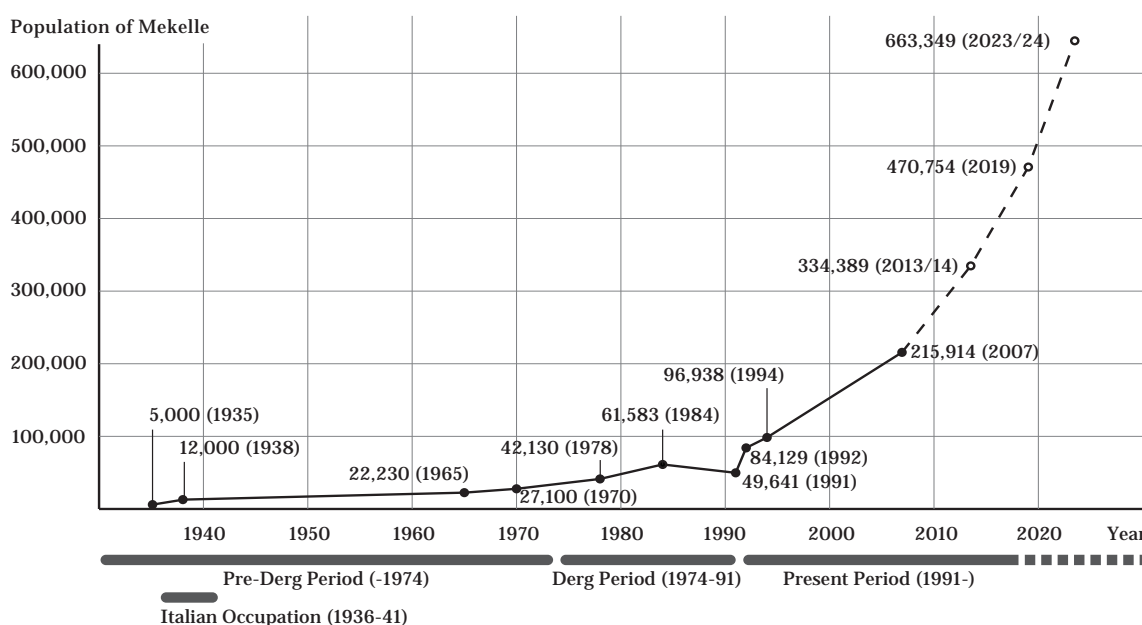


Fig.4-164 Changes in Mekelle's population, made by author (source: Central Statistical Agency 2013, Okazaki 2009, Yohannes et al. 2007).



Fig.4-165 Aerial photo of Mekelle taken in 1960s, after collection of Abriha Castle Hotel.



Fig.4-166 Appearance of Abriha Castle (perhaps around 1960), source unknown.

until 1991, the street between the square in front of the palace and present Romanat Square was made, perhaps by demolishing the buildings (Fig.4-79, 165). Thanks to these road extensions, two symbolic buildings, Yohannis IV Palace and Abriha Castle, are connected to each other by almost linear street via Romanat Square.

Furthermore, there was a plan to extend the urban area toward the north from Maryam Church, of which area was designated as the urbanized area. The plan was made by an Italian architect, Arturo Mezzedimi, who was a favorite

of Emperor Haile Selassie I, between 1966 and 1968. He gave the simple idea to Mekelle: the monumental government buildings laid out in a somewhat classical manner. Afterward, the Swedish team proposed to make housing districts consisting of dense residential complexes and detached houses in the area planned by Mezzedimi. Though the proposal was approved by the Ministry, the proposal was not realized (Okazaki 2014-2).

In the Derg period between 1974 and 1991, the development of Mekelle was relatively stagnant (Fig.4-164). In the 1980s, the growth of Mekelle seemed to halt due to the strong resistance movement against the Derg Government because Tigray was one of the most resisting strongholds of the Liberation Fronts (Okazaki 2009). The radical change on house ownership in this period was decisive, as discussed later.

After the collapse of the Derg government, the existing land use was designated by the Municipality in 1991 (Fig.4-167). Okazaki (2014-2) carried out detailed analysis on it: 1) The main idea was the continuation of the grid pattern of the Italian master plan beyond the boundary of the colonial city. 2) The idea of strong main axes, one of which is from the Abriha Castle and another from the Maryam Church, is apparent. 3) Due to the topographic consideration, the streets extended to the south were preferred to angular ones. 4) Land use for residential purposes occupied 53% in order to accommodate future growth of the population. 5) The zones for nature and agriculture were reserved. The northern part of the city was noted to be adequate for agriculture. 6) Historical aspects were not taken into account.



Fig.4-167 Existing land use of Mekelle in 1991, from National Urban Planning Institute (1993).

Based on the existing land use, the Development Plan was conceived by National Urban Planning Institute (NUPI) in 1993. According to Okazaki (2014-2), the task was difficult because the population increase due to immigration from the rural areas progressed more rapidly than expected (Fig.4-164). The action plan by the municipality was prepared only for the population of 80,000. Due to the lack of adequate data and experience, the attitude of this Development Plan became no more than a confirmation of the status quo with minimal interventions to the plans for different types of land use. Notions of buffer zones or green belts finally disappeared.

The rapid urban growth since then is apparent (Fig.4-164). Therefore, urban planners determined to extend the urban boundary, including the area beyond the mountain where a series of original hillside settlements exists. The latest edition of urban planning, the Mekelle City Structure Plan Revision (hereafter referred to MCSPR), was submitted in 2016 to the city's administration by Mekelle University. According to it, a much broader area has been presently added to the urban area, and road networks and other physical issues are in the hands of the city administration (Fig.4-

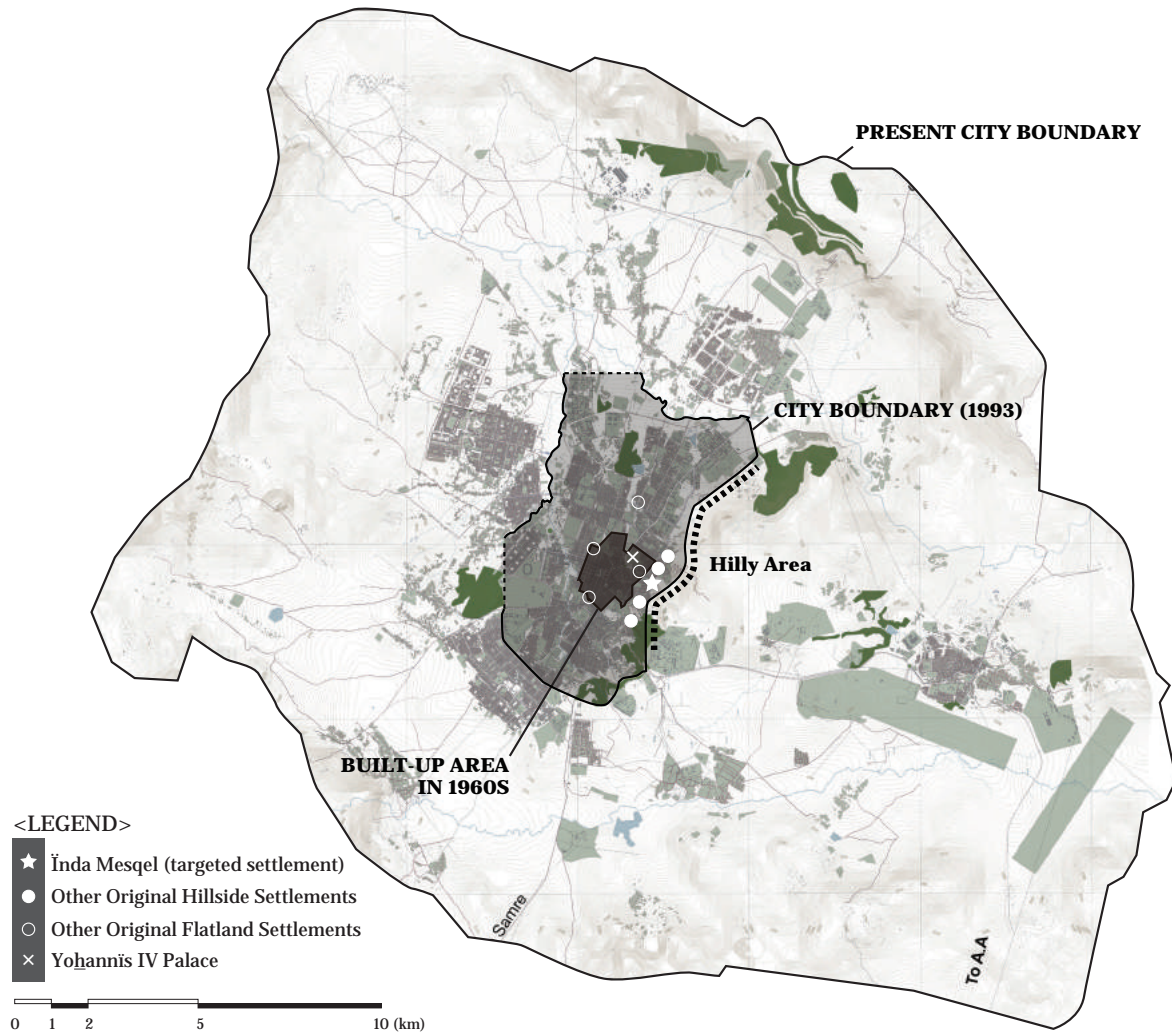


Fig.4-168 Changes in an urban area of Mekelle, after Mekelle City Administration (2016); other source: Aerial photo of Mekelle in the 1960s (Fig.4-165), Existing land use of Mekelle in 1991 (Fig.4-167), Okazaki (2014-1).

168). Remarkably, the issues on green frame network and urban agriculture are again considered in the mapping and text. This territorial expansion of the city absorbed local settlements into the urban area. That is, “urbanized settlement” have newly appeared here and there in Mekelle. İnda Mesqel, one of the original hillside settlements discussed in chapter I, is also one of such examples. The analysis on the detailed urbanization process of İnda Mesqel will be discussed later.

4-1-2: Changes of Central Mekelle

In the post-Italian occupation period, the process of “land adjustment” discussed in the previous section should have been continuously progressed until the beginnings of Derg period (Okazaki 2014-2). The area, consisting of curvilinear shaped parcels due to the lack of modern urban planning process, later gradually adjusted to new “street” pattern. That is to say, the buildings with an entrance(s) along the street increased as “land adjustment” progressed. This is a unique phenomenon that could not be found in the local settlements. According to the survey of a Swedish team in 1967, 24 out of the 55 that they studied had an entrance(s) along the street (Fig.4-169).

The land was owned by a few sovereigns and feudal lords, lords of ruling class, and wealthy land-right-holders, until the beginning of the Derg period (Lucchi 2009). They enjoyed the privilege of land tenure, and they erected buildings gradually in the vacant spaces of each parcel's courtyard. The densification of central Mekelle is confirmed by the aerial photo taken in the 1960s (Fig.4-170). According to Okazaki (2014-2), the reason for the building increase was to respond to an increase of owner's kin group.

However, in the Derg period, the landlords of central Mekelle suffered the loss of their privileges. The new government declared the nationalization of both urban and rural lands and the expropriation of extra houses by issuing Proclamation No. 47 in 1975. Accordingly, in the urban area including central Mekelle, all "extra" housing units became government property by expropriation, and possession of land more than 500 m² was prohibited (Metz 2007). The historical houses of central Mekelle were segmentalized into small pieces, and the former landlords were obliged to choose either to remain in an extremely reduced housing unit or move out (Okazaki 2011). Indeed, those who had been excluded from the opportunity to reside in an appropriate house were assigned in each piece of the old houses **under the control of kebele administration, a last and smallest administrative unit established in the Derg period.** However, the buildings were not maintained as well and suffered from serious damage and decay due to the lack of budget (*Ibid.*).

After the end of the Derg period, all urban and rural lands and natural resources have become to belong to the state and public. In the urban area, lands can be held through a lease system after being identified and registered by the municipality. The lease period is 99 years for residential purpose, but the right is freely transferable despite the existence of some restrictions (Ambaye 2015). Several former landlords of central Mekelle have recovered their land-rights, despite a number of buildings still being owned by *kebele*. In a case of the study area by Okazaki (2014-2), 57.6 % is still owned by *kebele*. In spite of the return of the former land-right-holders, the buildings in those recovered parcels have often been used by renters. Okazaki (2011) called this phenomenon "lend-away."

Presently, land-right-holders of central Mekelle have been trying to ensure income by renting rooms. Concerning this, the author interviewed seven people who made rent room(s) in the present period, as a preliminary survey in 2009. Accordingly, **three patterns to increase the number of rooms are found (Fig.4-171):** 1) Erecting



Fig.4-169 The relation between position of entrance and street at central Mekelle in 1960s, from Carlson et al. (1971).



Fig.4-170 Central Mekelle in 1960s, collection of Abraha Castle Hotel.

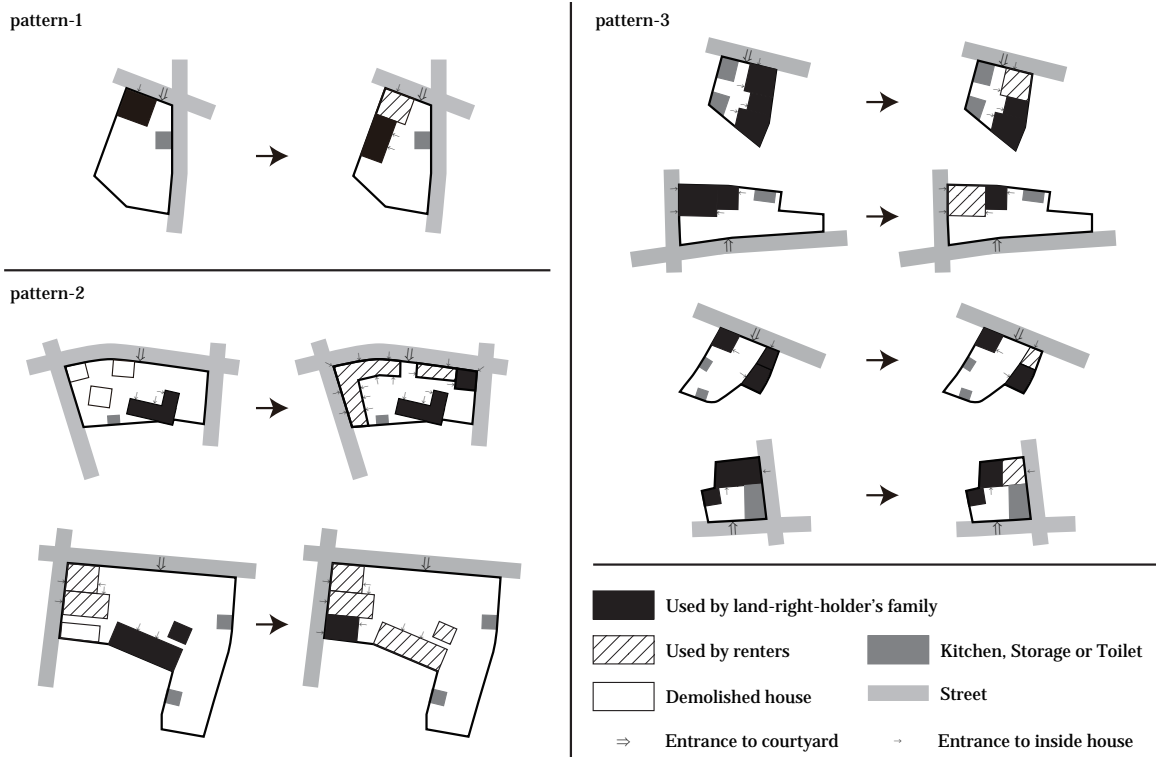


Fig.4-171 How to produce rent room(s) in central Mekelle in the present period, *made by author.*

a new building in the vacant space of the parcel (one case). In this case, the land-right-holder moved to the new building and rented the old one. 2) Demolishing one or more old building(s) and erecting new one(s) (two cases). In one case, the land-right-holder moved to a new building, but the other remained in the old one that has no entrance along the street to rent new ones along the street. 3) Segmentalizing an existing building by dividing an inside room with filled opening(s) or a newly erected wall (four cases). In every case, the land-right-holder took a room inside and rented a room along the street. A rent room along the street has higher potential as a commercial place, and moreover, a room facing the courtyard is more private for the land-right-holders, as it is reminiscent of the local domestic layout. These examples show the existing land-right-holders' desire to ensure income to maintain their own lives, and it sometimes diminishes their own rooms. This mindset is totally different from the pre-Derg period's one when land-right-holders enjoyed land privileges.

In 2009 and 2010, a new master plan was executed by the municipality in central Mekelle (Fig.4-172). In this master plan, operation of widening streets and construction of square are aimed for central Mekelle, because commercial activity had been active in this area. Though the area was, at the same time, the historic area formed since the period of Yohannis IV gradually, little consideration on the historic values was taken in the master plan. Due to the smallness

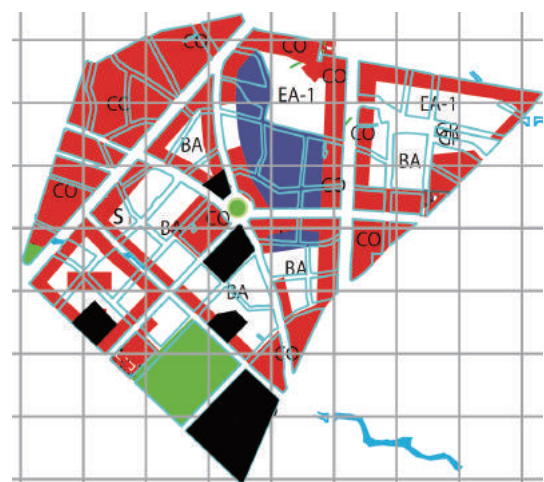


Fig.4-172 Proposed land use in the new master plan of 2009/10 (red: commercial; orange: residential / commercial; navy: historical preservation; blue: public service; green: green area), *made by Mekelle Municipality.*



Fig.4-173 Before and after the implementation of the new master plan of 2009/10, *photo by author.*

of the area allocated as the historic area, many existing buildings were totally or partly demolished to realize the aim of master plan (Fig.4-69, 172). The unique curvilinear and narrow streets have been widened in a rectilinear manner, and a number of historic buildings have been demolished, unfortunately (Fig.4-173). However, this point is more difficult and complicated than simply being considered as a heritage protection issue as the area had suffered urban poverty and other social related problems as well as low accessibility of vehicles. According to Okazaki (2011, 2014-2), the number of prostitutes that accounted for the largest occupation group in 2009 (before the execution of a new master plan) has decreased after the implementation of the new master plan, and the number of khat (locally pronounced as *chat*) sellers and Muslim merchants has increased presently.

4-2. Changes of the Buildings until Now

4-2-1: Masonry Townscape

Even after the implementation of the new master plan in 2009, the major material of the remaining buildings in central Mekelle is stone (Fig.4-174). That is to say, stone material has been applied for building materials even after the Italian occupation period. When the building walls of the remaining buildings are observed, two types of building wall are identified in accordance with the material of opening's frame. Both types being in the photo of Fig.4-175 were erected in the post-Italian period, in reference to Okazaki (2014-2):

- (a) A type of a masonry building such as the rightward building in Fig.4-175. Each opening is framed with wooden material. The roof is covered with corrugated metal sheet. As discussed above, this type of house had emerged post-Yohannis period.
- (b) A type of a masonry building such as the leftward building in Fig.4-175. Each opening is framed with RC member, and the roof is covered with corrugated metal sheet. The RC member is usually applied in the whole of the wall at the top of the opening. This type of house had become

possible due to the introduction of RC member in the Italian occupation period. Indeed, the basic construction method is similar to A School of Italians (Fig.4-138). This way of opening with RC member is preferred to the way of opening with a timber lintel.

It is remarkable that both of the masonry walls consist of larger and uniformed sized stones. In fact, from the appearance of buildings after the end of Italian occupation, maturity of tool use of *malakino* and *martello* is perceptible. Both examples of Fig.4-175 are the row house type, which has a series of openings along the street. The increase of this type of building is an important feature of central Mekelle in the post-Italian period. The recently paved cobblestone enhances the image of masonry townscape (Fig.4-175).

One remarkable house situated nearby the above-mentioned Liquor Factory was measured by the author. According to the owner, the building was erected by the wife of Krantis, the Greek manager of Liquor Factory, in c. 1956, namely after his death. Interestingly, the windows along the street are arched in this building (Fig.4-176). That is to say, the arched opening, which was not applied in the buildings of Italian occupation period, was revived after the occupation period, though other examples of it in this period have not been found yet. However, the openings along the courtyard are not arched. From the appearance of a wall along the courtyard, it becomes clear that the size of stone pieces applied in the walls is large and uniformed, as other buildings in this period (Fig.4-177). One can get access inside the house from the courtyard, and there is no entrance along the street (Fig.4-178). From the central room, one can enter each of



Fig.4-174 Building material of central Mekelle (targeted area of Okazaki) (gray: stone; purple: RC; yellow: *ch'iqqa*; cyan: container), from Okazaki (2014-2).



Fig.4-175 Townscape of central Mekelle, photo by author.



Fig.4-176 External appearance from the street, a house nearby Liquor Factory, *photo by author.*



Fig.4-177 External appearance from the courtyard, a house nearby Liquor Factory, *photo by author.*



Fig.4-178 Plan of a house nearby Liquor Factory, *made by author.*



Fig.4-179 Villa type house with RC structure constructed in DERG period, *from Okazaki (2014-2).*

the four rooms. Corrugated metal sheet is applied for the roof, and several rooms have a ceiling of wooden panels.

Other than masonry structures, there are several examples of RC structure building in central Mekele. In Okazaki (2014-2), one interesting example is described (Fig.4-179). Accordingly, the plan of the house is a villa type, which is characterized by the existence of a terrace and was promoted in Ethiopia by Italians in the late 1930s (Fig.4-75). This example of villa type house with RC structure was erected in around 1985, namely Derg period. That is to say, a villa type house introduced by Italians was still being built even after half a century since the exploitation of the model.

In the area of Italian-oriented grid between the old town and Abriha Castle, the townscape is characterized by the existence of masonry walls, too (Fig.4-180). The area is presently used for commercial purposes, such as cafés, restaurants, bar and shops. Though there are walls of RC structure, masonry walls with RC framed openings are conspicuous, too. Though the detailed survey on buildings has been not carried out, most of the buildings in this area were perhaps erected in the post-Italian or post-Derg period, judging from the appearance of stone materials applied in the walls. In this area, the masonry townscape is enhanced by recently paved cobblestone, too. The streetscape where people drink coffee sitting on movable chairs in the masonry townscape is very fascinating.



Fig.4-180
Townscape of the area
with Italian-oriented grid,
photo by author.

In this way, the townscape of both the old and new town in Mekelle is characterized by the existence of masonry walls consisting of stone pieces. Such a townscape was realized by a series of construction work since Yohannīs IV period until the post-Italian occupation period. Even in the larger buildings with modern construction methods such as RC structure or steel roofed structure, stone materials were often applied in the walls actively (Fig.4-181).

While stone was used for the material of walls even in the post-Italian period, *hidmo* roof consisting of timber and soil materials was no longer built. The material of the roof is replaced with corrugated metal sheet, which was introduced in the end of the 19th century. Most of the buildings erected in the post-Italian period have an corrugated metal sheet roof, and local *hidmo* roof was no longer applied. Even in central Mekelle, *hidmo*-roofed buildings erected in the post-Italian period have not been found yet.



Fig.4-181 An example of RC structure building with stone masonry wall, *photo by author.*

4-2-2: An Interest of Mengesha Siyyum

Mengesha Siyyum was Tigray's governor since 1960 until the end of the imperial period, namely 1974. His predecessor was his father Siyyum Mengesha who governed the whole of Tigray since the end of the Italian occupation until his death in 1960 (Rubinkowska 2010). There are two remaining buildings related to Mengesha Siyyum in Mekelle. One is Abriha Castle's conversion into a hotel, and the other is his second house:

(a) Conversion of Abriha Castle into Hotel

As mentioned above, the building erected at the beginnings of the 20th century had been ignored until c. 1960, when it was converted into the hotel. This conversion project was initiated by Mengesha Siyyum. As confirmed by the comparison between the aerial photo taken in the former period and existing plan, the building was extended when the project was carried out (Fig.1-25, 4-84). Not only the newly built structure on the south part of the building, but also a building consisting of rooms at the foot of the castle's hill was erected (Fig.4-182). From the photo of Fig.4-166, the previous state perhaps during the conversion work is confirmed. Interestingly, the extension part is easily identified by observing stone pieces of the masonry wall (Fig.4-183): the size of the stone pieces in the extension is much more consistent.

Through the conversion work, the inside of the original building was also transformed. Therefore, the remaining original structure is perhaps only the exterior walls. Among five existing doors on the ground floor, the central one from the south wall is the main entrance (Fig.4-85, 182, 184). The entrance hall is connected with an eastern room used for a café and a western room for restaurant. The eastern room has a conspicuous timber ceiling inspired by the *hīdmo* roof, while the western room has RC beams and the ceiling is plastered in a white color (Fig.4-185, 186). Perhaps, the larger timber beam of the eastern room is, in reality, an RC beam covered with timber material (Fig.4-185). In the original part of the building, there are two kitchens and a toilet in addition to the afore-men-

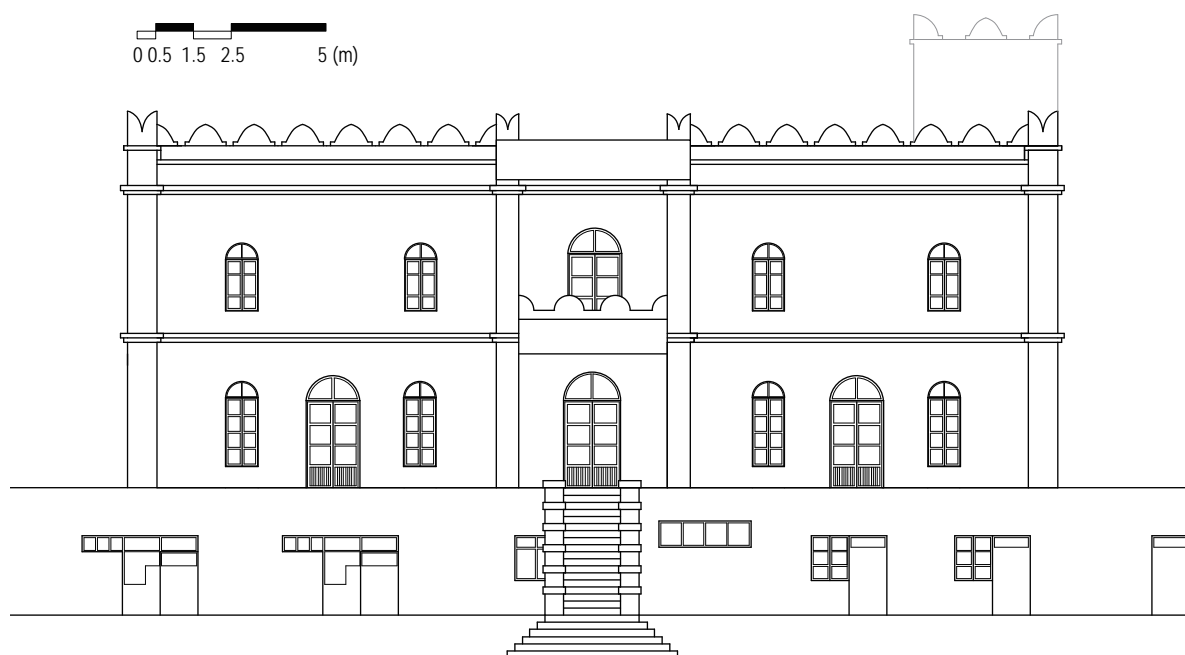


Fig.4-182 North elevation of Abriha Castle in Mekelle, made by author.



Fig.4-183 Different masonry works between original part (right) and extension part (left), Abriha Castle, photo by author.



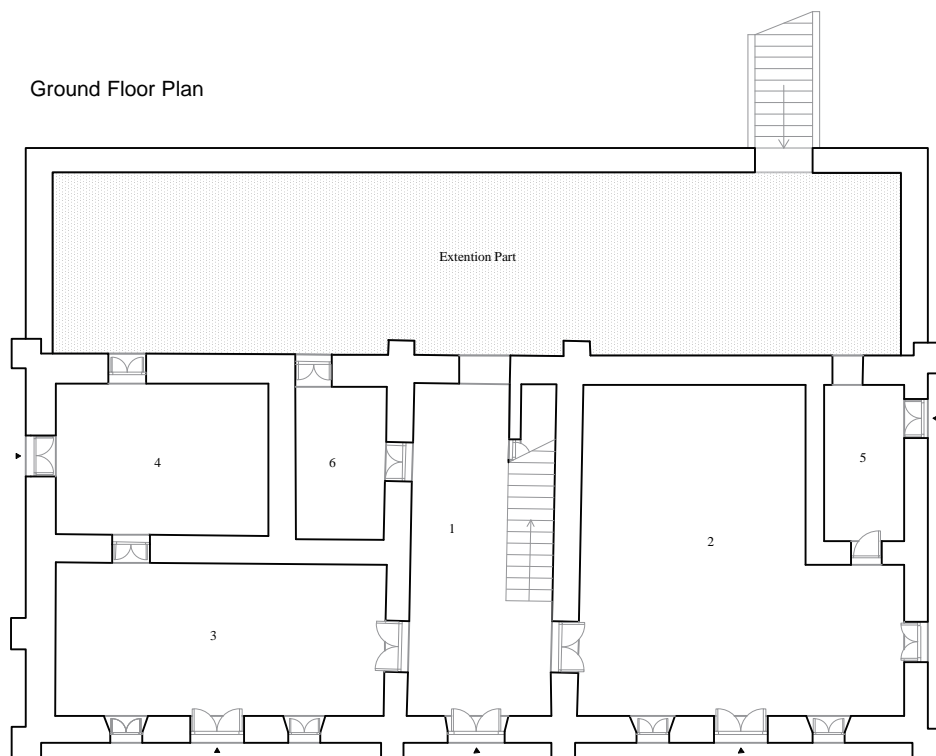
Fig.4-185 Hidmo inspired ceiling in the ground floor, Abriha Castle, photo by author.



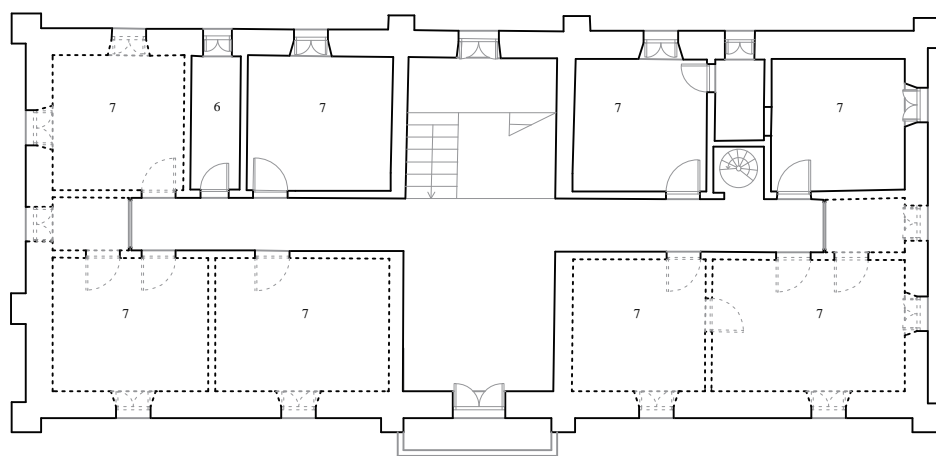
Fig.4-186 Ceiling with RC beam in the ground floor, Abriha Castle, photo by author.



Fig.4-187 Ceiling with wooden panels in the upper floor, Abriha Castle, photo by author.



Ground Floor Plan



First Floor Plan

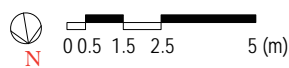


Fig.4-184: Plan of Abriha Castle in the present day, *made by author.*

tioned rooms. One can get access to the upper floor, which is used for the guest rooms, from the stairs situated in the entrance hall (Fig.4-184). The ceiling is of wooden panels (Fig.4-187). Over the ceiling, the building is covered with corrugated metal sheet, though it is obscured from outside the building.

(b) Mengesha's Second House (at Mekelle)

On the eastern part of Mekelle, there is a building erected by Mengesha Siyyum as his second house. Currently, this building is used as a bar, and the nameboard suggests that the building was erected in 1962. However, no more historical information is available.



Fig.4-188 External appearance of Mengesha's Second House, *photo by author*.



Fig.4-189 A timber window of Mengesha's Second House, *photo by author*.

From the appearance, it becomes clear that the building is inspired by *hīdmo* house (Fig.4-188). The size of stone pieces of the walls is large and uniformed. It has slightly sloped stringcourse in the upper part of walls. Above all, the opening is remarkable. Each opening, made from well-shaped timber materials, is arched, and the lintels have decorative shape, too (Fig.4-189). The motif and elaborate detail are perhaps inspired by Yohānnīs IV Palace. Furthermore, a charming arrangement of three windows in tiers is remarkable, too (Fig.4-190). In this way, the appearance of this building is filled with playful spirit, while inspired by the local techniques and motif.



Fig.4-190 Window arrangement in tiers, Mengesha's Second House, *photo by author*.

The inside of the room is one-roomed, but divided into two parts (Fig.4-191). In the northern part, there is an upper floor, though there is no direct access. The upper area of the southern part is presently used as a roof terrace. The ceilings of the ground floor are again inspired by *hīdmo* house, too (Fig.4-192). The appearance of large sized beams reminds one of the ground floor of Abriha Castle. Perhaps, the same ceiling method with Abriha Castle is applied in this case, too. That is to say, each beam is an RC beam covered with timber material, in reality. Toward the upper floor, one can get access through the outside stairs in the backside. The ceiling of the roof is plastered in the white color. A roof terrace is connected with this room.

Two projects led by Mengesha are remarkably inspired by the locally inherited design. On the one hand, he attempted to reuse a magnificent but abandoned castle building by changing the building function. On the other hand, he erected his second house by use of local design elements with a playful spirit. Perhaps, he preferred local design elements or had an interest in the antique buildings or design. Indeed, at the time of Oxford University's expedition in 1974, he showed a cooperative attitude: he gave not only letters of authorization, but also assisted with transportation (Juel-jensen *et al.* 1975).

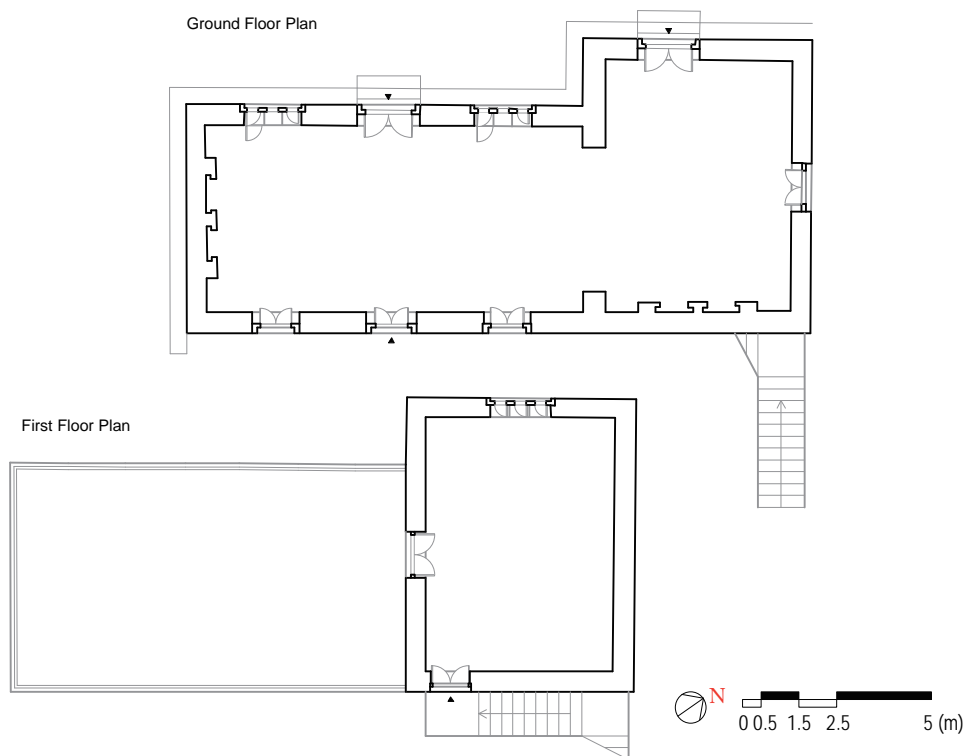


Fig.4-191 Plan of Mengesha's Second House, *made by author.*



Fig.4-192
Internal appearance of
Mengesha's Second House,
photo by author.

4-2-3: Recent Tendency without Stone Masonry Walls

As discussed above, newly introduced materials from the end of 19th century such as corrugated metal sheet, wooden panel, and RC member became popular in the post-Italian period. During this time, buildings constructed from modern construction methods using RC or steel were erected gradually in the post-Italian occupation period. For example, in 1966, the new municipality hall was completed in Mekelle (Fig.4-193: Okazaki 2009). Nevertheless, such large buildings cannot be found in the aerial photo taken in 1960s (Fig.4-165). Perhaps, buildings with modern construction method



Fig.4-193 Municipality hall of Mekelle constructed in 1966, Fig.4-194 External appearance of Defe'o Market from the street, *photo by author.*



Fig.4-195 Location and plan of Defe'o Market, *after google map and Lucchi (2009).*

in number were very limited, before the Derg period.

To understand the technical development on modern construction, the case of Defe'o market erected in c. 1973 is suggestive (Fig.4-194). This building complex encloses a block, and there was no building in the courtyard before (Fig.4-195). One room is approximately 3.5 m by 3.5 m, and the two rooms, each of which has an entrance along the street and courtyard respectively, are lined up along the outline of the block (Fig.4-195). According to Lucchi (2009), the building complex was erected in memory of the martyrs of Weyyane Rebellion. Remarkably, each room, or building, is covered with barrel vault, which had not been found in the buildings of the former period, while stone masonry wall with opening's frame of RC member was the building technique applied since the former Italian occupation period (Fig.4-196). Concerning how to realize a vaulted roof, the author succeeded in interviewing with a local builder who participated in the construction project, fortunately. The story is very interesting:



Fig.4-196 External appearance from the courtyard, Defe'o Market, *photo by author.*



Fig.4-197 A street that mid-rise buildings are increasing presently, *photo by author.*

The construction of this building complex was initiated by Mengesha Siyyum who brought the plan from a foreign country. He preferred the plan because it could be protected from fire. Though he firstly attempted to sell it to Christians, it was rejected. Therefore, he sold it to Muslims, and it was decided that the targeted building complex was made in the existing location. When the interviewee was asked to build the structure, he also did not know the method of construction because such a structure did not exist in Mekelle at that time. However, he conceived the idea after considerations, due to the “God’s gift.” He firstly put a timber (specifically eucalyptus) cast, secondly placed steel bars, and finally poured concretes. After pouring water on the concrete (twice a day) for seven days, he removed the cast. The gap between a wall over the door and a roof was filled by stone pieces at last. After he successfully built one vaulted building in this way, he and his colleagues built the next building in the same way repeatedly. His work amazed everyone at that time, and he was asked to participate in other projects after that.

Though the interviewee said that the success of this building was due to “God’s gift,” it is valid that he got hints from the existing construction technique on RC member. He mentioned that the concrete and metal bars had been already used for window’s frame at that time, too. He seemed to apply the technique to make a barrel vaulted roof. In any case, it is remarkable that the improvement of modern construction technique was achieved by a local builder. That is to say, we should pay attention to the fact that buildings in Mekelle were erected by local builders from the past until now, and they took an important role to improve the building techniques even on modern constructions.

After the stagnation in the Derg period, modern construction such as RC structure has been increasing after the end of Derg period. Above all, the mid-rise buildings are increasing presently, and the visitors can easily find the buildings under construction (Fig.4-197). Even in central Mekelle, there are such buildings including an eight-story one. One can meet the townscape that the local masonry houses are laid next to the mid-rise building (Fig.4-198). From the perspective of building materials, the use of concrete block material is the conspicuous feature presently (Fig.4-197). The masonry wall of limestone pieces has been ironically replaced with the wall of concrete block, which is produced from originally the same limestone. Due to the plastering work, the concrete block walls become to be obscured after the completion. Remarkably, the material of concrete block is used even in the slab of the building presently (Fig.4-199). Each concrete block, which is designed for the slab,



Fig.4-198 A *hidmo* roofed building next to a mid-rise building, *photo by author*.



Fig.4-199 A building that material of a concrete block is applied in slab, *photo by author*.

is put on the precast beam. After the reinforcement material is placed, concrete material is poured (GTZ *et al.* 2003)⁴. This construction method was at first developed to realize the low-cost housing construction by the Ethiopian Ministry of Federal Affairs with the support of GTZ (German Technical Cooperation) since 1999.

4-3: Recent Urbanization of a Local Settlement: in Case of Īnda Mesqel

4-3-1: A Local Settlement in Urban Planning

In MCSPR, the latest edition of urban planning mentioned above, a much broader area has been presently added to the urban area, and it has absorbed local settlements into the urban area. Īnda Mesqel, one of the original settlements of Mekelle that was discussed in chapter I, is one of such examples. While the settlement's initial formation process was discussed in chapter I, the changes, especially happening in the recent years, are discussed in this chapter.

MCSPR, which says that housing provision is a major priority among the development issues, along with unemployment and poverty, water supply and infrastructure, good governance, and municipal and other utility services, also consciously pays attention to local context in text. For example, the land for “urban agriculture and horticulture” is prepared in the proposed land use and the reservation of space to enhance like “*hidmo* villages and other indigenous cultural elements ... so as to revitalize indigenous cultural assets in a form of modern recreational lodge, skill training / transfer center” is recommended. If these attentions are fairly directed, existing urbanized settlements should be regarded as the potential for appropriate urban development.

However, the concrete strategy seems to look toward the opposite direction. Concerning this, the MCSPR mentions the following: “Those scattered rural built up areas ... are proposed to regularization and / or redevelopment. The expansion for new development is proposed towards these areas so as to stimulate development and address the claim for service provision of those areas and suitable vacant areas.” From this passage, it is clear that the city administration establishes the hierarchy for the development and gives more priority to improving elements of infrastructure such as roads,

⁴ Concerning the detailed construction process of this construction method, see: GTZ *et al.* (2003).

water, electricity, and other facilities, than consensus formation with existing land-right-holders regarding how to adapt to the newly appeared situation. This shows the difficulty of making a good relationship between city administration and land-right-holders. That is, while improvements in infrastructure are welcomed by residents, the fact remains that land-right-holders fear their land will be grabbed up. To correct this divisive and ironic misunderstanding and make existing urbanized settlements useful for harmonious and effective urbanization, understanding actuality of urbanized settlements and people's behavior and thoughts would give the fundamental essence.

Therefore, in this section, it is aimed to trace how one local settlement has urbanized, mainly from the spatial and building aspects. The periods are divided into post-Italian (1941-1974), Derg (1974-1991), and present period (1991-). Based on the actual case of Īnda Mesqel, how the settlement has been transformed in accordance with population and building increase is analyzed. The discussion is organized along the following scales: settlement, parcel, building and resident. In the settlement scale, rapid increase of land-right-holders is distinctive. As a result, the land, which was managed in a more integral way at one time, has been spatially segmentalized into pieces. This process is discussed in connection with transition of land tenure system and local thoughts on household. In the parcel scale, land reformation process, namely how people lay out buildings in the newly emerged each segmentalized parcel, is key. This is analyzed in association with above-mentioned local domestic layout of Īnderta. Furthermore, construction method of existing buildings in each parcel implies the land-right-holder's economic situation to some extent, because there is a kind of locally grown hierarchy. Therefore, analysis of existing buildings in connection with building age can lead the deduction of this settlement's social and economic situation. This is the analysis in the building scale. Finally, the analysis reaches the scale of resident. Here, residents who have resided in the targeted settlement, namely whether each building is resided by his / her own family members or renters, is mainly discussed. Through the set of analysis, the urbanization process of the targeted settlement is approached in relation to the local context. In addition to the above discussion, the case of the targeted settlement is compared with the case in central Mekelle, which had been urbanized gradually since the end of the 19th century. Depending on the distinctions of the location and the time of development, what kind of differences and similarity of physical characteristics can be found? Through the discussion, the plurality of the urbanization process that is essentially different from the idea of so-called modern urban planning would be clarified.

4-3-2: Scale = Settlement

After the end of Derg period, each hereditary line's land has been rapidly segmentalized into pieces, due to increase of the number of land-right-holders (Fig.4-200). The number of parcels has been increased to approximately double through the present period, and there have been more land-right-holders (Fig.4-201). According to the field survey, this increase is caused by the aggregation of cases that land-right is transferred from one person to two or more people. In majority of cases, the land-right has been transferred from either of parents to one's offspring (Fig.7, 4-202). On the other hand, it is remarkable that the examples of land-right trade have come to appear recently, despite the number of cases still being small (Fig.7, 4-202: iii).

Land segmentalization process was not so active prior to the present period. This is symbolized by the case of <family F>: though the land-right was inherited to six children and one existing building

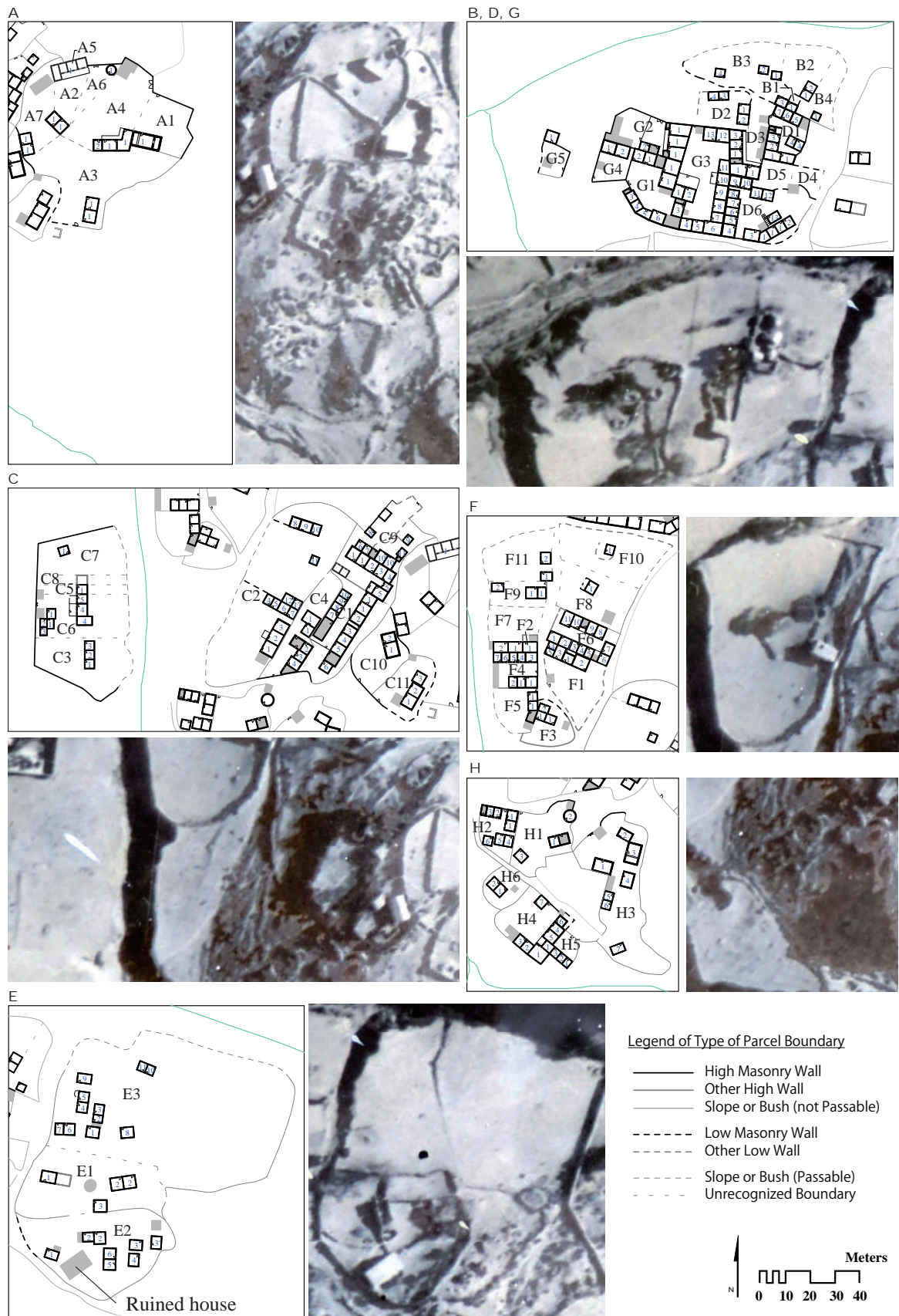


Fig.4-200 Comparison between present situation and 1960s with respect to each family lineage of İnda Mesqel. In addition, types of parcel boundary at the present are also shown at a time, *made by author (present map), after collection of Abraha Castle Hotel (aerial photo of 1960s).*

right, and every citizen was given the inheritable right to cultivate land sufficient to maintain oneself and one's family (Metz 2007). As a result, land-right-holders of Īnda Mesqel were exempted from the expropriation. Therefore, the people of the targeted settlement were not affected so much, while historical families in central Mekelle were requisitioned and segmentalized into pieces. This designation should be essential to consider the reason why land segmentalization process was not so active in Īnda Mesqel before the end of Derg period.

Nevertheless, a part of <family E's> land was exceptionally regarded as "extra" in the Derg period. According to the key informant of E1 (hereafter referred as [E1]), she became the only descendant who stayed in Īnda Mesqel at that time, due to the leaving of her relatives from the settlement. Perhaps, this is the reason why to be regarded as "extra." On the other hand, [C1] exceptionally extended his land area. Accordingly, the smith union that he belonged to acquired the land along the opposite side of the water stream for its workplace (Fig.4-200: C3 and C5-8). Though the buildings that have been still in used were built at that time, his colleagues left the union one by one, leaving him. Finally, his land-right was officially approved after 1991.

As mentioned in chapter I, the farm-like situation in the Derg period was reflected by the Mekelle Development Plan of 1993: Īnda Mesqel was ignored in the proposed land use, though it was situated within the city boundary and designated as "residential" in existing land use. According to the rural land laws, peasants were allowed to own lifetime right to use, lease / rent, donate, and inherit the land. This change perhaps promoted the land-right transfer in Īnda Mesqel, that is to say, increase of land-right-holders and resulting land segmentalization process were progressed. Finally, the settlement officially became an urban area at last. Presently, the MCSPR has designated the area of Īnda Mesqel as an "existing mixed use area."

In this way, it is clear that the series of changes on land tenure system affects the spatial transformation. Among all, the designation as rural in the Derg period was essential to consider the lack of land segmentalization process. Following shift of the land tenure system in the present period promoted the rapid land segmentalization process.

In chapter I, the author indicated that the land was relatively readily demolished due to their thought of "individualism" on household (Bauer 1977). That is to say, people wished to separate from the parent's household and become a head of one's own household. In Īnda Mesqel, such examples could be found in the periods before the Derg. According to [A], his ancestors held more extensively in the past, but the descendants left the land one by one and lessened the land area. When the present map is compared with the aerial photo of the 1960s, it becomes clear (Fig.4-200: A)⁵. Furthermore, it is estimated that the same is true for the present vacant land between the lands of <family C, E, and F>, despite the detail not being clear (Map 5). The aerial photo of the 1960s implies the existence of the parcel, but this place has become bush-land (Map 6). Perhaps, all the descendants of the former land-right-holder left here, and the place has been forgotten, as it is now. Furthermore, such neglect has happened on the building scale. For example, a *hidmo* house of <family E> became a ruin and lay neglected, due to the children leaving and the subsequent lack of maintenance (Fig.4-200: E). From these case examples, it is revealed that population was even de-

⁵ The land-right-holders of <family A> are trying to extend the land again by the erection of the wall structure on the south of the parcel, but it has not been affirmed until now.

creased in certain lands of original hereditary line before 1974.

When the land of <family E> was handed to [E1] from her uncle, he said that the land should be inherited to the person who would manage it, she remembers. This word seems to epitomize the common view of local thought on land inheritance. This recognition and the local land custom that people can live anywhere with independently of one's origin lead the following deduction: the increase of land-right-holders in the present period simply means that people who prefer to stay in Īnda Mesqel have been increasing. This new trend is symbolized by the episode that has happened in the land of <family E>: relatives of [E1], some of whom were actually strangers to her, claimed their land-right due to the kinship with her uncle or aunt. As a result, the land was divided into three, with 11 land-right-holders (Fig.7, 4-100: E). This episode is of course exceptional, at least in Īnda Mesqel, but the land-right transfer itself has exactly occurred much more frequently than before.

4-3-3: Scale = Parcel

Followed by land segmentalization, the land reformation process in the parcel scale should be considered. As explained in the chapter III, the domestic layout of parcel in Tigray is characterized by the existence of an open and uncovered courtyard (Fig.3-1). From the aerial photo of 1960s, it is understood that the domestic layout was also applied to each parcel of Īnda Mesqel (Fig.4-200). The land of each hereditary line was arranged more integrally than the present, and house buildings are situated at the upper side of each parcel to reserve farmland located in the lower side of each parcel, as following empirical knowledge on local agriculture. As mentioned in chapter I, farming activity could be seen normally in the past. According to [F2], her grandfather of the titled class also cultivated the farmland and kept domestic animals in her childhood, namely the beginning of the Derg period or shortly before. Even today, keeping cattle has been still seen in the land of [G2] (Fig.4-200: G).

Due to the hillside location, the division of parcel in Īnda Mesqel has been often affected by topography. Still now, the parcel boundary has been often separated by the existing natural setting such as slope and bush: it accounts for 43.1 % of the whole length of parcel boundary in Īnda Mesqel (Fig.4-203: d and g). In the upper side of the settlement whose topography is more steeply sloped, the original parcel such as <family A, C, and H> consisted of aggregation of several terraces. In case of the land segmentalization along topography, newly emerging parcels have been likely to be formed in increments of terraces (Fig.4-204). On the other hand, in the lower part of Īnda Mesqel such as <family B, D, F, and G>, which does not have enough incline to divide the land, boundaries are more likely to be by the masonry, and the original lands have been separated more artificially (Fig.4-200: B, D, G; Fig.4-204).

The ongoing urbanization process has obscured the relationship between topography and land use, because the process is basically caused by shift of land use from the farming to the residential. Namely, the lower side of each parcel, which was used as farmland at one time, has been concerted to residential parcel, and land-right-holders engaging farming activities have disappeared. Following this, the number of buildings has been increasing, too: a field survey on the age of existing buildings in the targeted settlement shows the result that 70.8 % are of the present period (Fig.4-205: i).

The actual land reformation process varies depending on each parcel, and the difference of each parcel's appearance stems largely from the degree of land segmentalization. When it is progressed,

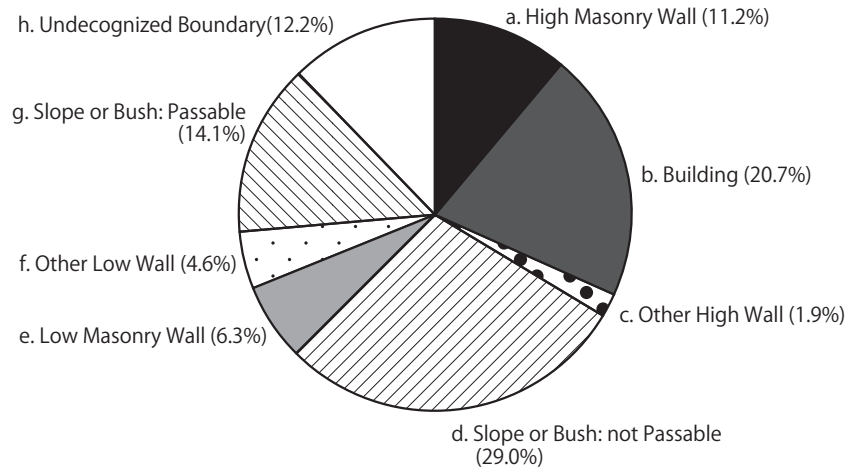


Fig.4-203 Types of parcel boundary found in Inda Mesqel in percentage, *made by author.*

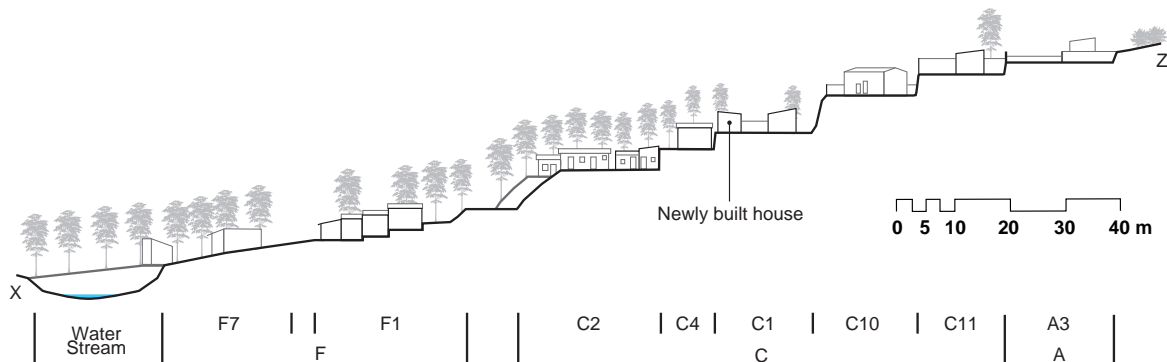


Fig.4-204 Land section of Inda Mesqel (X-Z corresponding with Map 5), *made by author.*

each parcel boundary is physically identified and more buildings are erected. Therefore, resulting appearance is more integrated. It is remarkable that outline of each parcel is enclosed by the buildings or other types of boundary to form a courtyard, as local domestic layout. This is pronouncedly shown in D1, D6, F1-6, and G1-5 (Fig.4-200). Due to higher building density than before, the parcel boundary is likely to be by erected buildings: 20.7 % (Fig.4-203: b). The building's wall is frequently shared with an adjoining building, even of the next parcel, to save materials, as shown in G3/D6 and F4/F7 (Fig.4-200). Furthermore, even an example to add new buildings to a not-so-large courtyard has come into existence recently (Fig.4-204: C). In these cases of integrated parcels, there are derivative cases that more than one recognizable enclosure is formed within one parcel, such as C2 and C9 (Fig.4-200).

In another case that land segmentalization process is not so progressed, the inner parcel's boundary is vague and buildings are dispersed within the large original enclosure, which is pronounced in the land held by <family A, B, and E> (Fig.4-200). Nevertheless, the residents concerned roughly recognize the visually unrecognizable parcel boundary, which account for 12.2% of the whole length (Fig.4-203: h). Therefore, this condition can be recognized as a phase of transition to integrated parcel. Though the buildings are dispersed, their entrance is not open to the street, and each private outside space has been appeared within the original parcel, instead of enclosed courtyard of the local domestic layout.

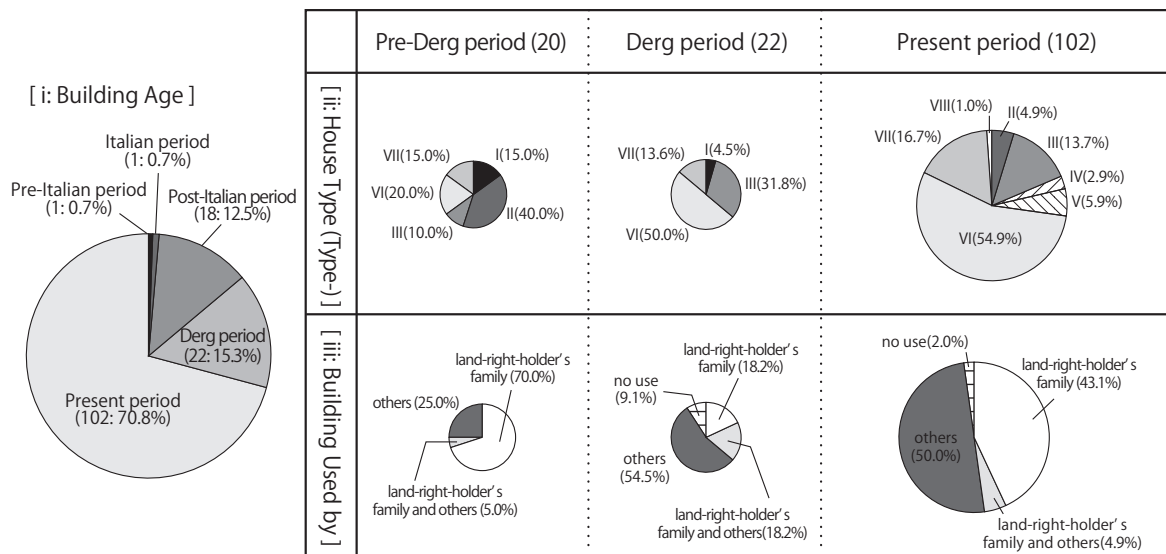


Fig.4-205 Attribute of the existing buildings of Īnda Mesqel in reference to building age, *made by author*.

In this way, the land reformation process or actual spatial situation of each parcel varies depending on the degree of land segmentalization. However, in any cases of the targeted settlement, the basic idea to form a courtyard, or alternative private space, is commonly found. This attitude must be derived from the local domestic layout. Actually, there are no buildings with an entrance on the street in the targeted settlement. That is, people must go through one's courtyard or private space from the street to access inside buildings.

4-3-4: Scale = Building

The existing buildings of Īnda Mesqel can be classified into following eight types in accordance with the building materials of the wall and roof (Fig.4-206):

- I *Hĩdmo* (Fig.4-206: Type-I). There are four remaining in Īnda Mesqel. The oldest one introduced in chapter II and III is the earliest example still found in Mekelle (Fig.2-10, 11). On the other hand, it is remarkable that there are examples that was constructed in the post-Italian period, because *hĩdmo* roofed house was not erected in the central Mekelle in post-Italian period. However, this type house has been no longer built in Īnda Mesqel.
- II This house type is constituted by a masonry wall and corrugated metal sheet roof. Additionally, timber is used in the frame of openings. Due to introduction of corrugated metal sheet in post-Yohannĩs IV period, this house type became possible. In house C10 that was built in the Italian occupation period, the original corrugated metal sheet brought from Asmara has been still used (Fig.4-206: Type-II). This house type was the most common before the Derg period at Īnda Mesqel.
- III Like Type-II, walls are stone, and the roof is corrugated metal sheet. However, an RC member is used in the frame of openings to replace the timber of Type-II (Fig.4-206: Type-III). The parts of RC member are plastered, but those of stones are usually bare. The ceiling of wooden panel is sometimes installed separately from the corrugated metal sheet roof. Although this house type had already been popular in central Mekelle from post-Italian period, it was not so

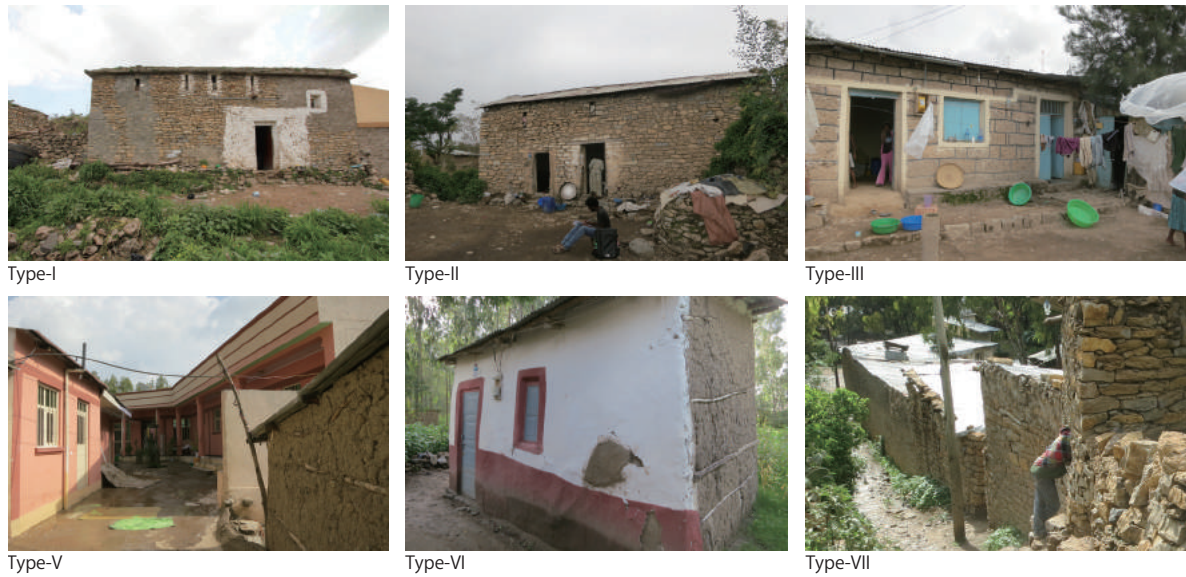


Fig.4-206 Housing types seen in Īnda Mesqel, *made by author.*

major in Īnda Mesqel at that time.

- IV This type is comprised of a concrete block wall with timber around the opening's frame, and a corrugated metal sheet roof. This house type has been recently appeared. Presently, a small production site of concrete block is in F11's land.
- V RC structure of which wall is by concrete block (Fig.4-206: Type-V). The wall is usually plastered. The corrugated metal sheet roof is usually hidden from the exterior by a high wall. Besides, a ceiling of wooden panels is usually installed separately from the corrugated metal sheet roof.
- VI A simpler house type consisting of a wattle-and-daub wall and corrugated metal sheet roof (Fig.4-206: Type-VI). As mentioned in above, this type is locally called "*ch'iqqa-bét.*" In Īnda Mesqel, this is the most dominant type (Fig.4-205: ii).
- VII This is a derivation of *ch'iqqa-bét*, provided that one side of the wall is stone. In this case, only the wall along the street is likely to be a masonry wall (Fig.4-206: Type-VII).
- VIII There is only one example of a stone masonry wall with a thatched roof.

There is a hierarchy on the building in accordance with construction method and material. In the past, rectangular *hīdmo* (Type-I with rectangular shape) was the most prestigious as discussed in chapter III, while a building with a thatched roof such as Type-VIII was recognized as a less prestigious. Presently, the most prestigious house has been replaced by Type-V. According to interviewees, the choice of house type is directly affected by the economic situation. That is to say, building Type-V house simply means that the land-right-holders has enough budgets to do so. For instance in Īnda Mesqel, a case that land-right-holder holding Type-V house has siblings in foreign countries, and another case that he himself was a contractor (now retired), are found. On the other hand, when money is in short supply, they are forced to go to *ch'iqqa-bét* or its derivation (Type VI and VII). Perhaps, the reason why only the wall along the street is by masonry in Type-VII house is the superficial ascent of the building's rank, even though it also helps to prevent fire from the backside. Therefore,

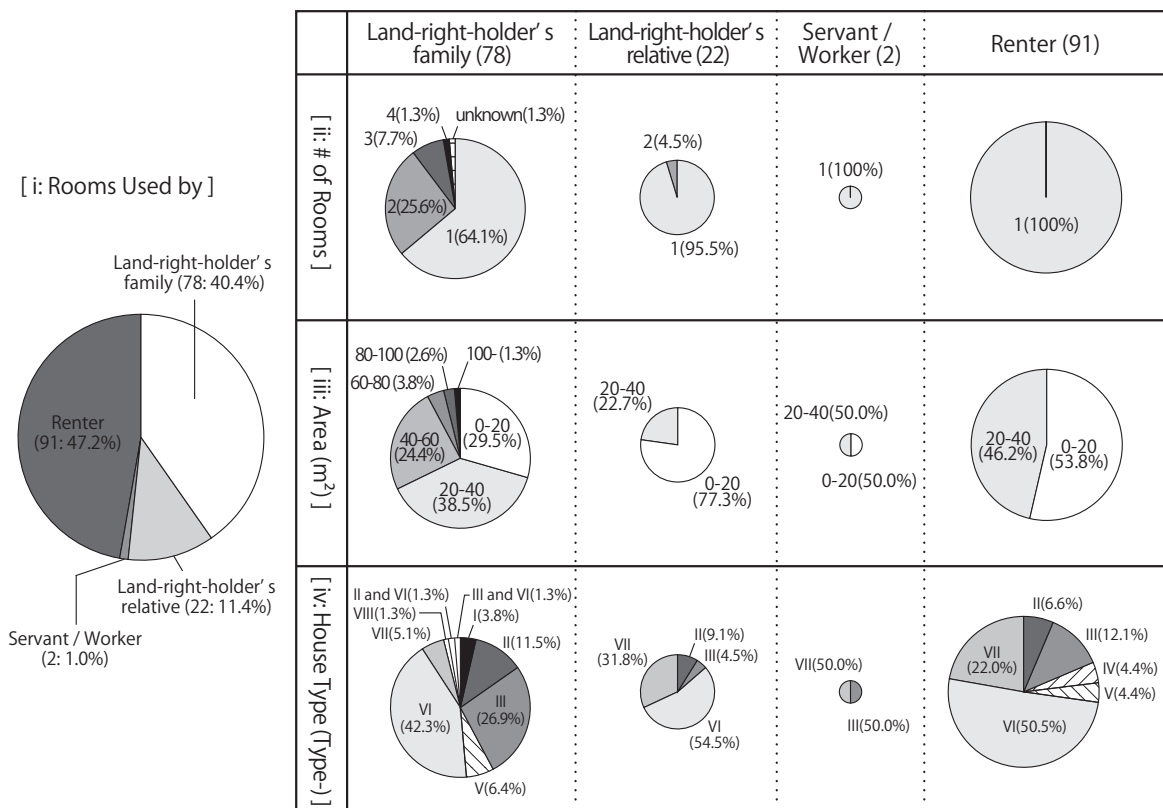


Fig.4-207 Status of each household's residence of Īnda Mesqel in reference to type of residents, *made by author.*

it is remarkable that 71.6 % of buildings of the present period are Type-VI or Type-VII (Fig.4-205: ii). This result would imply the economic situation of the existing land-right-holders. That is, they might have desire to erect new buildings despite their economic difficulty.

4-3-5: Scale = Resident

Īnda Mesqel is a residential settlement. From the spatial aspect, there are only two buildings with a window along the street which enable the running of a shop. However, only one is used in such a way in the time of field survey. Among its 193 households of Īnda Mesqel, there are only two households with a home-based business, one of which is the above (Fig.4-200: D6-1), and the second is a beauty salon (Fig.4-200: C6-1). In this section, by analyzing who existing buildings are resided by, specifically land-right-holder's family (indicating land-right-holder, his wife / her husband, or children), renter, or land-right-holder's relative, actual situation of Īnda Mesqel is approached.

According to the field survey in 2014, 40.4 % of existing households are the family of land-right-holders, 11.4% are other relatives, and 47.2 % are renters (Fig.4-207: i). The others are servant or worker under land-right-holders. From Fig.4-207, it is clear that preferable houses are more likely to be used by the land-right-holder's family. Among 28 houses with one more room, 27 are resided by them, and the building area is also larger (Fig.4-207: ii, iii). All the renters' houses have only one room, and building area of less than 40 m². Furthermore, the house type of a renter's one is more likely to be lower ranking: 72.5 % are *ch'iqqa-bét* or its derivation (Type-VI and VII), while the land-right-holder's family remains in 47.4 % (Fig.4-207: iv). Nevertheless, there are four cases of Type-V

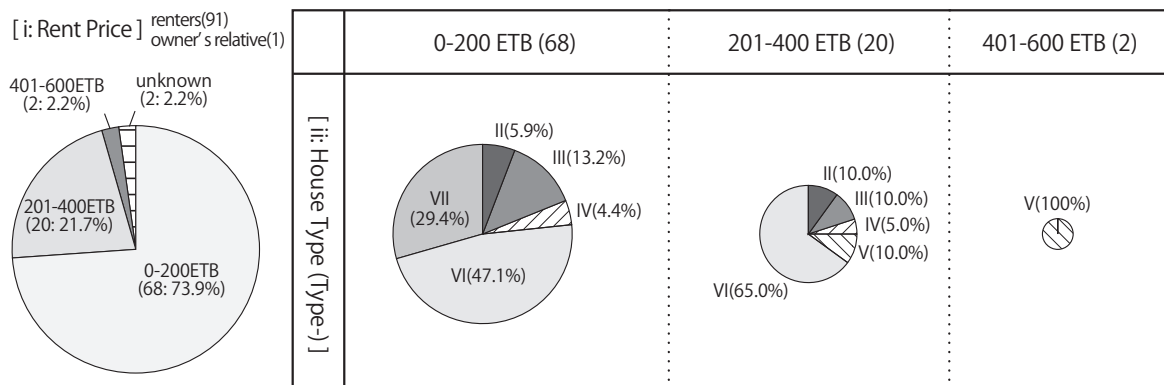


Fig.4-208 Rent price in Īnda Mesqel in connection with house type, *made by author.*

houses for renters (4.4 %) in the parcel of F6, where the land-right-holder resides outside Īnda Mesqel. The house rank of land-right-holder's relative shows a same trend with the renter's one: *ch'iqqa-bét* or its derivation is dominant, and all are less than 40 m² in a building area (Fig.4-207: ii, iii, iv). However, they usually reside without paying rent.

While pre-Derg buildings are more likely to be used by a land-right-holder's family, present period buildings are used more by renters (Fig.4-205: iii). When it is taken into consideration that buildings other than *ch'iqqa-bét* or its derivation are dominant in the pre-Derg period buildings, the result shows that land-right-holders have remained in the higher status house(s) and have made their relatives and renters reside in the newly built lower status one(s) (Fig.4-205: ii). Nevertheless, it is remarkable that the land-right-holders have the intention to erect buildings for their relatives, without any expectation of house rent.

Nevertheless, the presence of rent houses signifies the land-right-holder's desire to acquire rents. However, the rent prices are low. The price is less than 200 ETB in 73.9 % of rent houses, and the highest is 500 ETB even for the costliest one (Fig.4-208: i). A small amount of the rent price might be affected by the building's status. Though there is no distinction between materials of stone (Type II and III) and *ch'iqqa* (Type VI and VII), the most preferable Type-V house is relatively more expensive than other house types (Fig.4-208: ii). Perhaps, after enough budgets are acquired, lower ranked buildings will be upgraded and rent price will become higher in the future.

In this way, who have resided in which ranked houses correlates with each land-right-holder's economic or familial situation, and the quality of existing buildings. The majority of rent houses are austere due to the limited budgets of land-right-holders, however, it paradoxically makes the capacity to accept lower-income people into the urban area. The domestic layout that is similar to the locally inherited one is helpful for them to adapt to their new living environment. That is, the action of land-right-holders for the acquisition of a small amount of rent makes the small economic cycle in accordance with the renter's demand to reside in the city.

4-3-6: Comparison with the Urbanization in Central Mekelle

By comparing the urbanization process between central Mekelle and Īnda Mesqel, each of which has a different context, differences and similarities are identified as follows:

- While the increase of building density had happened in central Mekelle at the end of post-Italian occupation period, it happened in Īnda Mesqel only recently. At the end of post-Italian occupation period, Īnda Mesqel was equivalent to other ordinary villages. This should be the reason why the designation of urban / rural in the Derg period was different between them. As a result, landlords of central Mekelle suffered the loss of their privileges, while land-right-holders of Īnda Mesqel were not affected much.
- When landlords of central Mekelle enjoyed the privilege of land tenure prior to 1974, they erected the house buildings for their kin groups. This phenomenon is somehow similar to what is going on in Īnda Mesqel presently. However, in terms of building materials, they are clearly distinct. That is, while the majority of new buildings at that time in the central Mekelle were made of stone, the majority of recent ones in Īnda Mesqel are of *ch'iqqa*.
- The “land adjustment” process in central Mekelle was accompanied by the emergence of new house types including the ones with entrance(s) along the street. On the other hand, in Īnda Mesqel, there are no such buildings up to the present day.
- The majority of residents in central Mekelle are renters presently, due to the phenomenon of “lend-away” (Fig.4-209: i). In contrast, each parcel of Īnda Mesqel is likely to be managed by the family of land-right-holders. According to the author’s field survey, among 53 existing parcels, 39 have still had resident(s) from the land-right-holder’s family. The percentage of rooms used by the land-right-holder’s family is clearly higher in Īnda Mesqel (Fig.4-209: i).
- Commercial activity is still active in central Mekelle, specifically the study area of Okazaki, though the business categories have been changed recently due to the implementation of a new urban master plan in 2009 / 2010 (Fig.4-209: ii). On the other hand, it is not active in Īnda Mesqel.
- In central Mekelle, a number of stone buildings of the pre-Derg period still remain today (Fig.4-209: iii, iv). Therefore, those stone buildings have been available in central Mekelle, while land-right-holders of Īnda Mesqel have had to erect new buildings to make a new residential space(s) for renters or land-right-holder’s relative. However, mainly due to land-right-holder’s economic situation, they have been often forced to go to *ch'iqqa-bét* or its derivation (Fig.4-209: iii, iv). This affects lower rent prices of Īnda Mesqel, as well as lower commercial potential (Fig.4-209: v).

	Central Mekelle (study area of Okazaki, 2011)	Īnda Mesqel (2014)
i) Rooms used by land-right-holders	18.4%	40.4%
Rooms used by renters	13.6% (rented from private) 55.2% (rented from <i>kebele</i>)	47.2% (rented from private)
ii) Rooms used for commercial (or residential and commercial) purpose	29.4%	1.0%
iii) Buildings made by stone	78.2%	27.8% (Type I, II and III)
Buildings of <i>chikka bét</i> or its derivation	15.6%	65.3% (Type VI and VII)
iv) Buildings of pre-Derg period	40.6%-63.5%	13.9%
Buildings of present period	14.6%-36.5%	70.8%
v) Average of house rent	873 ETB (among 17 households interviewed by Okazaki)	205 ETB

Fig.4-209 Comparison between the cases of central Mekelle and Īnda Mesqel, *made by author*.

In this way, the series of urbanization process is different between central Mekelle and Īnda Mesqel. However, they share the situation-oriented attitude of land-right-holders. Their decisions are highly affected by the land tenure system of each period, the situation of land inheritance, existing buildings, potential of the site, and more personal economic and familial issues. That is to say, the actual urbanization process of both Īnda Mesqel and central Mekelle is led by combining individual actions of each land-right-holder.

The essence of the gap between the existing land situation and imaginary urban planning should be found here. That is, the bottom-up-like process initiated by the land-right-holder's action is basically opposite to the top-down-like one of so-called modern urban planning. The gap is symbolically shown in the base point of the transformation. While the former set the base in each parcel held by each land-right-holder, the latter is more likely in the newly developed road network. From the aspect of the former, the urbanization process can be found in each parcel. In this particular organic urbanization process, "indigenous cultural elements," in the words of MCSPR, have been able to be kept alive.

5: Transformation on “City” and Building since the 19th Century until Now

From the above discussion, it became clear that the “city” and buildings of Mekelle and its surrounds have transformed. This transformation is summarized in this section. The discussion in urban scale is carried out from the perspective of location, local settlement techniques, and spatial network, as following key terms of chapter I. And, the discussion in building scale is carried out from the perspective of material, tool, construction method, and builder’s role, as following key terms of chapter II and III.

(a) Urban Scale 1: Location and Local Settlement Techniques (Fig.4-210)

Mekelle was originally situated in the site with rich natural resources such as water and good soil for cultivation, following local settlement techniques. Furthermore, as other previous major sites of Tigray, it is located in the mountainous place. Before becoming a “city,” there were nine settlements, five in the hillside and four in the flatland, on the site of Mekelle. Hillside location is also the characteristic of local settlement to reserve the bottom of slope for farmlands. On the hilltop, a church named Īnda Yesus was situated, following local customs. In this way, topography was an important factor of the location of settlements, including the site of Mekelle.

In 1880s, Emperor Yohannis IV Palace was erected on the small hilltop in the flatland of Mekelle. Taking advantage of it, aristocrats and warriors under Emperor Yohannis IV and his family members migrated around this palace in the flatland. At that time, topography again took an essential role: the majority of houses were ‘built on several minor hills,’ in reference to Wylde (1901), by taking micro terrain into account. The shape of each parcel was curvilinear, and the concept of “street” was not important. There should not be a house building with an entrance along the street, namely in-between spaces of each parcel. In this way, initial “urban” formation of Mekelle was progressed by application of local settlement techniques actively.

After the decline due to First Italo-Ethiopian War of 1895/96, the development of Mekelle was progressed gradually. Firstly, Abriha erected his castle in the south part of Mekelle, an away from built-up area around Yohannis IV Palace. However, after he got away from Mekelle, the area around Abriha Castle was ignored in the development. On the other hand, the area around Yohannis IV Palace experienced population increase, which was accompanied with increase of foreign people and foreign influences, and densification of buildings. The “land adjustment” process, the process that each old parcel came to be adjusted to the newly established street pattern and divided into smaller lots, was progressed in the built-up area, namely central Mekelle (Okazaki 2011). This process is accompanied with appearance of new house types. The most remarkable point in the “urban” scale is that houses with an entrance(s) along the street increased. That is to say, the concept of “street” came into existence as this “land adjustment” process progressed. Nevertheless, this process can be understood as the extension of local settlement techniques, because it was caused by the local landlord’s demand of land inheritance and erecting buildings, namely bottom-up-like process without modern urban planning attitude.

The first urban master plan was made by Italians in the occupation period. This top-down-like process is totally different with the above-mentioned process of “land adjustment.” In the master

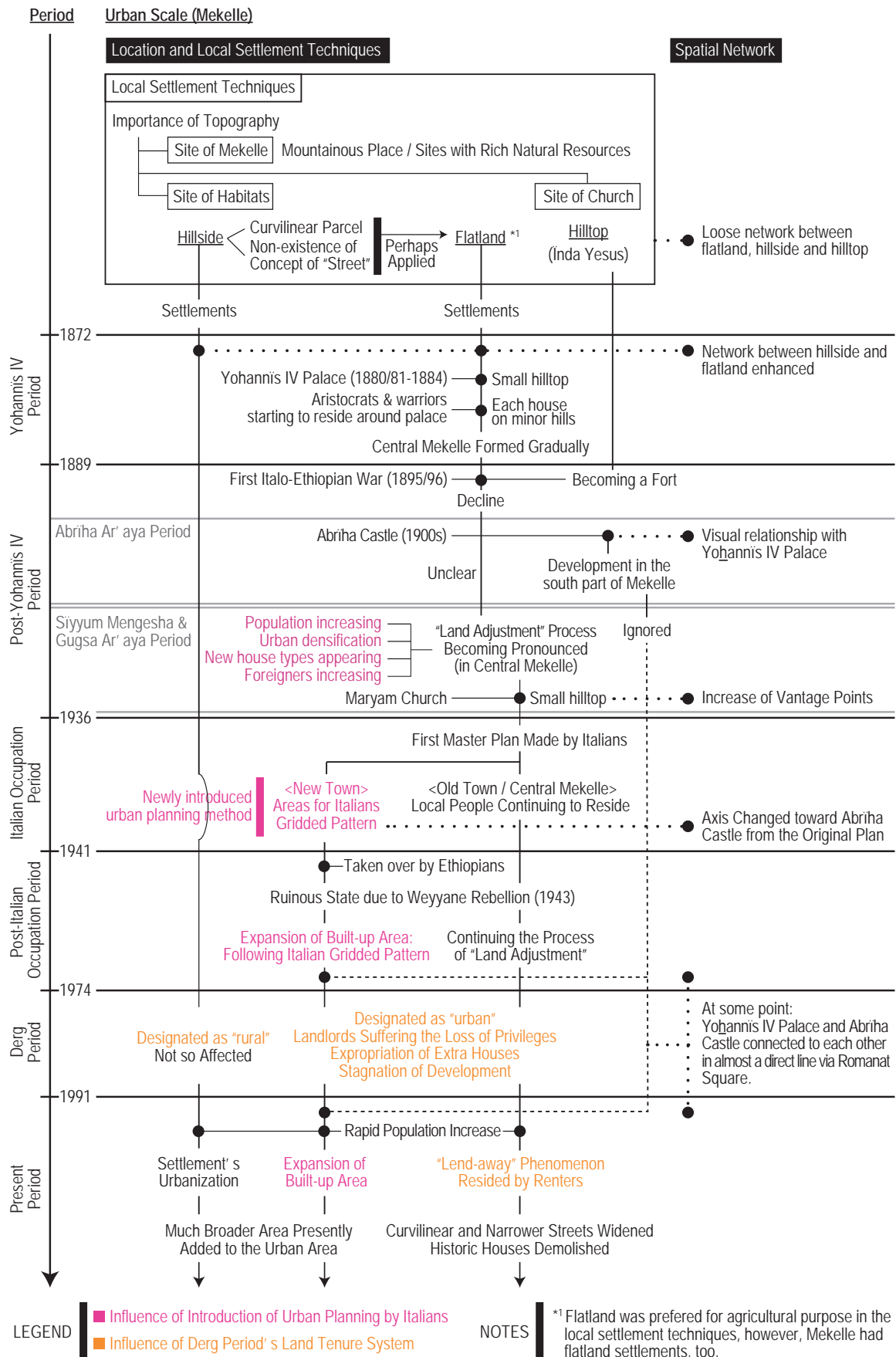


Fig.4-210 Transformation on city since the 19th century until now, made by author.

plan, the concept of segregation between Italians and local people could be found. As a result, the new town with gridded pattern was created beyond the area for local people, namely central Mekelle that had been formed previously. However, a degree of the achievement of this master plan in Italian occupation period should have been limited due to its shortness of the time. After the occupation period, the new town was taken over by Ethiopians, and the built-up area was expanded by extension of Italian gridded pattern. On the other hand, in central Mekelle, the process of “land adjustment” was continued.

Due to radical change on land tenure system in the Derg period, the landlords of central Mekelle suffered the loss of their privileges. The “extra” housing units became government property by expropriation, and the former landlords were obliged to choose either to remain in an extremely reduced housing unit or move out (Okazaki 2011). On the other hand, local settlements were, even the ones nearby Mekelle such as Īnda Mesqel, not so affected by this change of land tenure system, because they were designated as the rural.

After the end of Derg period, population of Mekelle has been rapidly increasing until now. Several former landlords of central Mekelle recovered their land-right, however, they have tended to no longer reside in central Mekelle and attempted to ensure income by renting rooms (Okazaki 2014-2). Even when they have resided in the parcel of central Mekelle, they have made a rent room(s) along the street by erecting a new house(s) or a wall(s). That is, the mindset has come to be different to the Derg period before. Recently, due to the operation of new master plan in 2009 and 2010, the unique curvilinear and narrow streets of central Mekelle have been widened in rectilinear manner, and a number of historic buildings have been demolished.

Presently, urbanization has happened in the former local settlement such as Īnda Mesqel, too. The land-right-holders have erected new house buildings for their relatives or renters, though the buildings have been often austere. The process of settlement’s urbanization in Īnda Mesqel is led by combining individual actions of each land-right-holder until now. Their attitude is situation-oriented: their decisions are highly affected by the land tenure system, situation of land inheritance, existing buildings in their parcel, potential of the site, and other personal economic and familial issues. This process is similar to the process of “land adjustment” though the actual outcomes are different. As expansion of the urban area has progressed in the master plan, these local settlements including Īnda Mesqel have been absorbed into the urban area presently. As a result the city is now in the midst of change.

(b) Urban Scale 2: Spatial Network (Fig.4-210)

Prior to initial “urban” development in the latter half of the 19th century, there were five hillside and four flatland settlements at the site of Mekelle. The relationship between these settlements do not seem very strong, though the settlements were incorporated in a network of water streams and there was kinship between settlers of different settlements at least to some extent. In addition, there was Īnda Yesus Church at the hilltop since before the “urban” development. Due to its strategic importance, the site became the site of the Italian Fort in the Italo-Ethiopian Wars.

Through the initial “urban” formation in Yohanni’s IV Period, the relationship between hillside and flatland areas was enhanced. The enhancement of the relationship is symbolized by the family history of a resident in Īnda Mesqel, one of the original hillside settlements: his ancestors had

a good relationship with the father of Yoḥannīs IV and Yoḥannīs IV himself. Īnda Mesqel was located at a strategically important place due to its highest location out of nine original settlements. Furthermore, the broad view westward is available, and water stream along Yoḥannīs IV Palace was poured, from Īnda Mesqel. Not only the sites of important family residences, but also the site of churches should be considered to understand the relationship between hillside and flatland areas: there were churches such as Īnda Yesus and Medhané Alem, which had a close relationship with a series of rulers, in other hillside or hilltop places. On the other hand, in the flatland, the palace was formed on the small hilltop. After the palace construction, the aristocrats and warriors under Yoḥannīs IV resided surrounding the palace in the flatland to secure it physically. In this way, the defense of the palace was strategically considered from every aspect of topography, network of water stream, physical security, and broader visual and acoustic network.

Importantly, there were visual and acoustic networks between these vantage points. As for progressing the development after the period of Yoḥannīs IV, other elements such as Abriḥa Castle and Maryam Church, both of which are located on a small hilltop in the flatland, were added as vantage points. The development process of Mekelle can be recognized as the process of multiplication of visual and acoustic networks.

Through the process of urban planning since the Italian occupation period, these vantage points were incorporated into the master plan. Firstly, Abriḥa Castle was planned as the focus of road network's central axis in the urban planning, though the first master plan made by Italians did not draw it so. In the 1960s, Maryam Church became the focus of new urban planning made by foreigners, though it was not implemented. In 1971, the space in front of Yoḥannīs IV Palace became a square by covering the river. And at some point until 1991, Abriḥa Castle and Yoḥannīs IV Palace were connected to each other in almost a direct line. In this way, several elements of network in the former "urban" formation were utilized for the sake of urban planning.

(c) Building Scale 1: Material and Tool (Fig.4-211)

In the past, local buildings were made from locally available materials such as stones, woods, and soils, though wood became scarce due to deforestation before the 19th century. In the 20th century, indigenous wooden species were replaced with transplanted eucalyptus woods. Since the latter half of 19th century, new building tools and materials were newly applied due to their introduction from abroad. Due to the new tools and materials, building techniques were transformed gradually:

From the observation of the buildings in the targeted area, it is hypothesized that the uniformed sized stone was firstly applied in the main entrance's arch of Yoḥannīs IV Palace. To shape stone pieces into the intended shape, stones pieces were collected from quarry site by use of *malakino*, and an outline of each stone piece was scraped by *martello*. The Italian-like pronunciation of each tool name corresponded with the fact that the palace construction was participated by Italian craftsman Giacomo Naretti. Though these tools were used to make an arch in the palace, the shaped stone pieces were applied to the building walls in later periods. Not only the application of uniformed sized stone pieces, but also application of large sized stone pieces were made possible by the use of these tools. The first such example is found at least approximately 15 years later than the palace construction. From this fact, it is hypothesized that the use of newly introduced tools was improved by the local builders. The application of such uniformed and large sized stone pieces became dominant

Period Building Scale

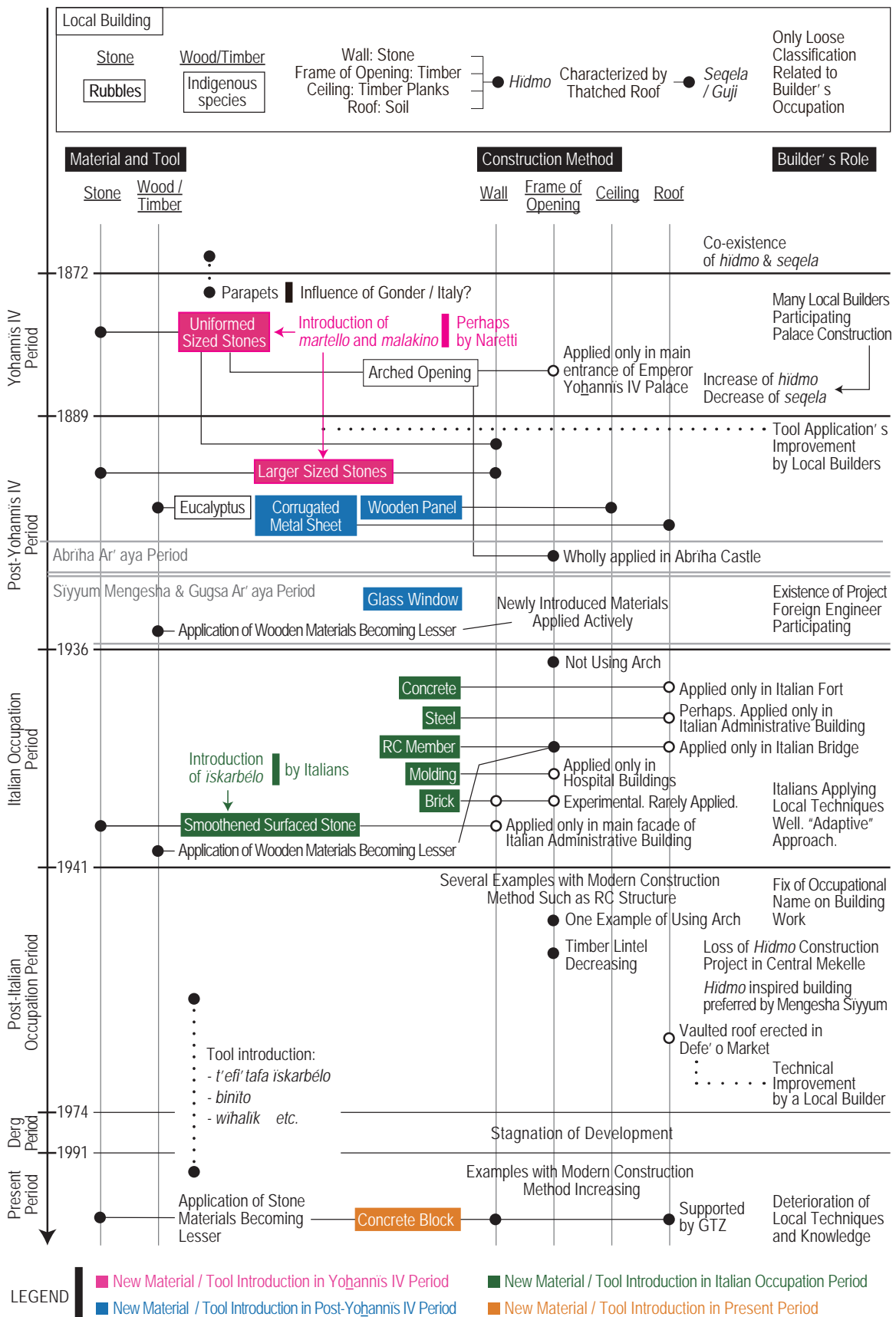


Fig.4-211 Transformation on building since the 19th century until now, made by author.

in the later periods. This transformation of stone pieces corresponds to the interview results with local builders. According to them, the suitable sized stone pieces that could be directly applied for the masonry wall became difficult to collect directly on or in the ground. Perhaps, the introduced tools became popular due to the increase of demand to take stone pieces from quarries. This situation may have been caused by the increased usage of stone materials, which was triggered from the initial “urban” formation in Mekelle after the construction of Yohannis IV Palace. Afterward, *iskarbélo* to make a smoothened surfaced stone piece was introduced, perhaps in the Italian occupation period. The first example to apply such stone pieces is found in Italian Administrative Building erected in that period. From the name of the tool, again Italian influence is likely.

Through the post-Yohannis IV period and Italian occupation period, new building materials were gradually introduced. According to the analysis of remaining buildings, corrugated metal sheet for roof material, wooden panel for ceiling material, and glass windows were introduced in the post-Yohannis IV period. These were actively applied in the later periods, too. During the Italian occupation period, introduction of RC member, namely material of steel and concrete, was essential. This was dominantly used in the later periods, too. Though the material of brick was applied experimentally in buildings of the Italian occupation period, it was rare and did not become popular in later periods. Remarkably, these newly introduced building materials replaced the building elements of wood, which had been scarce from the former periods.

In this way, the reason that newly introduced building materials and tools became popular can be found from the environmental situation at that time, such as the lack of good sized stones and scarcity of wooden materials. That is to say, tool and material introduction process can be interpreted as the result of local builders’ adaptive attitude to the environmental situation at that time rather than the simple introduction process of foreign materials and tools.

After that, the tools such as *t’efi’tafa iskarbélo*, *binīto*, and *wīhalik* seemed to be introduced, though the detailed introduction process cannot be traced. Recently, the use of concrete block has become popular. This material is now replacing the material for walls: stone. Therefore, the visual townscape of Mekelle, which was characterized by stone masonry, has changed radically.

(d) Building Scale 2: Construction Method (Fig.4-211)

In the past, there were two house types named *hīdmo* and *seqela*. While *hīdmo* consists of stone masonry wall, timber pillar(s), beams and ceilings, and soil roof, *seqela* is characterized by thatched roof. These two types of construction methods were applied to both houses and churches in the past. Even in Yohannis IV Palace, of which construction was participated by foreigners, locally inherited building techniques of *hīdmo* were actively applied, though several important technical improvements about stone arch and timber use can be also found.

Though the rural settlements in Īnderta before the palace construction were characterized by the co-existence of *seqela* and *hīdmo* houses (*seqela* was a more frequent choice), the initial “urban” formation of Mekelle was accompanied with an increase of *hīdmo*-oriented houses. Perhaps, the migration of the rich and many local builders’ participation in the palace construction caused the emergence of the unique masonry city of Mekelle.

In those *hīdmo*-oriented houses, uniformed sized and/or large sized stones, which were enabled by the introduction of tools, were usually applied. Though such shaped stones are made by appli-

cation of foreign-oriented tools since the 19th century, both the buildings with shaped stones and those with rubble stones are called “*hīdmo*” by local people. This is remarkable because it shows that the presently existing so-called “traditional house” is not exactly the same as the original one, and it is in part affected by foreign techniques. That is to say, techniques applied in the “traditional house” do not always correspond to the techniques applied in the past, and the “traditional” techniques and houses have been transformed in reality.

Instead of a local timber lintel, a stone arch was applied in Yoḥannīs IV Palace. Though it was applied in the main entrance, it came to be fully applied in Abrīḥa Castle at the beginnings of 20th century. Though an arched opening was applied until the end of post-Yoḥannīs IV period, it was no longer used during and after the Italian occupation period. In the Italian period, RC member became popular as the material for frame of opening. Timber lintel and opening’s frame were gradually replaced with RC member in the later periods.

From the post-Yoḥannīs IV period, timber ceiling and soil roof were gradually replaced with newly introduced wooden panels and corrugated metal sheet respectively. As mentioned above, this replacement was rational because wooden materials had become scarce. These building materials were continuously applied in the buildings of later periods. Modern construction methods such as RC structure and steel roofed structure may have been adopted during the Italian occupation period, as shown in a Bridge nearby Kwiḥa and Italian Administrative Building. Though such structures were continuously erected in the post-Italian occupation period, the total building number was not so high. The increase of modern construction method building began in earnest after the end of stagnation during the Derg period, namely the present period. These days, it is remarkable that not only buildings of RC and steel structure, but also buildings of concrete blocks are increasing.

As the buildings with newly introduced materials increased, local *hīdmo* construction started to decrease. In central Mekelle, *hīdmo* house erected after Italian occupation period is difficult to find. Though the *hīdmo* houses of post-Italian occupation period are possible to find in Īnda Mesqel despite in low numbers, there are no *hīdmo* houses of the present period. According to a builder in the rural area, *hīdmo* house is still built in rural areas, though the number has been decreasing. Though the *hīdmo* house has gradually become an infrequent choice, it is still one of the important cultural identities in Tigray. This was expressed by Mengesha Siyyum, a governor of Tigray in the 1960s and 70s: the building projects under him were clearly inspired by *hīdmo*.

(e) Building Scale 3: Builder’s Role (Fig.4-211)

As discussed in chapter III, the classification of builder’s occupation should have been loose previously. The author hypothesized that building construction was carried out by those who were good at construction work in the community. The loose classification of the builder’s occupation was rational because the local building techniques and knowledge to erect *hīdmo* were closely related with agricultural ones in the past. It is valid to understand local building techniques and knowledge as one of the techniques on the whole livelihood, regardless of the category such as food and shelter. Interaction between people and environment was the essential factor to produce such local techniques and knowledge.

Practically, the number of local builders with adequate techniques and knowledge should have increased by the construction project of Yoḥannīs IV Palace in 1880s, because the majestic palace fully

applied the local building techniques as discussed above. The builders who participated in the project should have contributed to constructing *hĩdmo*-oriented houses that formed masonry townscape of Mekelle, in the later periods. They not only inherited the techniques, but also improved the way of using tools, which were perhaps introduced from a foreign craftsman. Later, they also acquired the building techniques to apply newly introduced building materials such as wooden panels and corrugated metal sheet for ceiling and roof. These techniques and knowledge that local builders acquired were actively utilized by Italians, in the occupation period. In other words, Italians studied the local builders' techniques and knowledge, and applied them actively. This "adaptive" approach of Italians was realistic and rational because Mekelle was not a very strategically important place for the Italians.

Through the increase of building construction projects, the occupational ability on builders was specialized, and the occupational names such as *nedaqi*, *hanatsi* and *feleñamo* were fixed gradually. Introduction of new building materials utilized for only building construction should have been the driver. It is remarkable that the building construction was continuously carried out by local builders, in spite of gradual changes of major building materials and construction methods. Furthermore, it should be noted that the local builders sometimes realized the technical improvement of modern construction method, as shown in the example of Defe'o Market's vaulted roof.

However, as buildings without local techniques and knowledge increased and *hĩdmo* became an infrequent choice, the building techniques and knowledge on *hĩdmo* deteriorated. Presently, the number of local builders who have adequate techniques and knowledge to erect *hĩdmo* house has decreased, and they are becoming older. According to one interviewed builder, masonry structure was the best in the Italian occupation period. This is suggestive, because it implies that the tool introduction from abroad enhanced the workability and produced technical improvement on the one hand, it simultaneously affected the degradation of awareness for local techniques and knowledge on the other hand. Furthermore, it is critical that the deterioration of local building techniques and knowledge means that linkage between building and agricultural techniques and knowledge have been lost, and the whole interaction between people and environment has been weakened. The decrease of the number of experienced *hĩdmo* builders symbolically shows that building techniques and knowledge are separated from the local environment and the other categories of livelihood.

6: Conclusive Summary

In this chapter, the transformation of “city” and buildings since the 19th century was analyzed chronologically by dividing the time into several periods. Based on that descriptions following the timeline, the transformation was summarized from the perspective location and local settlement techniques (urban scale: 1), spatial network (urban scale: 2), material and tool (building scale: 1), construction method (building scale: 2), and builder’s role (building scale: 3), as following the topics of chapter I, II and III.

Yohannis IV Palace construction was the essential project to understand the initial “urban” development and the change of the trend on buildings. That is to say, after the palace construction, the “urban” area was formed by migration of aristocrats and warriors under him, and *hīdmo*-oriented buildings, which were perhaps erected by local builders who had participated in the palace construction, became dominant. Furthermore, the tools to shape stone pieces for arched opening were perhaps introduced by Italian craftsman at the time of palace construction.

As the population of Mekelle increased in the post-Yohannis IV period, each parcel of central Mekelle came to be adjusted to the newly established street pattern and divided into smaller lots. This transformation, which was mainly caused by the landlord’s demand of land inheritance and erecting buildings, was accompanied with appearance of new house types. For the buildings of this period, new building materials such as corrugated metal sheet and wooden panel began to be applied actively.

In the Italian occupation period, the first master plan, of which gridded pattern was totally different with the former “urban” formation, was made by Italians. On a building scale, the Italians actively utilized the building techniques and knowledge acquired by local builders until former periods. On the other hand, they started to apply the material of RC member at that time.

Though the degree of achievement of the first master plan should have been limited, the master plan influenced the later period’s territorial expansion of built-up area. That is, urban sprawl in the later period was implemented by extension of the Italian grid. Nevertheless, several pre-Italian buildings located at the vantage points were utilized for the sake of urban planning. On the other hand, in central Mekelle, landlords enjoyed the privilege of land tenure until the beginnings of Derg period. Concerning building scale, the materials and tools introduced in the former periods were often continuously applied. Nevertheless, the stone was seamlessly used for building walls, though the shape of each piece changed due to the introduction of tools. Therefore, the unique masonry townscape emerged in central Mekelle.

The Derg period was characterized by stagnation. While landlords of central Mekelle suffered the loss of their privileges due to the radical change in land tenure system, the rural people including Īnda Mesqel nearby Mekelle were not so affected. After the end of the Derg period, population of Mekelle has been rapidly increasing until now. Even in the former local settlements such as Īnda Mesqel, urbanization process has occurred presently. This settlement’s urbanization process has been led by combining individual actions of each land-right-holder until now, without modern urban planning processes. Nevertheless, such settlements are now in the hands of the city administration.

After the end of Derg period, the buildings with modern construction method have increased until now, and local *hīdmo* house is no longer built in the city and has become an infrequent choice even

in the rural area. As buildings without local techniques and knowledge increased and *hĩdmo* became an infrequent choice, the building techniques and knowledge on *hĩdmo*, which were closely related with agricultural ones, are now deteriorated. It is a serious problem because it means that the building techniques and knowledge have been separated from the local environment and the other categories of livelihood.

Conclusion

(1) Conclusive Remarks on Urban Issues

In both “cities” and local settlement in Tigray and Eritrean highland, similar techniques and knowledge on spatial formation were often applied. For example, both of them were located on sites with rich natural resources such as water resources and fertile soils, and the habitats were often placed in the hillside to reserve the bottom of the slope for farmlands. These techniques and knowledge, which were characterized by adaptation to topography, were related to local agricultural techniques and knowledge. Due to the hillside location of habitats, each parcel was usually curvilinear following the shape of the terrain. This curvilinear parcel was often applied even in cases when they were formed in the flatland. The hilltop was often occupied by a church. Not only in “cities” of Tigray and Eritrean highland, but also in a series of predate moving capital and fixed capital of Ethiopian monarchs, these applications of local settlement techniques and knowledge could be found. Though these similarities between “cities” and local settlements seems to make it difficult to understand the definition of a “city” in Ethiopia, there were several distinctions: a “city” was characterized by the existence of a palace or ruler’s parcel, larger population, existence of trading activity, more variety in people’s occupation, and visual and acoustic networks between vantage points. These are recognized as part of the criteria to decide whether a certain place could be called a “city” or not.

These characteristics fit into the case of initial “urban” formation of Mekelle, which progressed by taking advantage of Yohannīs IV Palace construction in the latter half of the 19th century, too. Though the “urbanized” area was established in the flatland next to the palace, the “city” was formed by taking micro topography into consideration: each curvilinear shaped parcel was situated on the top of a minor hill. Furthermore, there was a visual and acoustic relationship between flatland “urban” areas and several nearby hillside settlements. The multiple networks between vantage points strategically contributed to strengthening the defenses of the “city.” The “urban” formation process of the area urbanized since pre-Italian occupation period, which is called central Mekelle in this dissertation, was characterized by urban densification, which was mainly caused by the local landlord’s demand of land inheritance and construction of new buildings to accommodate population increase. Through the process, which was continued until the end of imperial state in 1974, new house types with entrances along the street increased, and the concept of “street” was gradually enhanced in a spontaneous way. This was progressed by the land-right-holders’ continuous individual actions directed by their situation-oriented attitude. Therefore, this process can be understood as the derivation of local settlement techniques. On the other hand, a different way of urban development, which was characterized by the extension of built-up area, was initiated in the Italian occupation period. Italians made the first master plan with gridded pattern, which did not pay attention to the topography of Mekelle. Though it was only partially achieved during the Italian period, the extension of built-up area in the later periods was progressed by extending this Italian grid. While this urban extension progressed without regard for topography, the vantage points containing buildings from previous periods such as palaces, castles, and churches, became the focus of the central axis in a series of urban planning projects.

In the present period, the population of Mekelle is rapidly increasing and the urban area is largely expanding. As a result, many of the surrounding local settlements have been absorbed in the urban area. İnda Mesqel, this dissertation’s targeted hillside settlement located next to central Mekelle, is one of the examples of these urbanized settlements. According to the results of the field survey, the

settlement urbanization has been carried out without any formal urban planning processes. The urbanization has been progressed by a series of land segmentalization caused by land inheritance and building construction by each land-right-holder. The appearance of each parcel varies depending on the status of land inheritance and each land-right-holder's economic situation. This process has spatially progressed by a shift of land use from farming to residential. However, the transformation is caused by the land-right-holders' continuous individual actions such as each land-right-holder's parcel formation and building construction with adaptive attitudes. In this point, the concept of "city," namely application of local settlement techniques and knowledge related to the agricultural ones, is inherited in this urbanized settlement.

When this process of settlement urbanization is compared with the case of central Mekelle, it becomes clear that the common contributing factors have led the urbanization process. However, in central Mekelle, the process was progressed without the shift of land use from the farming to the residential, because the area was not farmland from the beginning of transformation. Furthermore, the actual appearance is different between them, due to the difference of locational characteristics, historical context, land-right-holders' social, economic and familial situations, and resulted concrete individual actions. Notably, the relationship with agricultural land is weaker in central Mekelle.

(2) Conclusive Remarks on Building Issues

In Tigray, stone masonry technique dates back to the pre-Aksumite period. The technique in the pre-Aksumite and Aksumite periods is characterized by the existence of dressed block stones and huge stones used for obelisk and monolithic pillars. However, these techniques vanished after the loss of centralized political power in the post-Aksumite period. The remaining stone masonry technique was rubble masonry, which was achievable with less manpower and time. In the post-Aksumite church building, a series of timber layers and monkey heads were often inset in the masonry walls. Though many timber materials were used in the earlier church buildings such as the main building of Debre Dammo, the timber materials for walls were usually abandoned in the later period's buildings. This should have been affected by deforestation.

Remarkably, the common building materials and techniques with post-Aksumite church buildings were applied in a type of local house named *hīdmo*, too. It consists of rubble masonry walls without timber layers or monkey heads, timber pillar(s), beams and ceiling, and soil roof. The *hīdmo* house was made from locally available materials such as stones, woods, and soils. In Īnderta, namely Mekelle and its surrounds, limestone, which is soft enough to be easily shaped, is available. This is an important fact to understand the reason why masonry technique developed and continued in this area. On the other hand, wooden materials became depleted due to deforestation. Therefore, the use of wooden construction increased the prestige of the house. Above all, the use of finely shaped timbers was highly respected. Using more wooden materials and labor was meaningful to establish hierarchy and places of authority in the local community. Due to difficulty of material collection, *hīdmo* house was only built by those who could afford to build. People who could not build *hīdmo* were forced to build thatched roofed house named *seqela* or *guji*.

The local building techniques and knowledge were closely related with the agricultural ones in the past. Firstly, stone piling technique was applied in both agricultural terraces and house buildings. Secondly, tools such as *mahresha* and *ch'ikiro* were often the ones adopted for agricultural use.

Thirdly, soil knowledge essential for agricultural produce was applied to the construction of *hidmo*, especially as the material for roofing, masonry joint, and plaster, too. Finally, *taf*, the highest ranked cereal in the targeted area, was the most preferable type of straw (*hasir*) for masonry joint, too. This is remarkable because it shows that the criteria of cereal's rank were decided not only by gustatory issue, but also effectivity for building construction.

The building transformation since the latter half of the 19th century was mainly affected by the introduction of new building tools and materials. According to the observation results of buildings in Mekelle, tools used to cut stone pieces from the quarry and then shaping them were introduced from abroad to realize the stone arch in the Yohannis IV Palace, which was constructed in 1880s by an Italian craftsman. Thanks to the introduction of tools named *malakino* (iron bar with pointed tip to cut stones) and *martello* (hammer used for shaping stones), larger and uniformed sized stone pieces for masonry walls became possible. Importantly, improvements to the tool use was realized by Ethiopian local builders by the 1890s. This tool use solved the problem on the availability of stone materials at the time and changed the provision system of stone: according to builders, natural stones with suitable size that could be used directly for masonry wall ran out in Mekelle and its surrounds at that time. That is, the introduction of new tools changed the provision system of stone material from direct collection into stone cutting. As a result, the size of stone pieces applied in buildings became larger and uniformed. Thanks to that, a unique masonry townscape appeared in central Mekelle. While stone material was continuously used in the buildings of 20th century, wooden material was replaced by newly introduced building materials. Wooden panel ceiling and corrugated metal sheet were used instead of timber ceiling and soil roof from the end of the 19th century. RC members were used instead of timber opening frame from the Italian occupation period. These replacements contributed to constructing buildings without wooden materials, which had run out at that time.

(3) Who Was a Builder?

Interview research with local builders clarified issues that could not be unveiled from mere building observation. The important results from interview research was that local building techniques and knowledge were strongly connected with agricultural ones, and several of them were interchangeable. Therefore, conventional understanding on building was not applicable in the targeted area. The interview on the builder's occupational ability before the Italian influence suggests the loose classification of the builder's occupation. In this context, a builder was a farmer, who made up the majority of the population in Tigray. Continuous interactions with local environment gradually achieved various environment-adapted techniques and knowledge on both agricultural and building issues. To understand Tigray's society and culture, the application of similar construction method in both religious and residential buildings is suggestive because it tells that the same way of occupational ability was extended to the religious building activities.

The building transformation since the latter half of the 19th century could be explained by the introduction of new building tools and materials from abroad. Local builders acquired the skills to apply them, and improved them to fit local environmental situation at that time. This contribution of local builders should be respected. Thanks to it, erecting buildings without starved materials became feasible. That is to say, the building transformation of the targeted area can be interpreted as the achievement of local builders' adaptive practices to accept the environmental situation at that

time. Such building skills acquired by local builders were actively practiced by Italians, who adopted an adaptive approach in the occupation period.

While the tools and materials introduced from abroad enhanced the workability and resulted technical improvement on building, the builder's occupational ability was specialized gradually. This is confirmed by the nominalization of occupations such as *nedaqi* (mason), *hanatsi* (roofer) and *feleñamo* (workshop of wooden furniture). However, this trend caused the decrease of *hīdmo* house construction and a decrease in awareness for local building techniques and knowledge at the same time. That is, deterioration of builder's techniques and knowledge was the backside of the improvement of building techniques and knowledge. It led to the weakened connection of techniques and knowledge between building and agriculture.

On an urban scale, the connection with local agricultural techniques and knowledge decreased in the 20th century, too. Initial "urban" formation before the Italian period was carried out by application of local settlement techniques and knowledge derived from agricultural ones. This was characterized by the adaptation to topography. That is, local farmers' techniques and knowledge were applied not only for food production and building construction, but also to the spontaneous way of settlement and "urban" formation. However, it gave way to urban planning with gridded patterned street from the Italian occupation period. As the development of Mekelle progressed afterward, agri-urban environment of Mekelle deteriorated: a series of water streams were often exhausted and farming activities have declined recently.

(4) Potentials of Local Techniques and Knowledge

The agri-building and agri-urban connection has been visualized as actual masonry buildings and unique townscape with curvilinear streets. Their historical values should be highly regarded, not only as charming historical buildings and scenic townscape, but also as achievements of the local people who were at once farmers, builders, and "urban" actors. However, in central Mekelle, plenty of historical buildings have been demolished, and curvilinear and narrow streets have been widened into rectilinear shape recently, due to the implementation of new urban planning. The resulted obscuration of agri-building and agri-urban connection on local techniques and knowledge is a serious problem.

However, application of local techniques and knowledge for adequate heritage conservation, new building construction, and urban development is a difficult task from several aspects. First of all, the current local environment is different with the past. For example, there is a serious gap between the scarcity of wooden materials and application of many woods in the *hīdmo* house. As mentioned above, building transformation since the 19th century was affected by the changes of locally available building materials. Therefore, understanding on agri-building and agri-urban connection, or relationship between people and local environment, should be updated now, in tune with the current situation. Secondly, the current social situation on urbanization is completely different with the past. For example, demolition of historic buildings in central Mekelle is a more difficult and complicated issue than simply considering heritage protection, because the area had suffered from urban poverty. Both conservation and building and urban design should take the current social situation into consideration.

Nevertheless, the potentials of local techniques and knowledge on building and city should be tak-

en into consideration at the event of building construction and urban development in the future. For example, at the building scale, the potential of stone material, a locally sustainable material that is available even in the present day, should be reconsidered. As mentioned in the introduction, utilizing stone materials in the cobblestone project produced positive outcomes regarding economical urban infrastructure, poverty, community empowerment and fascinated townscape. It shows that conceiving the projects by way of local materials enables effective and active community participation in the project. For another instance, potentials of existing urbanized settlements should be regarded for the realization of green frame network and urban agriculture, which have been conceived in the latest edition of urban planning. Though recent environmental and social change must be taken into account, the local settlements were originally supposed to be located in the site which is suitable for food production. Existing land-right-holders' individual actions should be directed in an adequate way for its realization.

The whole local techniques and knowledge was developed through the local people's interaction with the surrounding environment such as topography, available materials, and tools. Therefore, its application will lead to effective participation of local community and builders, for adequate heritage conservation, and furthermore, building and urban activities for construction. Hopefully, new local techniques and knowledge consistent with current local environmental and social situation will be sought by taking into consideration newly introduced global techniques and knowledge such as information technology and electric generation with renewable energy. Local techniques and knowledge from the past will give various hints for it.

Reference

d'Abbadie, A.: *Douze ans dans la Haute-Éthiopie (Abyssinie)*. Paris: L. Hachette, 1868.

Acton, R., *Illustrated London News: The Abyssinian Expedition and the life and reign of King Theodore with one hundred illustrations engraved from the original sketches by the special artists and correspondents of the Illustrated London News*. London: Office of the Illustrated London News, 1868.

Al-Heimi, A. I., Peiser, F. E.: *Der Gesandtschaftsbericht des Hasan ben Ahmed El-Haimi*. Berlin: Peiser, 1894.

Alvares, F.: *Historiale Description De L'Ethiopie : Contenant vraye relation des terres, & païs du grand Roy, & Empereur Prete-Ian, l'assierte de ses Royaumes & Prouinces, leurs coutumes, loix, & religion ... ; Avec le table des choses memorables contenues en icelle*. Anvers: Plantin, 1558.

Alvares, F., Beckingham, C. F., Huntingford, G. W. B.: *The Prester John of Indies: A True Relation of the Lands of the Prester John, being the narrative of the Portuguese Embassy to Ethiopia in 1520, written by Father Francisco Alvares*, 2 Volumes. Cambridge: University Press, 1961.

Ambaye, D. W.: *Land Rights and Expropriation in Ethiopia*. Cham: Springer, 2015.

Amborn, H.: Handicrafts, *Encyclopaedia Aethiopica*, Vol. 2, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 999-1003, 2005.

Anfray, F.: Maṭarā, *Annales d'Ethiopie*, Vol. 7, pp. 33-88, 1967.

Anfray, F.: Yeha, les ruines de Grat Be'al Gebri: recherches archeologiques, *Rassegna di studi etiopici*, Vol. 39, pp. 5-23, 1997.

Anfray, F.: Mätära, *Encyclopaedia Aethiopica*, Vol. 3, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 864-865, 2007.

Annesley, G.: *Voyages and Travels to India, Ceylon, the Red Sea, Abyssinia and Egypt, in the Years 1802, 1803, 1804, 1805 and 1806*. Vol. 3, Mr. Salt's Narrative, London: Miller, 1809.

ARCCH (Authority for Research and Conservation of Cultural Heritage), CTA (Tigray Culture and Tourism Agency), DAI (German Archaeological Institute): *The Ancient Settlement of Yeha in the Abyssinian Highlands of Tigray*, year unknown (brochure on tourist attractions).

Arup International Development's Study Team (Arup), Cilies Alliance: *Future Proofing Cities: Regional Cities in Ethiopia*, Arup, 2016.

Asfawossen A., Metasebia D., Aberra M.: *Geotourism in Ethiopia: Archaeological and Ancient Cities, Religious and Cultural Centres: Yeha, Axum, Wukro and Lalibela*. Addis Abeba: Shema Books, 2008.

Aspen, H.: Houses of the Amhara, *Encyclopaedia Aethiopica*, Vol. 3, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 76-78, 2007.

Azene B., Birnie, A., Tengnäs, B.: *Useful Trees and Shrubs for Ethiopia: Identification, Propagation and Management for Agricultural and Pastoral Communities*. Regional Soil Conservation Unit, Swedish International Development Authority, 1993.

Bahru Z.: *A History of Modern Ethiopia: 1855-1974*. London : J. Currey ; Athens : Ohio University Press; Addis Ababa : Addis Ababa University Press, 1991.

Bairu T.: Yohannēs IV, *Encyclopaedia Aethiopica*, Vol. 5, Bausi, A. et al. (eds.), Wiesbaden: Harrassowitz, pp. 73-80, 2014.

Bauer, D.F.: *Household and Society in Ethiopia: An Economic and Social Analysis of Tigray Social Principles and Household Organization*. East Lansing: African Studies Centre, Michigan State University, 1977.

Beckingham, C. F., Huntingford, G. W. B., Almeida, M.: *Some Records of Ethiopia, 1593-1646: being extracts from the History of high Ethiopia or Abassia, by Manoel de Almeida, together with Bahrey's History of the Galla*. London: Hakluyt Society, 1954.

Beylot, R.: Gundä Gunde, *Encyclopaedia Aethiopica*, Vol. 2, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 917-919, 2005.

Bianchi, G: *Alla terra dei Galla : narrazione della spedizione Bianchi in Africa nel 1879-80*. Milano: Treves, 1884.

Bogale, T. (1): *A Study on the Historical Places of Feled Daero and Dejzmach Abraha Araya*. unpublished document (in Tigrinya).

Bogale, T. (2): *A Brief History of Abune Gebre Menfes Kidus Church Mekelle*. unpublished document.

Breton, J.: *Builders across the Red Sea*. Addis Abeba: Centre français des études éthiopiennes, Éditions de Boccard, 2015.

Bruce, J.: *Travels to Discover the Source of the Nile, In the Years 1768, 1769, 1770, 1771, 1772, and 1773*, 5 volumes. Edinburgh: Robinson, 1790.

Bruce, J.: *Travels, between the years 1768 and 1773, through part of Africa, Syria, Egypt, and Arabia into Abyssinia, to discover the source of the Nile : comprehending an interesting narrative of the author's adventures in Abyssinia and a circumstantial account of the manners, customs ... of that country, being the substance of the original work ...* London: James Cundee, 1805.

Bustorf, D.: Titles, Ranks and Functions, *Encyclopaedia Aethiopica*, Vol. 5, A. Bausi et al. (eds.), Wiesbaden: Harrassowitz, pp. 580-590, 2014.

Buxton, D. R.: The Christian Antiquities of Northern Ethiopia, *Archaeologia*, Vol. 92, pp. 1-42, 1947.

Buxton, D.R.: The Rock-hewn and Other Medieval Churches of Tigré Province, Ethiopia, *Archaeologia*, Vol. 103, pp. 33-100, 1971.

Buxton, D.R., Matthews, D.: The Reconstruction of Vanished Aksumite Buildings, *Rassegna di studi etiopici*, 25, pp. 33-57, 1974.

Carlson, P., Mårtensson, B., Sandstoröm, R., Astedt, M.: *Housing in Makalle, Ethiopia. Housing Sociology and Designing*. Stockholm: Svensk Bygghänsst, 1971.

Casartelli, C.: The Construction and Siege of the Italian Fort at Macalle', *Casemate*, No. 86, Oxford: The Fortress Study Group, pp. 19-23, 2009.

Castro, L. D., R. Società geografica italiana, Thomas Leiper Kane Collection: *Nella terra dei negus, pagine raccolte in Abissinia*. Milano: Fratelli Treves, 1915.

Cavaglieri, G.: Outline for a History of City Planning. From Prehistory to the Fall of the Roman Empire, *The Journal of the Society of Architectural Historians (Transactions of Society of Architectural Historians)*, Vol. 6, No. 3/4, 1947.

Central Statistical Agency: *Population and Housing Census of 2007*, Addis Abeba, 2013.

Chiari, G.P.: *A Guide to Aksum and Yeha*, Addis Abeba: Arada Books, 2009.

Contenson, H.: Les fouilles de Haoulti en 1959. – Rapport préliminaire, *Annales d'Ethiopie*, Vol. 5, pp. 41-86, 1963.

Conzelman, W. E.: *Chronique de Galâwdêwos (Claudius), roi d'Ethiopie Texte éthiopien*. Paris: E. Bouillon, 1895.

Corbeels, M., Abebe S., Mitiku H.: Farmers' Knowledge of Soil Fertility and Local Management Strategies in Tigray, Ethiopia, *Managing Africa's Soils*, No. 10, 2000.

Cosson, E. A.: *The Cradle of the Blue Nile: a Visit to the Court of King John of Ethiopia*. London: John Murray, 1877.

Crummey, D.: *Land and Society in the Christian Kingdom of Ethiopia: From the Thirteenth to the Twentieth Century*. Urbana and Chicago: University of Illinois Press, 2000.

- Crummey, D.: G^wält, *Encyclopaedia Aethiopica*, Vol. 2, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 941-943, 2005.
- Crummey, D.: Land Tenure, *Encyclopaedia Aethiopica*, Vol.3, Uhlig, S. et al. (eds.), Wiesbaden, Harrassowitz, pp. 496-499, 2007.
- Darbyshire, I., Lamb, H., Mohammed U.: Forest Clearance and Regrowth in Northern Ethiopia during the Last 3000 Years, *The Holocene*, Vol. 13, Issue 4, pp. 537-546, 2003.
- Dufton, H.: *Narrative of a Journey through Abyssinia in 1862-3*. London: Chapman & Hall, 1867.
- Embassy of Japan in Ethiopia: Mekelle University, Department of Heritage Conservation, *Newsletter: Sakura-Meskel*, Addis Abeba, 2009.
- Erlich, H.: Gugsä Ar'aya, *Encyclopaedia Aethiopica*, Vol. 2, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 905-906, 2005.
- Ephrem T. W., Miyake, R., Kaku, S., Ozawa, T.: Architectural Conservation Interventions on the Rock-hewn Churches of Lalibela, Ethiopia: A Study on Traditional Conservation Skills and Local Communities' Reactions to the UNESCO's Preservation Interventions, *Journal of Architecture and Planning (Transactions of AIJ)*, Vol. 83, No. 745, pp. 583-591, 2018. 3.
- Fattovich, R.: Houses in Ancient Aksum and Təgray, *Encyclopaedia Aethiopica*, Vol. 3, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 75-76, 2007.
- Fiaccadori, G.: Zag^we, *Encyclopaedia Aethiopica*, Vol. 5, Bausi, A. et al. (eds.), Wiesbaden: Harrassowitz, pp. 107-114, 2014.
- Finneran, N.: Lalibäla, *Encyclopaedia Aethiopica*, Vol. 3, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 482-484, 2007.
- Firret P. V. A., Galinier H. G.: *Voyage en Abyssinie dans les provinces du Tigré, du Samen et de l'Amhara, dédié à s. a. r. monseigneur le duc de Nemours*. Paris: Paulin, 1847-48.
- Foster, W., Pitts, J., Poncet, C. J.: *The Red Sea and Adjacent Countries at the Close of the Seventeenth Century*. London: Hakluyt Society, 1949.
- Gascon, A.: Urbanization, *Encyclopaedia Aethiopica*, Vol. 4, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 1038-1040, 2010.
- Girma E.: Däqiqä 'Estifanosenna yä-Däbrä Berhan sango, Kefl 1, Addis Abeba, 2007.
- Girma K.: *Environment and Society in Ethiopia*. Abingdon; New York: Routledge, 2017.

GIZ: *Making Good Governance Tangible: The cobblestone sector of Ethiopia*. 2012.

Gresleri, G., Massaretti, P. G.: *Architettura italiana d'oltremare. Atlante iconografico - Italian architecture overseas. An iconographic atlas*, Bologna: Bononia University Press, 2009.

GTZ, Ministry of Federal Affairs (Ethiopia): *Low Cost Housing: Technical Manual*. Addis Abeba: GTZ. 2003.

Heldal, T., Ermias Y.: Building-stone Resources in Eritrea: Results from Introductory Work in NGU-EGS Cooperation Programme, *Norges Geologiske Undersøkelse Bulletin*, Vol. 436, pp. 183-188, 2000.

Heldman, M.E.: Church Buildings, *Encyclopaedia Aethiopica*, Vol. 1, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 737-740, 2003.

Henze, P. B.: *Layers of Time: A History of Ethiopia*. London: C. Hurst and Co., 2000.

Heringer, A., Roswag, E.: Handmade School / Anna Heringer + Eike Roswag, ArchDaily, 2010. [URL: <https://www.archdaily.com/51664/handmade-school-anna-heringer-eike-roswag>], last accessed 21 Mar. 2019.

Hobsbawm, E.: Introduction: Inventing Traditions, *The invention of Tradition*, Hobsbawm, E., Ranger, T. (eds.), Cambridge: Cambridge University Press, pp. 1-14, 1983.

Holland, T. J., Hozier H. M.: *Record of the expedition to Abyssinia: compiled by order of the secretary of state for war*. London: Clowes, 1870.

ITYOPIS – Northeast African Journal of Social Sciences and Humanities (NEAJ): Transliteration and Transcription, Year Unknown. [URL: http://www.ityopis.org/Guidelines_files/ITYOPIS-I-Transliteration.pdf], last accessed 28 Mar. 2019.

Juel-Jensen, B., Rowell, G.: *Rock-hewn churches of eastern Tigray: an account of the Oxford University Expedition to Ethiopia, 1974*. Oxford: Oxford University Exploration Club, 1975.

Kaplan, S.: Stephanites, *Encyclopaedia Aethiopica*, Vol. 4, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 746-749, 2010.

Kobayashi Maki Design Workshop, Keio University SFC Hiroto Kobayashi Laboratory: Manawhari Learning Center, Veneer House, Year Unknown. [URL: <https://www.veneerhouse.com/manawhari-learning-center-en>], last accessed 21 Mar. 2019.

Last, G., Pankhurst, R., Robson, E.: *A History of Ethiopia in Pictures: from Ancient to Modern Times*, Addis Abeba: Arada Books, 2008.

Lefebvre, T., Petit, A., Quartin-Dillon, R., Murs, M. A. O.: *Voyage en Abyssinie exécuté pendant les années 1839, 1840, 1841, 1842, 1843*. Paris: A. Bertrand, 1847.

Lepage, C., Mercier, J.: *The Ancient Churches of Tigray: Ethiopian Art*. Paris: Éd. Recherches sur les Civilisations, 2005.

Littmann, E., Lüpke, T. von, Krencker, D.: *Deutsche Aksum-Expedition: Herausgegeben von der Generalverwaltung der Königlichen Museen zu Berlin*, 4 volumes. Berlin: G. Reimer, 1913.

Locatelli, F.: Colonial History of Asmāra, *Encyclopaedia Aethiopica*, Vol. 1, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 374-375, 2003.

Lucchi, E.: *Mekelle e il suo structure plan: Pianificazione urbana in Etiopia*. Venezia: G. Astengo, 2009.

Ludolf, H.: *A New History of Ethiopia: being a full and accurate description of the kingdom of Abessinia, vulgarly, though erroneously, called the empire of Prester John*. London: Samuel Smith, 1684.

Lyons, D.E.: Building Power in Rural Hinterlands: An Ethno-archaeological Study of Vernacular Architecture in Tigray, Ethiopia, *Journal of Archaeological Method and Theory*, Vol. 14, No. 2, pp. 179-207, 2007.

Lyons, D.E.: How I Built My House: An Ethnoarchaeological Study of Gendered Technical Practice in Tigray, Ethiopia, *Journal of Archaeological Ethnographic and Experimental Studies*, Vol. 1, No. 2, pp. 137-161, 2009.

Markham, C. R.: *A History of the Abyssinian Expedition*. London: Macmillan, 1869.

Massaja, G.: *I Miei Trentacinque Anni di Missione Nell'Alta Etiopia*, 12 Volumes. Rome, Milano: Coop. tipografica Manuzio, 1885-95.

Mathew, D.: *Ethiopia: the Study of a Polity, 1540-1935*. London: Eyre & Spottiswoode, 1947.

Matthews, D.H., Mordini, A.: The Monastery of Debre Damo, Ethiopia, *Archaeologia*, Vol. 97, pp. 1-58, 1959.

McCann, J. C.: *People of the Plow: An Agricultural History of Ethiopia, 1800-1990*. Madison: The University of Wisconsin Press, 1995.

Mekelle City Administration, *Mekelle City Structure Plan Revision*, Mekelle, 2016.

Metz, M.: Land Tenure in Modern Ethiopia, *Encyclopaedia Aethiopica*, Vol. 3, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 499-500, 2007.

Mitik G.: An Overview of the History of the Monastery of Debra Alima Asira Matira St. Mary Andenet Gedam, Paper Presented at the 2nd International Littman Conference, Aksum, 2006.

Miyake, R., Okazaki, R.: A Study on the Foundation of Gunda Gundo Monastery and its Construction Process, Several Facts from Observation on the Masonry Construction and Details, Paper Presented to the 18th International Conference of Ethiopian Studies, Dire Dawa, 2012-1.

Miyake, R., Okazaki, R.: A Study on the Trading Routes Connecting the Red Sea and Ethiopia as Serial Heritages, *Bulletin of Fuji Women's University*, No. 49, Ser. II, pp. 23-38, 2012-2.

Monti della Corte, A. A.: *Castelli di Gondar*, Rome: Societa Italiana Arti Grafiche, 1938.

Mouazen, A. M., Smolders, S., Meresa, F., Gebreziabher, S., Nyssen, J., Verplancke, H., Deckers, J., Ramon, H., De Baerdemaeker, J.: Improving Animal Drawn Tillage System in Ethiopian Highlands, *Soil and Tillage Research*, Vol. 95, Issues 1-2, pp. 218-230, 2007.

Mordini, A.: La chiesa ipogea di Ucro (Amba Seneiti), *Annali dell'Africa Italiana*, Vol. 2, pp. 517-526, 1939.

Munro-hay, S. C.: *Ethiopia, the Unknown Land: a Cultural and Historical Guide*. London; New York: I.B. Tauris, 2002.

Mulubrhan A.: *The History of Atse Yohannis Comprehensive Secondary School at Maqalla*, Addis Abeba University, Master's Thesis, 1995.

Naigzy G.: Some Traditional Types of Housing in Ethiopia, *Shelter in Africa*, Oliver, P. (ed.), London: Barrie & Jenkins, pp. 106-123, 1971.

National Urban Planning Institute: *Mekelle Development Plan –Final Report (Executive Summary)*, Addis Ababa, 1993.

Nedelykov Moreira Architekten: Archaeological Museum in Wukro, Ethiopia, Year Unknown. [URL: <http://www.nedelykov-moreira.com/en/projekte/kultur/archaeological-museum>], last accessed 21 Mar. 2019.

Nosnitsin, D.: New Branches of the Stephanite Monastic Network? Cases of Some Under-Explored Sites in East Tigray, *Proceedings of the International Workshop: Ecclesiastic Landscape of North Ethiopia: History, Change and Cultural Heritage*, Nosnitsin, D (ed.), Wiesbaden: Harrassowitz, pp. 57-142, 2013

Nosnitsin, D.: Asir Mätira, *Encyclopaedia Aethiopica*, Vol. 5, Bausi, A. et al. (eds.), Wiesbaden: Harrassowitz, pp. 264-265, 2014.

Okazaki, R.: *Study on the Urban Formation and Actuality of the Central District in Mekelle, Ethiopia: Appraisal of Historical Quarters and Inner City Problems*. Keio University, Master's thesis, 2009.

Okazaki, R.: Deterioration of Heritage by Informal Urbanization in Mekelle, Ethiopia, *Journal of Asian Architecture and Building Engineering*, Vol. 10, Issue 2, pp. 343-350, 2011.

Okazaki, R.: A Study on the Formation of an Imperial City in Tigray, Ethiopia, at the Turn of the 20th Century: Construction of Mekelle During and After the Reign of Yohannes IV, *Journal of Architecture and Planning*, Vol. 79, No. 702, pp. 1753-1759, 2014-1.

Okazaki, R.: *Study on Urban Formation of Historical Center and Heritage Risk in Ethiopia: Degradation of Living Conditions in Historical Districts*. Keio University, Ph.D. Dissertation, 2014-2.

Pankhurst, R.: *An Introduction to the Economic History of Ethiopia: from Early Times to 1800*. London: Lalibela House, 1961.

Pankhurst, R.: *Economic History of Ethiopia: 1800-1935*. Addis Ababa: Haile Sellassie I University Press, 1968.

Pankhurst, R.: *History of Ethiopian Towns: from the Middle Ages to the Early Nineteenth Century*. Wiesbaden: Steiner, 1982.

Pankhurst, R.: *History of Ethiopian Towns: from the Mid-nineteenth Century to 1935*. Stuttgart: Steiner, 1985.

Pankhurst, R.: *A Social History of Ethiopia*. Addis Abeba: Institute of Ethiopian Studies, Addis Abeba University, 1990.

Pankhurst, R.: The History of Deforestation and Afforestation in Ethiopia Prior to World War I, *Northeast African Studies*, Vol. 2, No. 1, pp. 119-133, 1995.

Pankhurst, R., Gérard, D.: *Ethiopia Photographed: Historic Photographs of the Country and its People Taken between 1867 and 1935*, London and New York: Kegan Paul International, 1996.

Pankhurst, R.: Danqaz, an Early Seventeenth Century Ethiopian Capital, and its Portuguese, and Portuguese-Indian, Architectural Connotations, Paper Presented to the Fifth International Conference of Ethiopian Art, Lisbon, pp. 28-31, 1999.

Pankhurst, R.: Gəbbi, *Encyclopaedia Aethiopica*, Vol. 2, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 721-723, 2005.

Parkyns, *Life in Abyssinia: being notes collected during three years' residence and travels in that*

country. 1. London: Murray, 1853.

Pearce, N.: *The Life and Adventures of Nathaniel Pearce*. London: Colburn and Bentley, 1831.

Phillipson, D. W.: *Ancient Ethiopia: Aksum, its Antecedents and Successors*. London: British Museum Press, 1998.

Phillipson, D.W.: *Ancient Churches of Ethiopia: Fourth-Fourteenth Centuries*. New Haven: Yale University Press, 2009.

Piccioli, A. ed.: La Costruzione dell'Impero: l'Opera dell'Italia in A.O.I. dopo la Conquista dell'Etiopia, *Gli Annali dell'Africa Italiana*, Roma, 1939.

Plant, R.: Notes on Seventeen Newly-Discovered Rock-hewn Churches of Tigre, *Ethiopia Observer*, 16(1), pp. 36-53, 1973.

Plant, R.: *The architecture of the Tigre, Ethiopia*. Worcester: Ravens Educational and Development Services, 1985.

Raffray, A.: *Afrique Orientale: Abyssinie*. Paris: E. Plon et Cie. 1876.

Rubinkowska, H.: Səyyum Mängäsa, *Encyclopaedia Aethiopica*, Vol. 4, Uhlih, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 646-647, 2010.

Rüppell, E.: *Reise in Abyssinien*. Frankfurt am Main: S. Schmerber, 1838-40.

Sacchi, L.: *Architectural Heritage in Ethiopia: Two Imperial Compounds in Mekele and Addis Ababa*. Milano: Skira Editore S. p. A., 2012.

Salt, H.: *Twenty Four Views Taken in St. Helena, the Cape, India, Ceylon, Abyssinia & Egypt*. London: William Miller, 1809.

Salt, H.: *A Voyage to Abyssinia, and Travels into the Interior of that Country*. London: Rivington, 1814.

Schlüter, T.: *Geological Atlas of Africa: With Notes on Stratigraphy, Tectonics, Economic Geology, Geohazards, Geosites and Geoscientific Education of Each Country*. Berlin: Springer, 2006.

Schneider, R.: Trois nouvelles inscriptions royales d'Axoum, *Atti IV Congresso internazionale di studi etiopici*, 2 volumes. Rome: Accademia Nazionale dei Lincei, pp. 767-786 (Vol. I), 1974.

Seigne, J.: Les structures I, J et K de Mashgha, *Le wâdî Hadramawt. Prospections 1978-1979*, pp. 22-33, 1982.

- Sernicola, L.: *Ancient Settlement Patterns in the Area of Aksum (Tigray, Northern Ethiopia) – Ca. 900 BCE – 800/850 CE*. Oxford: BAR Publishing, 2007.
- Shepherd, A. F.: *The campaign in Abyssinia*. Bombay: Times of India Office, 1868.
- Shitara, T.: *A Study on the Formation of Traditional Living Space and the Transformation of Living Space by Modernization in Gondar*. Keio University, Ph.D. Dissertation, 2008 (in Japanese).
- Simon, G.: *Voyage en Abyssinie et chez les Gallas-Rais. L’Ethiopie, le Negouss Iohannes, les eglises monolithiques de Lalibela*. Paris: Challamel aîné, 1885.
- Smidt, W.: Təgray, *Encyclopaedia Aethiopica*, Vol. 4, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 888-895, 2010.
- Smidt, W., Nosnitsin, D.: Sérac, *Encyclopaedia Aethiopica*, Vol. 4, Uhlih, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 626-628, 2010.
- Smith, C. E.: *Designing Inclusive Cities, Design with the Other 90%: Cities*, New York: Cooper Hewitt, National Design Museum, 2011.
- Smith, F. H.: *Through Abyssinia : an envoy’s ride to the King of Zion*. London: Fisher Unwin, 1890.
- Strecker, I.: Abraham & Sarah. Creators of a Productive Landscape, Film Presented to the 20th International Conference of Ethiopian Studies, Mekelle, 2018.
- Stylianoudi, L., Nosnitsin, D.: Kätäma, *Encyclopaedia Aethiopica*, Vol. 3, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 355-358, 2007.
- Tadesse S.: *Establishment and Development of Mekelle*. Mekelle: Mega Enterprise, 2001 (in Tigrinian).
- Takaste N.: The Zagwe Period and the Zenith of Urban Culture in Ethiopia, Ca. 930-1270 AD, *Africa: Rivista trimestrale di studi e documentazione dell’Istituto italiano per l’Africa e l’Oriente*, Vol. 61, No. 1, pp. 120-137, 2006.
- Teshale A., Solomon T., Equbay T, Okazaki, R., Miyake, R.: Formation and Development of the Outskirt of Mekelle, Aynalem, Paper Presented to the 18th International Conference of Ethiopian Studies, Dire Dawa, 2012.
- Tigray Tourism Office: *Mekelle Cluster: Sightseeing in and around Mekelle*. Mekelle: Sunrise Printing Press, year unknown (brochure on tourist attractions).

Tsegay B.: 'Addigrat, *Encyclopaedia Aethiopica*, Vol. 1, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 78-79, 2003-1.

Tsegay B.: Abrəha Ar'aya, *Encyclopaedia Aethiopica*, Vol. 1, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 46-47, 2003-2.

Tsegay B.: Mängäsa Yohannəs, *Encyclopaedia Aethiopica*, Vol. 3, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp.728-729, 2007.

UNESCO: *Culture: Urban Future; Global Report on Culture for Sustainable Urban Development*, UNESCO, 2016.

United Nations: 2017 Revision of World Urbanization Prospects, 2017. [URL: <https://esa.un.org/undp/wpp/>], last accessed 5 May 2018.

Vigoni, G.: *Abissinia; giornale di un viaggio*. Milano: Hoepli, 1881.

Volker-Saad, K.: Houses in Eritrea, *Encyclopaedia Aethiopica*, Vol. 3, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 82-84, 2007.

Williams, F.M.: *Understanding Ethiopia: Geology and Scenery*. Cham: Springer, 2016.

Wylde, A. B.: *'83 to '87 in the Soudan. With an account of Sir William Hewett's mission to King John of Abyssinia*. London: Remington, 1888.

Wylde, A. B.: *Modern Abyssinia*. London: Methuen & Co., 1901.

Yohannes A., Tsegay B. G.: Mäqälä, *Encyclopaedia Aethiopica*, Vol. 3, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, pp. 761-763, 2007.

Zewde G.: *Yohannes IV of Ethiopia: a Political Biography*. Oxford: Clarendon Press, 1975.

Zewde W.: Ar'aya Səllase Dəmsu, *Encyclopaedia Aethiopica*, Vol. 1, Uhlig, S. et al. (eds.), Wiesbaden: Harrassowitz, p. 314, 2003.

Appendix (separated volume of doctoral dissertation)

**Local Techniques and Knowledge on Building and City, and Their Transformation since the 19th Century,
in Mekelle and its Surrounds, Tigray Region, Ethiopia**

Graduate School of Media and Governance, Keio University

Nobuhiro Shimizu

Appendix I

Newly Documented Buildings in Mekelle and its Surrounds, Tigray Region, Ethiopia



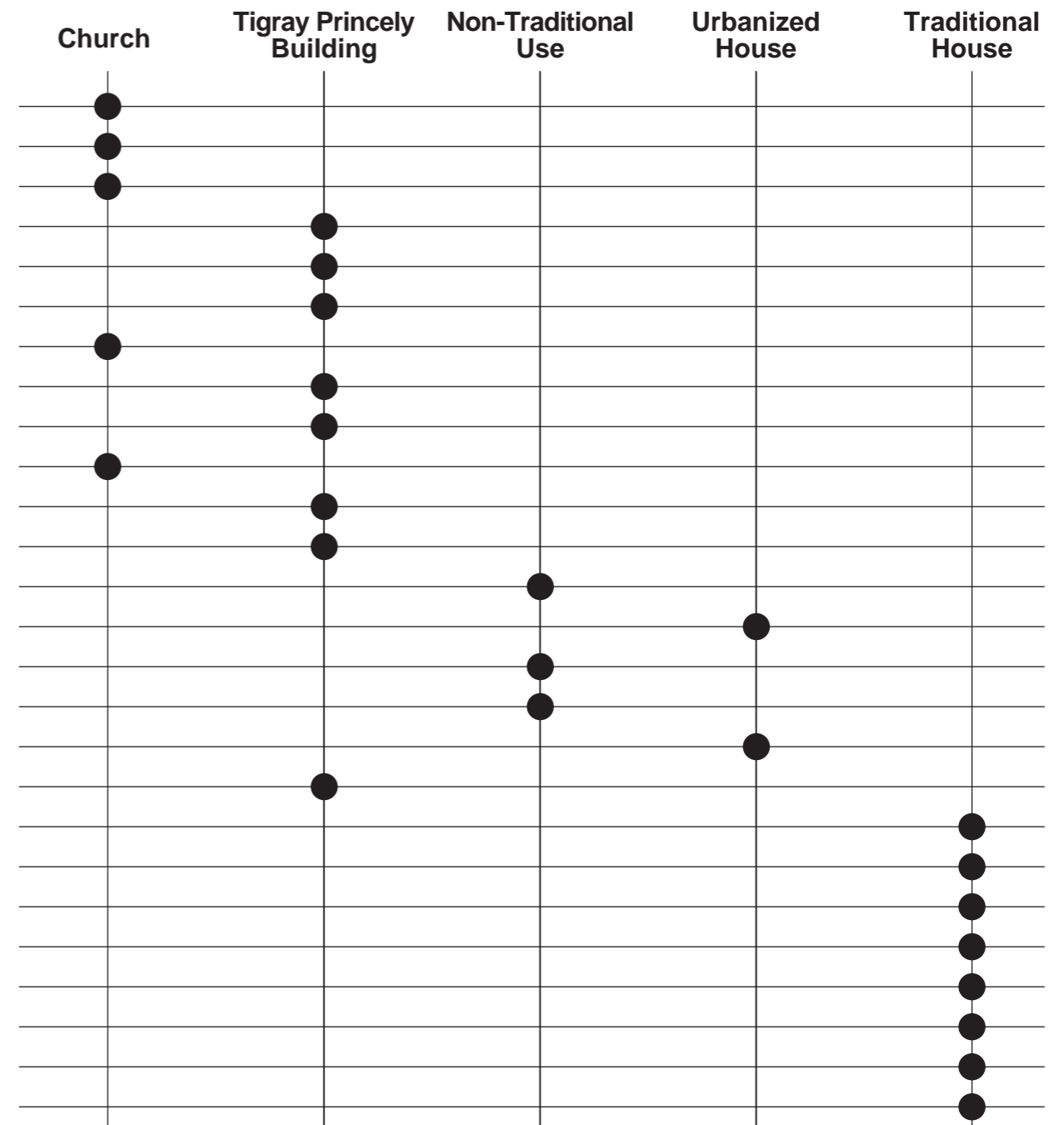
Newly Documented Buildings in Mekelle and its Surrounds, Tigray Region, Ethiopia

Nobuhiro SHIMIZU | 清水 信宏 (Keio University, Japan)

List of Buildings

Building Name	Location	Estimated Building Age
Asir Metira Monastery Old Church	near Atsbi	17C
Debre Sillase Church	near Atsbi	Unknown
Mika' el Church	Feleg Da'iro	17C or 18C
Residence of Ras Welde Sillase	Ch' eleqot	Latter Half of 18C or First Half of 19C
Ar' aya Castle	Feleg Da'iro	c. 1870s (or between 1870s and 1900s)
Former Residence of Yohannis IV	Agula ^c	1870s
Mika' el Ara Church	near `Adigdem	Yohannis IV Period (1872-1889)
Emperor Yohannis IV Palace	Mekelle	1884 (Completion)
Abriha Castle	Mekelle	1900s
Abune Gebre Menfes Qiddus Church	Mekelle	Siyyum Period (Perhaps the First One: 1914-1919?)
Siyyum' s Second House	Aynalem, Mekelle	Siyyum Period (Perhaps the First One: 1914-1919?)
Gugsa' s Second House	Mekelle	Gugsa Period (1918?-1933)
Liquor Factory	Mekelle	Gugsa Period (1918?-1933)
Melkam House	Mekelle	Gugsa Period (1918?-1933)
Italian Administrative Building	Mekelle	Italian Occupation Period (1936-1941)
Old Hospital Quarter	Mekelle	Italian Occupation Period (1936-1941)
Menen House	Mekelle	c. 1956
Mengesha' s Second House	Mekelle	1962
Imal House	inda Mesqel, Mekelle	c. 1870
Gebrehiwot House	inda Mesqel, Mekelle	c. 1965
A House in Melba ^c Village #1	Melba ^c Village	c. 1860s or 1870s
A House in Melba ^c Village #2	Melba ^c Village	c. 1865
A House in Melba ^c Village #3	Melba ^c Village	c. 1915
A House in Melba ^c Village #4	Melba ^c Village	c. 1925
A House in Ch' eleqot	Ch' eleqot	19C
A House in Ant' alo	Ant' alo	c. 1960s

Original Building Use





[1] Location, made by Shimizu, N. (source: Google Map)



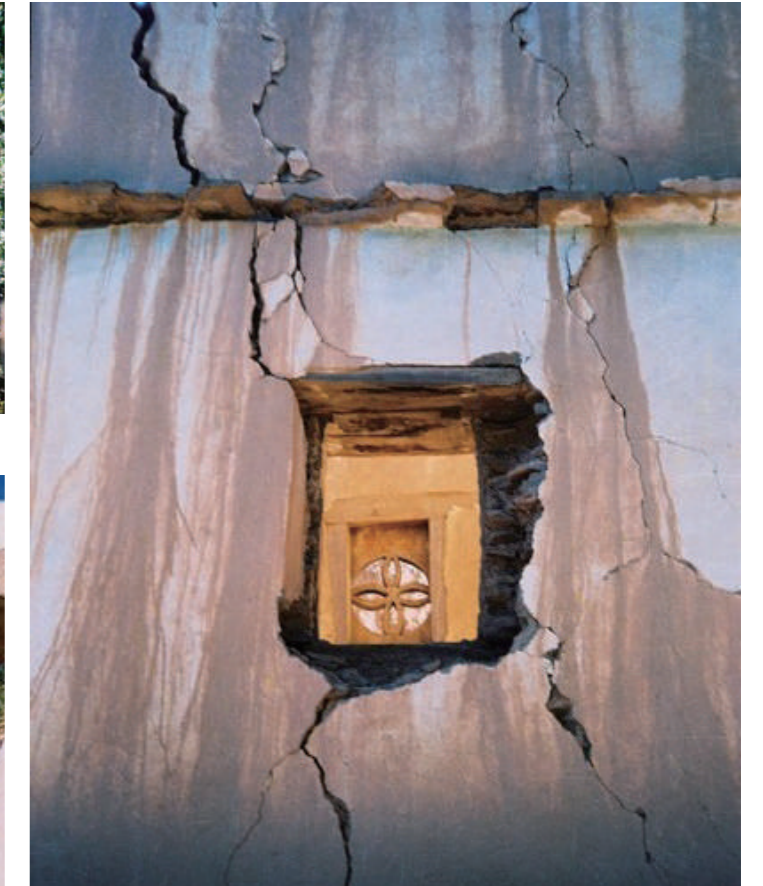
[5] External Appearance (from the South), photo by Mitik G., 2007



[6] External Appearance (from the South), photo by Mitik G., 2007



[7] External Appearance (from the North), photo by Mitik G., 2007



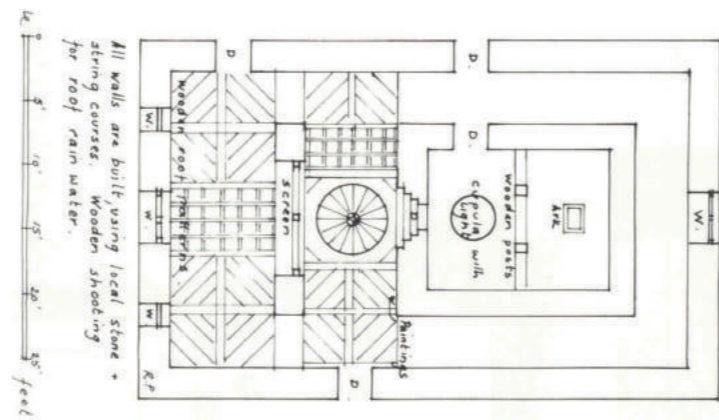
[8] An Ornamental Window in the Meqdes' Wall (Photo from the Outside Western Wall), photo by Mitik G., 2007



[2] External Appearance (from the South, 1970s), from Plant, R., 1973



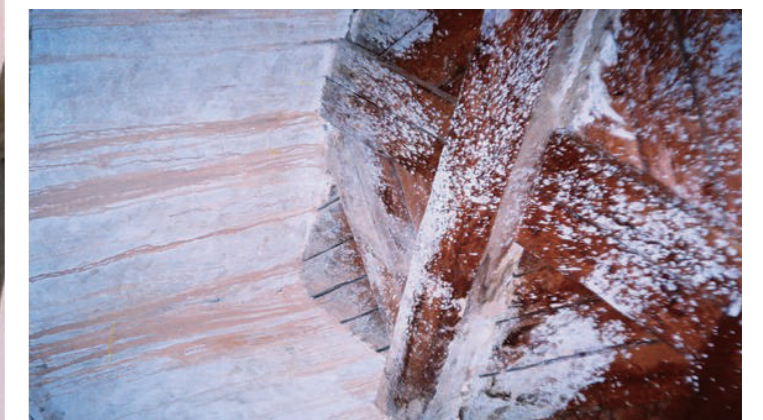
[3] Internal Appearance (1970s), from Plant, R., 1973



[4] Plan in 1970s, from Plant, R., 1973



[9] Internal Appearance of Qiné Mahlét, photo by Mitik G., 2007



[10] Original Wooden Ceiling, photo by Mitik G., 2007

<p>Site Name: Asir Metira Monastery Old Church (near Atsbi)</p>	<p>Title: Pictures</p>	<p>Survey Year: 2010, 2011</p>	<p>Introduction of the Site: Though the targeted monastery was established in the 6th century in reference to the local tradition (Mitik 2006) and flourished in the 15th century under Zer'a Ya'iqob, it was frequently endangered by the Muslims later (Nosnitsin 2014). In the 17th century, it was re-established by a certain abunā Yishaq and favored by Emperor Yohannis IV in the 19th century (Ibid.). From this chronology, the targeted old church seemed to be built in the 17th century. The targeted old church was recorded in the 1970s by Ruth Plant. She commented the church is "important example of where traditional methods both in the stone exterior walls and the wooden roof are still to be seen (Plant 1973)."</p>
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[11] External Appearance (from the South), *photo by Miyake, R., 2009*



[12] External Appearance (from the Southeast), *photo by Miyake, R., 2009*



[19] Internal Appearance after *Meqdes* Wall Demolished, *photo by Higuchi, R., 2010*



[20] Openings between *Qiddist* and *Qiné Mahlét*, *photo by Higuchi, R., 2010*



[13] Heavy Crack in the South Wall, *photo by Miyake, R., 2009*



[14] A Top-down View, *photo by Miyake, R., 2009*



[21] Remaining Beams in *Qiné Mahlét*, *photo by Higuchi, R., 2010*



[23] A Timber Ornament between *Qiddist* and *Qiné Mahlét*, *photo by Kinase, R., 2010*



[15] A Top-down View, *photo by Miyake, R., 2009*



[16] External Appearance (from the South), *photo by Higuchi, R., 2010*



[23] Remaining Timber Members, *photo by Shimizu, N., 2010*



[24] Building Foundation, *photo by Miyake, R., 2011*



[17] External Appearance (from the West), *photo by Higuchi, R., 2010*

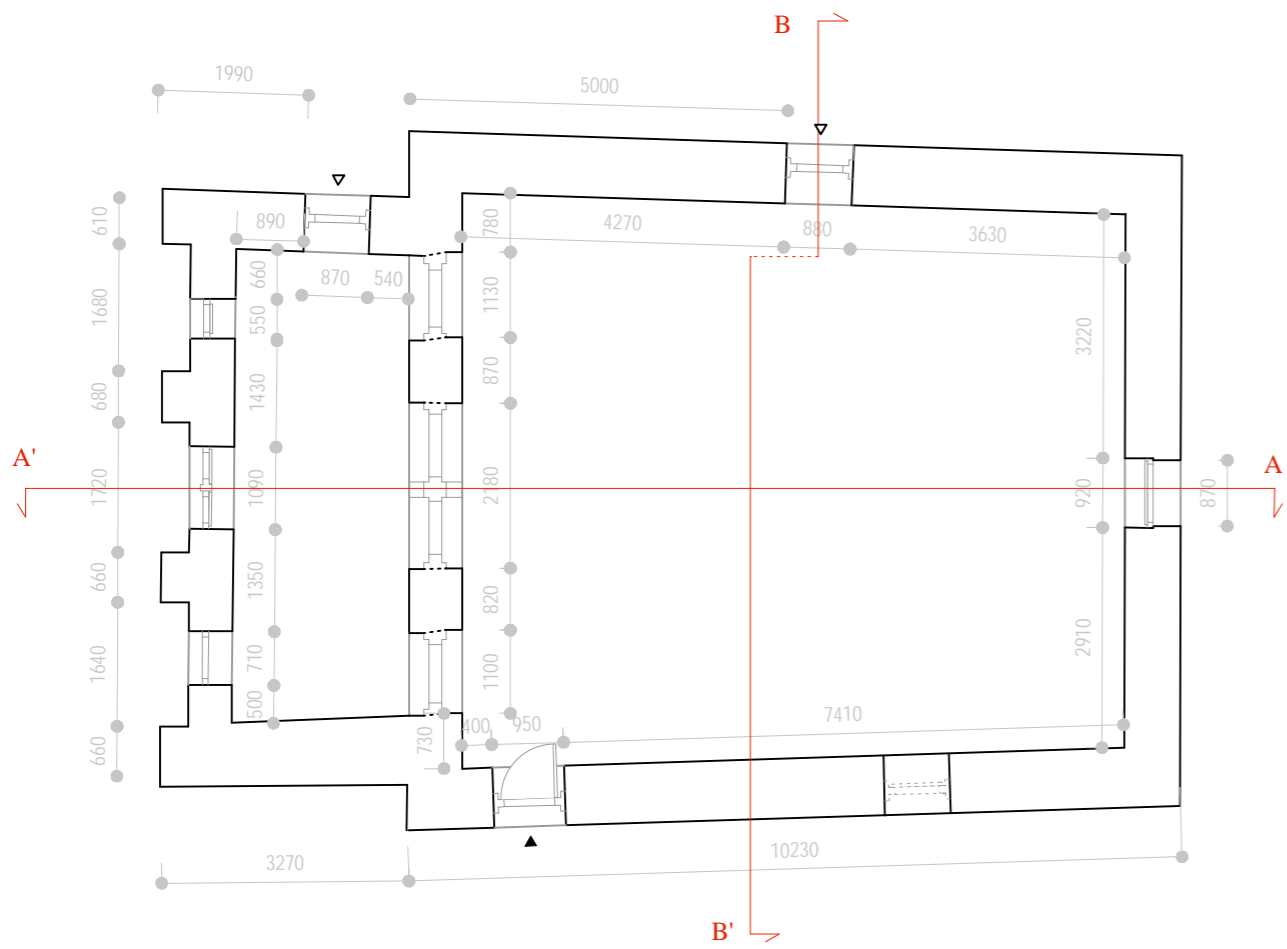


[18] External Appearance (from the North), *photo by Higuchi, R., 2010*

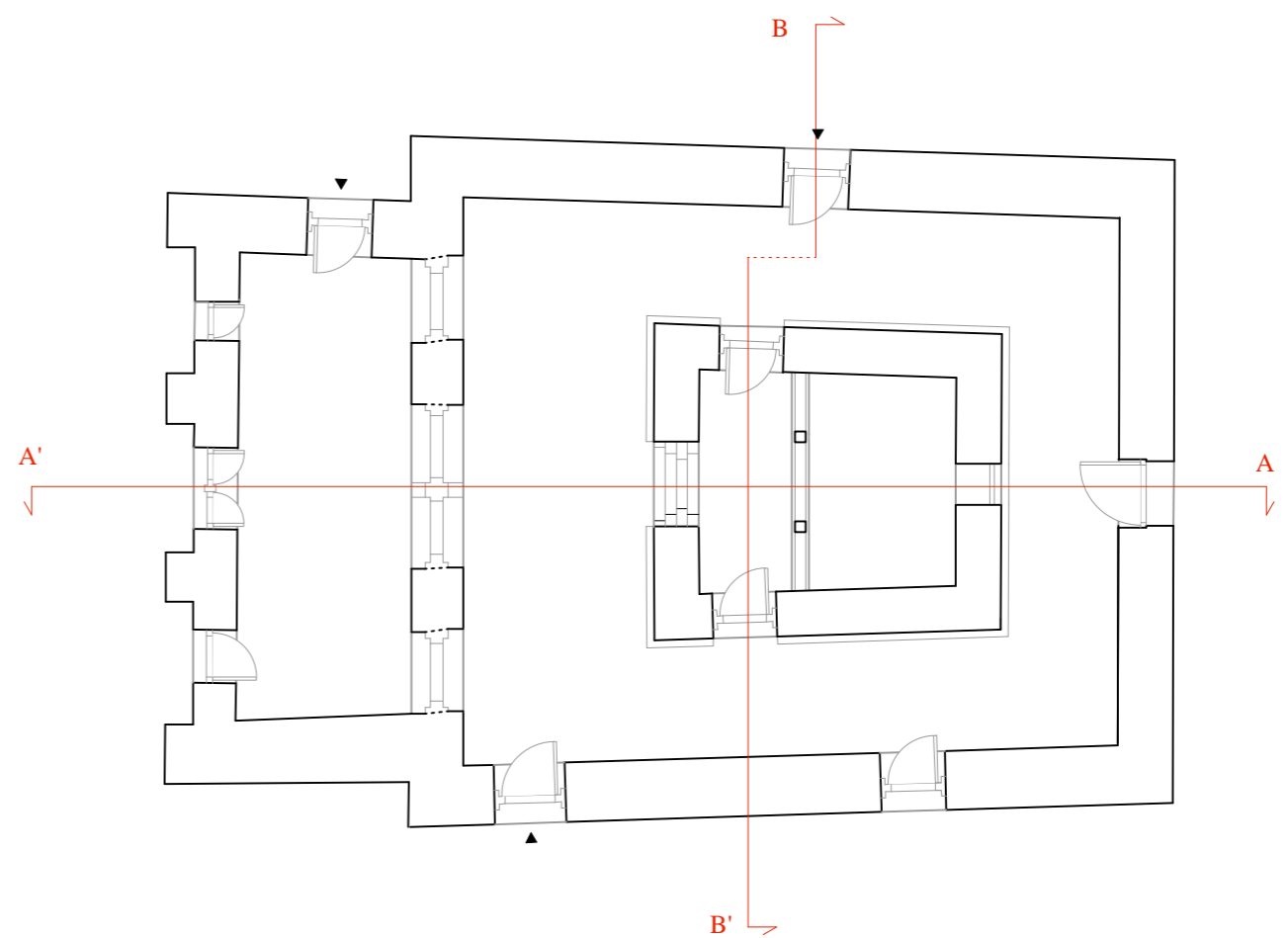


[25] The Monastery and Surroundings, *photo by Shimizu, N., 2010*

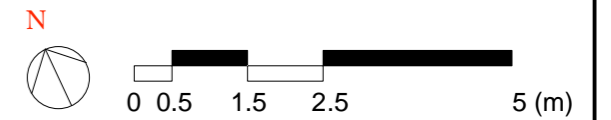
Site Name: Asir Metira Monastery Old Church (near Atsbi)	Title: Pictures	Survey Year: 2010, 2011	Introduction of the Site: (Cont.) However the church was destroyed in the late 1990s by lightning, and new church was erected in nearby site. The shown restoration plan in this archive is the outcome of Japanese team research headed by Riichi Miyake at the request of local organization. The detailed restoration process is described in Miyake et al. (in printing).
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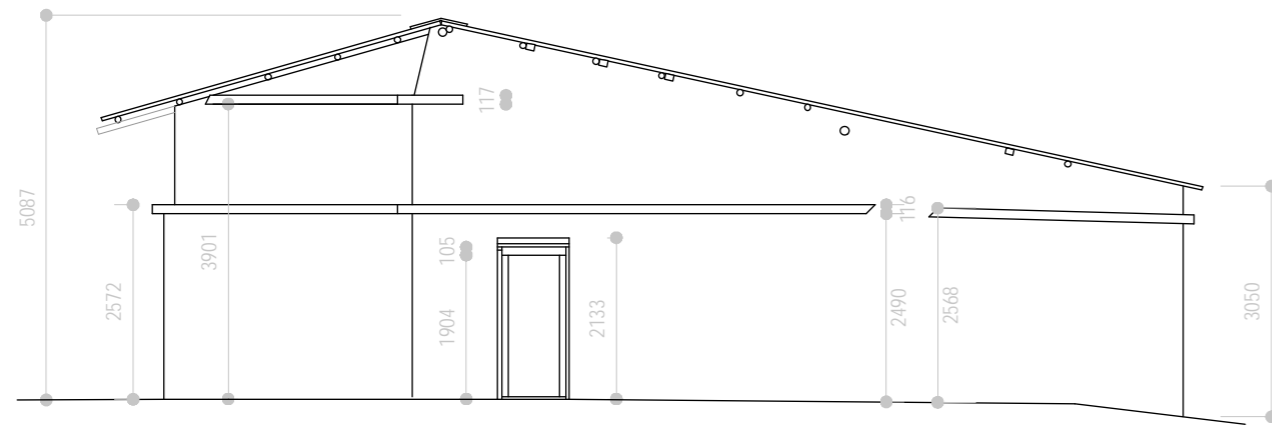
Plan (Present Condition)



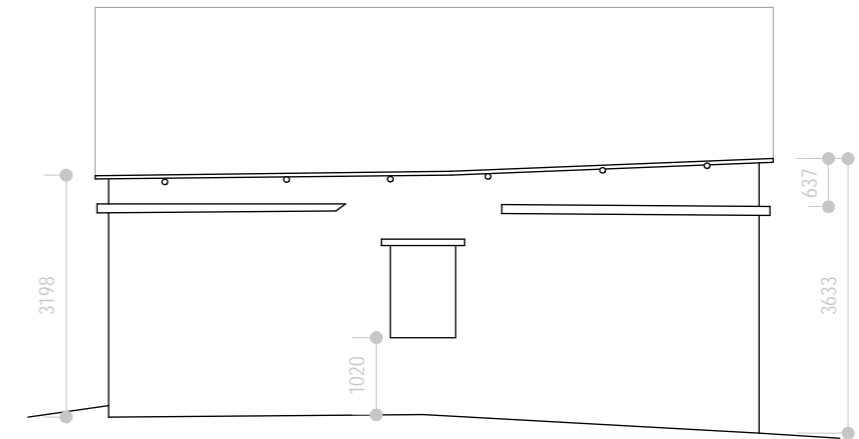
Plan (Restoration Plan)



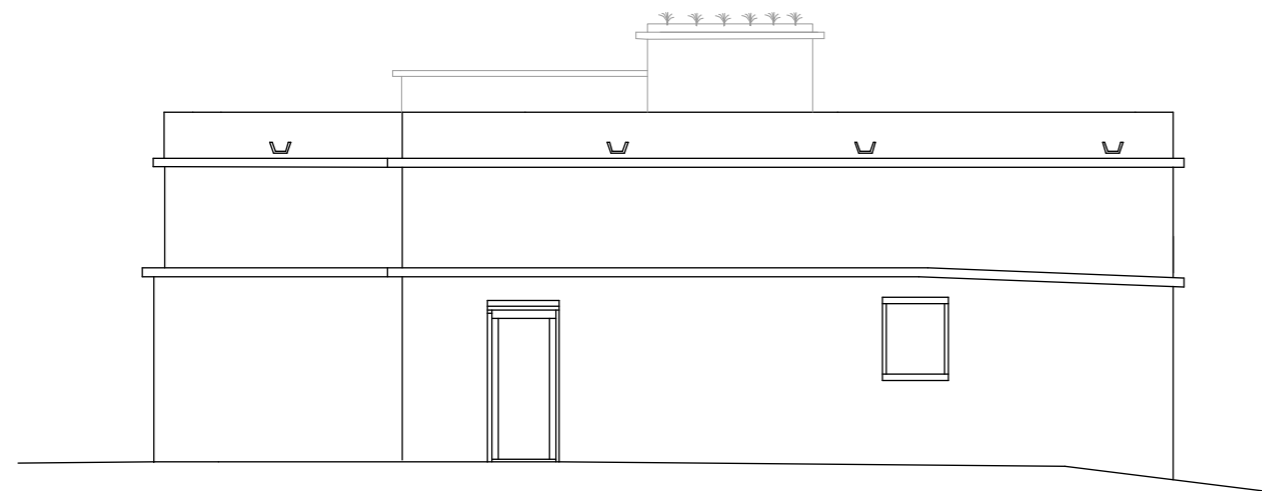
Site Name: Asir Metira Monastery Old Church (near Atsbi)	Drawing Title: Present Plan Restoration Plan	Survey Year: 2010 2011	Surveyed by: R. Miyake, N. Shimizu, Y. Mano, R. Kinase, R. Higuchi, S. Matsui, A. Nakayama, A. Habara, Y. Sugawara, Aklilu H., Tewodros N.	Drawn and Restored by: MIYAKE Riichi, SHIMIZU Nobuhiro, MANO Yohei	Scale: 1 : 100 (A3)	Sheet Number: 1 of 5
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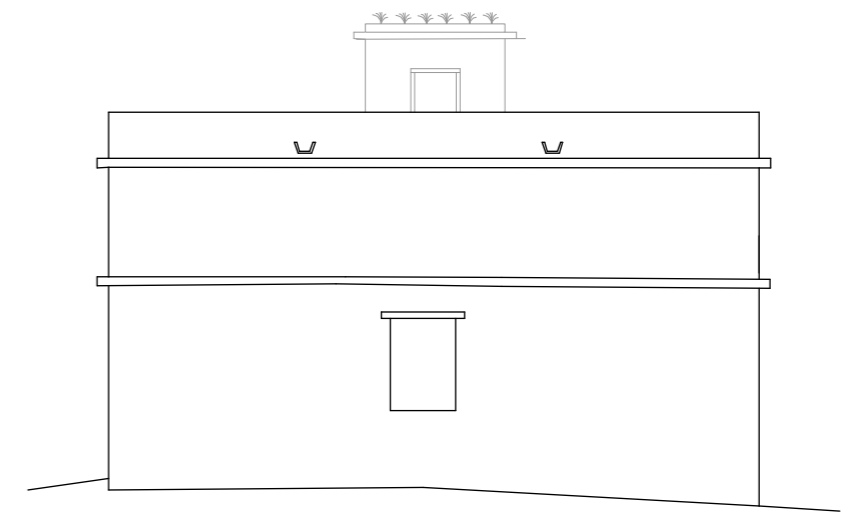
South Elevation (Present Condition)



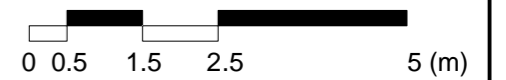
East Elevation (Present Condition)



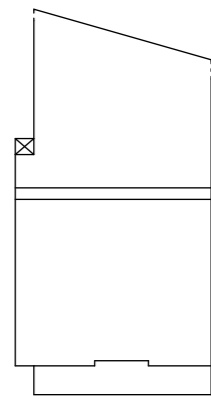
South Elevation (Restoration Plan)



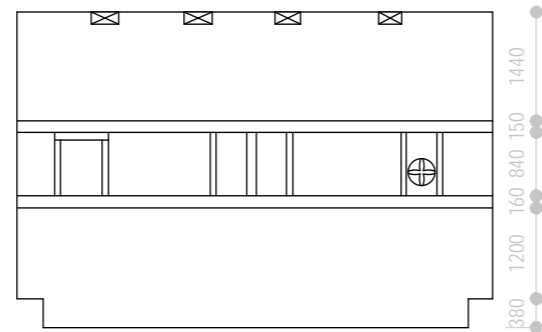
East Elevation (Restoration Plan)



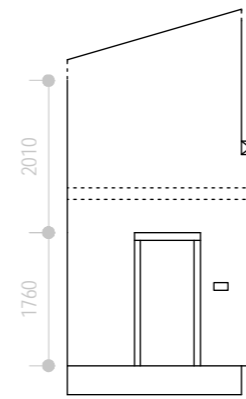
Site Name: Asir Metira Monastery Old Church (near Atsbi)	Drawing Title: Present Elevation Restoration Elevation	Survey Year: 2010 2011	Surveyed by: R. Miyake, N. Shimizu, Y. Mano, R. Kinase, R. Higuchi, S. Matsui, A. Nakayama, A. Habara, Y. Sugawara, Aklilu H., Tewodros N.	Drawn and Restored by: MIYAKE Riichi, SHIMIZU Nobuhiro, MANO Yohei	Scale: 1 : 100 (A3)	Sheet Number: 2 of 5
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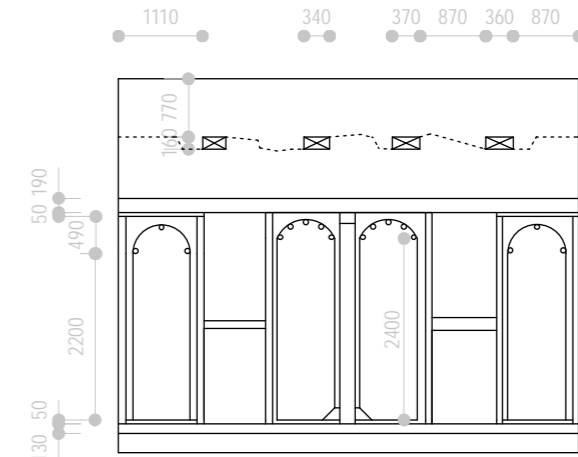
South



West

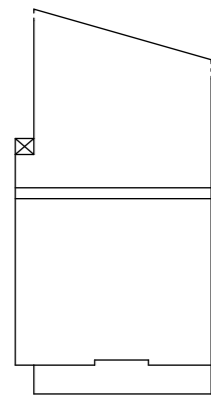


North

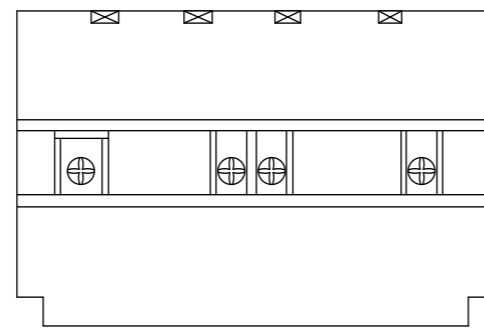


East

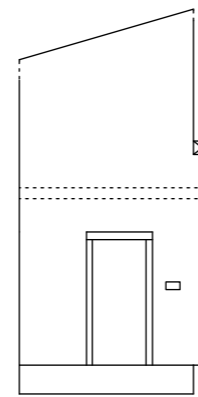
Internal Elevation of Qene Maheret (Present Condition)



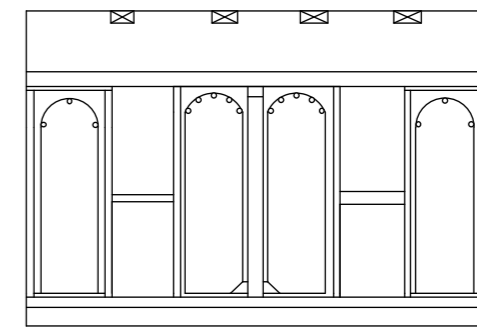
South



West

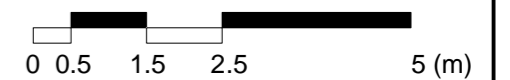


North

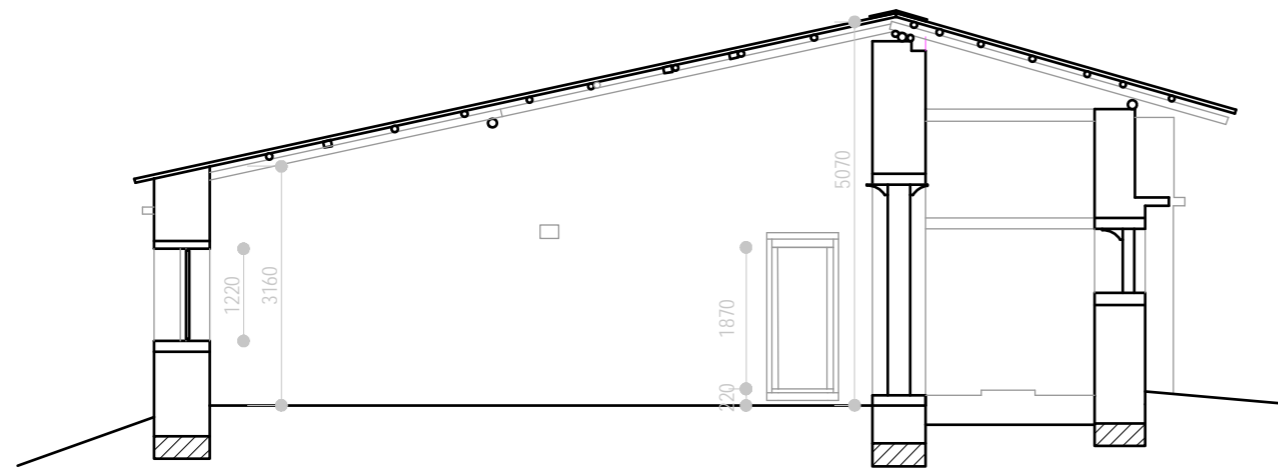


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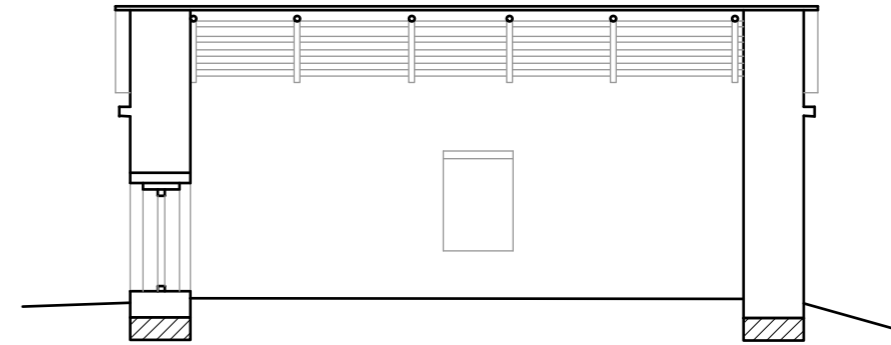
Internal Elevation of Qene Maheret (Restoration Design)



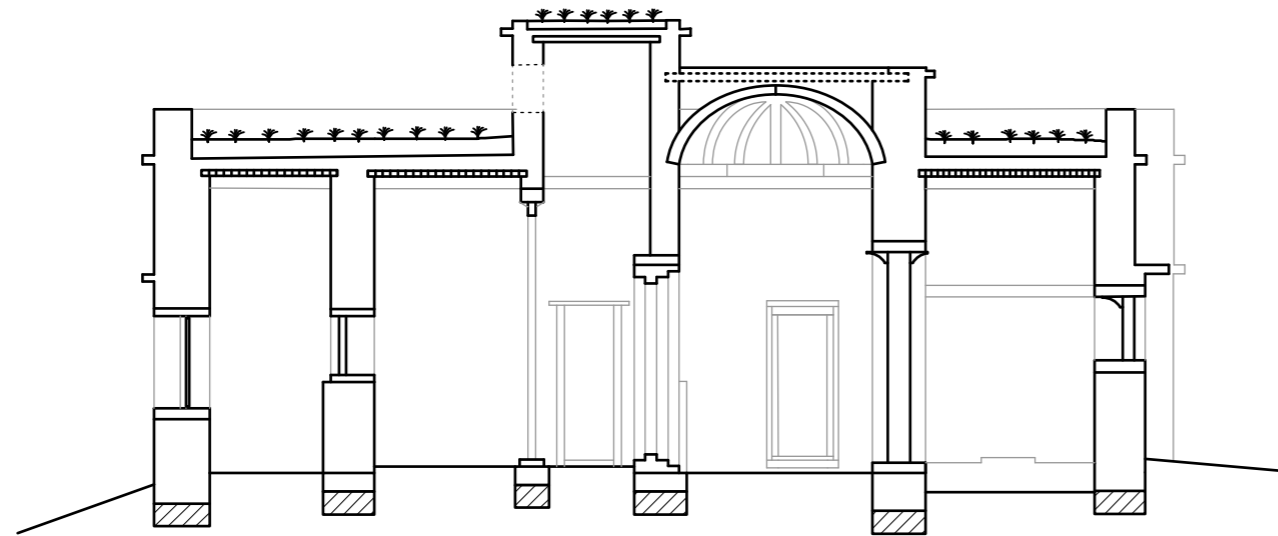
Site Name: Asir Metira Monastery Old Church (near Atsbi)	Drawing Title: Internal Elevation (Present, Restoration)	Survey Year: 2010 2011	Surveyed by: R. Miyake, N. Shimizu, Y. Mano, R. Kinase, R. Higuchi, S. Matsui, A. Nakayama, A. Habara, Y. Sugawara, Aklilu H., Tewodros N.	Drawn and Restored by: MIYAKE Riichi, SHIMIZU Nobuhiro, MANO Yohei	Scale: 1 : 100 (A3)	Sheet Number: 3 of 5
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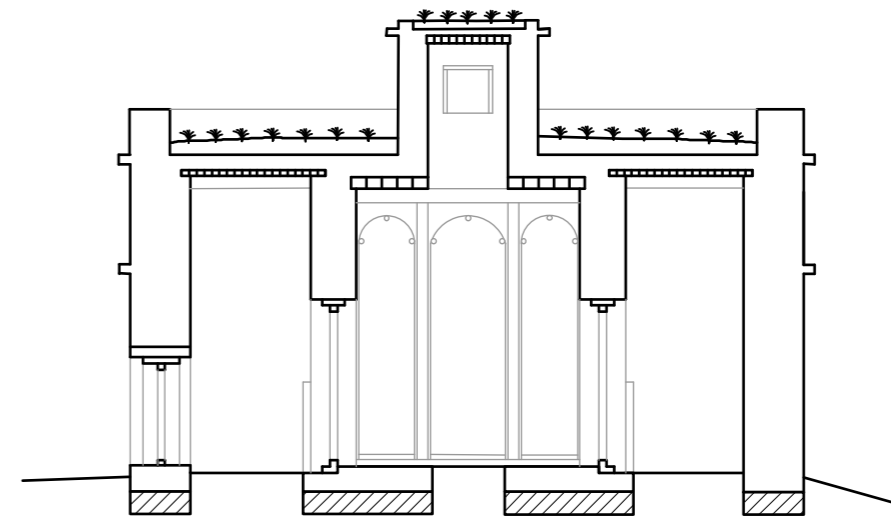
A-A' Section (Present Condition)



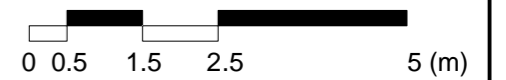
B-B' Section (Present Condition)



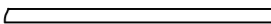

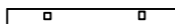

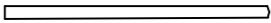

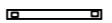

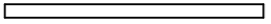



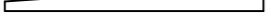

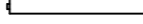

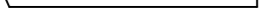

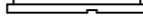

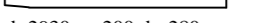

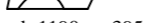

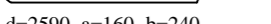

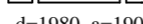

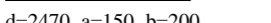

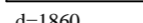

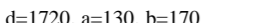

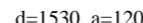

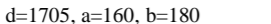

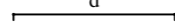

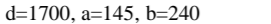

A-A' Section (Restoration Plan)



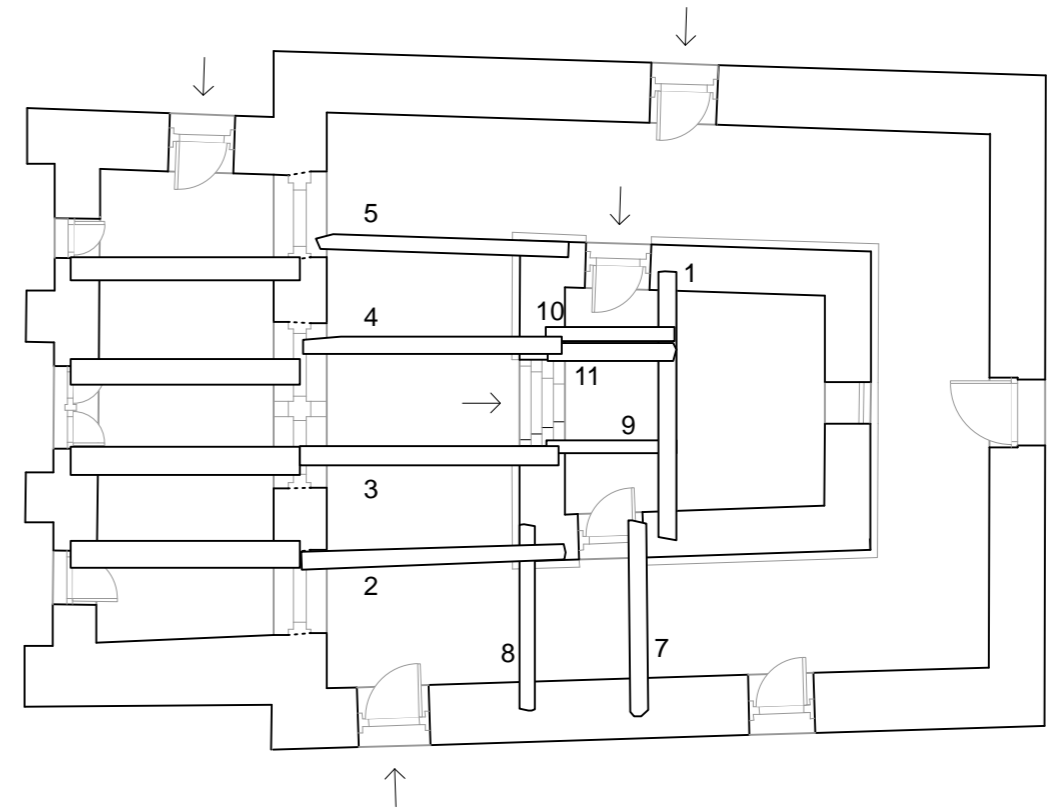
B-B' Section (Restoration Plan)



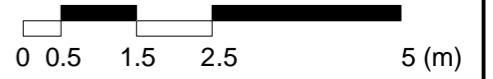
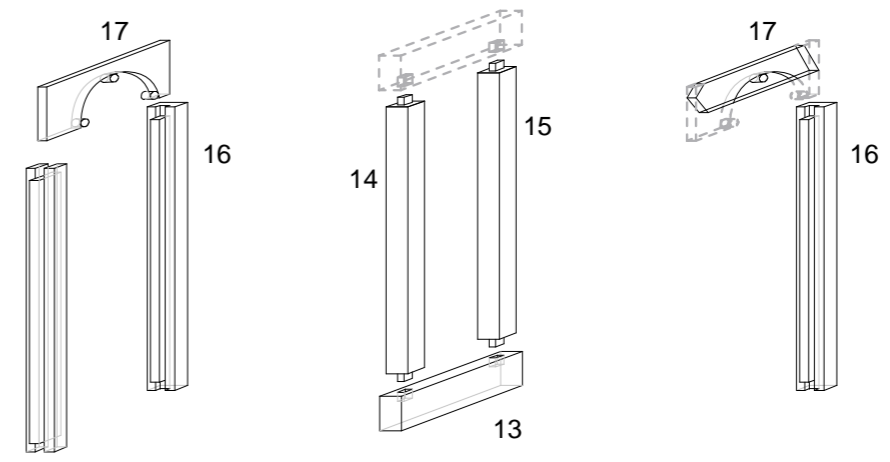
Site Name: Asir Metira Monastery Old Church (near Atsbi)	Drawing Title: Present Section Restoration Section	Survey Year: 2010 2011	Surveyed by: R. Miyake, N. Shimizu, Y. Mano, R. Kinase, R. Higuchi, S. Matsui, A. Nakayama, A. Habara, Y. Sugawara, Aklilu H., Tewodros N.	Drawn and Restored by: MIYAKE Riichi, SHIMIZU Nobuhiro, MANO Yohei	Scale: 1 : 100 (A3)	Sheet Number: 4 of 5
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1			12		
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2			13		
	d=3500, a=170, b=240			d=1245, a=125, b=170	
3			14		
	d=3420, a=160, b=260			d=1845, a=160, b=170	
4			15		
	d=3420, a=180, b=230			d=1845, a=190, b=125	
5			16		
	d=3340, a=160, b=200			d=1840, a=100+74, b=40+100+80	
6			17		
	d=2930, a=200, b=280			d=1190, a=395	
7			18		
	d=2590, a=160, b=240			d=1980, a=190, b=90	
8			19		
	d=2470, a=150, b=200			d=1860	
9			20		
	d=1720, a=130, b=170			d=1530, a=120, b=110	
10			<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <p style="text-align: center;">scale = [mm]</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>d</p>  </div> <div style="text-align: center;"> <p>b</p>  </div> </div> <p style="text-align: center;">□ 1 ≡</p> </div>		
	d=1705, a=160, b=180				
11					
	d=1700, a=145, b=240				

Size List of Remaining Woods



Estimated Position of Each Remaining Woods





[1] Location, made by Shimizu, N. (source: Google Map)



[6] Timber Ceiling over Qiddist, photo by Shimizu, N., 2018



[7] Internal Appearance of Qiddist, photo by Shimizu, N., 2018



[2] External Appearance (from the Southeast, 1974), from Juel-Jensen, B. and Rowell, G., 1975



[3] External Appearance (from the Southeast), photo by Shimizu, N., 2018



[8] Internal Appearance of Qiddist, photo by Shimizu, N., 2018



[10] Internal Appearance of Corridor between Meqdes and Eastern Wall, photo by Shimizu, N., 2018



[4] External Appearance (from the Southeast), photo by Shimizu, N., 2018

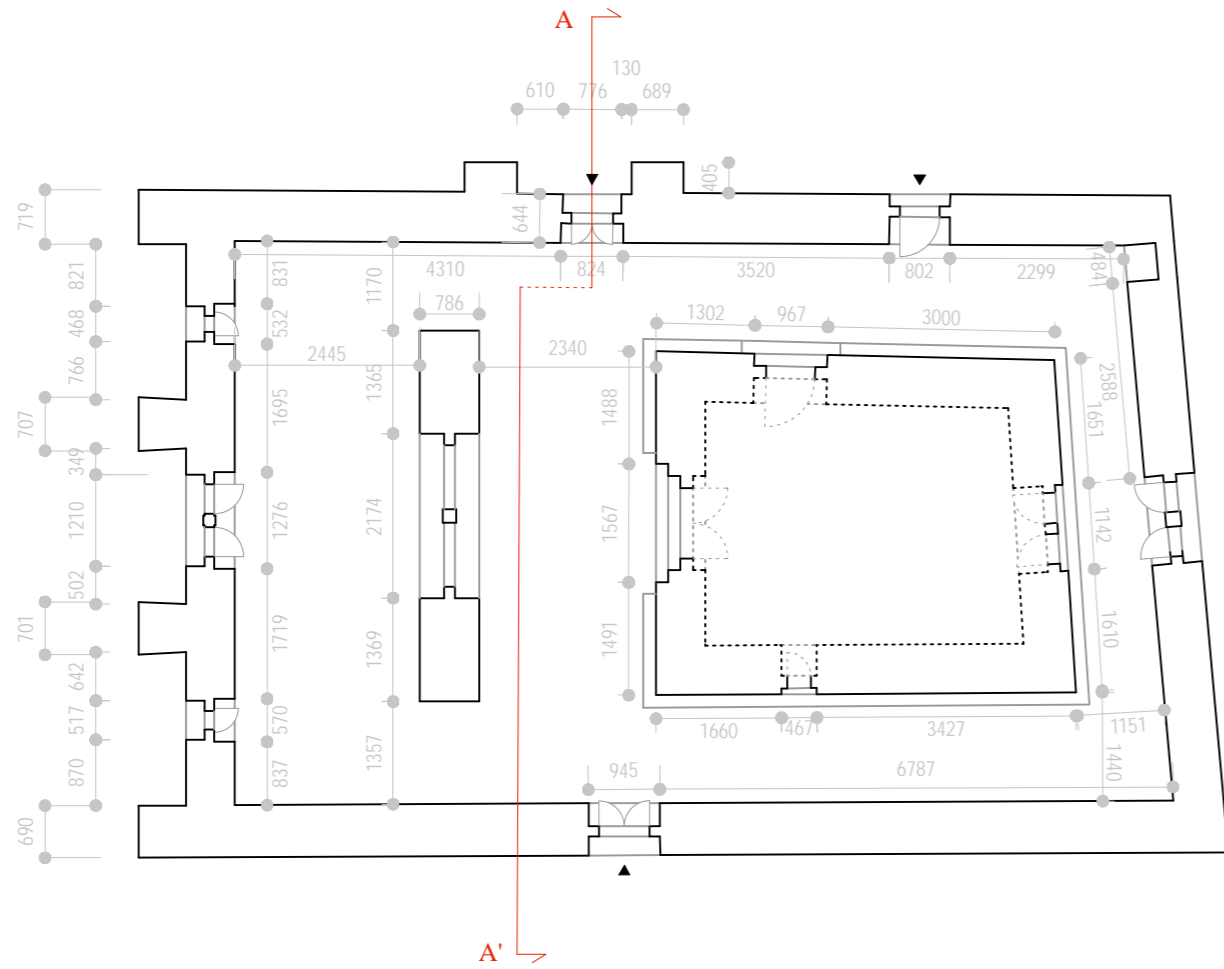


[5] A Timber Ornamental Window, photo by Shimizu, N., 2018

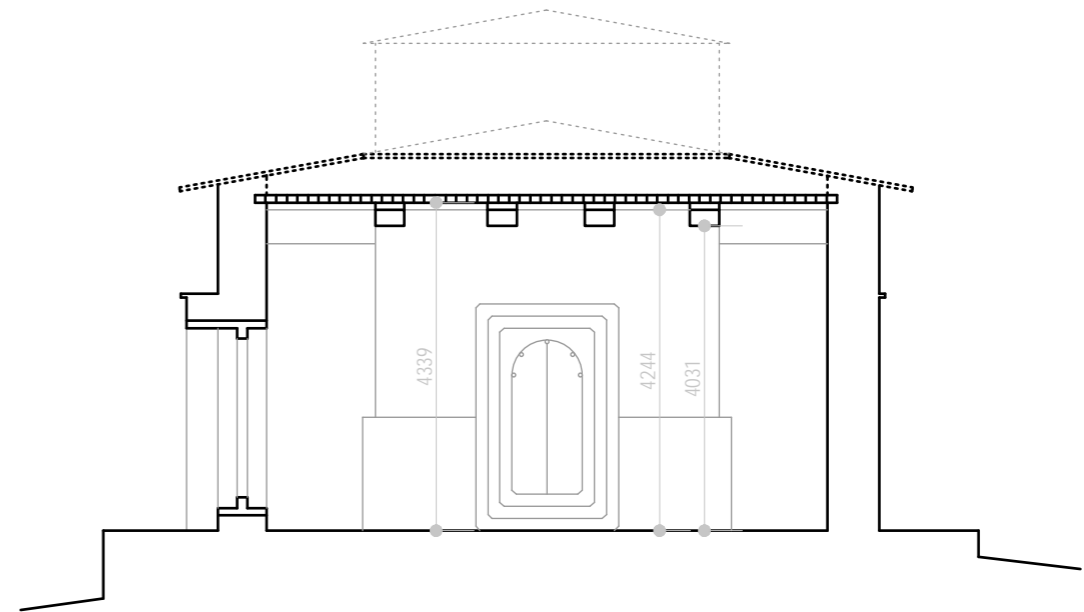


[9] An Opening between Qiddist and Qiné Mahlé, photo by Shimizu, N., 2018

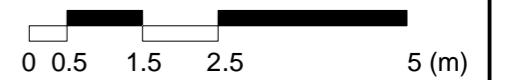
<p>Site Name: Debre Sillasé Church (near Atsbi)</p>	<p>Title: Pictures</p>	<p>Survey Year: 2018</p>	<p>Introduction of the Site: Though Debre Sillasé Church is introduced in Juel-Jensen et al. (1975), the site description in text and roughly measured plan does not correspond with the present situation. However, according to local tradition, the building is old despite building alteration implemented. Indeed, traditional construction method is applied in the targeted building and materials looks like older. The building plan is rather similar with the one introduced as Mikael Amba Dera in the book. However, the site description again does not often correspond with the present situation of Debre Sillasé Church. According to local tradition, the church was founded in the reign of Naod (r. 1494-1508) despite detailed history is not clear. The church building typically shows local features of Tigray's local church that is similar with Asir Metira Monastery.</p>
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Plan



A-A SECTION



Site Name: Debre Sillasé Church (near Atsbi)	Drawing Title: Plan	Survey Year: 2018	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 1 of 1
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[1] Location, made by Shimizu, N. (source: Google Map)



[6] Internal Appearance of Qiné Mahlét with Timber Ceiling, photo by Shimizu, N., 2014



[7] Internal Appearance of Qiné Mahlét and Corridor, photo by Shimizu, N., 2014



[2] External Appearance (from the South), photo by Shimizu, N., 2014



[3] External Appearance (from the West), photo by Shimizu, N., 2014



[8] Internal Appearance of Qiddíst with Dome-like Ceiling, photo by Shimizu, N., 2014



[9] An Ornamental Door between Qiddíst and Qiné Mahlét, photo by Shimizu, N., 2014



[4] Roof over the Area of Qiddíst, photo by Shimizu, N., 2014



[5] A Tripartite Window in the West Side, photo by Shimizu, N., 2014

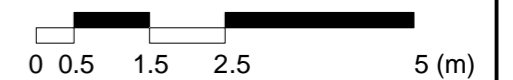
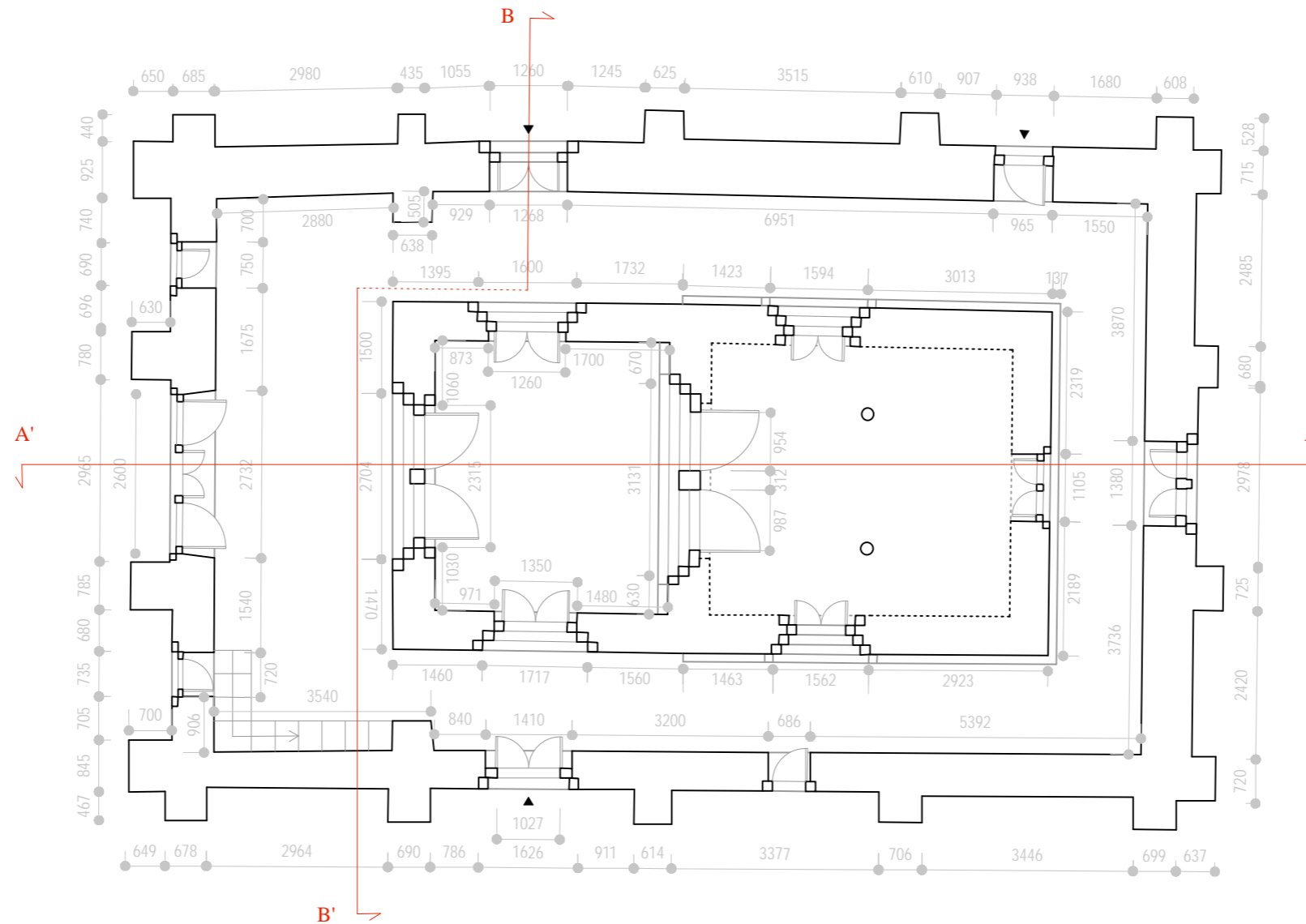


[10] Detail of Dome-like Ceiling over Qiddíst, photo by Shimizu, N., 2014

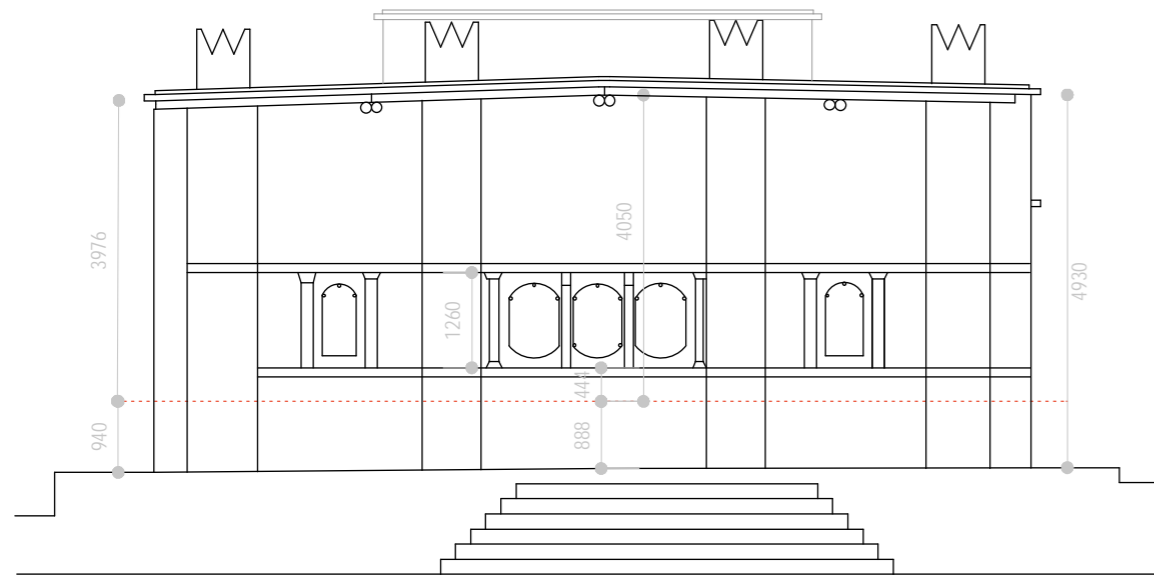


[11] Timber Ceiling over Meqdes, photo by Shimizu, N., 2014

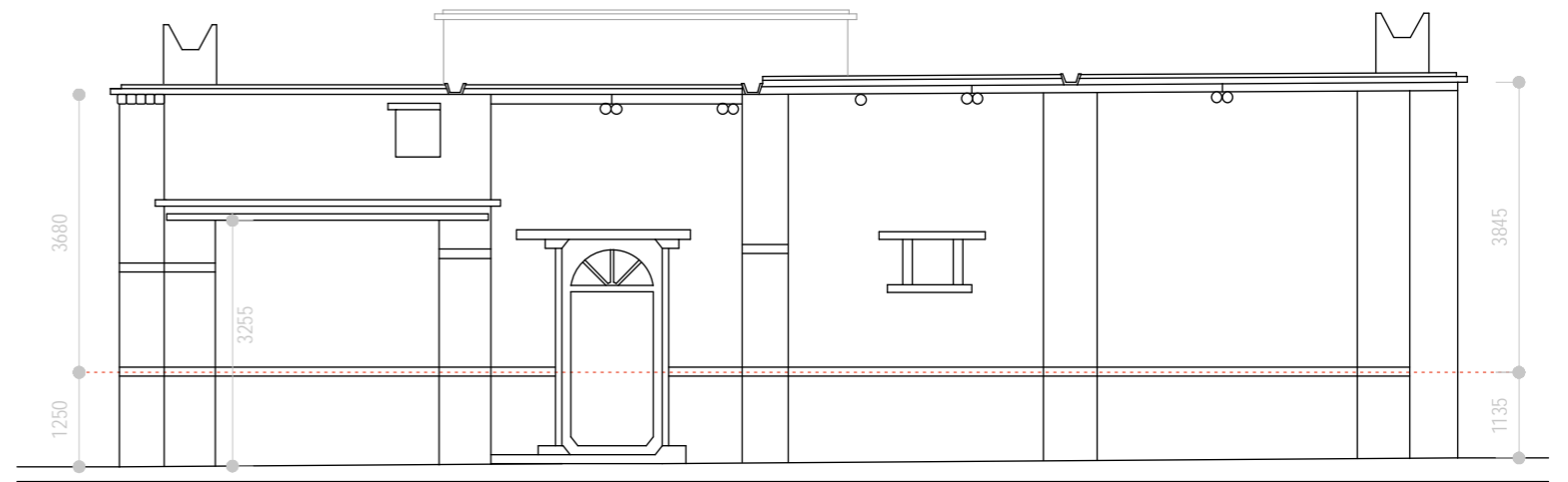
Site Name:	Title:	Survey Year:	Introduction of the Site:
Mika'el Church (Feleg Da`ïro)	Pictures	2014	Local tradition claims that the church was established in the 6th century but collapsed by the Muslims in the 16th century (Bogale: unpublished document-1). Afterward, the targeted church building was erected, perhaps 17th or 18th century. Due to new church construction a few decades ago, the targeted building was renamed and called Medhané Alem Church now.



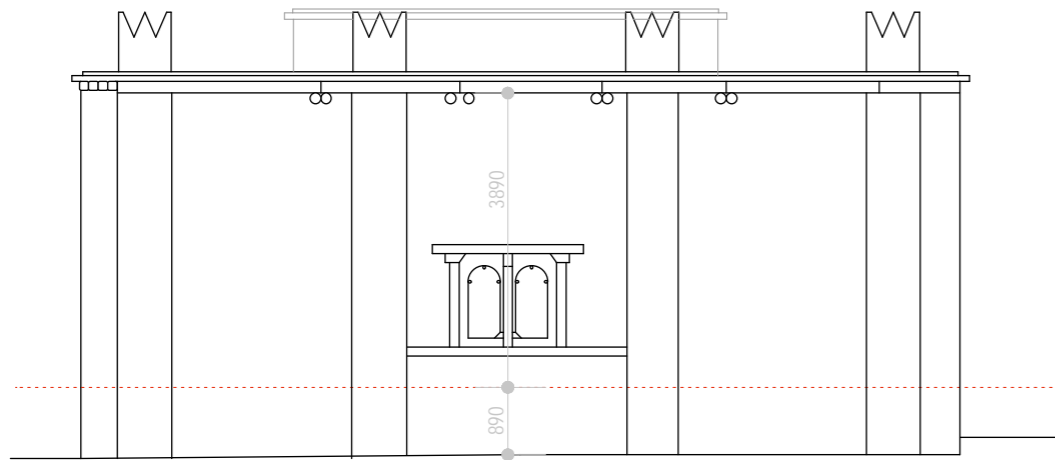
Site Name: <p style="text-align: center;">Mika'el Church (Feleg Da'iro)</p>	Drawing Title: <p style="text-align: center;">Plan</p>	Survey Year: <p style="text-align: center;">2014</p>	Surveyed by: <p style="text-align: center;">SHIMIZU Nobuhiro, Alexander Tetemke</p>	Drawn by: <p style="text-align: center;">SHIMIZU Nobuhiro</p>	Scale: <p style="text-align: center;">1 : 100 (A3)</p>	Sheet Number: <p style="text-align: center;">1 of 3</p>
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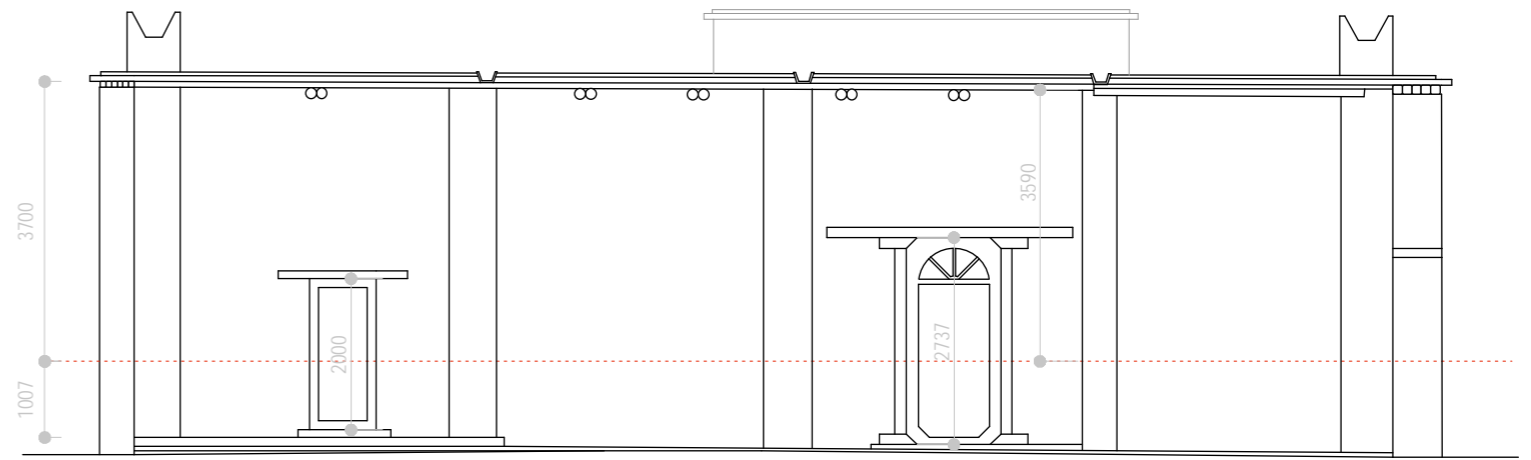
West Elevation



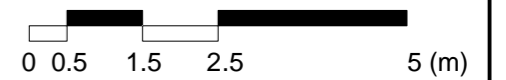
South Elevation



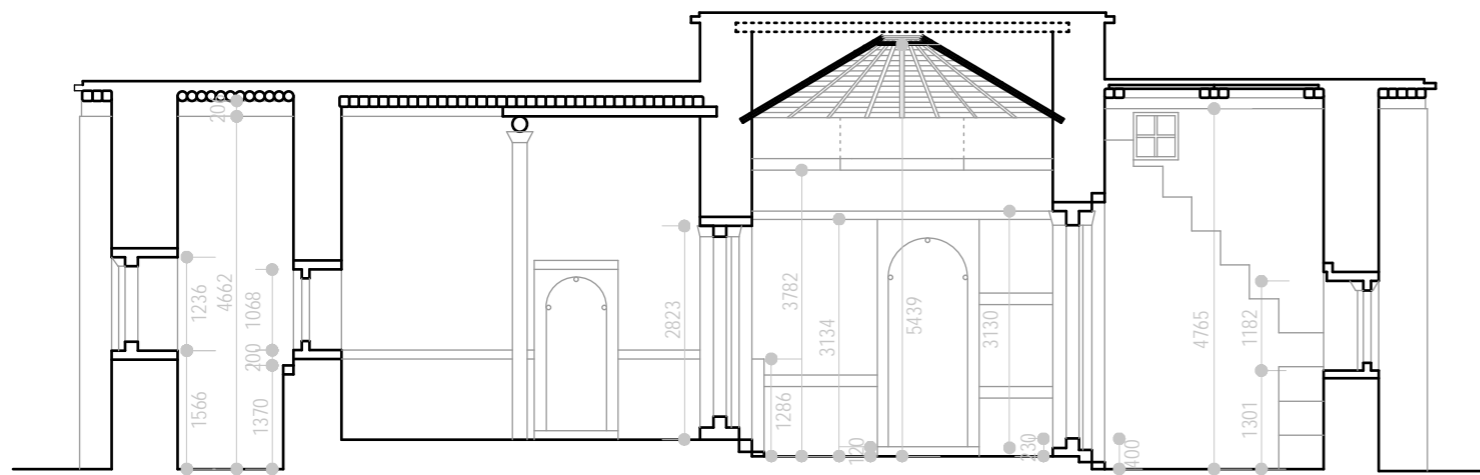
East Elevation



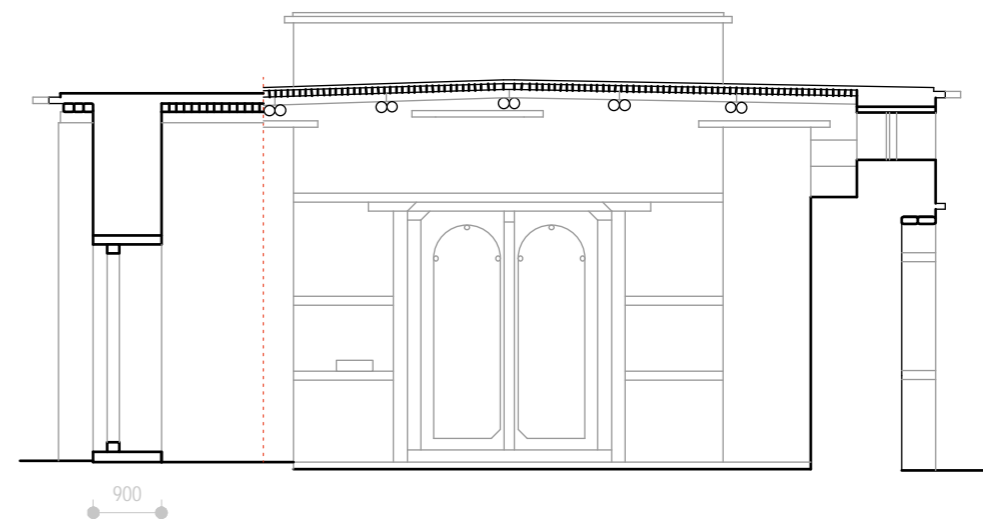
North Elevation



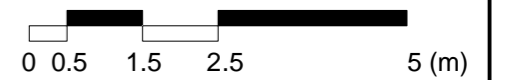
Site Name:	Drawing Title:	Survey Year:	Surveyed by:	Drawn by:	Scale:	Sheet Number:
Mika'el Church (Feleg Da`iro)	Elevation	2014	SHIMIZU Nobuhiro, Alexander Tetemke	SHIMIZU Nobuhiro	1 : 100 (A3)	2 of 3



A-A' Section



B-B' Section



Site Name: Mika'el Church (Feleg Da`iro)	Drawing Title: Section	Survey Year: 2014	Surveyed by: SHIMIZU Nobuhiro, Alexander Tetemke	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 3 of 3
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[1] Location, made by Shimizu, N. (source: Google Earth)



[6] Internal Appearance, Photo by Shimizu, N., 2013



[7] Goro 'Arat (Built-in Rack), Photo by Shimizu, N., 2013



[2] "A Sketch of Mr. Pearce's House at Chelicut" (Drawn by Henry Salt in 1809), from Salt, H., 1814



[3] Approach from the Southeast, photo by Shimizu, N., 2013



[8] Timber Work in the Corner, Photo by Mano, Y., 2011



[9] Timber Work from the Below, Photo by Shimizu, N., 2013



[4] External Appearance (from the Southeast), Photo by Shimizu, N., 2013



[5] Detail of Cracked Masonry Work with Horn, Photo by Shimizu, N., 2013

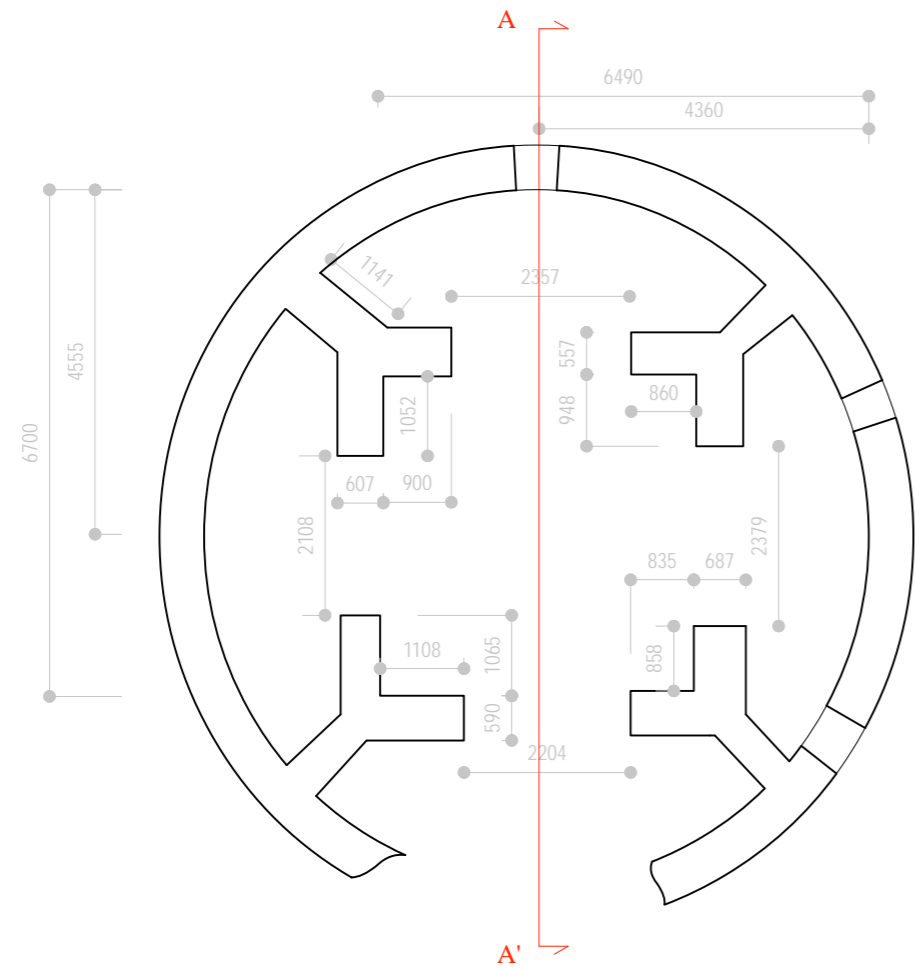


[10] Attached Furniture or Toilet, Photo by Shimizu, N., 2013

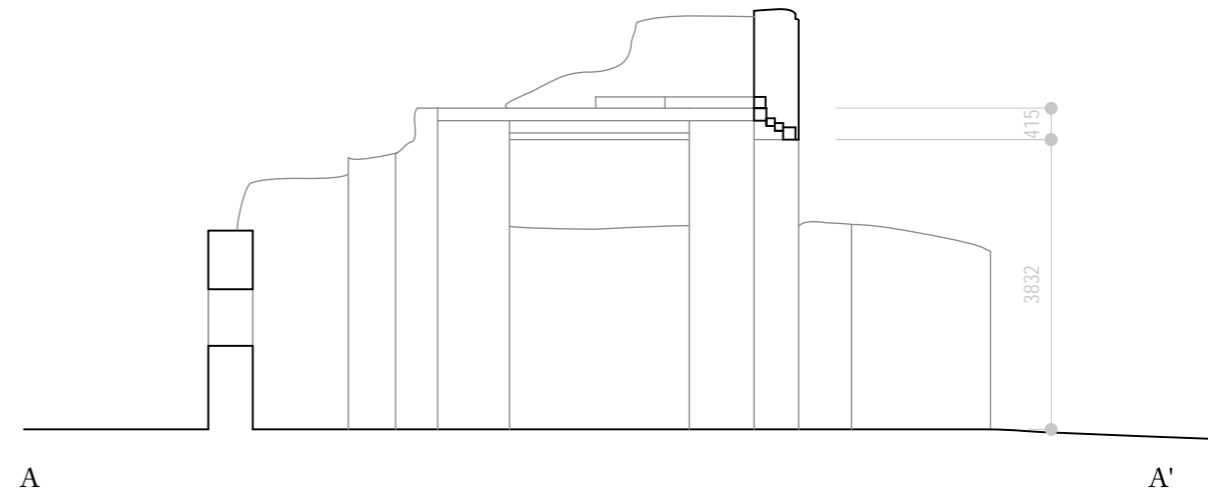


[11] A Timber Perhaps Originally Used as a Beam, Photo by Mano, Y., 2011

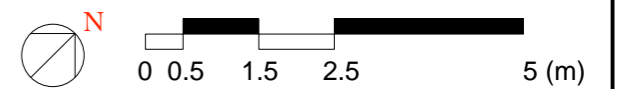
Site Name: Residence of Ras Welde Sillasé (Ch'eleqot)	Title: Pictures	Survey Year: 2011	Introduction of the Site: Ch'eleqot is one of the places patronized by Ras Welde Sillasé, the warlord of Tigray in the 18th and 19th century. Local tradition claims that the targeted building was erected and used by him. When Henry Salt visited Ch'eleqot for the second time in 1809, he drew a similar circular building, though the sketched building is not the one remaining.
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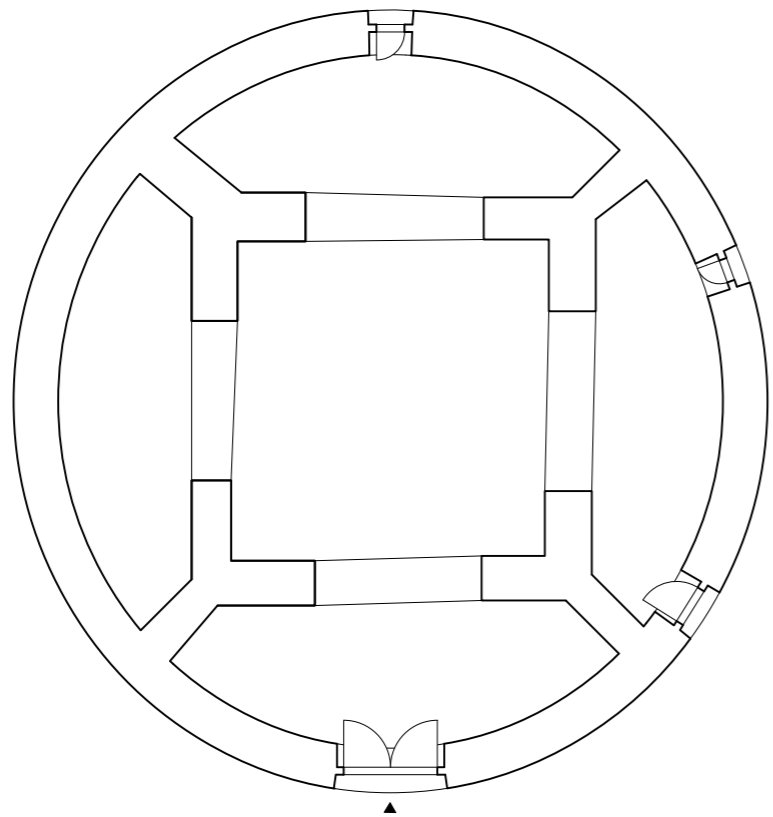
Plan



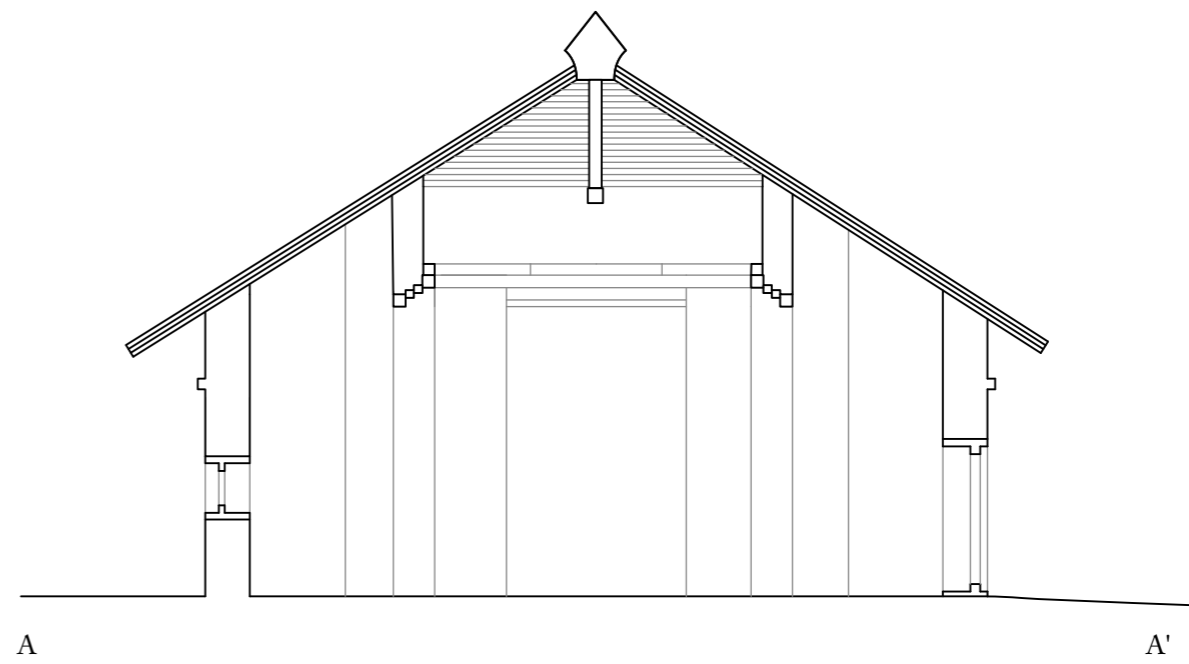
A-A' Section



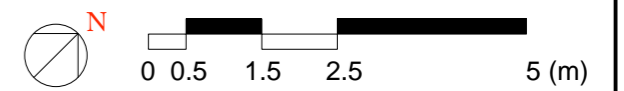
Site Name: Residence of Ras Welde Sillasé (Ch'eleqot)	Drawing Title: Plan and Section (Present Condition)	Survey Year: 2011	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 1 of 2
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Plan



A-A' Section



Site Name: Residence of Ras Welde Sillasé (Ch'eleqot)	Drawing Title: Plan and Section (Restoration Design)	Survey Year: 2011	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 2 of 2
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[1] Location, made by Shimizu, N. (source: Google Map)



[6] External Appearance (from the Northwest), photo by Shimizu, N., 2011



[7] Internal Appearance of Aderash (Ground Floor), photo by Shimizu, N., 2018



[8] Wall in the Aderash with Ornamental Horns and a Window Enabling to Overlook from Stair Hall, photo by Shimizu, N., 2018



[9] Stair Hall in the Upper Floor, photo by Shimizu, N., 2018



[2] Photo from its Surroundings, photo by Shimizu, N., 2018



[3] Approach from the Southeast, photo by Shimizu, N., 2018



[10] Internal Appearance of a Room on the West Side in the Upper Floor, photo by Shimizu, N., 2018



[11] A Timber Ornamental Pillar and Ceiling in a Room on the West Side in the Upper Floor (in Common with Hida), photo by Shimizu, N., 2018



[4] Previous State before Cement Plastering (from the East), photo by Shimizu, N., 2009



[5] Present State after the Collapse of Several Parts of Masonry Wall and Coronal-shaped Ornaments (from the East), photo by Shimizu, N., 2018

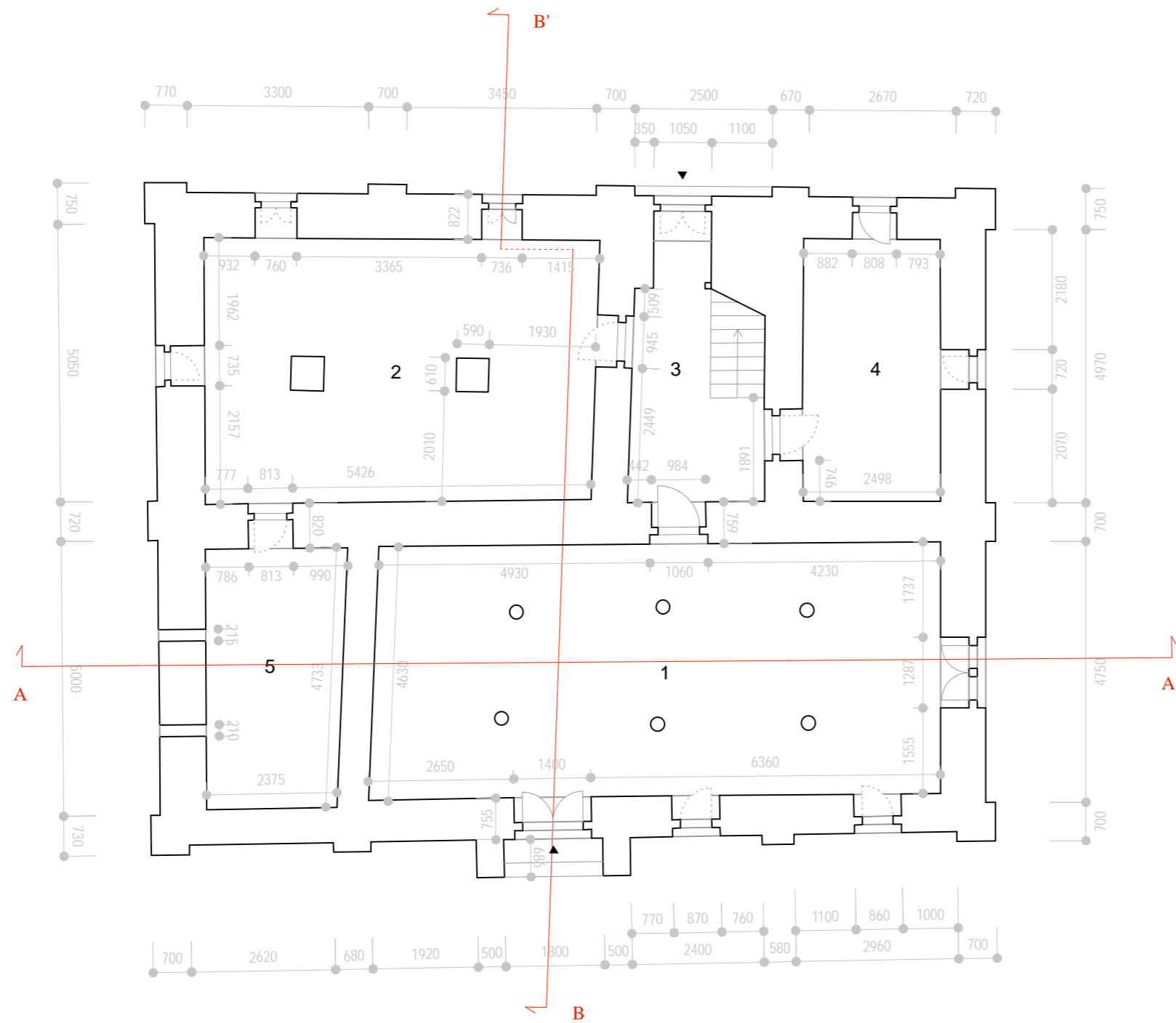


[12] Masonry Pillars and Wooden Ceiling of a Room on the West Side in the Ground Floor, photo by Shimizu, N., 2018



[13] Simpler Wooden Ceiling, photo by Shimizu, N., 2018

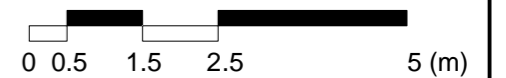
<p>Site Name: Ar'aya Castle (Feleg Da`iro)</p>	<p>Title: Pictures</p>	<p>Survey Year: 2011, 2012 2018</p>	<p>Introduction of the Site: Regarding the attribution of the targeted building, opinion is divided. According to Bogale (unpublished document-1), it was erected by Abriha Ar'aya, and author's interview with local people confirmed it. However, he built his castle in Mekelle, and his period (less than ten years from 1902) is too short and confused to build two castles. On the other hand, Mr. Aynalem (M / 1922 E.C.- / a descendant of Gebremika'el, a king of the province before Yohannis IV) claims that the targeted castle was erected by Ar'aya Sillasé Dimtsu, father of Abriha. He became a governor of the province under his nephew Emperor Yohannis IV (Zewde 2003). Considering the base of Yohannis IV placed in Mekelle, erecting his castle in this nearby site is reasonable. It is no wonder that Abr'aha used the targeted building before the construction of his castle in Mekelle, because he was a son of Ar'aya and Yohannis IV Palace was used by the Emperor's descendants.</p>
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Estimated use of each room in reference to local claims:

- 1: *Aderash*
- 2: Ladies' room (in reference to local claims, however doubtful)
- 3: Stair room (A space horses are tied in reference to local claims)
- 4: Guards' room (in reference to local claims, however doubtful)
- 5: Storage

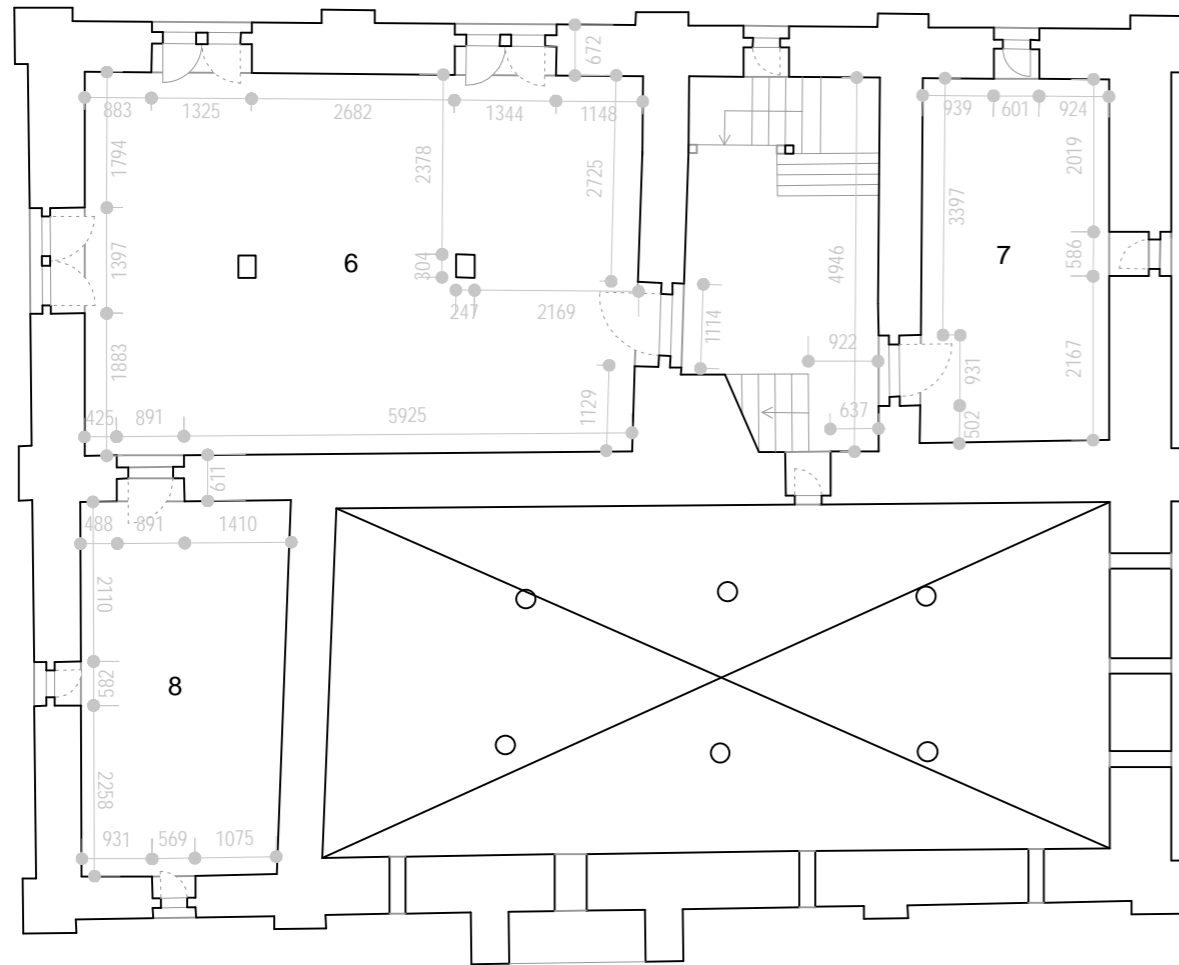
Ground Floor Plan



Site Name: Ar'aya Castle (Feleg Da'iro)	Drawing Title: Plan (GF)	Survey Year: 2011,2012 2018	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 1 of 5
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Estimated use of each room in reference to local claims:

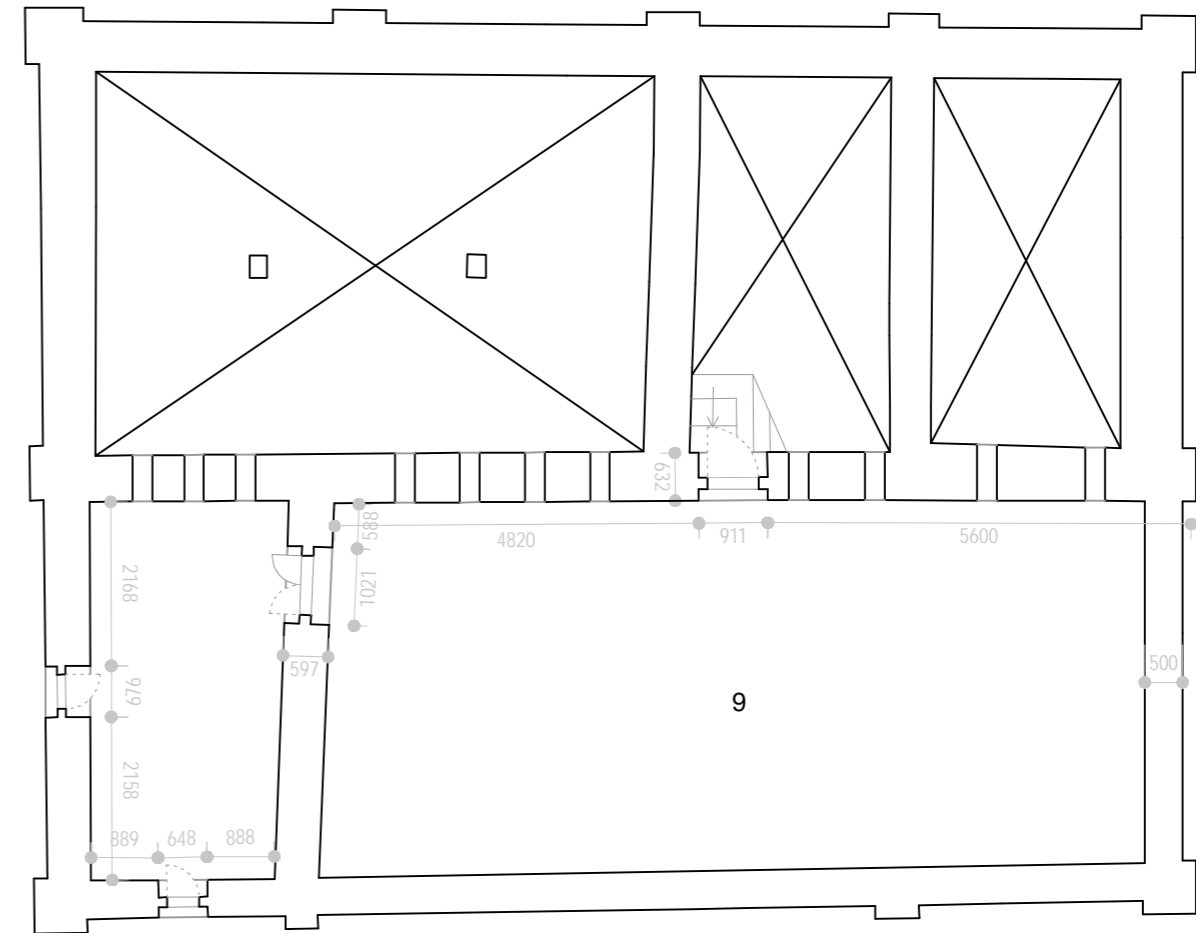
- 6: Master's room
- 7: Room for master's wife
- 8: Storage for master's property



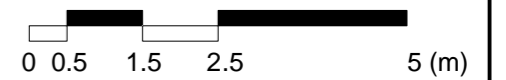
First Floor Plan

Estimated use of each room in reference to local claims:

- 9: Terrace



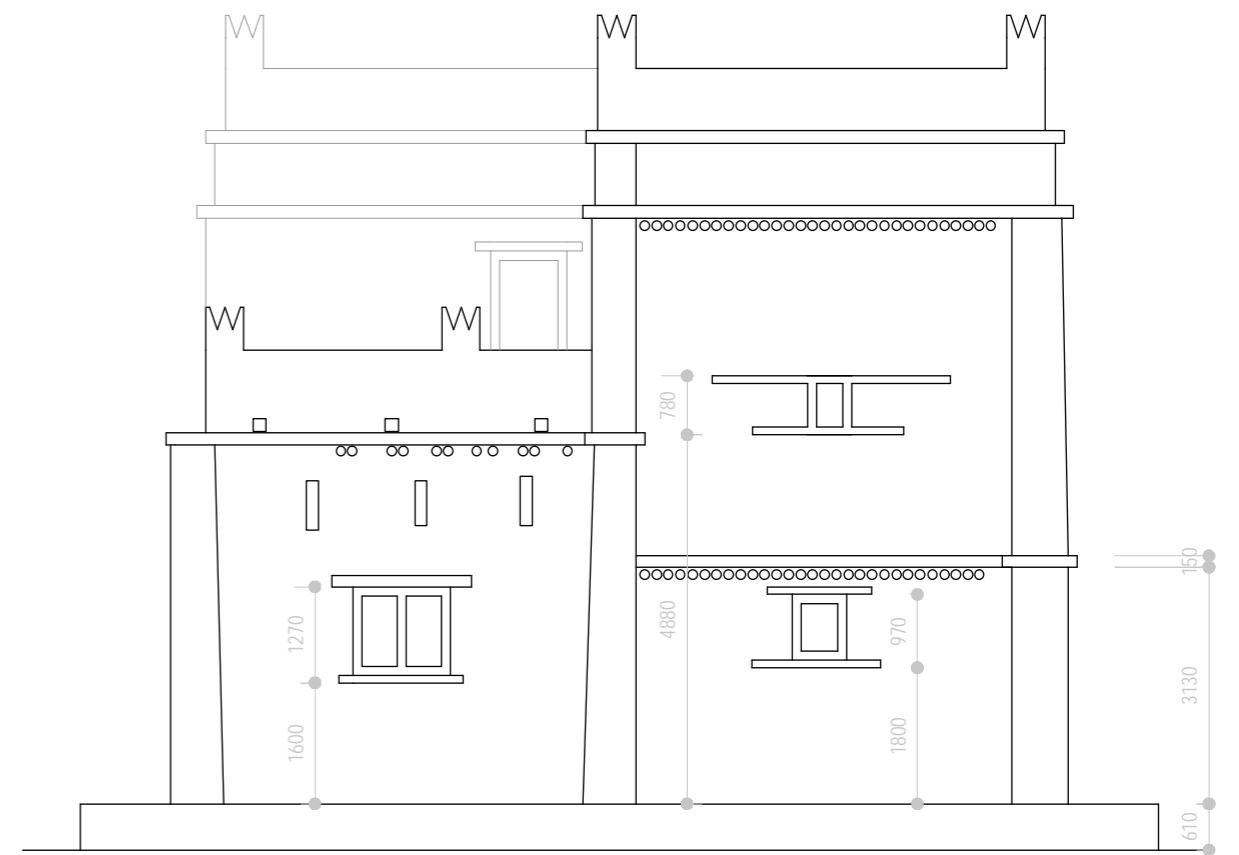
Roof Floor Plan



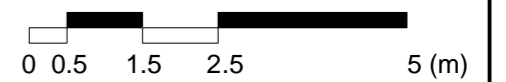
Site Name: Ar'aya Castle (Feleg Da`iro)	Drawing Title: Plan (1F, RF)	Survey Year: 2011,2012 2018	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 2 of 5
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East Elevation



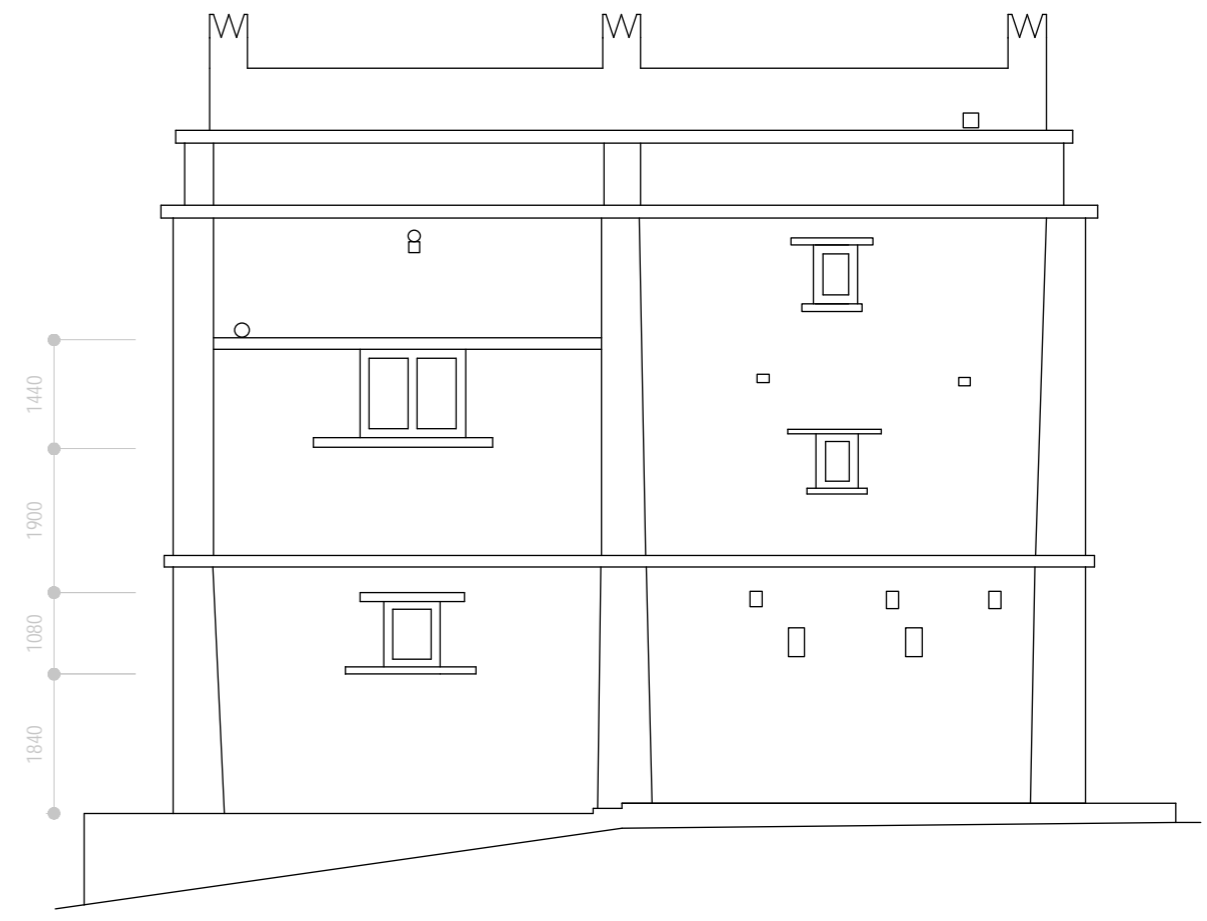
North Elevation



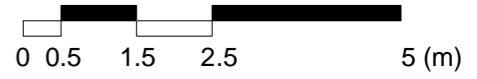
Site Name: <p style="text-align: center;">Ar'aya Castle (Feleg Da`iro)</p>	Drawing Title: <p style="text-align: center;">East Elevation North Elevation</p>	Survey Year: <p style="text-align: center;">2011,2012 2018</p>	Surveyed by: <p style="text-align: center;">SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega</p>	Drawn by: <p style="text-align: center;">SHIMIZU Nobuhiro</p>	Scale: <p style="text-align: center;">1 : 100 (A3)</p>	Sheet Number: <p style="text-align: center;">3 of 5</p>
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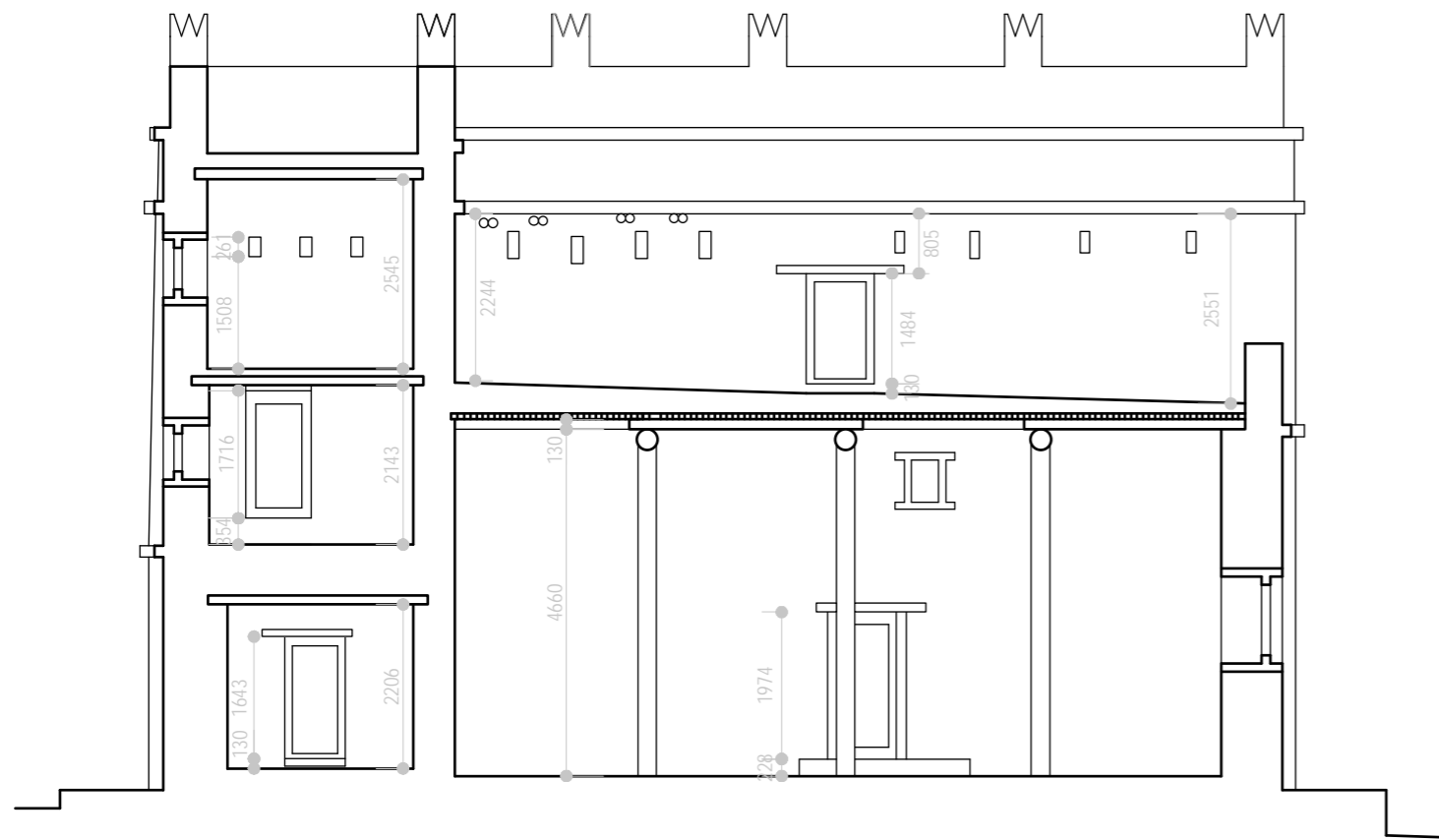
West Elevation



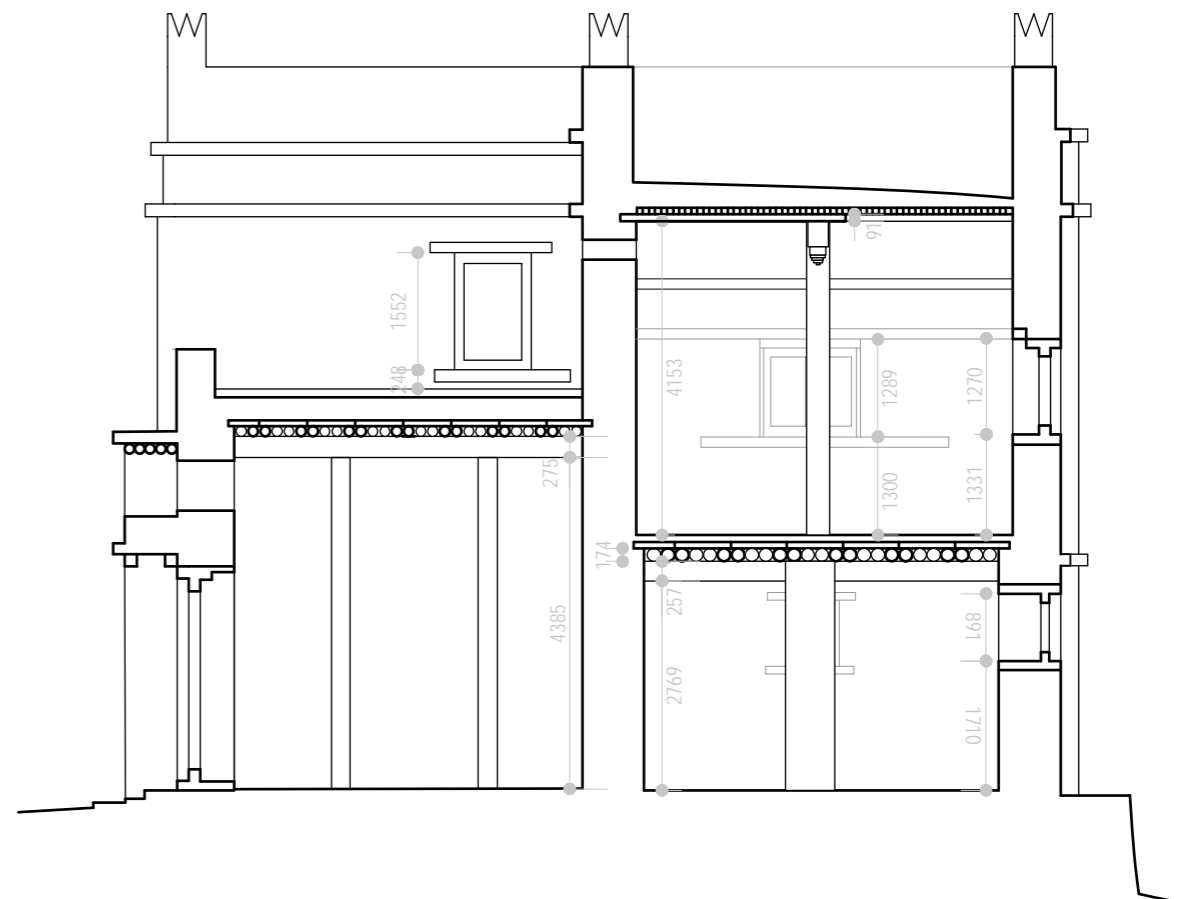
South Elevation



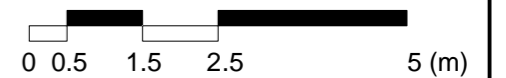
Site Name: Ar'aya Castle (Feleg Da`iro)	Drawing Title: West Elevation South Elevation	Survey Year: 2011,2012 2018	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 4 of 5
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A-A' Section



B-B' Section



Site Name: Ar'aya Castle (Feleg Da`iro)	Drawing Title: Section	Survey Year: 2011,2012 2018	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 5 of 5
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[1] Location, made by Shimizu, N. (source: Google Map)



[6] Internal Appearance of Building-A, photo by Mano, Y., 2011



[7] Internal Appearance of Building-B (Upper Floor), photo by Shimizu, N., 2012



[8] Internal Appearance of Building-B (Ground Floor), photo by Mano, Y., 2011



[2] View of the Targeted Buildings (from the North), photo by Shimizu, N., 2012



[3] External Appearance of Building-B approx. 1.5 Years after Plastering (from the South), photo by Shimizu, N., 2012



[9] Timber Ornamental Pillars and Ceiling of Building-A (in Common with Hidmo), photo by Mano, Y., 2011



[10] Timber Ornamental Pillars and Ceiling of Building-B (Upper Floor; in Common with Hidmo), photo by Mano, Y., 2011



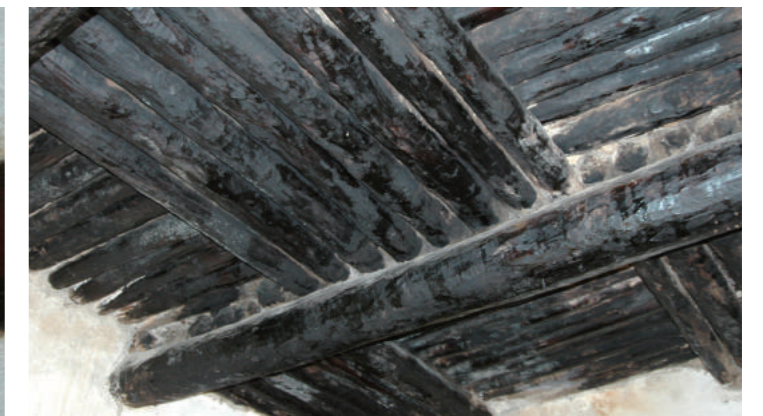
[4] External Appearance of Building-A (from the Northeast), photo by Mano, Y., 2011



[5] External Appearance of Building-B (from the Southwest), photo by Mano, Y., 2011

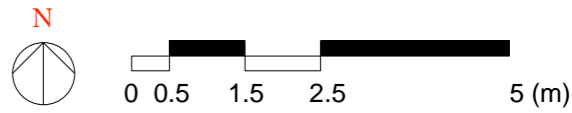
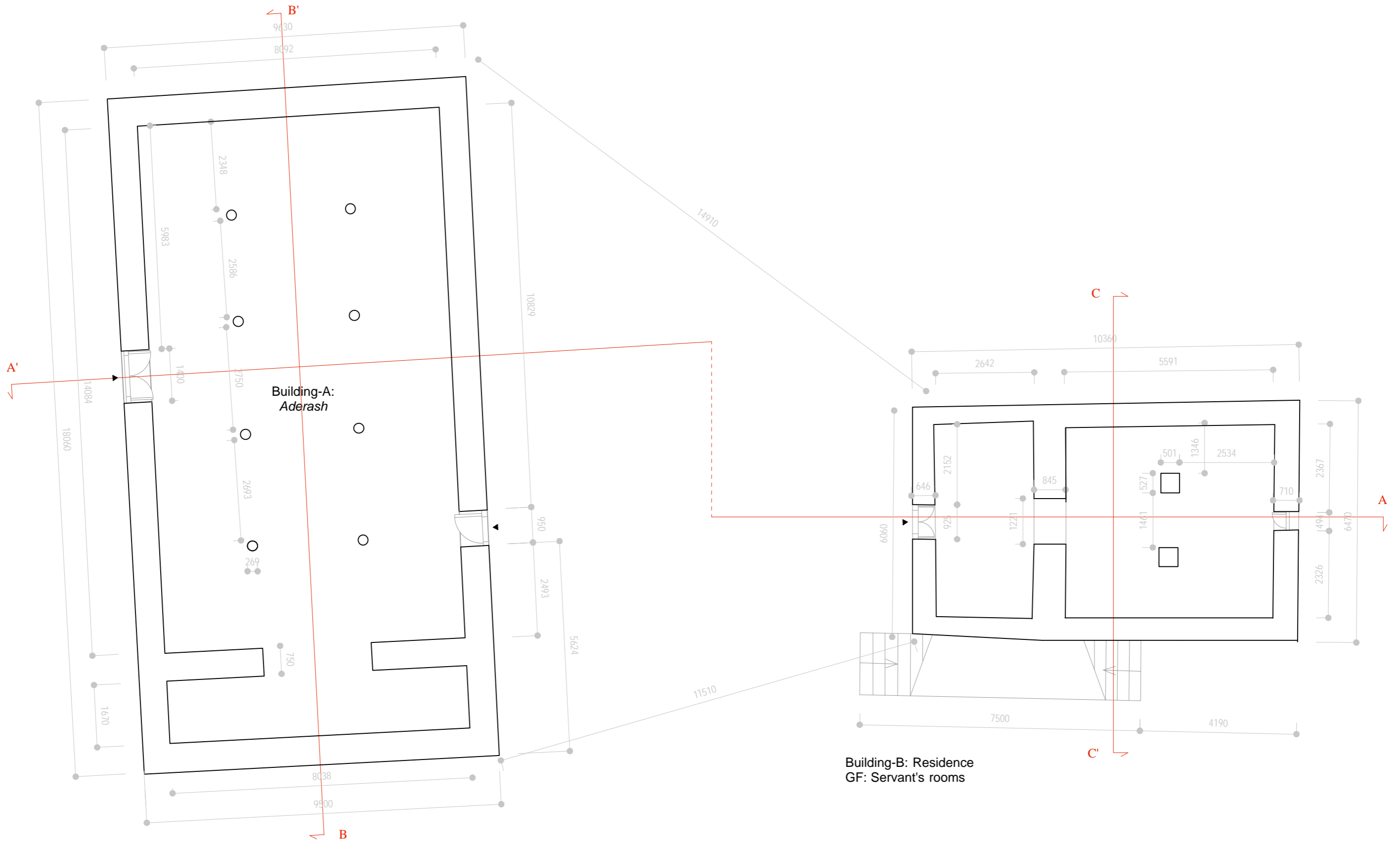


[11] Jointed Part of Timbers Braced by Clamp (Date of Installing Clamp Unknown), photo by Mano, Y., 2011

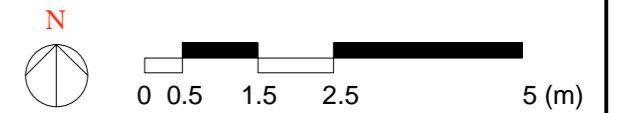
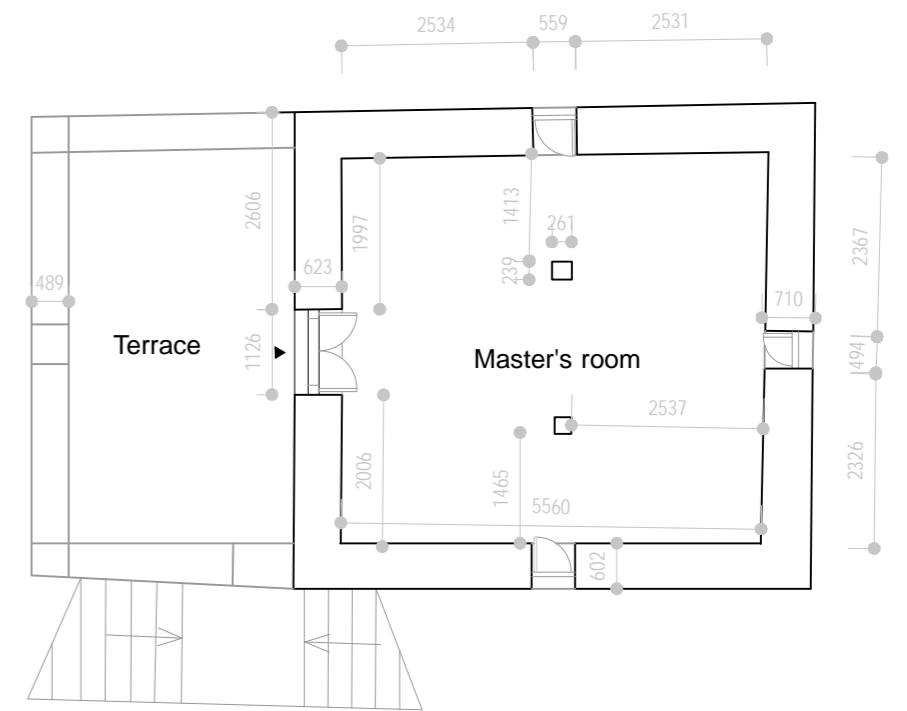
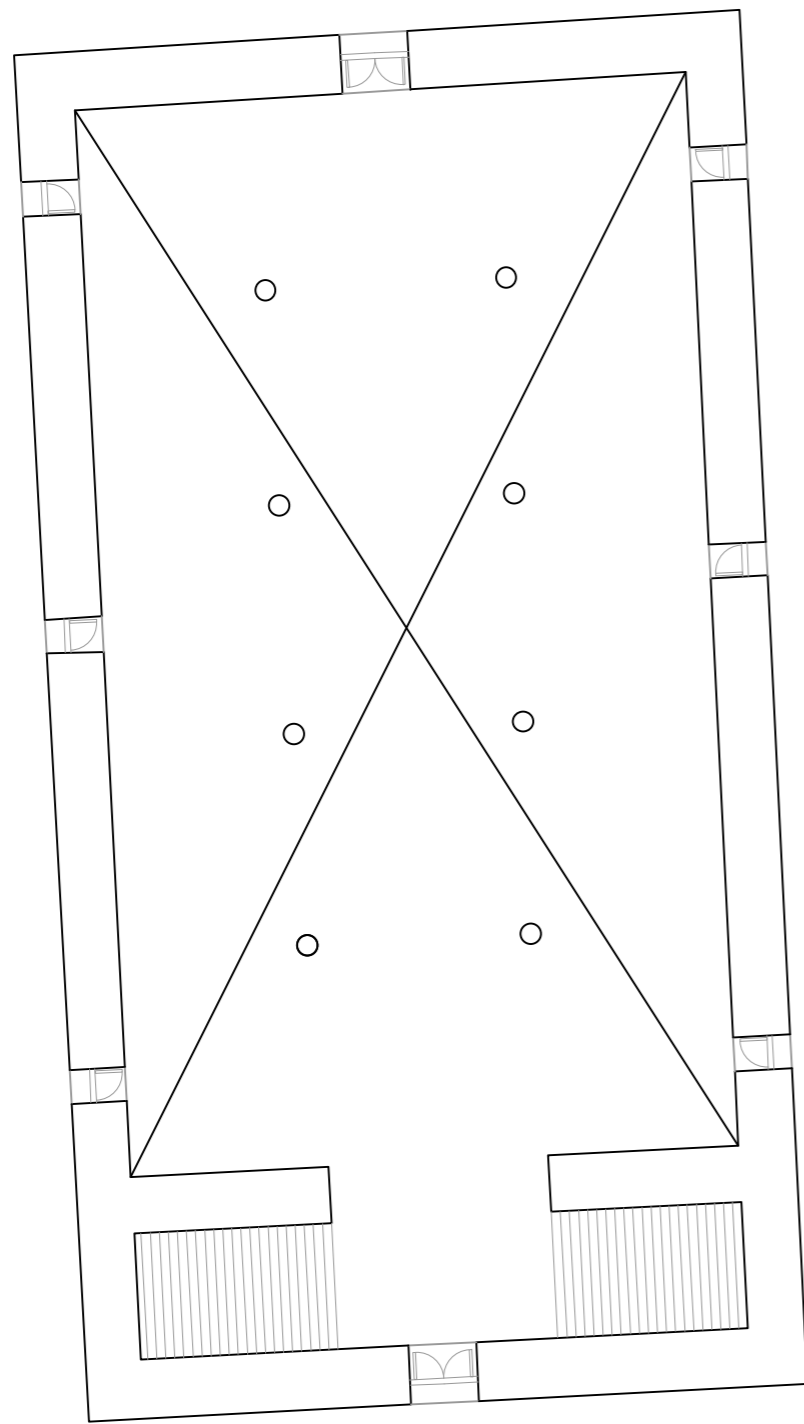


[12] Heavier Timber Structure of the Lower Floor, Building-B, photo by Mano, Y., 2011

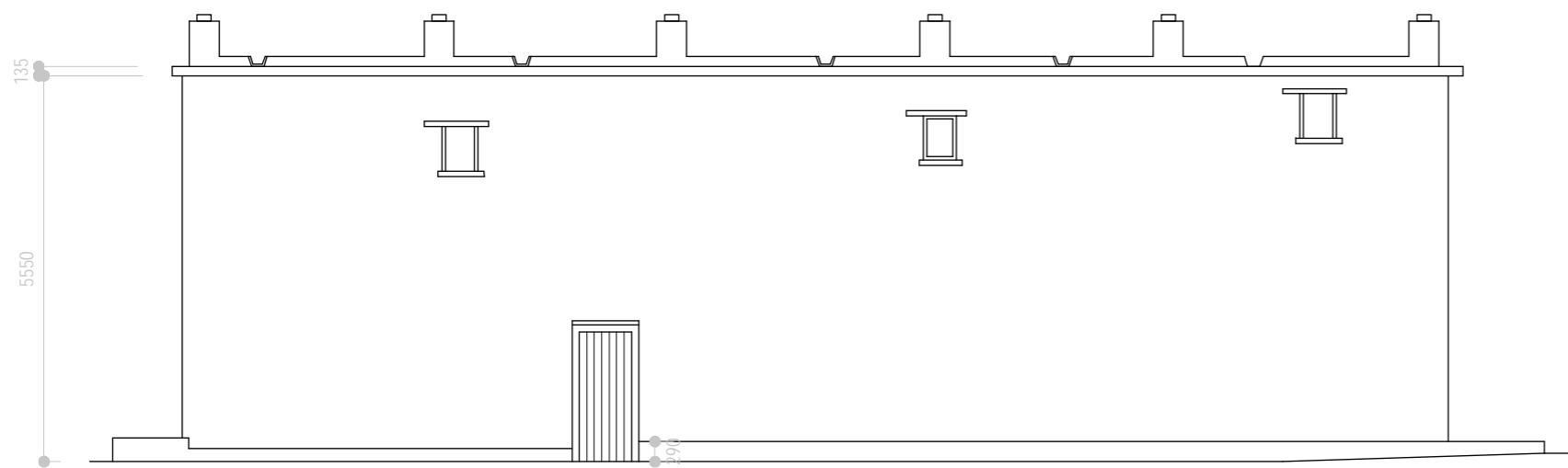
Site Name: Former Residence of Yohannis IV (Agula^o)	Title: Pictures	Survey Year: 2011, 2012	Introduction of the Site: In early 1870s, Tsira ^o , a historical province roughly corresponding to today's Wigo <i>wereda</i> , was the seat of Emperor Yohannis IV, and he set up the targeted buildings as his residence in Agula ^o (Smidt et al. 2010). However, he stayed there for a short time only, probably because the area could not provide enough supplies. When he moved to Mekelle, the buildings were donated to a church, however, the buildings have been half ruined today.
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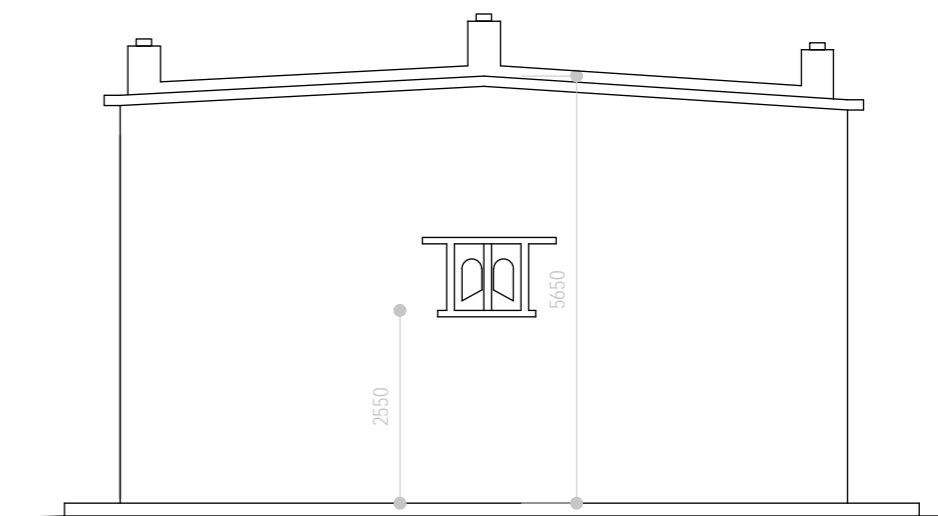
Site Name: Former Residence of Yohannis IV, Building-A and B (Agula^c)	Drawing Title: Plan (Ground Floor)	Survey Year: 2011 2012	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 1 of 5
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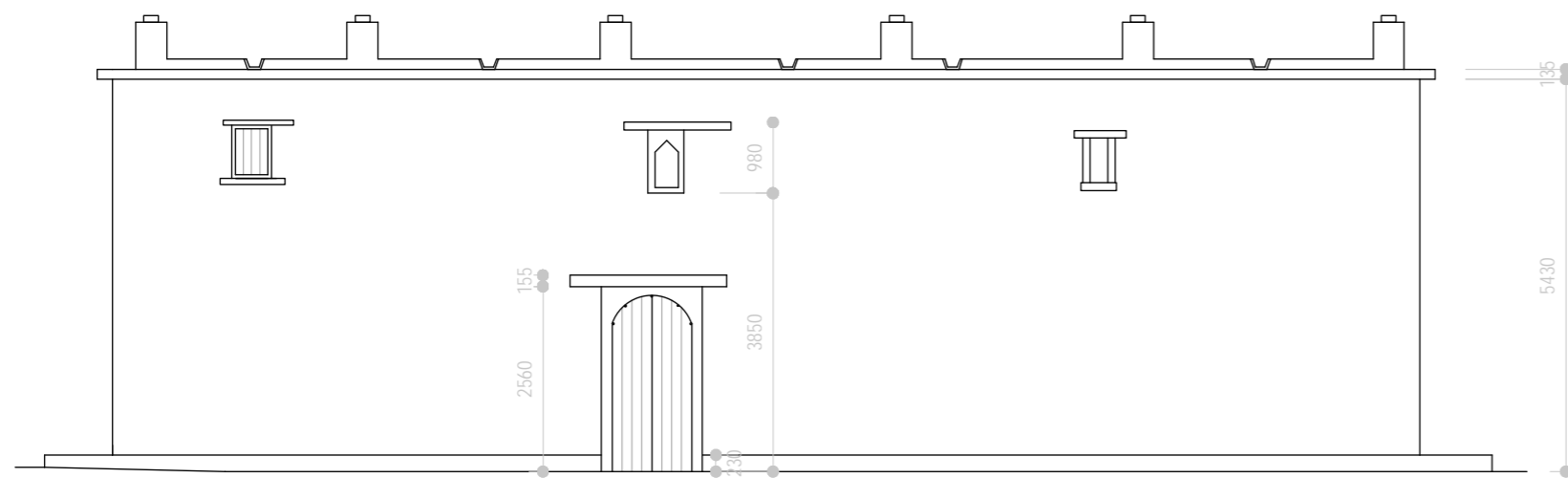
Site Name: Former Residence of Yohannis IV, Building-A and B (Agula^c)	Drawing Title: Plan (First Floor)	Survey Year: 2011 2012	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 2 of 5
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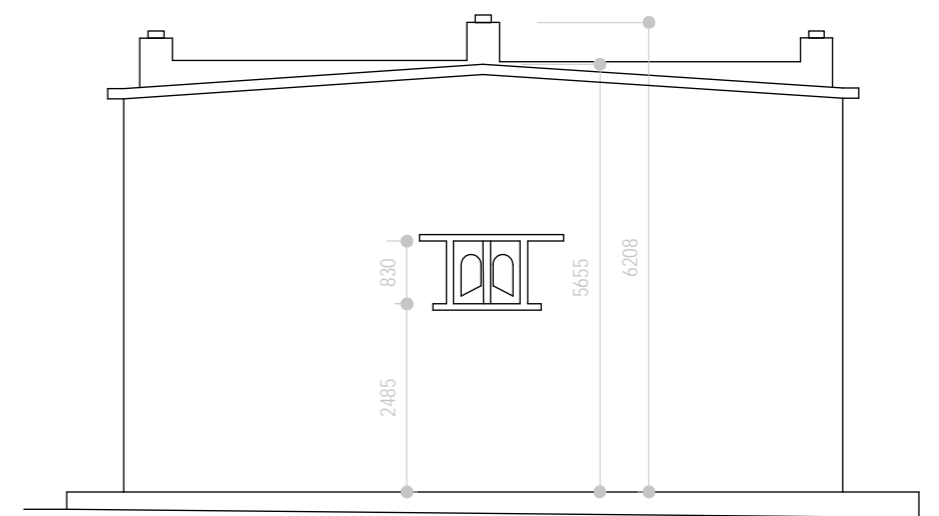
East Elevation (Building-A)



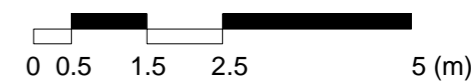
North Elevation (Building-A)



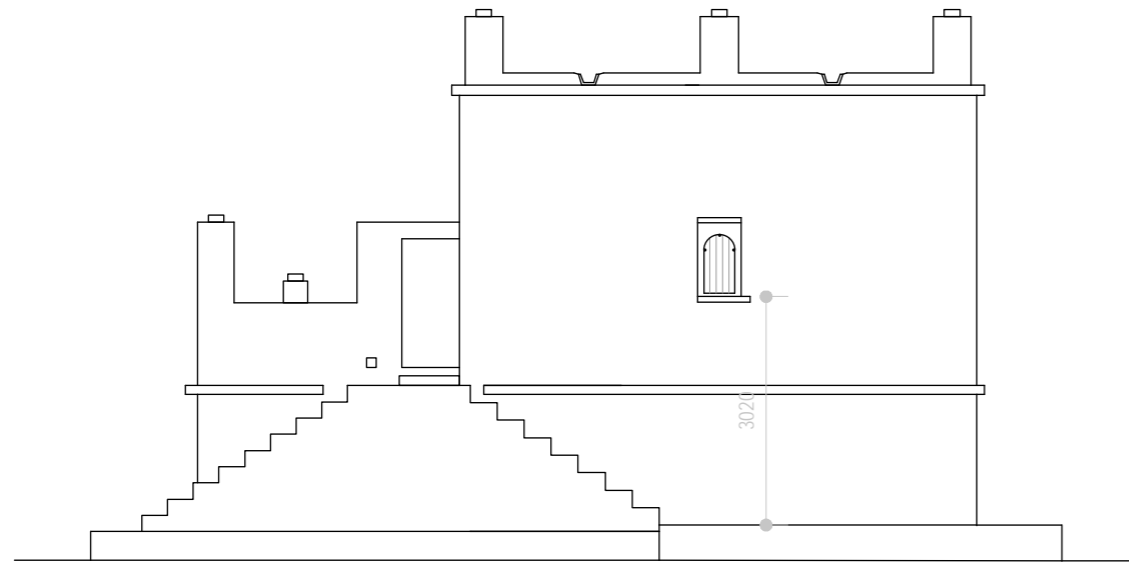
West Elevation (Building-A)



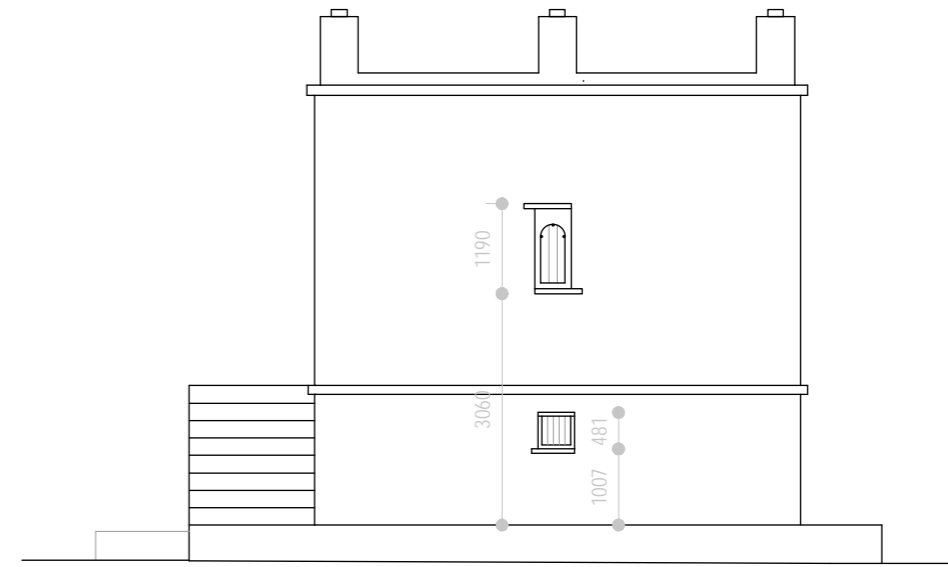
South Elevation (Building-A)



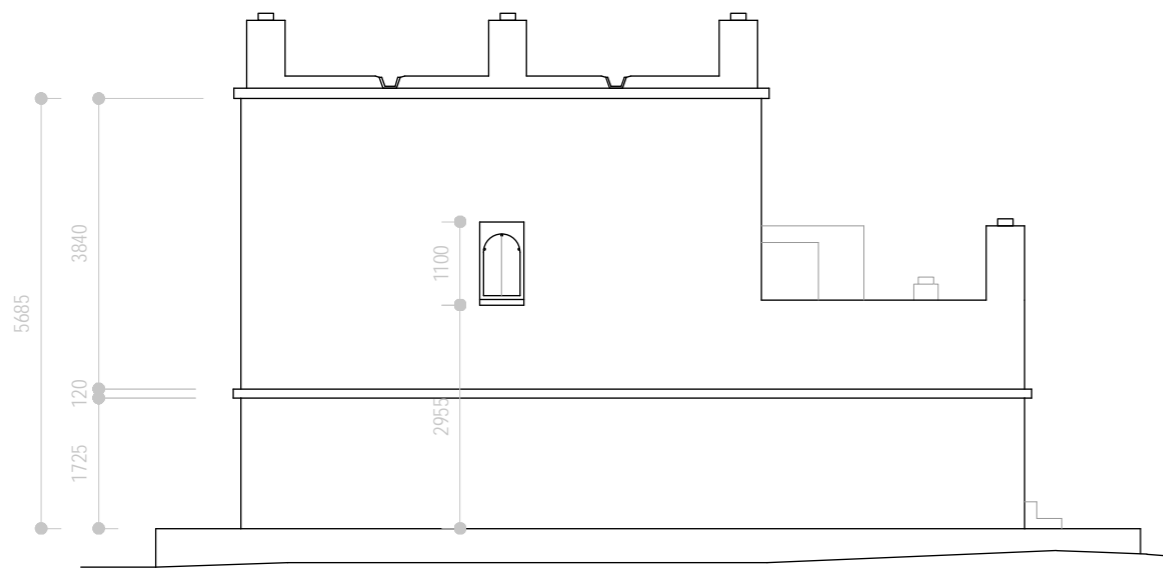
Site Name: Former Residence of Yohannis IV, Building-A and B (Agula ^c)	Drawing Title: Elevation (Building-A)	Survey Year: 2011 2012	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 3 of 5
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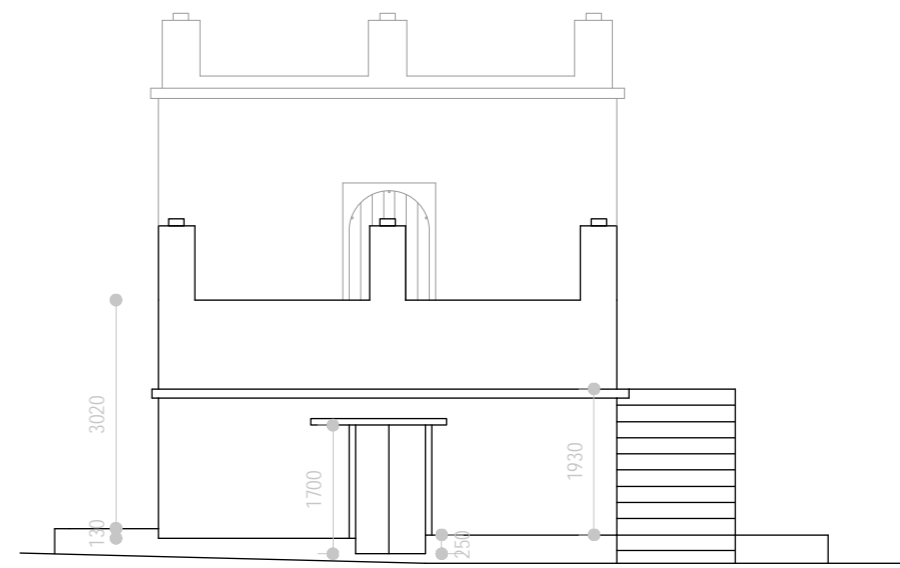
South Elevation (Building-B)



East Elevation (Building-B)



North Elevation (Building-B)



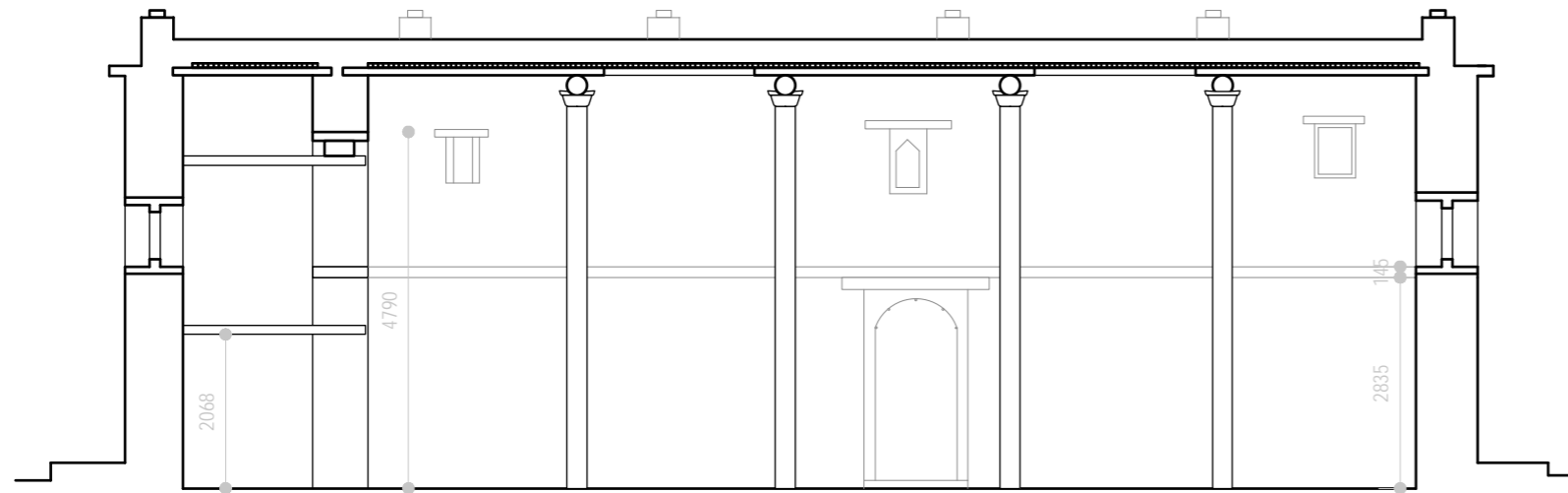
West Elevation (Building-B)



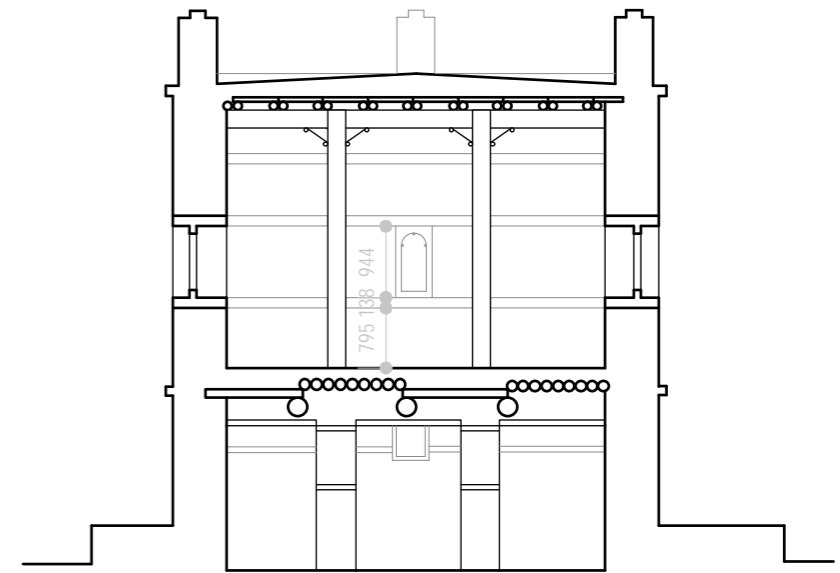
Site Name: Former Residence of Yohannis IV, Building-A and B (Agula ^c)	Drawing Title: Elevation (Building-B)	Survey Year: 2011 2012	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 4 of 5
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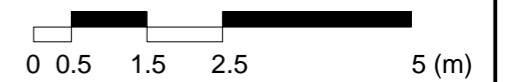
A-A' Section



B-B' Section



C-C' Section



Site Name: Former Residence of Yohannis IV, Building-A and B (Agula ^c)	Drawing Title: Section	Survey Year: 2011 2012	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 5 of 5
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[1] Location, made by Shimizu, N. (source: Google Map)



[6] Internal Appearance of Qiddist, photo by Shimizu, N., 2016



[7] Slightly Gabled Ceiling, photo by Shimizu, N., 2016



[8] Internal Appearance of Qiddist, photo by Shimizu, N., 2016



[2] View from the Church Entrance, photo by Shimizu, N., 2016



[3] Church Entrance, photo by Shimizu, N., 2016



[9] Internal Appearance of Qiddist, photo by Shimizu, N., 2016



[10] View from Qiné Mahlé toward Qiddist, photo by Shimizu, N., 2016



[4] External Appearance (from the Northwest), photo by Shimizu, N., 2016

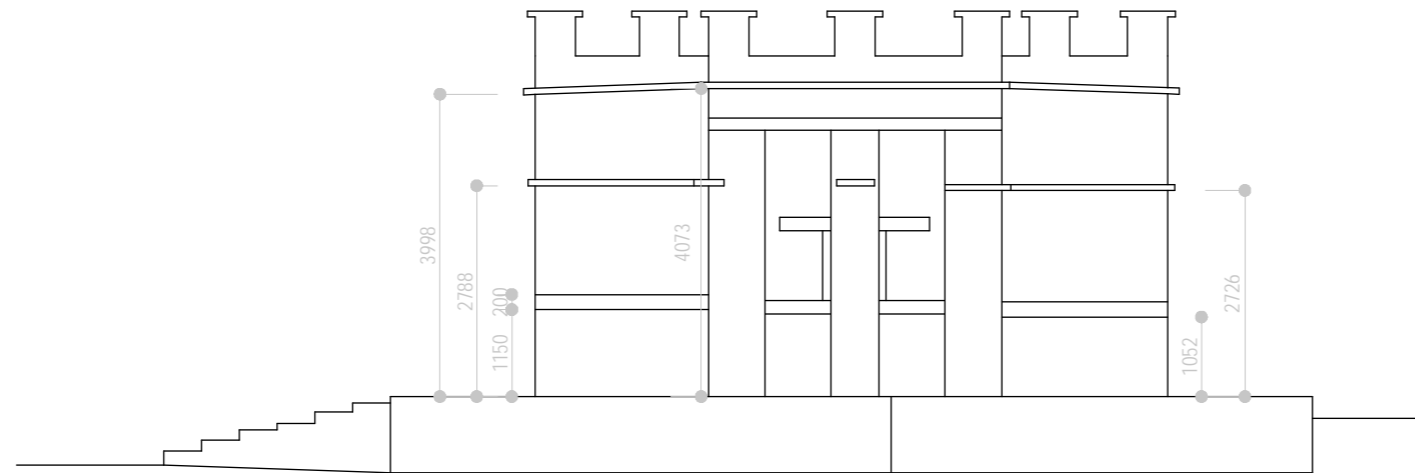


[5] External Appearance (from the Southeast), photo by Shimizu, N., 2016

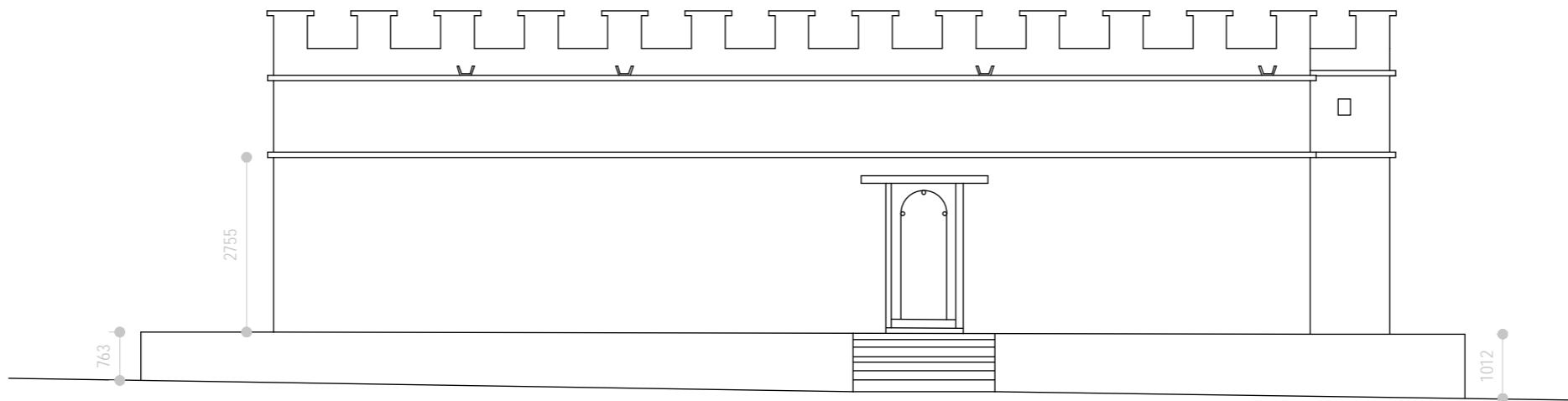


[11] An Ornamental Door between Qiddist and Meqdes, photo by Shimizu, N., 2016

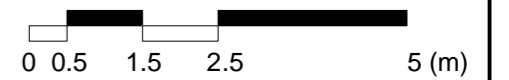
<p>Site Name: Mika'él Ara Church (near 'Adigudem)</p>	<p>Title: Pictures</p>	<p>Survey Year: 2016</p>	<p>Introduction of the Site: Situated at the summit of a little hill in 7km east of 'Adigudem, and facing the lowlands on the east. The church was consecrated by Emperor Yoḥannis IV (r. 1872-1889), in gratitude for the help given by the inhabitants of the region when he had been forced to go into hiding during the reign of Emperor Téwodros II (Tigray Tourism Office: year unknown). Namely, the building was erected in the 1870s or 1880s.</p>
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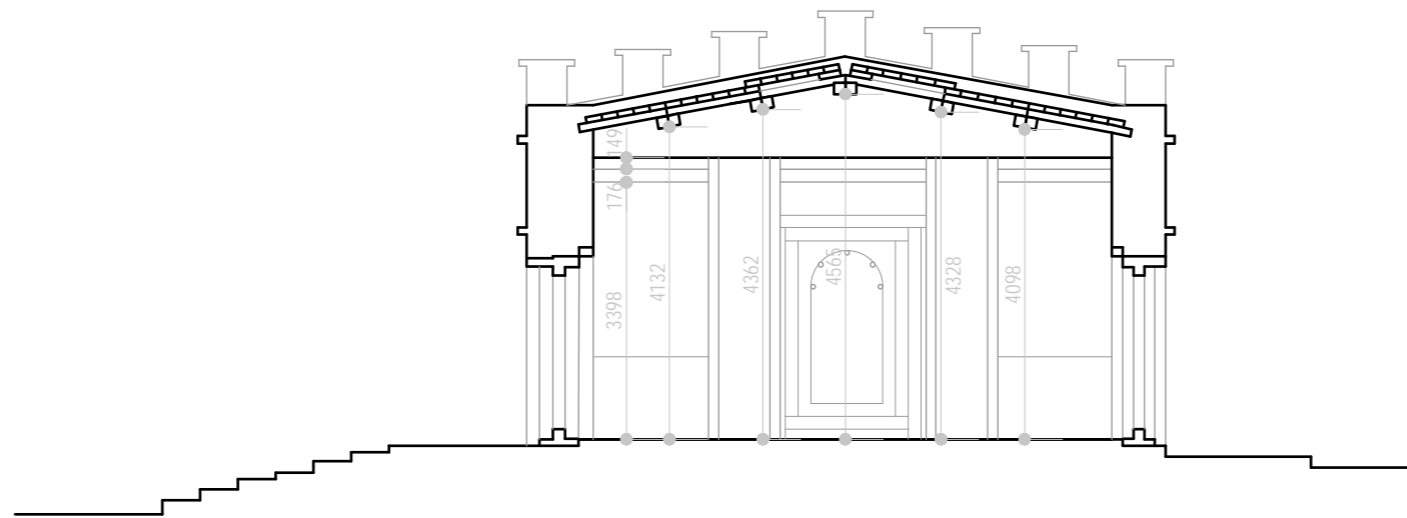
West Elevation



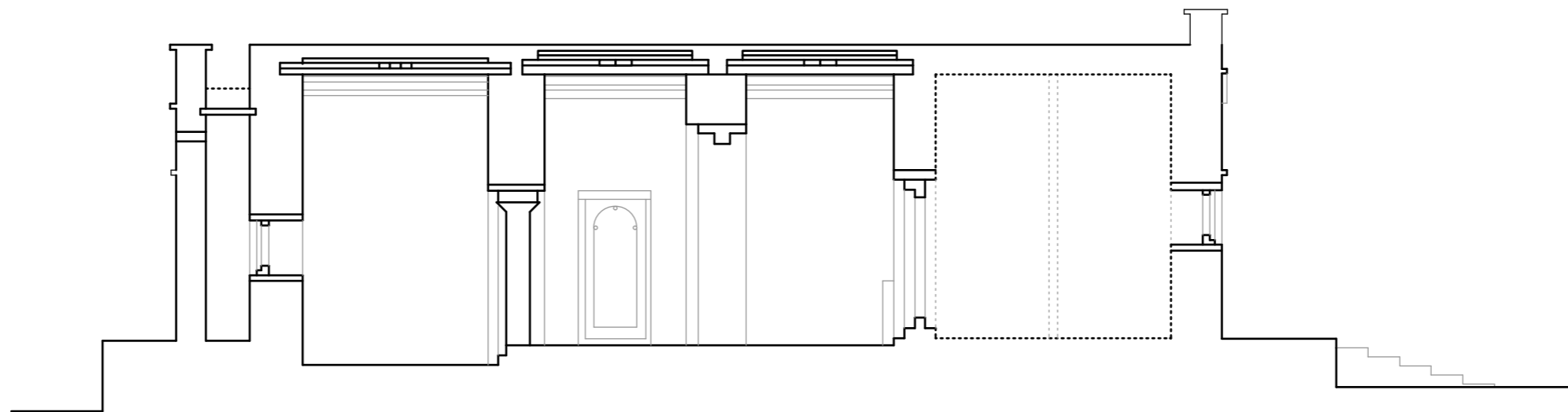
North Elevation



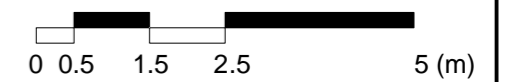
Site Name: Mika'el Ara Church (near `Adigdom)	Drawing Title: Elevation	Survey Year: 2016	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 2 of 3
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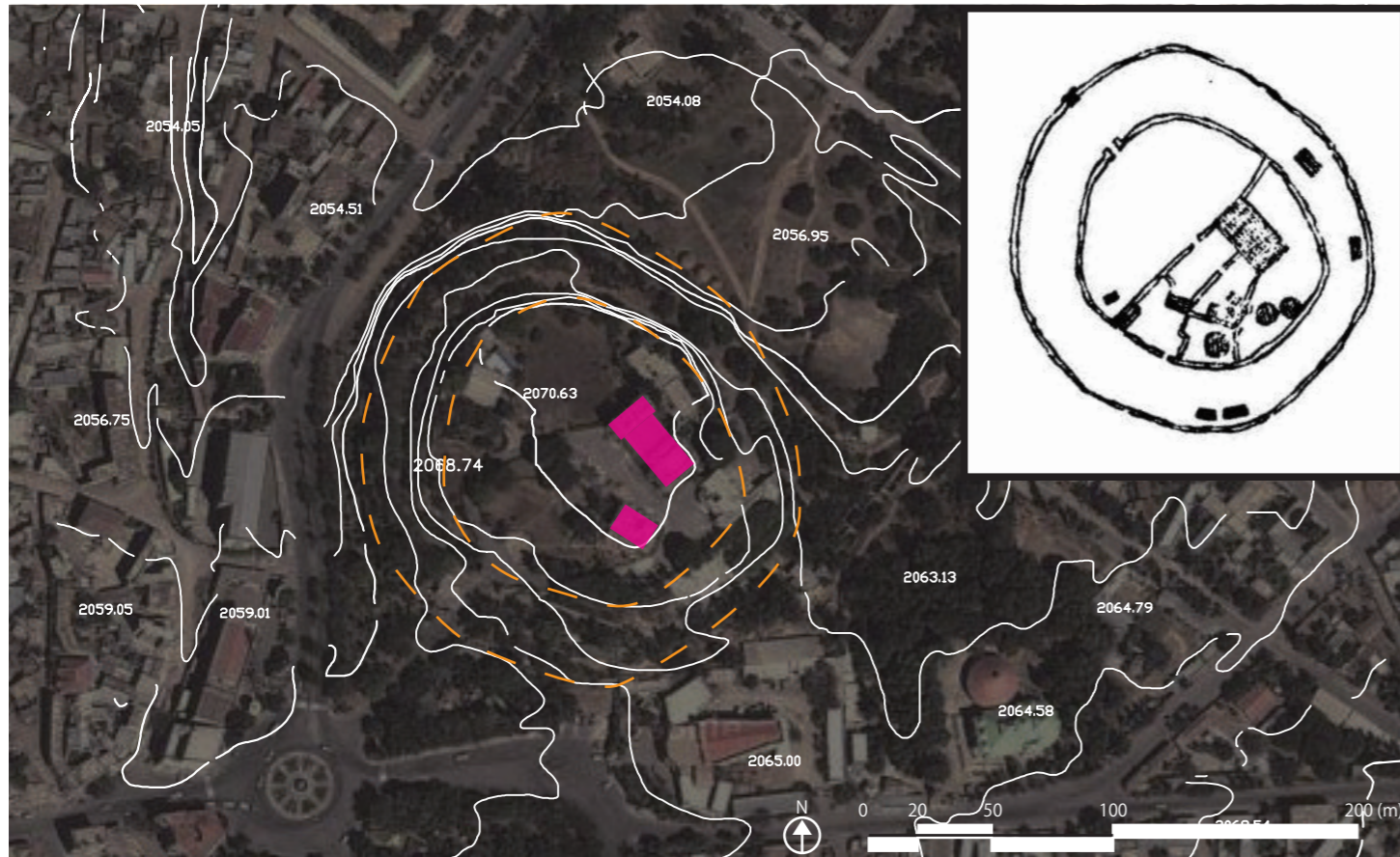
A-A' Section



B-B' Section



Site Name: Mika'él Ara Church (near `Adigdom)	Drawing Title: Section	Survey Year: 2016	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 3 of 3
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[1] Location and Plan in the Early Period, map made by Shimizu, N. (source: Google Map and Municipality Map); plan from Cavaglieri G., 1947



[6] External Appearance (Building-A, Date Unknown); Collection of Institute of Paleoenvironment and Heritage Conservation, Mekelle University (Collection of IPHC)



[7] Masonry Arches at the Entrance (Building-A, Shortly Before the Restoration); Collection of IPHC



[8] Internal Appearance of Building-A (Ground Floor); Photo by Smidt, W., 2010



[9] A Timber Ornamental Pillar and Ceiling (Upper Floor, Building-A); Collection of IPHC



[2] Aerial View (1935), Photo by Berding, A.; Plane Flown by Ciano, C., Associated Press Photo From New York



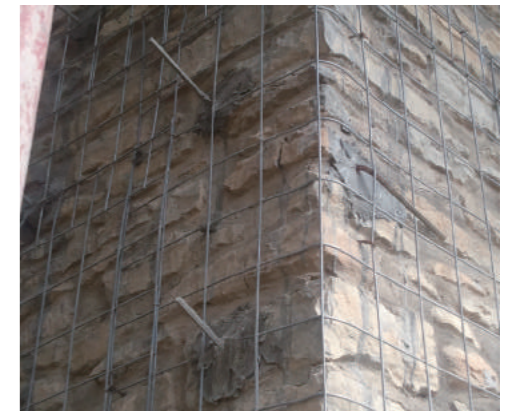
[3] External Appearance (1935); Imperial Parcel Originally Separated by Walls, Photo by Rousseau, R.



[10] Masonry Pillars with Timber Ornament and Timber Ceiling (Ground Floor, Building-A); Photo by Smidt, W., 2010



[11] A Timber Ornamental Door (Building-A), Collection of IPHC



[12] The Way of Wall Consolidation (During Restoration Work), photo by Shimizu, N., 2012



[4] External Appearance (Date Unknown); from Pankhurst, R., Gérald, D., 1996



[5] External Appearance (after Restoration); Photo by Shimizu, N., 2018

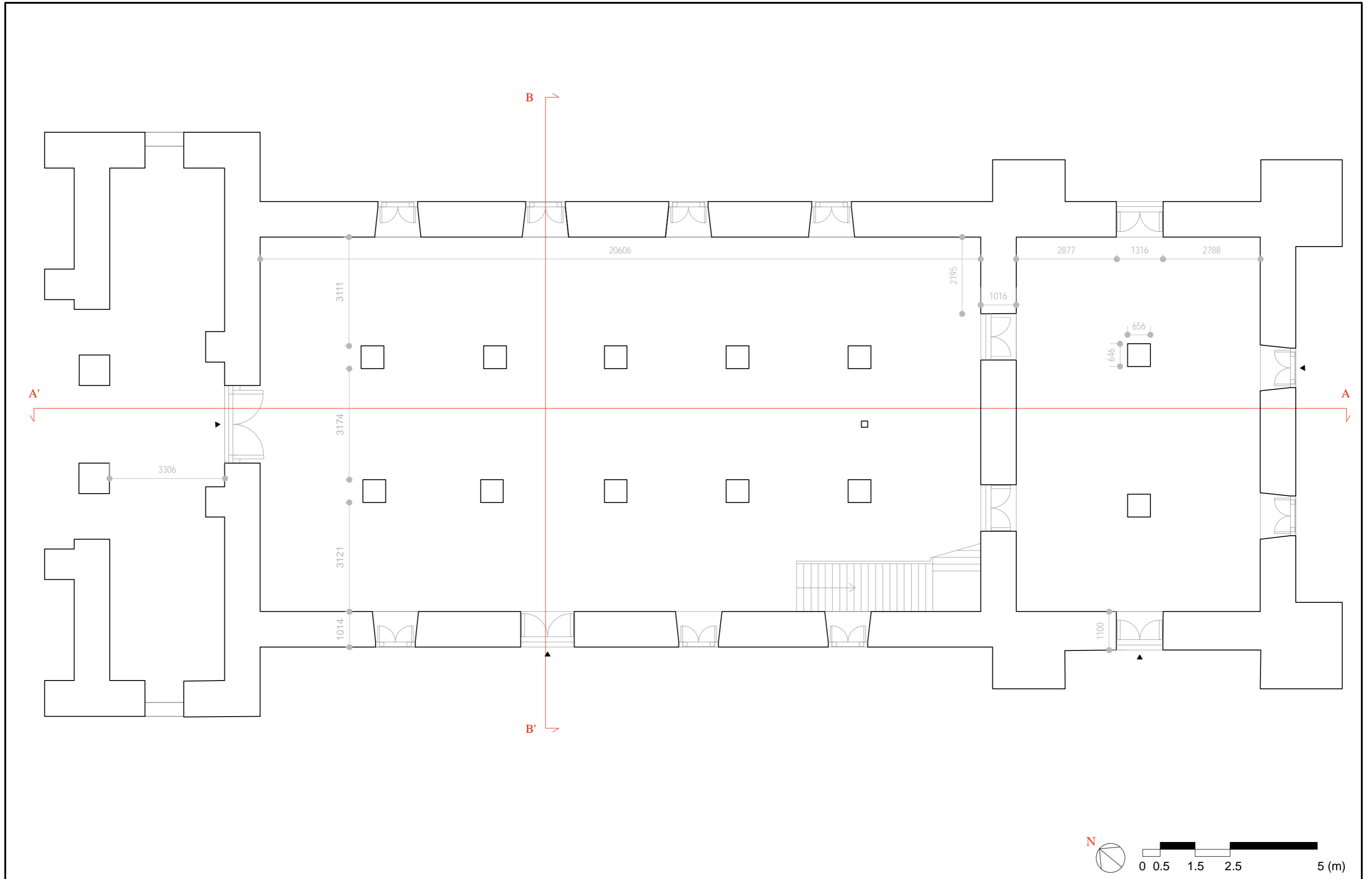


[13] External Appearance of Building-B (Shortly before the Restoration), Collection of IPHC

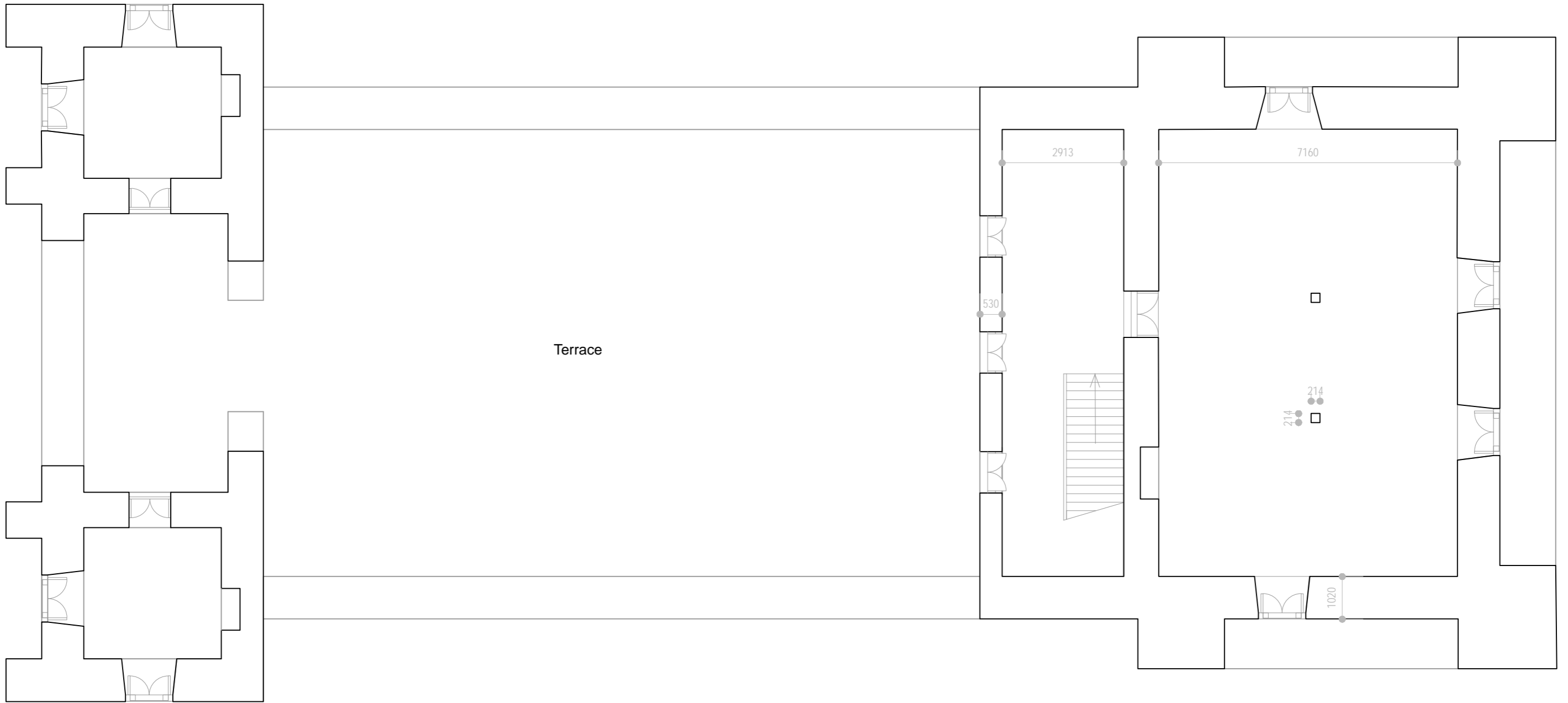


[14] During Restoration Work (Building-B), photo by Shimizu, N., 2012

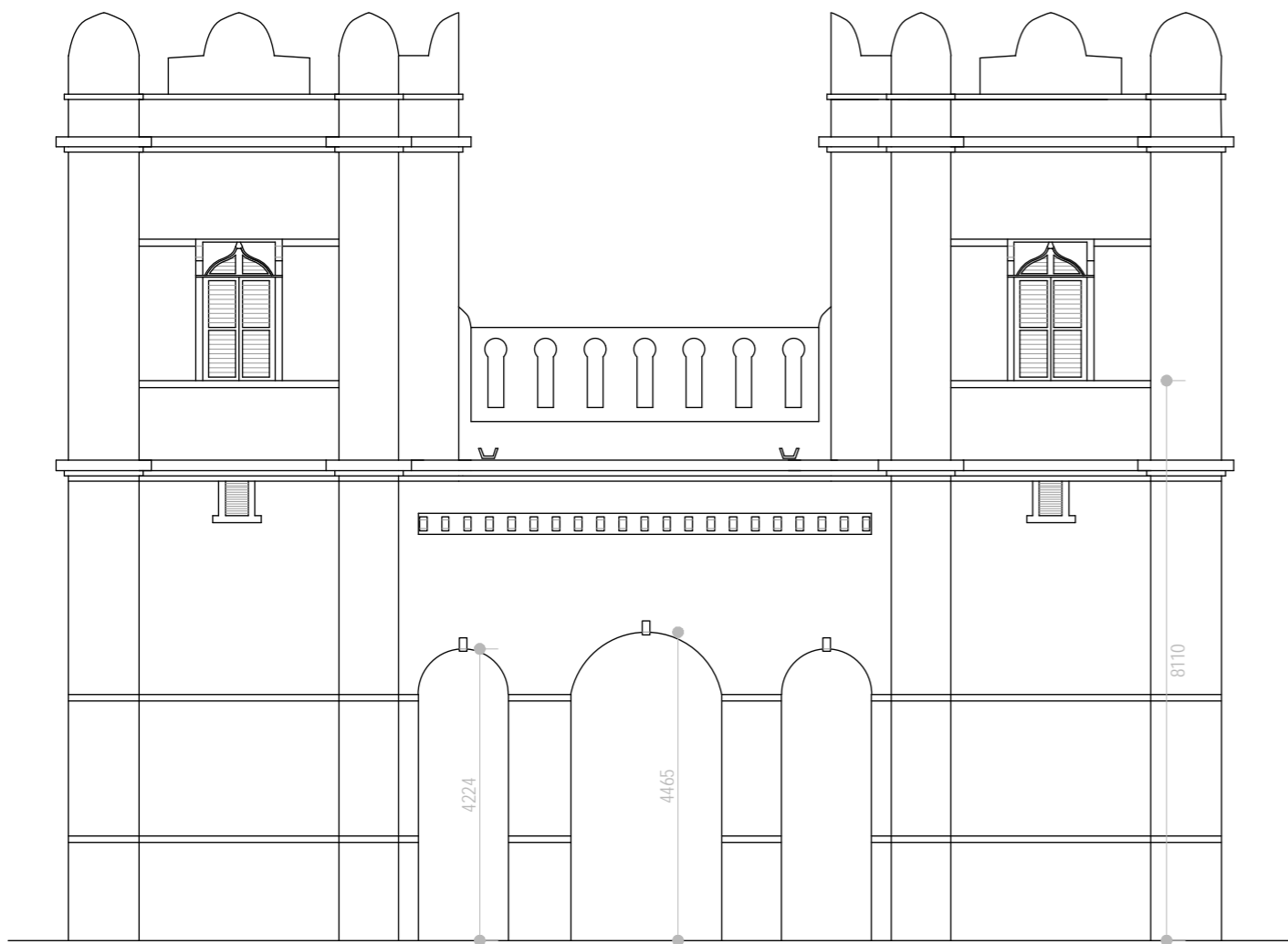
Site Name:	Title:	Survey Year:	Introduction of the Site:
Emperor Yohannis IV Palace (Mekelle)	Pictures	2010	Yohannis IV (then known as Dejzmach Kahsay) was crowned in 1872. He transferred Ethiopian political center to Tigray, and built his palace in Mekelle. The palace construction project that was completed in 1884 was participated by Italian craftsman Giacomo Naretti, the retainer of Yohannis IV, with the assistance of Whilhelm Schimper, the son of the botanist Baron Georg Heinrich Wilhelm von Schimper (Sacchi 2012). Local people's contribution should be emphasized, too. Harrison Smith who visited the site at the time of completion described the "masonry, it is true, had been actually built by natives, under unceasing superintendence of Naretti (Smith 1890)." On the other hand, he mentioned that woodwork was "entirely the production of his (Naretti's) own hand (Ibid.)."



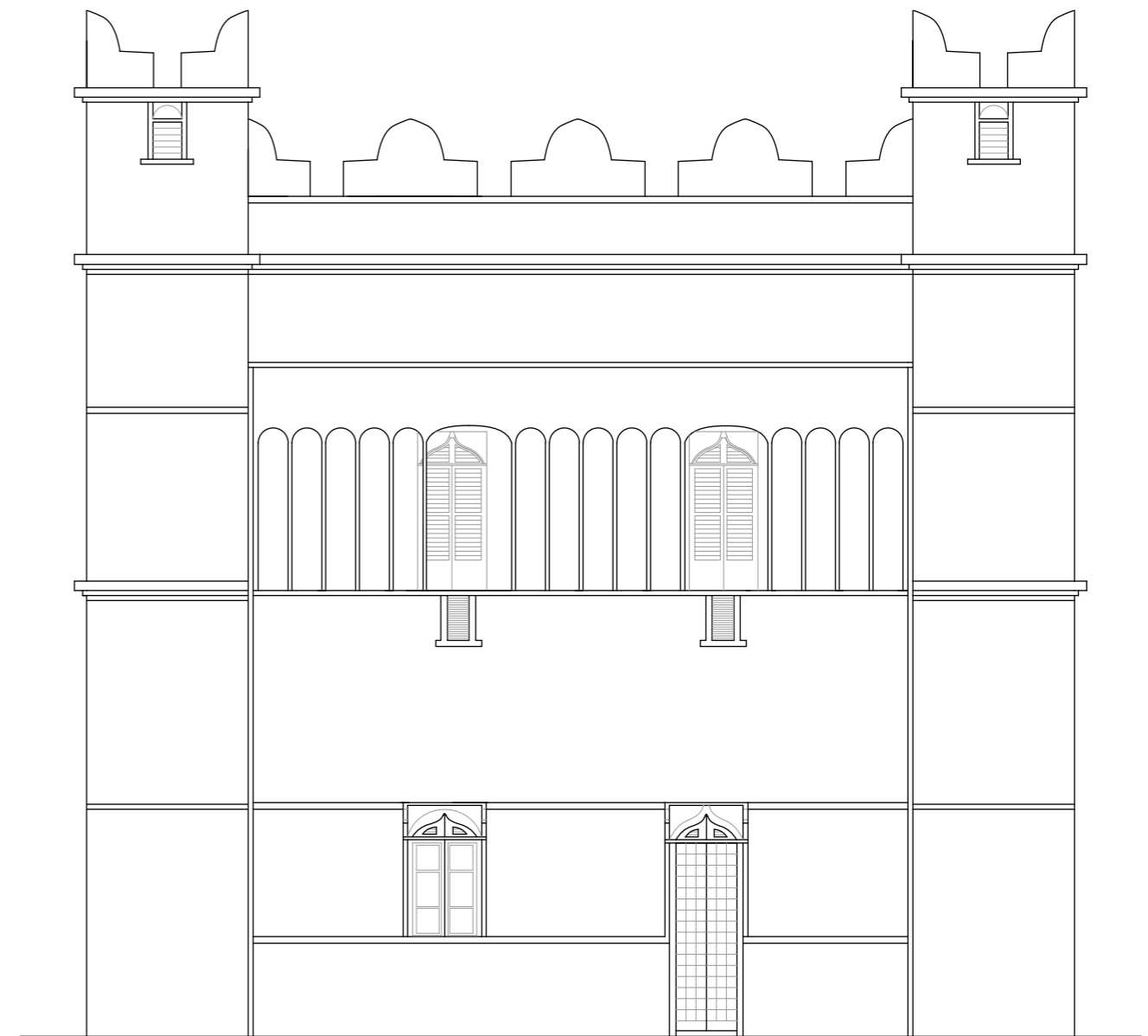
Site Name: Emperor Yohannis IV Palace, Building-A (Mekelle)	Drawing Title: Plan (Ground Floor)	Survey Year: 2010	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 1 of 11
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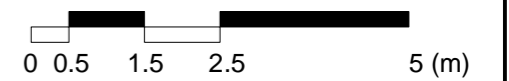
Site Name: Emperor Yohannis IV Palace, Building-A (Mekelle)	Drawing Title: Plan (First Floor)	Survey Year: 2010	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 2 of 11
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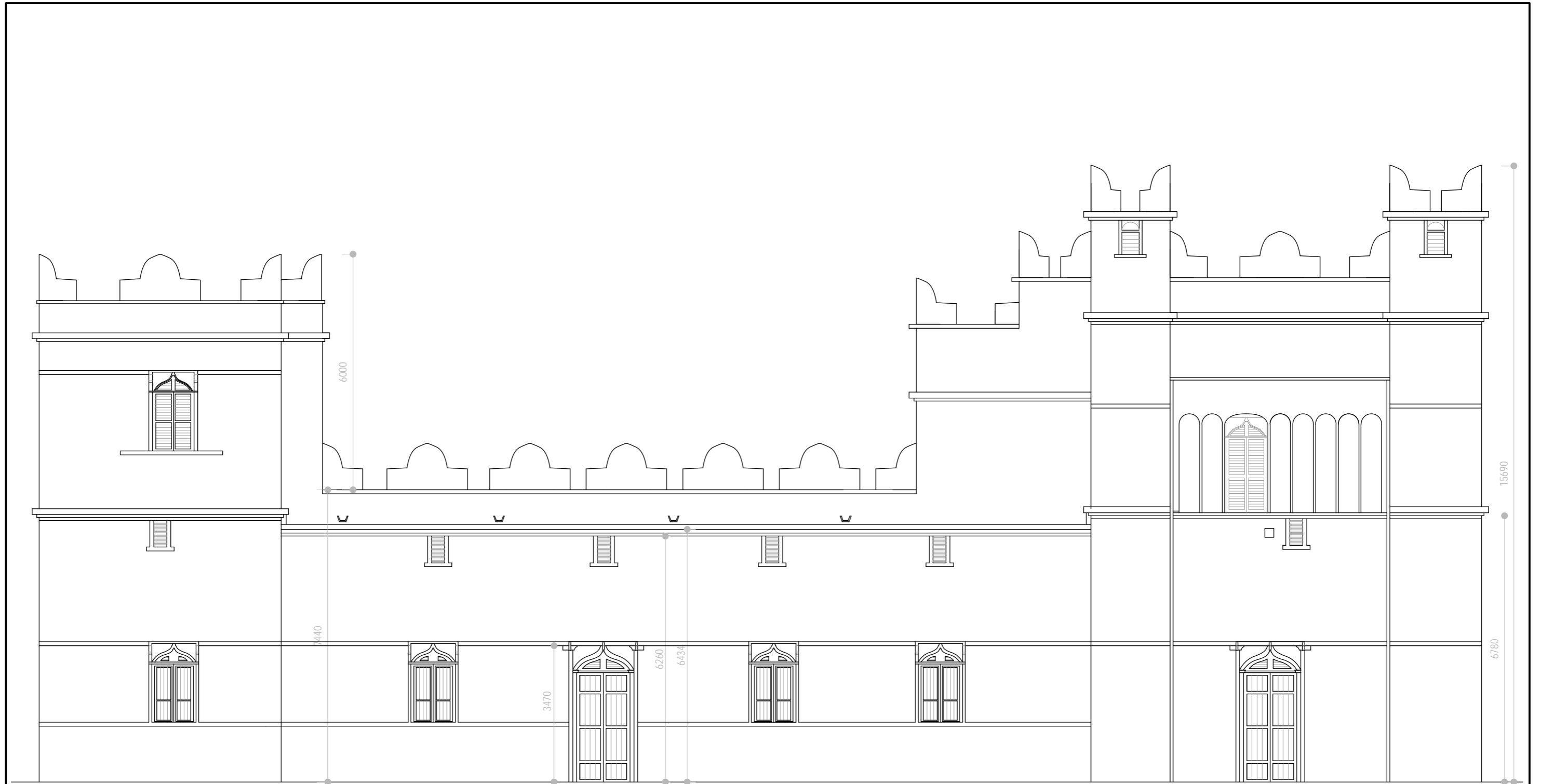
North-West Elevation



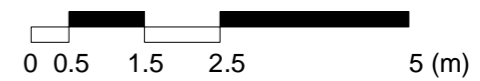
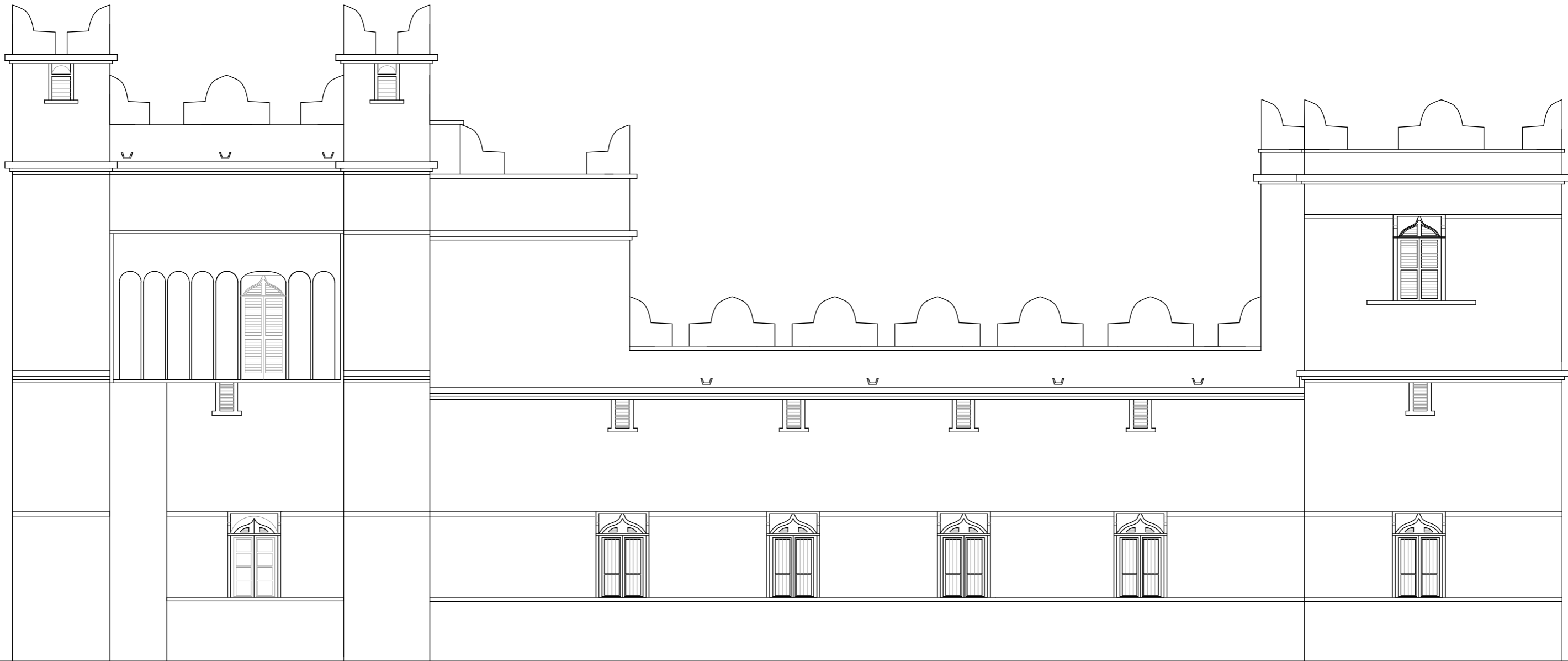
South-East Elevation



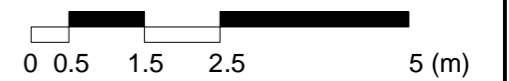
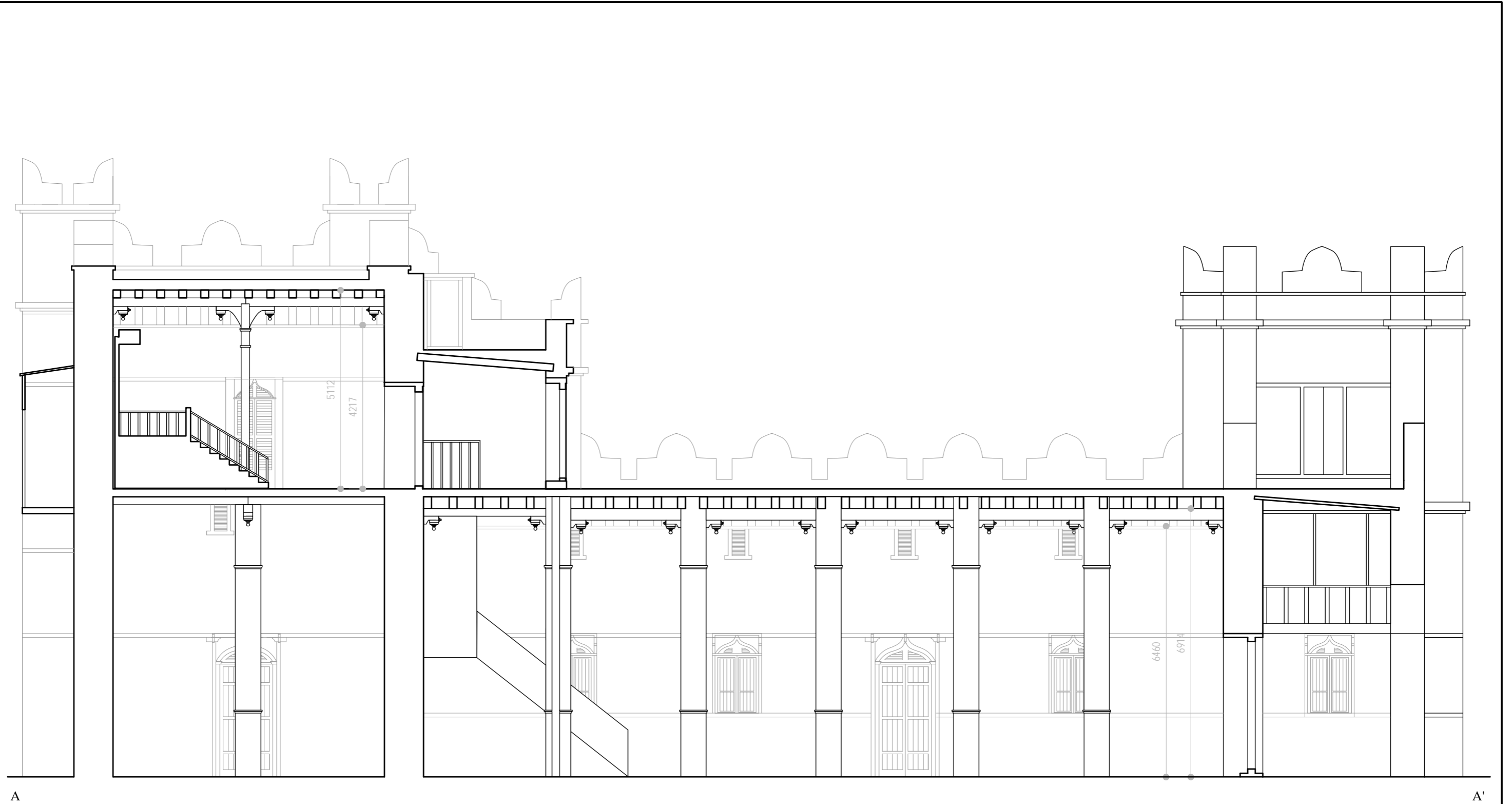
Site Name: Emperor Yohannis IV Palace, Building-A (Mekelle)	Drawing Title: Elevation (NW, SE)	Survey Year: 2010	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 3 of 11
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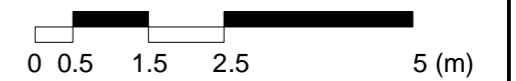
Site Name: Emperor Yohannis IV Palace, Building-A (Mekelle)	Drawing Title: South-West Elevation	Survey Year: 2010	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 4 of 11
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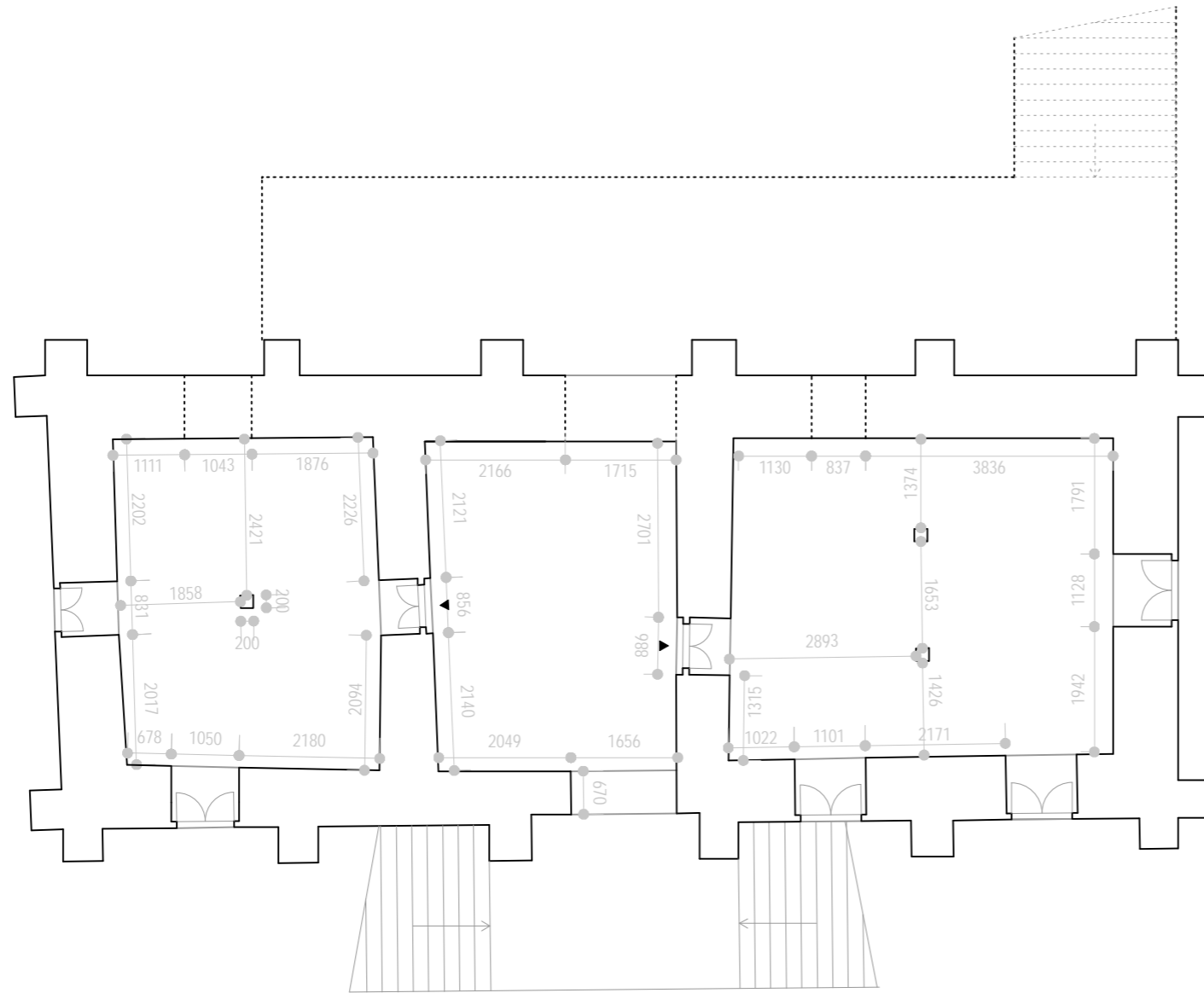
Site Name: Emperor Yohannis IV Palace, Building-A (Mekelle)	Drawing Title: North-East Elevation	Survey Year: 2010	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 5 of 11
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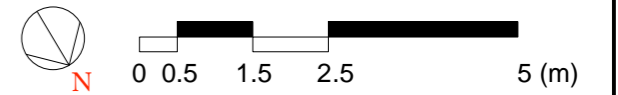
Site Name: Emperor Yohannis IV Palace, Building-A (Mekelle)	Drawing Title: A-A' Section	Survey Year: 2010	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 6 of 11
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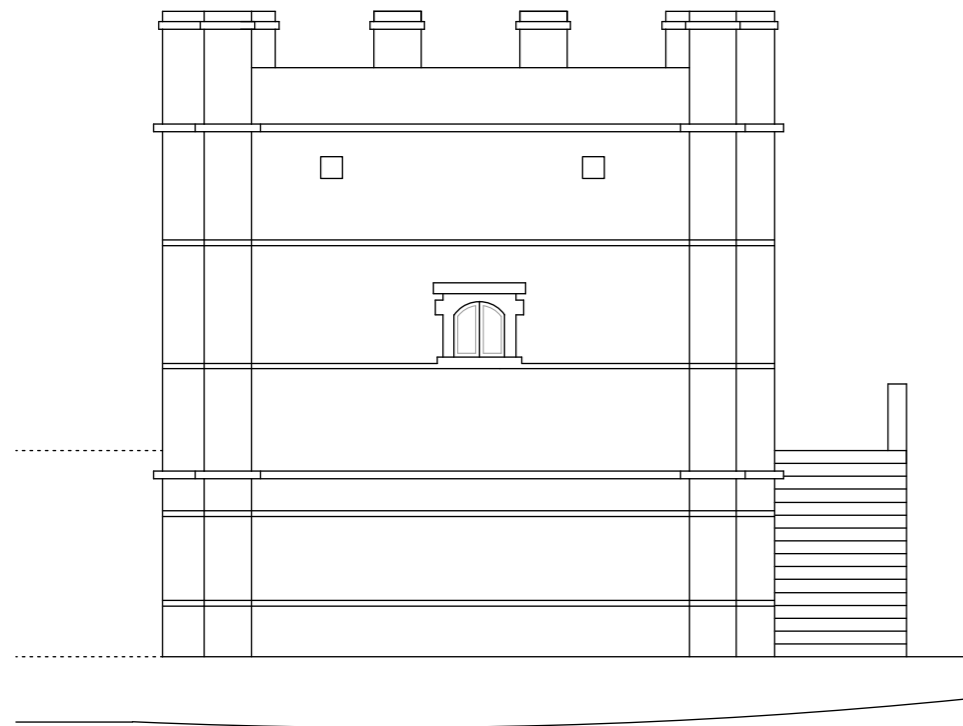
Site Name: Emperor Yohannis IV Palace, Building-A (Mekelle)	Drawing Title: B-B' Section	Survey Year: 2010	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 7 of 11
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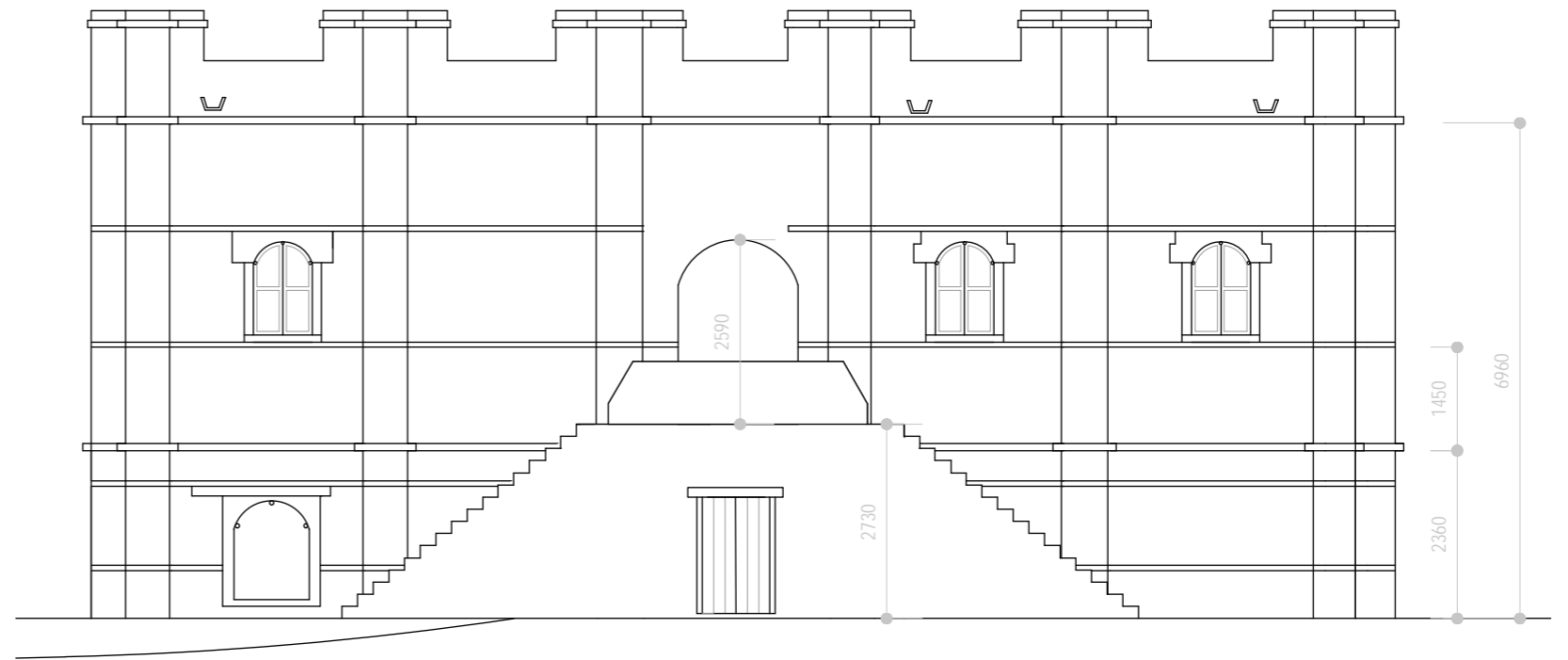
1F:
Resided by Mengesha Yohannis and his wife



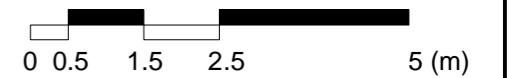
Site Name: Emperor Yohannis IV Palace, Building-B (Mekelle)	Drawing Title: Plan (First Floor)	Survey Year: 2010	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 9 of 11
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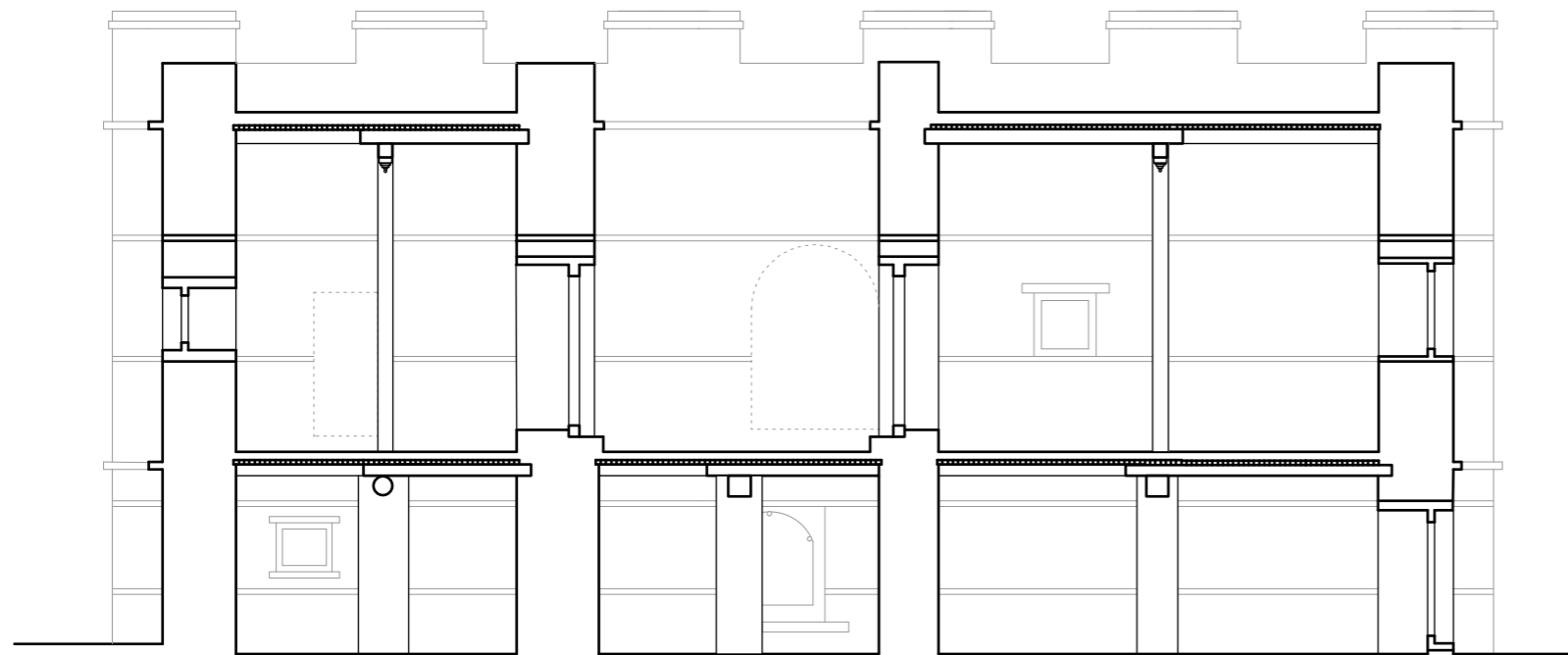
South-East Elevation



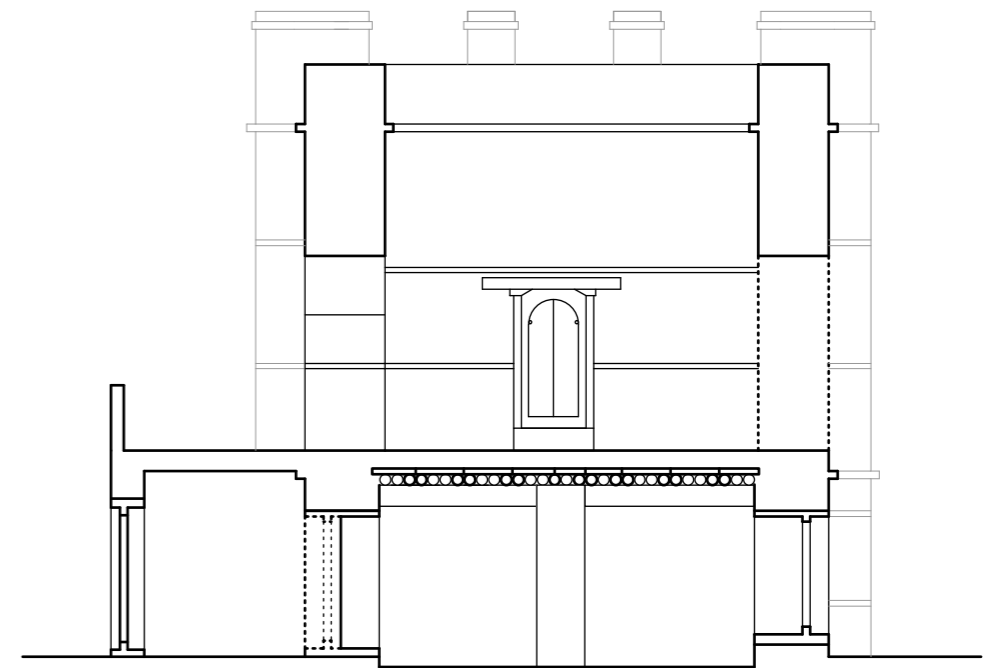
North-East Elevation



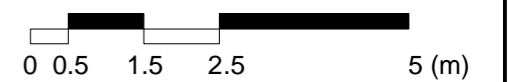
Site Name: Emperor Yohannis IV Palace, Building-B (Mekelle)	Drawing Title: South-East Elevation North-East Elevation	Survey Year: 2010	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 10 of 11
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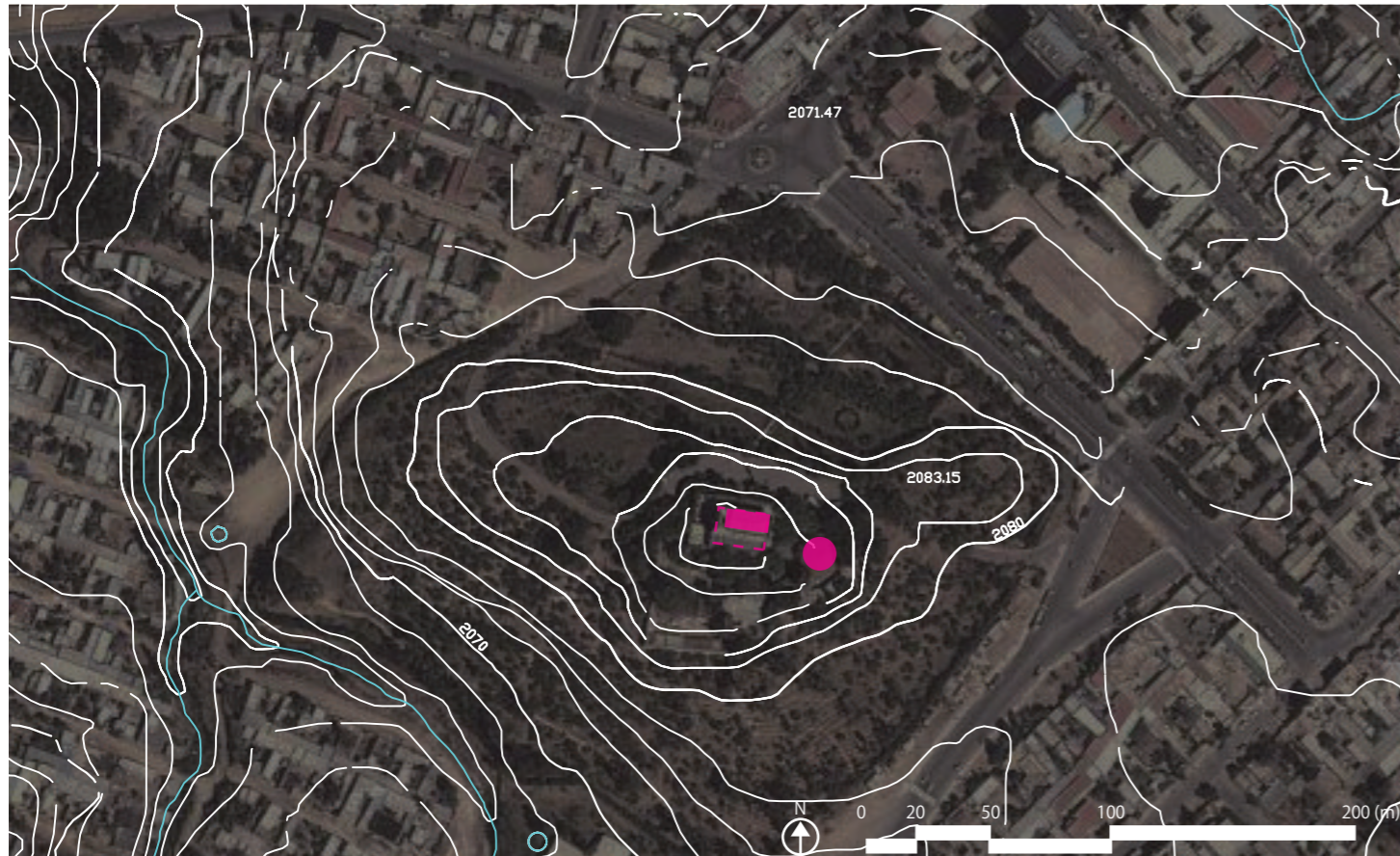
A-A' Section



B-B' Section



Site Name: Emperor Yohannis IV Palace, Building-B (Mekelle)	Drawing Title: A-A' Section B-B' Section	Survey Year: 2010	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 11 of 11
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[1] Location, map made by Shimizu, N. (source: Google Map and Municipality Map)



[5] During Renovation Work (perhaps ca. 1950s), source unknown



[6] External Appearance of Building-A (from the Northeast), photo by Shimizu, N., 2018



[7] Different Type of Masonry Works between Original Part (Right) and Extended Part (Left), Photo by Shimizu, N., 2018



[8] Cafe with Timber Ceiling in the Ground Floor of Building-A (Perhaps the Work in the Time of Renovation), Photo by Shimizu, N., 2018



[2] Aerial View (Perhaps 1930s), Collection of Cultural Association of Tigray



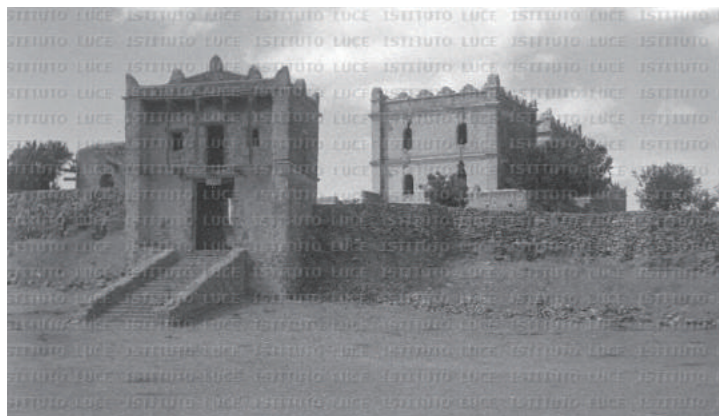
[4] At the Time of Renovation (ca. 1960; Right Part of the Building Extended), source unknown



[9] Lobby with Panel Ceiling in the Upper Floor of Building-A (Perhaps the Work in the Time of Renovation), Photo by Shimizu, N., 2018



[10] Corrugated Metal Sheet Covering Building-A, Photo by Shimizu, N., 2011



[3] Previous State (ca. 1935), Istituto Nazionale Luce A.O.

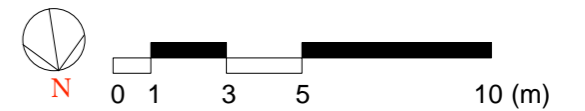
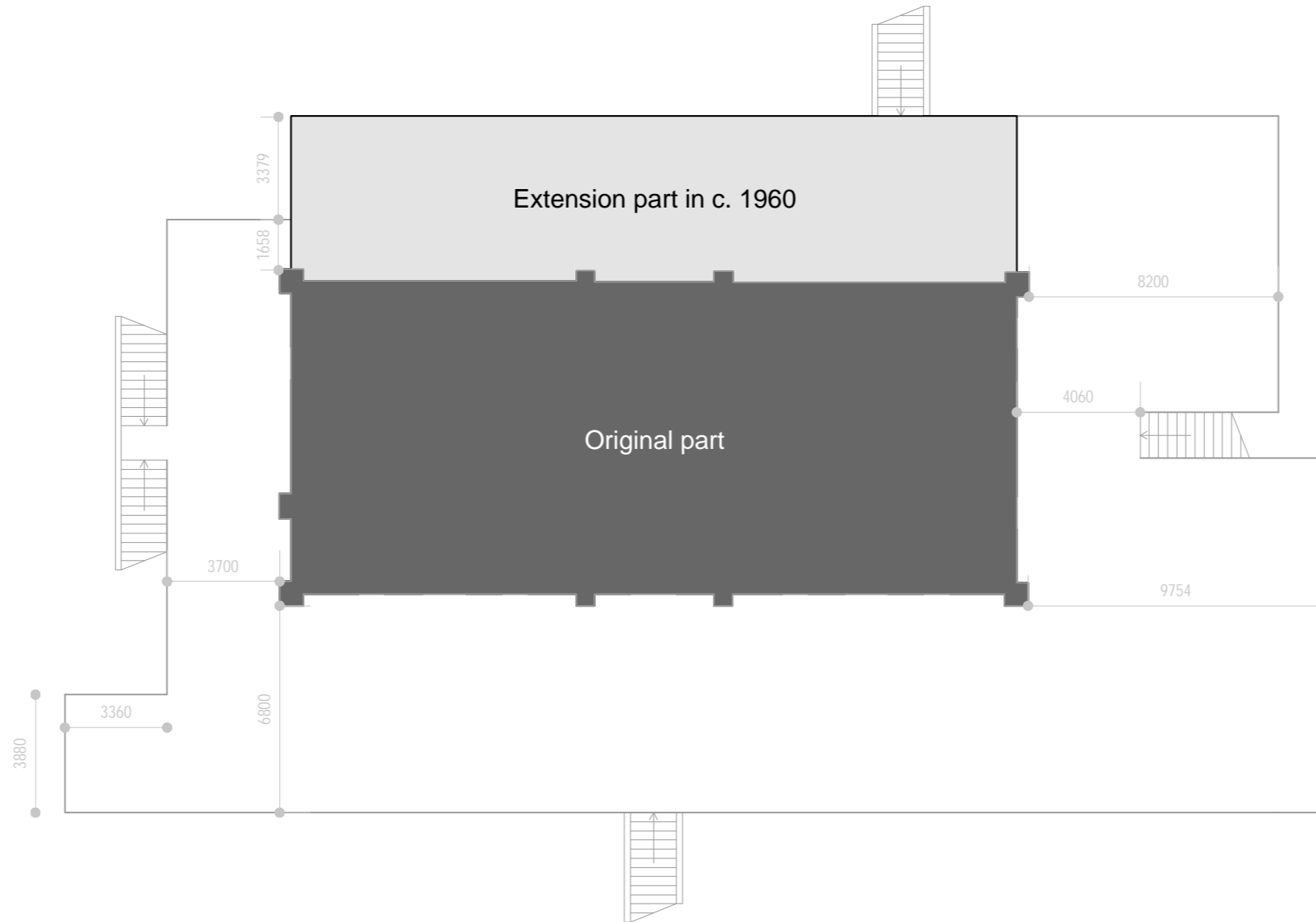


[11] External Appearance of Building-B (from the Northwest), photo by Shimizu, N., 2018

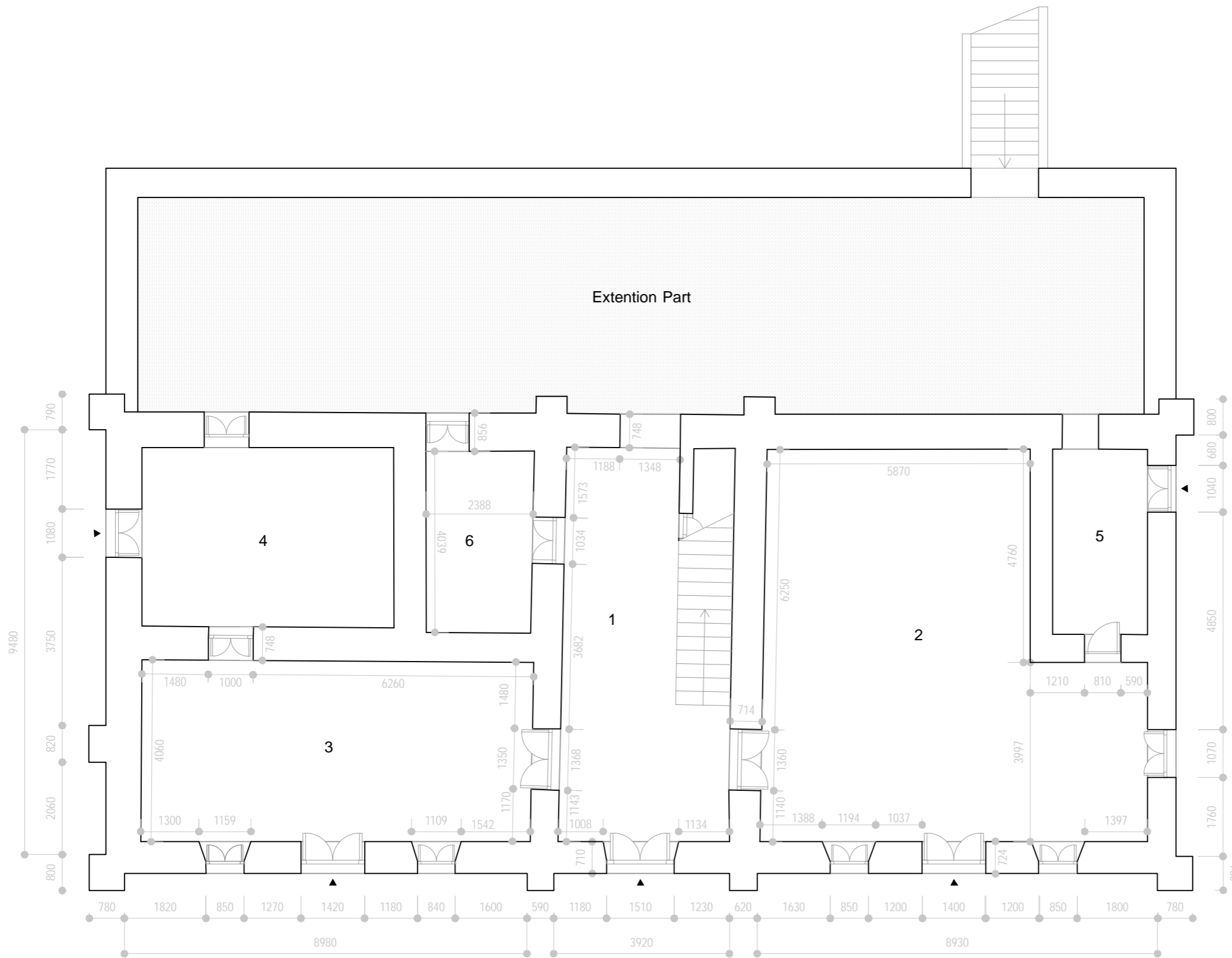


[12] Internal Appearance and the End of Brace, photo by Shimizu, N., 2018

<p>Site Name: Abriha Castle (Mekelle)</p>	<p>Title: Pictures</p>	<p>Survey Year: 2011, 2012 2018</p>	<p>Introduction of the Site: <i>Dejazmach Abriha Ar'aya</i>, a cousin of Emperor Yohannis IV, was appointed as a governor of much of eastern and southern Tigray by the central government in 1902 (Tsegay 2003). However, his reign was short: in 1909, Abriha protested against the appointment of another person as the overlord of Tigray, and was defeated and detained. Furthermore, during his reign, he was challenged by the turbulence caused by Siyyum Mengesha, who claimed an immediate descent from Yohannis IV. Nevertheless, he built new castle on a modified artificial hilltop in the southern part of Mekelle during his reign, perhaps because Emperor Yohannis' Palace was used by the immediate descendants. Though the photos of 1930s show the existence of the circular building in the location of Building-B, whether the building is original one or not is not clear. The castle became a hotel in c. 1960 by the commitment of Mengesha Siyyum, after the renovation and extension of the building.</p>
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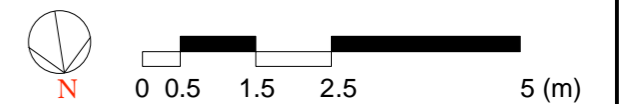


Site Name: Abriha Castle, Building-A (Mekelle)	Drawing Title: Layout Plan	Survey Year: 2011, 2012 2018	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 200 (A3)	Sheet Number: 1 of 8
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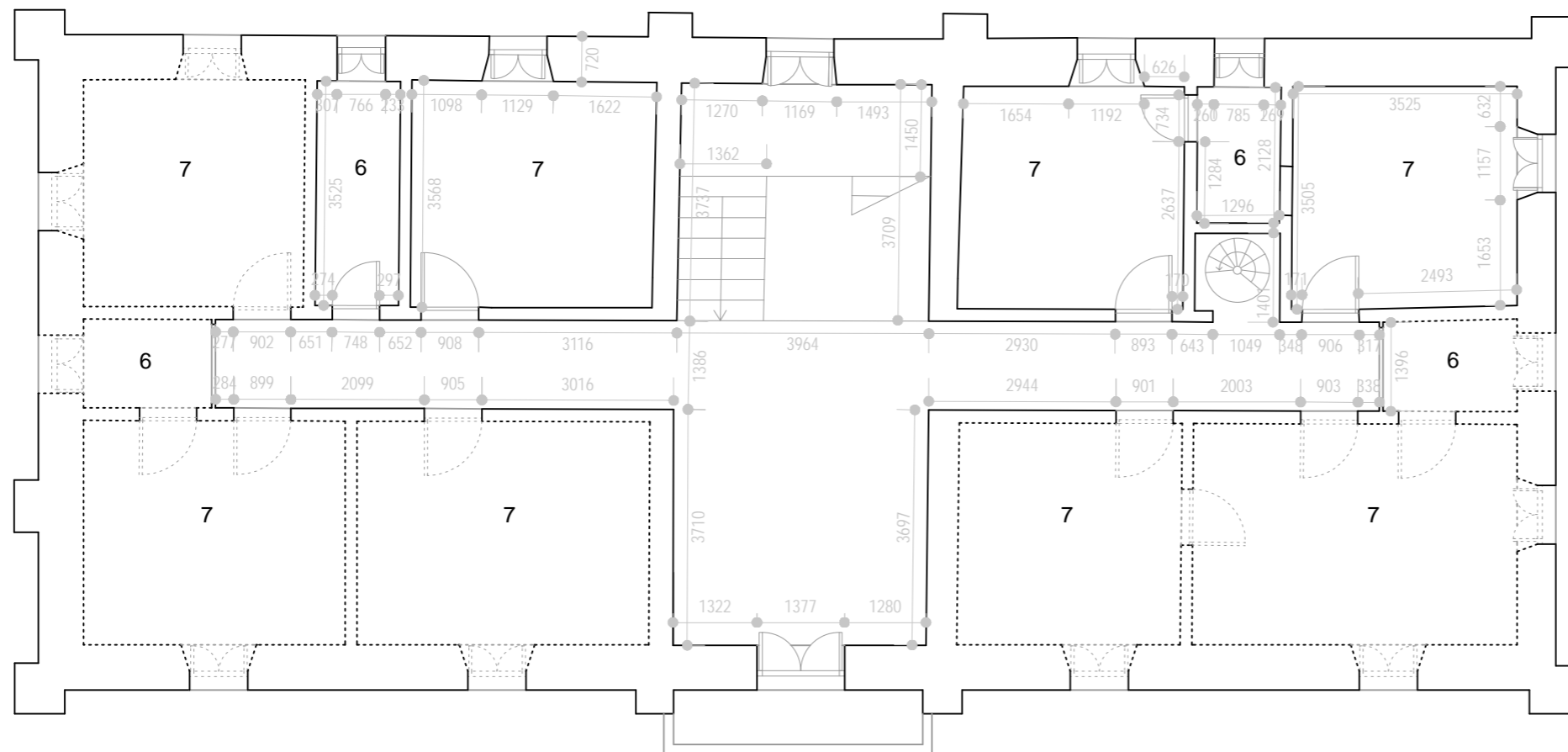


Use of Each Room in the Present Day

- 1: Entrance hall
- 2: Restaurant
- 3: Cafe
- 4: Kitchen
- 5: Kitchen
- 6: Toilet

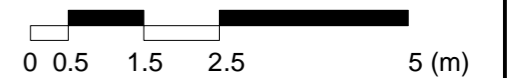


Site Name: Abriha Castle, Building-A (Mekelle)	Drawing Title: Plan (Ground Floor)	Survey Year: 2011, 2012 2018	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 2 of 8
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Use of Each Room in the Present Day

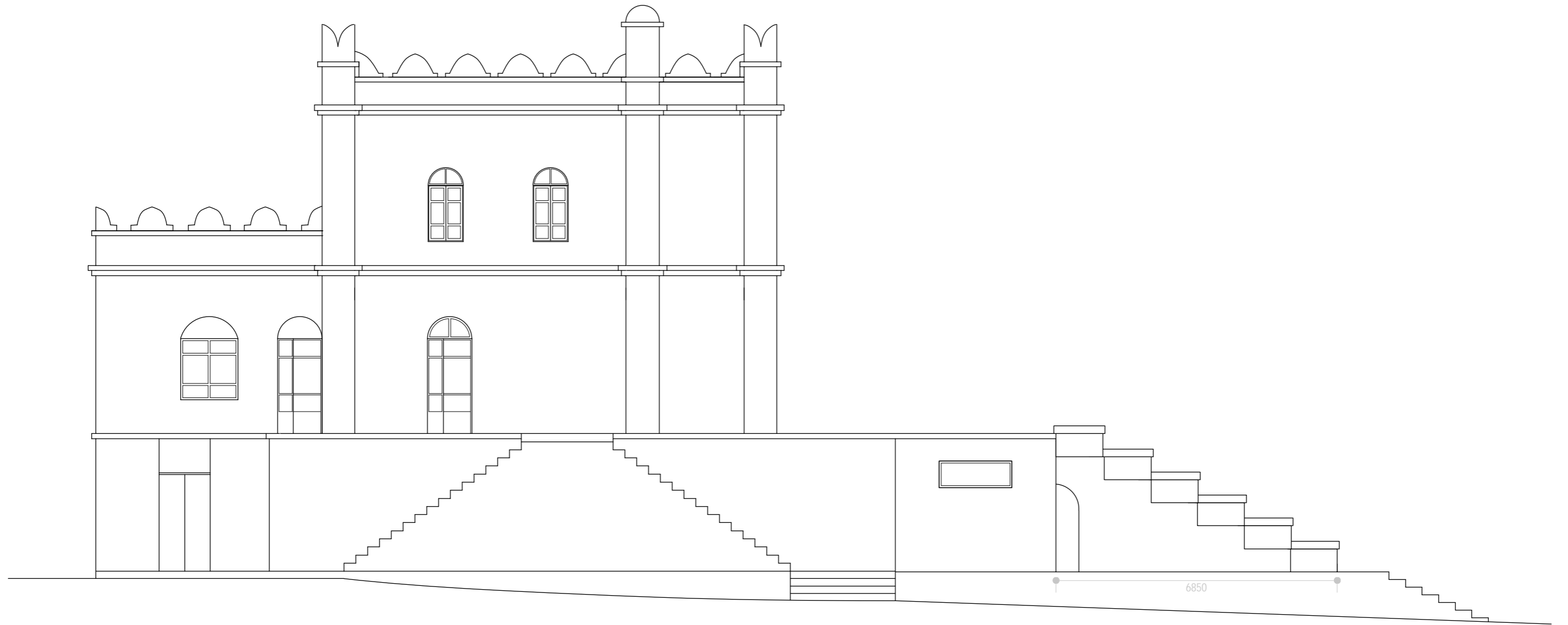
- 6: Toilet
- 7: Guest room



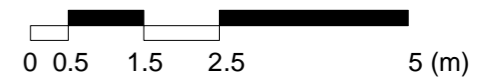
Site Name: Abriha Castle, Building-A (Mekelle)	Drawing Title: Plan (First Floor)	Survey Year: 2011, 2012 2018	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 3 of 8
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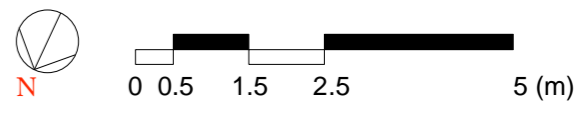
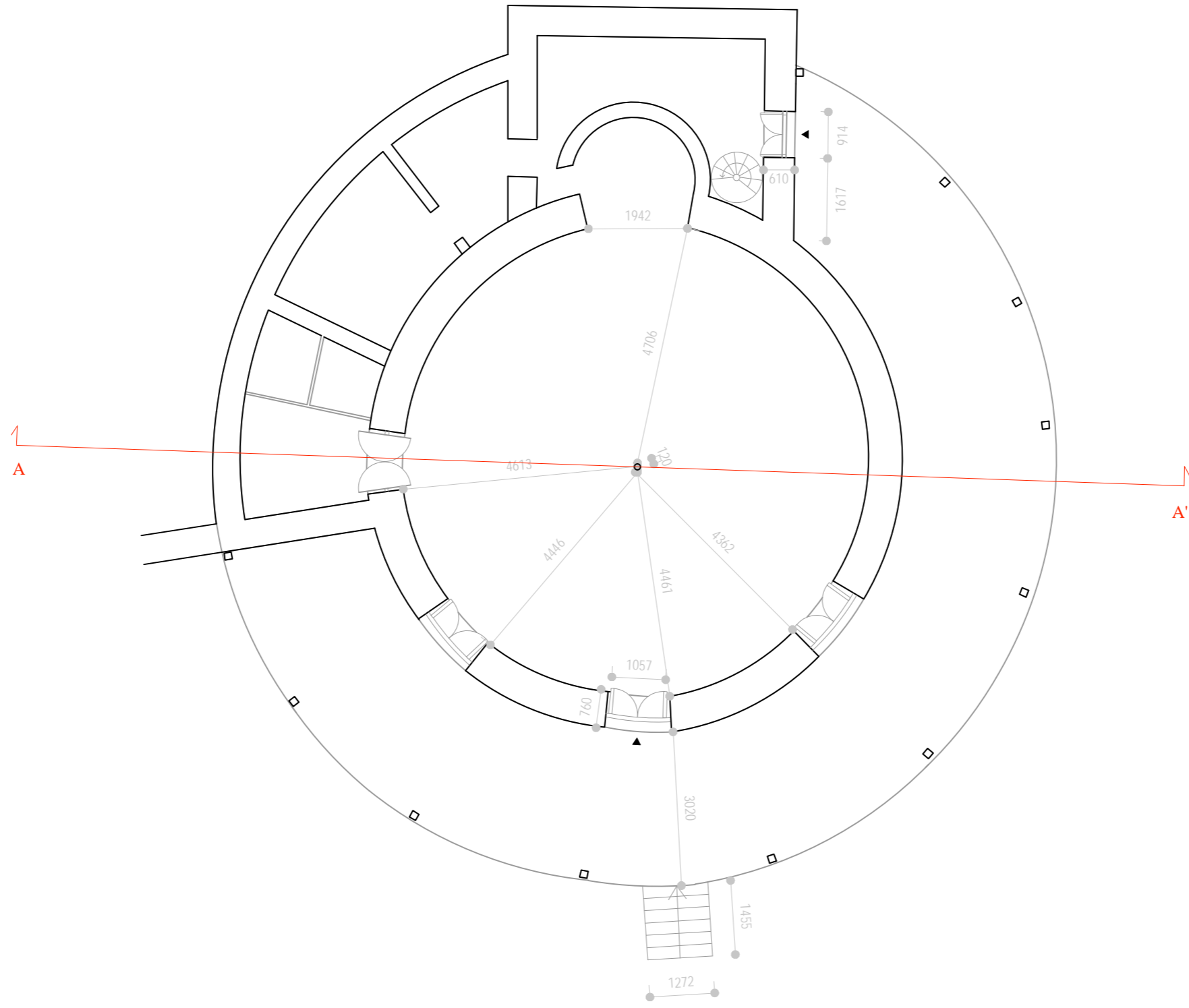
Site Name: Abriha Castle, Building-A (Mekelle)	Drawing Title: North Elevation	Survey Year: 2011, 2012 2018	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 4 of 8
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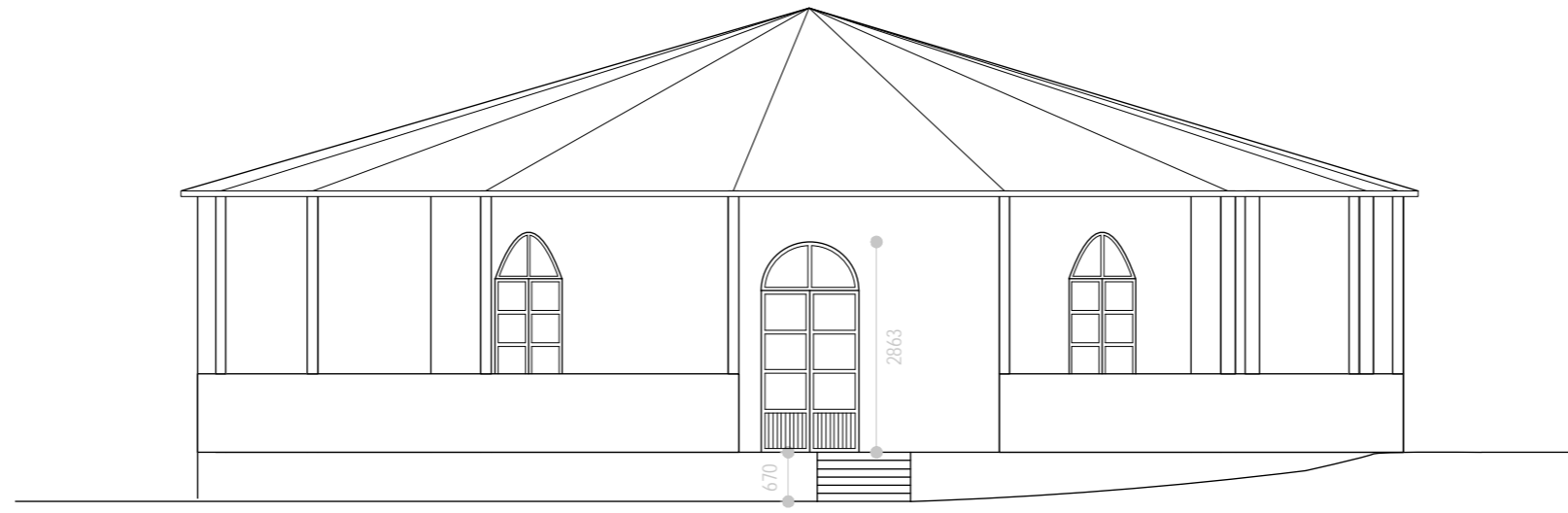
Site Name: Abriha Castle, Building-A (Mekelle)	Drawing Title: East Elevation	Survey Year: 2011, 2012 2018	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 5 of 8
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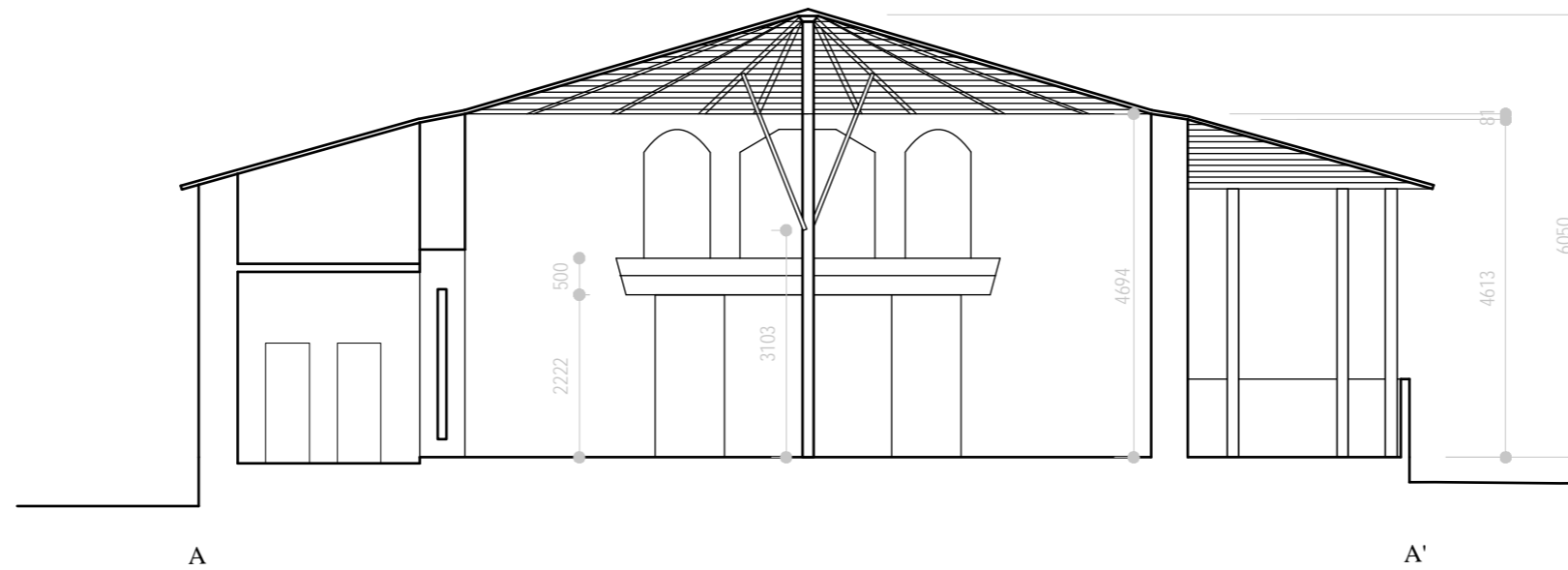
Site Name: Abriha Castle, Building-A (Mekelle)	Drawing Title: West Elevation	Survey Year: 2011, 2012 2018	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 6 of 8
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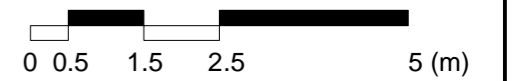
Site Name: Abriha Castle, Building-A (Mekelle)	Drawing Title: Plan	Survey Year: 2011, 2012 2018	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 7 of 8
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North Elevation



A-A' Section



Site Name: Abriha Castle, Building-A (Mekelle)	Drawing Title: North Elevation A-A' Section	Survey Year: 2011, 2012 2018	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 8 of 8
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[1] View from the Church Entrance, photo by Shimizu, N., 2012



[3] External Appearance (from the West), photo by Shimizu, N., 2012



[1] External Appearance (from the West), photo by Shimizu, N., 2012



[2] External Appearance (from the East), photo by Shimizu, N., 2012



[3] External Appearance (from the Southeast), photo by Shimizu, N., 2012



[4] A Tripartite Window in the West Side, photo by Shimizu, N., 2012



[3] External Appearance (from the Northwest), photo by Shimizu, N., 2012



[5] Space under the Veranda, photo by Shimizu, N., 2012



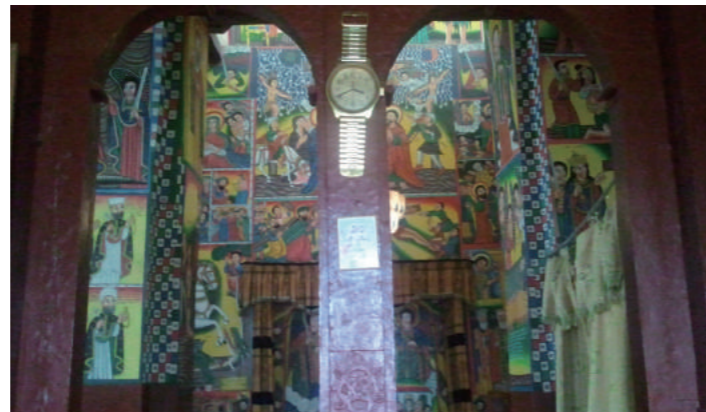
[5] Internal Appearance of Qiddist, photo by Shimizu, N., 2012



[6] A Masonry Pillar in Qiddist, photo by Shimizu, N., 2012



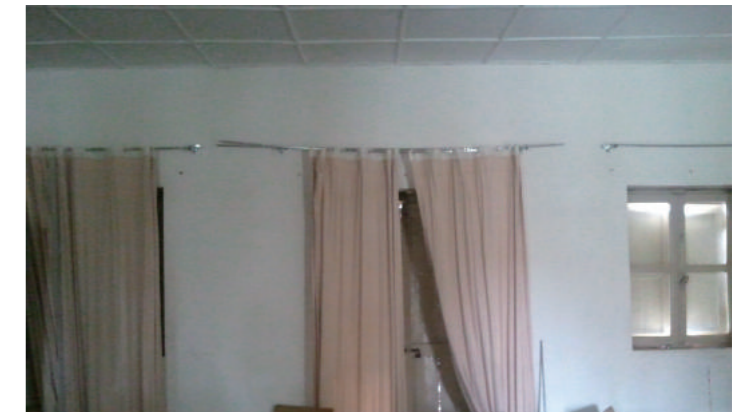
[4] Floor of Veranda, photo by Shimizu, N., 2012



[7] View from Qiné Mahlét to Qiddist, photo by Shimizu, N., 2012



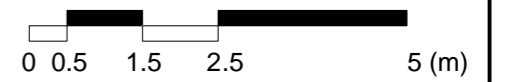
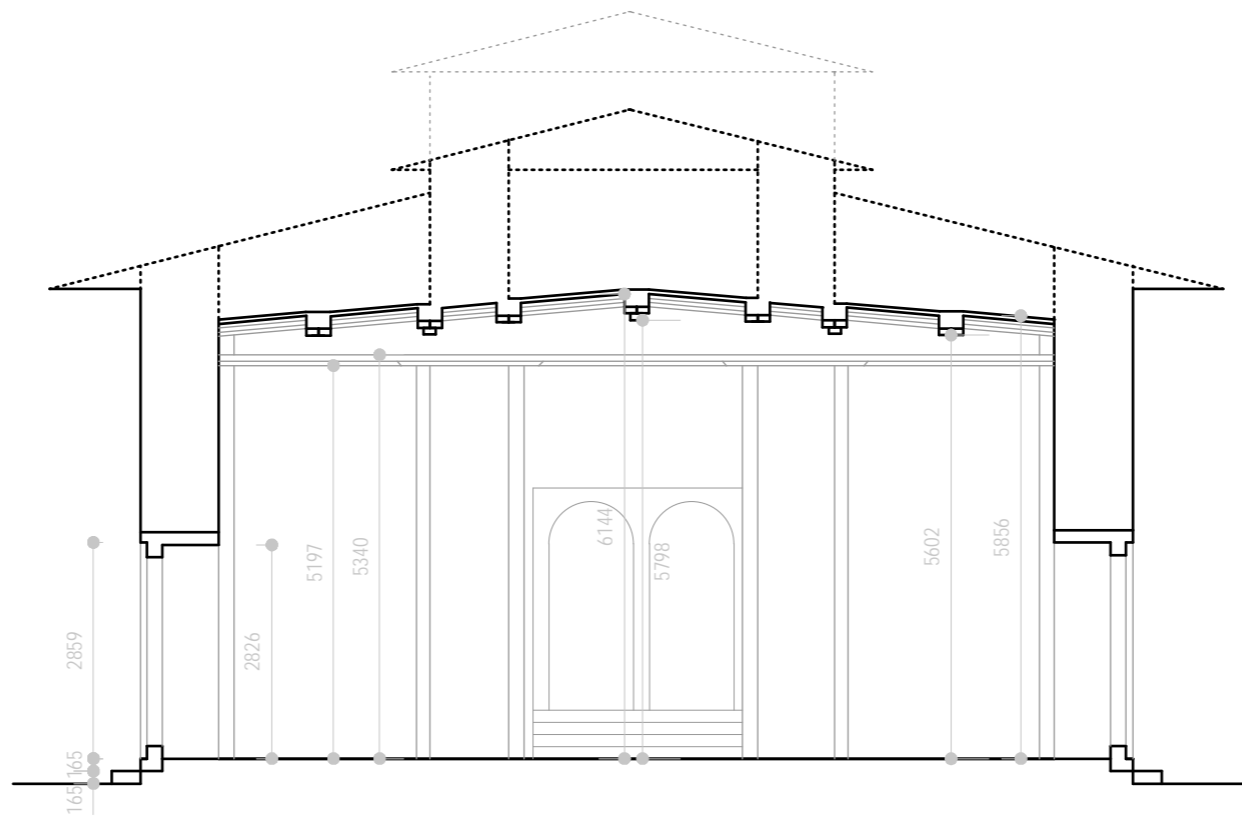
[6] Timber Ceiling of Ground Floor, photo by Shimizu, N., 2012



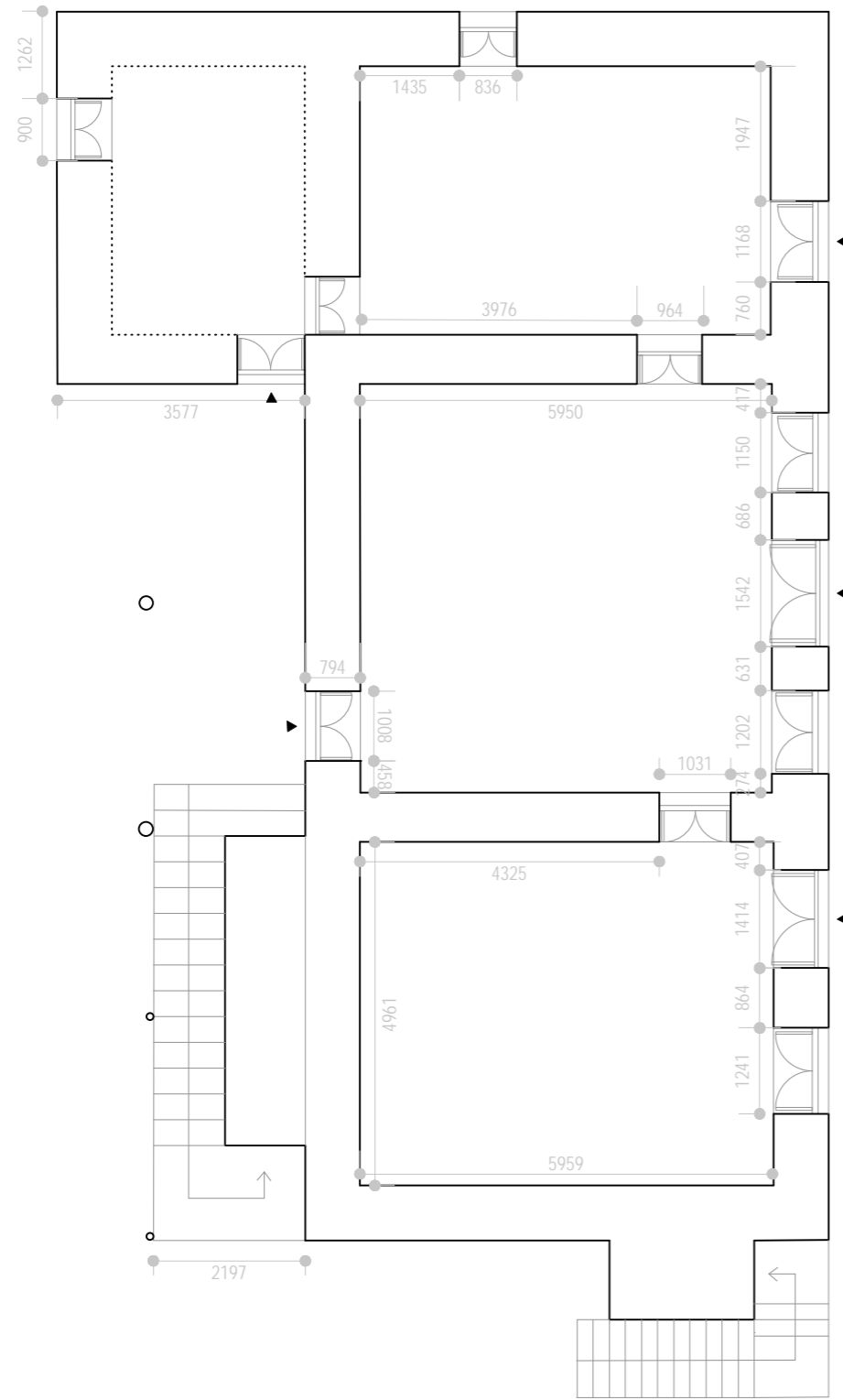
[7] Internal Appearance and Panel Ceiling of the Upper Floor, photo by Shimizu, N., 2012

Site Name: Abune Gebre Menfes Qiddus Church (Mekelle)	Title: Pictures Survey Year: 2012	Introduction of the Site: Bogale (unpublished document) described that existing church building was erected by Siyyum Mengesha (r. 1914-1928, 1941-1960), in reference to the interview with priest Malake Hiwot Areaya, employer of the church at that time.
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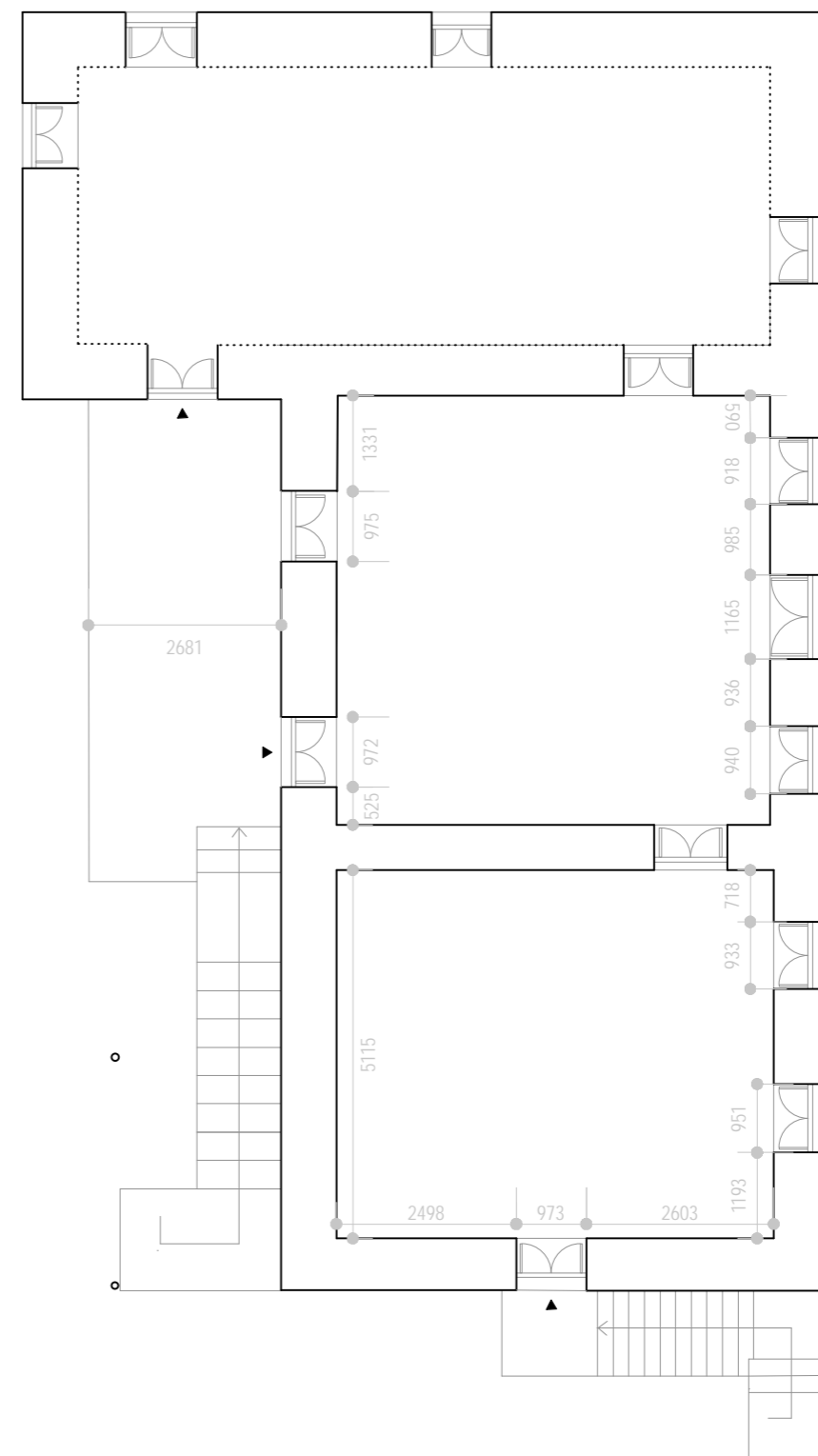
Site Name: Siyyum's Second House (Aynalem)	Title: Pictures Survey Year: 2012	Introduction of the Site: According to the local legend, the targeted building was erected by Siyyum Mengesha for the use of leisure activity or reception to guests. Perhaps it happened in his first period (1914-1919?). Currently, it is located in Mekelle Institute of Technology (MIT), and used as office or class room.
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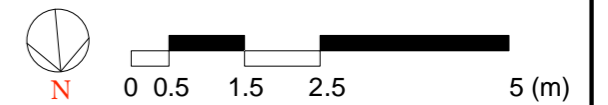
Site Name: Abune Gebre Menfes Qiddus Church (Mekelle)	Drawing Title: Section	Survey Year: 2012	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 2 of 2
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Ground Floor Plan



First Floor Plan



Site Name:	Drawing Title:	Survey Year:	Surveyed by:	Drawn by:	Scale:	Sheet Number:
Siiyum's Second House (Aynalem)	Plan	2012	SHIMIZU Nobuhiro, Tewodros Nega	SHIMIZU Nobuhiro	1 : 100 (A3)	1 of 1



[1] Location, map made by Shimizu, N. (source: Google Map and Municipality Map)



[6] Timber Ornamental Pillars and Ceiling (Building-A), photo by Shimizu, N., 2012



[7] Uncovered Roof with a Remaining Beam (Building-B), photo by Shimizu, N., 2012



[8] Detail of a Timber Ornamental Pillar (Building-A), photo by Shimizu, N., 2012



[9] Upper Floor of the Building-B Floored with Timber Members, photo by Shimizu, N., 2012



[2] External Appearance of Building-A (from the Southwest), photo by Shimizu, N., 2018



[3] External Appearance of Building-B (from the Southwest), photo by Shimizu, N., 2012



[10] Original Thatched Roof Covered with Corrugated Metal Sheet, photo by Shimizu, N., 2012



[11] Collapsed Stairs and Cracked Masonry Wall (building-B), photo by Shimizu, N., 2012



[4] Internal Appearance of Building-A, photo by Shimizu, N., 2012



[5] Internal Appearance of Building-A, photo by Shimizu, N., 2012

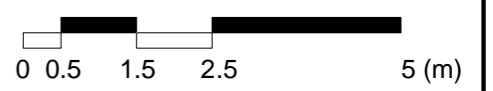
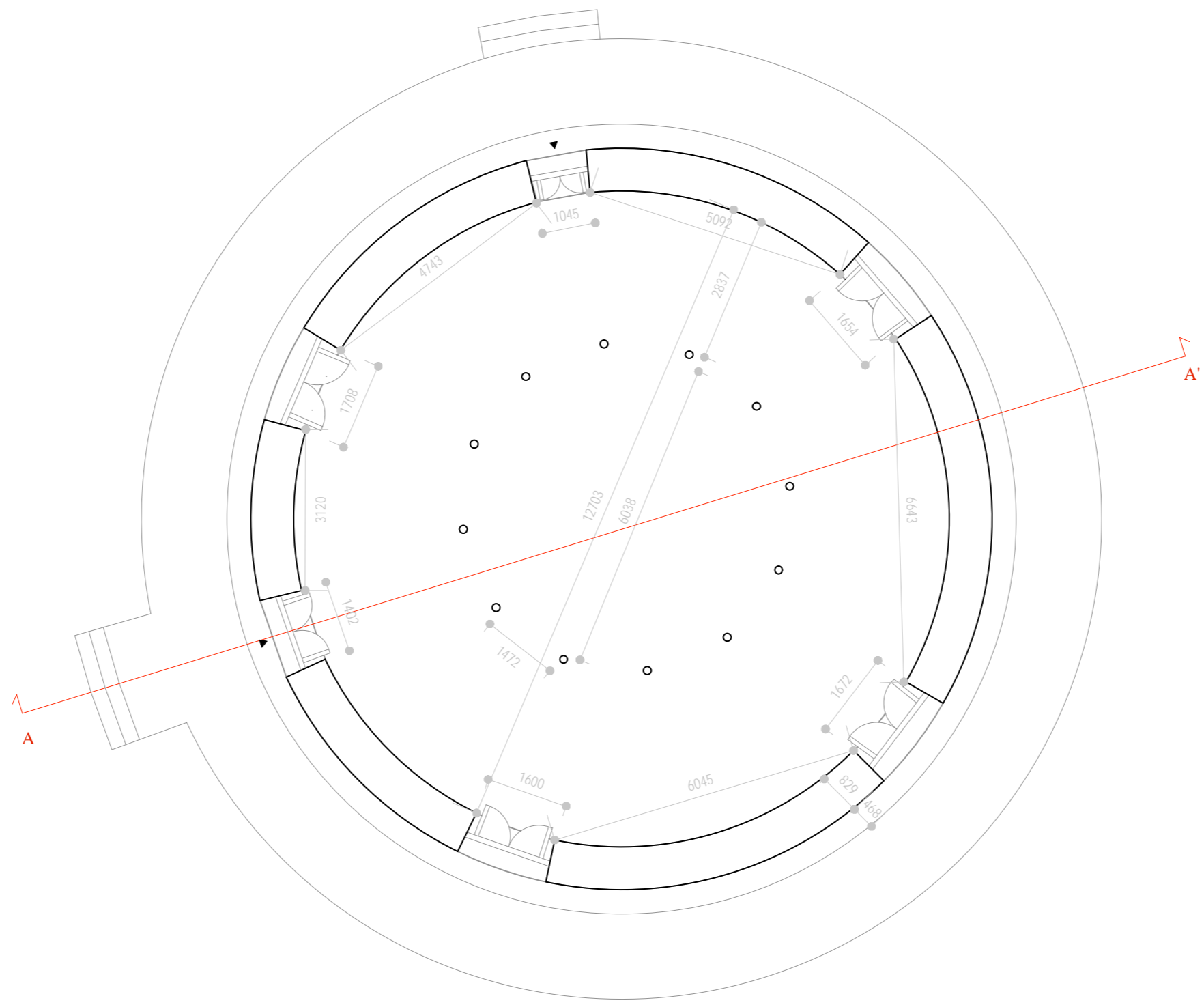


[12] Original Masonry Wall of Building-A, photo by Shimizu, N., 2012



[13] Cross-section between Ground and Upper Floor, photo by Shimizu, N., 2012

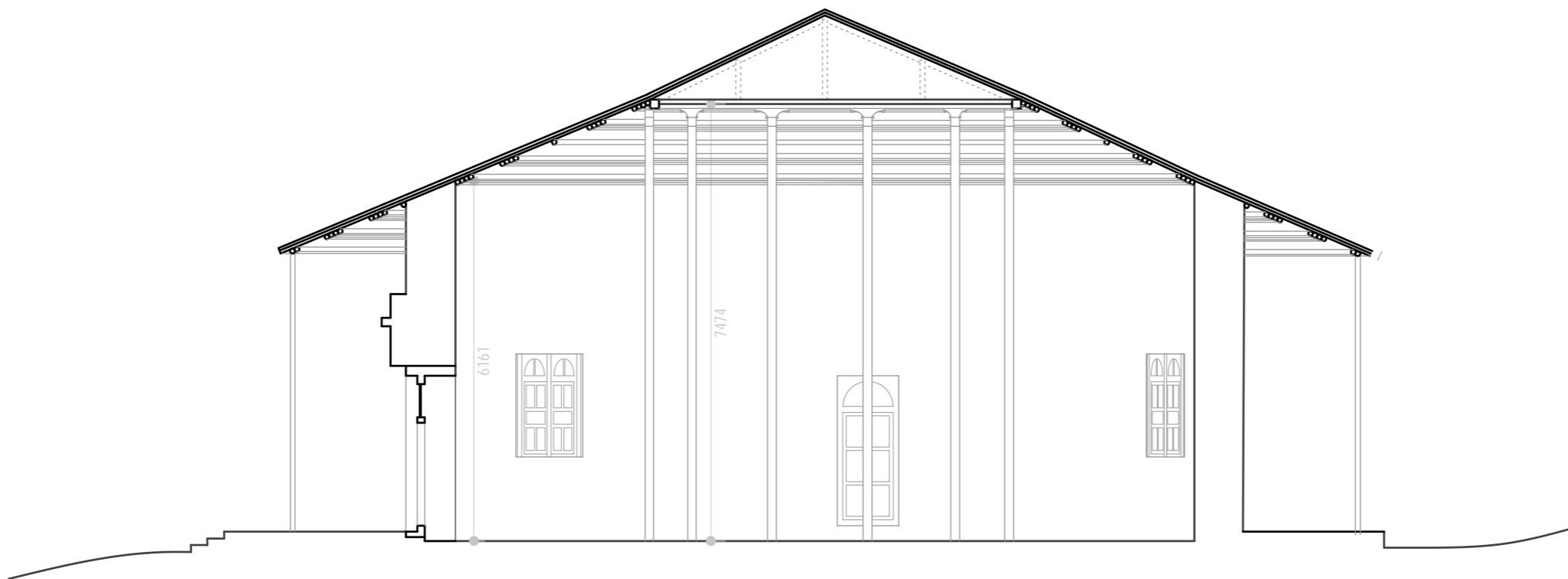
Site Name: Gugsa's Second House (Mekelle)	Title: Pictures	Survey Year: 2012	Introduction of the Site: Gugsa Ar'aya (r. 1918?-1933) made Mekelle his capital when he became the governor of eastern Tigray (Erlach 2005). According to the local legend, the targeted buildings were used by him as his second house. From the local context, a larger Building-A should be used for leisure activity and reception to guests. Considering the size of Building-B, it might be used as a guest house. Currently, the quarter named Inda Rasi was developed as restaurant and cafe. However, both of the buildings have been still in ruinous state.
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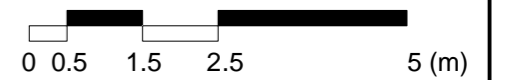
Site Name: Gugsa's Second House, Building-A (Mekelle)	Drawing Title: Plan	Survey Year: 2012	Surveyed by: SHIMIZU Nobuhiro, Philemon Equar	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 1 of 3
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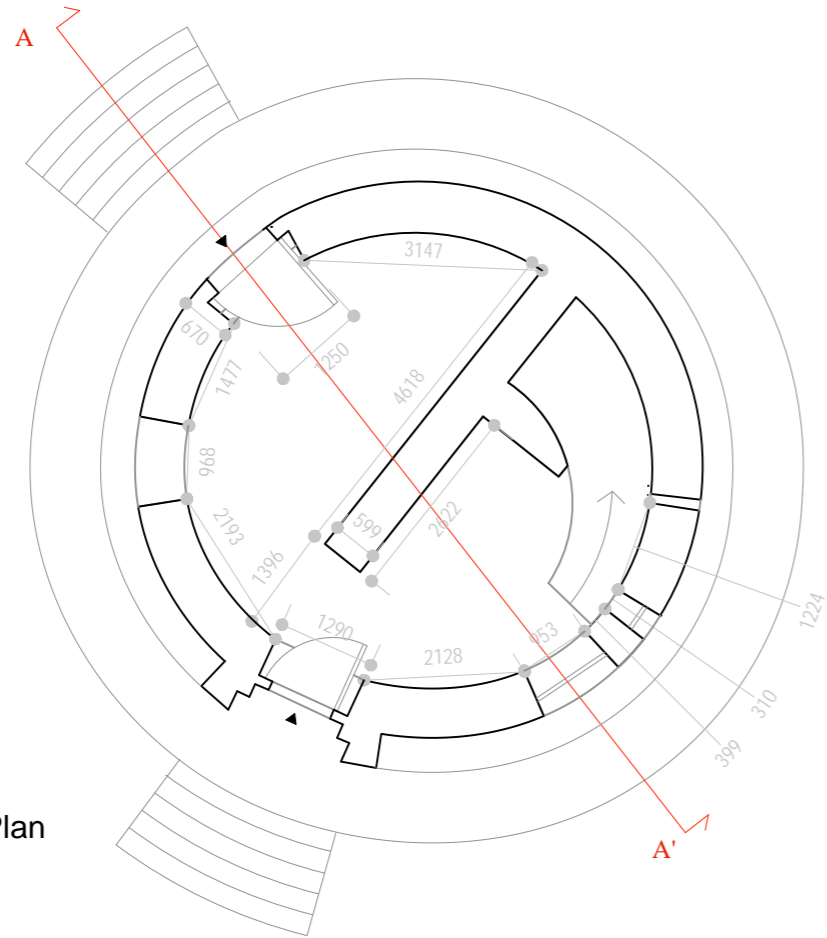
West Elevation



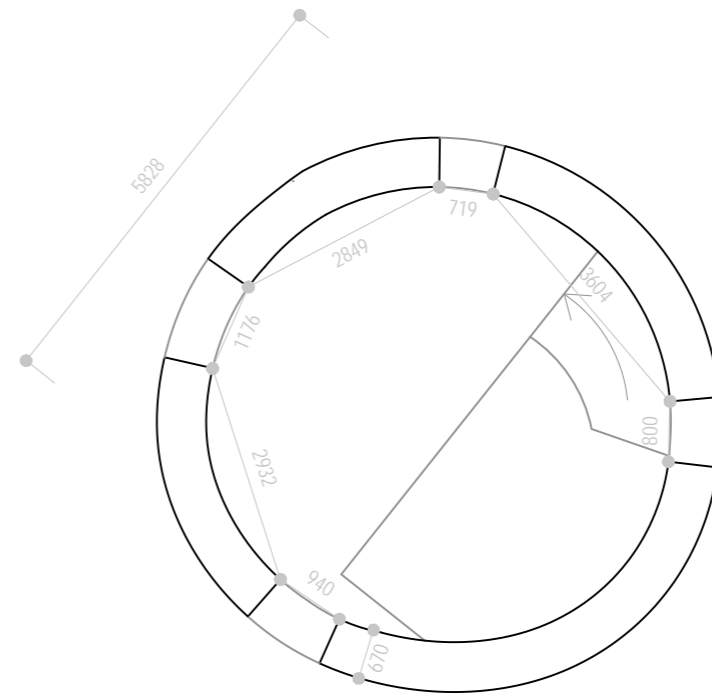
A-A' Section



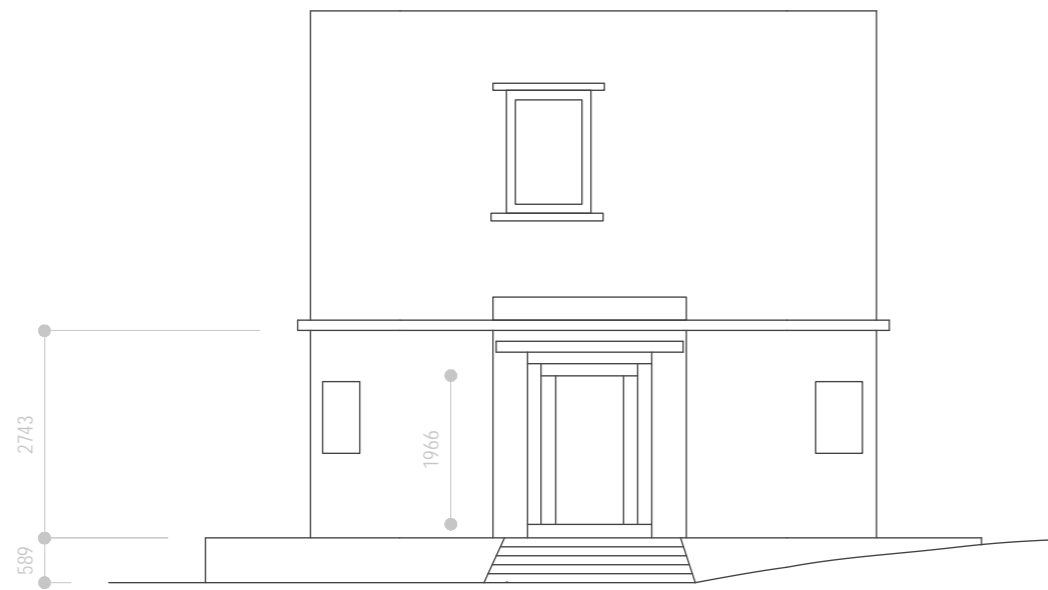
Site Name: Gugsa's Second House, Building-A (Mekelle)	Drawing Title: West Elevation A-A' Section	Survey Year: 2012	Surveyed by: SHIMIZU Nobuhiro, Philemon Equar	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 2 of 3
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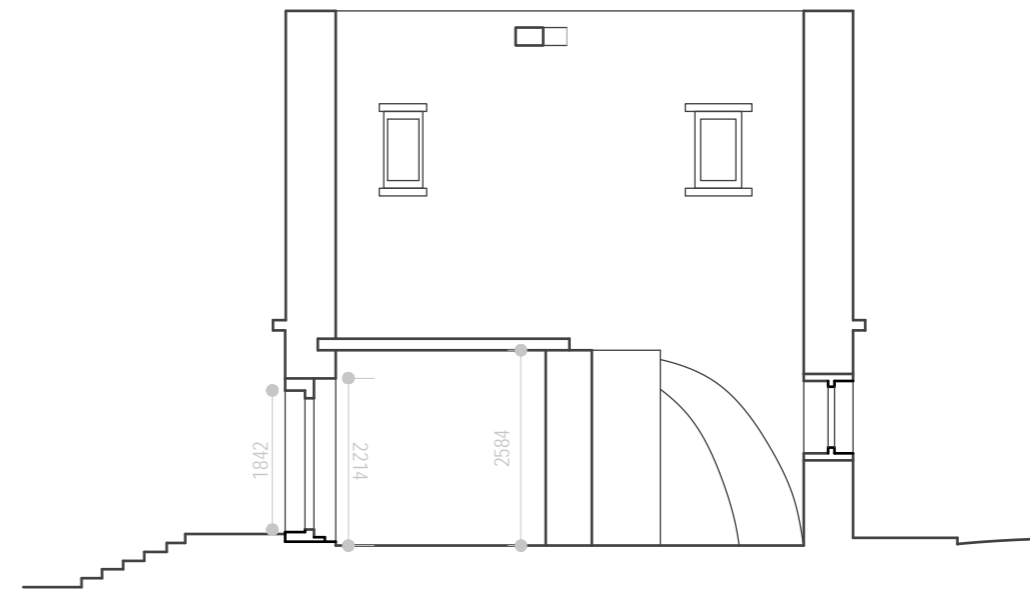
Ground Floor Plan



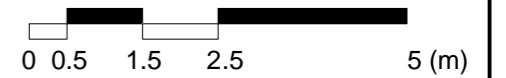
First Floor Plan



South Elevation



A-A' Section



Site Name: Gugsa's Second House, Building-B (Mekelle)	Drawing Title: Plan, Elevation, Section	Survey Year: 2012	Surveyed by: SHIMIZU Nobuhiro, Philemon Equar	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 3 of 3
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[1] Location, map made by Shimizu, N. (source: Google Map and Municipality Map)



[6] External Appearance (from the Southwest), photo by Shimizu, N., 2016



[7] External Appearance (from the West), photo by Shimizu, N., 2016



[8] A Room with Panel Ceiling in the Ground Floor of B-Part, photo by Shimizu, N., 2016



[9] A Hall in the A-Part (Reinforced Concrete Roof is not Original), photo by Shimizu, N., 2016



[2] External Appearance (Perhaps Italian Occupation Period); postcard "Macallé - Truppe indigene (Mekelle - Indigenous Troops)"



[3] External Appearance (Perhaps Italian Occupation Period); postcard "Truppe che sfilano davanti ad un Ghebi (Troops parading in front of a Palace)"



[10] A Room with Panel Ceiling in the Upper Floor of B-Part, photo by Shimizu, N., 2016



[10] Roofing Structure Exposed by Ceiling Unfastened (Upper Floor, B-Part), photo by Shimizu, N., 2016



[4] External Appearance (from the Southeast), photo by Shimizu, N., 2016



[5] External Appearance (from the East), photo by Shimizu, N., 2016

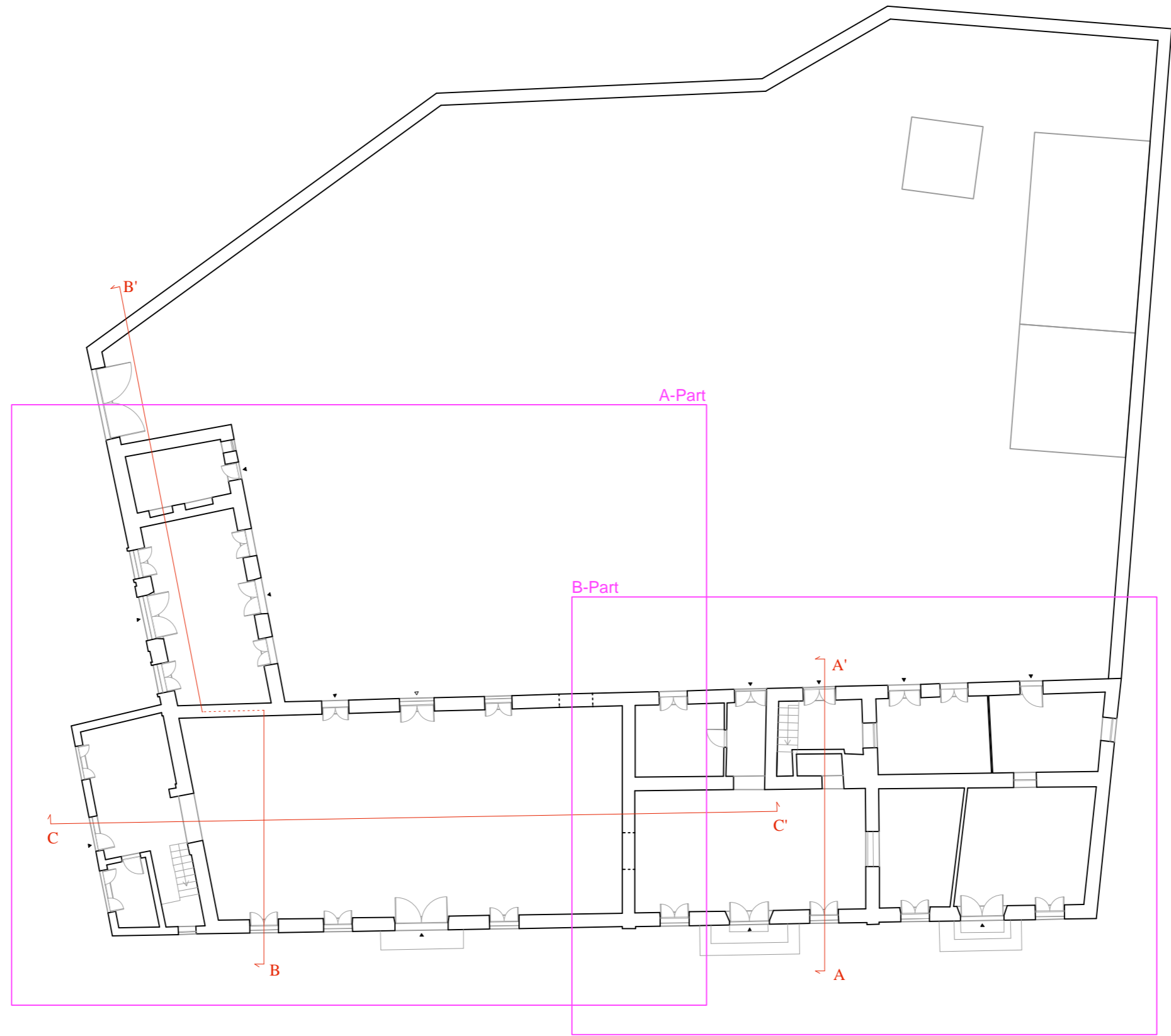


[12] A Room with Panel Ceiling in the Ground Floor of B-Part, photo by Shimizu, N., 2016

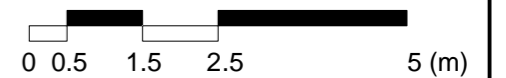
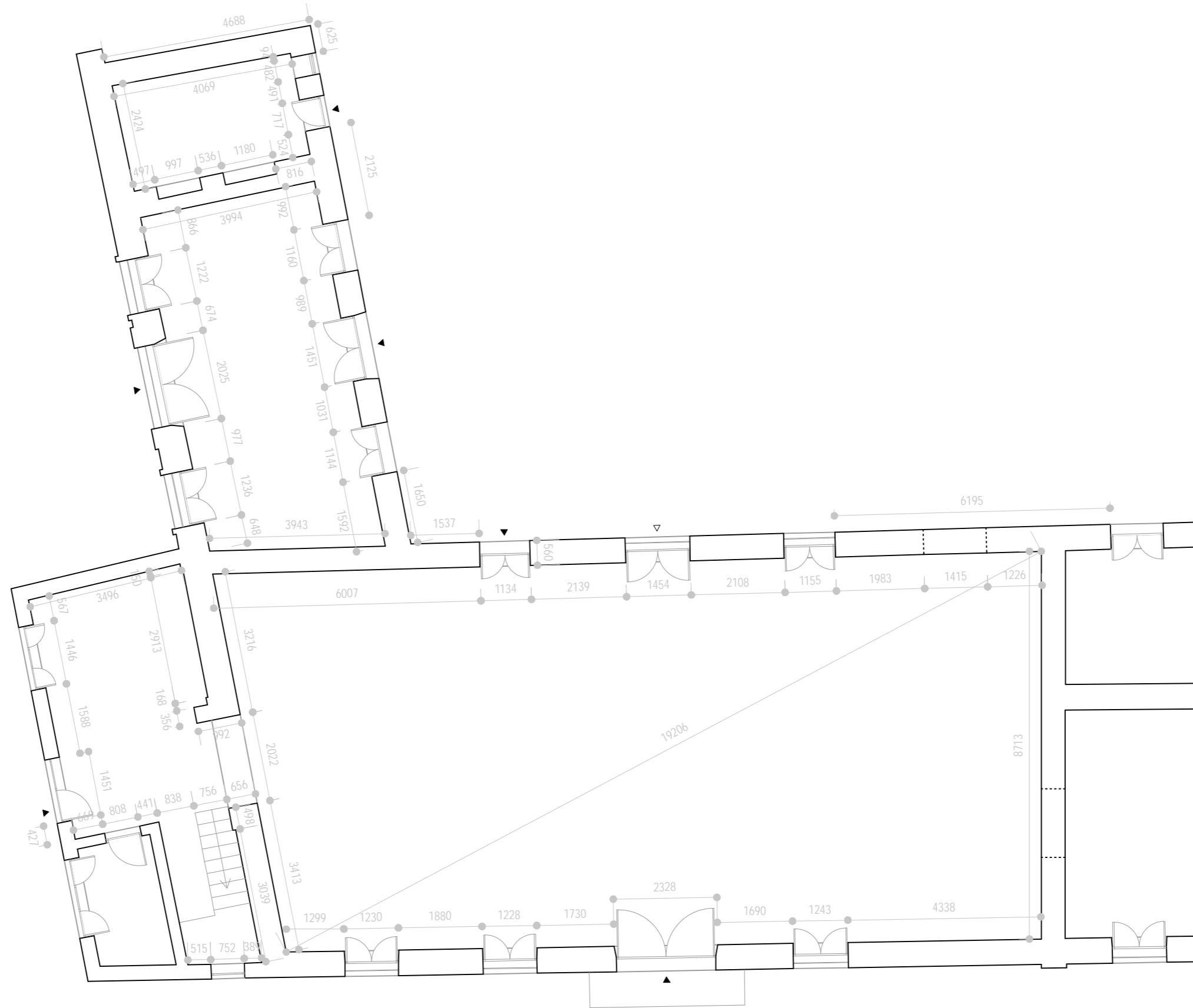


[13] The Slab Structure Composed by Timber Members (Photo Taken from the Ground Floor, B-Part), photo by Shimizu, N., 2016

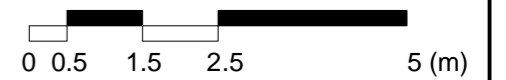
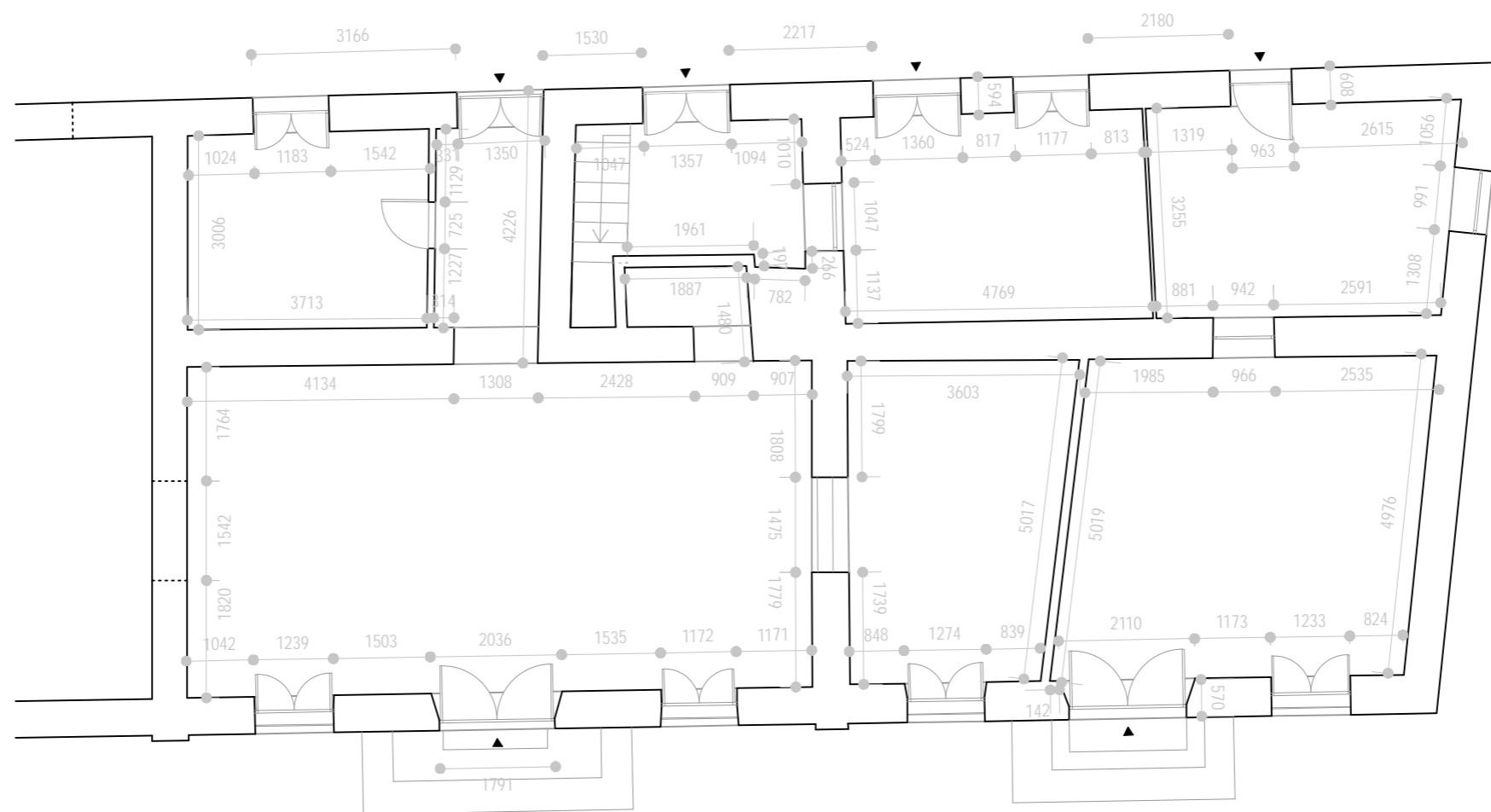
Site Name:	Title:	Survey Year:	Introduction of the Site:
Liquor Factory (Mekelle)	Pictures	2016	According to Mr. Aynalem (M / 1922 E.C. - / a descendant of Gebremika'el, a king of the province before Yohannis IV), the targeted building was erected in Gugs'a's period (1918?-1933) by a Greek man named Krantis. He managed a liquor factory in the targeted building. After the business close, it was used as cinema (Cinema Adowa). Perhaps, the roofing of the hall should be changed to RC member at that time (from the comparison between the old photo and current situation, the change of roofing method is clear). The cinema was closed in c. 1991, and the building was converted into government service. In c. 2001, the land-right was returned and cinema was opened again as Cinema Barok, however, it has been already closed. Currently, one room is used as charity clinic (Senay Tegibiar Metegagez Charity Association), however the other rooms including a hall are not used.



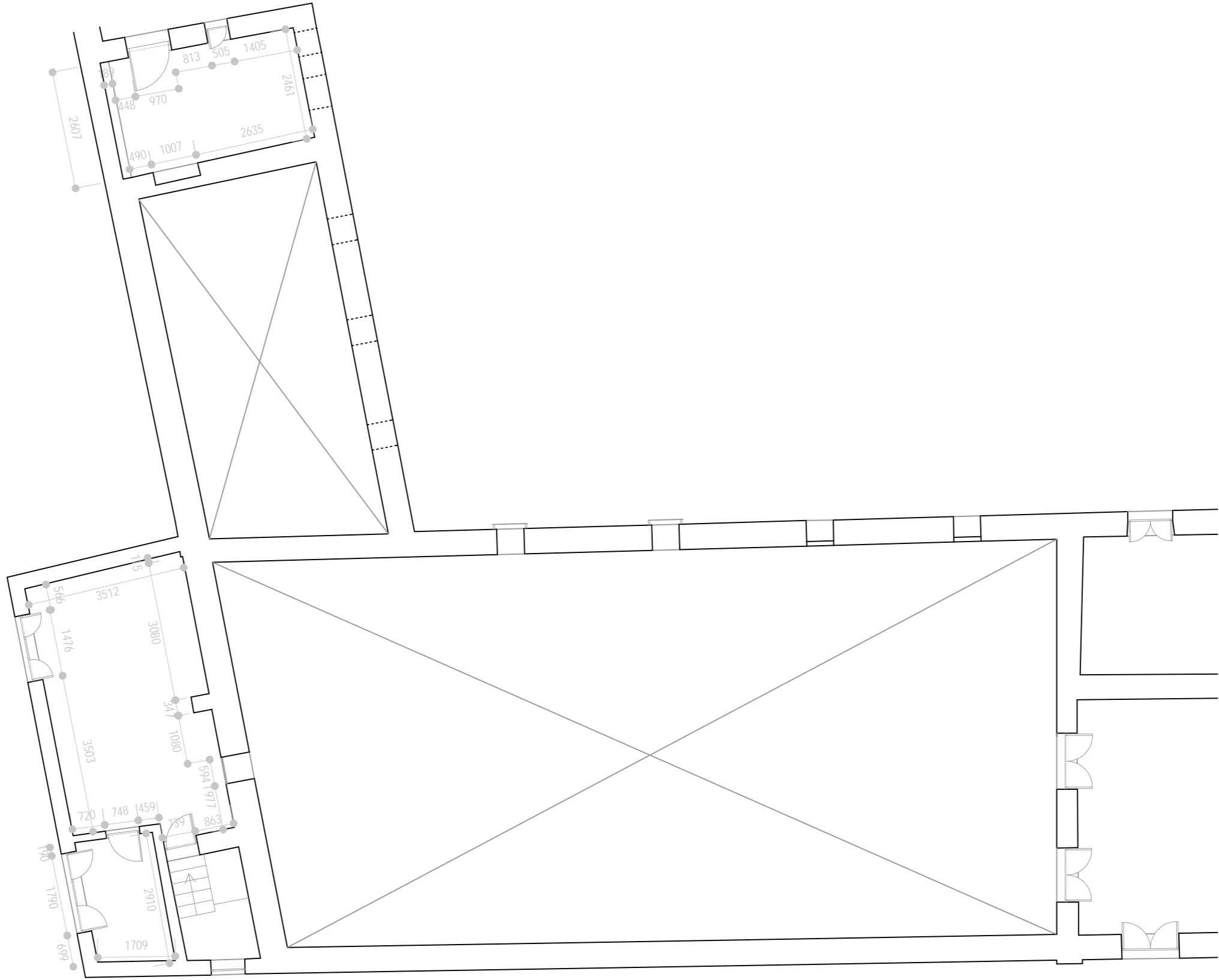
Site Name: <p style="text-align: center;">Liquor Factory (Mekelle)</p>	Drawing Title: <p style="text-align: center;">Site Plan</p>	Survey Year: <p style="text-align: center;">2016</p>	Surveyed by: <p style="text-align: center;">SHIMIZU Nobuhiro, Tewodros Nega</p>	Drawn by: <p style="text-align: center;">SHIMIZU Nobuhiro</p>	Scale: <p style="text-align: center;">1 : 200 (A3)</p>	Sheet Number: <p style="text-align: center;">1 of 9</p>
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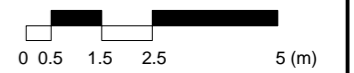
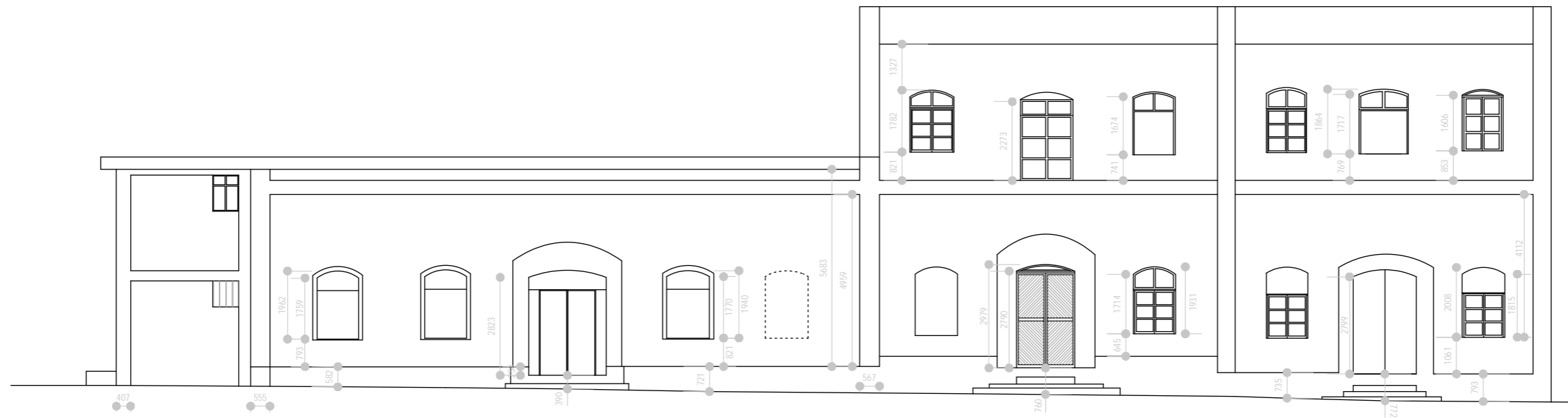
Site Name: <p style="text-align: center;">Liquor Factory (Mekelle)</p>	Drawing Title: <p style="text-align: center;">Plan (A-Part, Ground Floor)</p>	Survey Year: <p style="text-align: center;">2016</p>	Surveyed by: <p style="text-align: center;">SHIMIZU Nobuhiro, Tewodros Nega</p>	Drawn by: <p style="text-align: center;">SHIMIZU Nobuhiro</p>	Scale: <p style="text-align: center;">1 : 100 (A3)</p>	Sheet Number: <p style="text-align: center;">2 of 9</p>
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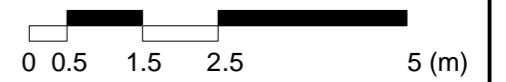
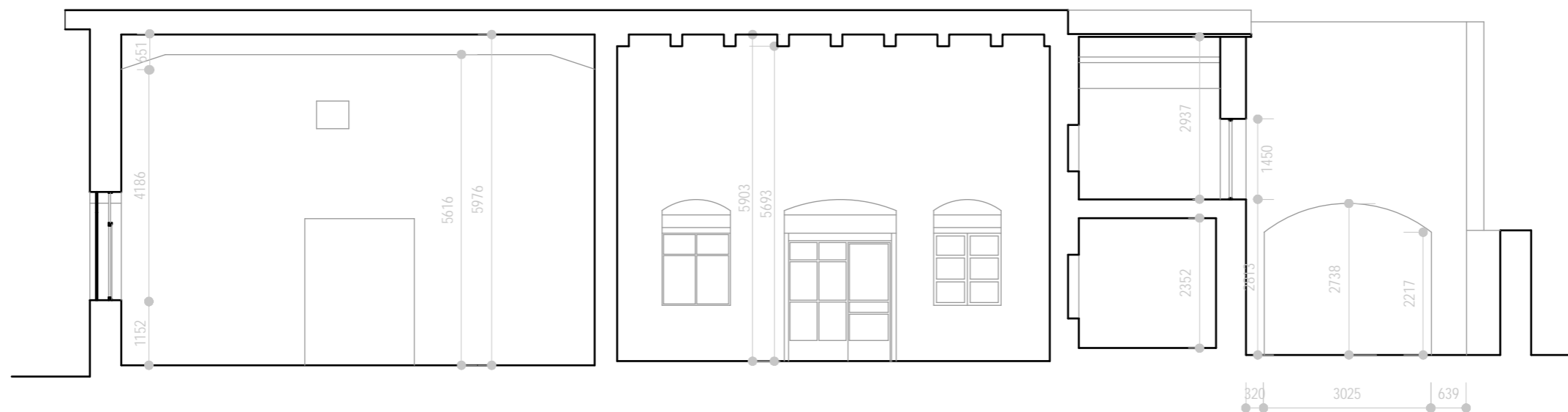
Site Name: <p style="text-align: center;">Liquor Factory (Mekelle)</p>	Drawing Title: <p style="text-align: center;">Plan (B-Part, Ground Floor)</p>	Survey Year: <p style="text-align: center;">2016</p>	Surveyed by: <p style="text-align: center;">SHIMIZU Nobuhiro, Tewodros Nega</p>	Drawn by: <p style="text-align: center;">SHIMIZU Nobuhiro</p>	Scale: <p style="text-align: center;">1 : 100 (A3)</p>	Sheet Number: <p style="text-align: center;">3 of 9</p>
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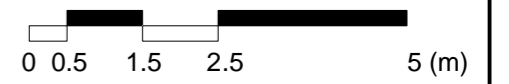
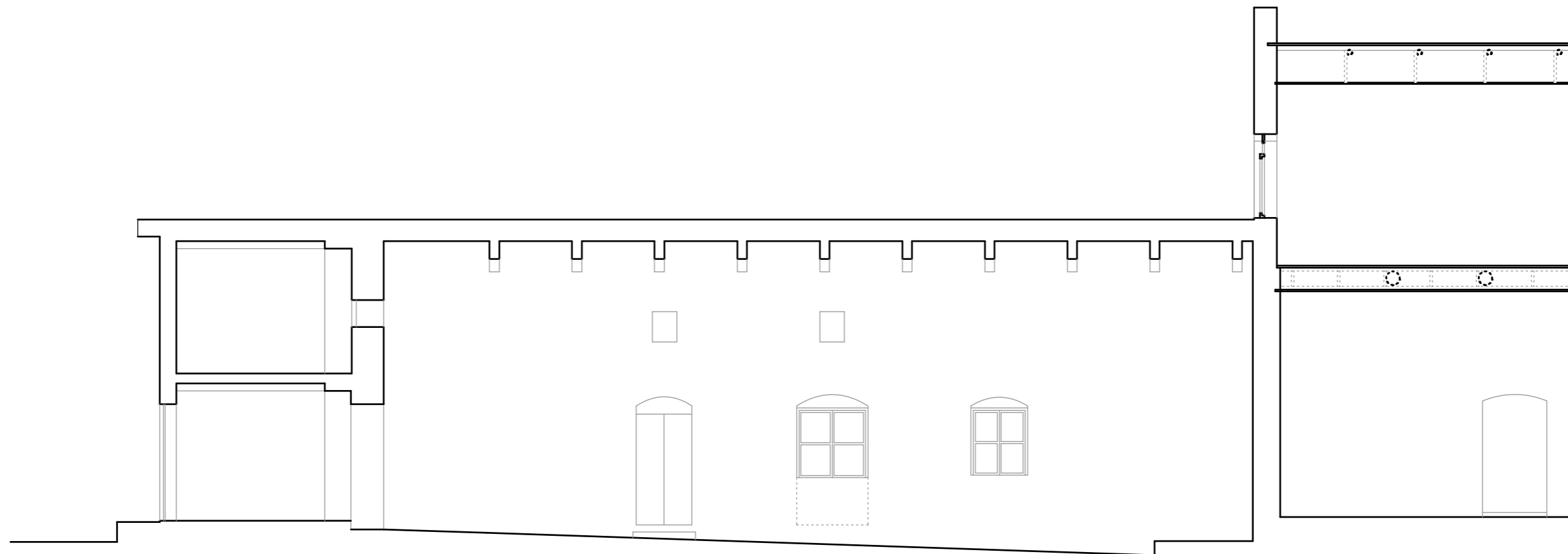
Site Name: <p style="text-align: center;">Liquor Factory (Mekelle)</p>	Drawing Title: <p style="text-align: center;">Plan (A-Part, First Floor)</p>	Survey Year: <p style="text-align: center;">2016</p>	Surveyed by: <p style="text-align: center;">SHIMIZU Nobuhiro, Tewodros Nega</p>	Drawn by: <p style="text-align: center;">SHIMIZU Nobuhiro</p>	Scale: <p style="text-align: center;">1 : 100 (A3)</p>	Sheet Number: <p style="text-align: center;">4 of 9</p>
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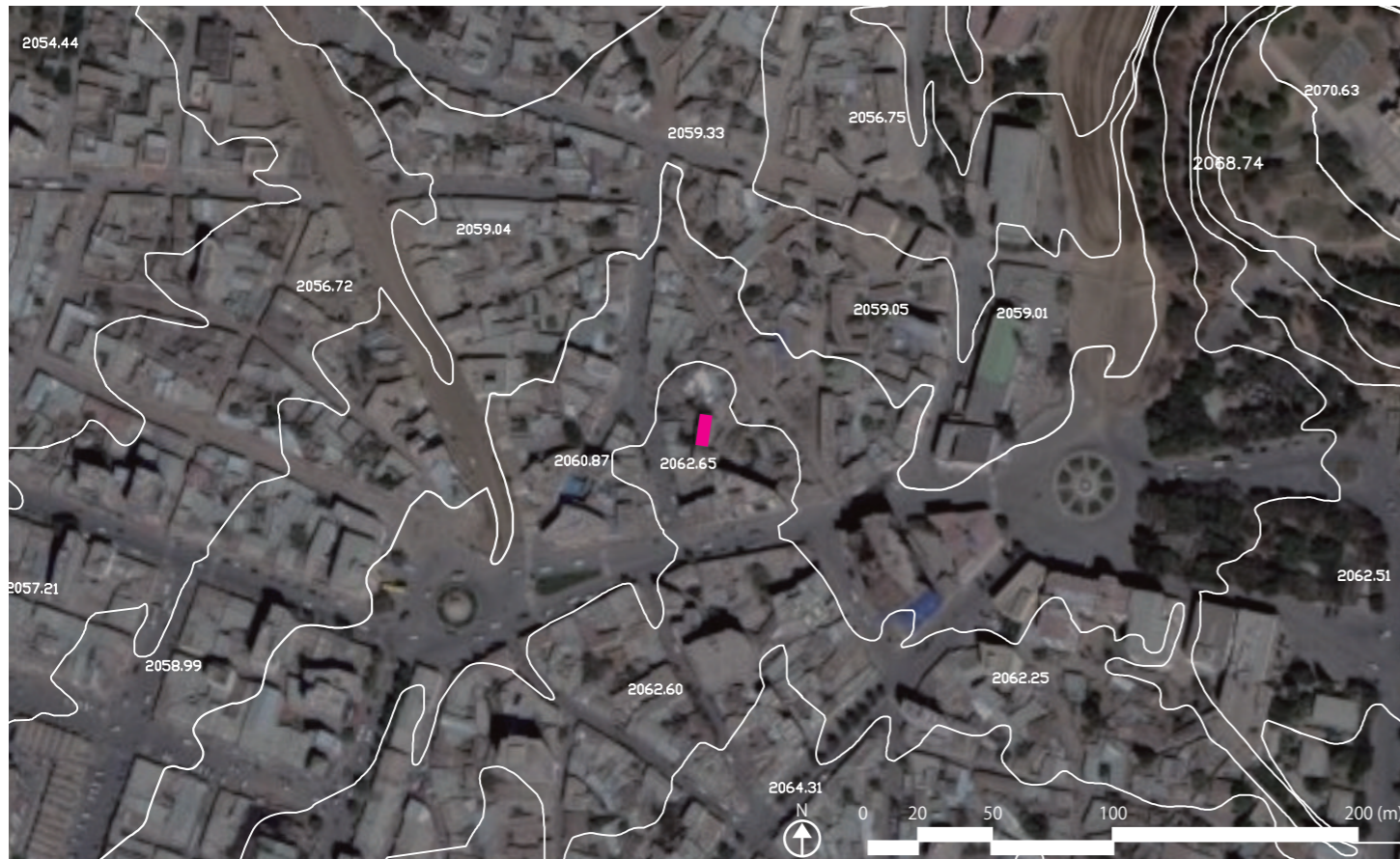
Site Name: <p style="text-align: center;">Liquor Factory (Mekelle)</p>	Drawing Title: <p style="text-align: center;">East Elevation</p>	Survey Year: <p style="text-align: center;">2016</p>	Surveyed by: <p style="text-align: center;">SHIMIZU Nobuhiro, Tewodros Nega</p>	Drawn by: <p style="text-align: center;">SHIMIZU Nobuhiro</p>	Scale: <p style="text-align: center;">1 : 150 (A3)</p>	Sheet Number: <p style="text-align: center;">6 of 9</p>
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Site Name: <p style="text-align: center;">Liquor Factory (Mekelle)</p>	Drawing Title: <p style="text-align: center;">B-B' Section</p>	Survey Year: <p style="text-align: center;">2016</p>	Surveyed by: <p style="text-align: center;">SHIMIZU Nobuhiro, Tewodros Nega</p>	Drawn by: <p style="text-align: center;">SHIMIZU Nobuhiro</p>	Scale: <p style="text-align: center;">1 : 100 (A3)</p>	Sheet Number: <p style="text-align: center;">8 of 9</p>
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Site Name: Liquor Factory (Mekelle)	Drawing Title: C-C' Section	Survey Year: 2016	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 9 of 9
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[1] Location, map made by Shimizu, N. (source: Google Map and Municipality Map)



[5] A Ground Floor Room with Timber Ceiling, photo by Shimizu, N., 2016



[6] An Upper Floor Room with Panel Ceiling, photo by Shimizu, N., 2016



[7] A Stair Room in the Ground Floor, photo by Shimizu, N., 2016



[8] A Stair Room in the Upper Floor, photo by Shimizu, N., 2016



[2] External Appearance (from the West), photo by Shimizu, N., 2016



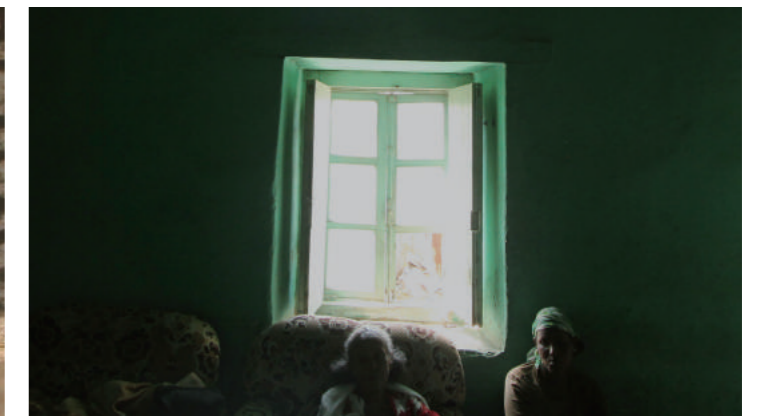
[4] External Appearance (Eastside), photo by Shimizu, N., 2016



[3] View from a Veranda, photo by Shimizu, N., 2016

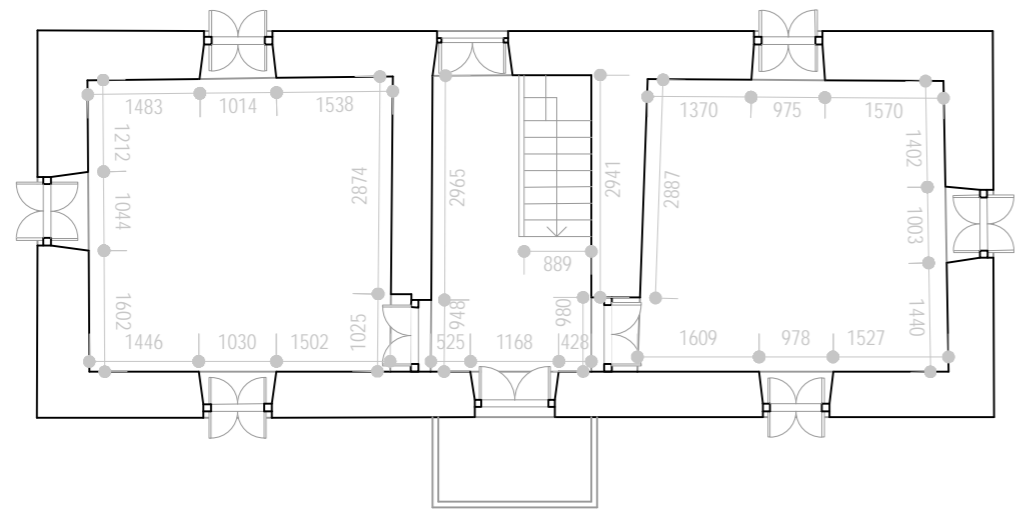


[9] An Opening in the West Side, photo by Shimizu, N., 2016



[10] An Opening (Photo Taken from Inside Room), photo by Shimizu, N., 2016

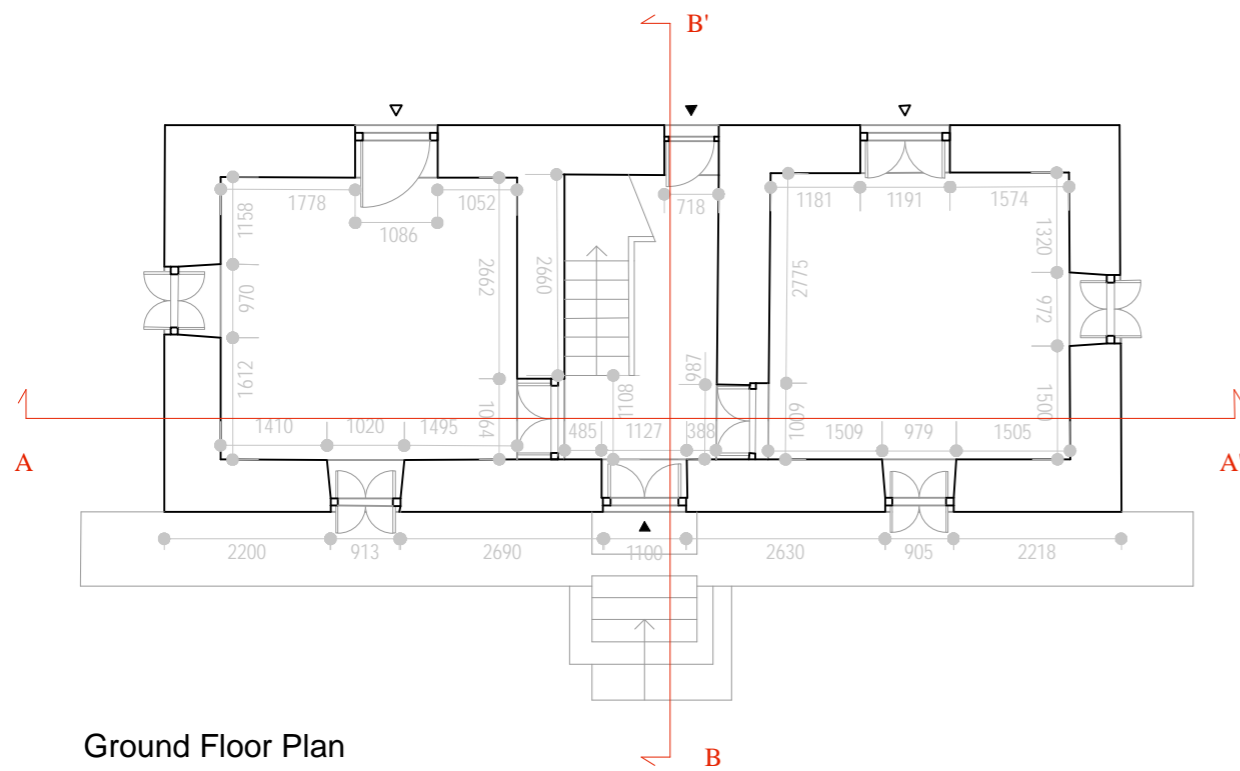
Site Name:	Title:	Survey Year:	Introduction of the Site:
Melkam House (Mekelle)	Pictures	2016	The targeted house was built by <i>deggijat</i> Melkam (c. 1906 - c. 1976) who served Gugsa Ar'aya. According to his daughter (c. 1936-), father of Melkam's wife is a brother of Gugsa's wife. The house built on a minor hill of the old city center was built in c. 1926, and she grew up in this house. This was one of the first urbanized houses around here.



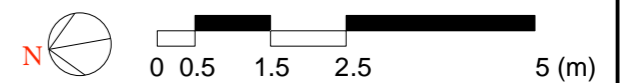
First Floor Plan



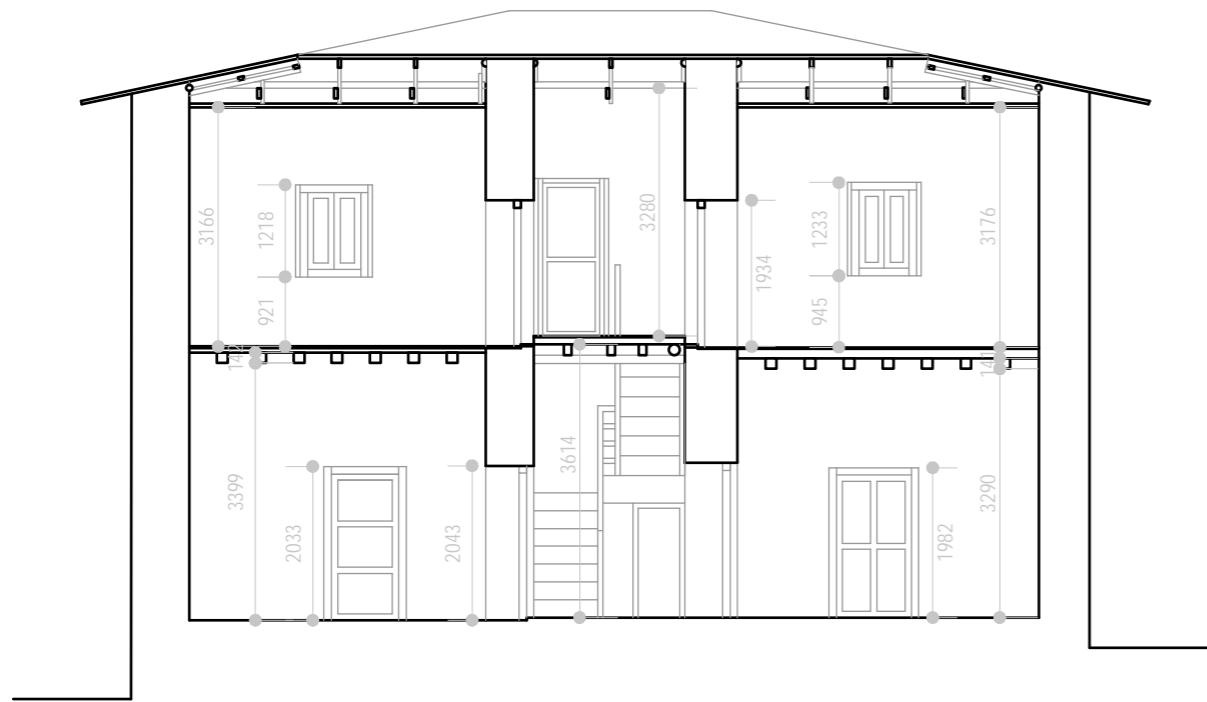
West Elevation



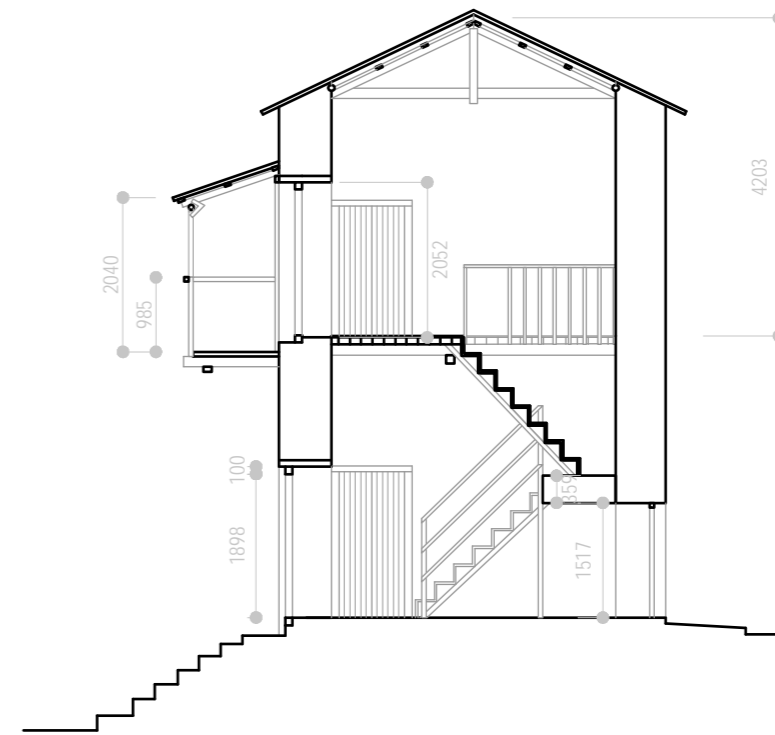
Ground Floor Plan



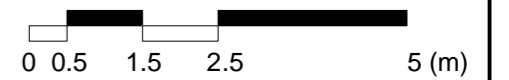
Site Name:	Melkam House (Mekelle)	Drawing Title:	Plan, Elevation	Survey Year:	2016	Surveyed by:	SHIMIZU Nobuhiro, Tewodros Nega	Drawn by:	SHIMIZU Nobuhiro	Scale:	1 : 100 (A3)	Sheet Number:	1 of 2
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A-A' Section



B-B' Section



Site Name: <p style="text-align: center;">Melkam House (Mekelle)</p>	Drawing Title: <p style="text-align: center;">Section</p>	Survey Year: <p style="text-align: center;">2016</p>	Surveyed by: <p style="text-align: center;">SHIMIZU Nobuhiro, Tewodros Nega</p>	Drawn by: <p style="text-align: center;">SHIMIZU Nobuhiro</p>	Scale: <p style="text-align: center;">1 : 100 (A3)</p>	Sheet Number: <p style="text-align: center;">2 of 2</p>
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[1] Location, map made by Shimizu, N. (source: Google Map and Municipality Map)



[6] An Entrance Porch, photo by Shimizu, N., 2015



[7] Height of Backside Roof is Lower, photo by Shimizu, N., 2015



[8] An Entrance Porch, photo by Shimizu, N., 2015



[9] An Office Room with Panel Ceiling, photo by Shimizu, N., 2015



[2] External Appearance (from the Southwest), photo by Shimizu, N., 2015



[3] External Appearance (from the West), photo by Shimizu, N., 2015



[4] External Appearance (from the North), photo by Shimizu, N., 2015



[5] External Appearance (from the South), photo by Shimizu, N., 2015



[11] A Corridor with Panel Ceiling, photo by Shimizu, N., 2015

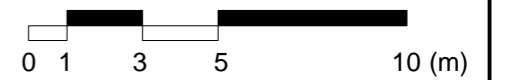
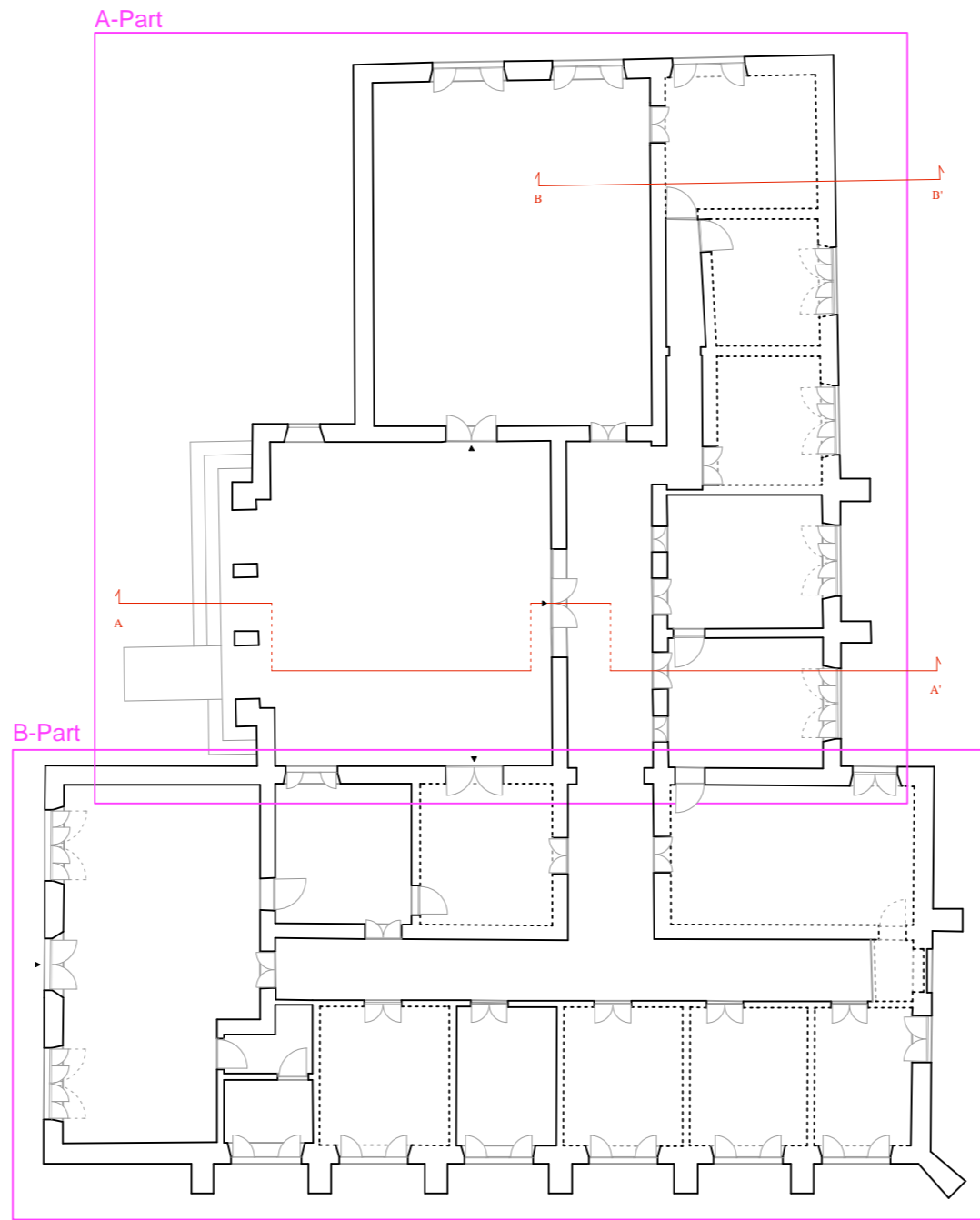


[10] An Office Room with Panel Ceiling, photo by Shimizu, N., 2015

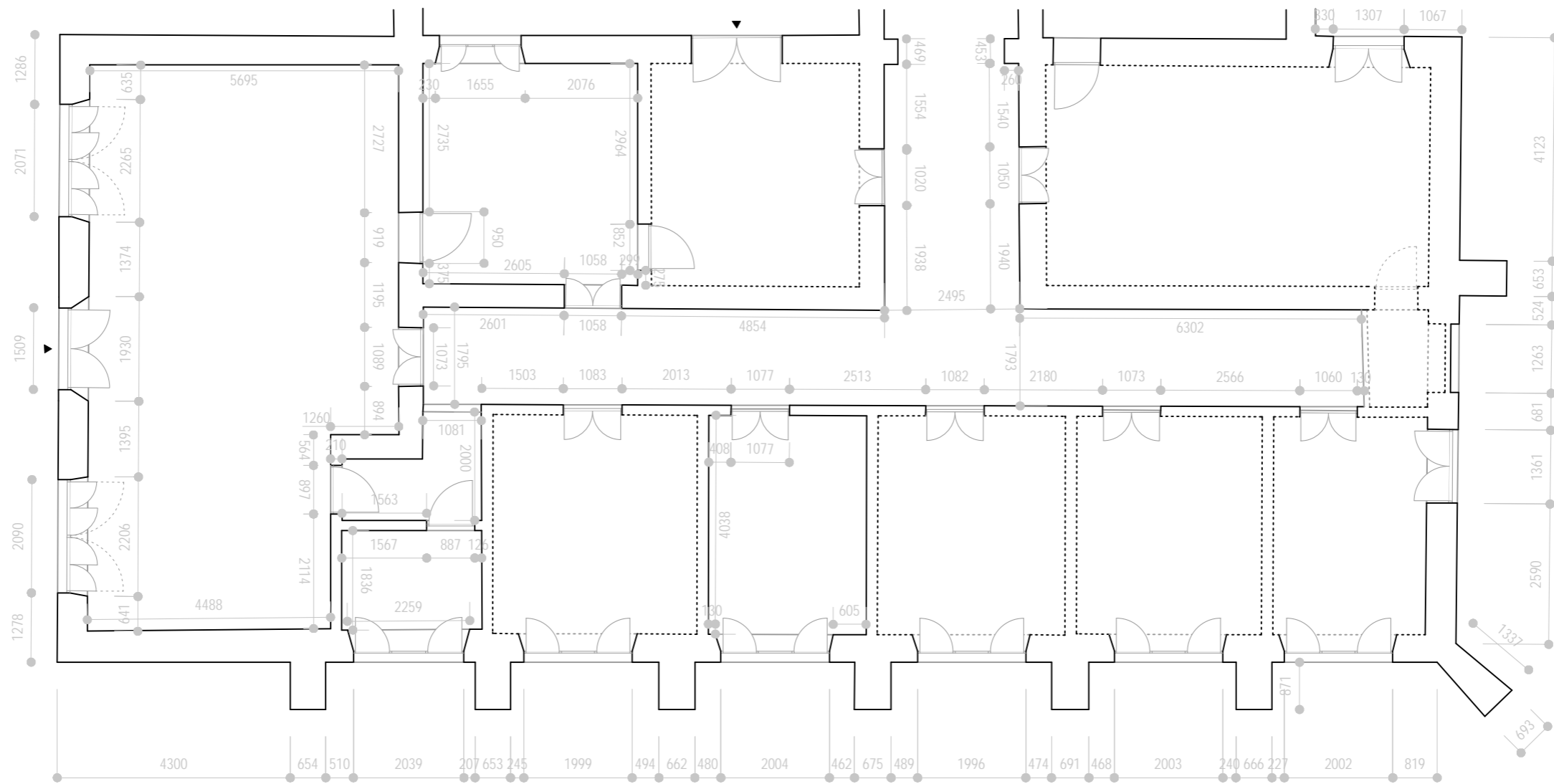


[12] Internal Appearance of a Basement Floor Room, photo by Shimizu, N., 2015

<p>Site Name: Italian Administrative Building (Mekelle)</p>	<p>Title: Pictures</p>	<p>Survey Year: 2015</p>	<p>Introduction of the Site: According to Mr. Aynalem, the targeted building was erected as an Italian administrative building over Tigray in the Italian occupation period. Even after the end of the Italian period, it was continuously used as an administrative purpose. However, it has recently become the supreme court of Tigray, after Derg was collapsed.</p>
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Site Name: Italian Administrative Building (Mekelle)	Drawing Title: Site Plan	Survey Year: 2015	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 200 (A3)	Sheet Number: 1 of 5
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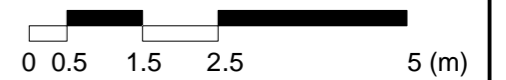
Site Name: Italian Administrative Building (Mekelle)	Drawing Title: Plan (B-Part)	Survey Year: 2015	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 3 of 5
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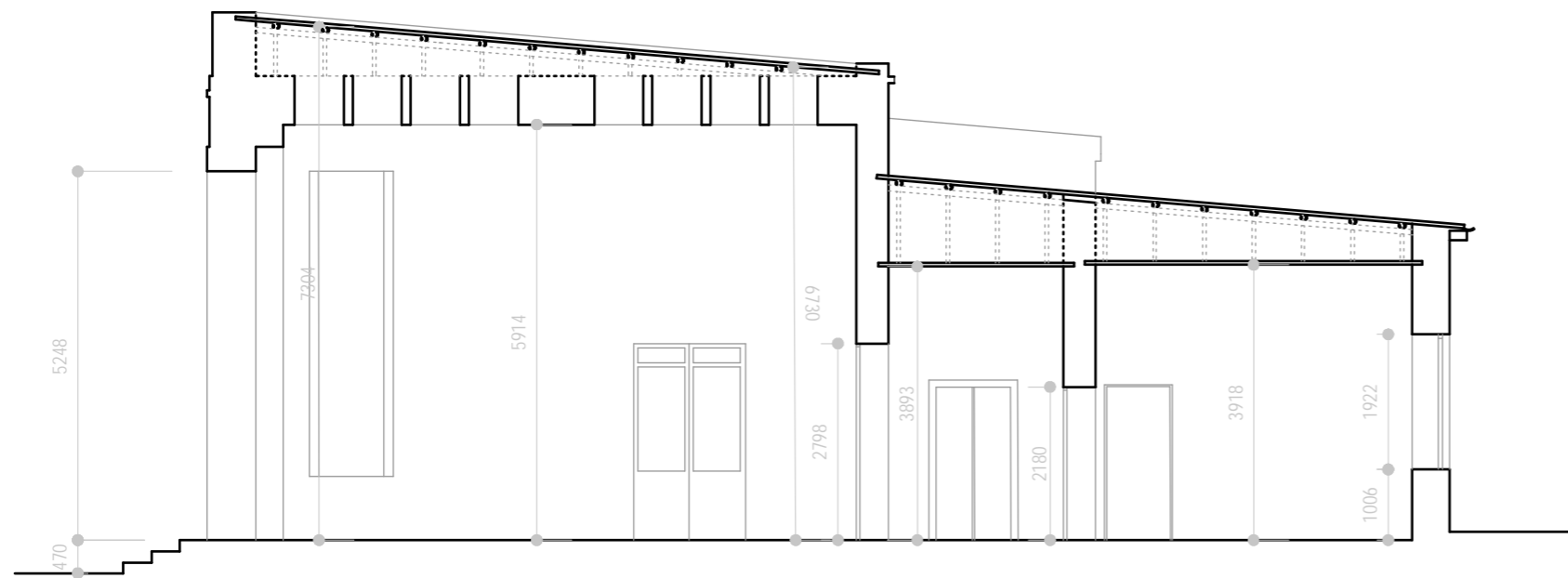
South-West Elevation



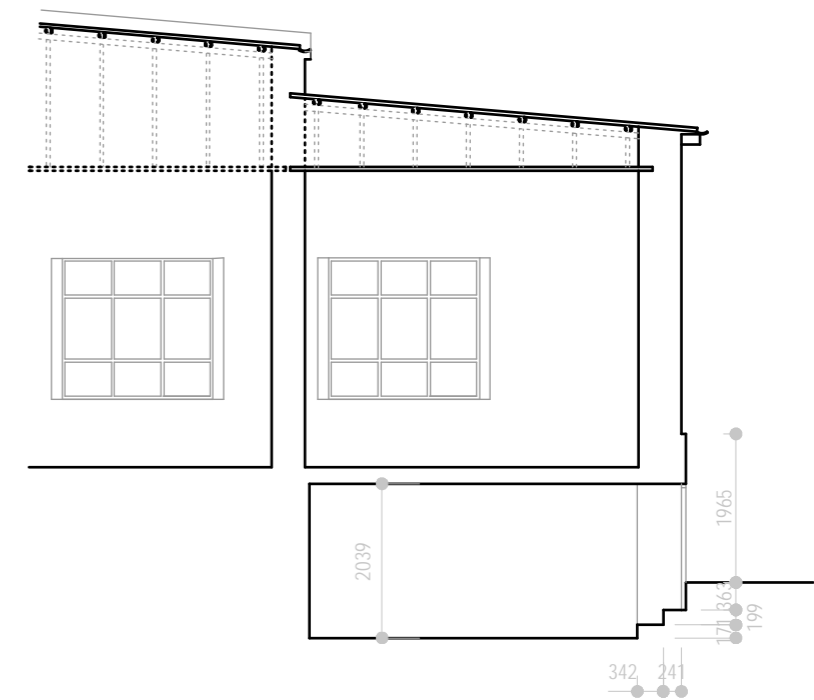
South-East Elevation



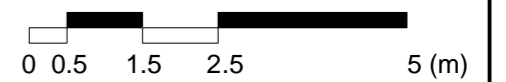
Site Name: Italian Administrative Building (Mekelle)	Drawing Title: Elevation	Survey Year: 2015	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 4 of 5
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A-A' Section



B-B' Section



Site Name: Italian Administrative Building (Mekelle)	Drawing Title: Section	Survey Year: 2015	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 5 of 5
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[1] Location, map made by Shimizu, N. (source: Google Map and Municipality Map)



[5] A Balance-like Mark in the East Facade (Building-A), photo by Shimizu, N., 2018



[6] An Opening in the West Side (Building-A), photo by Shimizu, N., 2018



[7] Internal Appearance of an Upper Floor Room (Building-A), photo by Shimizu, N., 2018



[2] External Appearance of Building-A (from the Southeast), photo by Shimizu, N., 2018



[4] Ornamental East Facade (Building-A), photo by Shimizu, N., 2018



[8] Internal Appearance of a Ground Floor Room on the South Side (Building-A), with a Timber Beam and Plastered Ceiling, photo by Shimizu, N., 2018



[9] Internal Appearance of a Ground Floor Room on the North Side (Building-A), with Timber Beams and Ceiling, photo by Shimizu, N., 2018



[3] External Appearance of Building-A (from the West), photo by Shimizu, N., 2018



[10] A Stair Room (Upper Floor, Building-A), photo by Shimizu, N., 2018



[11] Detail of Stairs (Building-A), photo by Shimizu, N., 2018

<p>Site Name: Old Hospital Quarter (Mekelle), Building-A</p>	<p>Title: Pictures</p>	<p>Survey Year: 2016, 2018</p>	<p>Introduction of the Site: In the targeted quarter, four buildings are lay out to form a rectangular courtyard. Due to the existence of the photo showing one of the targeted buildings, they seemed to be built in the Italian occupation period or shortly before. It is said that the quarter was originally used as a hospital (Okazaki 2009). Currently, the quarter has been used as a residence for local people. However, the targeted buildings are in danger of demolition because of the land-right transfer.</p>
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[12] External Appearance of Building-B (from the North), photo by Shimizu, N., 2018



[13] External Appearance of Building-B (from the Northwest), photo by Shimizu, N., 2018



[20] A Circular Window with Brick Rim and Stone Masonry Wall (Building-C), photo by Shimizu, N., 2018



[21] A Door and a Slender Window of Building-C (Photo Taken from Outside), photo by Shimizu, N., 2018



[14] A Collapsed Situation before Reinforcement, photo by Shimizu, N., 2016



[15] A Collapsed Situation before Reinforcement, photo by Shimizu, N., 2016



[22] Internal Appearance of Building-C, photo by Shimizu, N., 2018



[23] A Slender Window of Building-C (Photo Taken from Inside), photo by Shimizu, N., 2018



[16] Internal Appearance of Building-B after Reinforcement, photo by Shimizu, N., 2018



[17] Internal Appearance of Building-B with a Void in the Upper Part, photo by Shimizu, N., 2018



[24] External Appearance of Building-D (from the South), photo by Shimizu, N., 2018



[25] External Appearance of Building-D (from the Southwest), photo by Shimizu, N., 2018



[18] External Appearance of Building-C (from the East), photo by Shimizu, N., 2016



[19] Brick-used Northside Wall of Building-C (from the North); photo by Shimizu, N., 2018

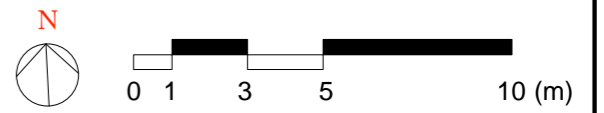


[26] Internal Appearance of Corridor (Building-D), photo by Shimizu, N., 2018

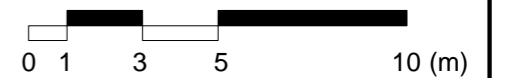
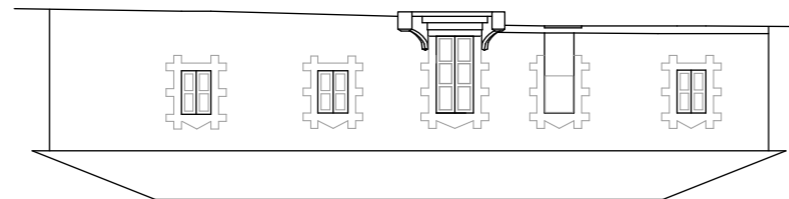
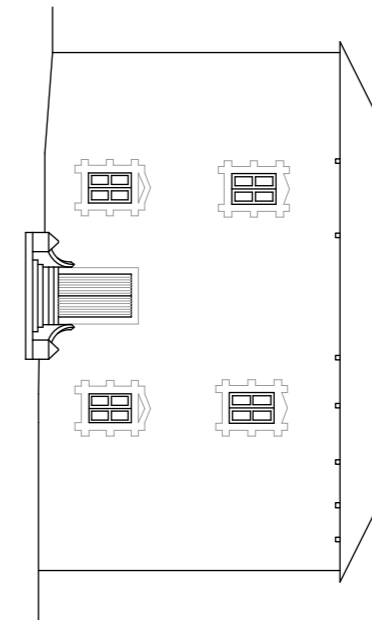
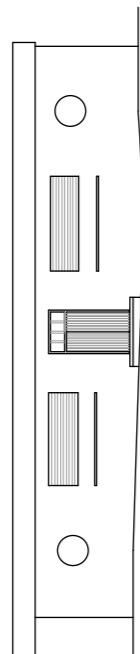
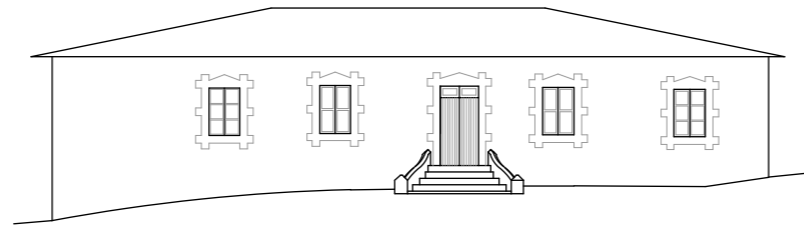


[25] Canopy Bed Space (Building-D), photo by Shimizu, N., 2016

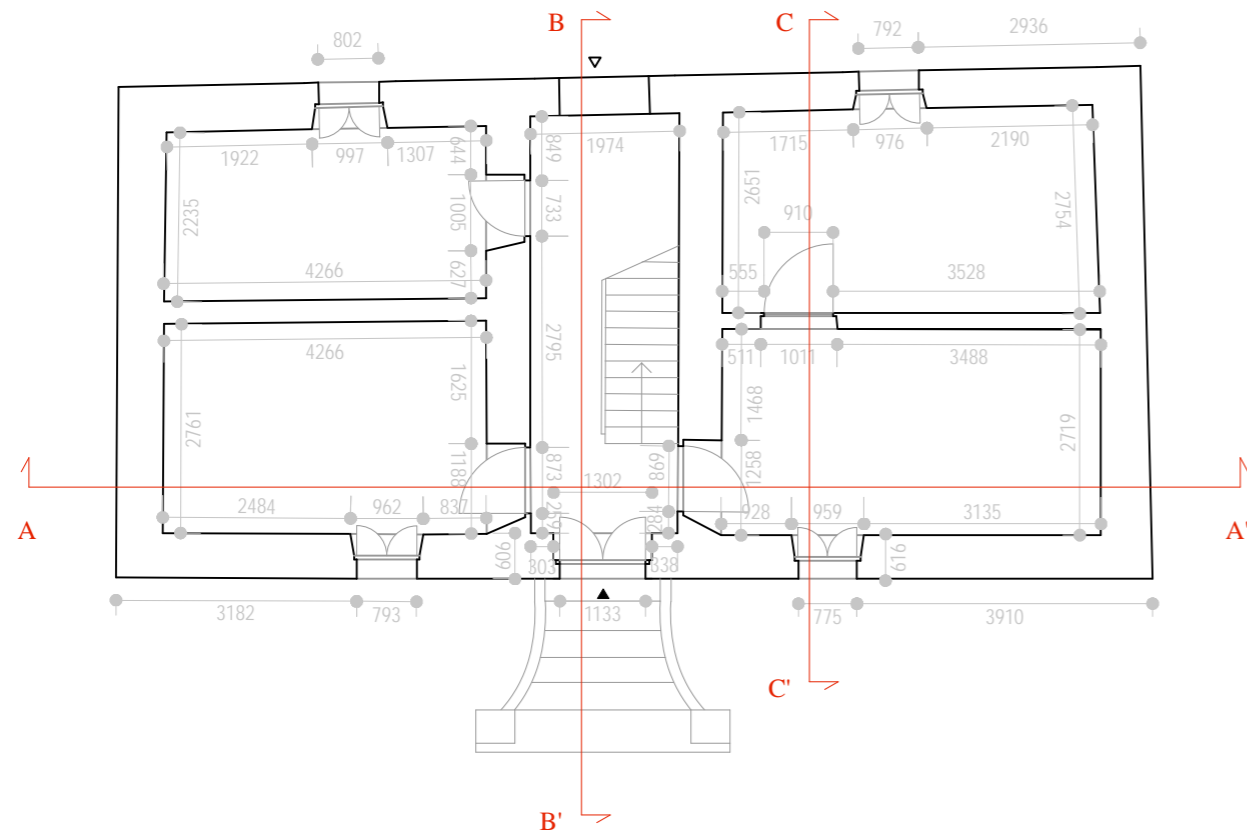
Site Name:	Title:	Survey Year:
Old Hospital Quarter (Mekelle), Building-B, C and D	Pictures	2016, 2018



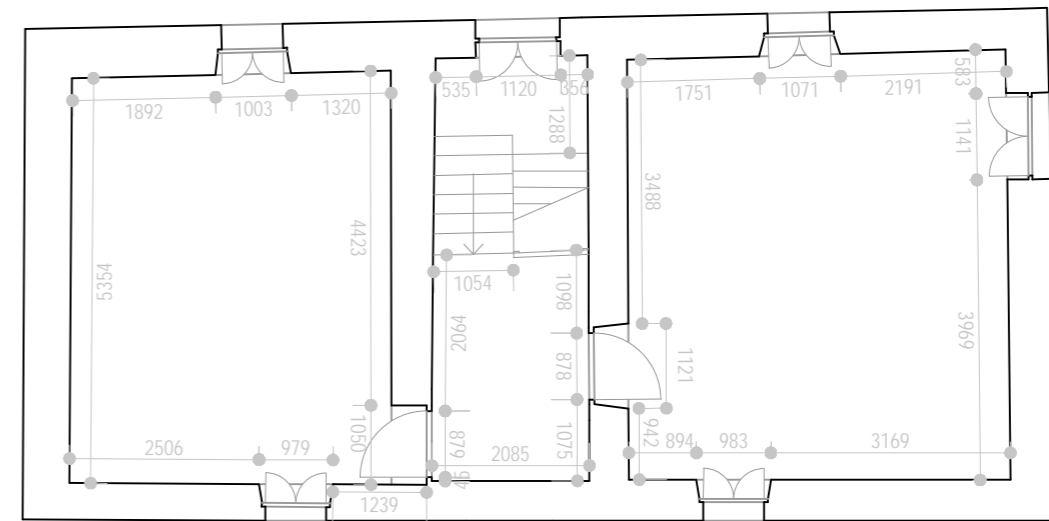
Site Name: Old Hospital Quarter (Mekelle)	Drawing Title: Site Plan	Survey Year: 2016 2018	Surveyed by: N. SHIMIZU, Gebremeskel T., Musse Y., Anwar M., Getenet G., Tewodros N.	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 200 (A3)	Sheet Number: 1 of 8
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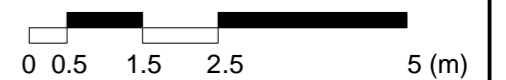
Site Name: Old Hospital Quarter (Mekelle)	Drawing Title: Site Elevation	Survey Year: 2016 2018	Surveyed by: N. SHIMIZU, Gebremeskel T., Musse Y., Anwar M., Getenet G., Tewodros N.	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 200 (A3)	Sheet Number: 2 of 8
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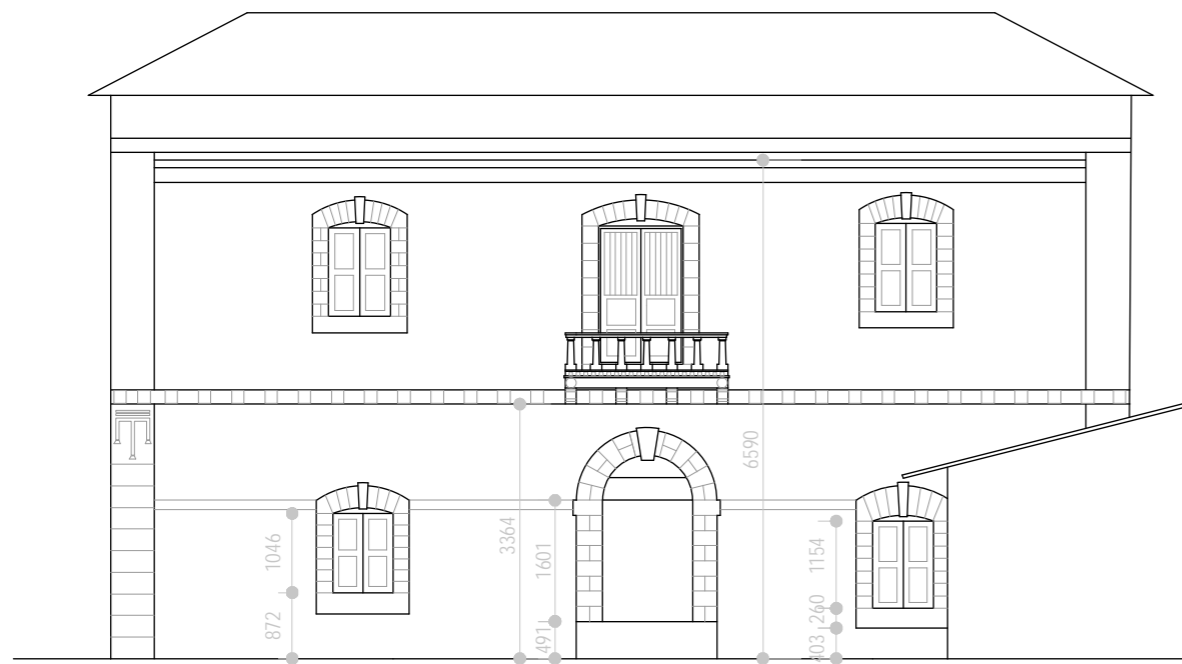
Ground Floor Plan



First Floor Plan



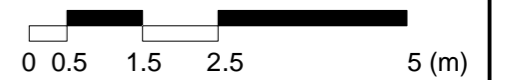
Site Name: Old Hospital Quarter, Building-A (Mekelle)	Drawing Title: Plan	Survey Year: 2016 2018	Surveyed by: N. SHIMIZU, Gebremeskel T., Musse Y., Anwar M., Getenet G., Tewodros N.	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 3 of 8
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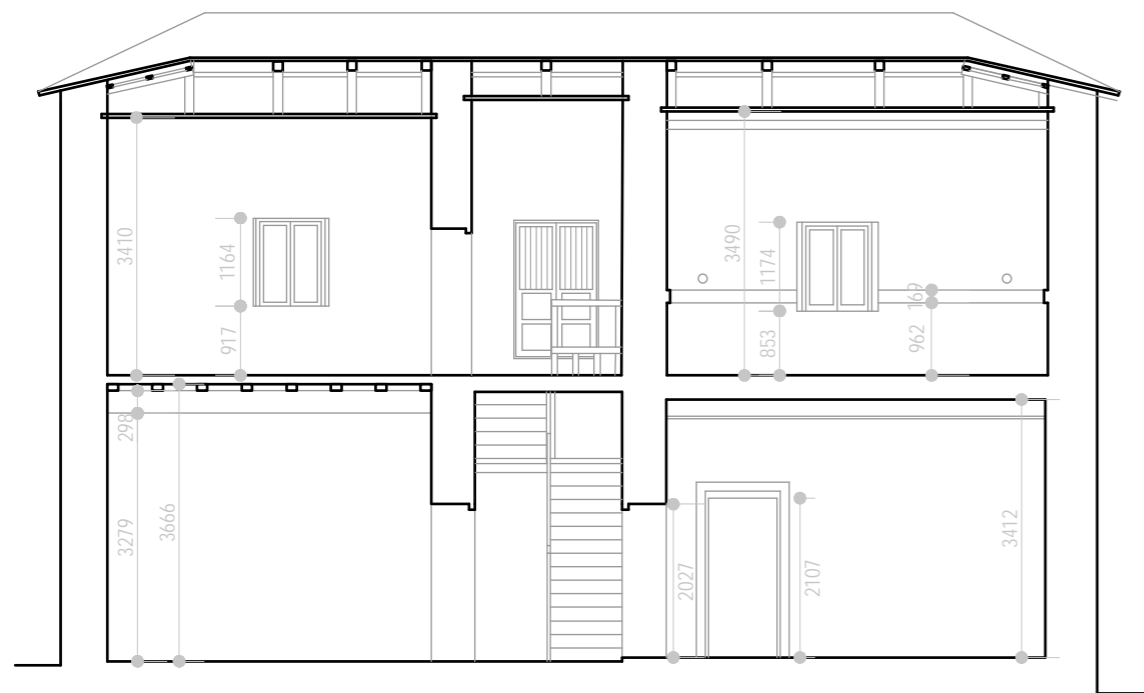
East Elevation



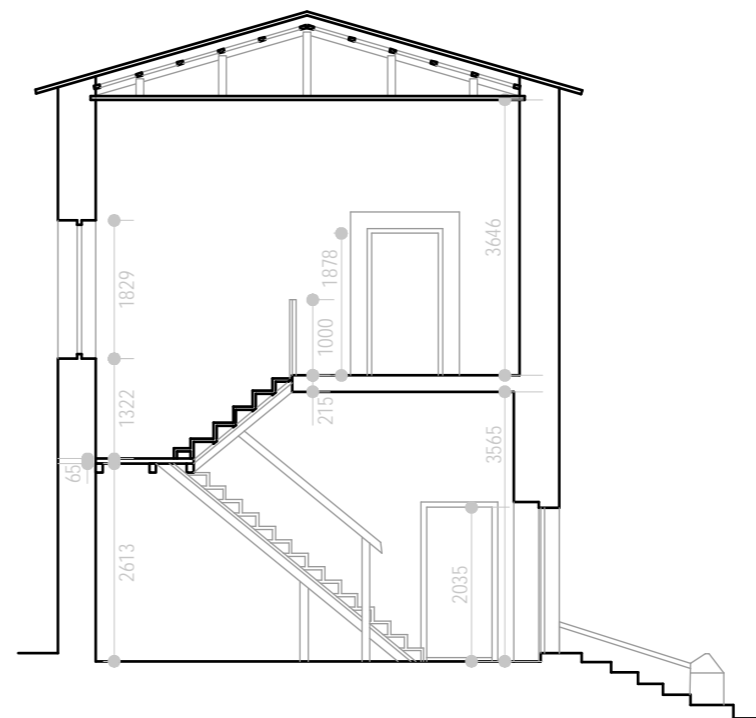
West Elevation



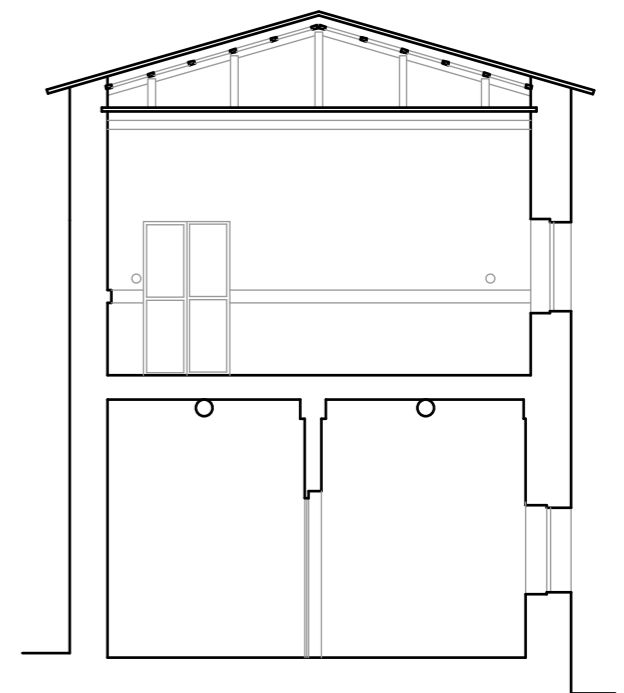
Site Name: Old Hospital Quarter, Building-A (Mekelle)	Drawing Title: Elevation	Survey Year: 2016 2018	Surveyed by: N. SHIMIZU, Gebremeskel T., Musse Y., Anwar M., Getenet G., Tewodros N.	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 4 of 8
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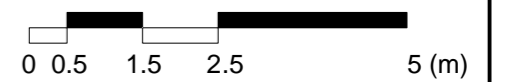
A-A' Section



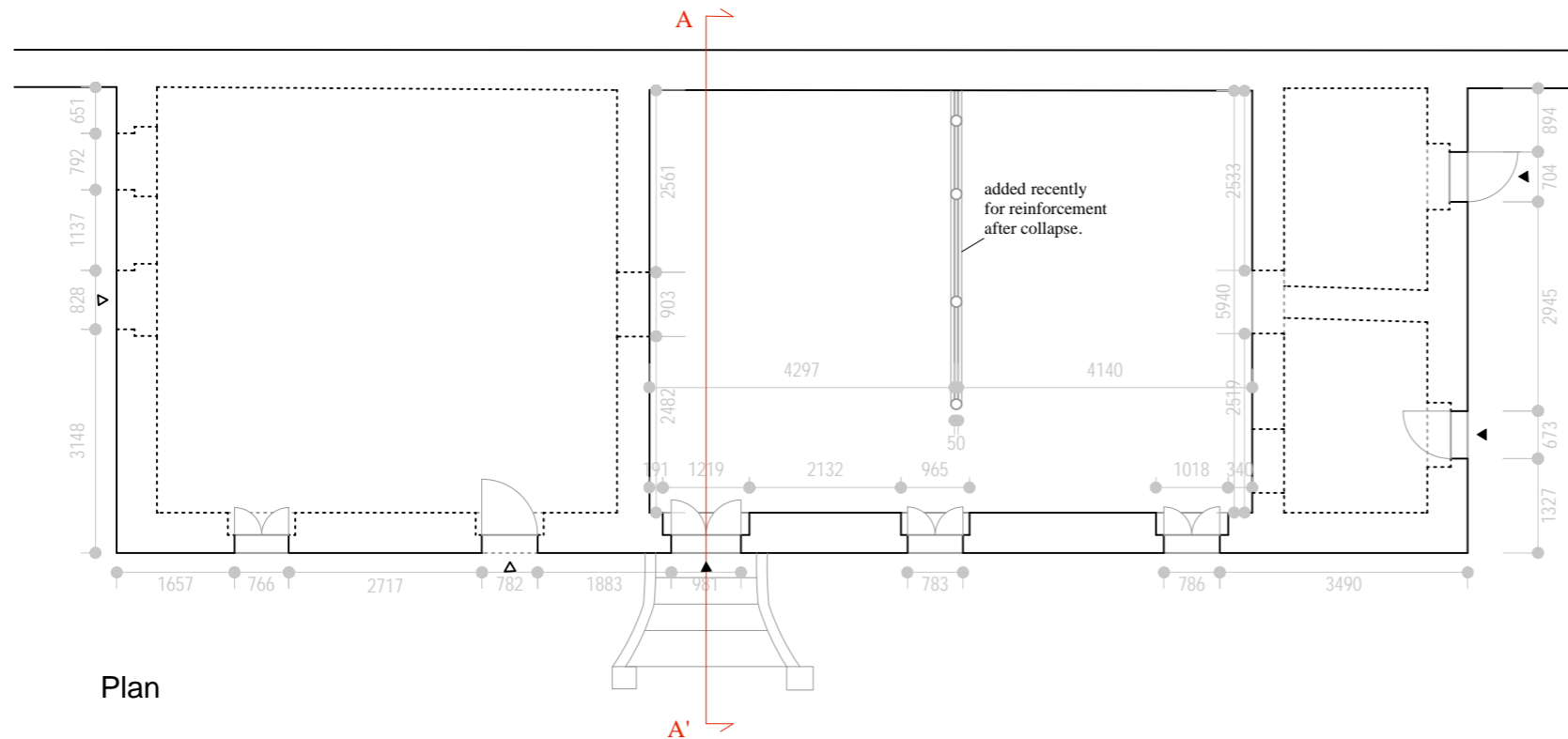
B-B' Section



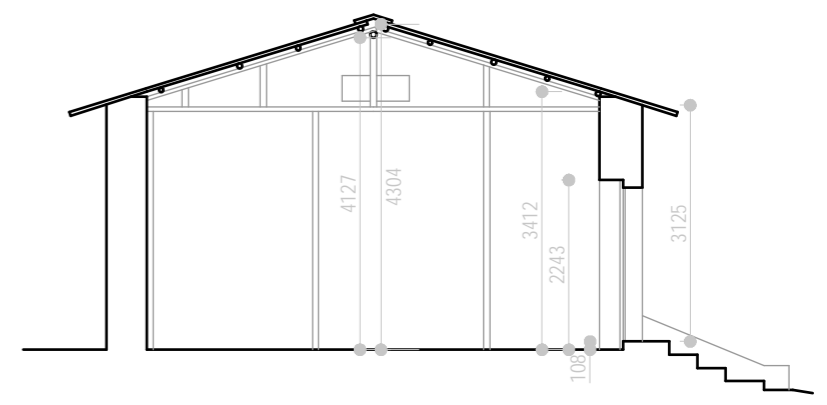
C-C' Section



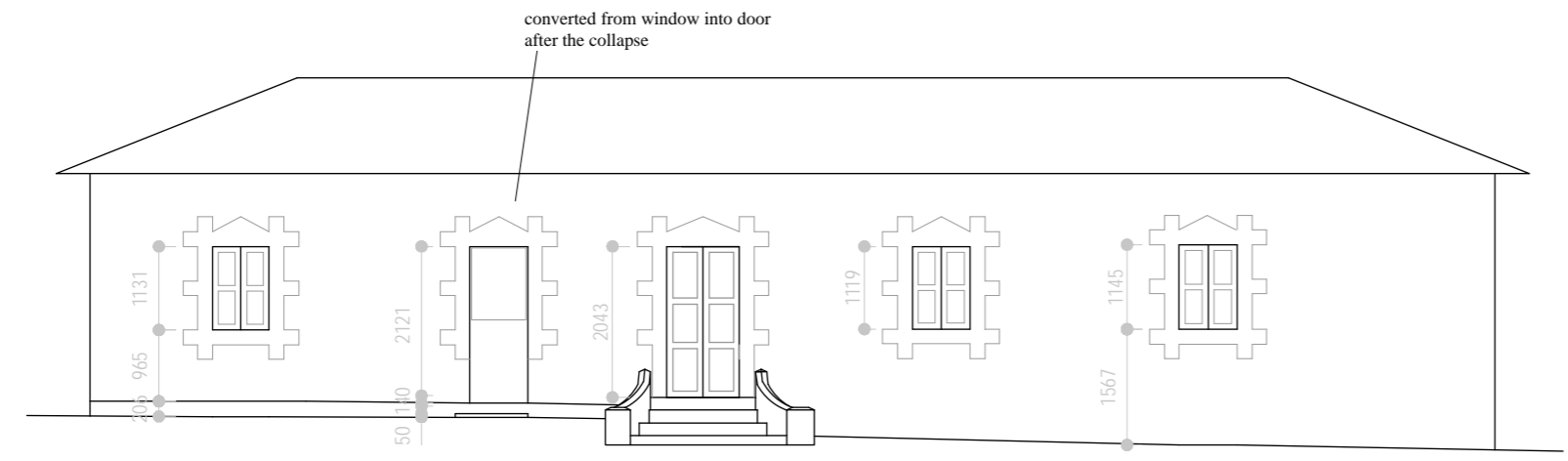
Site Name: Old Hospital Quarter, Building-A (Mekelle)	Drawing Title: Section	Survey Year: 2016 2018	Surveyed by: N. SHIMIZU, Gebremeskel T., Musse Y., Anwar M., Getenet G., Tewodros N.	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 5 of 8
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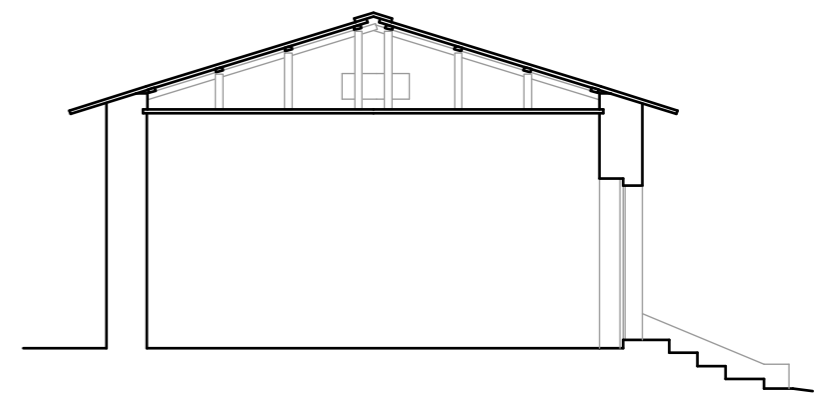
Plan



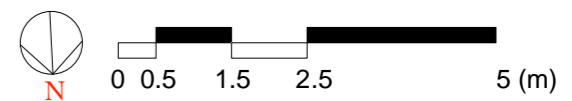
A-A' Section (after reinforcement)



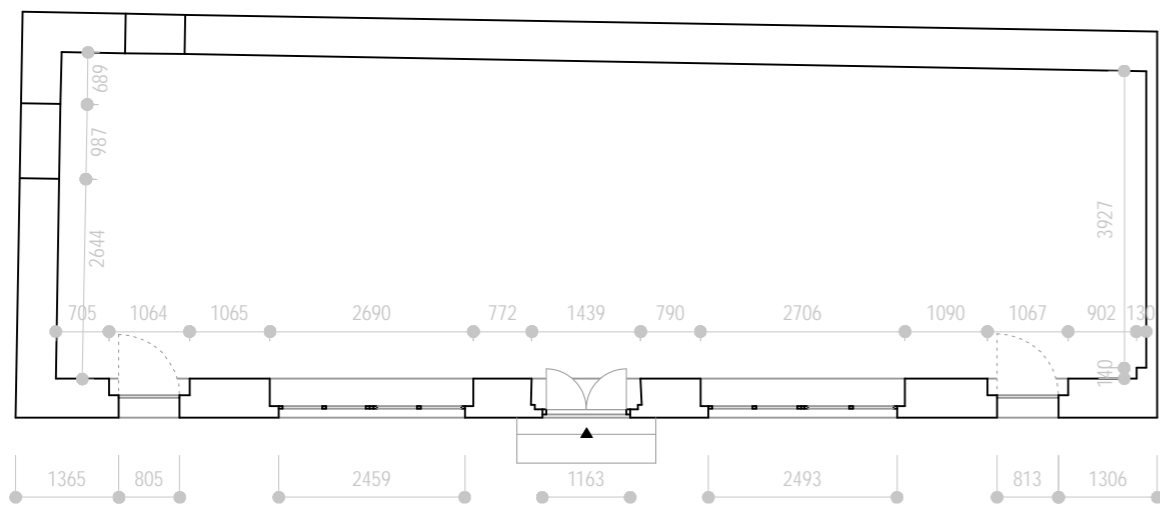
North Elevation



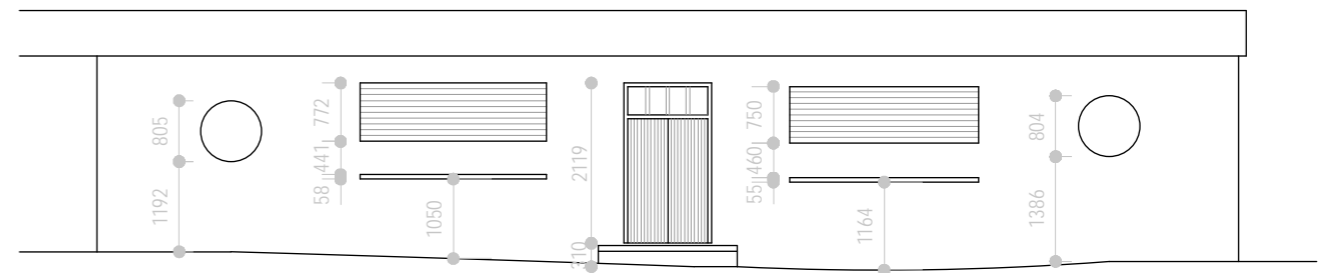
A-A' Section (before collapse)



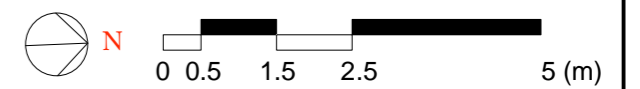
Site Name: Old Hospital Quarter, Building-B (Mekelle)	Drawing Title: Plan, Elevation Section	Survey Year: 2016 2018	Surveyed by: N. SHIMIZU, Gebremeskel T., Musse Y., Anwar M., Getenet G., Tewodros N.	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 6 of 8
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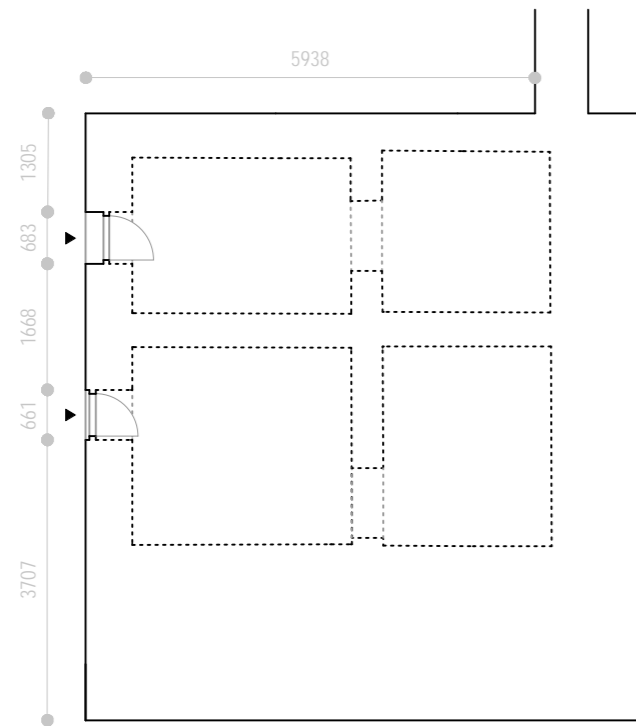
Plan



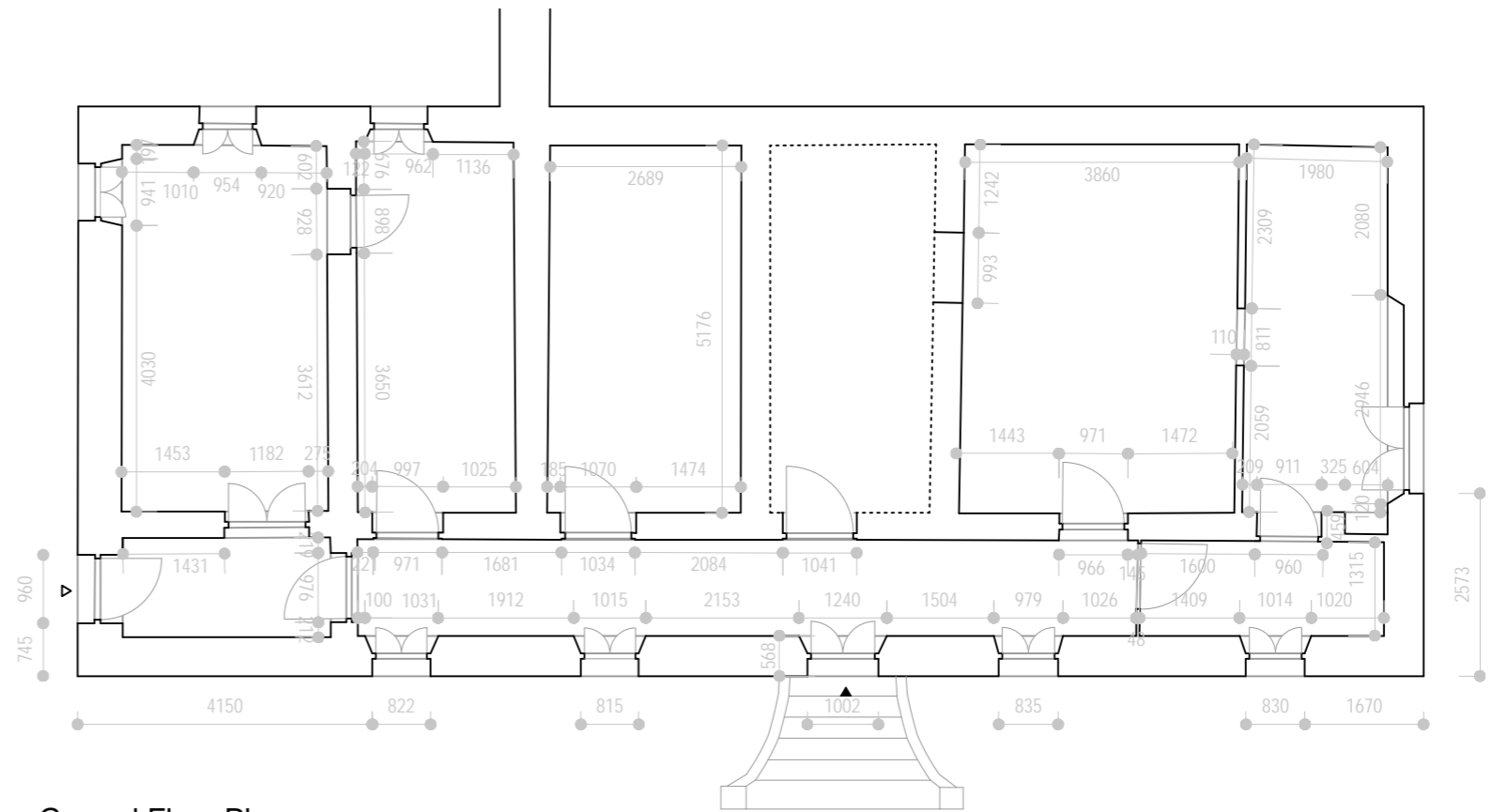
East Elevation



Site Name: Old Hospital Quarter, Building-C (Mekelle)	Drawing Title: Plan Elevation	Survey Year: 2016 2018	Surveyed by: N. SHIMIZU, Gebremeskel T., Musse Y., Anwar M., Getenet G., Tewodros N.	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 7 of 8
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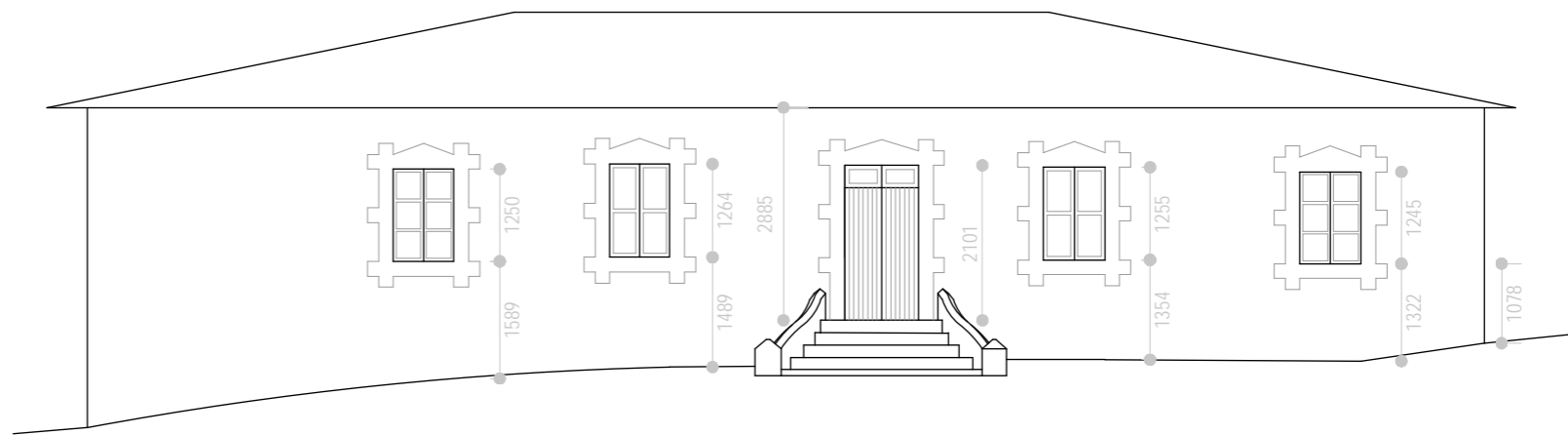
Basement Floor Plan



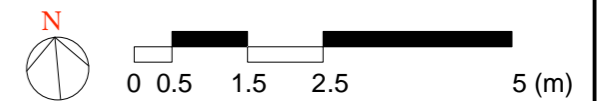
Ground Floor Plan



West Elevation



South Elevation



Site Name: Old Hospital Quarter, Building-D (Mekelle)	Drawing Title: Plan Elevation	Survey Year: 2016 2018	Surveyed by: N. SHIMIZU, Gebremeskel T., Musse Y., Anwar M., Getenet G., Tewodros N.	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 8 of 8
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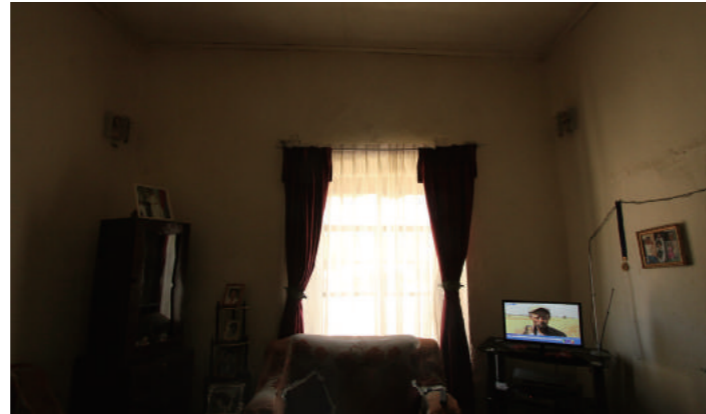
[1] External Appearance (from the Road), photo by Shimizu, N., 2016



[2] External Appearance (from the Courtyard), photo by Shimizu, N., 2016



[3] Internal Appearance of a Central Room with Corrugated Metal Sheet Roof, photo by Shimizu, N., 2016



[4] Internal Appearance of a Northeast Room with Panel Ceiling, photo by Shimizu, N., 2016

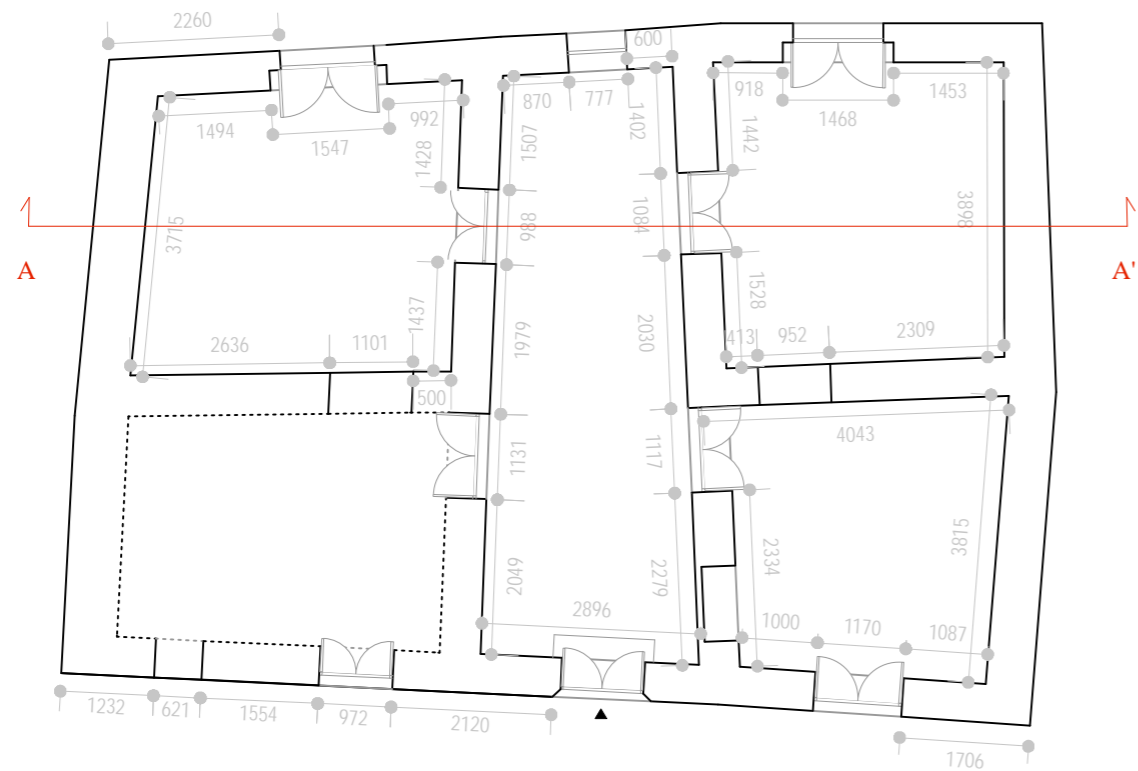


[5] A Southwest Room with Corrugated Metal Sheet Roof, photo by Shimizu, N., 2016

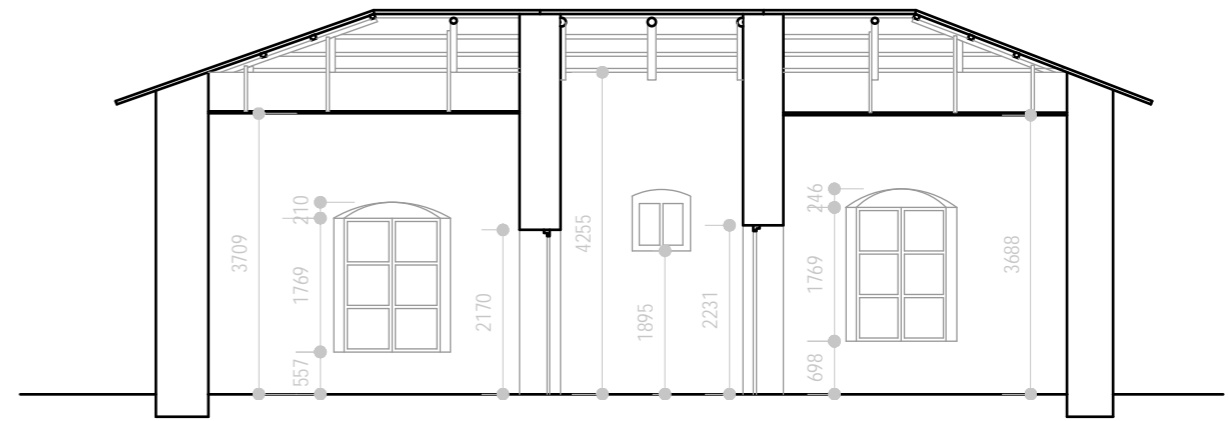


[6] A Timber Window in Arched Shape Masonry Wall, photo by Shimizu, N., 2016

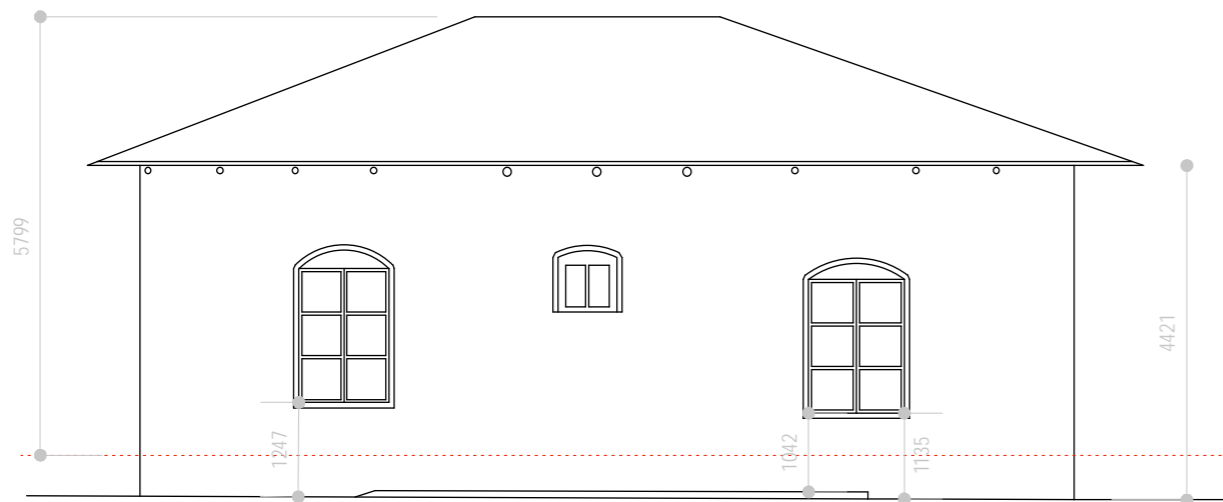
Site Name: Menen House (Mekelle)	Title: Pictures Survey Year: 2016	Introduction of the Site: Menen, the first owner of the targeted house, was wife of Krantis (See: Liquor Factory) and she inherited the site after his death. After she got married for the second time, the targeted house was erected by her in c. 1956. It was when the present house owner (M / 1946-), a son of her who grew up in Liquor Factory quarter, was approx. ten years old.
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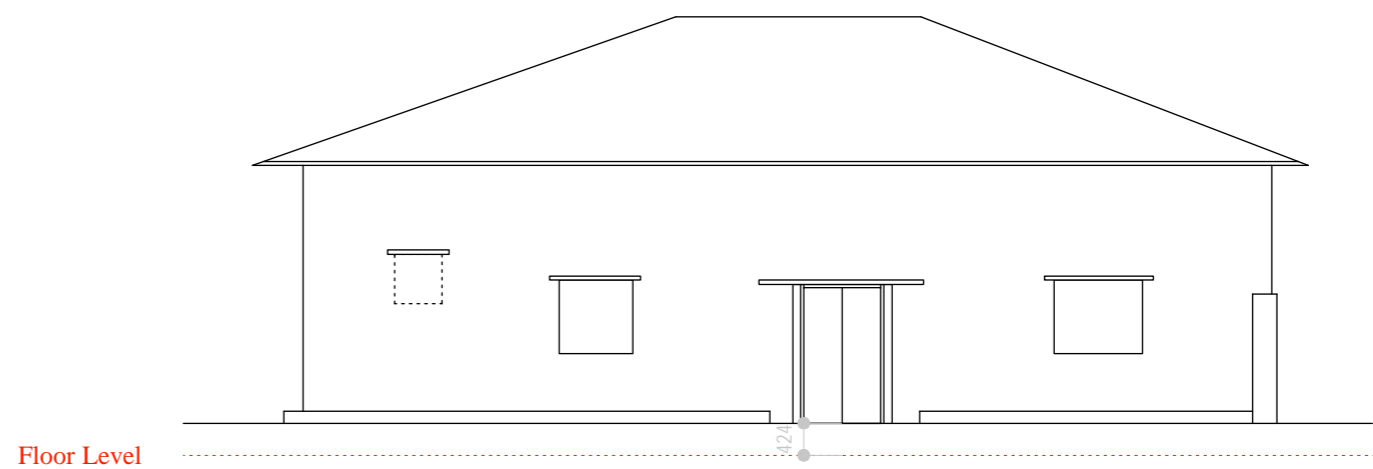
Plan



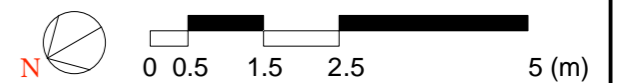
A-A' Section



East Elevation (from Street)



West Elevation (from Courtyard)



Site Name: Menen House (Mekelle)	Drawing Title: Plan, Elevation, Section	Survey Year: 2016	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 1 of 1
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[1] Location, map made by Shimizu, N. (source: Google Map and Municipality Map)



[6] Internal Appearance of the Ground Floor Room, photo by Shimizu, N., 2016



[7] Internal Appearance of the Upper Floor Room, photo by Shimizu, N., 2016



[8] Hidmo-inspired Timber Ceiling (Perhaps Beam is with RC member), photo by Shimizu, N., 2016



[9] Hidmo-inspired Timber Ceiling (Perhaps Beam is with RC member), photo by Shimizu, N., 2016



[2] External Appearance (from the West), photo by Shimizu, N., 2016



[3] External Appearance (from the Northwest), photo by Shimizu, N., 2016



[4] External Appearance (from the Southeast), photo by Shimizu, N., 2016



[5] External Appearance of Upper Floor (from the Veranda), photo by Shimizu, N., 2016



[10] An Ornamental Tripartite Window (Photo Taken from Inside Building), photo by Shimizu, N., 2016

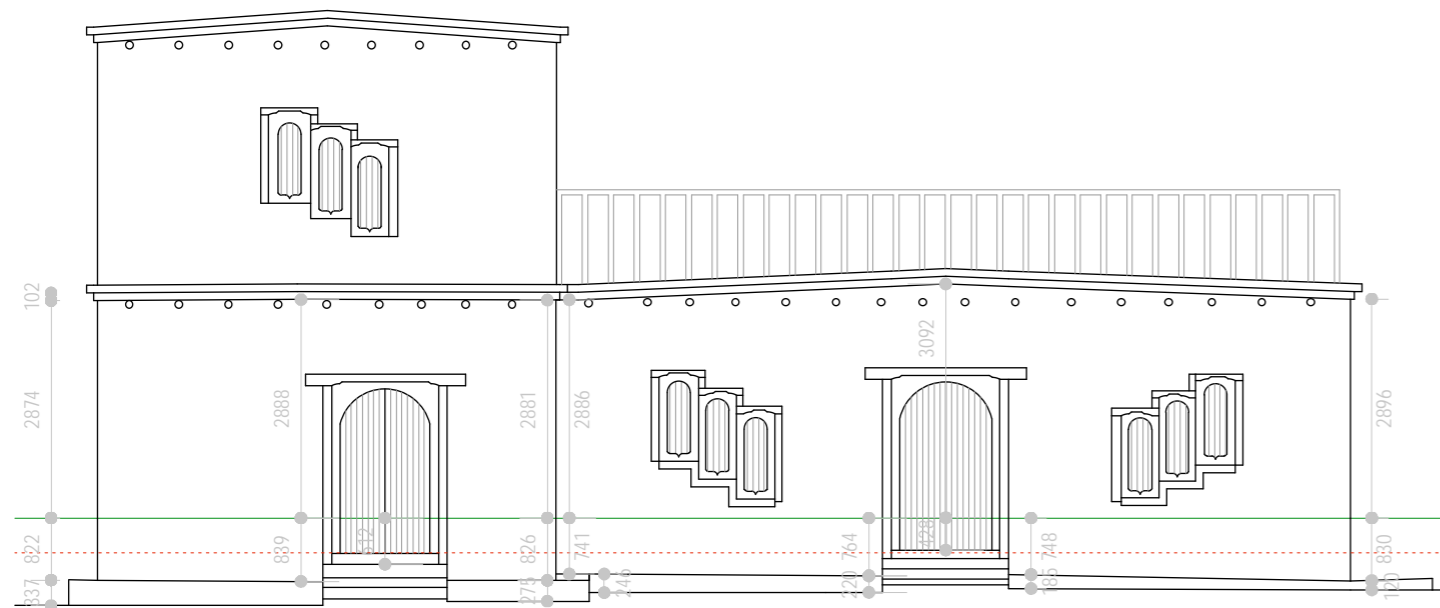


[11] An Ornamental Tripartite Window (Photo Taken from Outside Building), photo by Shimizu, N., 2016



[12] An Ornamental Window Set in the Southeast Side Wall (Each Door Having Similar Components), photo by Shimizu, N., 2016

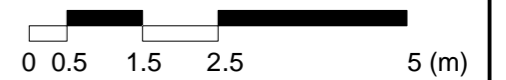
Site Name: Mengesha's Second House (Mekelle)	Title: Pictures	Survey Year: 2016	Introduction of the Site: This building has been reused as a bar named Black Rose. According to the nameboard, the building was erected by Mengesha Siyyum in 1962.
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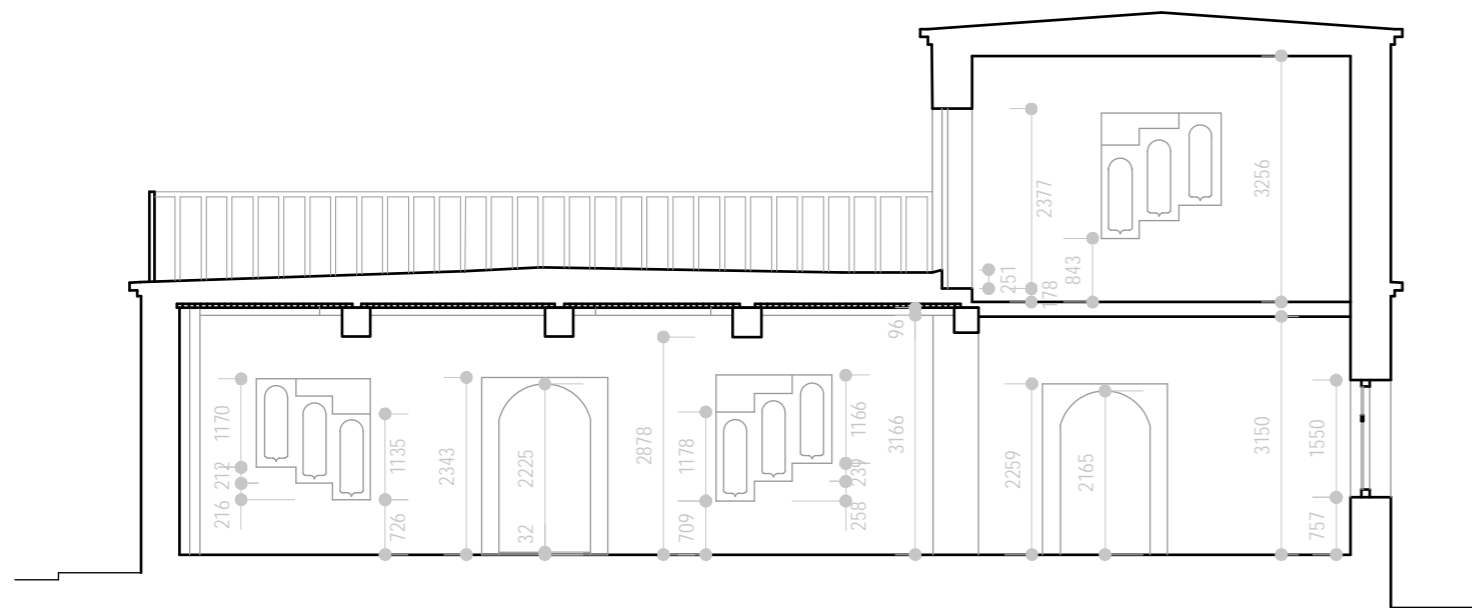
North-West Elevation



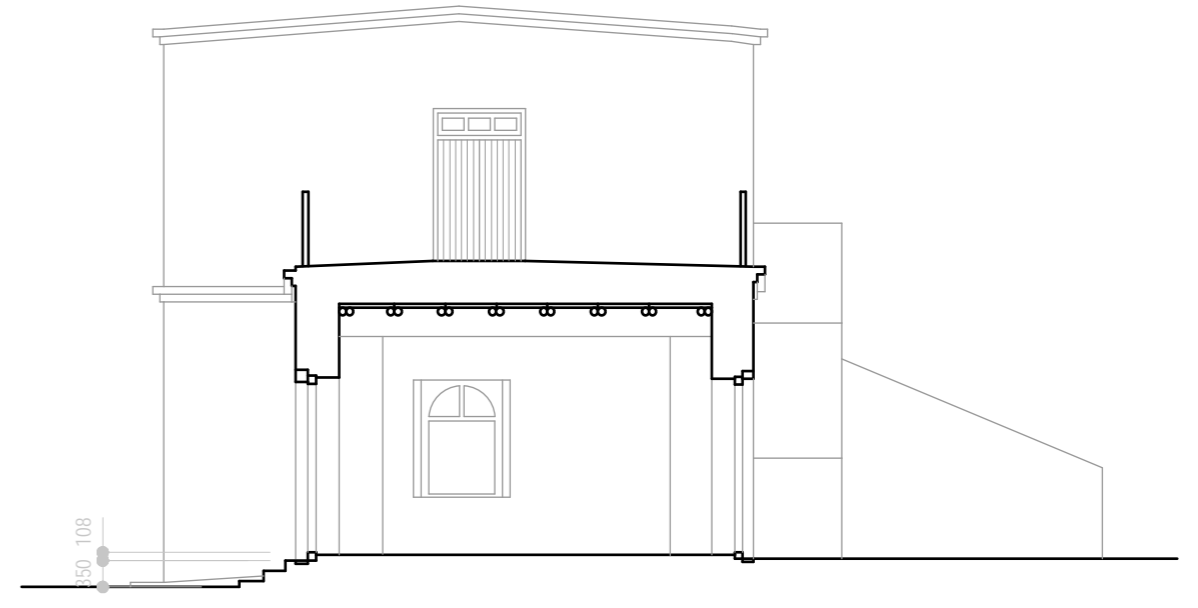
South-East Elevation



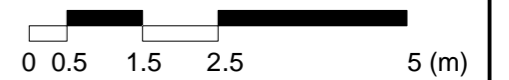
Site Name: Mengesha's Second House (Mekelle)	Drawing Title: Elevation	Survey Year: 2016	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 2 of 3
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A-A' Section



B-B' Section



Site Name: Mengesha's Second House (Mekelle)	Drawing Title: Section	Survey Year: 2016	Surveyed by: SHIMIZU Nobuhiro, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 3 of 3
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[1] View of the Parcel, photo by Shimizu, N., 2014



[2] External Appearance (from the North), photo by Shimizu, N., 2014



[1] A Parcel the Targeted House Locating, photo by Shimizu, N., 2014



[2] External Appearance (from the West), photo by Shimizu, N., 2014



[3] Detail of Hidmo Roof, photo by Higuchi, R., 2010



[4] Internal Appearance, photo by Higuchi, R., 2010



[3] Detail of Hidmo Roof, photo by Mano, Y., 2010



[4] Internal Appearance, photo by Sugawara, Y., 2010



[5] Internal Appearance, photo by Kinase, R., 2010



[6] Hidmo Ceiling, photo by Higuchi, R., 2010



[5] Accessing to the Upper Floor is Possible Only by Use of a Ladder, photo by Sugawara, Y., 2010



[6] Basement of a Pillar, photo by Sugawara, Y., 2010



[7] Appearance of Debri (Upper Floor), photo by Higuchi, R., 2010



[8] A Wall with Horns, photo by Higuchi, R., 2010



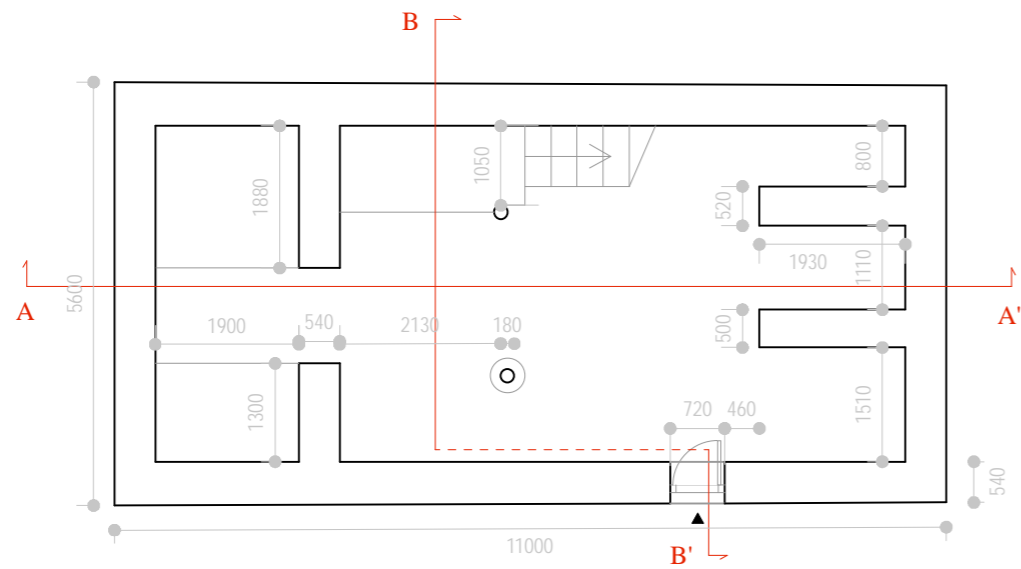
[7] Detail of Hidmo Ceiling, photo by Sugawara, Y., 2010



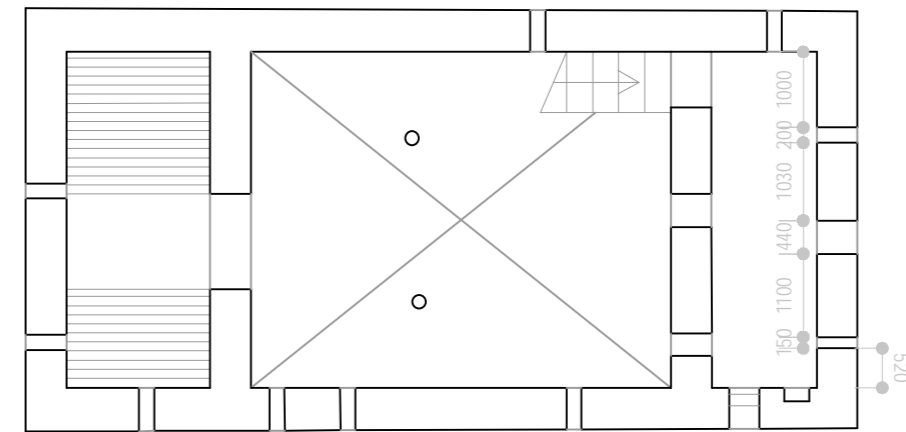
[8] Detail of Hidmo Ceiling, photo by Sugawara, Y., 2010

Site Name: Imal House (İnda Mesqel, Mekelle)	Title: Pictures Survey Year: 2010	Introduction of the Site: The hereditary line of the targeted house situated is the earliest one in İnda Mesqel. The ancestor settling to İnda Mesqel had a close relationship with Mirch'a, father of Emperor Yohannis IV. According to the informant (1933-2014) who is a descendant of the hereditary line, the targeted house was erected in c. 1870 by his grandfather, a son of the settler and serving as <i>blattén-geta</i> under Emperor Yohannis IV. This building is the earliest example still found in Mekelle.
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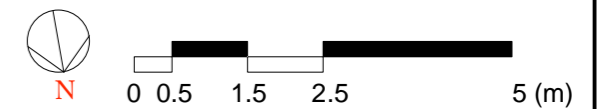
Site Name: Gebrehiwot House (İnda Mesqel, Mekelle)	Title: Pictures Survey Year: 2010	Introduction of the Site: The targeted house was built in c. 1965 by Gebrehiwot, the informant's father-in-law titled <i>basha</i> under Siyyum Mengesha. The informant inherited the house from him.
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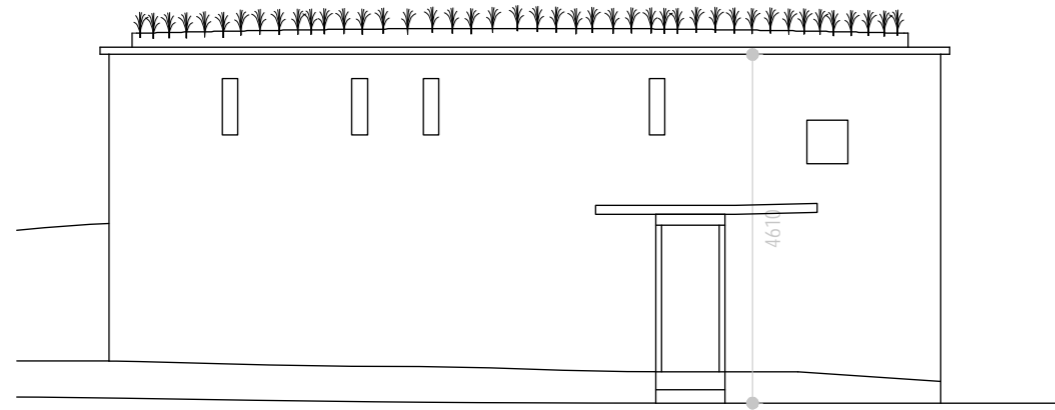
Ground Floor Plan



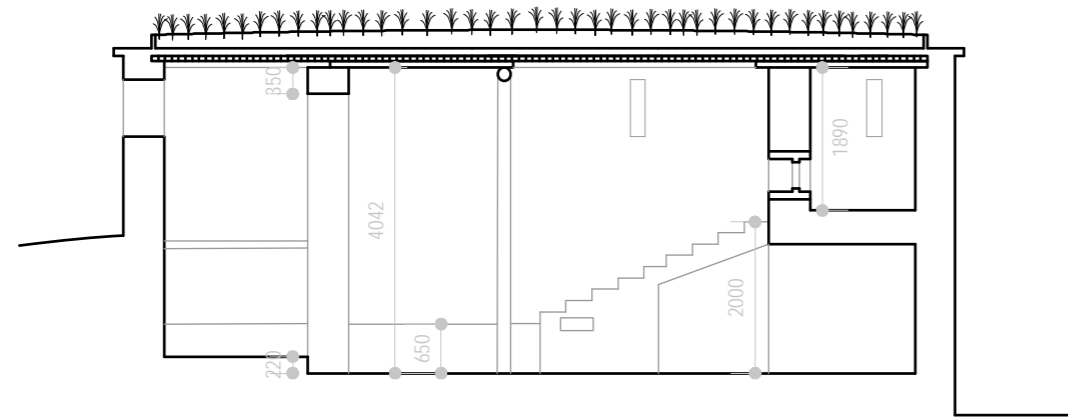
First Floor Plan



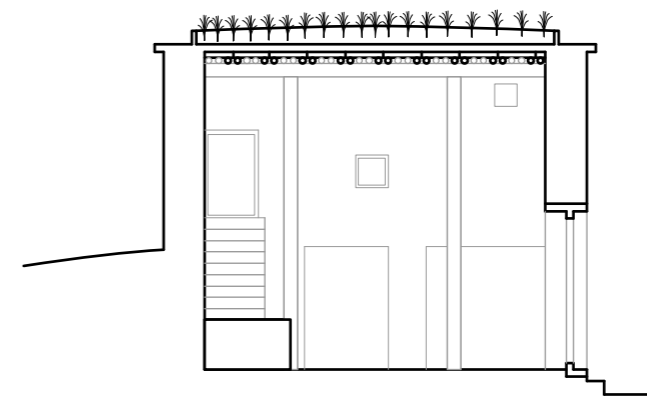
Site Name: Imal House (İnda Mesqel, Mekelle)	Drawing Title: Plan	Survey Year: 2010	Surveyed by: N. Shimizu, R. Miyake, R. Kinase, R. Higuchi, S. Matsui, Y. Mano, A. Nakayama, A. Habara, Y. Sugawara, Tewodros N.	Drawn by: SHIMIZU Nobuhiro MATSUI Shima	Scale: 1 : 100 (A3)	Sheet Number: 1 of 2
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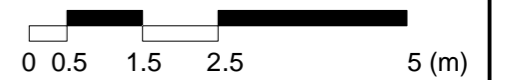
North Elevation



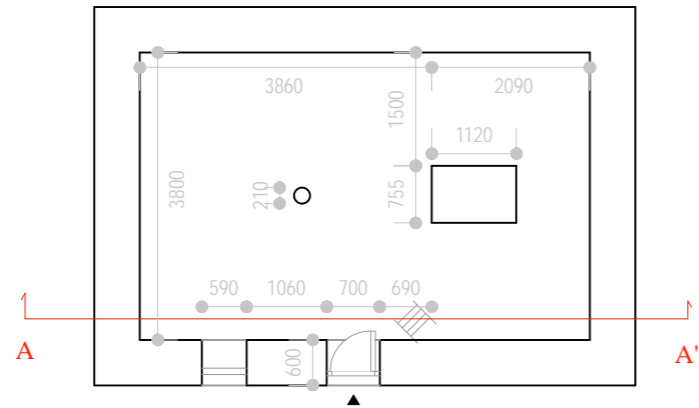
A-A' Section



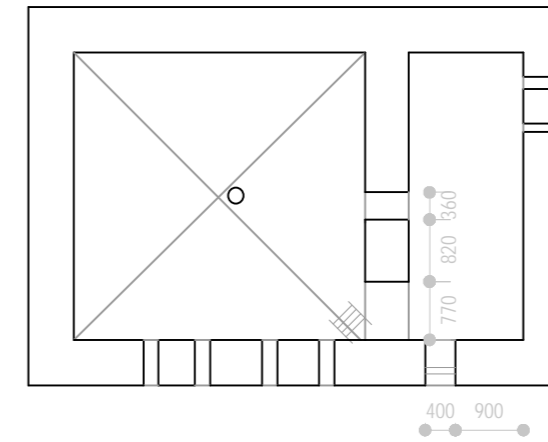
B-B' Section



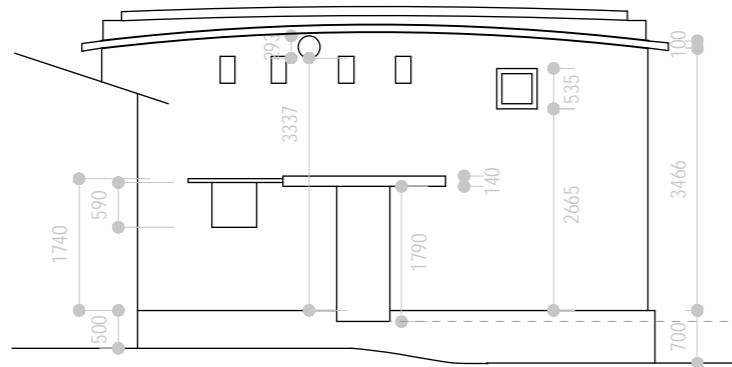
Site Name: Imal House (İnda Mesqel, Mekelle)	Drawing Title: Elevation Section	Survey Year: 2010	Surveyed by: N. Shimizu, R. Miyake, R. Kinase, R. Higuchi, S. Matsui, Y. Mano, A. Nakayama, A. Habara, Y. Sugawara, Tewodros N.	Drawn by: SHIMIZU Nobuhiro MATSUI Shima	Scale: 1 : 100 (A3)	Sheet Number: 2 of 2
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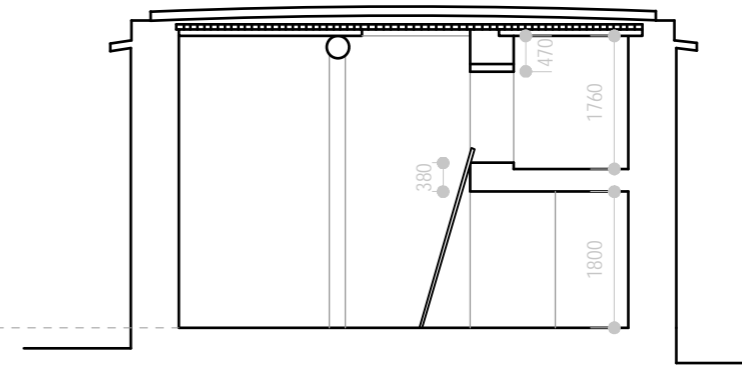
Ground Floor Plan



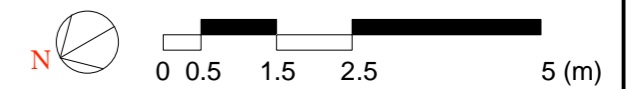
First Floor Plan



West Elevation



A-A' Section



Site Name: Gebrehiwot House (İnda Mesqel, Mekelle)	Drawing Title: Plan, Elevation, Section	Survey Year: 2010	Surveyed by: N. Shimizu, R. Miyake, R. Kinase, R. Higuchi, S. Matsui, Y. Mano, A. Nakayama, A. Habara, Y. Sugawara, Tewodros N.	Drawn by: SHIMIZU Nobuhiro MATSUI Shima	Scale: 1 : 100 (A3)	Sheet Number: 1 of 1
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[1] External Appearance (from the North), photo by Shimizu, N., 2015



[2] A Collapsed Wall in the Eastside, photo by Shimizu, N., 2015



[1] External Appearance (from the East), photo by Shimizu, N., 2015



[2] External Appearance (from the North), photo by Shimizu, N., 2015



[3] Internal Appearance, photo by Shimizu, N., 2015



[4] Internal Appearance, photo by Shimizu, N., 2015



[3] Internal Appearance, photo by Shimizu, N., 2015



[4] Internal Appearance, photo by Shimizu, N., 2015



[5] Detail of Hidmo Ceiling, photo by Shimizu, N., 2015



[5] Detail of Hidmo Ceiling, photo by Shimizu, N., 2015



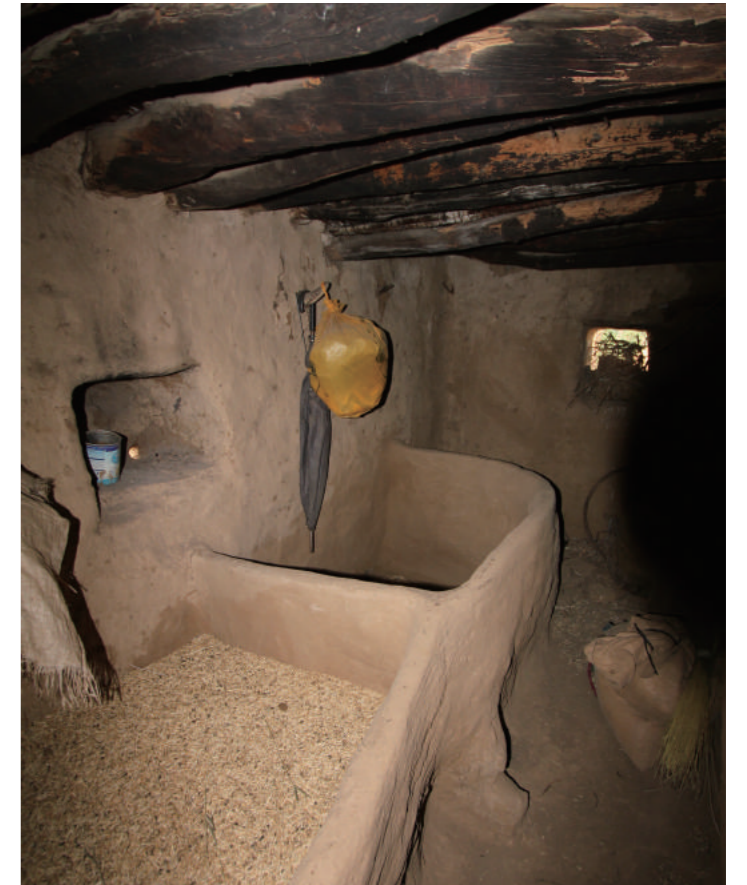
[6] Upper Floor in a State of Collapse, photo by Shimizu, N., 2015



[7] A Grain Store, photo by Shimizu, N., 2015



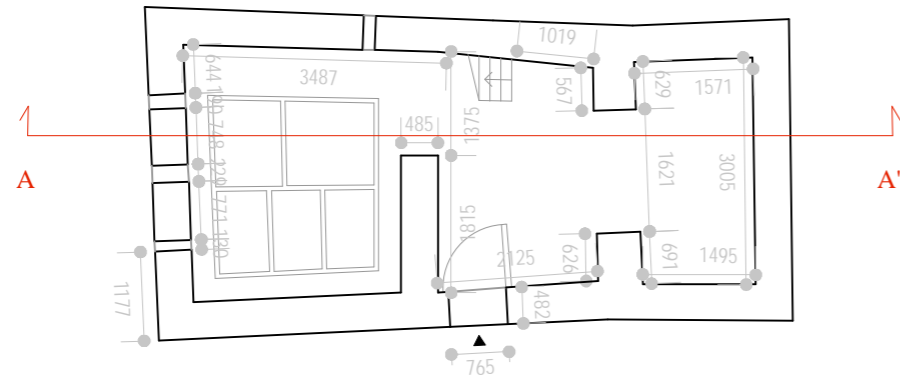
[6] Detail of a Slab between Ground Floor and Upper Floor, photo by Shimizu, N., 2015



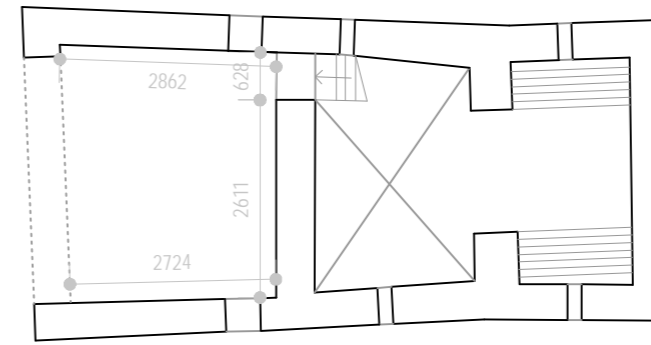
[7] A Grain Store in the Upper Floor, photo by Shimizu, N., 2015

Site Name: A House in Melba^c Village #1	Title: Pictures Survey Year: 2015	Introduction of the Site: The present house owner (M / c. 1955-) is the 3rd generation. His grandfather erected the building approx. 140-150 years ago (c. 1860s or 1870s). He was the almost same age as 1st generation of #2 house.
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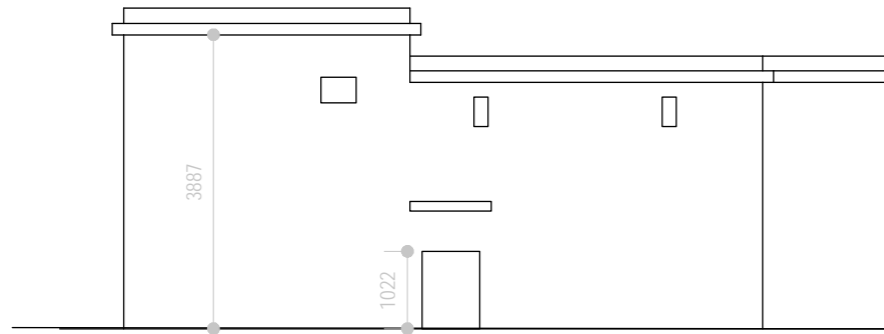
Site Name: A House in Melba^c Village #2	Title: Pictures Survey Year: 2015	Introduction of the Site: Great-grandfather of the present house owner (F / 1965-) erected the building approx. 150 years ago (c. 1865).
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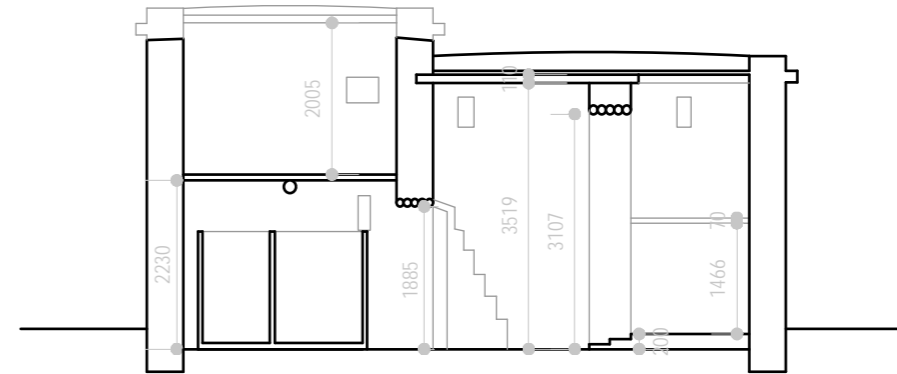
Ground Floor Plan



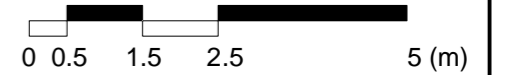
First Floor Plan



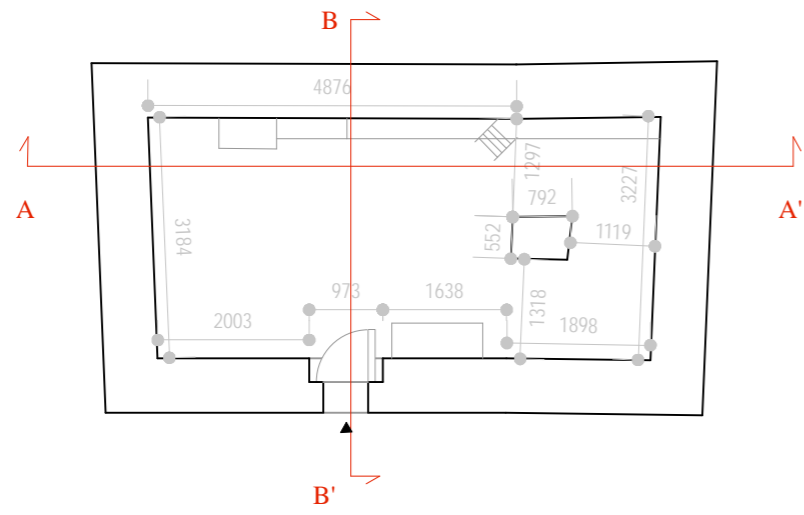
North Elevation



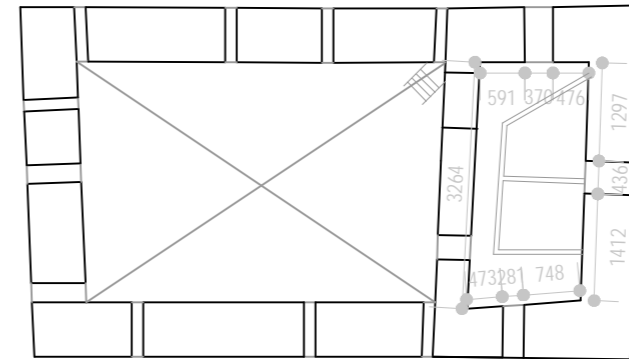
A-A' Section



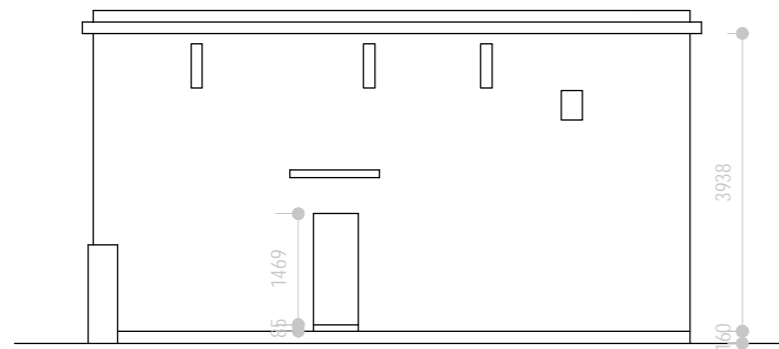
Site Name: A House in Melba ^c Village #1	Drawing Title: Plan, Elevation, Section	Survey Year: 2015	Surveyed by: SHIMIZU Nobuhiro, Ekubay Tesfay	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 1 of 1
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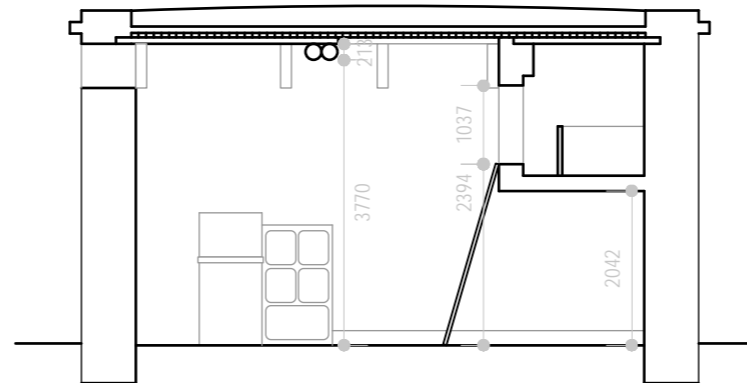
Ground Floor Plan



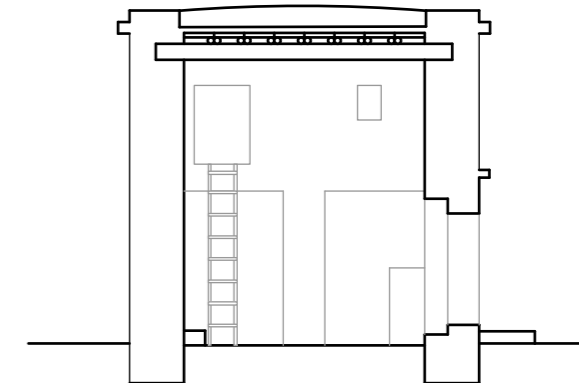
First Floor Plan



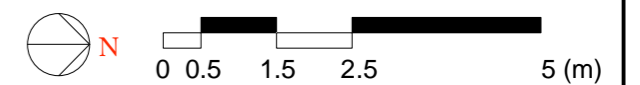
East Elevation



A-A' Section



B-B' Section



Site Name: A House in Melba ^c Village #2	Drawing Title: Plan, Elevation, Section	Survey Year: 2015	Surveyed by: SHIMIZU Nobuhiro, Ekubay Tesfay	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 1 of 1
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[1] External Appearance (from the Southwest), photo by Shimizu, N., 2015



[2] Internal Appearance, photo by Shimizu, N., 2015



[1] A Parcel the Targeted House Locating, photo by Shimizu, N., 2015



[2] External Appearance (from the South), photo by Shimizu, N., 2015



[3] Internal Appearance, photo by Shimizu, N., 2015



[4] Hidmo Ceiling, photo by Shimizu, N., 2015



[3] Hidmo Ceiling, photo by Shimizu, N., 2015



[4] A Central Masonry Pillar and A Built-in Rack, photo by Shimizu, N., 2015



[5] Detail of Hidmo Ceiling, photo by Shimizu, N., 2015



[5] A Central Masonry Pillar and A Built-in Rack, photo by Shimizu, N., 2015



[6] Detail of Upper Part's Slab, photo by Shimizu, N., 2015



[7] Entrance, photo by Shimizu, N., 2015



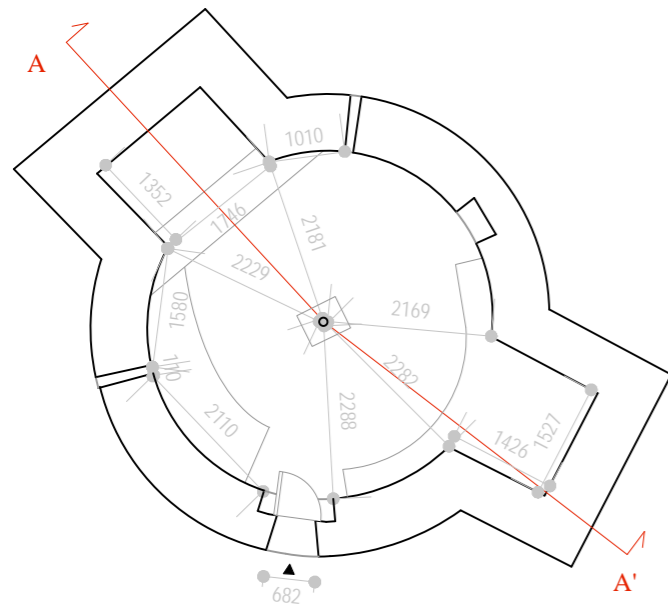
[6] Attached Furniture, photo by Shimizu, N., 2015



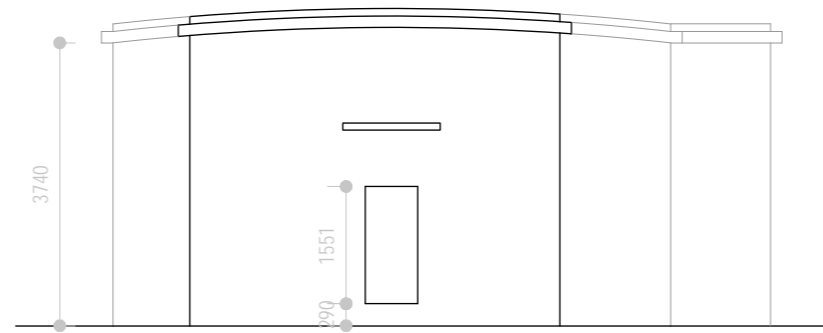
[7] A Grain Store, photo by Shimizu, N., 2015

Site Name: A House in Melba^c Village #3	Title: Pictures Survey Year: 2015	Introduction of the Site: According to the house inhabitant, the building was erected more than one hundred years ago (c. 1915).
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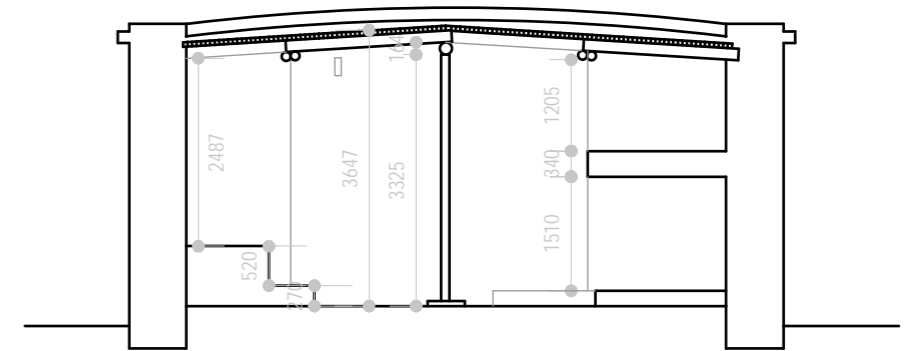
Site Name: A House in Melba^c Village #4	Title: Pictures Survey Year: 2015	Introduction of the Site: According to the house owner (F/ c. 1925-), this building was erected by her husband approx. 90 years ago (c. 1925).
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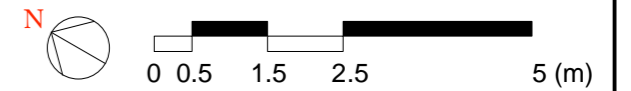
Plan



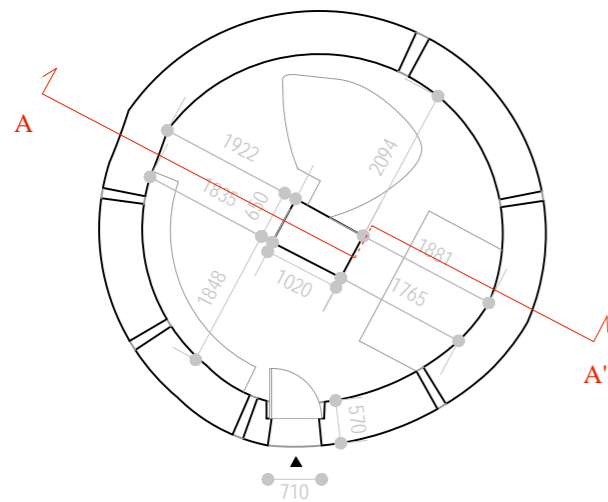
Elevation



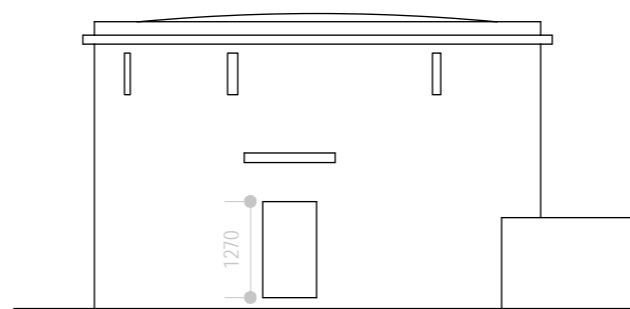
A-A' Section



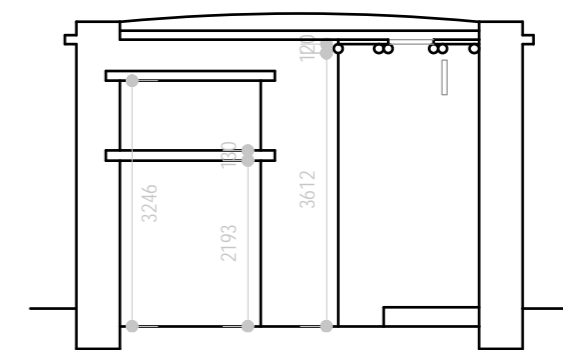
Site Name: A House in Melba^c Village #3	Drawing Title: Plan, Elevation, Section	Survey Year: 2015	Surveyed by: SHIMIZU Nobuhiro, Ekubay Tesfay	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 1 of 1
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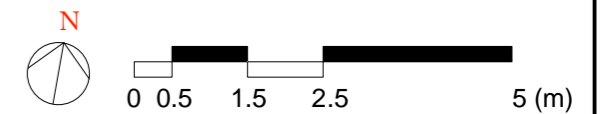
Plan



Elevation



A-A' Section



Site Name: A House in Melba^c Village #4	Drawing Title: Plan, Elevation, Section	Survey Year: 2015	Surveyed by: SHIMIZU Nobuhiro, Ekubay Tesfay	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 1 of 1
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[1] External Appearance (from the South), photo by Mano, Y., 2011



[2] Thatched Ceiling, photo by Mano, Y., 2011



[1] External Appearance (from the West), photo by Mano, Y., 2011



[2] External Appearance (from the Southeast), photo by Mano, Y., 2011



[3] Detail of an Opening, photo by Mano, Y., 2011



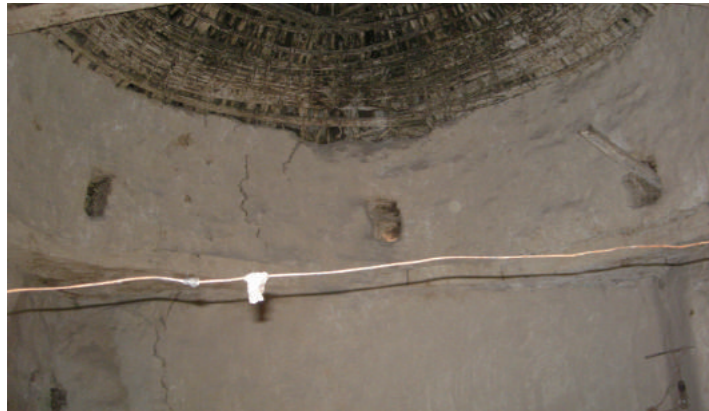
[4] Detail of a Corner, photo by Mano, Y., 2011



[3] A Pillar and Hidmo Ceiling, photo by Mano, Y., 2011



[4] Basement of a Pillar, photo by Mano, Y., 2011



[5] A Wall, photo by Shimizu, N., 2011



[6] Attached Furniture, photo by Shimizu, N., 2011



[7] Entrance, photo by Shimizu, N., 2011



[8] Internal Appearance, photo by Shimizu, N., 2011



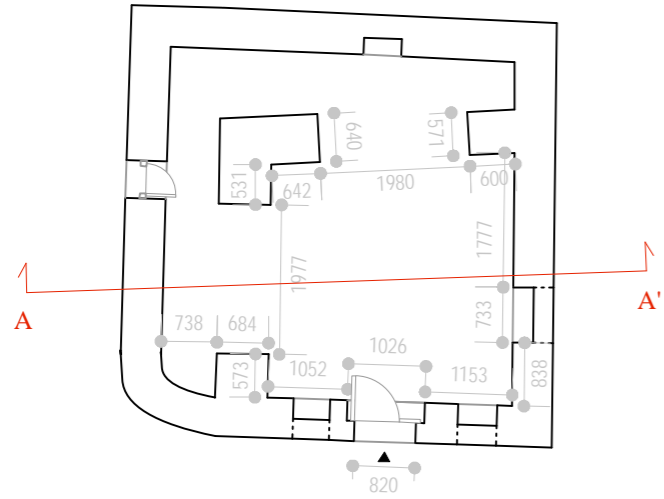
[5] Internal Appearance, photo by Mano, Y., 2011



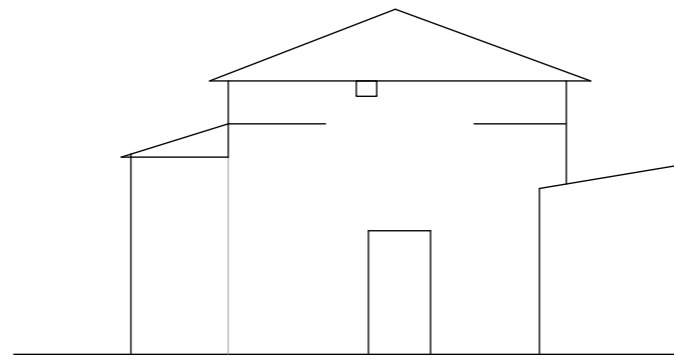
[6] Internal Appearance, photo by Mano, Y., 2011

Site Name: A House in Ch'eleqot	Title: Pictures	Introduction of the Site: The targeted house is located next to Sillasé Ch'eleqot, a circular built church dating from 1810 that was consecrated by Ras Welde Sillasé (Plant 1985). According to the informant, the targeted house was erected in almost the same time with the church.
	Survey Year: 2011	

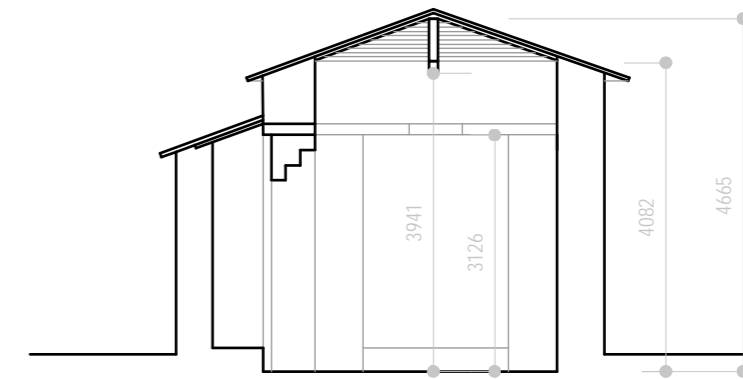
Site Name: A House in Ant'alo	Title: Pictures	Introduction of the Site: The targeted house was erected in the childhood of the house owner (1953-), namely c. 1960s.
	Survey Year: 2011	



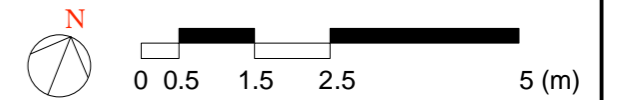
Plan



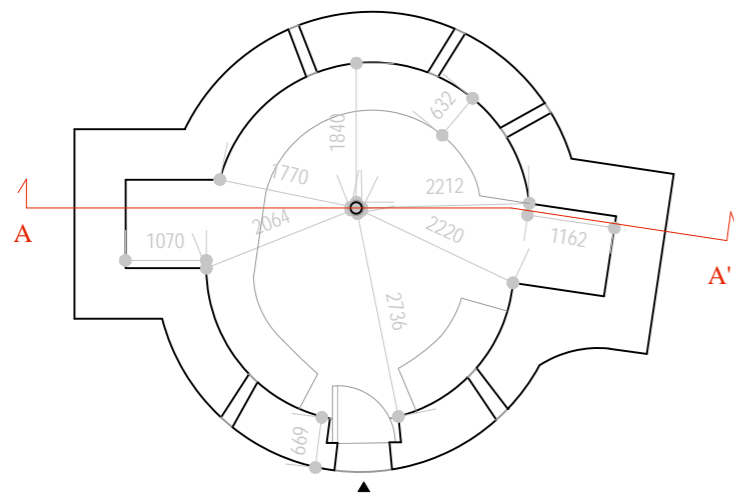
Elevation



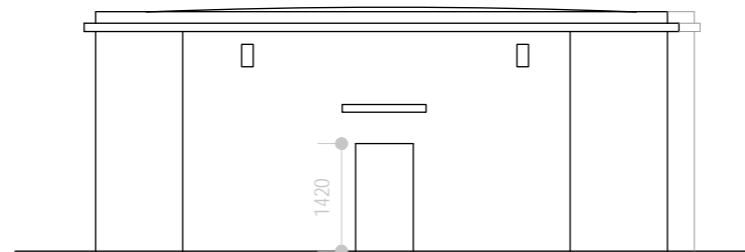
A-A' Section



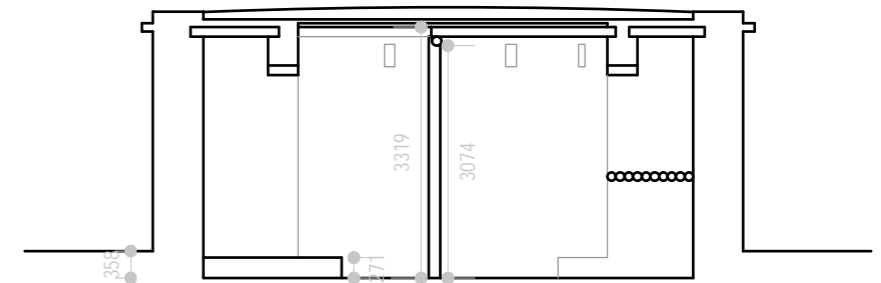
Site Name: A House in Ch'eleqot	Drawing Title: Plan, Elevation, Section	Survey Year: 2011	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 1 of 1
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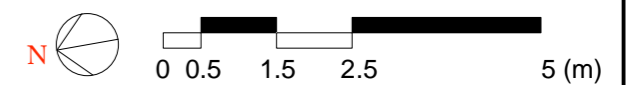
Plan



Elevation



A-A' Section



Site Name: A House in Ant'alo	Drawing Title: Plan, Elevation, Section	Survey Year: 2011	Surveyed by: SHIMIZU Nobuhiro, MANO Yohei, Tewodros Nega	Drawn by: SHIMIZU Nobuhiro	Scale: 1 : 100 (A3)	Sheet Number: 1 of 1
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Appendix II

Results of Interview Research with Local Builders

1. About Informants

	#1 (AS1)	#2 (AS2)	#3 (AA2)	#4 (ME1)	#5 (RO1)	#6 (OU1)	#7 (DE1)	#8 (DE2)	#9 (DA1)	#10 (OU2)	ME2	AS3	AA1
Personal Information													
Year of birth	1931	1954	u/k	1949	1947	1964	1944	1938	1939	1943	1975	1964	1933
Sex	M	M	M	M	M	M	M	M	M	M	M	M	M
Ethnic	Tigray	Tigray	Tigray	Tigray	Tigray	Tigray	Tigray	Tigray	Tigray	Tigray	Tigray	Tigray	Tigray
Religion	Orthodox	Orthodox	Orthodox	Orthodox	Orthodox	Orthodox	Orthodox	Orthodox	Orthodox	Orthodox	Orthodox	Orthodox	Orthodox
Occupation													
Nedaqi*	1951-	1960-	1974-	1974-	1976- When he was teenager, he was daily nedaqi worker.	1986-	1976-	Before 1971-	1976-	1963- He retired 5 years ago.	2004-	1974-	1963-
Hanatsi	-	o	o	o	-	x *Roof work was carried out by nedaqi, too.	x	x	x	x	o	o	o
Felenamo	x	x	x	o	-	x	x	x	x	x	o	x	x
Other occupation	Priest	Contractor	-	Local governor, Leader of <i>tabia</i> , TPLF soldier	Priest (since he was teenager)	Priest (After 8 years of becoming nedaqi, he became a priest (<i>keshi</i>), too.	-	-	-	Farmer * Because he is rural resident.	Priest	-	Priest
Notes					His 3 <i>may-bét</i> house was built 40 years ago. Since then, he has been nedaqi.	To get more income, he became nedaqi.	To get more income. He has church construction experiences. Furthermore, he participated the Hawelti project 22 years ago. At that time, his salary was 25 birr / day. * His house was built 48 years ago. It was built by another nedaqi (6 birr/day). He has possessed his own <i>imni</i> and <i>iskarbélo</i> from 20 years ago.	He possesses a certificate of Debri's school construction because he participated the project.	Main his working site is his village named Dabesharama. He started his career as nedaqi in here, too. He made a map installed in Mekelle University, which was made from stone material.	He did not have a father, and his mother was dead when he was 5 years old, too. Therefore, he needed to get income. That is the reason why he became nedaqi. In 1965 E.C., he participated the water pipe project at Shuhat (30km east of <i>Kwiha</i>). Someone who came from Mekelle chose him. That is, he had an adequate skills. His house was erected 38 years ago.	*He is young, but he learnt local building techniques and knowledge through the observation and hearing from the elders who has been dead. Interview results are aggregated in ME1 because interview was carried out together and ME2 only agreed the answers of ME1.		

2. Terminology (1/2)

	#1 (AS1)	#2 (AS2)	#3 (AA2)	#4 (ME1)	#5 (RO1)	#6 (QU1)	#7 (DE1)	#8 (DE2)	#9 (DA1)	#10 (QU2)	AS3	AA1
Name of building elements (Fig.3-17: plan)											*1 Transliteration should be reconfirmed again	
a-1. Wall	mendeq	mendeq	mendeq	mendeq	mendeq	mendeq	mendeq	mendeq	mendeq	mendeq	-	-
a-2. Masonry wall separating space-(a) from space-(b)	filatsa	filatsa	filatsa	filatsa / endifti	filatsa medeb	filatsa	hawerti * sometimes called "filatsa"	filatsa	filatsa	filatsa	-	-
a-3. Masonry to support the upper floor	hawerti nay debri	hawerti nay debri	degahfi *1	hawerti nay debri * hawerti = monument, nay=for	filatsa guaro	(mendeq)	hawerti	hawerti	filatsa nay debri	filatsa	-	-
a-4. Timber pillar	'amdi * A temporary pillar is called "bala" *1	'amdi	'amdi	'amdi * A timber pillar	'amdi * A bifolke pillar is called "bala", and it does not preferred for hidmo. It is used as a temporary pillar for a tent.	'amdi * A bifolke pillar is also called "amdi"	'amdi (both timber and stone ones)	'amdi * A bifolke pillar is sometimes called "bala 'amdi"	'amdi * A bifolke pillar is called "bala". In case of seqela house, it is called "wallem."	'amdi * A bifolke pillar is called "waltam 'amdi"	-	-
Name of building elements (Fig.3-17: elevation)											*1 Transliteration should be reconfirmed again	
a-5. House entrance	dege'af * House entrance is called "dege'af", while parcel entrance is called "beri"	dege'af * House entrance is called "dege'af", while parcel entrance is called "beri"	-	dege'af (afdege adf) * This word is used only for a house building. * Beri means a parcel door.	afdege / dege'af	derkhoyt *1	dege'af	dege'af	afdege (dege'af) hidmo	dege'af / afdege	-	dege'af
a-5. Door installed in the building	ma'itso	ma'itso	ma'itso	ma'itso * This word is only use for the house door	ma'itso	ma'itso	ma'itso	ma'itso	ma'itso (mezgiya *1)	ma'itso	-	ma'itso
a-5. Lintel	metsqeti dege'af (metsqeti=span, dege'af=entrance)	medefea geza *1 (medefea=wrapping, geza=house)	-	metsqeti dege'af	afdege tedefayt (tedefayt=opposite position)	tedefayt	don't know	tedefia *1	metsqeti afdege	derkhoyt (usually of wood)	-	-
a-5. Stone or timber placed below a door	medrek / derkhoyt *1	derkhoyt (working as stopper, both case of wood and stone) *1 * "medrek" is Amharic word	-	medrek *1 * A long stone is used	medrek / derkhoyt / teregatsit *1	derkhoyt *1	dege'af imni medrek geza (medrek= stage, geza=house) *1	medrek *1	medrek afdege *1	derkhoyt *1 (usually of wood)	-	-
a-5. Timbers placed in the both sides of an opening	zendo *1	angolo (=corner) *1	-	zendo *1	zendo *1	kewami (=standing) *1 He does not know the word "zendo"	In case of stone, it is called "filatsa"	kewami *1	medrekat nay afdege *1	derkhoyt *1 (usually of wood)	-	-
a-5. Hinge applied in opening	-	zendo *1	-	derkhoyt *1	heheita *1	don't know	zendo *1	zendo *1	don't know	don't know	-	-
a-6 Eave made by stones over the door	ch'ihmi (=mustasche; when grass is grown) thaf-thaf (when it is without grass)	ch'ihmi (=mustasche; when grass is grown) thaf-thaf (when it is without grass)	ch'ihmi (=mustasche; when grass is grown) thaf-thaf (when it is without grass)	ch'ihmi (masonry eave with grass) * church has longer eave	ch'ihmi (this word is applied even in case without grass)	ch'ihmi	ch'ihmi	zabeba	ch'ihmi	ch'ihmi	-	-
a-7. Thinner window (lintel is stone)	meshkot (around 10x50cm (WxH))	meshkot	meshkot	meshkot (1 sidri x 1 imet)	meshkot	meshkot	meshkot	meshkot	meshkot	meshkot	-	-
a-8. Larger window (lintel is timber)	meshkot birhan (around 50x60cm (WxH)) -- *The purpose of meshkot birhan is to secure the house from outside (there were many bandits in the past) and to ventilate for the fresh air	meshkot birhan	meshkot birhan (birhan means "light")	meshkot birhan (1x1 imet)	meshkot birhan	meshkot birhan *This is installed only in the gorgeous houses.	meshkot birhan	meshkot birhan	meshkot birhan	-	-	-
a-9. Holes to set up a scaffold	bukko * Applied in both houses and churches	bukko * Applied in both houses and churches	bukko	bukko * Bukko is usually applied only in church construction. Ladder is applied for house construction	bukko	bukko	bukko	bukko	bukko	bukko	-	-
a-10. Stringcourse	zabeba qatsela: thinner shaped stone. zabeba: stringcourse, which is made from <wood and grass> or <stone>	qatsela: traditionall word zabeba	zabeba	qatsela * "Zabeba" usually means stringcourse made by wood and grass. In case of stone stringcourse, the word of "qatsela" is usually applied. "Zabeb mebbeti" means the process of water flow through zabeba	qatsela *Name of sliced stone used for stringcourse	zabeba (name of the element) *Qatsela is name of the stone type. * When qatsela is not used for stringcourse, it is called "gonbel" *1	qatsela	qatsela * Each stone name is "qatsela." * The word of "zabeba" is applied when it is thatched roof structure.	qatsela	zabeba * "Qatsela" is name of the stone type.	-	-
b-4. Roof of hidmo	tahadim (muhdam)	sa'iri * Hidmo's one is "nay hidmo sa'iri" and church's one is "nay beta christian sa'iri"	sa'iri	ziban hidmo * ziban: upper part. * sa'iri: grass, not the grass roof	ziban hidmo * "tahadim" means finishing	ziban hidmo	ziban hidmo	ziban hidmo	ziban hidmo	hidmo	-	-
Notes									*Seni (=teeth) is a protruded stone to engage adjoining building (recent knowledge).	don't know	-	-

2. Terminology (2/2)

Name of building elements (Fig.3-17: ceiling plan)												
b-1. Timber beam	gadim / rogud medegefi *When two timbers are used for beam, it is called "gadim"; When it is single, it is called rogud medegefi	gadim / rogud medegefi	rogud medegefi	gadim	gadim	gadim	gadim / 'amdi	gadim	gadim	gadim	-	-
b-2. Upper beam	serayt	serayt	serayt	serayt	serayt * It means a "timber material," too	serayt * It does not mean "timber material"	serayt	serayt	serayt	serayt	-	-
b-3. Timber planks for ceiling	mihuts (hankeshtay)	mihuts (hankeshtay)	mihuts	mihuts	mihuts (hankeshtay)	mihuts (Each timber material is called so, too)	mihuts	mihuts	mihuts	mihuts	-	mihuts
Patterns of timber ceiling (Fig.3-17: ceiling plan)												
*1 Transliteration should be reconfirmed again												
c-1. V-shaped arrangement	hankeshtay qirtsi	hankeshtay qirtsi	don't know	hankeshtay qirtsi	hankeshtay qirtsi	hankeshtay qirtsi thaf-thaf (arranging turn by turn)	mihuts	mihuts	hankeshtay mihuts	hankeshtay qirtsi	hankeshtay qirtsi	-
c-2. Cross-shaped arrangement	qirtsi mesqel (mesqel qirtsi)	mesqel qirtsi	mesqel qirtsi	qirtsi mesqel	mesqel qirtsi In Temben area, it is called "tsahil" *1	mesqel qirtsi	mesqel qirtsi	mesqel qirtsi	mesqel mihuts	mesqel qirtsi	mesqel qirtsi	mesqel qirtsi
c-3. Parallel arrangement	don't know * If material shambaqo is used for this arrangement (usually tid is used), it is called "shambaqo"	don't know * If material shambaqo is used for this arrangement (usually tid is used), it is called "shambaqo"	don't know	tara mihuts * Tara means normal. If shambaqo is used, called shambaqo	don't know	don't know	no name	don't know	tara mihuts * "tara" = normal	don't know	-	don't know
Building elements for church buildings												
*1 Transliteration should be reconfirmed again												
Pilaster	-	arkan *1	cornish (ornamental purpose) *1	arkan *1	hawerti	filatsa	don't know	hawerti * For structural strength.	hawerti	kertsi *1 (meaning "form")	-	-
Upper floor of qiddist	-	-	-	gorerate *1	don't know	aramasko *1	don't know	-	-	-	-	-
Notes	"Cornish" means the candle place in the church that follows around the meqdes. "Arkan" means the stairs inside the church	-	-	-	"Zabeba" means the end of seqela roof.	* Ornamental elements on the top of roof is called "gorerate"	-	-	-	-	-	-

3. Planning

	#1 (AS1)	#2 (AS2)	#3 (AA2)	#4 (ME1)	#5 (RO1)	#6 (OU1)	#7 (DE1)	#8 (DE2)	#9 (DA1)	#10 (OU2)	AS3	AA1	
Name of each spatial component of <i>hidmo</i> (Fig.3-7)												*1. Transliteration should be reconfirmed again	
Space-(a)	midri bét -- living dining + reception	midri bét -- living dining + reception	midri bét -- living dining + reception	midri bét -- living dining + reception	midri bét	midri bét	midri bét	midri bét	midri bét	midri bét -- living dining + reception	-	midri bét -- living dining + sleeping	
Space-(b)	medeb-li'ilo (guada *1) -- bed room	midri bét -- midri bét = space (a)+ space (b), sleeping purpose	medeb-li'ilo -- sleeping purpose	guada -- space with medeb or medeb-li'ilo for sleeping purpose * Center: husband and wife; Right: children; Left: Guests	midri bét medeb (If medeb is installed)	medeb-li'ilo / medeb -- sleeping purpose *If there is medeb-li'ilo, it is called medeb-li'ilo. *If there is medeb, it is called medeb.	medeb -- because medeb is set in here.	medeb -- because medeb is set	may-bét na medeb (medeb-li'ilo) -- sleeping purpose *If there is medeb-li'ilo, it is called may-bét na medeb-li'ilo. *If there is medeb, it is called may-bét na medeb.	medeb -- because medeb is installed in here for sleeping purpose	-	medeb-li'ilo -- storage for dish and other necessities	
Ground floor of space-(c): without a backside space	wushto-bét / (guada) -- storage of rare goods, sleeping purpose	guaro-bét / wushto-bét --	wushto-bét -- to keep rare goods (honey, milk etc.)	wushto-bét -- storage of rare goods (honey, milk etc.)		don't know	don't know	don't know	-		-		
Ground floor of space-(c): with a backside space	guaro-bét -- place of cattle; after Haile Selassie period, it has been kept in the courtyard	place of cattle, horse, mules and rare goods such as honey and milk "guaro-bét" means backyard as a nuance.	guaro-bét -- to keep horse, mules and so on	guaro-bét -- to keep horse, mules and so on; only cattle are always in the courtyard (past & now)	guaro-bét / midri-bét-guaro -- used as a kitchen	guaro-bét	guaro-bét -- shelter for mule, donkey and horse.	guaro-bét * further block from the door is called wushto bét -- shelter for mule and donkey *a place to keep crops is called wushto-bét. In this case, "godo" (big pot approximately 1.5x2m) is installed.	guaro-bét (wushto-bét)	guaro-bét -- shelter for mule, horse and donkey	-	guaro-bét -- to keep horse	
Upper floor of space-(c)	debri -- storage of crops	debri -- storage of crops	debri -- to keep crops (teff, sorgham etc.)	debri -- to keep crops: Goreta (crop box) is set	debri	debri -- to keep crops	debri	debri -- to keep crops	debri -- to keep crops	debri -- to keep crops	-	debri -- to keep crops	
Furniture												*1. Transliteration should be reconfirmed again	
1. A stone platform covered by soil for sleeping bed	medeb * small one is "nishte medeb"	medeb	medeb	medeb * "god medeb" is the small medeb for one person	medeb made by stone and gravel, and covered by ch'iqqa.	medeb	medeb		medeb	medeb -- made by stone and gravel, and covered by chikka.	-		
2. A stone platform covered by soil for sitting purpose	megemet'i (Tigrinya) dereja (Amharic)	megemet'i (Tigrinya) dereja (Amharic)	megemet'i (Tigrinya) dereja (Amharic)	megemet'i (Tigrinya) dereja (Amharic)	meqemet'i / dereja	megemet'i / dereja * both are Tigrinya word	gual medeb (gual: daughter) *meqemet'i and dereja are the ones set in the outside.		meqemet'i / dereja	meqemet'i / dereja -- how to make is same with medeb	-		
3. Built-in shelf	ch'igwat (khabi)	ch'igwat	ch'igwat	ch'igwat	ch'igwat (khabi)	ch'igwat	ch'igwat	ch'igwat	chuhet (khabi)	ch'igwat (khabi)	-		
4. Built shelf, enabling to sleep above this	medeb-li'ilo	-	-	medeb-li'ilo	medeb-li'ilo	medeb-li'ilo	medeb-li'ilo	medeb-li'ilo	medeb-li'ilo	medeb-li'ilo	-		
5. Rows of logs for the storage of ploughing and other equipments	goro-'arat	goro-'arat	-	goro-'arat	goro-'arat	-	goro-'arat	goro-'arat	goro-'arat	goro-'arat	-		
6. Stairs	medeyayb	-	-	medeyayb	medeyayb	medeyayb	medeyayb (by stone) * When it is installed outside, it is called so, too.	medeyayb	medeyayb	medeyayb	-		
7. Ladder	mesalil	-	-	-	mesalil	mesalil	mesalil	mesalil	mesalil	mesalil	-		
8. Storage of grain set in debri	-	-	-	-	-	-	-	maeken	-	-	-		
9. Horn hung in the wall	-	-	-	-	-	-	-	kerni *1	-	kerni *1 * This is to hang dishes, not to hang clothes.	-		
Typical plan													
Length of width (by interview)	-	-	-	-	-	2 may-bét (without wall) 3,4 may-bét: (without wall)	-	In 3 may-bét case, usually +1m from 2 may-bét case.	valuable, depending on the economical situation.	Between 2, 3 and 4 may-bét case, the length is the same. His house case is standard size.	-		
Length of height (by interview)	3m+ (in any may-bét case)	3.5m (in any may-bét case)	-	6 imet, approximately 3m (in any may-bét case)	-	not fixed, depending on economical situation	-	not fixed.			-		
Measurement result of the building situated in the informant's parcel	His own house (3 may-bét) width: 417 (inside house) height: 402 (ground-mihuts) midri bét: 225 guaro bét: 238 medeb: 195				His own house (built in 40 years ago by himself, 3 may-bét) width: 370 (inside house) height: 400 (ground-mihuts); 390 (ground-serayt) midri bét: 230 medeb: 160 (+filatsa:60)	2 maibeyt house width: 370 (inside house) height: 350 midri bét: 280 guaro bét: 200	His own house (3 may-bét) width: 420 (inside house) height: 400 (ground-mihuts) midri bét: 230 guaro bét: 200 medeb: 190	His own house (built by himself, 2 may-bét) width: 357 (inside house) height: 360 (ground-mihuts) midri bét: 305 guaro bét: 184	His own house (built in 29 years ago, 2 may-bét) width: 435 height: 400 (ground-mihuts) 390 (ground-serayt) midri bét: 266 guaro bét: 266	His own house (3 may-bét) width: 455 height: 352 (ground-mihuts) 342 (ground-serayt) midri bét: 253 medeb: 152 (+filatsa: 55) guaro bét: 278	-		

4. Anthropometric Unit

	#1 (AS1)	#2 (AS2)	#3 (AA2)	#4 (ME1)	#5 (RO1)	#6 (QU1)	#7 (DE1)	#8 (DE2)	#9 (DA1)	#10 (OU2)	AS3	AA1
Imet / Kurona'												
Length between fingertip and elbow (approximately 50cm)	imet	kurona' / imet	imet / kurona'	kurona' / imet	imet / kurona'	imet / kurona'	imet	imet / kurona'	imet / kurona'	imet	imet	-
Measuring the building and material length by the unit of imet	o	o	Δ * not important unit	o	used for suitable part	-	often used	often used	-	often used	-	-
Measuring string length to mark the building corner before the construction	o	o	-	x	-	-	-	-	-	-	-	-
Notes								During Derg period, metric unit became dominant. In his early career time, imet was used dominantly.	This is from old time. Metric system was from Italian period.	When measuring a rope for onsite measurement		
May-bét												
May-bét's definition	Approximately 2m.	4 imet, or 2m	One span	Number of spans between stone partitions	One span, approximately 5 imet.	Number of rooms	Number of classes	Number of classes	Number of classes	Number of classes	o	-
Notes	He mentioned: "Size of may-bét is not always consistent. Sometimes it is varied. Usually, the length is two meter for one may-bét. But depending on client's interest, the length of may-bét can exceed two meters, when he wants to make it larger size. Generally, size of the house would be eight meters long."											
Describing the capacity of building by the unit of may-bét	o	o	o	o	o	-	o	o	o	o	o	-
Sudaro												
Length of one step (approximately 1m)	sudaro	sudaro Sometimes used during construction	sudaro	sudaro	sudaro	sudaro	sudaro	x	sudaro	sudaro	-	-
Measuring the building by the unit of sudaro	-	-	o	o for rough measurement	-	-	often used	-	rarely used	rarely used	-	-
Rough measurement of larger site	Δ	-	-	-	-	-	-	-	-	-	-	-
Other Units *1 Transliteration should be reconfirmed again												
Length between thumb and middle finger when spread widely (approximately 25cm)	sidri	-	-	sidri * use to combine with kurunah	sidri	sidri	sidri	sidri * often used	sidri	sidri * to check stone size	-	-
Length of one feet (approximately 30cm)	igri	channa (= shoes)	-	igri	igri 3 igri = 1 afdege	x	x	igri * Used to measure the width of opening, 3 igri.	-	-	-	-
Stick to measure fixed length	zengi 3m/2m/1m	zengi 1.5m/2m plant name: rewaye *1	-	zengi 2m	zengi 1.5m/2m/1m	x	zengi 3 imet He haven't seen.	x	-	don't know	-	-
Notes				The way to measure is: x-zengi, y-imet, z-sidri					imet + sidri			

5. Building Details (1/3)

	#1 (AS1)	#2 (AS2)	#3 (AA2)	#4 (ME1)	#5 (RO1)	#6 (OU1)	#7 (DE1)	#8 (DE2)	#9 (DA1)	#10 (OU2)	AS3	AA1
Foundation depth												
Church	200cm	100cm	-	150cm	Romanat church: 220cm If the ground is firm, 100cm is okay.	200cm	100cm	200cm width is 100cm	50-200cm	200cm	-	-
House	20cm	50cm	-	80cm - 100cm	firm ground: 30cm. Soft ground: 150cm	70cm	50cm	60-100cm width is 70cm	100cm	100cm * in case that ground is not strong.	60cm	-
Notes	-	-	-	Depending on ground. If ground is rocky, foundation is not dug.	Depending on the ground condition.	-	-	Depending on the ground condition.	Depending on the ground condition.	Depending on the ground condition.	-	-
How to make foundation	-	-	-	Bigger stones are roughly arranged	Bigger stones are arranged under the wall part.	Rough and big stones are used.	Large stones are used.	Large stones are used.	Large stones are used.	Large stones are used. Any type stone is okay.	-	-
Wall thickness												
Church	don't answer	70cm (- 50cm in upper part)	lower part: 70cm upper part: 50cm	70cm	70cm	70cm	60cm	70cm	60cm	lower part: 100cm upper part: 60-70cm	-	-
House	don't answer	50cm	-	60cm	60cm	60cm	60cm	60cm	50cm	lower part: 60cm upper part: 50cm	60cm	-
Notes	In case of church construction, upper part is thinner than lower part (In case of house, no)	In case of church construction, upper part is thinner than lower part (In case of house, no)	In case of church construction, upper part is thinner than lower part	-	Thickness of walls in the house were thicker in 50-60 years ago.	Thickness between upper and lower part is not different.	In the past, a wall was thicker and stronger.	-	Thickness between upper and lower part is not different.	Upper part is thinner than lower part.	-	-
Joint												
Preferable soil for joint	small powder is good	red soil (any soil is okay)	-	red soil	red soil	red soil	ash (<i>hamekushti</i>)	red soil / white soil * except clay soil, any type is okay.	house: ash church: red soil / white soil	red soil (from surroundings)	-	-
Joint material except soil	best: <i>hasir taf</i> / second best: <i>hasir ikli</i> (not <i>taf</i> such as wheat (<i>sunda</i>), <i>solgum</i> (<i>sugam</i>) and <i>shumbra</i> third: dry grass + hay (<i>durkua</i>) * <i>hasir</i> = straw	from soil, water and <i>hasser taf</i> * <i>Hasir taf</i> strengthens to hold stones. * Sometimes other crop's remnants replace <i>hasir taf</i> or it is not used.	from soil, water and <i>hasir taf</i> (grass extracted from the one-month dried teff) - * <i>hasir taf</i> is a traditional material to strengthen the wall structure	<i>hasir ikli</i> (stem of the crop: only powder part is used)	<i>hasir taf</i> : for church building <i>hasir ikli</i> : for house building	only red soil and water	gravel and water	<i>hasir taf</i> is better, but any <i>bahri</i> (such as wheat) is okay.	water	water (no <i>hasir</i> and dung. In Amhara, mix with <i>hasir</i> because soil is clay)	-	-
How to make joint material	1. selecting and collecting soils 2. mixing with water 3. adding crop's grass and mixing 4. keeping 5-7 days is good.	1. making mud by soil and water 2. mixing with <i>hasir taf</i> (or other crop's <i>hasir</i>)	-	1. selecting and collecting soils 2. mixing with water 3. adding crop's grass and mixing 4. keeping one day (when busy) - three days	mixing joint materials and keeping 3-4 days. If busy, within 1-day is also okay.	mixing immediately and used.	mixing ash and water.	1. stepping and mixing <i>ch'iqqa</i> , water and <i>hasir</i> 2. keeping 7-days.	mixing immediately and used.	mixing immediately and use.	mixing mud with <i>hasser teff</i> * mixing <i>hasir</i> is by stepping	-
Amount of joint material for wall strength	More joint material was used in the past. Less joint is better for the strength	Traditionally more joint material was used. Traditional way is more strong.	-	Joint material should be used more to hold the stones. More joint material was used in the past	More joint material was used in the past. Past one is more strong. <i>Ch'iqqa</i> should be used more for strength.	More joint material was used in the past, and it was more strong.	More joint material was used in the past.	More <i>ch'iqqa</i> was used in the past, because it was available more. <i>Ch'iqqa</i> has become scarce. The past one was stronger.	More <i>ch'iqqa</i> was used in the past, and it was good for the strength.	More <i>ch'iqqa</i> was used in the past, and it was good for the strength.	More joint material was used in the past. Mud is put on stones and a new stone is fit into the wall	-
Notes	-	-	Cement has replaced traditional joint material in present days	-	-	-	In village context, making a pile of ash of joint material.	-	-	-	Cement has replaced traditional joint material in present days	-
Plaster												
Good soil for plaster	-	<i>nora</i>	-	white soil (called " <i>tsa'ida bereg</i> ": white shining) * color of plaster is depending on this soil color * local soil type and can collect from the ground * <i>nora</i> is not available in this village	<i>chewbaredo</i> *1: plastering material with white color, from the surroundings. Sedimentary soil. After collection, firing, clashing and applying. * <i>nora</i> is the one available in the shop. It is stronger than <i>chewbaredo</i> , but expensive.	white soil from surrounding. * it is not <i>nora</i> , and not <i>chewbaredo</i> , too.	<i>nora</i>	<i>tsa'ida hamed</i>	<i>nora</i> (available in the market, with firing process) / <i>tsa'ida hamed</i> (no firing process)	<i>tsa'ida hamed</i> (from surroundings)	-	-
How to make plaster material	-	1. mixing <i>nora</i> , <i>hasir</i> and water 2. soaking around one week	-	1. selecting and collecting soils 2. mixing with water 3. adding <i>hasir taf</i> and mixing 4. keeping seven days	1. mix water and <i>chewbaredo</i> 2. used in the same day. * in case of <i>nora</i> , keeping 3-4 days.	mixing white soil and water.	mixing <i>nora</i> and water.	mixing <i>tsa'ida hamed</i> and water immediately.	in case of <i>nora</i> : mixing with water and keep for a few days. In case of <i>tsa'ida hamed</i> : mixing with water and immediately use.	1. mixing water and <i>tsa'ida hamed</i> 2. stirring in the 1st and last day. 3. keeping 4-5 days.	-	-
Plaster foundation	-	-	-	usually 3cm (if wall is flatten, 5cm)	-	roughly covering stones by the foundation materials of <i>ch'iqqa</i> and <i>hasir</i> .	plaster's foundation is made from <i>tsa'ida hamed</i> and water.	1. plaster's foundation is made from red soil, water and <i>hasir</i> . 2. step and mix once in two days 3. keep 3-days.	1. mixing soil (red/white), water and <i>hasir</i> . 2. stirring once a day. 3. keeping 1-2 day(s)	-	-	-
Notes	-	-	-	In church construction, outside is also plastered	-	waiting 1-week between foundation and plaster work.	waiting 4-6 days between foundation and plaster work.	-	-	-	-	-

5. Building Details (2/3)

Intention for masonry construction in traditional time (©always conscious; ○ often/frequently conscious; △ sometimes conscious; ×no conscious)											
Joint doesn't run straight vertically	©	©	©	©	©	©	©	-	-	-	-
Stone are arranged in the straight horizontally (stones' height is arranged in the same length)	© by eyes	○ by eyes / shaping stones in suitable size	© shaping stones in suitable size	© by eyes	© with string	© in his career start, by eyes. Recently <i>wihilik</i> is used.	© by <i>gemed</i> and stone. And by eyes.	in case that stone size is different, another suitable stone is added.	From Italian period, <i>gemed</i> started to be used. When stone size is different, another suitable sized stone is added.	When stone size is different, <i>ch'iqqqa</i> is added.	-
Stone size is arranged in the same length	-	©	△	×	-	-	-	-	-	-	-
When the circular building is constructed, stones are also shaped in circular	©	©	©	©	©	©	©	© from the past	©	©	-
Preferred Stone											
Preferred or popular size of each stone piece	<i>imni aserite-hamushite</i> (15cm in height) * The biggest stone's width is approximately 50cm	<i>imni aserite</i> (10cm), <i>asserte hamshite</i> (15cm), <i>'isira</i> (20cm)	<i>imni aserite hamshite</i> (15cm) and <i>'isira</i> (20cm) are now available and usual because of masonry tools.	approximately 10-25cm stone	10cm / 15cm / 20cm	20cm	10-15cm. 20cm is big.	15cm is the best. 2nd best is 20cm.	18-20cm is the best. 25cm is big. 30cm is very big.	15-20cm.	-
Inner wall stone is shorter than outer stones	Yes, traditionally (inner wall stones can be half thickness of outer wall)	Yes	Yes	Yes	Yes. *for the purpose of beauty. Poor material is inside.	Yes.	No. Stone size is same.	Yes. Level is arranged in the same height to put several stones.	Yes.	Yes.	Yes * for the purpose of beauty
Traditionally, the space between outer and inner wall is:	Always interlocked * present builders don't care it.	Always interlocked * present builders don't care it.	Always interlocked	Always interlocked	Always interlocked	Always interlocked	Always interlocked.	Always interlocked.	Always interlocked. Recent one is just only putting gravel and <i>ch'iqqqa</i> . This is bad.	Always or halfly interlocked. From Derg time, it started to be un-interlocked, due to the economy. Use of cement is also one of the reasons.	-
Large sized stones are	Used in change	-	-	Used in change	Used in change, in the same layer.	-	Used in change.	-	-	-	-
How to arrange big stones	Layer consisting of large stones is arranged in good order	Large stone is put in the lower part	-	Large stone is put in the lower part * Up to 1.5m, approximately 20-25cm stone, and higher part become gradually smaller such as 10cm stone.	Large stone is put in the lower part. The biggest one is no more 1.5-m height.	25cm stone is arranged in no more than 1m. Higher part is 20cm stone. Traditionally, the size was random. Then, it was difficult to arrange stones in the same size.	Bigger ones are for foundation. Next 1-1.5m, remaining bigger ones are used. Same sized stones are used in the same layer.	Above 2m height, large stones are not good.	Large stones are put only below 1.5m height.	Large stones are arranged in the lower part, next foundation. The same sized stones are put in the same layer.	-
Corner stones	-	-	-	-	Corner stone is special type with flat and rectangular. Interlocking the stones is more important than size. String is used to make rightangle.	Suitable stones are kept for the corner part. Stone is arranged alternately. This is from the past.	Interlocking alternately. Suitable stones are kept for the corner part.	Corner stones are shaped carefully. In the past, black stones were used for the corner. Suitable stones are kept for the corner part.	Suitable stones are kept for the corner part. Recently, <i>squadro</i> is used.	Stones are shaped in rightangle, and put alternately. This is traditional way.	-
Past masonry is stronger than present	Yes	Yes	Yes	-	Yes.	Yes. Recently, rest stones after cutting has been used in between stones.	Yes.	Yes.	Italian time was the best.	Yes.	-
Notes on strength of masonry	15cm stone is the best size.	13cm-15cm stone is good. 15cm thickness x 50cm width (<i>imni aserite-hamshite</i>) is the best size. 20cm stone is not good size because usually width/depth is short and difficult to interlock stones. Crack emerges soon.	Small stone is better for strength while big one is better for beauty. The strength is actually depending heavily on the skill of carpentors.	-	Thickness. More <i>ch'iqqqa</i> should be used. Careful construction.	More <i>ch'iqqqa</i> should be used. Careful construction, this is related to the budget of the owner.	Thickness. Interlocked arrangement is good.	As above mentioned.	-	More <i>ch'iqqqa</i> should be used.	Stone called <i>Sini Kilibi</i> (dog's teeth) is good. Though this is small and thin, it is easy to interlock stones. Therefore, it is strong though appearance is not good. Big stone is better for strength, beauty and construction period.
Suitable stone was easier to find in the past	Yes	Yes	Stone was collected from ground in the past. Nowadays big stone became available due to masonry tools.	-	Yes. It was found when ground was dug. And it was also available more on the surface of ground.	Yes. It was available both in surface and underground. There was no custom to split a rock into stones.	No. Recent one is better, because good stones are available due to <i>malakino</i> .	Yes. The best stone became available due to <i>malakino</i> .	Yes. Before Italian period, it was easily found, because population was small. Around Mika'el Church, there was quarry and <i>qatsela</i> was easily taken out.	Yes. It was common, but recently difficult to find.	No
Stone was smaller or larger in the past	Larger.	Larger.	Smaller; because equipment was not available	Stone size was more random before Italian period.	Smaller. Collected ones were directly used.	Smaller.	Smaller.	Smaller.	Smaller.	Smaller.	small
Notes	People sell preferable stone pieces from demolished building	A stone piece with smoothed surface is from Derg period. Though this is good appearance, not strong.	He used whatever stones that the client collected, both big and small. Stones of Italian period were small.	In case of ruler's church construction, stone pieces with different color are used in some part for the decoration.	A timber embedded in the wall is to level. This is a technique mostly of <i>Kwiha</i> .	A timber embedded in the wall is to level for keeping strength.	A timber embedded in the wall is also called <i>gadim</i> .	A timber embedded in the wall is to keep strength.	-	-	When he built church in Ant'alo, small stone was used due to lack of big stones.

5. Building Details (3/3)

Roofing												
Roof materials and its thickness (hidmo house) *from top to ceiling	4. nora + hamekushti (ash): 5cm 3. ch'iqqa (mud) + hasir: 10cm 2. ch'inch'a (gravel): covering mihuts 1. mihuts	3. nora + hasir (+ hamekushti): approximately 10cm 2. gravel: separating mihuts and upper material to avoid chemical reaction 1. mihuts	white soil	4. hamekushti (ash): covering ch'iqqa (instead of nora*) 3. ch'iqqa (mud): first: 5cm, second: 3cm, third: 2cm -> amount: 10cm, central part is approximately 15cm 2. kuret (gravel): covering all over mihuts 1. mihuts	5. nora 4. qatsela (stringcourse) is the last after the roofing. 3. ch'iqqa (50cm) 2. gravel: covering whole part with 1-layer. 1. mihuts	5. tsa'ida hamed'i (white soil): 15cm 4. qeyih hamed'i (red soil, small powdered): 5cm 3. qatsela 2. ch'inch'a (gravel) 1. mihuts	3. tsa'ida hamed'i (white soil): 20cm 2. ch'inch'a (gravel) 1. mihuts	3. ch'iqqa 2. ch'inch'a (gravel) 1. mihuts	3. ch'iqqa: 20-30cm 2. ch'inch'a (gravel) 1. mihuts	3. ch'iqqa: 20-30cm 2. gravel 1. mihuts		
Height of central part is higher	Yes.	Yes.	-	Yes.	Mihuts is not parallel. Central part is higher (approximately one stone height is different)	Yes (edge part: 10cm which correspond with height of qatsela, central part: 20cm)	Yes.	Yes. 10-20cm differs. Gravel is put more in the center.	-	Yes.		
Roof materials and its thickness (church) *from top to ceiling	Same with house.	4. nora: 10cm 3. hamekushti (ash): to avoid leak and crack 2. gravel 1. mihuts	-	Same with house.	70cm. Material is same.	Similar.	Same.	Same.	Ch'iqqa is 30cm thickness.	Same.		
How to make ch'iqqa	Same with joint material.	Ch'iqqa is not used	-	Same with joint material	Every type of soil is possible except clay. Chewbaredo and ash is not good for ch'iqqa. Hasir is not used. If the owner is rich, nora is used. It must be carried by car from the north, because it is not available.	Tsa'ida hamed'i and qeyih hamed'i	Tsa'ida hamed'i.	Tsa'ida hamed'i (sometimes qeyih hamed'i is used). Used directly. He found that white stone around his village is also strong like a cement. Clashed one is used for roof instead of tsa'ida hamed'i. It becomes hard during the rainy season. He called this stone "farqua".	Tsa'ida hamed'i, some hasir and water.	Tsa'ida hamed'i or qeyih hamed'i. Tsa'ida hamed'i is better.		
Soil (how and where to take)	Nora is white-colored soil taken from underground (depth is depending on the place). available around Mekelle	Nora is traditional material for roofing and plaster. White-colored soil taken from underground (not burned)*. Available in Inderta	-	-	From surroundings.	From surroundings.	From surrounding around Mariam Church. Sedimental rock.	From surroundings. In case of church, the material is carried by bag or donkey to nearby building site.	From surroundings.	From surroundings.		
How to make roof-top material	1. Nora and hamekushti mixing with water and step 2. Keeping approximately a week	Mixing with water and keep approximately a week	-	-	Mixing water and soil. Ditto 5-6-times.	Tsa'ida hamed'i: mixing with water and keeping 2-weeks. Scattering over the roof and sprinkling water. After 10-days, again sprinkling. Qeyih hamed'i: mixing with water and keeping 1-week. Making in the ground and carry to on the roof.	Mixing with water and immediately use. The material is finally stucked by wood.	Mixing with water and put and stepped. This ch'iqqa is carried to on the roof with zebedi, enkea or bucket. Hamed'i is shaped by wood or stone.	Mixing the materials. And keep 2-days, but possible to use immediately.	Mixing with water and keep two weeks. It is stirred at the starting and finishing time.		
How to drain water and protect from the leak	Roof-top material and roof shape	Ash and nora	-	Roof-top material and roof shape.	Nora and roof shape.	Tsa'ida hamed'i is strong. 1. luhukti 2. tsa'ida meret 3. bereki *1	Tsa'ida hamed'i is strong. shape of roof.	Tsa'ida hamed'i is strong. If it is compacted more, it is strong more. Shape.	-	Shape and soil quality.		
Community participation for roofing	Yes: Therefore owner must prepare more food and drink.	Yes: Majority of community people participating	-	Yes: Because it needs many participants	Neighbors and relatives. Preparing food and drink.	Every neighbor and relative. Set the day for roofing.	10-people participation, one day work.	3-4 people is enough. If 6-10 people, it can finish in 1-day easily. If it is not finished, several days are used.	15 people participation, one day work. Some invitation (lunch and dinner) is held.	2-3 people participation (relative and neighbors), one day work. Whether invitation is held or not is depending on the owner.		
Notes	-	Lime is another material that is available in Adigrat, Shiket (in Afar) and sometimes Wugro. This is used after burned for only painting (not use for roofing)	-	Nora is not available in the Melba. White soil is better.	-	Nora is only for the plaster.	Tsa'ida hamed'i is similar with nora, but not nora. While nora is acid, Tsa'ida hamed'i is friendly for the hand. Tsa'ida hamed'i is not by firing process. Nora is not available here, only from the market. It is not used in the roof part.	Color of tsa'ida hamed'i is actually gray. Nora is white and only available in the market. Traditionally nora was not used.	-	-		
Maintenance												
Leak and maintenance	No need to maintain, it's strong and rarely leaks. When leaking, nora is put on the roof	No need to maintain, it's strong and rarely leaks. When leaking, nora is put on the roof	When leaking, put white soil again	Covering by ash every year before the rainy season. Maintenance of ch'iqqa is once in several years.	Roof is durable almost 30-years without maintenance. If problem happens, covering it by nora.	-	30-years are durable without maintenance. In case of leaking, covering it by tsa'ida hamed'i.	in his case, 35-years has been possible without leak.	Some years later, leaking starts. In case of that, tsa'ida hamed'i is put.	In case of tsa'ida hamed'i, 20-years is durable. After leaking, hamed'i is put.	When leaking, nora is put on the roof.	When leaking, putting mixture of soil, water and hay
Wall and maintenance	No need.	No need.	-	When wall and qatsela is damaged, maintained by builders.	Plastering every year in mesqel time.	-	-	-	-	-	When wall is partially damaged, building again after reinforcing by woods	-

6. Tools (1/2)

	English Name	#1 (AS1)		#2 (AS2)		#3 (AA2)		#4 (ME1+2)		#5 (RO1)		#6 (OU1)		#7 (DE1)		#8 (DE2)		#9 (DA1)		#10 (QU2)		AS3	AA1
		pre-Italian	(post-)Italian	pre-Italian	(post-)Italian	pre-Italian	(post-)Italian	pre-Italian	(post-)Italian	pre-Italian	(post-)Italian	pre-Italian	(post-)Italian	pre-Italian	(post-)Italian	pre-Italian	(post-)Italian	pre-Italian	(post-)Italian	pre-Italian	(post-)Italian		
At Quarry Site																							
To quarry stones	Iron stick	mahresha - hankashe (originally fighting purpose) - dunksha*1 (triangle tip to take stone)	malakino (Italian)	merke (dunkusha) *1 diverted old mahresha (originally agricultural tool) form is similar with malakino - hankeshe is not to quarry stones	malakino	-	malakino	mahresha * iron tool for agricultural ploughing was used to quarry, too - hankashe * richer people used this tool	malakino	mahresha * iron tool for agricultural ploughing. Old one is used to quarry. - hankashe * iron tool for hunting. Old one is used to quarry.	malakino (Italian-)	no tool to split ground mahresha is difficult to split ground. Mahresha was used to take out stones from underground.	malakino (Italian-)	mahresha * possible to split 10-20cm. Used to split qatsela. Agricultural tool, but new one is also used)	malakino (Italian-)	mahresha * to split ground surface	malakino (Italian-) * originally from Italy, for the fence.	dunkushe - new one is only called "mahresha". When it becomes older, called "dunkushe"	malakino (Italian-)	malakino (Italian-)			
To smash a large stone	Large hammer	dimbibilo-thelim-imni (circular-black-stone)	medesha (Italian)	black stone from another place	medesha (Italian)	-	medesha	medesha * only rich people can use ** using both hands - hairi imni * meaning "power stone" ** poorer people use this	medesha	dimbibilo-thelim-imni (circular-black-stone)	medesha (Italian-)	dimbibilo-thelim-imni (circular-black-stone)	medesha (Italian-)	abiy dimbibilo-thelim-imni (big- circular-black-stone, sometimes called "hairi imni", hairi: powerful)	medesha	dimbibilo-thelim-imni / moqorti (circular-black-stone / moqorti: black stone) * bigger, approximately 25cm.	medesha (Italian period-)	dimbibilo-imni (circular- stone) * bigger.	medesha (Italian-)	abiy dimbibilo-thelim-imni (big- circular-black- stone.) - hairi imni (powerful-stone)	medesha (Italian-)		
Others	-														binito (to set in the niche, very recently)		binito (approximately 20-years)			shibilek (same with binito, 20-years)			
Stone Material																							
To cut and scrape a stone	Small hammer	dimbibilo-thelim-imni (circular-black-stone)	martello (Italian) - maseta: more decorative, function is same with martello	black stone from another place	martello (Italian)	stone	martello	dimbibilo-thelim-imni (circular-black- stone) - martello * recent hammer is called "maseta"	martello	dimbibilo-thelim-imni (circular-black-stone)	martello (Italian-)	dimbibilo-thelim-imni (circular-black-stone)	martello (Italian-)	nishte dimbibilo-thelim-imni (small- circular-black- stone, sometimes called "mukurti", mukurti: small black stone)	martello (post-Italian-)	dimbibilo-thelim-imni (circular-black-stone) * smaller, handy size	martello (Italian-)	dimbibilo-imni (circular- stone) * smaller.	martello (Italian-)	no use	martello (Italian-)		
To smoothen stone surface	Chisel	no use	iskarbélo (post-Italian)	mendel don't know the detail	iskarbélo	sometime s stone usually no need	iskarbélo	dmblobo thelim imni (circular-black- stone)	iskarbélo (post-Italian)	don't know	iskarbélo (Haile Selassie-)	dimbibilo-thelim-imni (circular-black-stone)	iskarbélo (Italian-)	thelim-imni (black stone)	iskarbélo (approximately 30-years)	-	iskarbélo (post-Italian-) - to bang iskarbélo , "maseta" is used	no use	iskarbélo (post-Italian-)	iskarbélo (Derg-)			
To smoothen stone surface * start to use around 1990s	Chisel with sharp tip	no use	iskarbélo (post-Italian)	no use	t'efit'afa iskarbélo * t'efit'afa = flat		iskarbélo	no use	iskarbélo (post-Italian)	no use	t'efit'afa iskarb élo (recently)	-	t'efit'afa iskarb élo (recently)	-	t'efit'afa iskarbélo (approximately 30-years)	don't know	don't know	no use	t'efit'afa iskarb élo	-	t'efit'afa iskarbélo		
Wooden Material																							
To cut wood	Saw	misar	megaz (Italian)	misar	megaz (Italian)	-	megaz (Italian) * popular in post-Italian	misar * tip metal can remove and revolve	megaz * from post-Italian	misar	misar	misar	megaz * for dry wood	misar	megaz (Italian-)	misar	fase *1 (Italian-)	misar *used in the forest	misar	misar	megaz (Derg-)		
To scrape wood	Ax	misar	misar	misar * including church's decorative openings	misar	misar	misar	misar (ax)	misar	misar	misar	misar	misar	misar	misar	misar	misar	misar	misar	misar	misar		
To make hollow in wood	Chisel	mendel	iskarbélo (post-Italian)	mendel	iskarbélo	-	iskarbélo	mendel	iskarbélo	mendel	iskarbélo (Haile Selassie-)	-	iskarbélo (post-Italian-)	mendel * the tool was used to make joint part of maharasha between iron and wood	mendel	mendel	mendel	meshershere *1 * a sharp edged tool made by blacksmith.	-	mendel	iskarbélo		
To smoothen wooden surface	Plane	-	melagiya *1 (post-Italian)	-	-	-	melagiya *1	no use	misar	don't know	don't know	melagiya *1 (wider length than msar)	melagiya *1 (modern plane)	-	melagiya *1 (modern plane: post-Italian-)	-	melagiya *1 (modern plane, post-Italian-)	melagiya *1 * similar to msar.	-	melagiya *1 (Derg-)			

7. Parcel

	#1 (AS1)	#2 (AS2)	#3 (AA2)	#4 (ME1)	#5 (RO1)	#6 (OU1)	#7 (DE1)	#8 (DE2)	#9 (DA1)	#10 (OU2)	AS3	AA1
Name of building and space in a parcel												
1. Meraba	-	-	-	-	courtyard	courtyard	courtyard	courtyard	courtyard	courtyard	-	-
2. Beri	parcel's door	parcel's door	-	parcel's door	parcel's door	parcel's door	parcel's entrance without door	parcel's entrance without door	parcel's entrance without af-gebela	parcel's entrance with one door.	-	parcel's door
3. Af-gebela	parcel's entrance space	-	-	parcel's entrance space	-	a space for house animals. * especially space with a roof for cattle (alternative word of ger and gibaza).	parcel's entrance with door * a case of his house is called af-gebela	parcel's entrance with door	a structure over the entrance	parcel's entrance with bigger or more than one door.	-	-
4. Damigogo	kitchen building (also the place where injera is stored, usually seqela or guji)	-	kitchen building (by seqala, guji or circular hidmo)	kitchen building (by seqela or guji)	kitchen building (usually seqela or guji) In his parcel's case, both damigogo for injera and wat are existed.	kitchen building	kitchen building to bake injera	kitchen building	kitchen building to bake injera. Usually seqala.	kitchen building.	-	-
5. Dembe	a space for house animals in the courtyard	-	-	a space for house animals in the courtyard	a space without walls where house animals usually exist	-	a space under a roof for cattle, cow and oxen.	a space under the roof	a space for cattle. collective word of "7.indu-".	a space for cattle and other house animals. roof is optional.	-	-
6. Ger	-	-	-	-	-	a space under a roof for house animals, especially for cattle (alternative word of af-gebela).	a structure over the entrance.	a space under a roof, for the reception purpose	a space under grass roof	a space under grass roof for horse and mule	-	-
7. Gibaza	-	-	-	a house for house animals (especially for cattle).	a space under a roof and without walls.	-	-	-	-	-	-	-
8. Inda- * Inda: space / place / house.	inda tele-begi'i (for sheep and goat) inda mirakut (for small cattle) inda edug (for donkey) *1 inda frass (for donkey, horse and mule)	-	-	inda tele-begi'i (for sheep and goat) inda mirakut (for small cattle) inda edug (for donkey) *1 inda metsegna (for donkey, horse and mule) *1 * east-side door is better	In his parcel, inda mirakut (for small cattle) or inda tele-begi'i (for sheep and goat), without roof, is existed.	-	inda-, is placed at some corner of compound. For the chicken, with roof is better, and for the others, without roof is better.	-	In his compound, inda edug, without roof, is existed	inda frass or inda metsegna is alternative word of gibaza	-	-
Other element and notes				Hyena eat donkey, therefore donkey is inside the house								
Planning Method												
Orientation of hidmo	North door is better because wind is from the east.	-	-	North door is better because people don't like direct light and like to keep the space cool.	Nothing.	Entrance faces courtyard depending on the compound location.	Entrance faces courtyard.	North or south door is better. In west door case, light in evening is heavy. In east door case, cold window comes into the house.	Nothing.	Nothing.	-	-
Why door is sometimes very small	-	To avoid horse entering directly.	-	To protect inside from animals and people who are with horse together. They should get in house after getting horse down. People don't like the elite people to enter their house because they run through plenty of foods and drinks. They are economically but for the local people	To avoid Italian people to taking in the house with horse directly * appeared only in Italian period	For security, since before Italian period.	Don't know (construction error?).	No mention.	Don't know	To protect from invaders entering the house directly by horse.	When judge or ruler came to village, they searched hidmo with big doors to put their house. Therefore, people began to build house with small doors. They wanted them to keep horse in their house.	-
Why people sometimes sleep on the roof / Roof-top activity	Related with the security. After rainy season finishes, it is needed to protect the crops from thieves and birds	To protect the site from the thieves. This is traditional custom	-	Because there are sometimes insect in the house after rainy season Roof is used for both sleeping and putting dry grass for animals	For security. Except rainy season, they're on the roof	For security.	For air refresh. Insects infests the rice inside house.	For security, protecting from thieves. Putting feed for house animals (one month from middle of Sep.). To keep it clean, actually bacteria is in the soil. If it is put on the ground, eaten by cattle.	For security, especially at the time of harvest season (Oct.-Nov.) Protecting from the livestock as well thieves.	For security.	-	-
Role of enclosure	-	-	-	Compound wall is enclosed not to cattle go out.	-	-	-	-	-	-	-	-
Human Life and House, Inheritance												
Lifestage to build their own house	New house is built before or just after the marriage. They move the land after marriage (M:30, F: 20, approximately)	-	-	People live in the hidmo house together with parents until 18 years old. When 18, building house. After marriage, they move to another site. Of course it is possible to live together with parents, but moving is recommended as soon as possible.	Approximately 20 years old: If his parents have money or he is allocated the land, he build house. In case of him, it was carried out 40 years ago, when he married (usually in one's family parcel). In his case, the land was allocated by Derg.	When approximately 20 years old or after marriage: House is built inside parent's parcel.	Depending on the economy. Marriage is when 18-20 years old, and building house is approximately when 25 years old. In his case, his house is built in his parent's parcel.	When 22-25 years old, building house. But if parents are rich, it is possible to build before that, even before marriage.	When 25 years old, at the time of marriage. 1/3 of parent's parcel is acquired. In his case, he moved from inside village with his wife and her family. Originally the land was owned by his mother.	When 25 years old (depending economical situation), soon after the marriage. If they are economically good, building in other land with his parents.	-	-
Hidmo or Seqela	The type of building is depending on the economic situation.	-	-	-	-	Depending on the economic situation.	Depending on the economic situation.	Hidmo is preferred, because it's strong and seqela is easy to be fired. Depending on the economic situation.	Hidmo is better because it is more durable and sustained. Depending on the economic situation.	Depending on economic situation. Hidmo is better for the safety.	-	-
Inheritance	-	-	-	After the death of parents, the land tended to be inherited to the last son or daughter. If the last son/daughter does not live in that land or land is bigger, it is distributed to other children, or exchanged with something.	All of sons and daughters have a right, therefore, discussion is carried out.	Both sons and daughters have a right. Therefore, sharing it.	In old time, children discussed and agreed. Usually the youngest child inherited to live in there. In modern time, when not agreed, sell and get money. In case of him, he is middle and divide the land with youngest son.	All of sons and daughters have a right equally. If they have good relationship, they live together from traditional time. If the land is small, the poorest one inherits the house.	Some parents decided who inherit the land. When children cannot agree each other, they got the land individually.	All of sons and daughters have a right equally.	-	-

8. Occupational Ability (1/3)

	#1 (AS1)	#2 (AS2)	#3 (AA2)	#4 (ME1)	#5 (RO1)	#6 (OU1)	#7 (DE1)	#8 (DE2)	#9 (DA1)	#10 (OU2)	AS3	AA1
Occupational ability regarding building construction												
Nedaqi	Professional of stone masonry works.	Professional of stone masonry works.	Professional of stone masonry works.	Professional of stone masonry works. Also called "mendeq ki'ila."	Professional of stone masonry works.	Professional of stone masonry works. Church roof and wooden opening construction is also nedaqi's work.	Professional of stone masonry works. Engaging a roof work of hidmo house, too. Traditionally, moreover, engaging the wooden ornament.	Professional of stone masonry works.	Professional of stone masonry works. Timber ceiling work also done by nedaqi.	Professional of stone masonry works. Timber ceiling work also done by nedaqi.	Professional of stone masonry works.	Professional of stone masonry works.
Name of "nedaqi" is used from	After Italian influence. Before that, it was just known as "imni ki'ila"	After Italian influence. Before that, it was just known as "imni ki'ila" (imni: stone, ki'ila: expert)	After Italian influence. Before that, it was just known as "imni ki'ila"	Don't know.	Before Italian influence.	Before Italian influence.	Before Italian influence.	Before Italian influence.	Before Italian influence.	Before Italian influence.	-	-
Higher skilled nedaqi	-	nay-dege nedaqi (nay-dege: outside) Higher skilled and experienced nedaqi assumed exterior walls and he is more respected. The exterior is more difficult and stone size is larger.	-	1. nay-dege (outside) of church walls is carried out by the highest skilled nedaqi (decoration works are carried out by him, too). 2. nay-dege of house walls and nay-wishti of church walls are the next. 3. nay-wishti of house walls is carried out by the lowest skilled builders. Nay-wishtii nedaqi is called "aebai nedaqi." too	1. nedaqi (usually works on outside part of nedaki) 2. nay-wishti nedaqi (it can be understood as the assistant of nedaqi)	1. nedaqi: professional builder (25 birr/day) 2. nay-wishti nedaqi: beginner(15 birr/day) 3. daily labor (3 birr/day)	nedaqi	nedaqi When he became to own martello, he is more seen as nedaqi.	nedaqi	nedaqi	Always working exterior wall. The appearance is more important in exterior and should be more careful	-
Lower skilled nedaqi	-	nay-wishti nedaqi (nay-wishti: inside) Lower skilled nedaqi assumed interior parts of walls.	-	-	-	-	Lower skilled nedaqi engage the inside part of walls (nay-wishti nedaqi)	Lower skilled nedaqi engage the inside part (nay-wishti nedaqi)	Lower skilled nedaqi engage the inside part (nay-wishti nedaqi)	Lower skilled nedaqi engage the inside part (nay-wishti nedaqi).	Working interior wall. Actually inner wall is covered by plaster work.	-
Term of nay-wishti nedaqi (informant's case)	-	-	-	-	-	15 years After the experience of Maryam Church, he became nedaqi.	2 years	1 year	6 monthes	2 years	-	-
Hanatsi	A wooden work expert who makes a ceiling: curving wood with ax including the materials used in church construction. Before Italian influence, he was called just "inch'et-ki'ila"	A wooden work expert who makes a ceilings: In these days, feleñamo is also known as hanatsi.	A wooden work expert who makes a ceilings: Before Italian influence, he was called just "encheyti ki'ila"	A wooden work expert who makes a ceilings and oprings.	A wooden work expert who makes church building's ceiling: since pre-Italian influence.	Corrugated metal sheet roofer for the church building, since Italian influence.	Corrugated metal sheet roofer, since Italian influence.	In the past, wooden windows, doors and artwork in the wall were made by hanatsi. In modern context, the word points corrugated metal sheet roofer.	In modern context, corrugated metal sheet roofer. Before that, it points a wooden work expert: since Italian influence.	In recent time, corrugated metal sheet roofer is called hanatsi. Traditionally, the a wooden expert who makes doors and windows was called hanatsi, since pre-Italian influence.	Professional of wooden works, including the work of wood curving for the church. Experienced hanatsi was summoned to the site.	Nedaqi or other farmers curving woods before. Maybe there was no wooden professional in here, even if existing in Asmara or other place.
Feleñamo	A wooden work expert who makes doors and windows: Before Italian influence, he was called just "inch'et-ki'ila"	A wooden work expert who makes doors and windows, and curves woods for the church buildings. Usually summoned from Atsbi and D'esa. They are good at curving woods with a big ax. The name of "feleñamo" is from Italian influence. Before that it was just known as "inch'et-ki'ila".	A wooden work expert who makes doors and windows: Before Italian influence, he was called just "inch'et-ki'ila"	Don't know.	In modern context, feleñamo means a workshop of wooden furniture in the downtown.	Alternative word of hanatsi, since Italian influence.	Since post-Italian influence.	Don't know.	A wooden work expert, similar with original role of hanatsi, since Italian influence.	Same with original role of hanatsi, since Italian period. Feleñamo is newer word. Who makes them with machine is more likely to be called feleñamo.	-	-
Notes on the profession	-	-	-	-	Construction of his house was carried out without hanatsi.	-	When he was 15 years old, he saw that nedaqi engaged the whole work process (masonry walls and ornamental wooden works) of church construction.	-	-	-	-	-
Status of carpenters	Not high when he starting his nedaqi career as well as hanatsi in 1951. People didn't want his daughter to marry with builders.	-	-	-	Respected	-	High. In both aspects of honor and economy, nedaqi is better than labor.	Highly respected. Skillful builder should be contacted carefully.	Traditionally respected.	Highly respected. In his period, one of the richest works was nedaqi. In 10 years ago, per diem was 150 birr. This was good price in that time. However, nedaqi usually wasted money, therefore, money was not saved. Currently 250 birr.	-	-
How to get skills	Nobody taught stone work to him. He got skills through observation of other builders.	His grandfather was nedaqi and getting skills through the observation of him in childhood. He also teaching the skills to his son and other people.	Learning through the observation when he was an assistant of skilled nedaqi.	At first, learning through the observation when he was an assistant of skilled nay-dege nedaqi. If his attitude is open, learning through the discussion with him. Nedaqi is usually open-minded.	He served nedaqi as an assistant. Guild did not exist, there was only an individual relationship.	He assisted Tesfay Gebrezabiel.	Through the observation and talk, he learnt the skills.	Through assisting experienced nedaqi, he got the techniques.	There was no master, and he learnt it by himself. He trained it through the works for courtyard fence of his parcel.	Starting with the career as daily labor. He observed skillful builders' works and improved skills. Usually, not ask to other nedaqi.	Learning through the observation when he was an assistant of skilled nedaqi. At that time he was 18 years old.	Nobody taught him the skills
How to get new work / How to find nedaqi	People who saw his work or heard his reputaion came to his place, and new clients asked him to build his house as the building he built in the past. This is traditional way.	New client comes through the introduction of other clients. The clients came to bino house to find nedaqi. His reputation was high, therefore people came to his place one after another.	Skilled nedaqi became famous and people asked him. Also person who saw his past work came to him.	1. At first, a client asked to nedaqi living in the same village, usually skilled nedaqi is known within the community. If it was not possible, visiting other villages to ask it. 2. Sometimes a client directly came to the respected nedaqi to ask the work.	He built his house by himself, and the person who saw it ordered to build his house.	In the past: Someone who wanted to build house saw the house he constructed, and visited its builder. In fact, community people knows who is a good nedaqi in his community. In these days: In the square in Kwiña, there is a place that builders gathered in the morning.	Someone who saw hia past work judged whether the builder is good or not. Good assistant is chosen by the nedaqi.	Someone who saw the building came to his house and asked.	A client asked someone that who is the best nedaqi. And he visited him.	There was a rumor that he is good nedaqi. Or, a client asked someone that who is good nedaqi. And he visited him. If the nedaqi built good house, someone who saw it asked the owner who built it.	If his work satisfied his former client, he introduced a new client to him. A person who saw his past work asked the owner who built it, and new client was introduced. In the period without mobile, he decided the place to be.	People who saw his past work came to his place. Skilled nedaqi became famous.

8. Occupational Ability (2/3)

Builder's organization												
Existence of traditional guild for carpenters	No.	No.	No. Every <i>nedaqi</i> worked individually.	No.	No.	No.	No.	No.	No.	No.	No. The techniques were open.	No
Communication between builders	Many <i>nedaqi</i> gathered <i>mino</i> house, though it was not the place for only <i>nedaqi</i> . They eat and drink together and celebrate saint people together.	He made many <i>nedaqi</i> friends at construction site and <i>mino</i> house where many <i>nedaqi</i> gathered, especially on every Sunday. <i>Bino</i> is the name of traditional drink, which is similar with <i>tela</i> and was preferred by <i>nedaqi</i> (While <i>mino</i> is prepared by bottle, <i>tela</i> by pottery). Currently, the number of <i>mino</i> house is decreasing.	-	-	No place to gather <i>nedaqi</i> . Client comes to his place directly.	In <i>siwwa</i> house	For example, a <i>nedaqi</i> ask another <i>nedaqi</i> to join his work, and vice versa. Individual communication was active.	In rural area, there was (is) no gathering place of <i>nedaqi</i> .	Training <i>nedaqi</i> under him. There was (is) no gathering place in his village. When he didn't work, he didn't go to downtown.	In <i>t'ejj</i> house in Mekelle, <i>nedaqi</i> gathered. In Haile Sellassie period, many <i>nedaqi</i> from surrounding villages, such as Debr, Gambella, Romanat and <i>Kwiha</i> , came to Mekelle by mule. Technical and knowledge exchange was carried out in that place. Also clients invited <i>nedaqi</i> and satisfy them. This custom is traditional.	Through the working, people made friendship.	
<i>Nedaqi</i> 's association in Derg period	The association aimed mutual benefit of <i>nedaqi</i> . It consisted of approximately 10 <i>nedaqi</i> and 10 daily workers. He resigned it because the payment was the same between high and low skilled <i>nedaqi</i> . Then he worked around countryside. It emerged and disappeared in the Derg period.	-	There were modern associations consisting of approximately 10 <i>nedaqi</i> .	-	No existent.	There was association but not worked well. The purpose was only cooperation, not for securing the techniques.	No existent.	Derg tried to control the rural farmers and <i>nedaqi</i> . To control rural <i>nedaqi</i> not to visit city, license was given for urban <i>nedaqi</i> . Actually, Derg wanted rural people to stay in village and engaged farming activities. Therefore, rural <i>nedaqi</i> could not participate urban <i>nedaqi</i> association. Clients could individually ask to the rural <i>nedaqi</i> . But if it is come to light to the authorities, it was guilty.	No.	No. He appreciated Derg's socio economy. It was stable and well worked. Life was better at that time.	He has heard concerning the existence of association somewhere, but does not know the details.	

8. Occupational Ability (3/3)

Agreement between Nedaqi and Client												
Foundation of Agreement	-	-	-	-	Verval agreement.	Verval agreement.	Verval agreement.	Verval agreement.	Verval agreement.	Verval agreement.		
Decisive factor to arrive at agreement	-	-	-	-	Price. When he is a chief <i>nedaqi</i> , he manage the work. Usually 1/3 is paid in the foundation phase, 1/3 in the middle phase, and the other 1/3 after the completion. This system has been since pre-Italian period.	Discussing concerning employment. When it is agreed each other, someone witnessed the agreement.	Whether he can choose good assistants or not, and whether he can use good materials or not.	Daily per diem. Usually, <i>suwa</i> and food were served during the whole construction period.	Payment is negotiated.	Size, building height and payment were discussed.		
Dominant form of payment on house construction	-	-	-	-	Contract (since pre-Italian).	Contract. In case of per diem base, owner should watch every step.		Per diem.	Contract or per diem. He likes the form of per diem.	Since Haile Selassie period until now, per diem base is dominant. In case of contract, 3 <i>may-bét</i> house was 100 birr in Haile Selassie period. Which is preferred is depending on <i>nedaqi</i> , or his economical situation.		
Dominant form of payment on church construction	-	-	-	-	Contract (since pre-Italian). Church committee negotiated with <i>nedaqi</i> .	Contract.	Depending agreement, contract or per diem is decided.	Everyone worked at no charge.	Per diem.	In Haile Selassie period, the form of per diem was dominant. However, contract is dominant recently. Per diem is generally better for the quality because they want to finish as quick as possible in case of contract. However, in per diem case, they are likely to become lazy to earn more. When he was a contractor of Abuna Aregawi church construction in 25 years ago (some part of walls), 6,000 birr was paid in 40 days working, Materials were prepared by the church, and assistant cost was paid by contractor (5 birr/day)		
Form of payment	In the past, payment was not by money: food and drink were served. In case of church, money was paid to contractor and <i>nedaqi</i> . When he improved his skills, people increased his payment. This is reason why he became <i>nedaqi</i> .	Money, when client had money In case of church, only food and drink were served.	-	During Haile Selassie period: it was paid daily. It was possible to buy ox and other livestock with it in the past. However, in present day, this is difficult.	Pre-Italian: grain During and after Italian: money	Cash or grain (in case of both house and church).	Money (in his days). In case of church construction, food is prepared by the community.	Money (in his days). In the past, oxen, donkey or cow was paid.	Money (in his days).	Money (in his days). Before that, he does not know.		

9. Building Preparation and Construction Process (1/4)

	#1 (AS1)	#2 (AS2)	#3 (AA2)	#4 (ME1)	#5 (RO1)	#6 (OU1)	#7 (DE1)	#8 (DE2)	#9 (DA1)	#10 (OU2)	AS3	AA1	
Stone Material Collection													
Carried out by	house owner / client * in case of his house construction, neighbors also helped to bring stones. They carried one or two stones on the way.	house owner / client * If there are good siwa and injera, the neighbors helped to collect stones.	house owner / client * In case of his house construction, his relatives helped.	house owner / client * His community people helped him.	house owner / client * It was assisted by his family members, friends and neighbors. Helping is part of life.	house owner / client * It was assisted by neighbors and relatives.	house owner / client * It was assisted by family members and community people without payment. He invited something to eat and drink (his house was carried out like this way).	house owner / client * He was assisted by no ones.	house owner / client	house owner / client He was assisted by no ones.	house owner / client house owner / client	house owner / client	house owner / client
Production site	surrounding area (in case of his house construction) - In the past, stone materials were easy to take, from anywhere. Suitable stone materials can be collected from the agricultural land (sometimes the ground should be dug). It was good for agriculture, too.	surrounding area (in case of his house construction) - In the past, stone materials could be collected from the surrounding ground. When the ground was dug, mahresha was applied. Meaningless for agriculture.	Stones were from Qalamino, Shafat, Eilkin, Dagiat, Ch'eleqot and Shimta. Specifically in the case of Aynalem, Eilkin, Dagiat and Shimta were the stone sites.	In the past, local stones were applied. Suitable stone materials could be collected from the agricultural land (sometimes the ground should be dug). It was good for agriculture, too. In the present, they are on the market.	Surrounding area.	Surrounding area. In Kwiha, there is quarry site even in now.	Surrounding area. Debri is famous as stone production site from the past.	Surrounding area. Debri is famous as stone production site from the past.	Surrounding area, from the past.	Surrounding or nearby site. In Kwiha, there is a quarry site even in now.	In case of his house construction, he had enough stones in another place. He brought the stones to the site.	When he built existing house, he demolished previous house situated in another place. Therefore he reused the stones. - Gramelamil, Qalamino, May-gugs (all near Aynalem) is the place where he collected stones	
How to bring	donkeys	donkeys	-	donkeys / people	donkeys	donkeys and people	donkeys and people	donkeys	donkeys	donkeys	donkeys	donkeys *one donkey can four stones at one time. When he built house, there is only one track in Mekelle.	
Notes	-	-	-	Shape and size of stones are adviced by nedaqi to clients	-	-	-	-	-	-	-	If clients did not have enough stones, he suggested suitable stones	
Wooden Material Collection													
Mihuts: wooden species, production site, how to bring	1. tsehidi (juniperus / from Dés'a / decoratively good) 2. awli'i (olive / from Giba / good strength) by donkey	tsehidi (from Dés'a) 600-700 logs should be prepared. by donkey		tsehidi (from Dés'a) by donkey	awli'i (from Gheralta, 10km from Romanat to the west, next of Giba), ebuk (from Gheralta). * Tsehidi (from Dés'a) is the best, but rarely used because of its cost. by donkey	tsehidi (from Dés'a) * Branches of tsehidi is used after cutting them at the site by donkey	meritsa (from around Temb en) by donkey / people	ebuk (from surrounding), this case is most often seraw (material from next village is called so) awli'i (from surrounding) tsehidi (from Dés'a) by donkey, people or camel	ebuk (from lowland area on the way of Afar, but it is relatively near) tsehidi (from Dés'a) eucalyptus (since modern period) by donkey, mule or horse	tsehidi (from Dés'a), awli'i (from neighbor site), awoh (from near Afar) by people	awli'i: generally he used (from Shibe: around Gelalta) tsehidi (from Dés'a): for rich people	tsehidi (from Dés'a) and eucalyptus were used.	
Serayt: wooden species, production site, how to bring	tsehidi (from Dés'a) by 4 people	tsehidi (from Dés'a) 80 logs by donkey		tsehidi (from Dés'a) by 1 serahyit / 1 person	eucalyptus and awli'i (from Gheralta) by 2-3 people / 1 piece	tsehidi (from Dés'a) by 2 people / 1 piece	awli'i (from surrounding area around the lowland of water fall) eucalyptus (from surrounding area around the lowland of water fall, since modern time) by 2 people / 1 piece	ebuk (from surrounding) seraw (material from next village is called so) awli'i (from surrounding) tsehidi (from Dés'a) by 2-4 people / 1 piece	tsehidi (from Dés'a), awli'i (from lowland area on the way of Afar, but it is relatively near), eucalyptus (since modern period) by camel (can bring 4 pieces) or donkey (2 piece)	tsehidi (from Dés'a), awli'i (from nearby site), awoh (from near Afar), by 1 person / piece			
Gadim: wooden species, production site, how to bring	1. awli'i (from Giba) 2. tsehidi (from Dés'a) by 8 people	tsehidi (from Dés'a) 2 large woods by four people / 1 piece	Tsehidi (from Dés'a) was the most familiar, but awli'i (from around Hoholo) was also used.	1.tsehidi (from Dés'a) *a couple of tsehidi is dealt with one gadim, because size of tsehidi is small. 2. awli'i (from surrounding area) 3. eucalyptus (from surrounding area) * awli'i and eucalyptus is bigger.	eucalyptus and awli'i (from Gheralta) by 2-3 people / 1 piece	tsehidi (from Dés'a) by 2 people / 1 piece	for church: tsehidi (from Dés'a) for house: awli'i, eucalyptus by 8 people/ 1 piece	awli'i (from surrounding) seraw (from next village) tsehidi (from Dés'a) by 6 people / 1 piece	tsehidi (from Dés'a), awli'i (from lowland area on the way of Afar, but it is relatively near), seraw, eucalyptus (since modern period) by 4 people / piece, team of 20 people brings in turn.	tsehidi (from Dés'a), awli'i (from nearby site), awoh (from near Afar,) eucalyptus (since modern period) by 6-8 people / piece	Eucalyptus wood is good because it is bigger than other materials (note by researcher: eucalyptus is was not available in old time).	He used eucalyptus. Eucalyptus is thicker than tsehidi.	
Pillar: wooden species, production site, how to bring	1. awli'i (from Giba) 2. tsehidi (from Dés'a) small one: by 2 people big one: by 4 people	tsehidi (from Dés'a) 1 big wood by 4 people / 1 piece		awli'i (from surrounding area)	eucalyptus and awli'i (from Gheralta) by 2-3 people / 1 piece	tsaddo (from surrounding) by 2 people / 1 piece	for church: tsehidi (from Dés'a) for house: awli'i (from surrounding area around the lowland of water fall) by 8 people/ 1 piece	awli'i (from surrounding) seraw (from next village) tsehidi (from Dés'a) by 10 people / 1 piece	tsehidi (from Dés'a), zigba (from on the way of Maych'ew), awli'i (from lowland area on the way of Afar, relatively near), eucalyptus (surrounding area, since modern period). by 3-4 people / piece, team of 15 people brings in turn, actually pillar is thinner than gadim.	tsehidi (from Dés'a), awli'i (from neighbor site), awoh (from near Afar,) eucalyptus (since modern period) by 4 people / piece			

9. Building Preparation and Construction Process (3/4)

Construction Issues												
Length of house construction period	In case of his own house (6.8m x 4.2m x 4m house), It took 1 month with four <i>nedaqi</i> . 2 <i>may-bét</i> house / 1 month / 4-5 days working per a week / 6 people working * But it is usually difficult to work 4 or 5 days due to holidays and lack of materials. It can take 10-12 months to complete.	In case of 7 x 6m house, it took three years including material collection. It took six months (3 <i>may-bét</i> house case) by one <i>nedaqi</i> . If there were other <i>nedaqi</i> participants, it was possible to finish in three months. In case of his own house, it took only approximately 6 months because he had other <i>nedaqi</i> participants (3 <i>may-bét</i> house). 3 <i>may-bét</i> house / 9 months / 2-3 days working per a week / 1 <i>nedaqi</i> + 1 assistant worker 2 <i>may-bét</i> house / 6 months / 2-3 days working per a week / 1 <i>nedaqi</i> + 1 assistant worker	People didn't (don't) work in saint holidays, therefore, it was (is) difficult to estimate the length of construction period. It may take (may have taken) approximately 2 months with 2 daily assistant workers.	3 <i>may-bét</i> house / 8 months or more (if all materials, money, facility was prepared) / 3-4 days working per a week (sometimes only 2-3 days because of saint holiday) / 2 <i>nay-dege nedaqi</i> and 1 <i>nay-wishtii nedaqi</i> 2 <i>may-bét</i> house / 6 months or more (if all materials, money, facility was prepared) / 3-4 days working per a week (sometimes only 2-3 days because of saint holiday) / 2 <i>nay-dege nedaqi</i> and 1 <i>nay-wishtii nedaqi</i>	3 <i>may-bét</i> house / 30 working days / 2 <i>nedaqi</i> and 2 <i>nay-wishtii nedaqi</i> .	3 <i>may-bét</i> house / 7 working days / 10 <i>nedaqi</i> and 15 <i>nay-wishtii nedaqi</i> .	3 <i>may-bét</i> house / 4 months / 2 <i>nedaqi</i> and 2 <i>nay-wishtii nedaqi</i> / 3 days per a week	In case of his house: 2 <i>may-bét</i> house / 1 year / himself, son and wife	3 <i>may-bét</i> house / 1 month / 4 <i>nedaqi</i> and 4 <i>nay-wishtii nedaqi</i> / 4-5 days per a week (Saint day was not working day)	In case of his house: 3 <i>may-bét</i> house / 2 months / 2-4 <i>nedaqi</i> and <i>nay-wishtii nedaqi</i> / 3-4 days per a week.	It took three years by one <i>nedaqi</i> . In case of 3 <i>may-bét</i> house, it took one year with one <i>nedaqi</i> . When there were other participants, it became shorter. In his experience, owner didn't have enough stones and needed to wait, then it took one year.	In case of his own house, it took approximately 2 months.
Working process	-	Routine work, such as one week stone shaping and later one week stone piling.	-	-	-	-	Stones were brought in the morning, and piled them up within that day.	Actually they worked as farmer, too. Material collection needed the time.	-	-	-	-
Who participate the construction except <i>nedaqi</i>	The owner's relative and neighbors sometimes helped. If the helper was <i>nedaqi</i> , he did masonry work. If not, he assisted the work such as material carrying and donkey lent.	Neighbor helped the construction.	Usually two dayly assistants were hired (in urgent case, three). Sometimes neighbors participated, too.	Some neighbors and relatives helped.	Neighbors and family members helped. They prepared <i>ch'iqqa</i> and gravels.	-	Many people helped the construction.	In his case, the construction was carried out only by him, his son and his wife.	Outside work was carried out by males.	Labors	-	Relatives and neighbors participated without payment. Usually they did not have other assistants. In case of his own house, his wife brought materials such as mud and gravel.
Furniture such as <i>medeb</i> made by	Female.	Female.	-	-	Female.	Female.	Female.	Male.	Female.	Both, case by case.	-	-
Plaster work done by	-	Female.	-	-	Female.	Female.	Male, small one was (is) by female.	Female.	Female.	Female.	-	-
Ceremony	After the completion of roofing work with community people (approximately 15 people), party entertained with <i>injera</i> , livestock, <i>siwwa</i> and music. The clergy came and celebrated the completion.	After the roofing work with community people, party was carried out. Owner entertained them with a sheep or ox and <i>siwwa</i> (local beer).	The rich owner celebrated after the completion	Roofing work was carried out by more people. Therefore, party was carried out with the participants to celebrate the completion of roof work.	No ceremony.	In the same day with roof making, it was held.	After completion, it was held.	After <i>ziban hidmo</i> was completed, food and <i>tela</i> were prepared.	No ceremony. Ceremony was held only in the city.	Opening ceremony was held.	After moving to new place, food and drink were served. If the owner was rich, livestock served.	No celemony
Ceremony is religious or not (<i>hidmo</i> house case)	Yes.	No.	No.	No. However religious motif appeared.	-	Sometimes religious motif appeared.	No.	No.	-	No. However religious motif appeared.	No.	-
Church construction												
Who decides to build church building	-	-	-	-	Church committee. Requested by local community, and collecting money from common people. This is the way since the past.	Church committee. Requested by local community, and collecting money from common people. This is the way since the past.	Requested by local community to <i>sebekha gubae</i> .	Requested by local community to <i>sebekha gubae</i> .	Requested by local community.	Requested by local community (at least in Haile Selassie period).	-	-
Permission to build church building	-	-	-	-	By bishopric. The church committee visited bishopric and explained.	By bishopric.	-	By bishopric. In the past, they must have been visited Maryam Church in Aksum.	By bishopric.	By bishopric office located in Mekelle (at least in Haile Selassie period)	-	-
How to decide church planning	Making existing church sample case.	-	-	-	Committee asked local people and gatheed opinion. Not only planning, but also which saint is dedicated is also the topic.	Requested by local community. Knowledgeable person was also available.	-	Requested by local community (plan, which saint is dedicated) In the past, team of experienced <i>nedaqi</i> measured a church in another village, and followed it.	The position and shape of the church is requested by local community. <i>Tabot</i> is from bishopric office.	Requested by local community.	When a community decided to build a new church, they visited a church in another village, and decided the planning.	
Building orientation	-	-	-	-	-	<i>Meqdas</i> is in east.	-	<i>Meqdas</i> is in east.	<i>Meqdas</i> is in east.	<i>Meqdas</i> is in east. In the north of <i>maqdas</i> , external door exists.	-	-

9. Building Preparation and Construction Process (4/4)

Wooden work is done by					<i>Feleñamo</i> (in town, modern time) There was similar profession in the past.	Nedaqi, done in the church compound.	Nedaqi, done in the church compound.	don't know.	hanatsi (shaping every material)	Traditionally, hanatsi did in the site. Recently, <i>felenamo</i> did it.		
How to manage construction					sebekha gubae (head of committee): finance, planning issue Contract is agreed with nedaki. kobrari (time-keeper) is related only in the case of town's big church.	Dedicated committee for the construction is governed under sebekha gubae. Various people from church, local community, man and woman were included.		Committee was existed. Phylogram is: church - sebekha gubae - elders of community - working staff such as nedaqi and labors Traditionally, <i>kobrari</i> (time keeper) is assumed by a chief of community. He was involved in the Gabriel Church construction as <i>nedaqi</i> , around 40-years ago (Derg period). His team of 4- <i>nedaqi</i> became candidate and decided. At that time, he offered including budget.	Committee for the construction was made under sebekha gubae. Usually of 5-people erected by community people.	"Meajata" is the committee to organize the church construction. This is influential and existed since pre-Italian period. This <i>meajata</i> allocate <i>nedaqi</i> . The head of <i>nedaqi</i> worked for the design of detail.		
Difference of technique and knowledge between church and house	More knowledge is required for church construction. It has more complicated plan than <i>hidmo</i> house, therefore, more experienced <i>nedaqi</i> is needed. The walls are constructed more carefully.	Roofing material is different (see another sheet)		The technique is the same, but church building is more elaborate.	Same.	Same.		Thickness is different. More careful construction is required, namely, he took care that stones are more interlocked.	Same.	More preferable stone is required (in modern case)		
Length of church construction period	2-3 years (4-5 days/week, 4-10 people, in case of quick construction) When he built St. Michael church, it took around three years with six <i>nedaqi</i> , five assistant <i>nedaqi</i> , and many community participants who carried the building materials.				Recent: 1-year (because payment is risen) Past: 3-years (4- <i>nedaqi</i> , 4-assistants, 3-days/week, often stopped due to lack of money)	1-year.	2-years. After collecting stones, it takes only 5-monthes.	5-years (in the past). 1-year (Gabriel Church, the case he was involved)	3-4-years. Recently, material shape cost the time.	2-years.		
More skilled and experienced <i>nedaqi</i> is appointed or not.	Yes.	Yes.		Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.		
Who participate church construction	Community people participate the church construction to bring stones and other materials by donkeys. The construction is managed by church man. Relevant position of the church: <i>sebekha gubae</i> (a general church manager, and he discussed with nedaki), <i>kobrari</i> (time keeper)	Skilled and experienced <i>nedaqi</i> with higher payment is appointed for the church construction, sometimes from remote place. Majority of community people also particulates.	Community people participate the church construction by bringing stones and other materials.	Community people, needless to say, participated the construction. It was religious service, therefore, voluntary work without payment. Since around Haile Selassie period, salary became to be paid. The construction is managed by church man.	Food is served by the local community. People help to build church by collecting materials and so on..	Everybody helps the construction.	Many community people participate.	Often there was no payment (his case of Gabriel Church, it was paid) Per diem is 20-birr.	Community people participated as a daily labor or food server. While <i>nedaqi</i> get payment, others do not get.	Church assigned villagers to help and rotate church construction sites. These people cannot get payment, only foods.		When he participated the project of Maryam Maigundi, he got sheep from community people.

10. Aderash and Thatched Roofed House

	#1 (AS1)	#2 (AS2)	#3 (AA2)	#4 (ME1)	#5 (RO1)	#6 (OU1)	#7 (DE1)	#8 (DE2)	#9 (DA1)	#10 (QU2)	AS3	AA1
Aderash												
Present meaning	-	-	-	-	Meeting hall	Meeting hall	Meeting hall	Meeting hall	Meeting hall	Meeting hall	-	-
Original meaning of Aderash	Built by local leader or government and any rich people in the parcel of their residence. Inside is huge and vacant space with usually more than 4 may-bét. Used as the salon and meeting space. There would be one <i>aderash</i> in one village.	Built by the noble or the rich. Called "aderash" when the building is more than 4 may-bét. To show his wealth. Used for salon of family members and guests, and sleeping room. Not for the reception or ceremony (in that case, tent-like structure named "lebba geddel" was used). But for the specific religious feast, noble people gathered in <i>aderash</i> . <i>Aderash</i> of non-noble usually did not have <i>wushto-bét</i> . Timber length of <i>aderash</i> is longer than ordinary <i>hidmo</i> .	Built by the noble or the rich family, instead of <i>hidmo</i> house. Used as the salon of family members and relatives. Family members slept in here, too.	Large rectangular <i>hidmo</i> (<i>aderash hidmo</i>). Size and shape are criteria. More than 2 or 3 may-bét. Children, relatives and guests gathered. Religious feast was held here and people gathered <i>aderash</i> at that time.	More than 4 may-bét building. Only existing in the rich people's parcel. Residential purpose without special purpose.	Large and gorgeous house with more than 4 may-bét is called "aderash" Residential purpose.	<i>Hidmo</i> house is called <i>aderash</i> , even if it is 2 may-bét.	<i>Hidmo</i> house is called <i>aderash</i> , even if it is 2 may-bét.	More than 4 may-bét house. Only rich people could build.	Larger size (4 may-bét is the best <i>aderash</i> / <i>debri</i> + 'amdi + <i>filatsa</i> , 3 may-bét also can be called <i>aderash</i>) and rectangular <i>hidmo</i> . Invitation of the royal family is held in the best <i>aderash</i> in the village in the past.	4 may-bét <i>hidmo</i> with pillars. Built by the noble or the rich. Used as a reception hall.	-
Why definition was changed	Not so changed, although the structure type has been changed	Meaning of <i>aderash</i> changed.	-	According to him, TPLF provided some opportunities to change <i>aderash</i> 's meaning, i.e., TPLF sometimes asked to use the traditional <i>aderash</i> for the meeting.	Original <i>aderash</i> included the function of the rich people's reception purpose. That's the reason.	-	From the appearance.	-	-	-	-	-
Traditional meeting space	-	under a big tree	-	structure named "dass" under a big tree	under a big tree	under a big tree	under a big tree, especially <i>daero</i> .	under a big tree	under a big tree	under a big tree	-	-
Aderash construction done by	Local leader ordered community people to participate <i>aderash</i> construction. Therefore the quality could be worse than ordinary <i>hidmo</i> house	Skillful <i>nedaqi</i> was ordered to participate <i>aderash</i> construction. This is non-payment work, therefore, he could get only foods and drink. Community people also participate by collecting stones and other materials.	Community people were mobilized to <i>aderash</i> construction. No payment, only food and drink were served.	-	<i>Nedaqi</i> worked. This was contract work and process was similar with general house construction.	-	same with general house construction.	same with general house construction.	any <i>nedaqi</i>	process is same with general <i>hidmo</i> construction	-	-
Quality of <i>aderash</i> construction	Less elaborate.	Elaborate.	-	-	Same.	Elaborate	Same.	Same.	Same.	Elaborate.	-	-
Stone size of <i>aderash</i> is smaller or bigger than house and church building	-	Small: not to collapse.	Small.	-	Same.	Bigger.	Same.	Same.	Same.	Best quality stone pieces were used.	-	-
Special technique is needed or not	-	-	-	-	No need.	Stone is better shaped.	No need.	No need.	Same.	-	-	-
Notes	There was <i>aderash</i> around his place, but it has been demolished. Behind <i>aderash</i> , there were prison room, because the compound was big.	There was <i>aderash</i> around his place, but it has been demolished.	-	-	-	-	-	-	-	-	-	-
Seqela and Guji												
Seqela	Conical roof building with more than approximately 3m diameter; usually approximately 8m. Tigrinya word.	Circular shaped building with thatched roof and central pillar. the word is Tigrinya. The size is bigger than <i>guji</i> .	Regardless of stone or <i>ch'iqqa</i> wall, and house or church building, it can be called so. Tigrinya word.	-	Bigger than <i>guji</i> . Tigrinya word.	Diameter is approx. 6m. Better quality than <i>guji</i> , for residence.	Bigger than <i>guji</i> , Tigrinya word. There is no pillar in majority of cases. A pillar on the beam is often called <i>bala</i> .	Bigger than <i>guji</i> , approximately 3.5m diameter. Tigrinya word.	Bigger than <i>guji</i> , approximately 8- <i>imet</i> diameter.	Bigger than <i>guji</i> . Usually built for the house in the time of marriage.	-	-
Guji	Conical roofed building with less than approximately 3m diameter, usually approximately 2m. Amharic word.	Smaller than <i>seqela</i> . <i>Guji</i> is for 1 or 2 people, and a temporary structure. Amharic word.	Both stone and <i>ch'iqqa</i> walls are possible. Both house and church are possible. Amharic word.	-	Approximately 3m diameter. Tigrinya word.	Diameter is approx. 4m. Poor quality, for cattle house.	For temporary use. There is no pillar in majority case, the pillar on the beam is often called <i>bala</i> .	Smaller, approximately 2m diameter. Tigrinya word.	Smaller than <i>seqela</i> , approximately 5- <i>imet</i> diameter.	Smaller.	-	-
Foundation	-	-	-	-	Digging 50cm and putting flat stone. On that stone, sprinkling salt.	Digging 1m around (Depending on the ground condition). Buried by gravel and <i>ch'iqqa</i> between pillar and ground.	-	Wall foundation is 50cm. A foundation for a pillar is 20cm.	A foundation for a pillar is 30cm around. Flat stone, gravel and salt are put.	-	-	
Damigogo is usually by	<i>seqela</i> or <i>guji</i>	-	both	-	<i>guji</i>	<i>guji</i>	<i>seqela</i> (it needs ventilation)	<i>seqela</i> (it needs ventilation)	<i>seqela</i> (sometimes <i>hidmo</i>)	<i>guji</i>	-	-
Storage is usually by	-	<i>seqela</i> or <i>guji</i>	-	-	<i>guji</i> (not built so much)	don't build	-	-	-	-	-	-
Element and Detail of Conical Roof Structure												
1. Binded flexible branches along circular plan	-	<i>moro</i>	-	-	<i>moro</i>	<i>moro</i>	<i>moro</i>	<i>moro</i>	<i>moro</i>	<i>moro</i>	-	-
2. Binded flexible branches between center and edge	-	<i>chinchimate</i>	-	-	<i>kasta</i>	<i>shaqna</i> / <i>ere</i>	<i>kasta</i>	<i>kasta</i>	<i>kasta</i>	<i>kasta</i>	-	-
3. Bark of tree to tie <i>moro</i> / <i>chinchimate</i>	-	<i>lihtsi</i>	-	-	<i>lihtsi</i>	<i>lihtsi</i> / <i>shuhukho</i>	<i>lihtsi</i>	<i>lihtsi</i>	<i>lihtsi</i> (from <i>seraw</i>)	<i>lihtsi</i>	-	-
4. Groundwork for a thatched roof (bamboo, cactus etc.)	-	<i>ere</i>	-	-	-	<i>sleal</i>	<i>ere</i> / <i>shaqua</i>	<i>shahoya</i>	<i>shahoya</i> (bush less than 1m around) <i>ere</i> (type of wood)	<i>shakaia</i>	-	-
6. Thatched material (<i>sa'ir</i>) for building	-	-	-	-	<i>chinchimate</i>	<i>chinchimate</i> (1-row of thatch)	<i>chinchimate</i> (1-row of thatch)	-	-	-	-	-
7. Pot covering thatched roof at the center	-	-	-	-	<i>etro</i>	<i>etro</i> (pot) / <i>kelewo</i> (small pot)	wrapping grasses	<i>etro</i> , <i>ankel</i>	<i>etro</i>	<i>etro</i>	-	-
Length between <i>moro</i> and <i>moro</i>	-	-	-	-	50cm	50cm	1 <i>imet</i>	6- <i>moro</i> are set.	50cm	less than 50cm	-	-
Drainage	-	-	-	-	Extending some length by grass.	Packing well.	By grass. No maintenance is okay, leaking is not a concern.	By sloped grass.	-	By maintenance. When interspace comes into existence, it is buried.	-	-
Notes	-	All materials are from surroundings. Roof withstands 15-20 years.	-	-	<i>Seqela</i> (<i>guji</i>) is built for economic reason.	-	All materials are from the surrounding.	" <i>qufquf</i> " is the word to mean arranging grass.	-	A pillar on the beam is called " <i>waltem</i> 'amdi"	-	-