

The Role of Collaboration in Survey and Documentation of Historic Buildings. Case Study: Akre Historic Area in Kurdistan Region of Iraq

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ABSTRACT: Historic buildings express the identity of associated communities and are an important asset for development via tourism activities. Investment in historic buildings is increasingly being acknowledged as an effective strategy for sustainable development. Survey and documentation are a fundamental step in heritage protection. Methods and techniques used in documentation are diversifying as technology progresses. However, documentation is not exclusively based on dimensions data; rather, it includes descriptive data, which helps in developing a holistic understanding of the value of historic buildings that in turn is a prerequisite for developing an effective conservation and management plan. Survey and Documentation has been valued by many international instruments, such as Athens, Venice, and ICOMOS Charter. Iraqi law has since the early 20th century placed high value on survey and documentation of historic buildings. Akre historic city is registered in the Iraqi National Archaeology List of 1970. However, the historic image of Akre historic area is increasingly lost over time due to the replacement of many historic buildings to new architecture and deterioration of many others. Additionally, the local government has not performed proper survey and documentation of the historic buildings, while information of those buildings is likely to be lost every day. Therefore, a collaborative initiative for the study and documentation of the Akre historic area, which is the focus of this study, was implemented in order to lay the foundation for future heritage conservation of this area. Various methods and technologies have been used to conduct survey and documentation activities with the results showing there is still 63% of the buildings having historic potential posing individual and collective value, and 68% of the building occupants still willing to stay in the historic area despite the existing difficulties. Meanwhile, the business is in decline in the old bazaar. This research reveals that the role of collaboration between governmental and non-governmental stakeholders is fundamental to conducting proper documentation of areas with a high density of historic buildings. It involved a collaborative approach that necessitated methods and technologies that fulfill the objectives of all stakeholders, and is expected to lead to further collaborative work for the heritage conservation in Akre historic area and other historic areas in the context.

Keywords: Akre historic area, Historic buildings, survey and documentation, Conservation plan, Collaboration.

1. Introduction

Survey and documentation are a fundamental step for the protection of heritage including historic buildings. Historic buildings are an important asset for sustainable development. Investment in the conservation of such assets is acknowledged as an effective strategy for shaping identity of the territory, poverty reduction, empowerment of local communities, and social cohesion.

Documentation of historic buildings is important (Dems, 2002) for understanding a heritage site and the factors affecting its condition (Council of Europe, 2009; Muhamad & Chabbi, 2012), and it helps develop an effective conservation and management plan. Therefore, documentation is essential to the sustainability of the site (Council of Europe, 2009).

Many international instruments, such as the Athens Charter of 1931, the Venice Charters of 1964, the International Council of Monuments and Sites (ICOMOS) in 1996, the Australian Burra Charter of 1999, and the ICOMOS Principles for the Conservation of Heritage Sites in China in 2015 emphasized the importance of the documentation of historic buildings (Haddad et al., 2021). Nations could also have guidelines for the survey and documentation of historic building, such as the San Francisco Guidelines set in 2005 and the Guidelines set by the United Kingdom Royal Commission for the Historic Monument of England in 1996.

Methods and technologies used for metric documentation of historic buildings continuously evolve, including: (i) non-image-based technology such as manual/ direct measurements (using tape and rod), total

Station, and global positioning system (GPS) to laser scans, and (ii) image-based technology such as close-range photogrammetry, Unmanned Aerial Vehicles (UAVs), etc. (Hassani, 2015). These new technologies for digital documentation make the process easier and faster and allows for better storage of information. The purpose fusing both techniques is to produce 3D models. There is continuous debate on what survey and documentation of historic buildings should include (Bob Hill Mrics, 2005). LeBlanc and Eppich (2005) of The Getty Conservation Institute stated that documentation encompasses two main activities: the first is capturing information such as physical characteristics, history and problems related to the site. The second activity includes the process of organizing, interpreting, and managing the collected information. Performing these activities helps in the process of heritage protection in many ways, such as:

- Serving as a medium for creation of a lingua franca among different disciplines involved to communicate the character and interpret the importance of historic buildings.
- Assessing the value and significance of the site.
- Guiding the process of conservation.
- Providing a tool for managing and monitoring the site.

This reveals that documentation is not an easy task, but it rather needs other information than measurements, such as intangible descriptive data (fabric, history, social and locational) to ensure holistic understanding and assessment of the site significance before a conservation plan takes place (Feilden and Jokilehto, 1998). As a result, different methods need to be used to collect data on sites, such as oral and written information, graphics and photographs, and old maps.

However, the parameters that may be included during survey and documentation depend on many factors: the site characteristics, the site scale (single building or urban area), the type of issues, professionals involved in the process, information previously collected by local government, etc. Moreover, documentation also needs budget, time, relevant skills, different technologies and involvement of many different disciplines, such as historians, archaeologists, surveyors, photographers, architects, engineers, information technology and computer, etc. Thus, collaboration among agencies (governmental and non-governmental) is essential.

Documentation is a continuous process; it should not only apply to the first phases of conservation. Rather, documentation should be conducted in all phases throughout the conservation process. (ICOMOS, 1996) (ICOMOS New Zealand Charter for the Conservation of Places of Cultural Heritage Value, 2010). Digitization of documented information to produce digital archives has become preferred internationally due to storage convenience and data reuse along the conservation process (ICCROM, 2005). Digital technology can help conservation team with monitoring the intervention in the site (Hassani, 2015). However, the information collected from documentation activities can be used repeatedly, particularly for the integration of a conservation plan with other plans such as the tourism plan. This integration is necessary to ensure sustainability (Ismael, 2015; Ripp, 2011).

In Iraq, survey and documentation have been valued as a required step of heritage conservation in sequential heritage laws since early 20th century, with the most recent law, Article 8 of the Iraqi Heritage Law no.55, being passed in 2002.

However, no guidelines were imposed by the legislation to survey and document the historic buildings to assess the local governments. The Directorate of Antiquities in Duhok Governorate is the main agency responsible for survey and documentation (Iraqi Heritage Law no.55, 2002). This directorate has departments in all the six districts of Duhok. It relies primarily on foreign professionals for sites with high architectural details that require modern technologies such as laser scan or UAVs (Ismael, 2021), highlighting lack and limited ability of the professionals to conduct proper documentation, particularly for historic buildings within the directorate. Many valuable historic buildings especially in small cities such as Amedy, Akre and Zakho are being lost or altered more rapidly than it can even be documented (ibid, 2). Generally, few sites in Iraq have been documented properly. This limitation is caused by several factors, such as inadequate resources and budgets, the huge number of heritage sites to be documented, difficulties in site accessibility, security considerations, the lack of experts in new documentation technologies, community ignorance, etc. (Alsadik, 2020).

All the district departments of the Directorate of Antiquities are understaffed and lack knowledge of new technologies for documentation. Therefore, their staff primarily rely on hand measurement, theodolite, and heterogeneous photographs. Using such conventional documentation methods is considered time-consuming and resource-intensive, particularly in areas with a high density of historic buildings. According to the Law no. 55 of 2002, the Directorate of Municipality and the Directorate of Urban Planning must coordinate and collaborate with the Directorate of Antiquities in heritage conservation.

However, these two directorates focus more on improvement of utilities and development of new expansions of cities rather than the revitalization of historic cities. Thus, the historic buildings in these historic cities have been left to an uncertain fate.

Currently, initiatives have been made by the High Committee of Strategic Planning (HCSP) of Duhok Governorate in coordination with Directorate of Antiquities of Duhok Governorate with international NGOs in the region to create job opportunities through heritage conservation, especially considering Akre District reaching an unemployment level of 16% in 2022 (Directorate of Statistics of Duhok Governorate, 2022). One example of such initiatives is the survey and documentation of buildings in the historic area of Akre, which was a collaborative effort between government-related agencies, the University of Duhok, and Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ).

The aim of this article is to further emphasize the importance of survey and documentation of cultural sites. This research presents part of the results of the survey and documentation of buildings in Akre historic area, along with the methods and the technology used in the documentation process. It also illustrates how heritage documentation practices in the study area are approached from a collaborative perspective.

2. Study area

Akre City is one of the historic cities in Iraq and the Kurdistan Region of Iraq (KRI). It is the center of Akre district, which is one of the six districts in Duhok Governorate (Figure 1). The historic area of the city is registered as a cultural heritage site in the national inventory of Iraq, called the *Atlas of Archaeological Sites in Iraq*, which was published by the Ministry of Culture and Information of the Republic of Iraq, specifically by the Directorate General of Antiquities in 1970.

Akre historic area is said to have been settled as early as the 7th century BC. According to William Wigram and Edgar Wigram (1922), Akre is one of the oldest settled areas in the region. Many major powers throughout the history ruled over the city, such as the Medes, the Assyrians, the Romans, the Islamic empires, and the British, but left behind a valuable legacy. The city also has the insignia of the Bahdinin Emirate, which ruled the city from 1376 until 1843.

The historic area of Akre was founded along the steep hillside below the former castle, and it overlooks the orchards in the valley. It consists of three residential neighborhoods: The Jewish neighborhood, Gorava, and Qapaki, in addition to the historic bazaar. The buildings in historic area are distributed organically in the hill side shaping a terrace form. The traditional main building materials used in Akre historic area consist of natural and curved stones, lime, and wood. The buildings in the historic area are connected with each other horizontally through a sophisticated system of narrow zig-zag alley networks, and sometimes those alleys are cul-de-sacs. Vertically, the historic buildings are connected by staircases. When navigating the historic area, the alley network can suddenly lead one from a public space to a more private one.

Due to the terrace form of the historic area, it is common for residents to perform activities on the roof of a house below them. These houses are mostly one- or two-story buildings, and sometimes different houses share the same roof. However, the lower houses never obstruct the view of houses above them. This significance utilization of the space is characterized by social cohesion and interaction, and the level of trust the residents have towards each other. The terrace form of the historic buildings represents the main character-defining elements that pose the value and significance of the historic area of Akre (Ismael, 2015). However, due to the site constraints, horses and donkeys are used until today to transport goods and also collect garbage, as some of the alleys are too narrow and sharp for vehicles to move on.

In addition, the general master plan developed for Akre City in 2011 focuses mainly on the expansion of the city, while largely excluding the historic area from study, although it clarifies that the historic area needs a specific master plan that is focused on heritage conservation (Municipality of Akre, 2011). However, no steps have been taken by the government towards developing a conservation plan of buildings and a revitalization plan for the area. The only intervention that took place in the historic area was in 2012-2013 when a reconstruction strategy was chosen for some number of historic buildings within the historic area; however, it was not based on the documentation data.

Hence, the result was the loss of the values of each reconstructed building as well as traditional visual integrity of the historic buildings (Ismael, 2015). Due to the economic crisis starting in late 2014, funding for the government's reconstruction project was entirely suspended. Thus, it was an opportunity for discussing weaknesses and needed reorientation of the conservation action plan that was developed with the responsible agencies. The biggest threat to the historic image of Akre historic area is the residents rebuilding their houses with new materials and architecture or modifying their houses according to their needs, following a lack of support from the government in renovation. However, no survey or

documentation has been performed to know the number and spatial distribution of buildings that still have historic feature and potentials. The lack of documentation also leads to a lack of data with which to assess the value of each building, whether individually or collectively.

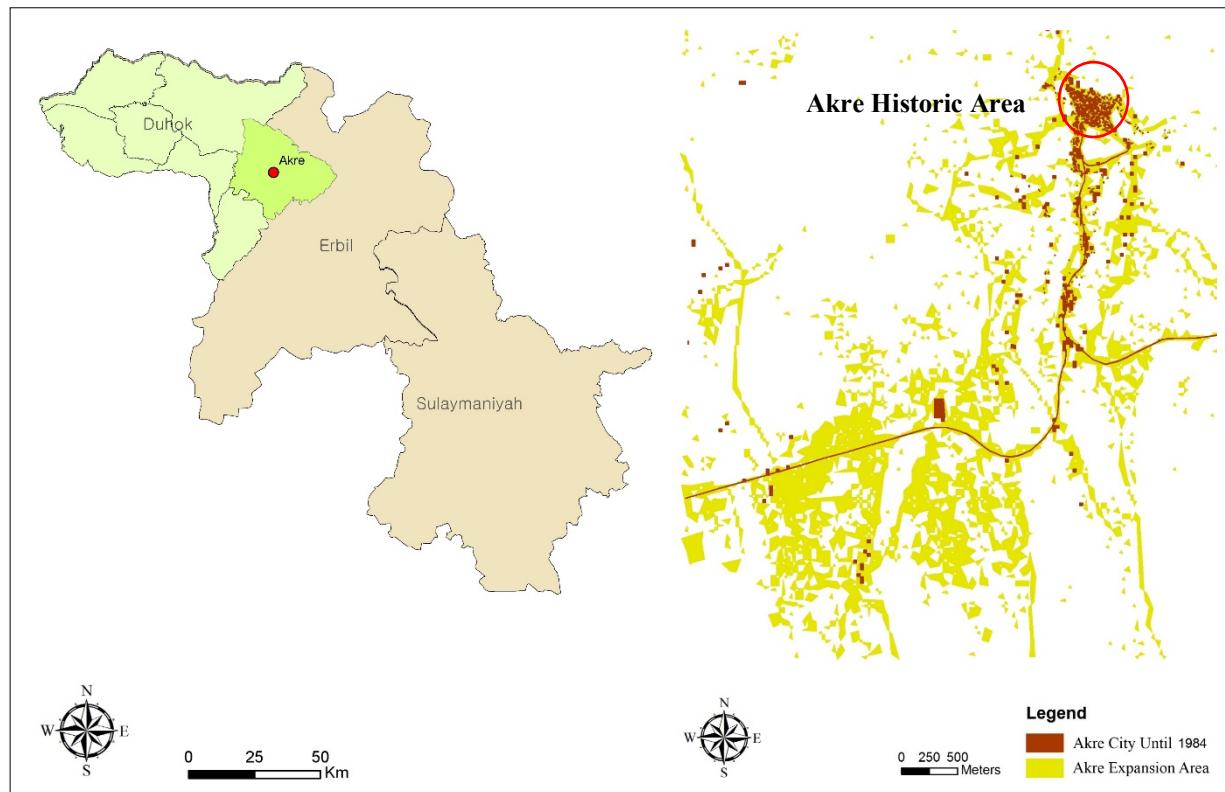


Figure 1: A: Akre City in the Context of Kurdistan Region of Iraq. Source: KRG, 2008

Figure 1: B: Akre Historic Area within Akre City. Source: Authors, 2022

3. Methods and Methodology

Research has shown that different methods and technologies can be used for survey and documentation of heritage sites. The choice of the method and technologies depend on numerous factors, such as the characteristics and scale of the site, available budget, professionals involved in the process, etc. This research discusses the methods and technologies applied in a collaborative activity of documentation of historic buildings in Akre historic area.

Many stakeholders were involved in the documentation project, including governmental (e.g., the HCSP of Duhok Governorate, the Directorate of Antiquities of Duhok Governorate, the Directorate of Antiquities of Akre City, and the Directorate of Municipality in Akre City), and non-governmental (e.g., the University of Duhok, and GIZ), along with a representative of the residents. In January 2022, several meetings were held by the stakeholders discussing the current situation of the historic buildings and the importance of documentation.

The stakeholders generally acknowledge the negative impact of the previous project of the historic buildings reconstruction that was selected as a conservation strategy. They also agreed that collaboration is necessary to collect data on the historic buildings because they were convinced that no single stakeholder (agency) would be able to conduct documentation for the site, and that it would require concerted efforts of multiple agencies to achieve this due to the existence of numerous challenges, mainly lack of experience within the government staff, different specialties needed for documentation, and the budget required. Furthermore, the involvement of non-governmental agencies is important to relevant governmental agencies, as they are considered neutral actors, due to the realization within governmental agencies that they have not been effective at developing a comprehensive conservation plan for the historic buildings, at a time when residents needed to make necessary changes to their houses. Thus, involving non-governmental agencies in the documentation process is important in order to build back trust with the local residents, particularly with owners.

The two researchers were both members of the HCSP and supervisors in the project. Both researchers wanted to know the extent to which collaboration would be effective in the documentation of historic

buildings, especially considering that many historic buildings in other KRI cities have not been documented.

All stakeholders shared a common vision for the heritage protection starting at documentation. However, each stakeholder prioritized different objectives to reach this vision. The HCSP of Duhok Governorate, for example, prioritized the creation of jobs in different districts, including Akre where the unemployment rate has reached 16%. The Directorate of Antiquities of Akre City prioritized the documentation of as many historic buildings as possible, whereas the Directorate of Akre Municipality placed more importance on the acquisition of data on the occupants (e.g., ownership status, income, family size) including buildings that have lost their historic features as it could help identifying the best strategy to deal with the occupants, particularly owners.

Professionals in the University of Duhok advocated for the use of different methods and technologies for documentation, such as close-range photogrammetry, not only traditional methods such as theodolite and hand surveys. GIZ prioritized job creation from documentation by opening up registration primarily for Akre residents, while emphasizing equal access to registration for all newly graduates by announcing the project on their website via specific link - with certain qualifications required, but with priority given to architects, survey engineers, and archaeologists.

However, the Akre residents prioritized completion of the documentation process as soon as possible in order to move to subsequent steps of developing a conservation plan and clear guidelines for the residents who want to make alterations to their houses based on their current needs. There was a consensus that the skilled workers involved in the documentation need to be local residents of Akre city due to their familiarity with the city and its people, and are thus better able to navigate the organic pattern of the historic area. Additionally, collection of data on the historic buildings could also foster a sense of belonging among the skilled workers who can also partake in future projects of heritage conservation in the area.

There was also a consensus that the building capacity of the government staff, particularly the two Directorates of Antiquities and Municipality in Akre, should be increased urgently. However, there were concerns among the stakeholders regarding the skills and specialties of those applying to documentation positions. Due to this, the final documentation program was not developed until the registration was completed and skilled workers were chosen. GIZ announced the documentation project through its Cash for Work (CfW) program (GIZ – CfW, 2022) from 6-17 March 2022.

During the period of announcement and selection of the participants, government staff from the Directorates of Antiquities and Municipality of Akre were involved in a 2-week workshop about the building capacity of heritage conservation. This workshop, funded by the EU through the ILUCIDARE Network and the World Monuments Fund and implemented at the University of Duhok, focused mainly on conservation issues related to the historic buildings, specifically the importance of documentation of heritage sites and conservation strategies. In addition to government staff, young academics were also involved in this workshop in the hopes that they would train the skilled workers who were accepted in the documentation project. Moreover, the researchers were able to obtain an orthomosaic map of Akre historic area from unpublished research. This image was acquired by Pro UAV, equipped with a DJI 1" CMOS camera (Effective pixels: 20M), through a flight mission on 17 September 2021. It was extremely important because the most recent satellite image the government has was acquired in 2009, while Akre's historic area has since then undergone many changes.

After the registration of applicants ended, GIZ announced the hiring of 45 skilled workers including 9 architects, 9 archaeologists, 4 surveyors, and 2 computer scientists. The rest were in other disciplines. In a meeting held on 31 May 2022, the stakeholders discussed the optimal time to conduct the documentation as well as the required logistics, and the representative of Akre historic area community informed the local residents of the documentation duration. Also, the Qishla Historic Building was selected to be the headquarters of the project.

The newly-hired skilled workers, particularly the architects, were also included in the meeting in order to brief the stakeholders about their computer skills especially in documentation softwares and their past experiences. During the meeting, the architects confirmed their know of how to use a wide range of softwares, including AutoCAD, 3ds Max, V-Ray and Lumion for rendering, in addition to hand measurement methods and tools. However, they lacked experience in applying this knowledge to historic buildings and in identifying parameters to be considered in the documentation. The newly-hired workers' skills, the number of skilled workers, the characteristics of the site (particularly the complexity of the urban pattern and form), the specified duration of the project (40 days within two months), and the main objectives of each stakeholder were all taken into consideration when designing the documentation program and activities. Based on the request of the Directorate of Municipality of Akre, the program

included survey of houses that lost many of their historic features (such as houses that were rebuilt by residents).

Moreover, GIZ's methodology of recruiting workers and the lack of applications from survey engineers forced the elimination of photogrammetric methods (close-range) of documentation, despite their convenience, short field work period, and low-cost of the equipment required (Hassani, 2015). However, the researchers already recognized that this method could not be the dominant method of documentation, as other methods were also needed due to the site constraints, the complex pattern of the historic area, limited visibility for the interior, the buildings sharing the roof mainly on the first floor, and narrow and zig-zag alleyway network and steep staircases. Furthermore, a considerable number of buildings were demolished or partially demolished, causing difficulties in finding suitable locations from which to make an adequate photographic record, etc.

Before conducting documentation, it was important to perform desk work, which covered dividing the survey area into zones, considering landmarks for each zone such as the Qishla building, the Old Church, the Grand Mosque, the Old Hammam, the health center, the city's traditional alleyways, and the border of the neighborhoods.

Another topic covered by the desk work was the selection of an appropriate scale for drawings, creating a list of requirements (e.g., clipboards, tape measures, paper, colors, copies of maps), designing different work groups and the survey form, and setting up a three-day training workshop for the skilled workers. Two teams were established:

Team 1 was responsible for the architecture survey including measurements, sketches, drawings, and description of building elements and characteristics, and problems. It consisted of four groups, each including 2 architects, 1 surveyor, and 1 archaeologist.

Team 2 was responsible for the data collection and entry. It consisted of 4 groups with the first including 18 members who interviewed heads of the household. For this, a specific survey form was used with a focus on the physical condition of buildings, date of construction, current and previous use, distinctive features of the building, occupants' data (family size, income, ownership, and their desire to stay or leave the buildings, along with their reasons) (Figure 2).

The second group consisted of 4 members who were responsible for data entry using excel program.

The third group had 2 members checking ownership data in the Directorate of Real Estate Registry in Akre (TAPO).

The fourth group had 4 members surveying the property prices and rent, along with open spaces, in addition to the traditional network of alleyways, which will be published independently in a research paper in the future.

The 13th of June 2022 was the official starting day of the 40-day project, which began with a 3-day training workshop for both teams. Day 1 of the workshop involved an introduction to the survey and documentation of historic buildings, its importance, methods, and techniques. Afterwards, the contents of the survey form were explained Figure (3).




 General Directorate of Antiquities & Heritage Duhok Directorate of Antiquities & Heritage / Akre Directorate of Antiquities & Heritage Documenting Historic Buildings in Akre 2022		 Duhok Directorate of Antiquities and Heritage		 Akre Directorate of Antiquities and Heritage		
Items	Applicable	Not Applicable	Script Data			
Location			Duhok	Akre	Quarter Name	
Code of the Building						
Name/State of Ownership			Building Name	Ownership State		
				Rent	Own	Others
Name of Owner/Institute			Civil	Public	Religious Affairs	
Building Usage			Residential	Mosque	Church	Others
Original Use of Building/Current			Original		Current	
Number of Building Floors			One	Two	One & Basement	Two & Basement
Dimensions/Height/Area			Height	Length	Width	Area
Occupancy State			Inhabited		Uninhabited	
Accessibility Condition			Easy & Possible		Difficult to Reach	
Building Condition/Previous Maintenance Works			Re-Built by Residents	Reconstructed by Municipality	Historic Building in Fair Condition	Demolished Historic Building
						Partially Demolished Historic Building
						Modified Historic Building
Date of Construction						
Architectural State			Doors	Windows	Alleys	Roofs
Cement Coat/Paint/Cover			Lime Mortar	Stones	Cement	Mixed
Roofs			Cement	Mud & Wood	Others	
Possibility of Acquisition			Possible		Impossible	
Building Characteristics			Plant Motifs	Engineering Motifs	Others	
Value of Building			Very Important	Important	Little	None
Number of Ownership Document						
GPS						
Number of Photos						
Heritage Authority			Available		Not Available	
Families Living in Each Building						
Number of Members of Each Family			First Family	Second Family	Total	
Monthly Income						
Local Handmade Products						
Desire to Stay in the City?			Yes/Why?		No/Why?	
Sector Where the Head of Family Works			Public Sector		Private Sector	
Is there a shop in the building?			Yes		No	
Person Responsible of Survey						
Date of Survey						
Date of Report						
Important Notes						

Figure 2: Survey Form



Figure 3: Groups in Team 1 and Team 2 at First Day of Training

However, there were concerns over the ability of the group responsible for the survey forms to properly identify the physical condition of buildings. Six categories for building conditions were formed according to the previous knowledge of the researchers and visual inspection during the site visit by all groups: fair condition, modified (alteration, cement layer added to the facade or interior, a new partition added using cement with concrete blocks), partially demolished (part of the building is collapsed), completely demolished (ruin or walls remained without roof), rebuilt by residents (new building using modern materials and designs), and re-constructed by the Municipality of Akre (reconstructed by the municipality under previous "conservation" project in 2010) (Figure 4). Thus, all 45 skilled workers were divided into 7 temporary groups, with each group having a number of architects and archaeologists, and a leader. These groups visited the historic area, with each group going to their respective zone, using copy of the orthomosaic map and color markers and coding each zone with a number starting with 1. They started identifying conditions of the buildings in each zone after each building was coded using a 3-digit number, and the condition and the number of each building illustrated on the map of each zone Figure (5). Day 2 of the workshop involved splitting of the trainers (academic staff) into two groups.

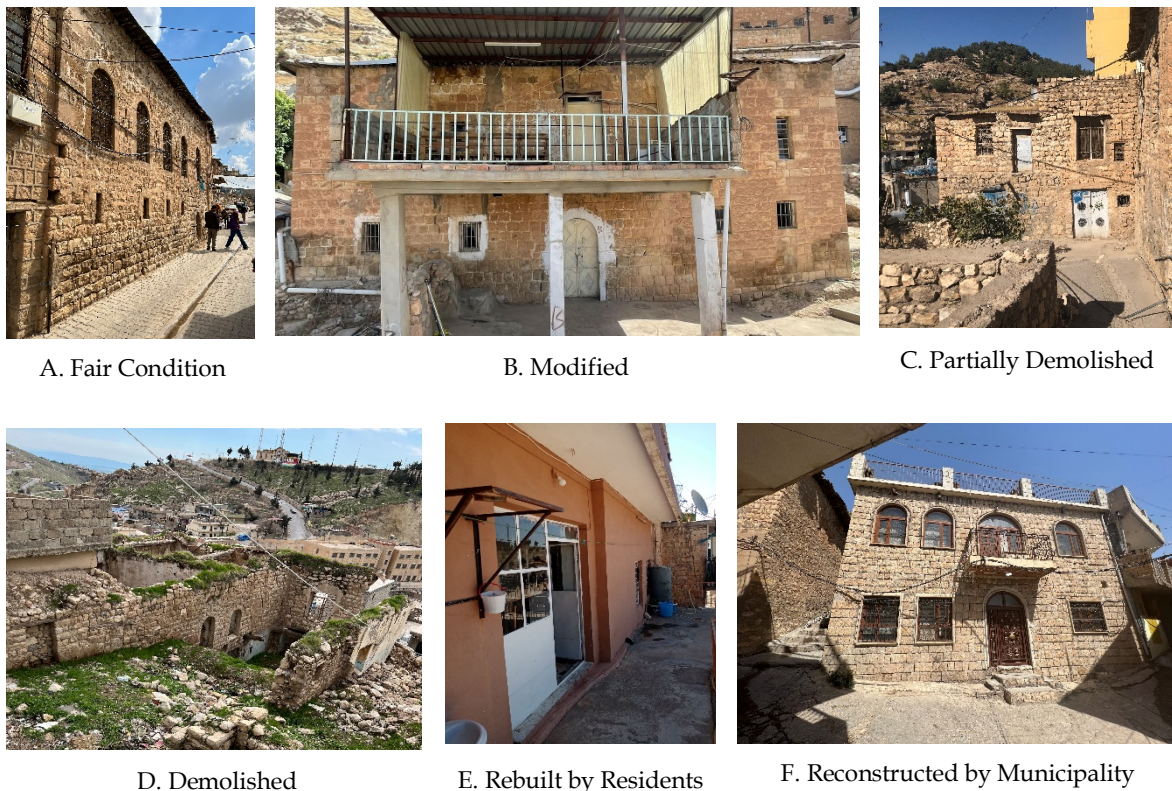


Figure 4: Building Conditions in Akre Historic Area

The first group discussed with Team 1 on the appropriate scale of drawing i.e., 1:50 scale for all floor plans, sections, elevations and structures, and 1:20 scale for details of doors and windows and 3D model of the buildings. Three forms of descriptive data were distributed among the four groups of the team, including data on the roof, façade, opening, frame, perspective, view from the building, an important person who once occupied the building, an important event associated with the building, date of the building construction, previous use of the building, and old photos of the buildings. The results of the descriptive data are not presented in this article; however, they will be integrated into the produced drawings data to be used in the assessment of the value and significance of the documented historic buildings which will be based on comparative analysis of the historic buildings in the study area. The methodology and results of the value and significance assessment of the historic buildings will be published in a separate article.

The second group trained Team 2 on the coding system for buildings, consisting of three parts: a capital letter representing the first letter of the neighborhood name, a small letter representing the zone, and a number representing serial number of the building.

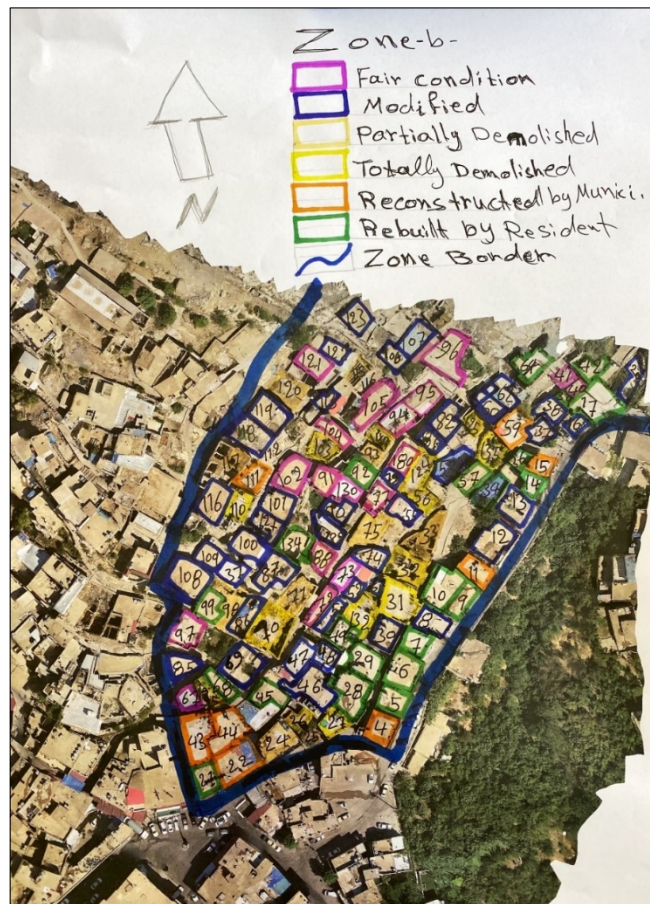


Figure 5: Coding and Identifying the Conditions of Each Building in Zone b

For example, “Gb60” represents Gorava neighborhood, Zone b, and building no. 60 (Figure 6). The group responsible for the survey forms were also trained in interviewing the residents and proper etiquette with occupants. If identification of the head of the household was not possible, the group members were encouraged to visit them later in order to obtain data. If a building was not occupied, the neighbors would have to be interviewed. This group was also trained in data entry primarily using electronic tablets. Organization of the collected data discussed with the group responsible of the data entry (Figure 7).

The group responsible for collecting data on property price and rent under Team 2 interviewed 5 real estate agents for data on property prices and 47 tenant households for data on rent following a clustered sampling method. In zones a, g, and f, 5 buildings were selected each, while in zones b, c, e, and d, 8 buildings were selected each. The selection was based on the data collected by the group responsible for the survey forms; these data identified the number of buildings in rent along with their codes and different physical conditions of the buildings. However, the result, methods and methodology of data collection followed by the group responsible for data of open spaces and traditional network of alleyways will be published in a separate article as mentioned earlier. On the last day of the training workshop, Team 2 officially started the work (Figure 8), while Team 1 was trained in hand surveys and theodolite surveying.



Figure 6: Building Photo with Code



Figure 7: Data Entry Group



Figure 8: Team 2 Interviewing Head of House Hold

Two buildings (Jc14 and Jc67) were used as training grounds for this procedure, both in Zone c (Figure 9). An example of the descriptive data was explained for all the groups. Team 1 and Team 2 were not working in isolation; they instead exchanged information as data was collected (Figure 10), particularly since Team 2 collected data at a higher rate. For example; Team 2 had to inform Team 1 of any historic features they observed on a building (e.g., engravings, old text, any uncommon feature in the interior layout, old materials used in windows or doors, tunnels hidden in a historic building, etc.) so that Team 1 could prioritize these buildings in the drawing process. Another example was when both teams encountered houses that shared the same slab (2or 4 houses). These buildings were seen in the orthomosaic map as one building and thus were given a single code. Thus, when any group of Team 1 and Team 2 identified this feature, they would inform the other team to correct the numbering code of the houses. For example: Buildings with code: Jc105, Jc106, Jc 65 and Jc64 in Zone c are sharing the same roof.



Figure 9: Training Group Members in Team 1 Using Hand Measurements and Theodolite

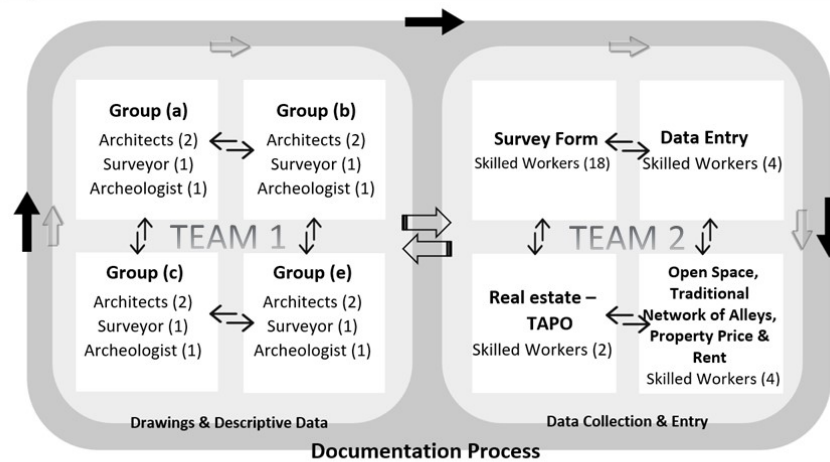


Figure 10: Continuous Interaction Between Working Groups of Team 1 and Team 2

Data collected by Team 2 specifically the group responsible for the survey form, along with the data collected by the members of the groups in Team 1 and the researchers through the purposeful site visit to each zone. These data were compared and analyzed to determine which buildings to prioritize for preparing detailed architectural drawings and collecting descriptive data. This process depended on the selection of the data which was based on criteria such as conditions, important features, visual prominence, and representativeness. Moreover, the collective value, which is the building's role in raw or cluster showing the important features in the urban fabric, was also considered. The time taken to document each building varied, with some buildings taking one day to complete, although the majority of the buildings took 2-3 days to complete per group (Figure 11).

Every two weeks, a break was given in order to review the data collected and discuss any issues the groups faced. During the monitoring process, it was revealed that 30 buildings required revision of codes; of those, 10 buildings required a second site visit, which was required due to data entry errors, specifically use of the same photo for two different buildings. The hard and digital data collected by both teams were provided to the Directorate of Antiquities in Akre as the main responsible agency.



Figure 11: Architecture Groups in Team 2

4. Results

During data collection, more specifically the data from survey form, it was revealed there were 650 buildings used for different uses in the historic area of Akre.

One survey form was completed for each building. The data concluded that 1,727 inhabitants and 419 families live in the historic area. and 64% of the buildings were privately owned while 30% were rented (Figure 12 A).

The remaining 6% were unregistered in the Directorate of Real Estate Registry in Akre (TAPO). Among the 650 buildings in the historic area, 88% (569) are used for residential purposes, 10% (68) are commercial buildings, and 2% (13) are public buildings (Figure 12 B).

Four percent (25 of 569) of residential buildings use part of the building as a small business, and 81% (461) of the residential buildings are occupied.

Data from the site visit and the interviews held with the heads of households show that the highest category of the buildings was the modified which included 219 buildings; this highlights the need for alterations by many families, particularly due to extended families and many of these buildings required consolidation.

The second category in ranking was the rebuilt by residence, which included 179 buildings and involved changes with the massive amount occurring after 2005, as illustrated in the historic photos of the city.

The third largest category were the historic buildings in fair condition, consisting of 121 buildings, of which 97 are occupied (Figure 13).

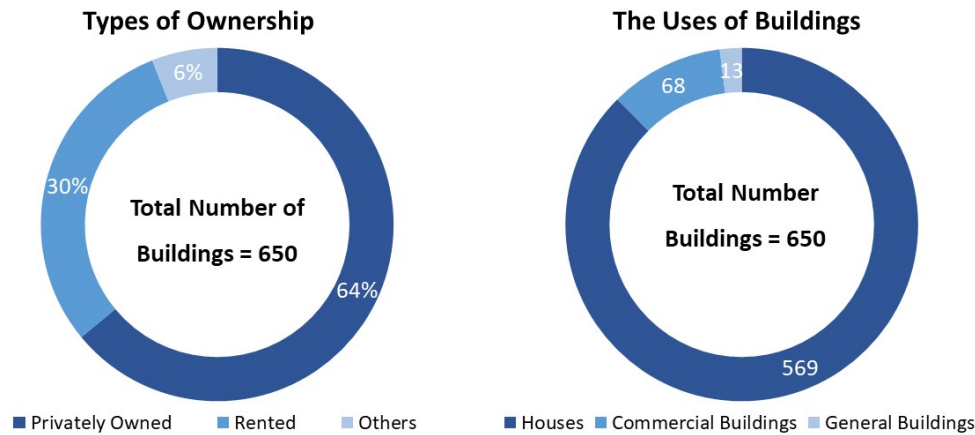


Figure 12: A: Ownership of Buildings in Study Area **Figure 12: B: Type of Uses of Buildings in Study Area**

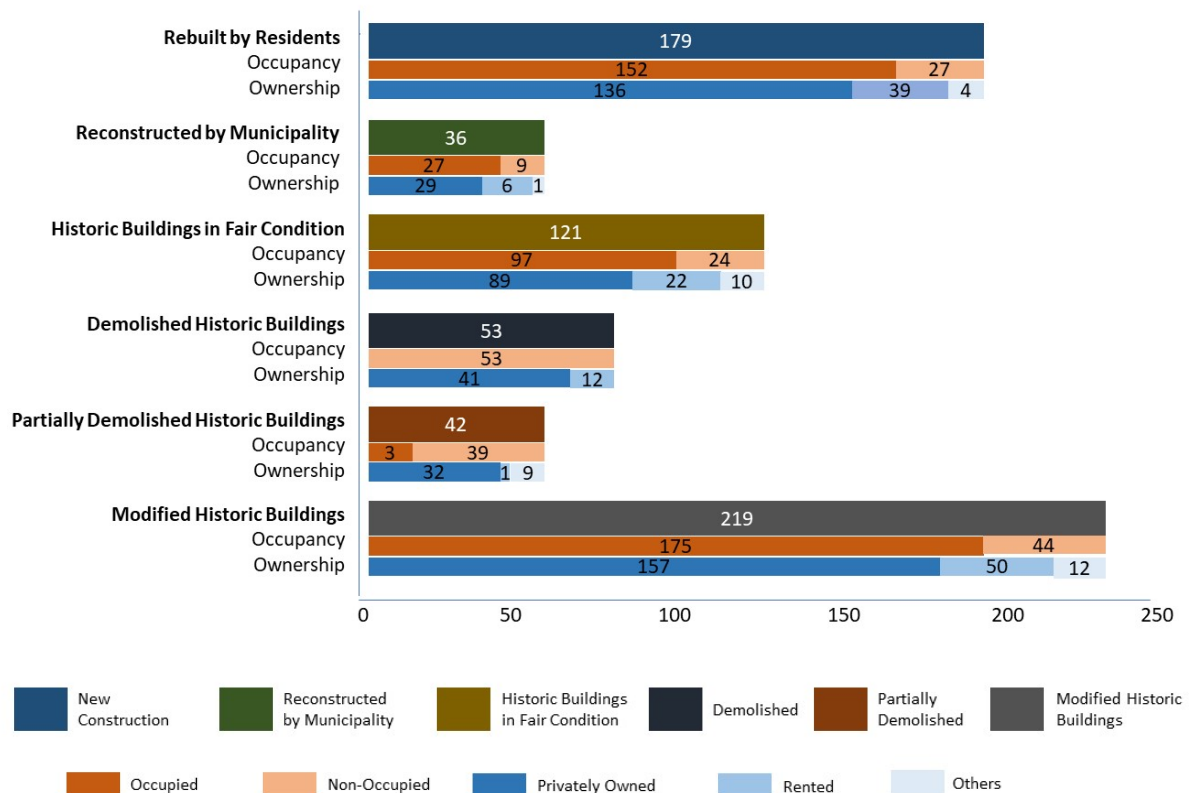


Figure 13: Buildings' Condition, Occupancy and Ownership Status in Akre Historic Area

Half of the buildings in this category are in zone c (Figure 14). The results show that 63% of the buildings continue to have historical potential, as they are included in the following categories: modified, partially demolished, demolished and historic building in fair condition.

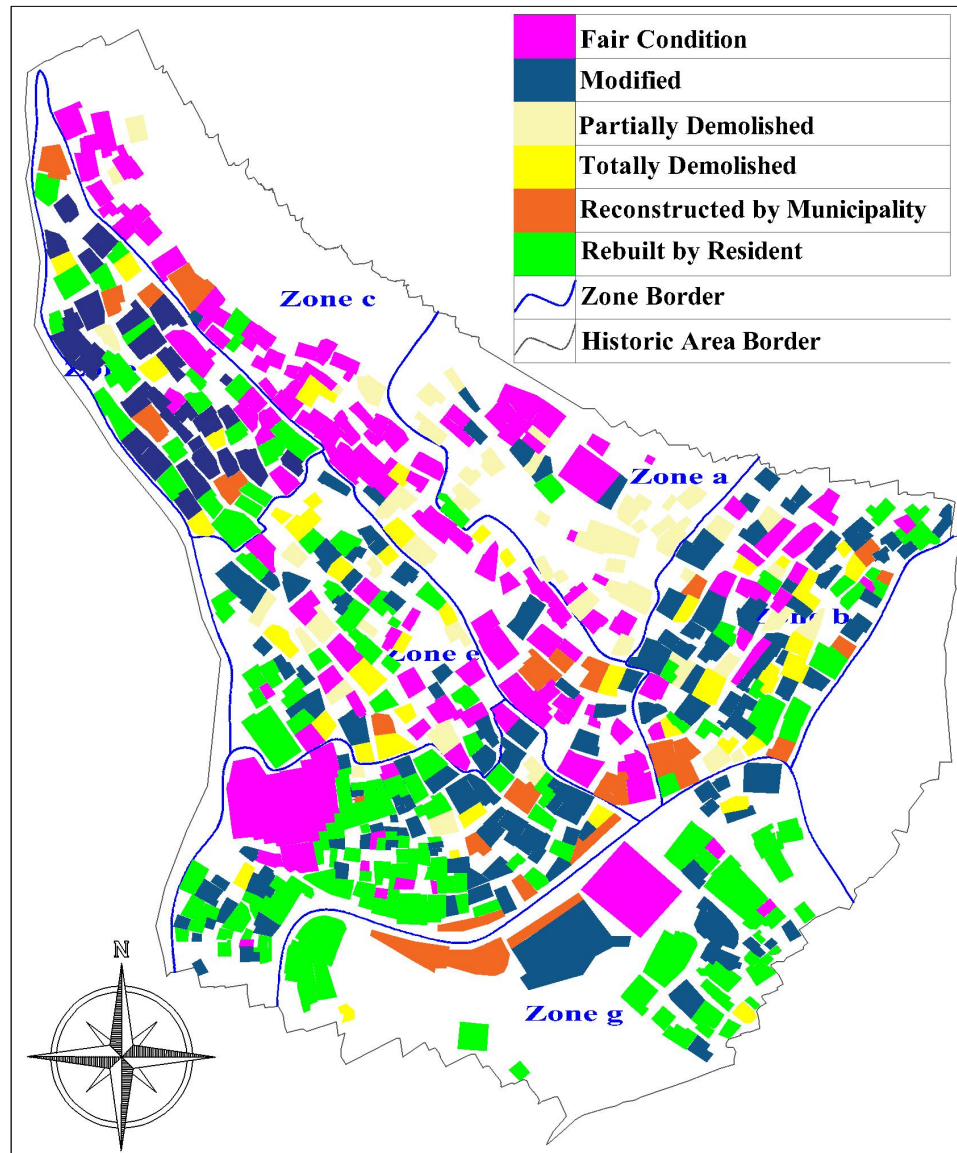


Figure 14: Spatial Distribution of Buildings' Different Condition in Akre Historic Area

Occupants in 461 buildings were questioned by the form survey group on their desire to remain in the historic area.

The majority of respondents (68%) expressed a desire to stay in their houses. Of those occupants, 57% cited attachment to the city and safety as their main reason for this desire, while 26% cited the affordability of life in the historic area. A further 15% mentioned proximity to work and other activities in the historic area, while the remaining 2% did not mention any specific reason (Figure 15).

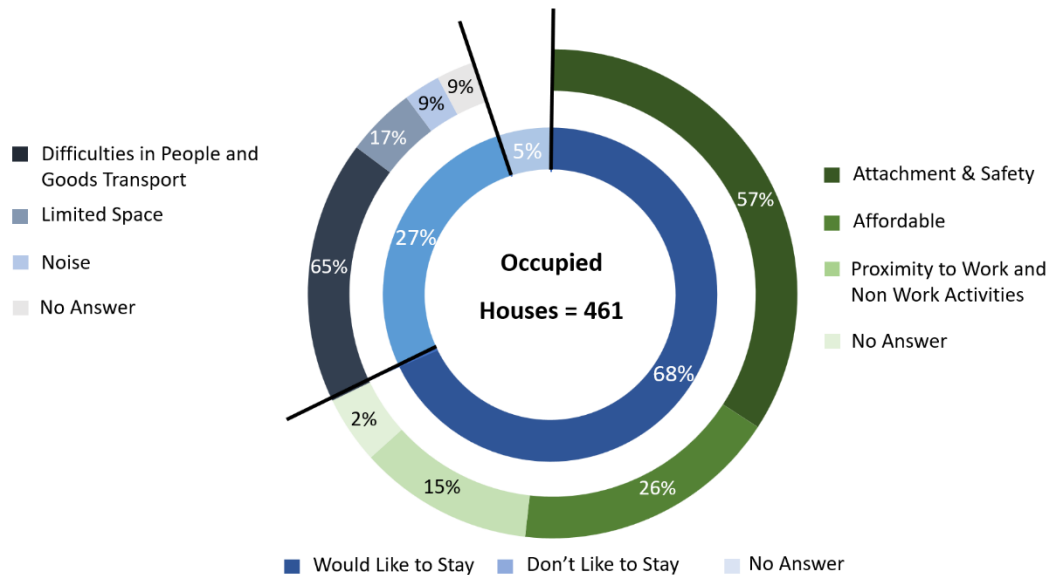


Figure 15: Occupants Desire and Reasons to Stay in or Leave from Akre Historic Areas

Meanwhile, 27% of respondents wanted to leave the historic area. Of those occupants, 65% mentioned the difficulty in mobility and in the transport of goods. This issue was prominently faced by the residents in zone a and b. another 17% cited lack of space in their houses. A further 9% whose houses are located near bazaar mentioned the noise in the historic area as the primary reason for the desire to leave. The remaining 9% did not define any reason for their desire to leave (Figure 15). During the interviews with the heads of households, almost all participants expressed urgency of having guidelines to be set by the government as they urgently need to renovate their houses. They also wanted to know about the government plans for the historic houses and whether the government would support them in maintaining their houses. Another important point highlighted by the residents including those who rebuilt their houses is an urgent need for the government to intervene regarding demolished and partially demolished houses as they pose a safety risk to nearby residents. Houses in the historic area cost considerably less than other areas mainly in the recent expansion of the city in terms of rent and sale. Buildings in the historic area can be sold for as low as \$5000 to \$40,000 per house. Monthly rent in this area can vary from \$40 to \$80 per house. The affordability of life in the historic area can be attributed primarily to the people's income, which stands at a monthly average of \$170. It is to be noted that the lowest monthly income in the historic area is \$100, while the highest is \$800. Additionally, the buildings located in the lower zones (such as g, e, and f) of the historic area cost more than houses in the higher zones (such as a and b), and the price difference between the historic houses and the renovated houses is negligible. The old bazaar of Akre contains 209 different businesses, in addition to another 82 businesses, which have been closed since last year due to low number of customers despite the low rent of the old bazaar shops relative to the newer areas of the city (Figure 16).



Figure 16: Old Bazar in Akre Historic Area

The majority of the closed businesses primarily sold local products. The failure of these businesses is an indicator of the lack of government effort in advancing the historic area as a tourist hotspot although the bazaar is around 300 m away from Sipa site (natural waterfall), a tourist natural hotspot visited by hundreds of thousands of people a year (Directorate of Statistics of Duhok Governorate, 2022). The current land use of the historic area is shown in the map in (Figure 17). Buildings illustrated in the map include one historic church crowning the historic area of the city at the top, eight mosques, one old hammam, one health center, the Qishla building dating back to Ottoman times, one primary school in the lower part of the historic area, the old bazaar at the bottom of the historic area which stretches mostly across Zone d, and small shops that are located across different zones. However, the dominant use of land in the historic area is housing. The smallest plot used for housing has an area of 32 m² while the largest plot has 300 m². Seventy-six percent of plots used for housing have an area of less than 100 m². In addition, the data shows historic area of Akre has an area of 32,1 Acres, and the population density is 54 inhabitants per acre, which is close to the high-density standard set by UN Habitat, which is 60 inhabitants per acre (UN HABITAT, 2014). Most of the open spaces in the historic area consist of steep natural terraces not suited for large gatherings of people. Plots holding historic buildings that have now become ruins are currently used for backyard farming by other households (Figure 17). Since Team 1 consists of four groups who were chosen from the seven zones of the historic area so each group can focus on one zone to prioritize buildings based on their historic potential to provide detailed drawings and descriptive data. The result of the data collected by the groups responsible for survey forms in Team 2 shows the number of buildings in each category of condition and in each zone (Table 1). The table shows that the most buildings with historic potential are in zone e, c, b, f, a, d, and g per the order of their numbers. The above data were triangulated with the data from previous knowledge of both researchers in the area, and the data from the purposeful site visit by all groups in Team 1 along with researchers. Selection of the data was based on criteria mentioned earlier in the methodology section. Zones a, b, c, and e were chosen. Zone a was chosen over Zone f despite the latter having more buildings with historic potential; this is primarily due to the buildings in Zone f being scattered further apart, while Zone a had buildings with important features individually and buildings clustered much closer together around the church.

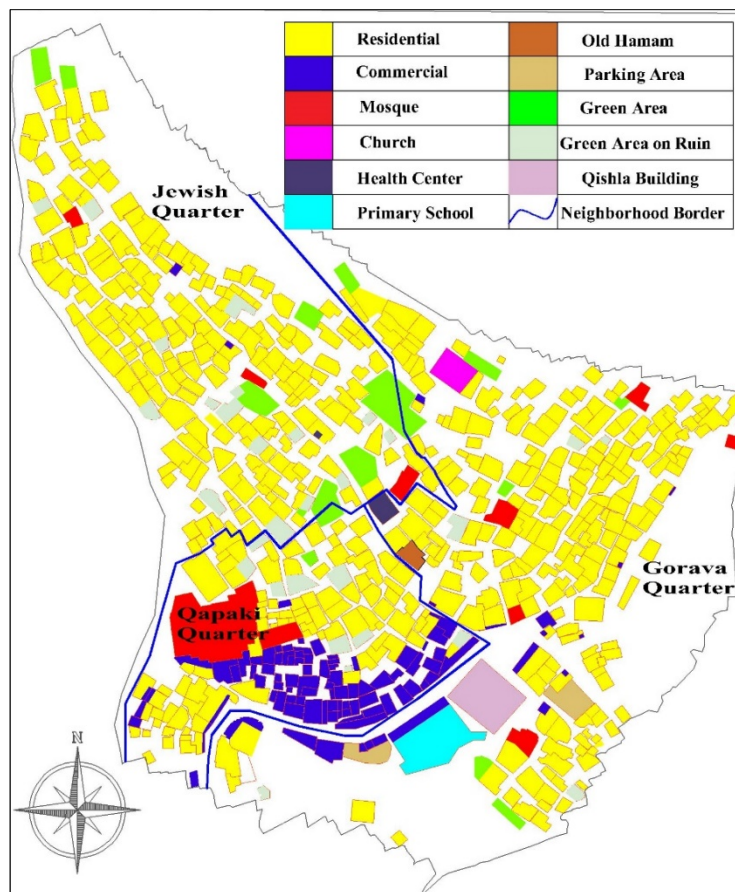


Figure 17: Land use Map of Akre Historic Area

Zone Condition	a	b	c	d	e	f	g	Total
Rebuilt	2	16	31	54	20	23	33	179
Reconstructed	1	10	7	6	1	8	3	36
Fair Condition	13	10	61	5	17	11	4	121
Demolished	0	14	13	3	15	5	3	53
Partially Demolished	3	12	7	5	13	2	0	42
Modified	28	49	9	25	56	34	18	219
Total of Buildings with Historic Potentials	44	74	90	38	101	52	25	650

Table 1: Number of Buildings in Condition Categories

Two hundred buildings were selected from the four zones in the first round. However due to the time constraints of the project, 80 buildings were prioritized for the detailed documentation (Figure 18). Buildings that held very important features were also selected, even if they are located outside the four study zones, i.e. the building receive code Gg24 in Zone g.

However, the drawing data of 80 buildings reveal important features, both for individual buildings or groups of buildings that are mostly located in Zone c and e which are part of the Jewish neighborhood. The data show a diversity in typology, construction method, interior layout, and façade design, as well as different designs of arches of windows and doors, thus reflecting the Roman and Islamic influences in the architecture of the city throughout history.

Moreover, the data show the originality of the design and materials and diversity in plans and structure which all indicate adaptation to site constraints, particularly the limited space available in the hillside, with consideration of each building's view, thus resulting in the terrace form of the city. This terrace form is significant in that it is the only terrace character out of all the historic cities in Iraq. Tables 2, 3, 4 and 5 show the traditional architectural details of eight buildings, of which two were selected from each one of the four zones studied. These details include the building code, plans, elevations, sections, windows and door details, and photos. The architecture data of the studied buildings along with descriptive data would perfectly serve the determination of the importance of buildings by a rating system ranging from highest to lowest importance with a comparative analysis of similar buildings in the study area and the context.

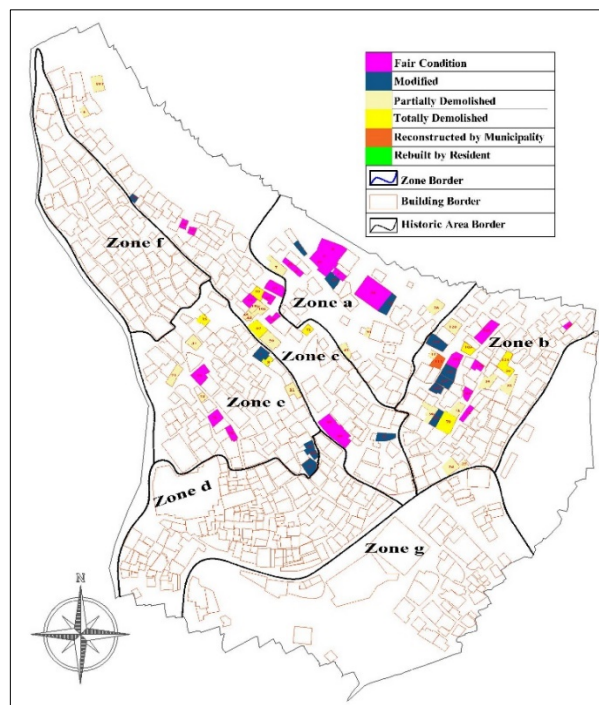
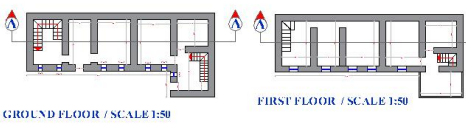
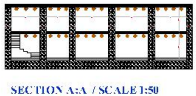
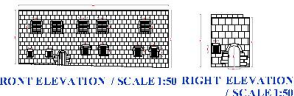
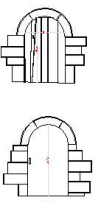
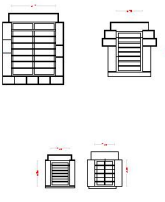



Figure 18: Selected Buildings for Documentation

B. CODE	PLAN	SECTION	ELEVATION
Ja 6 Ja 48	 <p>GROUND FLOOR / SCALE 1:50</p> <p>FIRST FLOOR / SCALE 1:50</p>	 <p>SECTION A-A / SCALE 1:50</p>	 <p>FRONT ELEVATION / SCALE 1:50 RIGHT ELEVATION / SCALE 1:50</p>
DOOR	WINDOW	PHOTO	
			

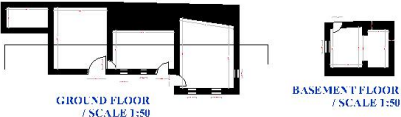

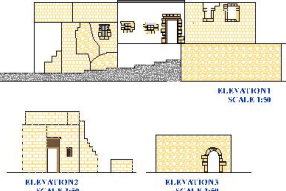
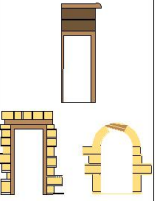


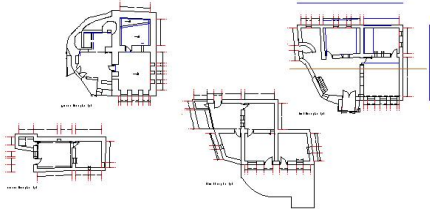

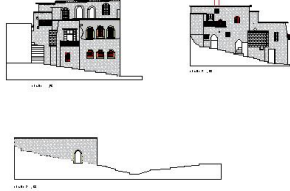
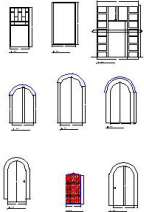
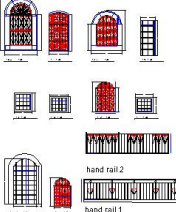

B. CODE	PLAN	SECTION	ELEVATION
Ga 24	 <p>GROUND FLOOR / SCALE 1:50</p> <p>BASEMENT FLOOR / SCALE 1:50</p>	 <p>SECTION A-A / SCALE 1:50</p>	 <p>ELEVATION1 / SCALE 1:50</p> <p>ELEVATION2 / SCALE 1:50</p> <p>ELEVATION3 / SCALE 1:50</p>
DOOR	WINDOW	PHOTO	
			

Table 2: Architectural Detail Drawings of Buildings with Historic Potential in Study Area in Zone a

B. CODE	PLAN	SECTION	ELEVATION
Gb 75			
DOOR	WINDOW	PHOTO	
			

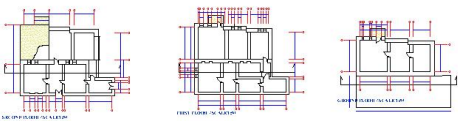

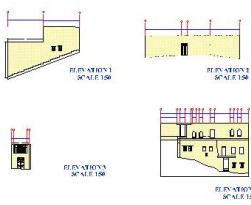
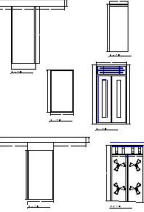
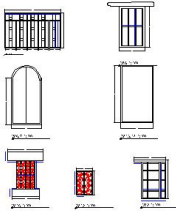

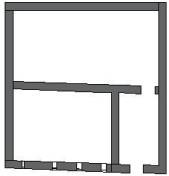
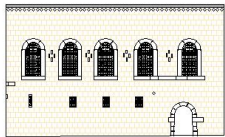
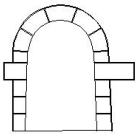
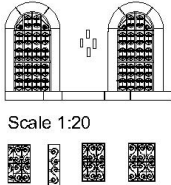
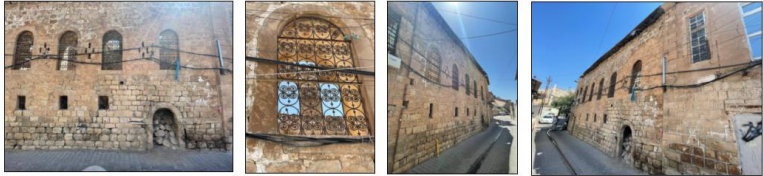
B. CODE	PLAN	SECTION	ELEVATION
Gb 117			
DOOR	WINDOW	PHOTO	
			

Table 3: Architectural Detail Drawings of Buildings with Historic Potential in Study Area in Zone b

B. CODE	PLAN	ELEVATION
Jc 67	 <p>Ground floor plan Scale 1:50</p>	 <p>Front elevation Scale 1:50</p>
DOOR	WINDOW	PHOTO
 <p>Scale 1:20</p>	 <p>Scale 1:20</p>	

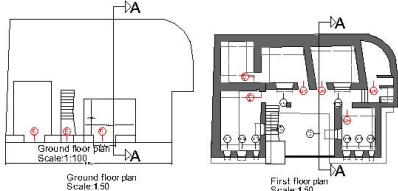

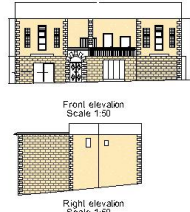

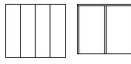
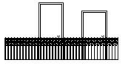
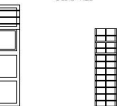

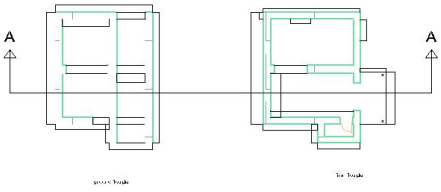
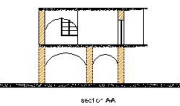
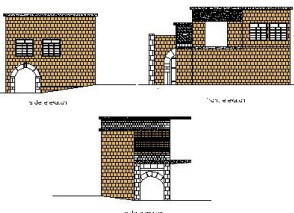
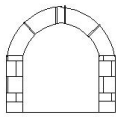
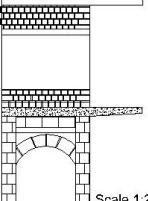
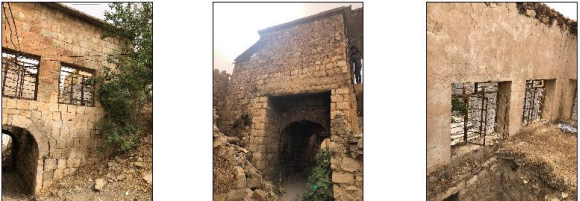
B. CODE	PLAN		SECTION	ELEVATION
Jc 70	 <p>Ground floor plan Scale 1:50</p> <p>First floor plan Scale 1:50</p>		 <p>Section A-A Scale 1:50</p>	 <p>Front elevation Scale 1:50</p> <p>Right elevation Scale 1:50</p>
DOOR	WINDOW	PHOTO		
 <p>Scale 1:20</p>  <p>Scale 1:20</p>	 <p>Scale 1:20</p>  <p>Scale 1:20</p>			

Table 4: Architectural Detail Drawings of Buildings with Historic Potential in Study Area in Zone c

B. CODE	PLAN		SECTION	ELEVATION
Je 15				
DOOR	WINDOW	PHOTO		
 Scale 1:20	 Scale 1:20			

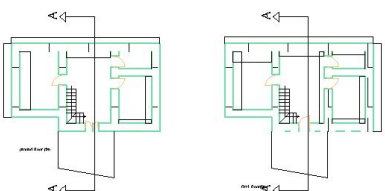
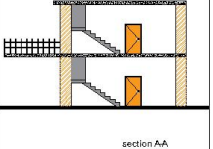
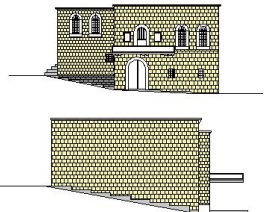
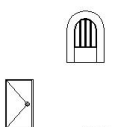
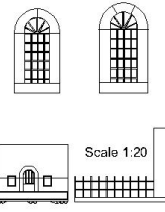

B. CODE	PLAN		SECTION	ELEVATION
Je 101				
DOOR	WINDOW	PHOTO		
 Scale 1:20	 Scale 1:20			

Table 5: Architectural Detail Drawings of Buildings with Historic Potential in Study Area in Zone e

Moreover, those data would help in designing the conservation plan of each building. Furthermore, the four examples of the 3D model of the group of buildings illustrated in Figure (19) could be used to set guidelines for preserving the traditional integrity of buildings represented in many features such as in the terrace form of the city. Another set of guidelines are needed to restore this feature in places where it has been lost, mostly in area where houses rebuilt by the residents and those reconstructed by the government are located. However, for the strategic plan with a heritage conservation vision, there is still a need for further collaboration efforts to collect data on the remaining important and deserved buildings.



Zone a



Zone b



Zone c



Zone e

Figure 19: 3D Model of Group of Buildings in Different Zones in Akre Historic Area

5. Conclusion

Akre historic area is significant for its cultural heritage. Recently, this distinctive area has been confronted with many challenges that impede sustainable development of the area. The city has been losing many historic buildings quicker than they can be documented. This has led to a gradual loss of the city's historic image.

The government has no strategic plan for the historic area of Akre. The potential of the historic buildings has not been tapped and well-integrated in the everyday life practices of the local residents, especially with respect to the related touristic activities. However, in recent times, heritage has come to be considered a valuable asset for achieving job creation through survey and documentation activities in light of the increasing unemployment rate of the city.

Documentation is a vital part of any conservation plan for the historic sites, and includes measurement data and descriptive data. Many methods and technologies can be used for survey and documentation.

Factors that influence selection of methods and techniques include site characteristics, available budget, and professionals involved. However, the collaborative approach of this project directed selection of survey and documentation parameters, and use of appropriate methods and techniques in order to fulfill objectives of all the stakeholders. The relevant government department employees require trainings in new documentation technology within image-based and non- image-based technology to have a more active role in the collaborative documentation activities.

The study results show that the majority of buildings in Akre historic area still hold historic potential with diverse traditional architecture. Moreover, more than half of the occupants expressed a desire to stay in the historic area despite the site constraints. Furthermore, this research concludes that there is still a large number of buildings that need urgent documentation.

The survey findings including ownership, building condition, occupants desire to stay in or leave the historic area along with their reasons, property prices, and income could help the local government in Akre city identify the best strategies for dealing with occupants specifically owners through acquisition, tax credits, or any other measure to encourage occupants to preserve the historic buildings. The above data along with measured and descriptive data can be used repeatedly to develop a conservation plan, plan tourism trails, develop a land use plan ensuring integration of the historic area with other areas of the city, and set guidelines and standards for buildings with or without historic potential.

The role of non-governmental agencies is fundamental to heritage documentation, particularly if there is a large number of sites that require documentation. The presence of GIZ in Duhok Governorate presents an opportunity for heritage documentation.

The role of universities can be expanded to include conservation education including new methods and technologies of documentation in their programs (particularly architecture). This will ensure that students are well-versed in documentation techniques and informed about the importance of conservation efforts. This may also make conservation easier as newly-graduated students may be able to quickly adapt to documentation and conservation-focused work. The role of universities in training government staff must also be recognized. Documentation activities can lead to further collaborative efforts with greater job opportunities.

6. Acknowledgments

This work would not have been possible without the financial support of GIZ. Authors are especially indebted to the staff of Cash for Work Program who have been supportive of the goals of this research. Special thanks to the residents of Akre City who were very cooperative and supportive. Thanks for all governmental stakeholders who worked actively to provide support. Gratitude to academic staff of University of Duhok (Dr. Ismael Hajani, Architect Solin Rajab, Mr. Zaid Abdulla, and Miss. Warjin Abdulla for their role in training of skilled workers on survey and documentation).

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