A PARADIGM FOR LOCAL ECCLESIASTICAL ARCHITECTURE IN JORDAN, COMPARATIVE STUDY OF THREE CHURCHES AT UMM EL-JIMAL

By

Mais Fahmi Haddad

Supervisor:

Dr. Jawdat Salem Goussous

Co-Supervisor:

Dr. Bert de Vries, Prof

This Thesis was submitted in Partial Fulfillment of the Requirements for the Master's Degree of architecture

School of Graduate Studies
The University of Jordan

DEC,2019

COMMITTEE DECISION

This Thesis (A paradigm for local ecclesiastical architecture in Jordan, comparative study of three churches at Umm el-Jimal) was successfully Defended and Approved on December 12th 2019.

Examination Committee	**Signature**
Dr. Jawdat Goussous, (Supervisor) Assoc Prof. of History and theories of architecture.	.....
Dr. Samer Abu Ghazaleh, (Member) Prof. of Urban Design in Architecture	.....
Dr. Ali Abu Ghanimeh, (Member) Prof. of Architecture history and Theories	.....
Dr. Naif Haddad, (Member) Prof. of Architectural heritage conservation (American University of Madaba)	.....

Dedication

I dedicate this work to my father's soul who is with me every time and everywhere ..

To my light, my Mother, who is a piece of my soul, to every single member. of my family..

To my crazy twins Saleem and Tha'er and everyone who strengthened my self-confidence..

To my angel who is among us on earth Hani ..

To my lovely cousin Yazan & Yana ..

To my other family; Bert, Sally and Jenna de Vries, God extended their life to their love and support ..

To a special and kind friends Elizabeth, Nawras, Zein, Laura, Muaffaq and my half Dana ..

To every soul that I loved and no longer exists among us ..

To those who have left this land and left us with unforgettable memories ..

To my uncles and my aunts for their love and kindness ..

To those who have a special place in my heart friends and family and know themselves ..

Last and not least I dedicate this work to that person who suddenly has appeared in my life and changed its colors and taste and added his luster and his distinctive touch ..

love you all.….

Acknowledgments

In the name of the Father, the Son, and the Holy Spirit

I offer my sincerest gratitude to my supervisors, Dr.Jawdat Goussous and Prof. Bert de Vries, for their valuable contributions, knowledge, encouragement and helpful advice. As well as their vision that brought this work forward, for being there any time I knocked at their doors. I wish him more success and happiness.

I would like to take a moment to thank my university "The University of Jordan", lecturers and employees, for the moral support and encouragement during my entire graduate studies.

Special thanks to the American center for oriental research (ACOR) for their supports and efforts and all things they gave me to finish this work.

Thanks for the spiritual bishop Christiforous for all his support and encouragement.

List of Contents

ABBREVIATIONS

ACOR	American center for oriental research
AASOR	Annual of the American schools of oriental research
UJP	Umm el-Jimal Project
UJPT	Umm el-Jimal Project Team
DoA	Department of Antiquities.
ICCROM	International Centre for the Study of the Preservation and Restoration of Cultural Property.
ICOMOS	International council on monument and sites.
WHC	World Heritage Convention.
ADAJ	Annual of the Department of Antiquities of Jordan
MOTA	Ministry of Tourism and Antiquities.
UNESCO	United Nations Educational, Scientific and Cultural Organization

List of architectural terms of the church		
1-	Church	الكنيسة
2-	Cathedral	كنيسة كبيرة تابعة للاسقف
3-	Chapel	كنيسة صغيرة
4-	Apse	الحنية
5-	Nave	صالة الكنيسة الوسطى
6-	Aisle	ممر جانبي
7-	Altar	المذبح
8-	Ambo	المنبر
9-	Narthex	المجاز
10-	Chancel screen	حاجز الهيكل
11-	Atrium	باحة (ساحة الكنيسة)
12-	Monasteries	الأديرة
13-	Transept	جناح الكنيسة
14-	Bema	منطقة التقاطع امام المذبح
15-	Sanctuary	الهيكل
16-	Stoup	جرن الماء المقدس
17-	Choir	الخورس
18-	Gallery	الشرفة (المعرض)
19-	Diaconicon	غرفة الشمامسة
20-	Icon	أيقونة
21-	Prothesis	غرفة تحضير القربان المقدس
22-	Synthronon	مقاعد رجال الدين
23-	Baptistery	مكان المعمودية
24-	Lintel	ساكف (قمط)
25-	Gable	جملون
26-	Corbel	طنف
27-	Basilica	البازيليكا
28-	Tower	البرج
29-	Keystone	حجر العقد
30-	Arches	الأقواس (العقود)
31-	Cornice	الكورنيش
32-	Mosaic	الفسيفساء
33-	Door’s hinge	مفصل الباب
34-	Inscription	النقش
35-	Substrate base	قاعدة الركيزة
36-	Clerestory	نوافذ عُلوية مطلة على صحن الكنيسة

List of Figures

List of tables

A PARADIGM FOR LOCAL ECCLESIASTICAL ARCHITECTURE IN JORDAN, COMPARATIVE STUDY OF THREE CHURCHES AT UMM EL-JIMAL

By

Mais Fahmi Haddad

Supervisor:

Dr. Jawdat Salem Goussous

Co-Supervisor:

Prof. Bert de Vries

Abstract

Umm el-Jimal, the black jewel, a completely integrated town, embraced multiple societies and civilizations that successively left valuable content mastered by the ancestors in their composition and creation. Ecclesiastical society and all its components. Multi-storey houses, markets, military barracks, the praetorium, and others have come together to weave Umm el-Jimal.

The research deals with the ecclesiastical part and the Christian periods (specifically Byzantine) that have passed on the history of Umm el-Jimal, including the architectural art and construction methods developed by the architect to use the materials and techniques available in a good manner while maintaining the architectural beauty show and taking advantage of the natural materials that were famous for the country.

The churches of Umm el-Jimal are distinguished by its unique value, its numbers 16, its black stones, accuracy and integration, similar in characteristics and differed in others. The research deepened in a detailed and analytical study of three churches, the West Church, the Southwest Church, and the Julianos Church, some of which are separate and others are complementary to residential spaces. The research also clarified the architectural details of each church of the study and its characteristics and documented everything that is present on the ground currently and discuss the architectural and structural method of the method of roofing, and presented a proposed model for each church using modern computer software.

Chapter 1: Introduction

1.1. Introduction:

This study examines three structures in the antiquities site at Umm al-Jimal, Jordan in order to delineate ways in which they comport with or deviate from the generally accepted definition of church architecture. From its beginning, a critical part of Christianity has been the gathering of people worshipping together. By virtue of this activity, the “place” where they worship has become endowed with a symbolic form. Historically, when believers build their places of worship, they have searched for a physical arrangement capable of expressing this symbolic form. This symbolic organization of the building called "church" was guided by the form of worship (liturgy) which in turn was shaped by the particular set of beliefs ("theology") of the group of worshippers (Komechak, 1982).

The diversity of questions concerning the church building resulted in the term of "church architecture" which is the combination of features – design, choice of materials, decoration, and construction – that combine to form these Christian places of worship. In the past, people adapted previous designs and building technology to suit their special needs. This included the worshippers' own houses, as long as they were forced to worship in secret. Thenin the late 3rd and 4th century, Christians adapted the Roman basilica, a secular place in which people had gathered to hear a judge conduct law case (Mango 1997).The transition from house church to basilica happened after Constantine ended the persecutions and permitted public worship (Stark, 1997).

This present study is based on the definition of the structure, components, and vocabulary of the church, and focuses on three study cases of Byzantine churches at Umm el-Jimal. This research examines the ecclesiastical Christian architecture that prevailed in the churches of Umm el-Jimal in particular and which belong to the architecture of the Hauran region in general, and also provides a

simple summary of the impact of multiple civilizations and temporal periods that influenced and added a distinctive luster on the architectural composition of Umm el-Jimal's churches.

The researcher provides this study through five chapters. The current chapter provides a general introduction, including the theoretical introduction, its problem, importance, objectives, methodology, and literature review. Chapter two discusses the history and architecture of churches, including the beginning of Christianity, its constructions, churches, and its type, patterns, the components, architecture features and method of building, and also clarifies the history and architecture of churches at Umm el-Jimal in particular.

Next, in Chapter Three, the methodology utilizing quantitative and qualitative techniques that includes the use of modern computer software is presented. Then in Chapter Four, the most important part of this dissertation, the results of the three case studies of Umm el-Jimal churches are presented. Using documentation, analysis, drawing, and photography, plans, plans, elevations, and sections which were created for each church. Additionally, virtual reconstructions of the churches and their roofing are included. Finally, Chapter Five assesses the results, and discusses how the methods used in this study could be used in the future at other churches at Umm el-Jimal or in other regions.

1.2. Historical Background of Umm el-Jimal

Located in northern Jordan, Umm el-Jimal is home to almost two thousand years of fascinating history and culture—as well as a vibrant modern community. Umm el-Jimal is both a modern town and an archaeological site, located approximately 70km northeast of Amman and just south of the Syrian border. It is considered the best-preserved Byzantine town in the Southern Hauran region, and archaeological investigation has been underway on location for over a century (Umm el-Jimal Project, 2018).

Umm el-Jimal is a rich archaeological area with wonderful architectural resources and planning systems. In ancient times the site was occupied from roughly the 1st to 8th centuries AD and then used again in later times, particularly during the Middle Islamic period. During these periods, the site was remodeled and reused by its various residents (Umm el-Jimal Project, 2018).

Furthermore, many of the remains were rebuilt, used, and inhabited by the Syrian Druze and then by the Lebanese Druze in the 19th and 20th centuries. Masa'ed Jordanian tribes occupied Umm el-Jimal at the start of the 20th century, but now the ancient site is surrounded by fences to protect archaeological and architecture value (Abu Aballi, 2016).

Today, the magnificent archeological remains in the site contains 107 houses, 16 churches, 33 water reservoirs and other valuable buildings built over the many centuries (De Vries, 2018). The architectural forms are explained the valuable, worthy and precious patterns of ruins by plans, elevation, construction of the super building structures, ornament, arches, columns, corbel system and roofing slabs also mosaic floors, altars in church, and a lot of details and features and principles which were developed by using local basalt stone in n the purely lithic architecture in Umm el-Jimal. Using purely lithic architecture with basalt stone as the nearly exclusive material, Umm el-Jimal’s remarkable architectural forms include corbeling, cantilevering, slab roofs, arches, ornamental lintel-relieving, and other architectural features that have been generally documented by archaeologists. Other specifically religious and ornamental features include altars and decorative mosaics.

Umm el-Jimal was the largest ancient settlement in northeast Jordan, but still a rural town rather than an urban center. That so many churches existed at the site is surprising and spectacular. Most of its churches date to the Byzantine period (5th to 7th centuries AD)) a period during which Christianity spread throughout the Mediterranean. Evidence points to the fact that local people often refurbished their churches, adding new floors or altar-screens over time (Umm el-Jimal Project, 2018) .

This research will focus on three of Umm el-Jimal churches named by archeologists the (*West Church, Southwest Church and Julianos Church*) and will explore their architectural details, construction, and roofing, and will make comparisons between them.

1.3. The Research Significance

This study explores the ecclesiastical architecture in Umm el-Jimal. However, during these centuries there are a lot of details in this type of architecture that changed and must be explained to highlight an important aspect of the formation of the architecture in Umm el Jimal, through which ecclesiastical architecture is formed. Therefore, this dissertation will focus on the architectural features of the churches in Umm el-Jimal, with an emphasis on the structural forms, materials and composition that will be analyzed to provide a frame work for the historical and architectural details of churches. The research will also produce plans, elevations and sections of the various types of basilica churches and will examine structural techniques used in their floors, walls, and roofs.

The research will provide a model that will serve in part as the basis for conservation, restoration, and architectural interventions at Umm el-Jimal, which will help preserve and maintain the ecclesiastical architecture on the site. In addition, it will provide a comparison of church architectural styles in the region through the sixth and seventh century, as revealed through different architectural characteristics. So, the each of the three churches will be studied in isolation with all their architectural designs, plans, elevations and sections, and suggest from the evidence the way in which they were originally roofed, in addition to the remaining architectural details.

There is an important role for modern technology in the promotion and rehabilitation of Umm el-Jimal, which will encourage the activation of the role of churches in the region in a vital way. It is important to integrate the archaeological and architectural design with new technical methods to increase the understanding of the value of architectural design elements in ecclesiastical

architecture and to create a model for providing solutions for any stage of preservation. Finally, the MA dissertation will be an essential part of a larger research program to which it will make specific contributions. The data presenter here will become a chapter in the book resulting from this larger research.

1.4. Objectives of Study

Umm el-Jimal's churches (specifically the West church, Southwest church, and Julianos church) represent a variety of architectural types and societal roles in the community of Umm el-Jimal. As a part of a larger research program, the object of this dissertation is to do a comparative study of the architectural design of these three churches in order to create a special scientific database framework to study the architecture of the churches atUmm el-Jimal which is based on a modern research study and modern architectural analysis. Also, it seeks to:

1. Understand the nature and variety of churches built in the sixth century AD and the ways in which this architecture is connected with the larger architectural context of domestic neighborhoods (Southwest and Julianos Churches) and independently enclosed space (West Church).
2. Layout, enhance and describe the distinctive architectural characteristics of the ecclesiastical architecture to revitalize the important role of the scientific and cognitive content of Umm el-Jimal in particular.
3. Establish a connection between function, form, and structure within archaeological studies and their benefits in churches design to enrich architecture and enhance the design concepts.
4. Create a prototype of the evolution of churches in Umm el-Jimal and linking this to the system of churches in the region.

1.5. Problem of Study

This thesis builds on previous work, such as the early mapping of the churches by H.C. Butler, the study of the Julianos Church by G.U.S. Corbett in 1957, the Department of antiquities (DoA) clearing work at the Southwest and West Churches, and the Umm el-Jimal Project excavations in the West and Julianos Churches. In addition, Linnaea Cahill included the West Church in her mapping of the larger area of excavations in 2015. Building on that information, there is a need to update the current documentation to reflect the present situation; therefore, the dissertation will use new documentation procedures to develop plans, elevations and three-dimensional renderings of these churches, thus creating an integrated comprehensive architectural framework for the ecclesiastical architecture of the three churches.

1.6. The Research Hypotheses and questions:

The Research Hypotheses:

The main hypothesis of this study argues that the application of modern technology can improve and help us to understand and visualize the diversity of the characteristics of these churches in their architectural and functional arrangement and use. The paradigm argues the role of adding technological architectural and aesthetic value by which we can better understand the architectural design and construction (from foundation to roof) to create the spaces suitable for the liturgical needs of the Christian community. The new methodology will integrate the ecclesiastical architectural issues and its structural principles in the site by using accurate methods of design tools in new architectural programs, instead of applying the traditional way of understanding the information of churches.

The Research questions :

Can we achieve a new, modern and technological comprehensive study of the ecclesiastical architecture and its documentation enhance and enrich the value of Umm el-Jimal?

1.7. Literature Review

Many studies have been carried out on religious architecture. This literature review discusses the most important sources about ecclesiastical architecture and churches in Jordan. The following are the highlights of these studies:

In **1913** H. C. Butler presents in his book **"Architecture. Syria,"** a map of Umm el-Jimal and its architecture, which includes Roman/Nabataean structures, the churches, and water system with canals and reservoirs. He focuses on the ancient walls of the city, the gates, towers, 15 churches, and their arches, monumental tombs, two and three-story mansions and 108 houses, all of which were built of basalt All of these are located on two fine maps (Butler, 1913). He made an architectural study of some of the buildings, such as Roman and Nabataean monumental buildings and chamber tombs.

In **1972-1981** De Vries aimed in **"Umm el-Jimal – A frontier town and its landscape in northern Jordan"** to create a historical documentation base for Umm el-Jimal in late antiquity, and an overview of Umm el-Jimal's internal history, which contains published information on Umm remained skewed towards the monumental, public and ecclesiastical. This book completed Butler's mapping of structuresComprehensive information on many buildings within the site was documented with a detailed and accurate description of each of them and drawn within a special map of the archaeological site (De Vries, 1998). Most importantly, the research included stratigraphic excavation in order to develop a profile of artifacts and to establish the phases of use of the site from Nabataean to Modern times. Also included was analysis of material remains, especially ceramics, floral and faunal samples, plasters and mortars, and the discussion of Umm el-Jimal as a community with its social, religious, and economic structures.

In **1991,** Haddad’s research presented a comparison of the churches at Umm el-Jimal, and those in surrounding areas in Syria and Jordan. He made an analytical study of nine of the

Byzantine churches, in order to contrast the differences of the internal and external details of the structures. Moreover, he determined an approximate date for churches by analyzing and studying the differences and similarities among them. The study helps current researchers compare the structures for digital reconstruction, as well as develop theories on how the buildings were destroyed through time. This research also introduced the use of Three-Dimensional models.

In **1994**, Thomas aimed to study church architecture from a variety of different angles or viewpoints. He defined three basic concepts - Theory, Meaning, and Experience - which, while interrelated in practice, are ultimately separate. This study presented the three basic religious architectural theories and applied them to the study of churches. Thus, he considers the effects of aesthetic factors such as design rules, proportion, light, and darkness. Also, it argued that church buildings have to be made, and regarded as places that are by nature special and of special significance, and suggests that architects, in creating new churches.

In **1995**, **Church History** by **Bradley & Muller** highlighted the importance of the architectural history of English churches through the study of a set of definitions of ecclesiastical architecture and its components, including stylistic development, functional requirements, regional variations, and arcane vocabulary. This book also explains how to learn from building plans and explore historic churches knowledgeably, and how to evaluate dates and restoration phases.

In **2000, Shatha abukhafaja** in her study **" Documentation and conservation of the basilica and the chapel at Yajuz "** aimed to create a general framework in dealing with the architectural heritage all over Jordan, by studying all the terminology related to architectural heritage conservation. The study also documented the basilica and the chapel in Yajuz as a first step in conserving it, through preparing drawings, taking pictures, and analyzing the content.

In **2007**, **Randa Qaqish** collected information and historical data about the churches in Jordan, coordinating them and organizing them according to unified standards, both technical and analytical. This book provided a reference to the architecture of the churches and its annexes in terms of the social environment, archaeological activities, architectural patterns, building materials and techniques, decorations, maps, tables, and graphs. This book is a comprehensive guide to the churches of Jordan and an informative and cultured base for all

In **2011**, **Carbonara** presented an up-to-date review of the realities of restoration whereas it is carried out always and only on the original, with all the attendant risks of error and damage, and thus with all the prudence that demands. He emphasized that the true nature of restoration is a complete fusion of historical and technical-scientific expertise and distinguished between a 'project of consolidation' and a true restoration project. Moreover, he discussed the history of architecture and theory of restoration, the techniques of survey, analysis, diagnosis and intervention on the materials and the structure, and legislative and regulatory aspects.

In **2012**, **Abu Ali's MA** study aimed to create a developmental and promotional plan for the site of Umm el-Jimal as a tourist destination. He suggested some strategies for protecting, maintaining, and restoring the site, and stressed on the role of conscious management of the site in the right manner while ensuring the participation of the local community in the process of tourism development.

In **2014**, **Haddad's** research discussed ways of The process of building with basalt stone in the northern Jordan Badia, as an example of an architectural and heritage study of the historical city of Umm el-Jimal, local people used to build their houses of ancient Umm el-Jimal basalt stone as a major building material that was available in the site in abundance as a

local building element that contributes to saving energy and achieving sustainability by comparing it with other construction materials.

In **2016, Abu Aballi MA** study aimed to assess the damage that has occurred at Umm el-Jimal by making a 3D reconstruction and documentation of selected features that have been destroyed through time. It also studied the effect of climatic conditions on the site and in the degraded state of mosaic in the floors of churches, and the impact of surrounding conditions on the stone buildings. The research provided reliable information on the measurement and characteristics of the stone decay at Umm el-Jimal. This thesis presented a preliminary proposal for preserving Umm el-Jimal and preparing the site to accommodate the larger number visitors without damaging the site, and also discussed how it can be protected and documented as one of the important sites in Jordan.

In **2016**, **De Vries's** research discussed methods of preservation (Digital preservation, Inclusion) which are the twin pillars of the site conservation and presentation agenda. He argued that the involvement of the local people in archaeological sites can prevent looting and sabotage (De Vries, 2016). of Umm el-Jimal by conducting a series of traditional field seasons of mapping and excavation where it consists of 150 still-standing buildings constructed from basalt blocks. It is a town of neighborhoods in which 16 churches are interspersed.

Chapter 2

Theoretical Framework: History and Architecture of the Church

2.1. Introduction

Christian history began with the presence of Christ, who is the basis of the Christian faith life, his teachings, his death and then his resurrection. The Christians were at first rejected and persecuted,. But Christianity expanded and spread among the nations, and is now the largest religion in the world. Due to splits and theological differences of doctrine, the Christian church evolved into four branches: Roman Catholic, Eastern Orthodox, Oriental Orthodoxy and Protestant (Ehrman, 1997).

During early Christian eras, churches and worship houses played an important role in spreading Christianity. Christian buildings and constructions first spread to include many nations, for example, Syria, Jordan, Iraq, and Palestine. Christian buildings were formed in different styles, methods, and techniques; however, even though Christians were in different locations, the same key elements existed in all church buildings. So although the forms or layouts of churches varied, they contained many of the same inner and external parts, architectural components, and features.

This chapter sheds light on Christianity's birth, growth, and prosperity, and explains the Christian period chronology. The beginning of Christian architecture is discussed next, including multiple types of buildings and various worship houses, such as the chapel, church, cathedral, and basilica. Architectural church details and their components are introduced and defined next, and then church construction methods are detailed.

2.2. Origin and Growth of Christianity and its Churches.

Roman periods are the key to the Byzantine civilization of the Christian religion so that civilizations rolled during the Christian periods and then it evolved and flourished. The Roman Empire was powerful and influenced not only by the diversity of its civilizations and languages but also by its variety of worship and religions. People across the empire worshiped many gods because they were influenced by the people whom they conquered or had been conquered by, who had various religious persuasions. Few intellectuals believed these myths, which are just symbolic matters or interpretations of nature, and so they were nominal religions. There was also a period during which Roman emperors were seen as deities (the Imperial Cult) (Elsner, 1998).

Christianity began to take shape and spread among the people during the Apostolic Age (AD 30 to 100). According to the Acts of the Apostles Exodus 11.26, the apostles were called Christians for the first time in Antioch; thus, the origins of Christianity could be considered in the capital of the Greek world in AD 49 (Brown, 1993). There were differences between the Christian religion and the other Roman religions as they clearly defined their beliefs (Haight, 2004). which led the Roman Empire to the persecute them for two and a half centuries and to attempt to destroy everything related to Christians, including the destruction of Christian homes, synagogues, books, and culture. The decree of Constantine I (Caesar of the Western Empire) and Licinius Caesar of the Eastern Empire of Milan in AD 313 was the turning point in Christianity and the triumph of the Church. They signed the Edict of Toleration introduced the concept of Orthodoxy and Christianity into the official synods into the Roman Empire. The percentage of Christians showed a marked rise during those centuries, reaching a climax of 40% (Elwell & Comfort, 2001). Byzantine Christianity in the Roman Empire developed in conjunction with the Byzantine state and its laws and wealth. It spread, expanded and increased its influence, especially during the Middle Ages, so Christianity became the official state religion of the Roman Empire in AD 380 under Emperor Theodosius I. Christian civilization preserved many Eastern Orthodox churches even after the fall and end of the empire (Holt, 2011). Figure (1).

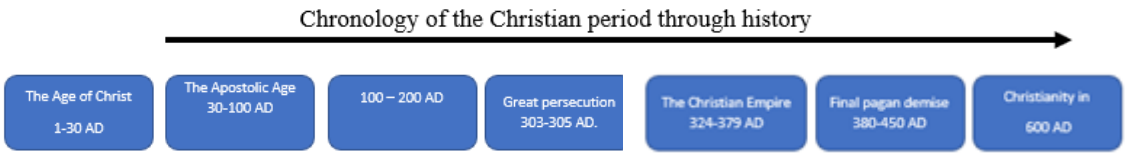


Figure (1): Chronology of early Christian period (Brown, 1993) adapted by author.

The third century and the primacy of the early Orthodox Church influenced everything that existed at the time, based on Christian teachings. Christianity began to spread on a larger scale. The church's role in providing medical care to the sick which was the most important reason that contributed to the success of spreading Christianity during its first period. Christians cared for non-Christian patients, encouraging people to embrace the new religion, especially during difficult times. Christianity was playing the role of salvation at the time. Christians were valued during this period as opposed to the time of persecution of Christians in the Depression after the rule of Diocletian. Christians no longer hid but were able to become influential again (Stark, 1997).

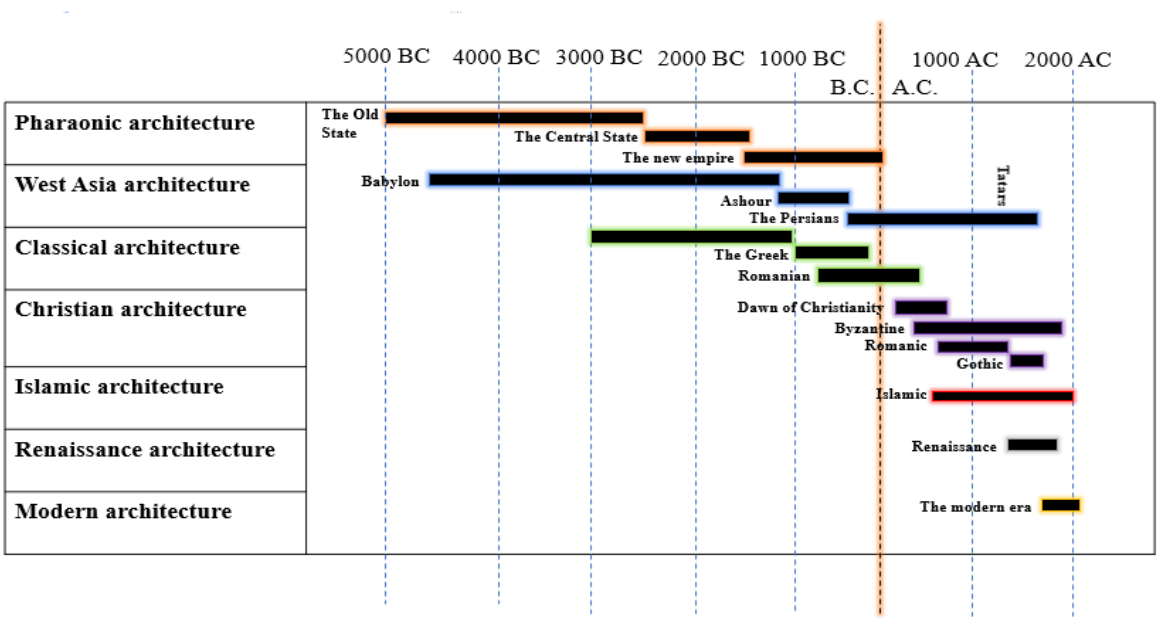


Figure (2): Chronology of architecture through history, adapted by author. (أسامة، 2017)

2.2.1. Christian Churches architectural Overview

The congregation of believers for worship was the main goal of Christian architecture, but there are other types of buildings, such as monasteries, the fortified church. The origin of Christian architecture for worship started with the house church and then expanded to include the chapel, and then the church in many forms; basilica and cathedral. This section provides a brief explanation of each of the important Christian buildings, with emphasis on church forms.

Churches

In the holy bible, the Church is the body of Christ, and Christ is the head of the Church. The Christian Church began with the birth of Christ. When a group of believers meet together, the church is formed. Through history, the number of these believers increased, so it became necessary to have a suitable space for them to gather. (Acts 11:26). The church is a Syriac name meaning "assembly", and the Greek word used in the New Testament in the bible is "ecclesia" also "Kyriakos" is a Greek word that means "the Lord's House". Greece enacted legislation enabling Christians to worship, prayer and invite believers to discuss things (Acts 19:32 and 41) (Bible, The Holy Book).

According to the archeology, the first church that was built as a house was (Domus ecclesiae), the Dura-Europos church, between AD 233 and 256. Then in the middle of the 3rd century AD, the first Christian purpose-halls for worship was (aula ecclesiae). Although many houses were occupied as small churches for Christian groups, a lot of them were destroyed during the Persecution. The larger and official elaborate churches started to appear during the Constantine period (Snyder, 2003).

The presence of Christianity coincided with the continuation of the Roman civilization. The Roman Emperor Constantine I (from ADs 306 to 337) was the first Roman emperor to convert to Christianity (Elsner, 1998). In 330 Emperor Constantine moved the capital from Rome to

Constantinople, which became the center of Eastern Christianity and an international cultural center. In AD 380 Christianity became the official religion of the Roman Empire. Constantine tried to promote the Christian religion and impose imperial authority around him (Elliott, 1996) After the First Council of Nekya and the establishment of the first church in Jerusalem, Jerusalem was a prominent and important place in Christian history, so Jerusalem had given a special honor (The first century Council of early Christianity, AD 50). Five years later, Constantinople officially converted to Christianity in Constantinople. After the early Christian period in ADS 330, the Christian cultures were mixed. Compulsory, the authorities intervened with the Christian religion. By the end of the early Christian period, the Church within the Roman Empire had hundreds of bishops who imposed their authority on others (First Council of Nicaea).

The spread of the Christian religion was delayed due to the many wars that swept Italy until 451 AD. Thus, , lacking novel architectural influence during the rapid growth of the church, church architecture was not liberated from Byzantine and Roman traditions until the Romantic era. Because of the increasing numbers of Christians, there was a need to provide the appropriate space with spiritual hegemony. Active design of the architectural space of the church, monasteries and religious buildings began. Accordingly, the concept of ecclesiastical architecture emerged, namely the architecture of Christian churches buildings. As a result of the succession of civilizations and the difference of cultures, the architectural styles influenced one another. New techniques and methods were developed to meet the needs of that time which was influenced by and subsequently and influence in architectural development, from Byzantine churches and Roman architecture to the Gothic cathedrals and churches of the Renaissance, over 2000 years of Christianity, history reveals the changing architecture and advancements in technology in the church building (Ousama, 2017).

Based on the above, the ecclesiastical building can be defined as a space that is designed according to the principles, rules, and requirements set by a group of believers to practice their religious rites and no value for this building without its users.

House church

The spread of Christianity began in secret. Believers began gathering to pray in their homes, then as the numbers grew, there was a need for a larger space for them to practice their religious rites. At that time, fearing persecution, the Christians removed the internal partitions of the house to provide a suitable space. It was the beginning of increasing the Christian movement and the proliferation and localization of the ecclesiastical cells started (White,1990). The term "Domus Ecclesiae" is an ancient term used to express the Christian church house. In the middle of the third century was the establishment of the first Christian religious hall which was called " Aula ecclesia" (Snyder, 2003). The result of excavations in the 1930s in Syria yielded a private house in Dura-Europos which was used as a Christian meeting place in AD 232, as well as a baptistry chamber. (Filson, 1939).

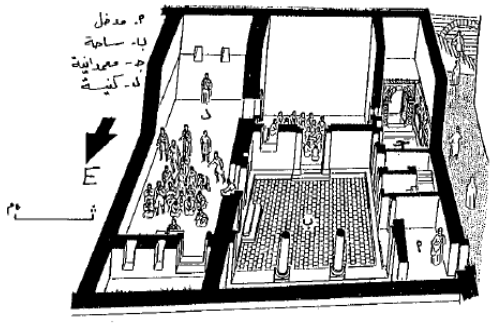


Figure (3): Isometric for church house – Saleihieh region.(خميس، 1995)

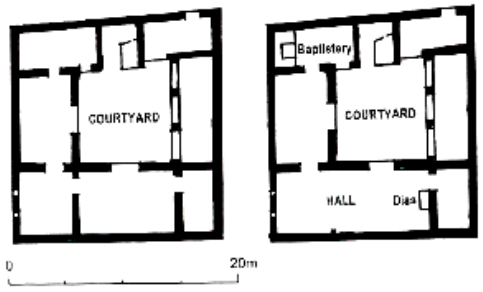


Figure (4): Dura Europos house church plan (Balderstone)

These churches were installed in medium-sized houses, usually two-stories in height, which included of a courtyard and several rooms, this was the general house plan of homes in that period. After the spread of Christianity and the transformation of this architectural space (house) into a church, the ground floor was used as a church with some adjustments to suit the new function, while the upper floor was used as a house. Part of the modifications was to merge the existing rooms together to create a hall used for religious meetings. The hall introduced the orientation (the apse) as a bishop's place facing west. The rooms on the northwestern side were used for the baptism. Thus, parts of the church were created using the available architectural space (خميس، 1995).

Chapel

A chapel is a place devoted to prayer completely like the church. The difference comes with its smaller area. This area does not contain the details of the church and its components, it is simpler architecturally. Sometimes it is part of a church exactly in the eastern part containing the altar. On the other side, it may be part of a building or service complex such as a school, a hospital, a huge house, a castle, and military installations. Consequently, the chapel is part of a building and specifically a particular chamber used for prayer which is more holy (Banks, 1994). Chronologically, within the general concept, the differences between Chapel and Church are relatively simple. Both of them symbolize the architectural and spiritual ecclesiastical place. But the church serves in a broader purpose.

Cathedral

The Cathedral is the most extensive main church type. The church differs from the cathedral because the cathedral is usually associated with bishop or another figure of church authority. There is only one in the city per community and he is directly related to the administration of that area. The church is an architectural space to serve the community for performing religious duties and worship. Also, churches are run by a group of priests. People used to call big churches Cathedrals, which is not true. In general, as for the shape of the church, it is often in the form of a cross, and its roofing is often using either domes or vaults or a truss roof. The altar was directed east and the entrance to the west (Petit, 1841).

The term Basilica comes from the Roman period. It is a rectangular public space with a central nave and aisles, and usually with a raised platform and interior columns that divide the space in between. It is usually located in the center of the city. It was not religious but was originally commercial, social, legal and everything related to matters in the Roman period. Thus, after the spread of the Christian religion and the urgent need for the establishment of churches and houses of worship, it was more appropriate to use the available basilicas as they fit with the requirements of

Christians. So, the basilica became the most widespread architectural type of the Christian churches (Perkins, 2013).

Monasteries

The monastery is a building or several buildings combined to include places of prayer and places dedicated to monks. In later periods they were provided with supplements such as a school, library, dispensary, and workplaces. There are three types of monasteries in the Orthodox Church. First is a Cenobium where monks pray, live, work, and serve together, and follow their elder monks. The second one is a Skete, which is smaller than the first and allows each one of the monks to perform religious rites separately and meet together on Sunday. Thus, it contains a solitude element. The last is a Hermitage which is private. Each monk lives and worships alone rather than in a monastic community (Dunn, 2003).

Fortified church

The Fortified church is a type of church designed for military purposes and for defense in war situations. The construction of these churches was characterized by their strength and rigidity as they were built with relatively thick walls. Some of them were built with exterior walls surrounding the church, as well as towers. (Duguleana, 2018)

Table (1): Differences between Chapel and Church:

Differences	**Chapel** (Banks, 1994)	**Church** (Petit, 1841)
Definition	Small chamber for worshipping and the most sacred room within the church.	Worship space to pray to the Lord.
Structure	Part of another structure.	Separate building with its structure
Sacredness	The most sacred place	It has service rooms
Mention in the Bible	No	Yes

Based on the archaeological operations carried out in Jerusalem and Nazareth, it was found that during the early Christianity period, a Christian community also used Jewish synagogues to worship to avoid persecution by the state. They also used House Churches, and due to the domination and rule of the state at the time, some used the catacombs, which were considered underground burials of the dead as a place to hold religious rituals(2011 ،اسعد) . Here are some differences between churches and temples:

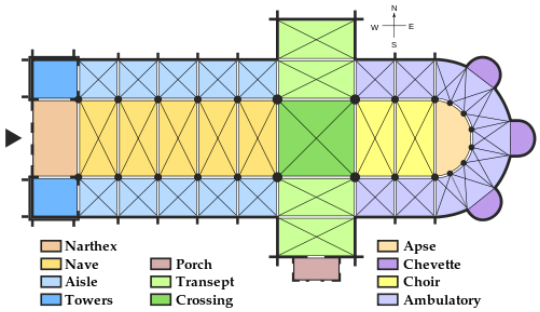
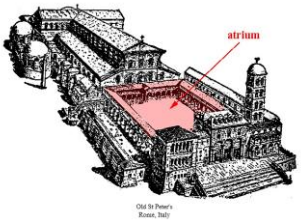
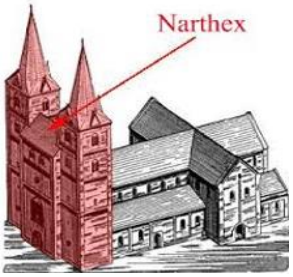
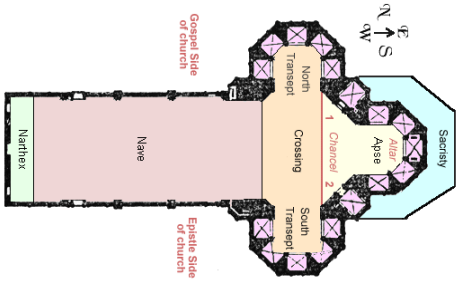
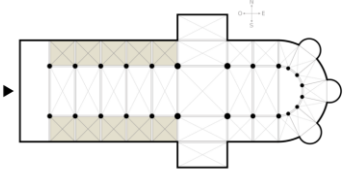
Table (2): Differences between Churches and temples

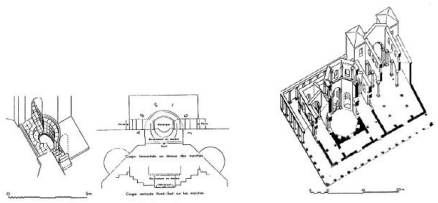
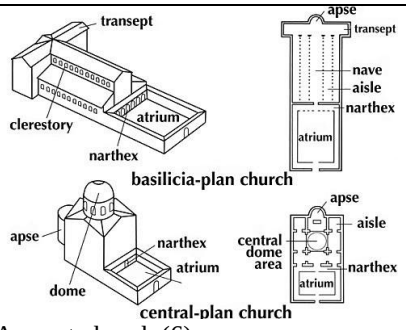
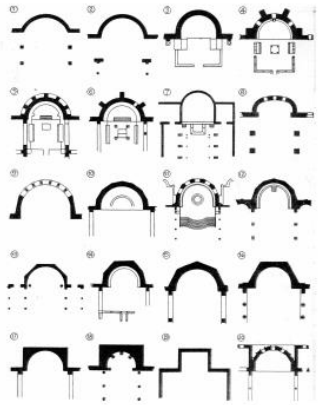
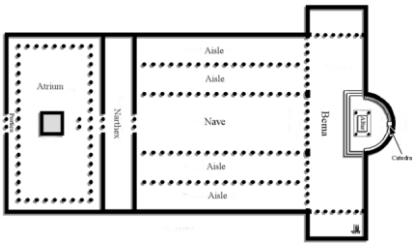
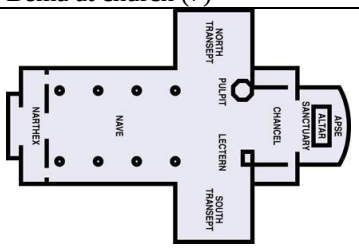
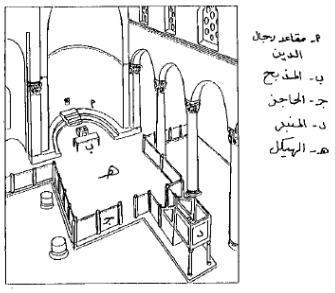
Differences	Church (Petit, 1841)	Temple (Scully, 2013)
Place	Started within houses.	Complete separation and spatially distant from houses.
Form	Started with any space, then developed to the form of a basilica and then others.	It took a rectangular form with a gallery.
Period	Christianity period	Before Christianity

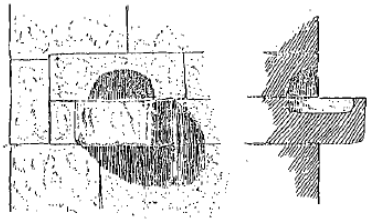
2.2.2. Components of the early Christian church building

The general composition and plan of churches are not much different from the temples: in fact, the apse of the church is the same one used in temples, and as discussed above the basilica form was reused in the Christian period. Below is a list of the general components that can be found in almost all churches, and a discussion of their meaning (Athanasius, 2004).

Table (3): Churches' components, meaning, and function.

Components	Meaning & Function	Pictures
		 A schematic plan showing the elements and orientation that are common to many churches(1)
Atrium	An open space before a church. It is located between the porch or vestibule and the church body. Some of them have a fountain or well.	 Old st Peter's Rome Italy (2)
Narthex (or Vestibule)	A covered entrance at the western end of the courtyard opposite the main altar of the church.	 Narthex of church (3)
Nave	It is a central part of at the church, where the people did their religious services, its space was stretching from the main entrance to the transepts to the chancel. It is divided into two parts, the first is the Chorus, it rises three steps above the surrounding space where the Chorus dedicated their hymns, the second is the space where the worshipers were sitting, always it contains two or four aisles on both sides.	 Nave of the church (4)
Crossing area	The space where the nave, chancel and transept intersect together.	
Aisles	Walking space that also contains seats rows on one side or both sides, some churches have double aisles on each side..	 Aisles of the church (5)

Baptistery	Architectural space for performingbaptisms. It is a separate, centrally planned structure from the church, and has two entrances from the west and the east.	 Baptistery at church (1994,حجار)
Apse	A semicircular or polygonal termination, oriented east toward Jerusalem, which contains the altar.	 Apse at church (6)
Transept (Prosthesis and Diakoniko)	The wings (arms) of the church. According to liturgy, it faces East, divided into two parts; the left transept and the right transept. The transept crosses the nave and together they form a cruciform shape.	 Styles of apse (1994,حجار)
Bema	Bema is a raised platform approached by steps, first made of stone, and then wood. The main function was to seat of clergy in the Early Christian basilicas period. Today, this space is used as a crossing area.	 Bema at church (7)
Altar	The place where the Eucharistic Sacrifice is offered. It should contain a relic of a Saint.The Tabernacle is usually kept on it.	 Altar at church (8)
Sanctuary /The Channel	The most sacred area of the church, located at its eastern end. It rises slightly above the level of the main floor of the church and was used only by the clergy. Another type of chancel that was popular in Jordan and Palestine in the 6th century AD was completely separate from the church.	 Reconstruction of the Church of Saints Paul and

		Peter in Jerash. (خميس، 1995)
The Stoup	A dish of various forms and sizes. It could be located inside the church at the bottom of the altar and used to wash the utensils used during the Eucharist as well as the hands of the bishops, or it could be placed outside the church's western entrance so that people could wash and purify before entering.	 Stoup at Umm el Jimal church. (Bert de Vries Drawings)

2.3. Architecture of churches.

2.3.1. Early Christian Architecture

The Roman Empire architecture was an extension from late antiquity to the Middle Ages and was concentrated in the capital of Constantinople. The cultures of the local communities overlapped with the ruling countries resulted in architectural details harmonious between the architectural designs of the dominating cultures and those imposed by the culture of communities of Arab countries as Eastern churches emerged (Athanasius, 2004). Byzantine architecture evolved with all its characteristics, qualities and places found during different periods of time. Each period was characterized by special features.

During the fourth to the fifteenth century AD, Byzantine architecture followed the traditions of the early Roman period. The architects developed and added new structures, notably improved fortification walls and domed churches (R.Bagnall, 2012). Byzantine buildings continued as a style defined as more eclectic and irregular. One of the most important principles of Byzantine architecture was the emphasis on function over form (J.A.Hamilton, 2018). Thus, early Christian architecture flourished and cultures and architectural styles were developed in the early centuries. The first period which was the golden age of the Byzantine architecture was during the sixth century. Church building spread tremendously. Most of the churches which spread in south Hauran, Syria, and Jordan were in the first period of Byzantine architecture (خميس, 1995).

There was more concern for buildings' interior design and details rather than their exteriors. The Christian period played an important role in architecture and in particular the conversion of the secular basilica into an awesome church with the impressive domed ceiling, but in general, Basilicas have pedimented roofs. The Roman tradition in Byzantium, including architecture and city planning, continued to be based on the principles of the Roman Empire. The city was developed to include commercial and public spaces, and streets and protection for the ancient antiquities, arches and city gates. Due to the disuse of many pagan temples, the materials from them were the basis of a new structure, blending the civilizations. These features became a Byzantine building characteristic, an amalgamation or evolution, rather than original-classical construction (R.Bagnall, 2012).

As a result of the existence of the Eastern and Western empires, there were two systems of buildings. The most prominent in the legacy of Christian architecture are the cathedral and the basilica. The Eastern Empire used the dome system, from the eastern influence, while the Western Empire adopted the system of basilica buildings in the construction of churches. Each occupied an important social, cultural and historical position in Christian civilization. This architecture contained various forms with a high level of precision and excellence (Johnson, Ousterhout, & Papalexandrou, 2012).

The final split was the great schism that led to the division of the Roman Empire in the fourth century. The cultures and rites were split, and the empire split into two parts, eastern and western. It was not long before Eastern and Western Christianity separated and each took its own approach of architecture. The basilica spread in the west and became prevalent in the Christian East. After the transfer of the capital from Rome to the city of Byzantium, the empire became known as the Byzantine Empire. This city is in present day Turkey and is now called Constantinople, later on it was known as the Byzantine Empire. Until the 6th century, a unique style of Byzantine art was developed. The most prominent achievements of this period were the Cathedral of Hagia Sophia

with its massive dome and mosaic motifs (J.A.Hamilton, 2018). The Eastern Orthodox Church, which was formed in Russia in the sixteenth century, took a different architectural approach. It replaced the huge dome with a thinner and longer shape to accommodate the weight of the snow in that climate. Thus, the dome became more conical in shape, thus preventing the accumulation of snow on the ceilings. A classic example of this conical structure is St. Basil's Cathedral in Moscow's Red Square. In the Middle East, the region, its geography, its climate and its nature influenced church building. The Coptic Orthodox Church emerged in Egypt. Coptic architecture emerged, sometimes reflecting similarities to the ancient Egyptian temples, in terms of the movement path within the vacuum from the outer courtyard to the inner space. Thus, the influence of the original Coptic architecture melded with Egyptian traditions and Greek-Roman and Byzantine-Christian architectural styles (Atroshenko, 1985).

Most architects, however, took the architectural arches and vaults from the earlier Roman period. They also tried to develop the large Roman halls, as well as their own and use them as a base for the design of the main type of church, the basilica (Fletcher, 1905). The Old Church of St. Peter in 330 is the first and most important early Christian Basilica, now the place of St. Peter's Church is in Rome. The building materials used in the basilica construction were ordinary bricks or stone from the outside and decorated with mosaics on the exterior. The mosaics are pieces of glass, marble or stone that combine together to make a picture or design, and plaster painting (C. Mango, 2018). The Byzantines used bricks for their architecture. To build the wall they placed two faces and poured a mortar and rubble between them. These materials were made from lime, sand and crushed bricks or pebbles. Byzantines continued to use the same materials until the fourteenth century AD. For the architectural details, columns and cornices and decorations for doors and windows, they used marble. In addition, they paid attention to the details of interior designs, paintings and mosaics. Imperial buildings and important basilicas were given more marble than anywhere else. The ceilings in churches and houses were often made of wood (Cormack, 2018).

By the 9th century, the number of churches built throughout the period slowed though Christianity persisted. Since a large number of churches had already been built with the goal to accommodate a specific number of worshipers it was no longer necessary to build huge churches. They used to utilize the dome and its supported arches as a cross-in-square plan for the roofing, which is a curved triangle of vaulting formed by the intersection to bridge the gap between adjacent arches. This leads to the transformation of a square plan to a circular one. The building square basis divaricated into bays which probably had a half or full dome ceiling. In addition to these features, the apse was the most popular choice which was on the middle of the plan and usually was with or had two side-apses at the eastern churches (J.A.Hamilton, 2018).

With regard to the history of the Levant Land, it dates back to the early Christian era which was an important crossroads between the culture and civilizations, whether socially, politically or economically, due to its geographical position on the Mediterranean coast. The Levant was occupied by many societies and was a strategic area for the great powers of Rome and Persia to alternatively control them and built their facilities, buildings, and their architecture in all its details. The cultures of the local communities overlapped with the ruling countries resulted in architectural details harmonious between the architectural designs of the dominating cultures and those imposed by the culture of communities of Arab countries, thus the end the Eastern churches emerged (Athanasius, 2004). Byzantine architecture evolved with all its characteristics, qualities and places found during different periods of time. Each period was characterized by special features. The first period which was the golden age of the Byzantine architecture was during the sixth century. Church building spread tremendously. Most of the churches which spread in south Houran, Syria, and Jordan were in the first period of Byzantine architecture (خميس, 1995).

There is a clear relationship between the architectural spaces and ecclesial structures and forms and the socialization of individuals and their religious and social behaviors. Therefore, the general composition and aesthetic architectural features of the building are fully associated with the

spiritual domination of individuals and their interaction. The architecture of Byzantine churches is easy to distinguish with a general canonical scheme consisting of an apse, altar, sanctuary, nave, side aisles, crossing area, transept, an atrium, and auxiliary rooms (Clark, 2007).

The design of the Basilica was followed as an example for the design of the Byzantine churches. The basilica's hall and its roof were supported by pillars and columns from its sides. These columns created a central space which was called a nave which created an aisle beside it. In the first floor over these aisles there was a gallery. Looking out over the nave, later on the apse was developed. The Basilica plan during the Byzantine Empire continued as is until the 6th century, then some editing happened on the timber roof, and dome-vaulted roof appeared. After that the modifying on the plan of Basilica developed and became bigger enabling it to be able to have three, four, or five aisles. For example, in Armenia there were much darker interior aisles and on the other side in Syria there were monumental aisles build from a huge stone block. Hundreds of basilicas were built during this period (C. Mango, 2018).

Table (4): Byzantine compared to Early Christian basilican churches and architecture

	Early Christian	Byzantine
Where in Europe	West	East
Capital	Rome	Constantinople
Relationship between churches and state	Sparation between them	Union between them
Type of Christianty	Catholic	Orthodox
Type of plan	Basilica plan	Central plan
Type of roofing	Flat Timber was borne over the long perspective of columns. (Horizontal thought)	Grouping of domes covered squared space of church plan. (Vertical thought)
Roof suport	Post and lintel	Pendentives

* This table is the author's work. Sourse: from referances above.

2.3.2. Church forms:

Based on previous studies and Howard Butler's pattern for churches, they differed in form and layout and had an impact on the composition of early Christian churches, mostly from southern Syria and Hauran. There are four principal forms that will be discussed in this section: the basilica, the two-aisled church, the hall church, and the centrally planned church.

Basilica:

The term basilica means an imperial or royal place. The Roman basilica was a rectangular hall with ceilings, containing internal pillars that divided the area. The apse, located at the end of the middle area, was where the important people would stay. Later on, the altars were usually built over a shrine of a saint or martyr so the memorial shrines were merged with the basilica exactly in the area designated for the altar expanding eastward. This central area was the most influential point and also where the amount of light was greatest. Small areas or chambers distributed around the hall overlooked it and were separated by columns. This style dates back to the first half of the fourth century. The transformation of the basilica into a church was not difficult as they used the spaces in the hall for separate functions. The apse became the place where the priest sat, and the hall became a space for worshipers. The rest of the spaces were distributed for other functions of the church, such as a baptistry. Constantine built the first Christian basilica that utilized transepts, thus creating a distinctively new form. Gregory Nazianzen was the first to observe this resemblance of the new basilica to the Christian cross. Thus, the symbolism of the cross was coupled with architecture, and in future construction this cruciform pattern was essential. Patterns and schemes of the basilica spread and varied during periods of Christian prosperity. In the eastern basilica, for example, the median space was often higher than both sides, forming a partition with windows called a clerestory. These spaces were covered by one single roof. Therefore, the inner spaces were revered as the most sacred place (Pergola, 2002).

Church roofing also varied over time. The most common roofing style that spread in southern Syria and the Hauran region was a gabled roof that covered the central nave of the church and was supported by triangular wooden beams that were mounted on columns and supported by arches. The two aisles were half-gabled with a lower height than the middle roof. The middle roof contained a series of windows set above the lowest roof (clerestory). The materials used internally included marble, mosaic, carved stone and other valuable (as well as mundane) materials (خميس, 1995). Over time, the Latin cross church plan spread across Western Europe and the central church plan prevailed in Eastern Europe, the complexity and magnificence of church construction have risen.

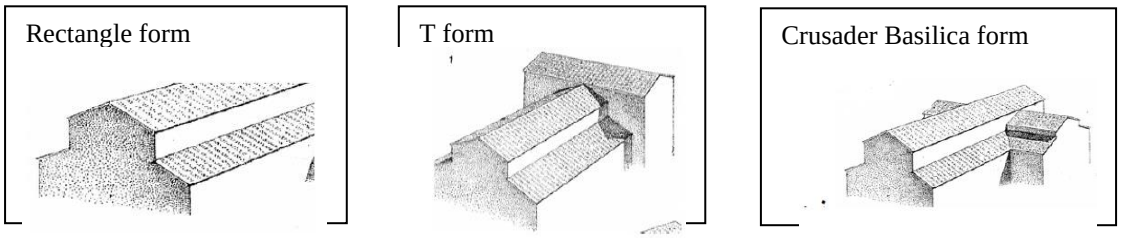


Figure (5): Basilica's Forms (2010,بسام)

The basilica took on a number of sub-forms, such as the Rectangle form, T form, and the Crusader basilica form. Typically, the first form contains an odd number of arcades (one, three or five) and the columns were distributed along the arcades up to the eastern part of the basilica. This form spread through the general Syrian region. The T form differs in that the columns do not reach the eastern part of the building, but end up to several meters before. This space formed a hallway called Engarsio, which ends with all the aisles perpendicular to them, the letter T is formed when the Engarsio emerges from the level of the corridors connected to it. The Crusader form consists of four sections where the columns start from a central point and create the cross shape (2010 ،بسام).

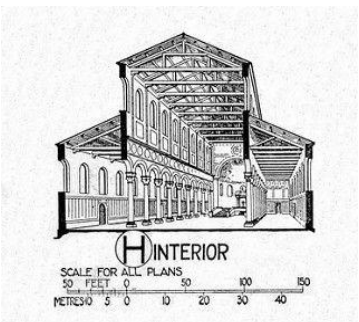


Figure (6): Basilica schematic section of Sant Apollinare. (Fletcher, 1905)

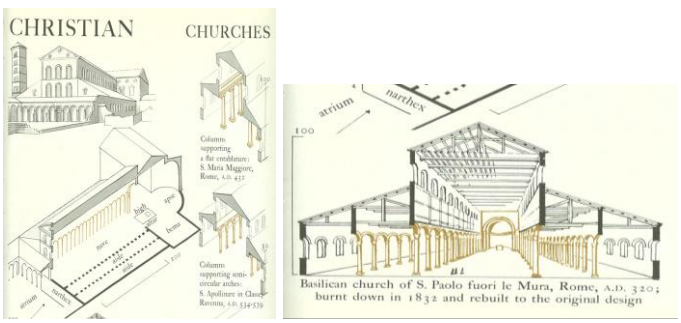
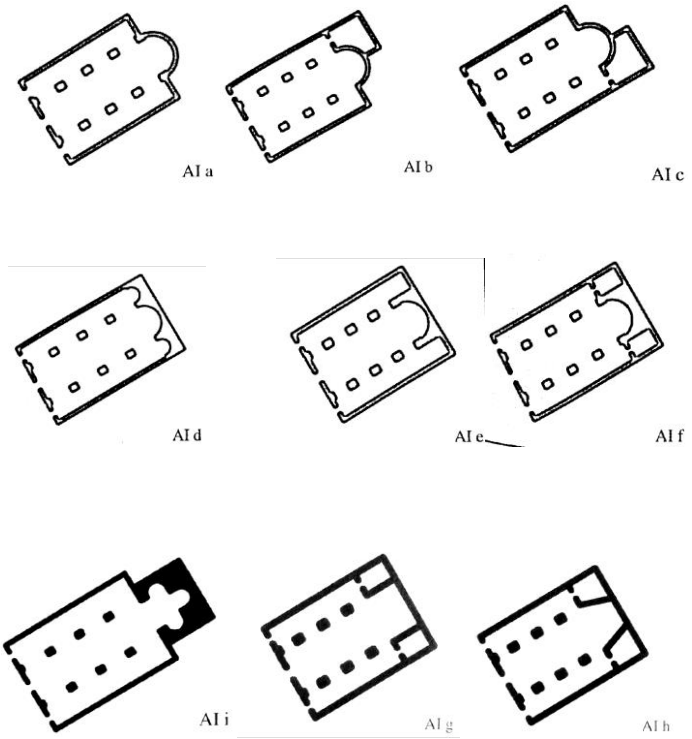
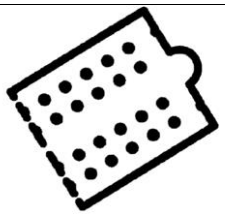
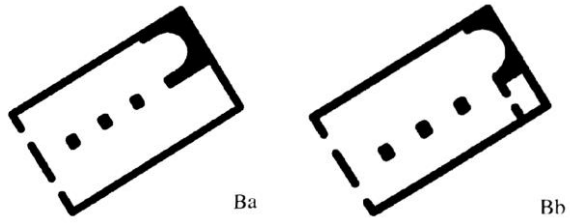
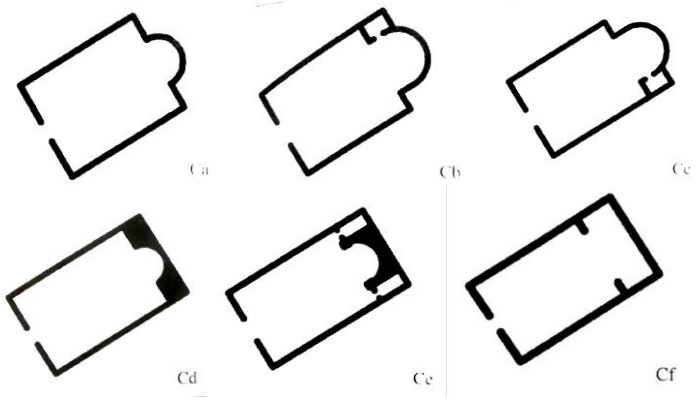
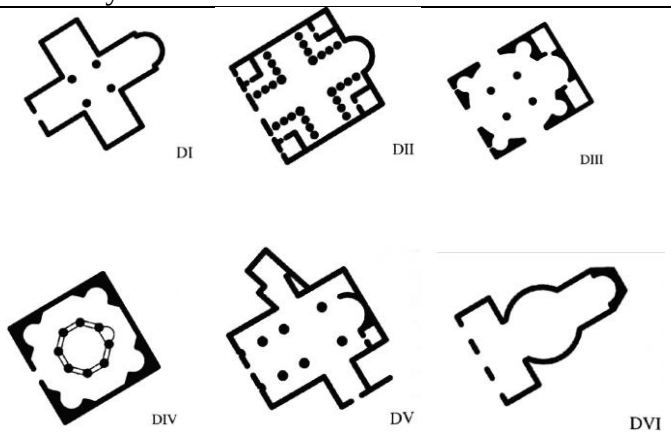


Figure (7): Basilica schematic section of Sant Apollinare. (Mansbridge, 1967)

The main forms and styles of the churches were intertwined with the characteristics of other churches. New forms and styles resulted in addition to the local influence of the area where the church was located. Each region makes its mark with its architecture, be it structural, or using different architectural and decorative elements.

Table (5): Patterns of church*(Done by author, Source: (Qaqish, 2007)):

1. Basilica AI	
	This pattern is the most common in the Eastern Churches. It's a rectangular plan ending with a variety of apse forms in the eastern part of the church, internally it is rows of columns separating the central region/Nave (main hall) from the two side aisles (some churches have more than one aisle on each side (AII)). There is a variety of apse ends, some churches have a half apse, and others are in a square or trapezoid form which are adjacent to the sides of the two service rooms.
Basilica AII	
	This pattern followed AI Pattern but with more than one aisle, four rows of columns formed four aisles and wide nave, and prominent Apse from the church.

2. Two Aisled Church	
	The rectangular church shape which is divided into two parts (two Naves) is separated by a row of support columns, some of them which have two Apses with different shapes and others have one Apse and a side services room.
3. Hall Church	
	A rectangular church scheme with one hall and no side Aisles, it has one Apse which is a semi-circular or rectangular shape, whether inside the church plan or prominent to outside.
4. Centrally Planned Church	
	This pattern focused on central point, it took the shape of cross, both inside or outside of square, with circle or with regular segments.

Basilica AII pattern was the most widely used and it constitutes almost 70% of the total churches in Jordan and Syria in ancient times. The reason for the popularity of this style is the ease of construction, addition, and expansion without the need for radical changes in the

building(Mango, 1979). In addition, this type of scheme gives space for religious ritual occasions and is suitable for the movement of both worshippers and clerics (Krautheimer, 1975).

Type (f) of basilica pattern (AI) is the most widely spread characterized by the presence of two side rooms next to the apse for service. This is according to the research of Howard Butler and his study of the ancient churches of Syria. He said that one of these rooms was for the preparation of the Eucharist and its examples were evident in the churches of Umm el-Jimal. But there were other beliefs for the functions of these two chambers. Their construction came along the Apse to be structural support pillars. Also, type (d) in the basilica pattern (AI), with three Apses was widespread in the Western and Eastern Christian churches. Howard Butler documented five churches in northern and southern Syria belonging to this type (Butler, 1913). There are also other studies that documented the transformation of church pattern from (AIf) to (AId) and its examples, as mentioned by the Negev, found in the Negev region of southern Palestine in the late fifth century AD (Negev, 1989). (AIa) Basilica pattern is also one of the simplest types of churches, which is a half-circular apse on the outline of the church, and this pattern is spread geographically in the north, the north-east and central part of Jordan(زيادين، 1982). The pattern (AIg), which consists of two open side services rooms is extended with the two aisles and the apse with the nave in the center, its examples in the churches of Umm Al-Rasas, Mafraq Governorate and the northeastern regions of Jordan. The quadrangular Apse is the least prevalent pattern used in church construction. The Apse area opens directly into the Nave, and it is surrounded by two closed service chambers from the two side aisles. There are a few examples in Jordan in the area of Umm el-Jimal and other areas of Mafraq (Qaqish, 2007).

As for the multi-portico (AII) side, it follows the same system of (AI) with the repetition of rows of columns in both directions. Examples include the Church of the Nativity and the Church of the Holy Sepulcher in Palestine. This pattern accentuates the greatness in the church with its grand

architecture and is meant to facilitate the celebration of religious occasions. The style dates back to the fourth century AD (Qaqish, 2007).

Two-Aisled Church, Pattern (B): This rectangular-shaped church has two styles. The first one is a rectangular plan with two naves: the first is circular and the second is regular segments with a separated area which was a row of support columns. The second style is the same, with the addition of one apse and one service room (Qaqish, 2007).

Hall Church, Pattern (C): This is a rectangular church without any aisles, with one open -pace nave. Some have a semi-circular or rectangular apse, whether inside or outside of the scheme, and some contain additional side services rooms. The roof, often covered by wood, was supported on crossbows and topped with reeds and mud (Qaqish, 2007).

Centrally Planned Church, Basilica (D): Which focuses on a central point, taking the shape of the cross, both inside or outside of the square, with a circle or with regular segments. According to Butler's studies, it was not widespread in Syria and south Hauran in comparison with other forms (Butler,1913). The reason for their infrequency was likely the difficulty in building and construction. (Qaqish, 2007). Krautheimer says that this type of church was influenced by imperial shrines (religious architecture) (Krautheimer, 1975), while Mango argues that the idea of central churches came from the reception halls of Roman palaces (C. Mango, 2018).

2.3.3. Churches' Architectural features, details, materials and technique:

Christ was the basis of the Christian religion, and the spread of the Christian religion over multiple periods of time was accompanied by many positive or negative changes. In times of persecution, the followers of Christ followed the symbols to preserve their lives. Symbolism played an important role in Christian history. Symbolism has become an architectural space of spirituality and faith. The church became the house of God and a place of worship. It began the

practice of religious rituals that changed and developed the function and spaces of the church. Thus, this led to the creations a difference in design between early Christian buildings and Byzantine buildings (Bevan, 1938). Understanding and recognizing the principles of Christian architecture will be achieved through the realization of religious ritual and influence of previous civilizations and cultures during that period in both symbolism and construction method. In the early periods, Christian architecture was complementary to Roman architecture and took its elements, then used its buildings and all its annexes. What was added to the Christian architecture was the design of the church as a blueprint and a touch added by every civilization on the church building. They used available materials for construction (Bevan, 1938). In this section, the architectural details of most churches will be detailed and explained.

Architectural details

Plans:

The plan of the churches at the beginnings was following up the basilica planning, where they reused the Roman halls and their auxiliaries. Over time they used the cross plan which was covered by domes in the center over squared space, and two arms which created the Transept and galleries on both sides (Fletcher, 1905).

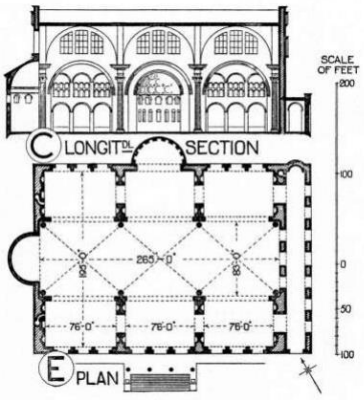


Figure (8): Basilica of Maxentius and Constantine

Facades:

The facades of churches in the early Christian period, just like the basilica, were built using rubble or concrete, then faced with plaster, brick, or stone. Quadrated stone blocks in most of bilad ash-Sham. Then most of the early churches were constructed by using brick. In theearly Christian and Byzantine periods external architectural elements were simple and comfortable to look at it with various colors of stone and brick, thus, highlighting the church's function as a building of worship. On the other hand, there was regard to internal walls, which started with mosaic

decoration on the floors and then marble casing and mosaic which expanded on the interior walls. (Fletcher, 1905)

Openings:

The openings, both doors, and windows were typically semi-circular at the top, though sometimes segmental and horse-shoe arches were used. Most churches in Jordan have simple flat lintels, certainly at Umm al-Jimal. The openings of Byzantine architecture were most distinguished by mosaics and the inclusion of stained glass. The main source of light came in through the central dome (drum) or through openings around the circular base of the dome. These windows illustrate the accuracy and art in church architecture (Fletcher, 1905).

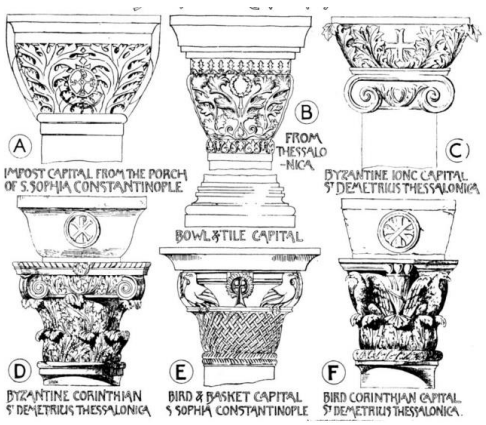


Figure (9): Types of column's capital. (Fletcher, 1905)

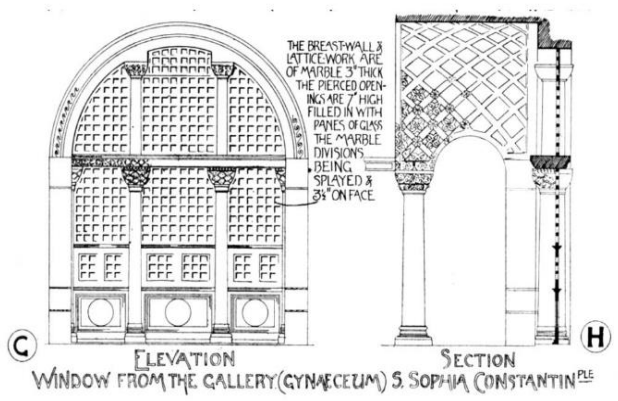


Figure (10): Openings' details. (Fletcher, 1905)

Columns:

The ornate columns used in churches were often taken from ancient Roman temples and reused according to their size, strength, and durability. As for the capital of these columns, they used multiple styles, for example, the Tuscan, Doric, Ionic, and Corinthian capitals. These columns did not exist in the East as they were in the West, so there was a motivation to create their own designs there. In the east, the columns were more functional than decorative; thus, they supported the arches which in turn supported a roofing above the aisles. The artists formed the surfaces of the capitals by engraving them (Fletcher, 1905).

Materials and techniques:

The Byzantines architects used specific materials in building their churches, and most of them used what was available locally. Stone was the most common in Jordan, Syria, and Palestine. In Constantinople, Greece, Italy, Egypt, and Iraq, bricks were typically used to form the foundation (C. Mango, 2018). Different techniques were used in the construction in the Byzantine churches. When limestone, basalt, or other stone was used for the entire building, the wall was a double wall in the form of a square or rectangle. Each wall is rows of stones separated by a layer of mortar, and the internal space between the two walls was filled with mortar as well. External stones were often the best existing stones, while the internal stones were smaller in size and less uniform in form. The reason is that the outer walls appear the same without any addition. The type of stone will be covered while the interior is clad in layers, whether plastering or mortar or mural paintings or marble or mosaic. Therefore, whatever the type of stone internally it will be uniform externally. This method of construction spared in Hauran and Syria (Davies, 1952). The second method of construction was to build a wall by brick as rows with layers of plastering between them, and this is what was been in Iraq and Egypt. A third style was to build three to four rows using brick and then one row with stones. This repetition continued until the whole wall was finished. This method was meant to give more support to the wall and make it stronger. This method spread in both Constantinople and Armenia. Finally, sometimes stone formed the bottom layers, while the upper ones were brick (C. Mango, 2018).

Roofing and Covering the basilica

The diversity of architectural styles in the building of the churches led to the use of more than one method of covering and roofing the structure. The various factors that helped in the selection of roofing methods in churches included the areas (spaces) required for roofing, geographical factors, and other factors. The first way of covering a church was to use a wooden truss (gable) roof over the church's central nave and a downward-sloping roof toward the outside of each of the two aisles. The second way of covering was a flat roof using stones. The reason for the use of stones was the climatic factors, such as extreme heat, and also the lack of wood. This type of roof spread widely in

the eastern areas, and due to the weight of these ceilings, it was necessary to increase the thickness of the walls to reach 60-80 cm, and up to 100 cm for apse walls. The most common method of roofing in the Byzantine period was using domes, where the square-plan church was covered with a central dome and supported by two vaulted aisles on each side. Thus, the top view scheme took on the shape of the cross. Domes over square or octagonal plans were a distinctive addition to Byzantine architecture. As for the apse, it was covered by a half-dome and lined with gorgeous glassy mosaics (Fletcher, 1905).

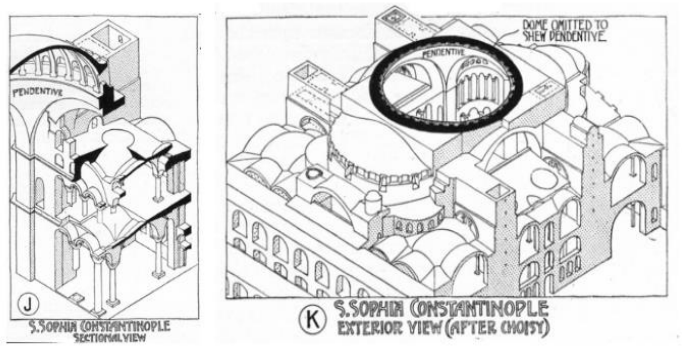


Figure (11): Roofing methods (domes). (Fletcher, 1905)

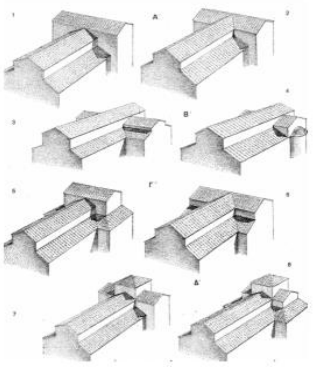


Figure (12): Roofing methods (gable). (Fletcher, 1905)

Ornament:

The ornament was sophisticated and amazing, just as the church architecture was meant to be. Colored stone or glass mosaics could be used to form a particular image of a saint, or to create a floor with Christian symbolism. Painting (frescoes) could be used in similar ways, typically as a wall ornament. The architectural style was using certain lines of the painting, whether vertical or horizontal covered by the mosaics which are painted to form the specific desired design. some mosaics patterns were created by using stone of various natural colors and colored glass tesserae (cubes). Byzantine ornament differed from its predecessors in the method of design. The pattern appeared as incised and engraving inscriptions, not like the previous ones which were a layer applied over another layer (Fletcher, 1905)

2.4. Byzantine Architecture of churches in the Hauran

The Bible gives us numerous connotations that hint at the many Christian churches in Jordan. In Matthew 25:4 " And there followed him great multitudes of people from Galilee, and from Decapolis, and from Jerusalem, and from Judaea, and from beyond Jordan". Also, in John 10 :40 "Then Jesus went back across the Jordan to the place where John had first been baptizing, and He stayed there."

Based on the latest statistics on the number of Byzantine churches in Jordan, there are more than 150 churches, and they were not of a specific pattern. The shapes, patterns, details, and schemes of these churches are varied. These Byzantine buildings (including chapels, churches, cathedrals, and 'parish' churches) were used as places of prayer and worship, and sometimes as pilgrimage shrines. (Clark, 2007). In 1980 and 1981, a survey of Islamic and Byzantine sites in Jordan was conducted. Christian church architecture was well-known and illustrated by previous studies and missions. In the Islamic period, some changes were made to Christian buildings, some of which were converted to their foundations by pillaging their fabric. They used available materials at that time, such as local black basalt and often exclude any other materials, including wood (King, 1982).

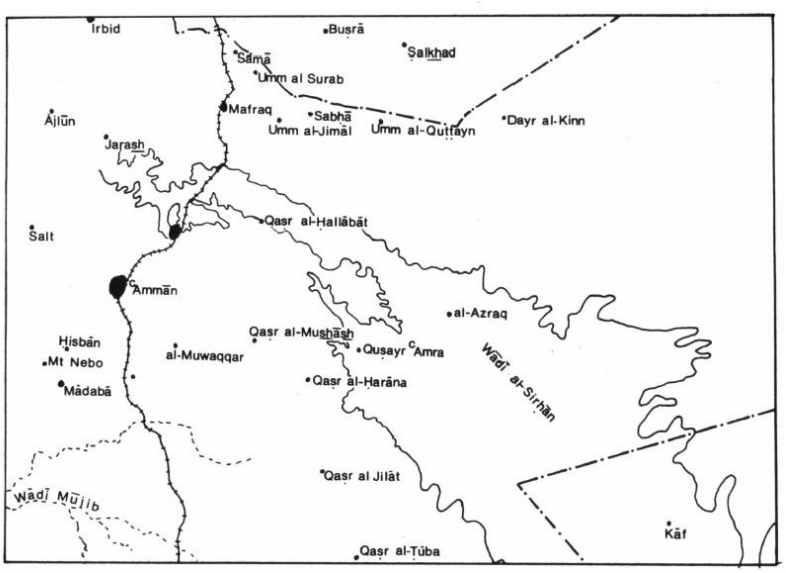


Figure (13): Map of Hawrãn and eastern Jordanian desert. (King, 1982)

The oldest and first church in the world is Umm al-Zannar Church in Homs-Syria. Dating to AD59, it was an underground cellar. The church was characterized by its unique architectural style, using black basalt stone in addition to stone arches. After Milan's promulgation in AD 313, the Christians of Homs began the construction of a large church above the ancient church; they used the Black Hummus stone in their construction and roofed the church with wood (المتاحف، 2012) .

The rock formations found in Jordan and the surrounding areas provide suitable stones for construction, such as basalt stone, limestone, and sandstone. In the area of Umm el-Jimal, Umm al-Quttein, Umm al-Sarab, Sabha and others, the stone available and used for construction was basalt. Limestone was used in the west and the central plains, and sandstone were used in the south. Internally, marble was the main material for construction in addition to mosaics. The Byzantines reused earlier building materials, specifically the stone pieces that were uniform in shape and straight chamfered edges which were used in columns, doors, and windows. This helped them to reduce the time and effort. Often when they reused these pieces they added their own touch: for example, stones could be engraved with crosses or other designs (Qaqish, 2007).

Howard Butler noted the lack of internal mortar in the churches of Horan and southern Syria, which could hold the rubble-filled walls together. This was one of the reasons why these churches did not survive the earthquakes in the region over time. (Butler, 1913). In the Hauran, church capitals were often carved only on one side, resulting in a simple architectural style when compared with the ornately carved churches in other parts of Syria (Qaqish, 2007).

In the churches of Jordan, the decoration was usually limited to door lintels, which was carved or decorated with crosses. Holy water jars were also found in several churches in Umm el-Jimal, where they were used at the entrance to the churches for purity before entering the church. Howard Butler, called these types of capital by the same terms, like late Ionic and Doric capitals. This is in addition to the minor adjustments made by the local people to add their culture to their architecture.

(Butler, 1913). The domes were the most important elements that the Byzantines developed in the building of churches, but because of their structural difficulty and the need for time and effort, the churches of Southern Syria and the Hauran used wooden or stone roofing. In some buildings of the Houran area, the method used to cover the walls was more than one layer of plaster (two layers from the outside and three from the inside). Internally, the first layer was rough, which is gravel and the second less rough than the first one to be prepared for decoration as a third layer. Structural architectural features often appeared ornamental even as they were primarily functional, particularly with respect to roofing. The pillars and the extended columns of the roof were supported by arches. The arch is designed based on the dimensions of the ceiling and the breadth of the arch increases according to the width of the roof. Some of the church buildings in Hauran had a wooden roof, which helped reduce the thickness of the walls which did not exceed more than one meter and is enough to carry the ceiling. Alternatively, because of the limited availability of wood in the area, the corbelling method, was also used for roofing, as system whereby a slab extends out of the inside of the wall. It was built using stones 45-60 cm, anchored by timber. Also, there was a method of multiple transverse arches supporting the roof. Other roofing methods use both wood and stone. The goal of the architects was to find local architectural solutions and materials of sufficient quality to support so that they could expend as few resources as possible. In some churches in Syria, the middle hall was covered with a layer of wood and another layer of mortar and stone fractures. In the apse of the churches, a half-dome roof was constructed. These were built using lightweight volcanic slag mortar, and examples still exist in some churches of Umm el-Jimal, such as the West Church. There were three styles for windows: square, rectangular, and circular. This is due to the specificity of the space used and the amount of light needed to illuminate the architectural space. The apse windows had specific foundations according to the Eucharist rites. The doors were mostly rectangular in shape, but with multiple heights and multiple sizes. But there were some door entrances that still exist in Umm el-Jimal in a semicircular shape. Trimmed stones were used to frame and surround the door opening. There were upper lintel and lower pedals. The number of doors and their distribution in churches varied depending on the area of the church, the

number of worshipers, and the direction of the church. Another important factor was whether the church was separate or connected to adjacent buildings. The distribution of doors on the walls of the church was uneven. One important factor is the direction of worshiper's houses to come to their church. But in reality, there is no radical decision on how and why church doors are distributed. This is due to the incomplete picture of any churches for analyzing. As for the materials from which the doors were made, there are indications that some of them were cut stone and others were wooden doors with a thickness of 10-15 cm fixed with huge nails. There is also an upper umbrella over the doors, a phenomenon found in most of the churches of Horan (Butler, 1913) (De Vries, 1972-1981) (Qaqish, 2007).

Two-storey churches have been found, for example, the Church of Numerianos in Umm el-Jimal. However, most of the churches had one floor without overhead galleries overlooking the nave. It is notable that in the Hauran, the numbers of the churches exceeded the needs of the population (Qaqish, 2007). Since the beginning of Constantine's rule, the middle of the fourth century, the churches were directed to the east where the apse was and the main entrance to the church was on the west side. Butler pointed out that most of Hauran churches were oriented to the east. Somehow the direction may differ in some cases and also the lack of accuracy of compasses in the time when the churches were built. Early churches were more precise in orientation. In Umm el-Jimal specifically, the churches tend to be 20 degrees east. One of the reasons for the inclination of churches was their location along the old Roman street or the annexation of the church to the existing old building as in the churches of Umm el-Jimal (Butler, 1913).

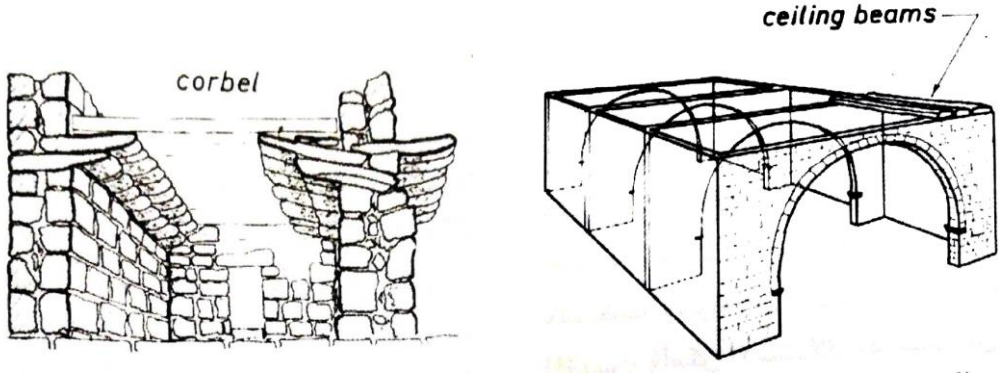


Figure (14): Methods of roofing at Umm el Jimal. (Bert's De Vries Drawings)

It was noticeable that church buildings existed in residential areas, where buildings congregated around churches. In some cases, the churches are completely adjacent to the houses and in others, the churches are part of the residential houses. The churches had architectural spaces, whether separate or part of a building. The architecture surrounding or adjacent to the church was not only religious but sometimes could include schools or health centers. There could also be tombs, wells, and water tanks, and in some cases towers and monasteries. In addition, there might be housing for the clergy and ecclesiastical facilities and chapels, which were open directly to the church space. Service rooms for the church were usually adjacent to the north and south walls (Qaqish, 2007). The area of Umm el-Jimal is unique in its privacy for the following buildings of the church. These architecture facilities do not open directly to the church, but to a square to the south of them. According to Butler, he believed they belonged to the church. (Butler, 1913). The tombs were linked in the church architecture, therefore the churches were built on cemeteries. In other cases, churches were built near graves or those built near a cave that may be used to be buried. No specific architectural pattern was followed, the relationship between them was close. Water supply was also important in churches; the clergy and church architects were keen to secure water sources (wells or reservoirs) near the churches. (Qaqish, 2007).

Church towers were not a frequent phenomenon in the Eastern Churches and were more prevalent in the northern parts of Syria. .The West Church of Umm el-Jimal is an example of this. The western church connected with two towers but they were not as high workmanship or quality as the building of the church was. This indicates that the church and the towers were built in two different periods of time. Opinions differed on the function of the towers, Butler considered it a way to climb the roof of the church so that the roof could be maintained and the overhead building materials renovated to avoid any damage to the roof (Butler, 1913). Pena considered them as rooms of the church guard or a place of service for the monks of the church (Pena, 1997). On the other hand, Krautheimer ruled out the use of these towers for any functional goals, he thinks it is an aesthetic architectural element that added to the church building’s luxury, greatness and steadfastness (Krautheimer, 1975.) In order to avoid any

misunderstanding of the function of the church towers, churches' bells in the tower had nothing to do with its function in that period (Qaqish, 2007). There were many types of churches in Umm el-Jimal, including what was likely to be a church of a monastery: the East church. This type of church is widespread in rural areas, so these churches are small in size and they are part of a set of ecclesiastic buildings (Mayerson, 1985).

Another type of structure is known as contiguous churches. This happens when two churches are built adjacent to one another (exemplified by the Double Church in Umm el-Jimal) or even three (e.g. in Jerash the Churches of St. George, St. John the Baptist, and SS. Cosmos and Damian. These churches form an ecclesiastical space together; however, previous studies and excavations in church areas have shown that these churches were not built together at the same time (Qaqish, 2007).

In the Umm el-Jimal Double Church, the second church built is to the south and they are joined by a wall with two doors. This wall enabled the continuation of movement between the two churches (Butler, 1913). Opinions and interpretations of the purpose of two churches built together like this vary, in large part because they are located in a residential area where it would have been possible to have one church large enough to accommodate the neighborhood.. One of the reasons for the double constructions may have been managerial or economic: in a later time there may have been more money available for the establishment of new churches, which may have facilitated the expansion. It is also possible that two joined churches could be managed together, thus reducing expenses and services that might be too great if spread between two separate churches (C. Mango, 2018).has also been speculated that the laws of the state and land ownership at the time limited the contiguity of churches (Bujard, 1992).

There were also religious constructions that had links with Roman and Byzantine-period fortifications: there are many examples of churches built within forts or camps (such as at Deir al-Kahf), and sometimes these military buildings were used as monasteries .(Qaqish, 2007).

Figure (15): Drone photography image for Umm el-Jimal town (UJAP, 2014)

2.4.1. Umm el-Jimal and its churches

Umm el-Jimal, in the north of Jordan, is part of the Hauran plains, its architecture followed the prevailing system of churches of Hauran. Each community settled in it and added their special architectural touch. (Butler, 1913) Researchers differed in the designation of Umm el Jimal, such as Graham and Merrill, who tried to link them to beth Gamul. The term was found in the Torah, but Butler emphasized based on his studies of the region of Horan, maps and ancient Roman records where it was named Thantia, a city southwest of Bosra al-Sham. Umm el-Jimal, now called the Jewel of the desert. It is one of the basalt cities that stretches east to reach the Druze Mountain, but unfortunately, it was subjected to multiple forms of destruction, many of its stones have been removed for other constructions outside of the area (Doughty, 1979) (Butler, 1913) (Merrill, 1981). The Nabataean period continued in Umm el-Jimal (312 BC to 106 AD), w a period of thriving commerce and agriculture. The Nabataean temple on the southwestern side is one of the most important Nabataean architectures in Umm el-Jimal. In addition to the inscriptions, columns and its capitals and bases which were found near the Commodus gate in the west. The Nabataean reservoir water was also one of the most important accomplishments to serve the population at that time

(Butler, 1913). The Roman era continued at Umm el-Jimal during (106 AD to 324 AD), the Romans tried to make trade successful in order to increase their prosperity and power. They built the Turjan commercial road from which several sub-roads were split, Umm el-Jimal was connected to this road. Via nova trainan – it's most important function was military; top move troops rapidly. The importance of Umm el-Jimal began by its location on the commercial road between Philadelphia (Amman) and Bosra Al-Sham. At the beginning of the third century, the number of Bedouin tribes increased. The Romans had to fortify themselves by building a wall around the area with watchtowers. This wall is the wall of the city of Umm el-Jimal, which is still clearly defined today. By the end of the third century AD, poor economic conditions and increased awareness of the population and their refusal to worship the gods coincided with the spread of Christianity. The conversion to Christianity seemed a reality. Umm el-Jimal still retains the Roman buildings built in the previous periods, the building of the Praetorium 371 AD, the Wall of the City and the Commodus Gate (176-180 AD) (De Vries, 1972-1981) (Honde, 1966).

In the Byzantine period, Constantine was able to transform the areas of Syria, Jordan and Palestine from Roman provinces to a Christian Byzantine state and started building churches. The Byzantine period (324 AD - 491 AD) was a transitional period. In addition to the dominance of Christianity, a number of buildings were converted for other purposes as a kind of re-purposing such as praetorium, the military barracks, and the Castellum.(خضر، 1981) (De Vries, 1985) (الحديدي، 1996)

Church building or construction continued despite the existence of Islam in 636 AD. However, the area was devastated in AD 749 following a horrible earthquake that struck the area, thus, the residents had to leave the area without restoring or rebuilding it (DeVries, 1979). Umm el-Jimal remained unchanged or even documented until 1857 when Graham visited and briefly described its details. Then in 1861-1862 Waddington copied and documented the inscriptions he found in the area. In 1875-1876 Doughty read the inscriptions in the churches and

described the various houses in Umm el-Jimal (Doughty, 1979). In the same year, the US Consul in Jerusalem, Merrill, visited there and talked about its architecture and the proximity of its buildings, churches, and inscriptions. Visits to the Umm el-Jimal area were followed by researchers such as William Thomson, Frauberger, and G.Less. The first plans of Umm el Jimal were published in 1894 by Schumacher. But the first survey was conducted by The Princeton University Archaeological Expedition in Syria 1904-1909 under Butler's supervision. He presented two schemes showing the city, the first one shows the city and its surroundings and another one refers to the important buildings of the city itself. He documented many of the inscriptions and took many pictures that are the only historical reference for the region (Butler, 1913)(Merrill, 1981).

Archaeological surveys and visits by researchers and architects continued, and the last survey in Umm el-Jimal was by Bert De Vries in cooperation with the Department of Antiquities. He completed butler's excavation, then he did his documentation, cleaning, and restoration of some of the buildings which clarified their features. Most of the researchers aimed to know the chronology of the region as a result of the succession of civilizations. They also wanted to know the architecture that was used to produce these houses, churches, gates and water facilities with a professional water system.

In 1992, archeological surveys were done and documented in Umm el-Jimal and focused on specific areas such as the cathedral, Nabataean garden, and the administrative headquarters (Praetorium). The results of archaeological excavations revealed the presence of some Roman tombs on the site and many Nabataean pottery fractures and coins in addition to the plaster and colored coverage. (الحصان,2001)

A direct source of evidence of their Christian religious significance in the previous Byzantine periods is the abundance of its churches. Umm el-Jimal is a rural town inhabited by multiple civilizations. Its churches are integrated together as one unit, forming a Christian ecclesiastical

community in the center of Umm el-Jimal. Some of these churches were outside the archaeological city (now) such as the Western Church. What distinguishes the city of Umm el-Jimal is its unique architecture and multiple churches distributed among the housings. There are separate churches that are in the middle of a residential area and there are other churches affixed to residential buildings, as well as churches that are located inside a residential vacuum, which can be accessed only from the courtyard of the house (UJP). Umm el-Jimal was distinguished by the distinctive black stones distributed over 800 Donum. It is a completely integrated city with several Byzantine churches and multi-story houses that can be traced back to the Byzantine era (Trimingham, 1979).

Based on previous classifications of churches and our study of the churches of Umm el-Jimal, there are 16 churches in Umm el-Jimal and we can say that Umm el-Jimal churches follow two churches' patterns; the first one is basilica churches pattern and other one is hall churches patterns. Most of the churches in Umm el-Jimal go back to the late Byzantine period (491-636) which was a flourishing era of Christianity. However there is no specific date for the period in which each church was built. Butler attributed the history of the construction of the Julianos Church (one of the cases in this dissertation) to 345 AD, which is one of the earliest churches in Syria. Probably the history of the cathedral goes back to 557, which makes it one of the largest churches in the region. It is still apparent and obviously marked, despite its destruction in the Umm el-Jimal area. However, Bert De Vries, proposed that the construction of the Northeast Church goes back to 490 AD. These churches were distributed within the region, so there are West Church, Cathedral, South West Church, Barracks Chapel, Numerianos Church, South East Church, Masechos Church, East Chapel, House 95 Chapel, Double Church, East Church, North East Church, North West Church, Julianos Church, Klaudianos Church (Butler, 1913) (DeVries, 1985) (Trimingham, 1979).See Figure (17)

As mentioned earlier, there are separate churches built independently, surrounded by buildings such as the West Church, North Church, Numerianos Church and the cathedral. The other pattern

that belongs to some buildings is that they are adjacent to the wall of a building or that is within a group of buildings, such as the Church of Masechos Church, double Church, South East church Klaudianos Church, and Julianos Church. Since there is no specific date for the periods when churches were built, most researchers relied on geographical locations to distinguish churches.

In all its architectural details, most of Umm el-Jimal's churches adopt the basilic style mentioned above. It is a rectangular structure divided into three sections with two aisles and a Nave that has clearstory (lightening windows) in the gap left because of the height difference with the adjacent roofs. The apse is located in the western part of the church, usually in the semi-circular form and is covered by a half-dome. Inside, it contains opposite seats wrapped in the clergy's apse synthronus, the most important one of which is Bishop Cathedra's middle seat. The altar on which the divine sacrifice is erected is directly in front of the apse and on one side of the apse there is a pulpit from which was read the Holy Gospel and the priest preached to the worshipers from an area that was called Ambo. The two chambers that surround the Apse had different uses. The right one is called Diaconicon used to change bishop clothes and the other on the left called Prosthesis was used to prepare the Eucharist. The Atrium where prayers gathered before worship and may contain a pure water (Cantharus) or a stoup installed in the western wall at the main entrance, whereas the Narthex is the separation between the square and the Western Wall (Davies, 1952) (kimball & Edgell, 1972) (Negev, 1986). The patterns of the hall churches, which follow the basilica differ from the previous one, where the two aisles and Nave are equal in height, some of them may contain two Naves or a Nave with two aisles. The openings in the exterior walls are relatively large due to low luminance. Either their roof is one level which is divided to show the interior space, or sometimes the roof may be vaulted (Brubaker, 1985). Butler’s observations is different. He said that there was no Nave and Aisles separated by Columns in these churches, as is a rectangular space with transverse arches, or in some cases it is a square vacuum and has a single cross bracket. The apse is capable of being circular or rectangular. It may have a narthex.

(Butler,1913). The churches of Umm el-Jimal have a rectangular vacuum with two aisles and a nave of equal height, a circular apse .

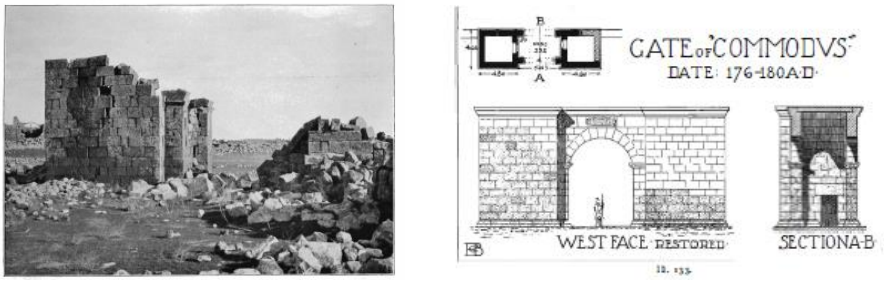
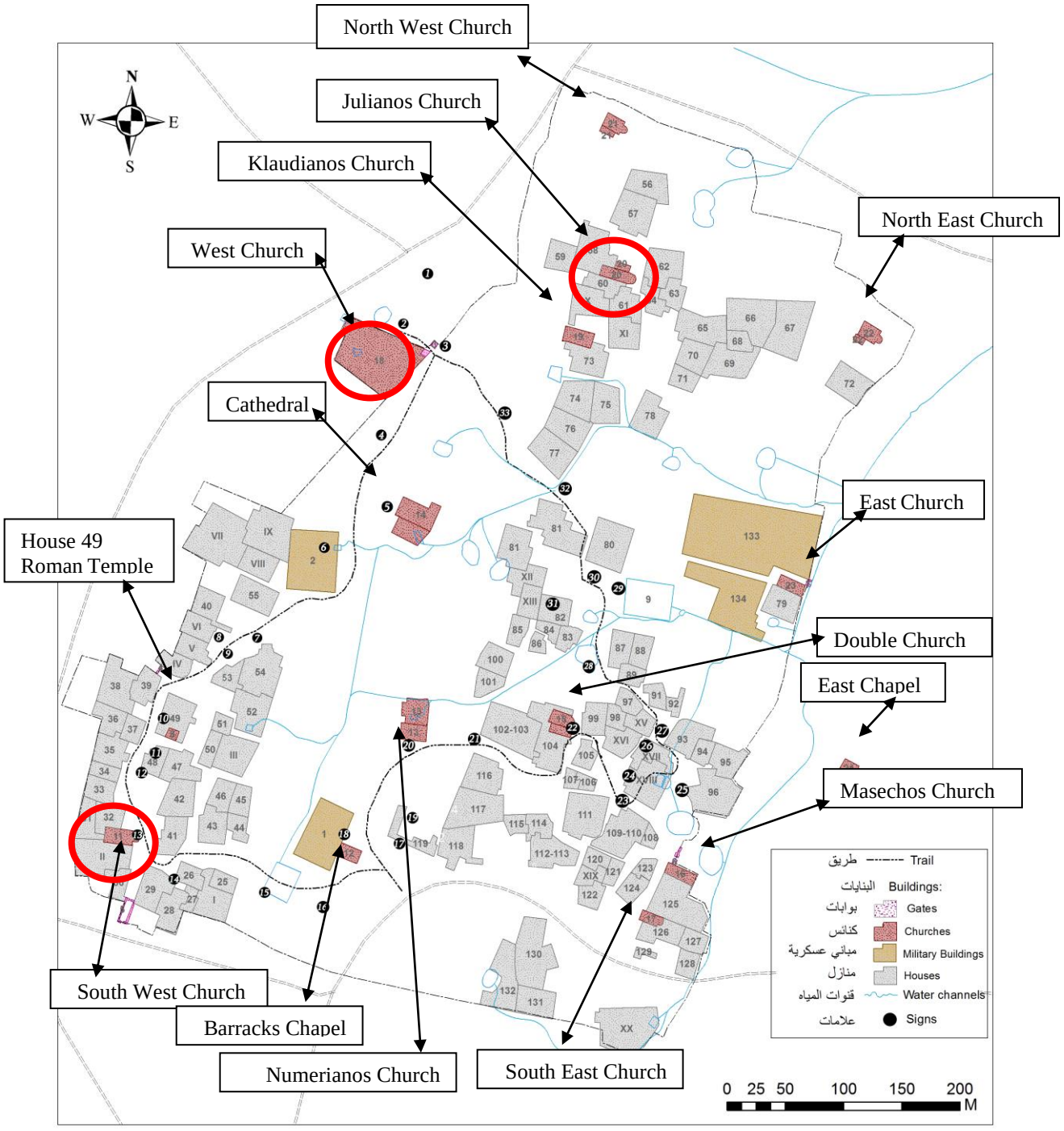


Figure (16): Commodos Gate; perspective, 2D elevation and plan (Butler,1913).



Figure(17) : Umm el-Jimal Archaeological site Trial map (UJAP, 2015).

*Red circle Refers to three churches (cases).

Chapter Three: Methodology

3.1 Introduction

This chapter describes the work process of the documentation of three churches located in Umm el-Jimal (South West church, West church, and Julianos church). Those three churches are considered a part of the ecclesiastical community that is available there. The research provides a paradigm for the local ecclesiastical architecture in Umm el-Jimal, through a comparative study of three churches. The methodology uses a mixed-method approach by comparing and combining the available information in books and research studies with the existing ruins of the churches. Subsequently, modern software is used to produce two-dimensional technical drawings and three-dimensional perspectives of the three churches. By implementing these methods, the research aims to create an architectural documentary base for illustrating the structure and design of ruined churches, using the examples of the South West church, West church, and Julianos church, which can help in understanding the essence and the variety of other churches in the region. Furthermore, this study will help in understanding the architectural styles and their connection with the regional churches' architectural styles (Southwest and Julianos Churches) and independently enclosed space (West Church).

The quantitative and qualitative approaches of the methodology will result in a descriptive and analytical study that is supported by data collection and theoretical investigation in two quite distinct fields of research: archaeological findings and a study of the historical documents. Umm el-Jimal Project archive, The American Center for Oriental Research (ACOR) and The Department of Antiquities (DoA) are the main sources for providing the related information and facts. Archaeological findings are considered an important source of knowledge, in their way of offering direct and contemporary evidence through reviewing the results of excavations. This research was followed by a visit to the three churches to document and analyze the main architectural features. Then, the churches in the Roman and Byzantine periods were studied to understand their typological, structural, and morphological aspects.

Finally, the data were analyzed by integrating the design principles of historical churches in order to validate the diversity of the characteristics of three churches..

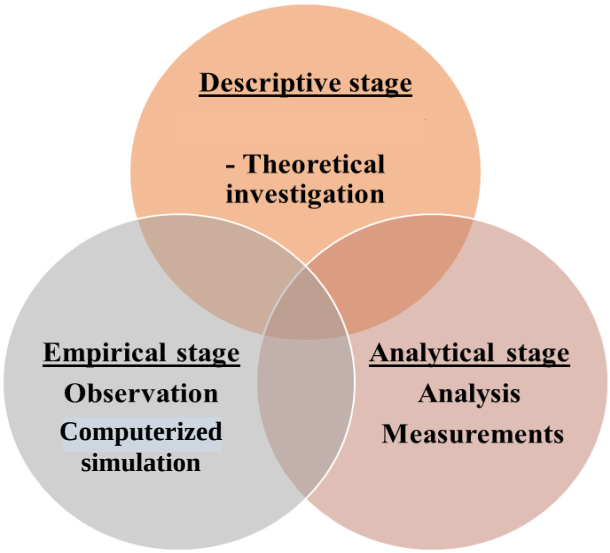


Figure (18) : Methodology integration chart. Sources: by Author.

3.2. Case Studies

The methodology described above was applied to the three case studies (The South West church, The West church, and The Julianos church) with slight differences due to the unique conditions of each church that located in an ecclesiastical community in Umm el-Jimal. South West church and Julianos church were built into housing complexes, but the West church was on its own, located outside the earlier Roman wall.

3.2.1 South West church

The Department of Antiquities of Jordan, in cooperation with the Umm el-Jimal Archaeological Project Team (UJAP), has worked on the conservation of the South West church, making it the most preserved in comparison to its surroundings (The church was cleared by the Department of Antiquities, then damaged by looters and then cleared again by UJAP in June of 2019, subject of excavations). The collapse debris has been removed by the DoA. Because of the obvious well-preserved church walls, the documentation process was easier and all the work was done smoothly.

Figure (19) : South West church photos through field works. Sources: by author

3.2.2. West church

A number of factors helped in analyzing in the West Church. First, most of the walls of the West Church exist, which helped in matching the stones for their historical period. Second, accurate measurements and drawings of the church arches were done. In addition to photography and technical drawing, archaeological studies and excavations were done by the Umm el-Jimal Project (UJP). This archaeological fieldwork aimed in identifying the archaeological layers below the West Church in order to understand and date the changes in the building over time.

Figure (20) :West church photos through field works. Sources: by author

3.2.3. Julianos church.

Because of the relatively poor preservation of this church, the selected research method was relatively difficult to apply. currently, the ruins of the Julianos church consist of a few courses of stones that make up the walls, some of the doors and the steps of the apse. Aerial photographs taken by the UJP were used to take the church site measurements and to draw the church 2D drawings and model it in detail.

Figure (21) :Julianos church photos through field works. Sources: by author

3.3. Fieldwork

The study of the three Umm el-Jimal churches seeks to develop a deep understanding of their construction techniques and an understanding of how the churches relate to the buildings around them. The analysis includes types of plans, elevations and sections, architectural features and details, and in some cases, a graphical reconstruction will be created.

This fieldwork contributes to enhancing and describing the distinctive architectural characteristics of the ecclesiastical architecture and will help to revitalize the important role of the scientific and cognitive content of Umm el-Jimal in particular. From there, the location's context and the conditions of its nature can be determined. Also, to compare what has been documented and written in the literature and the archival data with the current conditions. During field visits and on-site work. The main tools used were the scale, measurements tool and camera.

The presence of accurate details on-site which is called "Archaeological information" based on survey and excavation. This includes the soil layers and floors excavated (stratigraphy), whether it is pottery pieces, mosaic layers, pieces of the roof of some of these churches and archaeological inscriptions, can form the foundation for the discovery of important information, thus, helps to highlight new facts and discoveries that didn't exist before.

Figure (22) :Field works. Sources: by Author

3.4. Computer Modelling and Simulation

After reviewing important literature, it was decided that the best way to start the documentation process was to take pictures of the church's sites. Pictures of the remaining walls, floors, and architectural details were taken using a Nikon camera with high resolution, also using a measurement tool to document the dimensions of each piece. Once fieldwork was completed and the data was gathered, modern computer software was used to redefine the angles of photos and then transform the taken images (3D perspective shots) into two-dimensional images using Adobe Photoshop. During site visits, some distinguished stones that are close to regular known shapes were measured to rescale the size of the taken images to its real-life size (1:1).

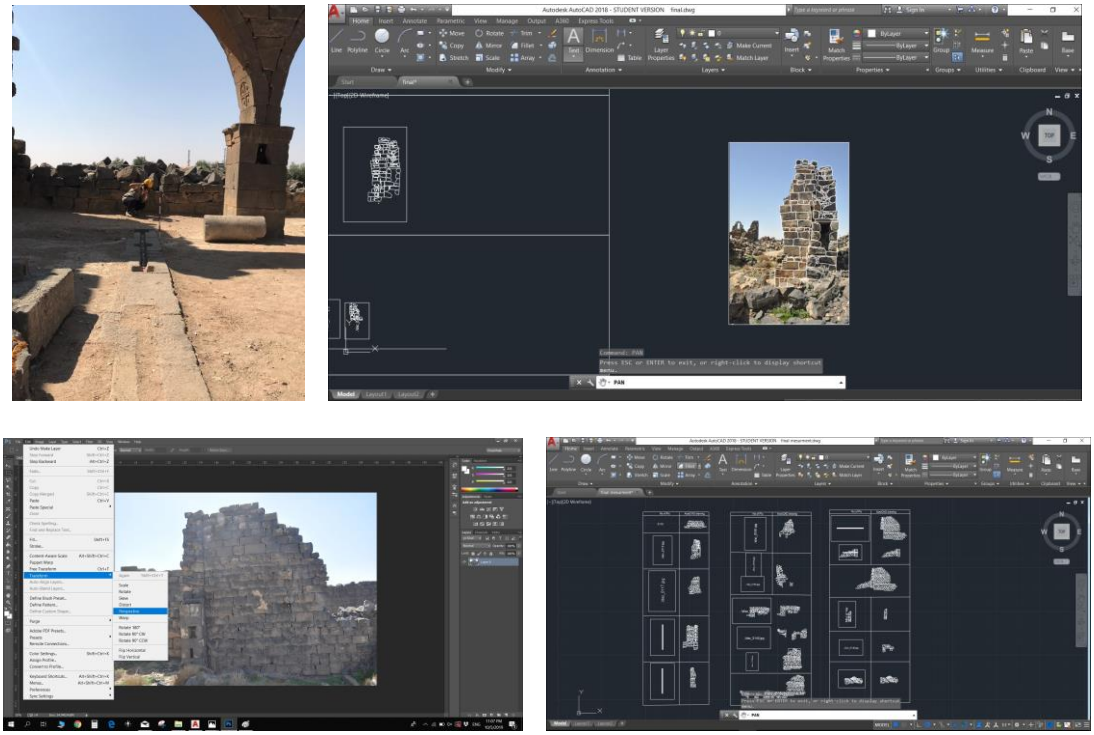
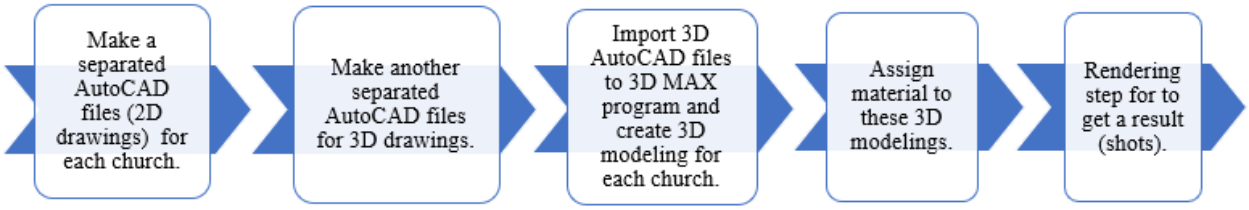
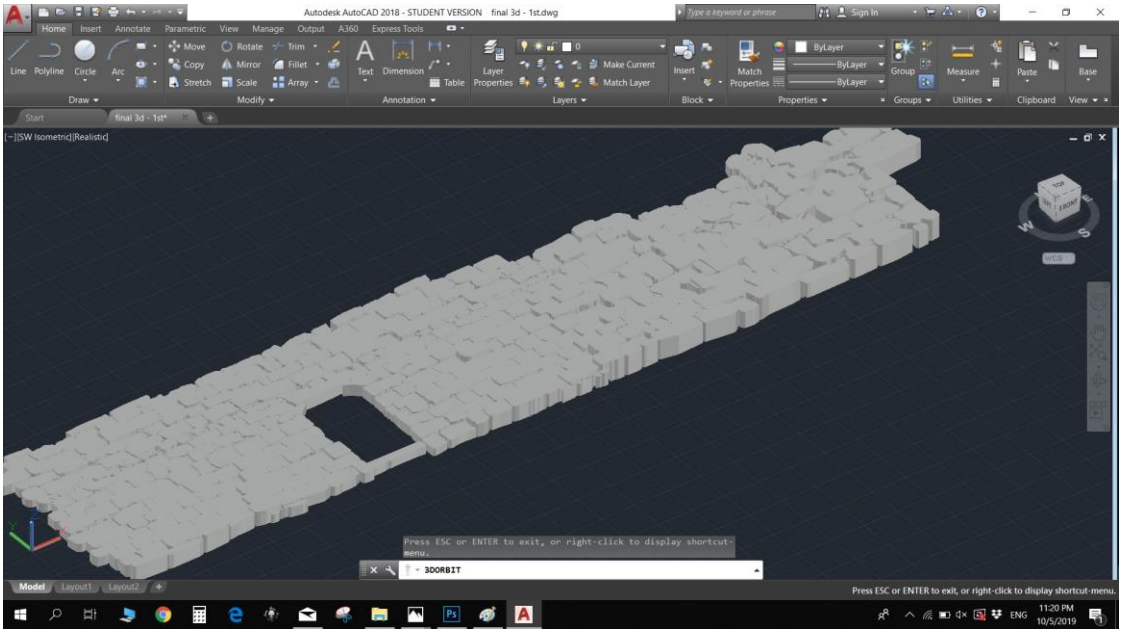
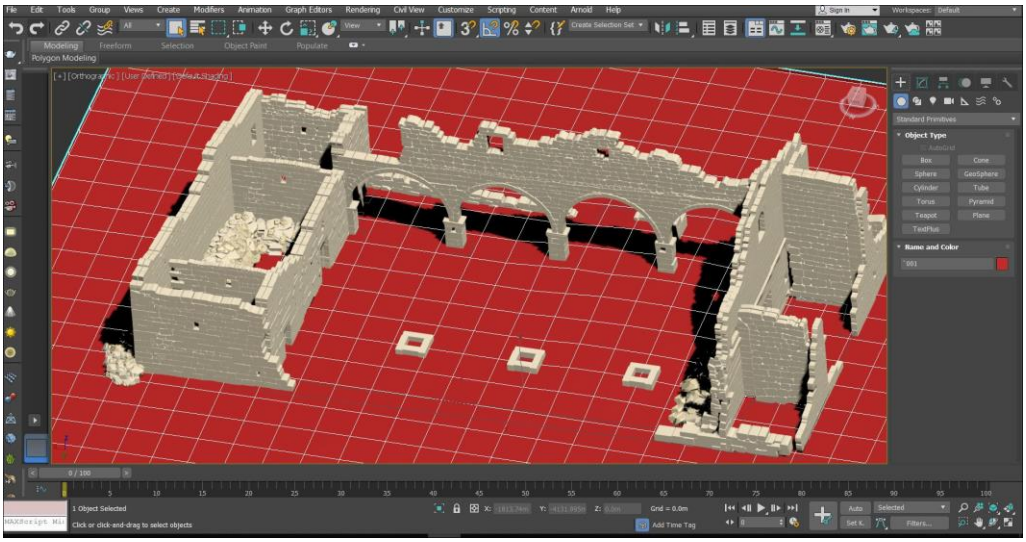


Figure (23): Graphic figure and photos illustrate the first steps of process. Sources: by Author.

The technical drawings were formulated using AutoCAD, in which the image was imported and then drawn (stone by stone). This work produced the first result of the documentation: two-dimensional architectural drawings of the church remains. The second step was to use AutoCAD to draw the three churches in three dimensions and import them into Autodesk 3Ds Max computer software to determine the required material for rendering. As a result, the churches and the surrounding neighborhoods were completely modeled in three-dimensional drawings, which completed the second phase of documentation.







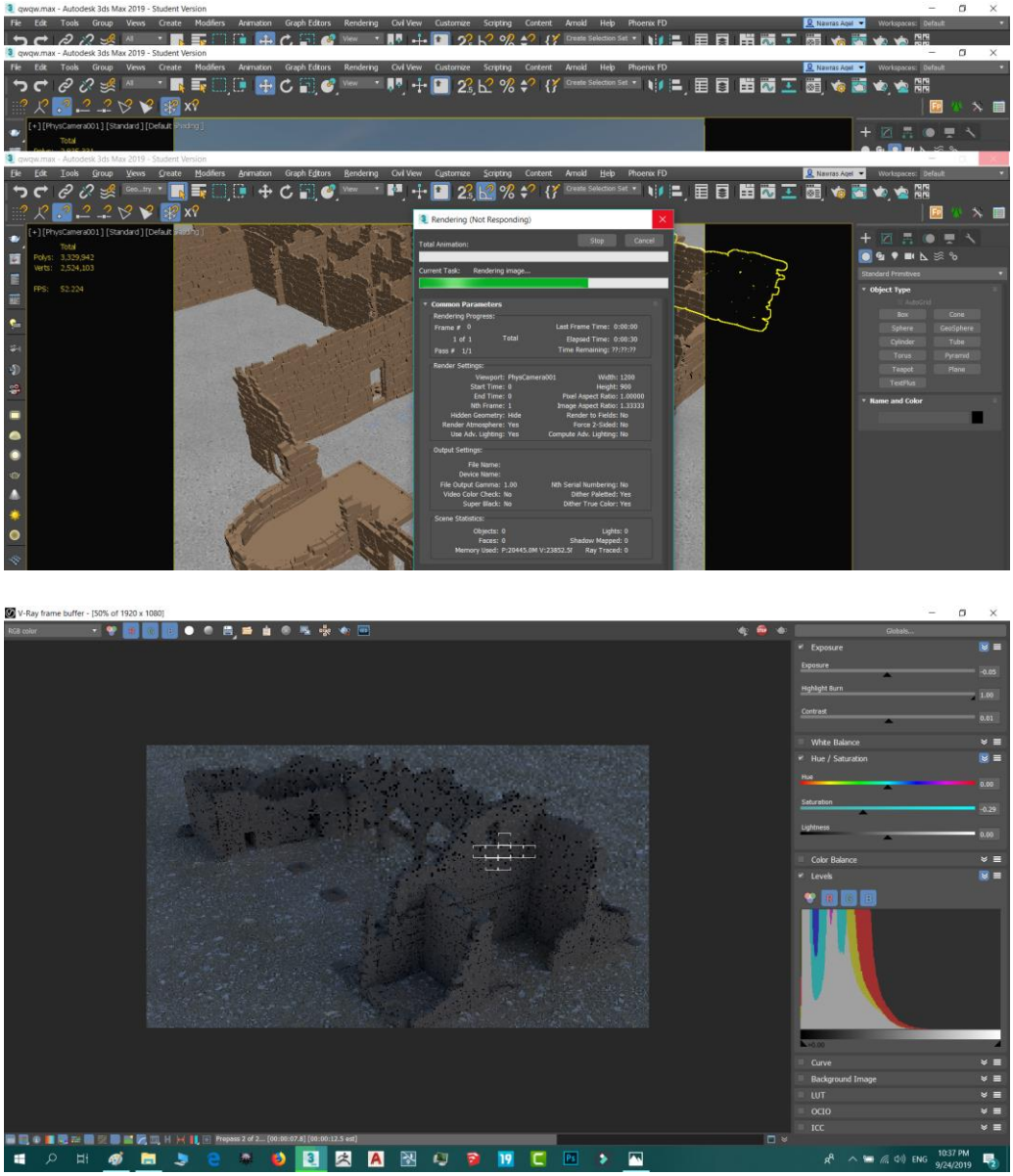


Figure (24) : Graphic figure and photos illustrate the second steps of process. Sources: by Author.

The collection of research studies, site excavations, and investigation conducted in the fieldwork were used to hypothesize the churches' original conditions and the exact features of their walls, ceilings, and other details. Thus, it was possible to determine the original features and structures of the churches.

Following the analysis and comparisons, the third and final step was to complete the comprehensive form of these churches, determining how the roof of each one was built, based on the available data and site observations. A reconstruction of the walls and roofs of the churches were then drawn using Autodesk 3Ds Max software. Then, the materials of the roofs

were selected, using historical and archaeological information to determine their makeup. The Three-dimensional images simulated show what the original churches would have looked like in antiquity.

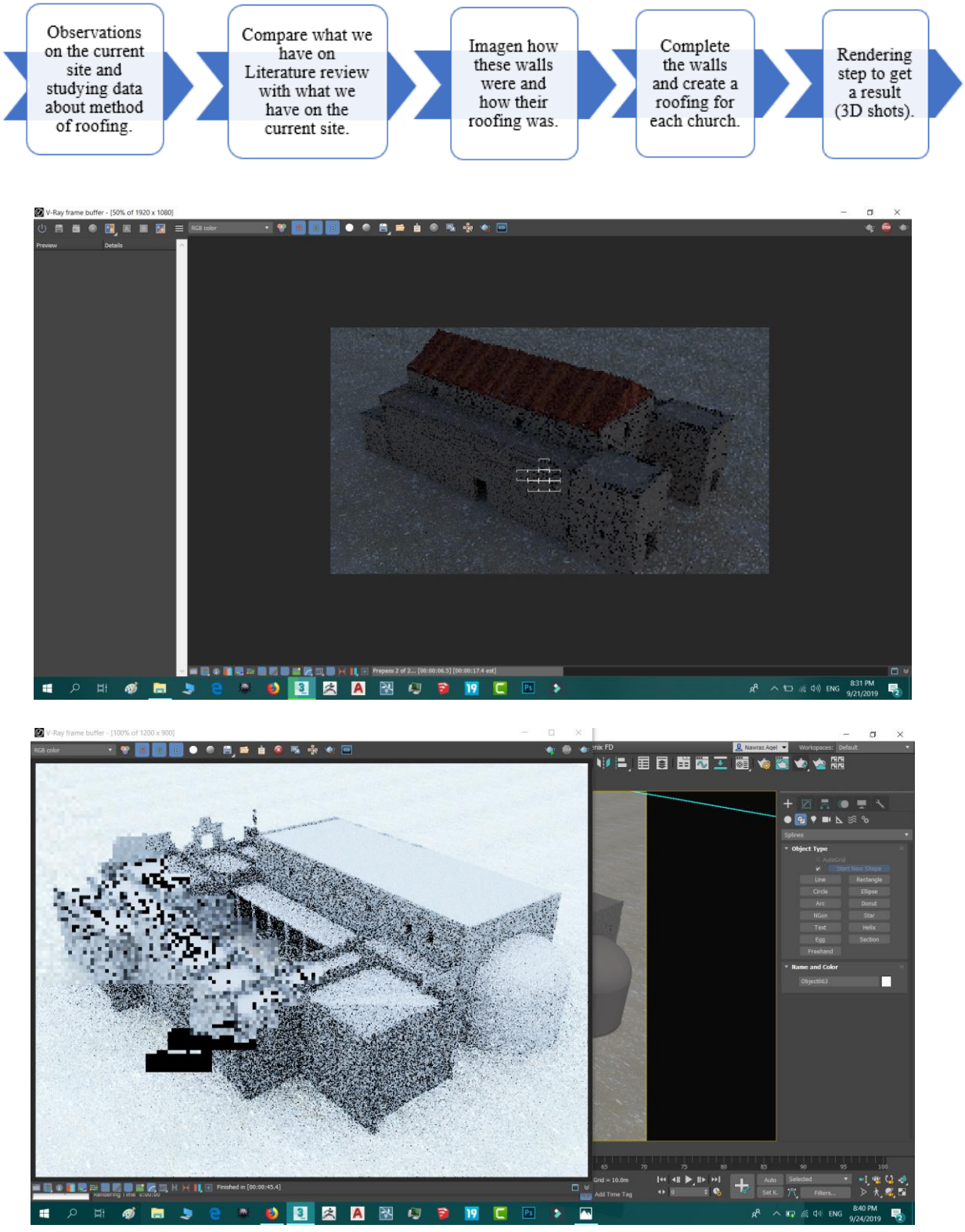


Figure (25): Graphic figure and photos illustrate the third steps of process. Sources: by Author.

3.5. Conclusion

This chapter summarized the used methodology in this research. A mixed methodology including quantitative and qualitative methods was carried out to achieve research objectives. Quantitative methods were used to measure and analyze the churches. Each has its own documentation, drawings, and 3D modeling. At the same time, the qualitative method included an important literature review, data collection, and theoretical investigation. The following chapter presents the results in full. A comparative study between the layout of three churches in different typologies of structures in relation to their location, types, size, and other architectural features. This will be followed by technical analysis for compositions form concept and material. Thus, an evaluation to decide conservation and reconstruction techniques and materials was one of our goals. Modern technology has changed matters in documentation radically and promises to continue to bring rapid changes. AutoCAD, 3D Max, Photoshop and others are new programs that can be used to draw and complete the drawings for the church's documentation. Diversity of the characteristics of these churches in their architectural, functional, arrangement and use in new programming tools and create a special scientific database in the area of Umm Al-Jamal regarding the architecture of the ecclesiastical churches is the main aim for this study which is achieved through this methodology.

Chapter Four

Digital Documentation and Analysis

4.1 Introduction

In ancient Umm el-Jimal, church architecture varies in identifiable ways from other structures like houses and reservoirs, even though all structures in Umm el-Jimal are distinguished by the same black basalt stone, which was the building material most readily available at the time the structures were built. As mentioned earlier, there was an Christian community in Umm el-Jimal, which has 16 churches. Some of them are separate and surrounded by houses, many adjacent to homes, some reached by buildings.

This chapter provides a sufficiently detailed description of the three case study churches: The West church, Southwest church, and Julianos church. As discussed above, these churches are representative of the types of church building cases that exist in Umm al-Jimal. Architectural details will be discussed, and plans, elevations, and three-dimensional renderings including walls, doors, and floors will be presented. The internal division of each church will also be analyzed, along with previous records and studies, in order to determine the original state of the churches, particularly the roofing and other details. Finally, this chapter presents a paradigm of comparison between these churches, explaining their characteristics and descriptions of convergence and divergence.

4.2. West Church

The West Church is a free-standing church located outside the town wall, built of black basalt stones, linked to the town through its wall which runs east to the Commodus entry gate. This church is one of the largest and most important landmarks among Umm el-Jimal’s churches. There are no houses nearby or just around the church. There is an underground

cemetery with arched vaulting, connected by a short walkway on the west side of the church. Therefore, this church may have been used as a kind of burial church.

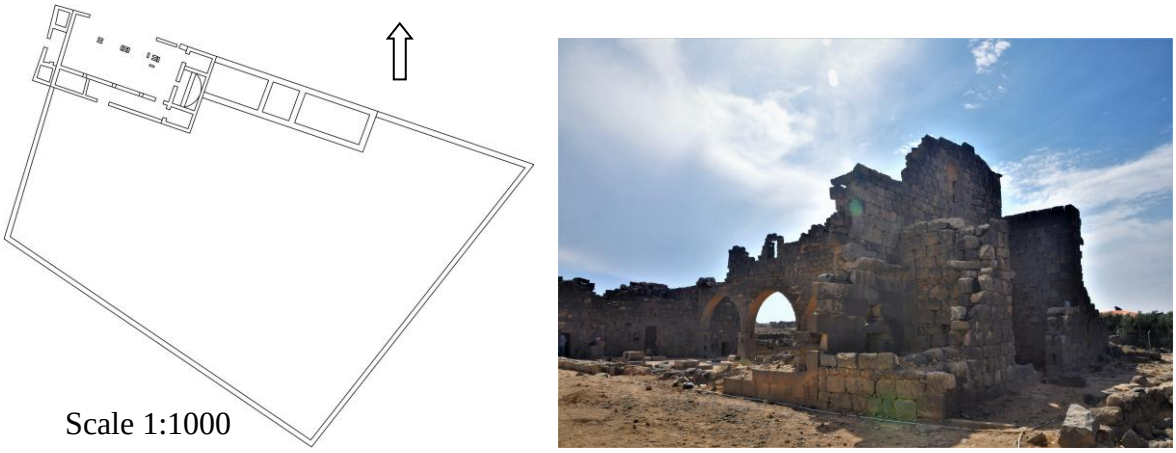


Figure 27: West church two-dimensional plan drawings and photograph. Source: Author

The church's outline is rectangular (17.60 m length, 12.40 m width). The inner space consists of a nave (6.60 m width) and two aisles (2.85 m width each). There are two towers (we can call them chambers because they are not higer than the church) on the west side next to the western entrance, which is considered to be added to the church building in later periods due to the way they were constructed. The apse on the east side is surrounded by two lateral chambers used to serve the clergy, and also to proclaim the Eucharist before it is placed on the altar.

The interior of the apse is relatively large (circumference 12.00 m wide) and it rises three steps above its internal level. The apse had a semi-circular form from inside but its outside was surrounded by straight Basalt wall. There are semi-circular steps inside the apse called a *thronon*, were used as seats for the priest and deacons. The rooms beside the apse almost have the same dimension with 6.20m length, 3.00 m width, and 2.20m height. The space between the altar screen and the apse was an arch but what actually remains on the site is a separating wall between these two regions, its stones of which are different from those of the church building and can also be considered a wall added later.

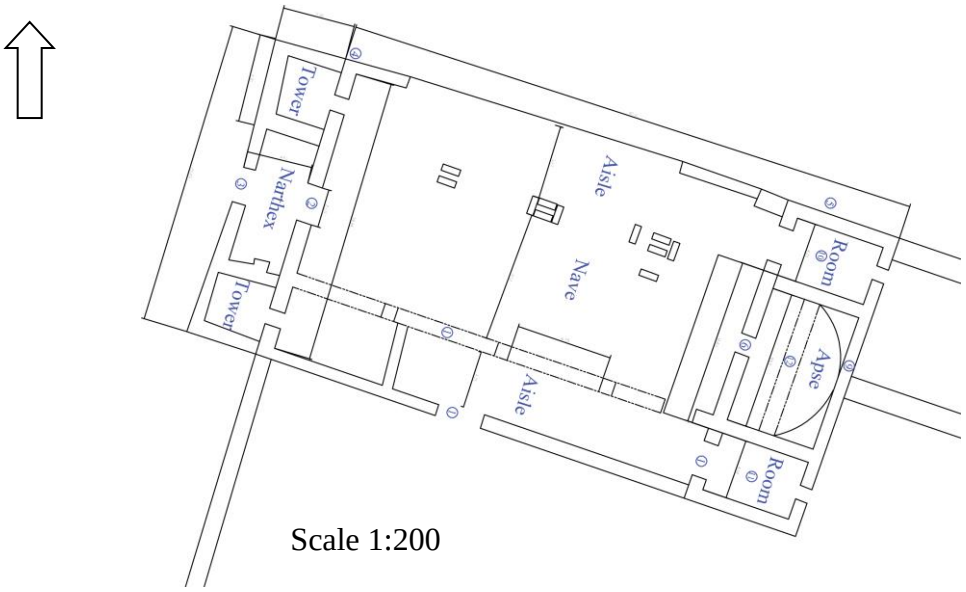


Figure 28: West Church two-dimensional detailed plan drawing. Sources: by Author.

Several doors give entrance to the church: the western door that is directly opposite the apse is the largest and widest one with 2.45 m height 1.95 m wide and 0.85 depth. It is therefore the main entrance to the church. The southern wall had an entrance and the northern wall also had an entrance, but because of collapses in these two walls, the dimensions are unknown. According to Butler's plan, these two doors have the same level and are close in dimensions. Each room on either side of the apse has two doors. The room to the right of the apse has a door leading directly into the church with 1.60 m height, 80 cm width and 80 cm depth. Another door leads to the outside of the church from the east. The room to the left of the apse has a door leading directly into the church with 100 cm height, 60 cm width and 95 cm depth. Another door leads to the outside of the church from the east. One of the room's doors still at the church.

Figure 29: Perspective inside West church room. Perspective outside West church (Nave). By Author.

The church had windows to illuminate the inner space: there is a semi-circular window above the western door and also the two side rooms had square windows. The arch-supported wall rose above the church's outer walls, indicating that clerestory was present and therefore that most of the illumination of the church was at the top of these walls through their windows.

Figure 30: Cross inscription on the door’s lintel and arch, door's shutter.

The church floor level is different from the apse, which is two steps higher than the nave, and the two side chambers are on the same level, Their doors have threshold carved inside the cylindrical frame and would have been fitted with stone doors, as was typical at the site. The nave is separated from the aisles by three bases carried the arches with 80 cm length, 80 cm width, its capital took a larger area. There are four arches in each wall between the nave and aisles, each supported by piers. This system of pillars and arches supported the roof. In addition to the finely carved stones, what distinguishes these church's arches are the cross engravings that are still visible to this day.

Figure 31:Row of ornamental stones (cornice). Figure 32: Cross engraving on the arch. By Author

In addition to the decorative Byzantine cross carvings on the stones, the western wall contained a row of ornamental stones (cornice stones) that marked the boundary that separates the ground floor from the clerestory. As for the floor, we know from the UJP excavations that there were two different mosaic floors over time. There are still remnants of the latest mosaic floor intact, which features geometric and animal designs.

Figure 33: Altar Screen base stones with under surface mosaic layer. By Author.

The two side towers (3.60 by 4.50 m.) on the west facade of the church are an addition to the church building As mentioned earlier, the way these towers were built and the quality of the stones varied. Back to Butler's studies, there is a transverse arch connecting the towers at the western entrance of the church.

Later, when the function of the church was changed, the apse was completely covered by a different basalt wall and the door was opened through it with 1.00 m width, 85 cm depth and 2.00 m height between the apse and the alter-screen. The alter had the same width of the apse and 3.50 m length.

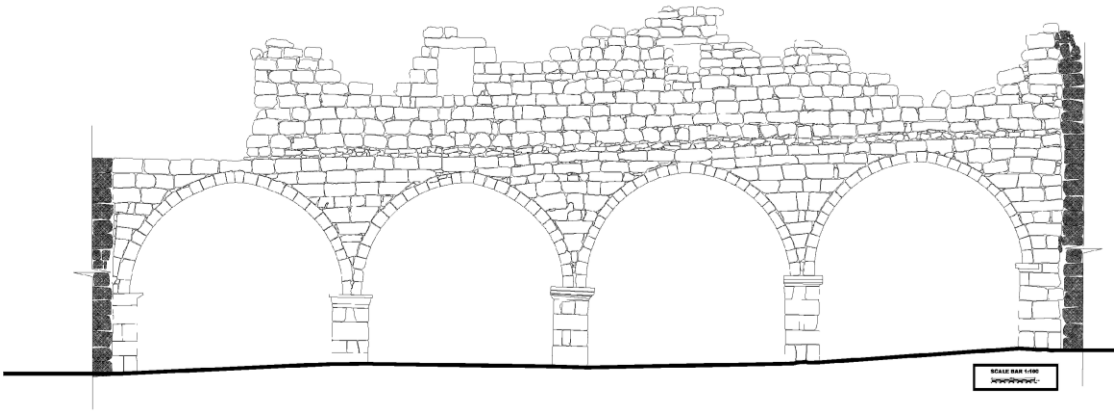
In this church, basalt stones varied, some of which are well-trimmed and relatively flat, others not well finished. Therefore, we can see that some stones were shaped or reshaped specifically to be used in the church and others were reused from earlier structures. Eventually, the church underwent collapse, like its counterparts. However, some of its walls remain upright in part even now, such as the western wall and the wall between the nave and

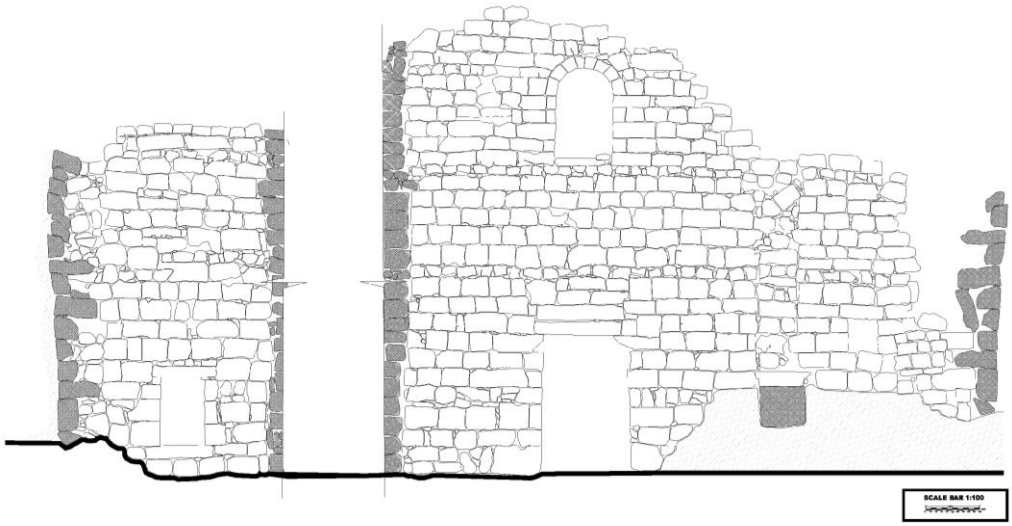
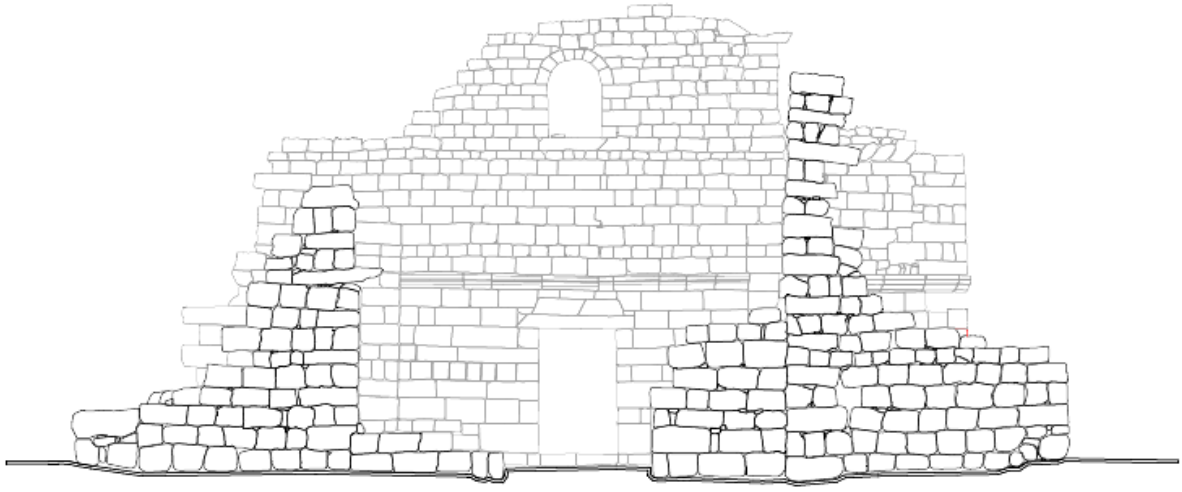
the aisles from the south, the area of the apse and its adjacent rooms. The northern region was completely destroyed.

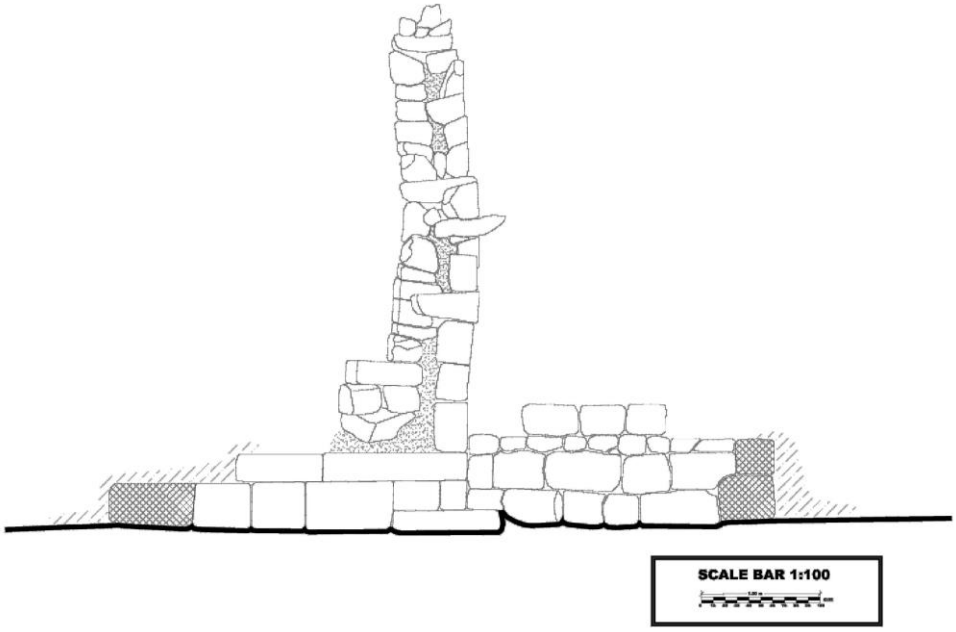
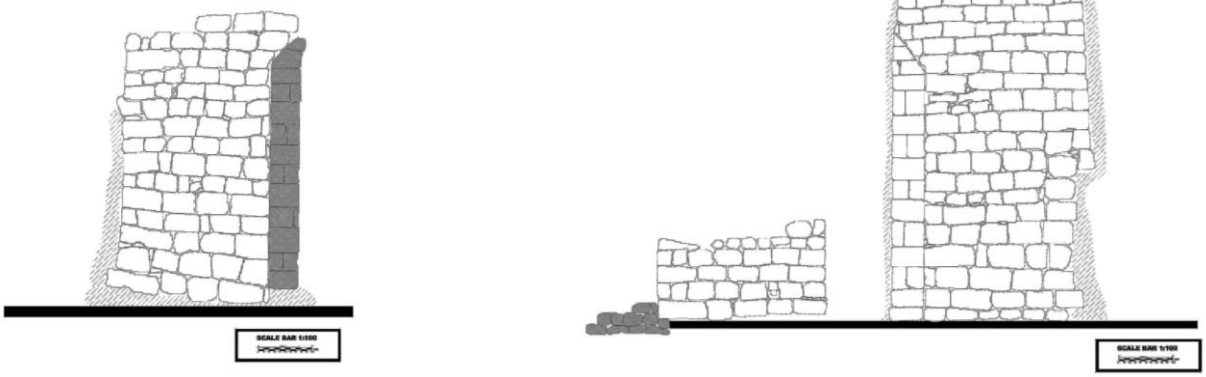
Figure 34: stones details show the door's hinges and candle's stone. By Author.

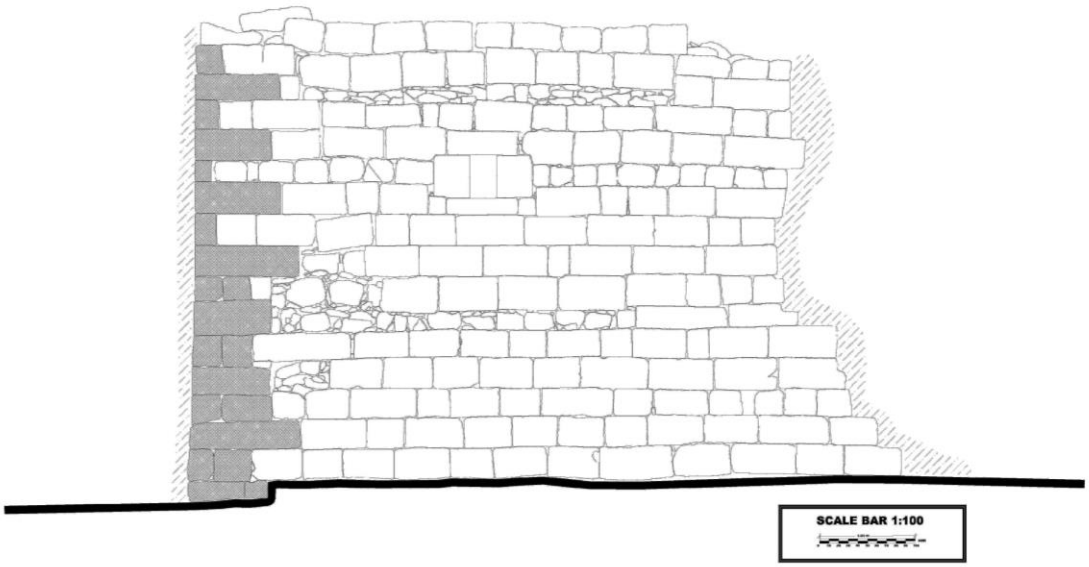
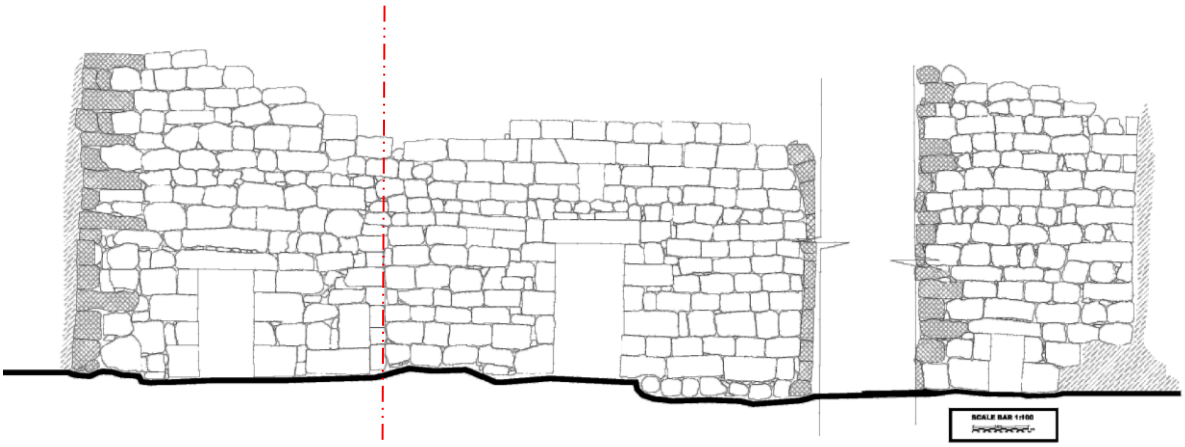
To record and thus preserve this church, all its walls, architectural details, sketches and a new site plan were recorded by the researcher. The church is modeled and simulated by 3D MAX program, which was used to produce three-dimensional perspective.

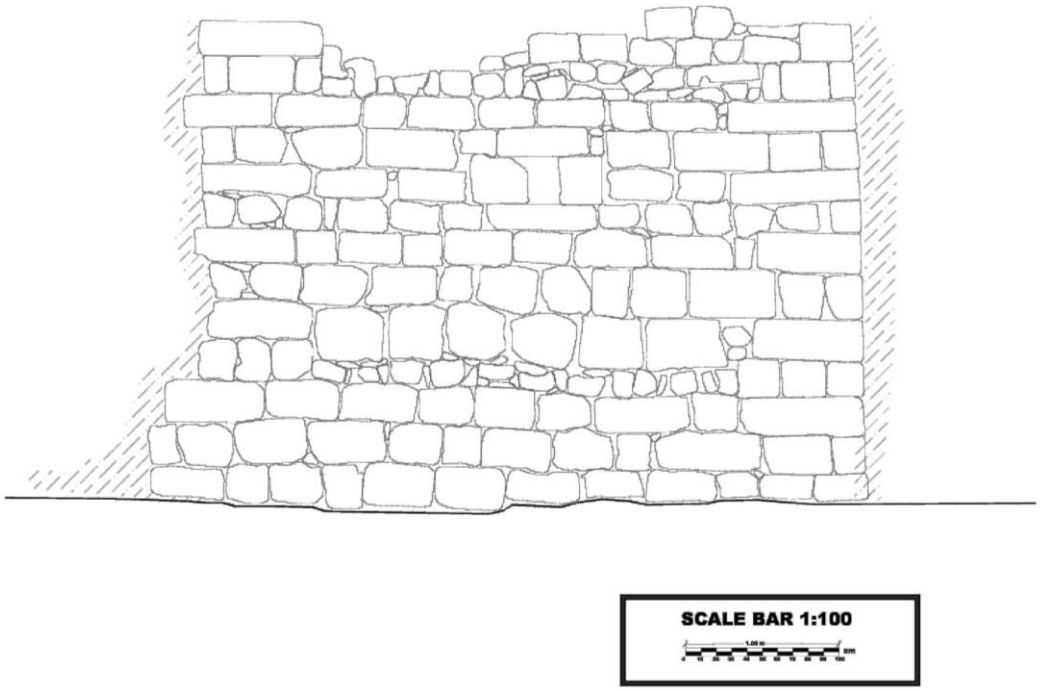
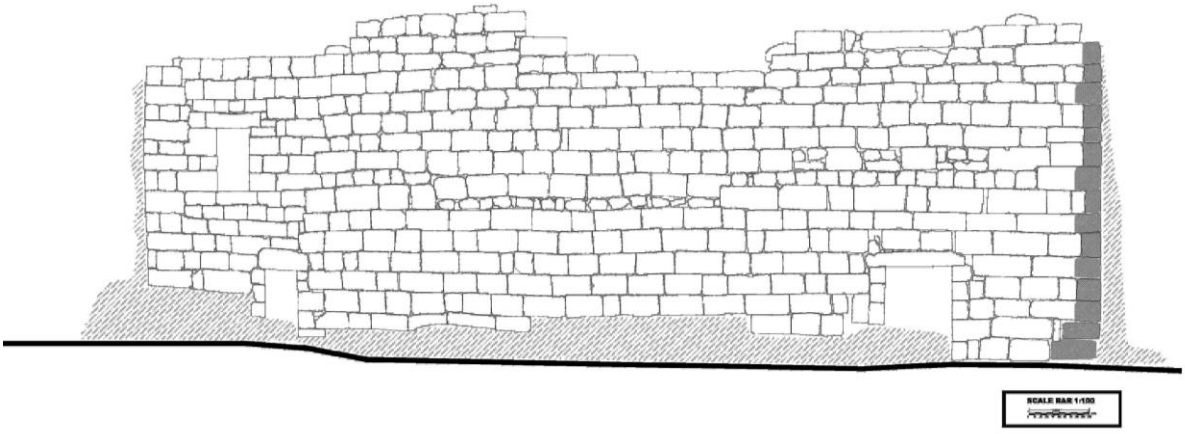
Table (6): Two-dimensional drawings :

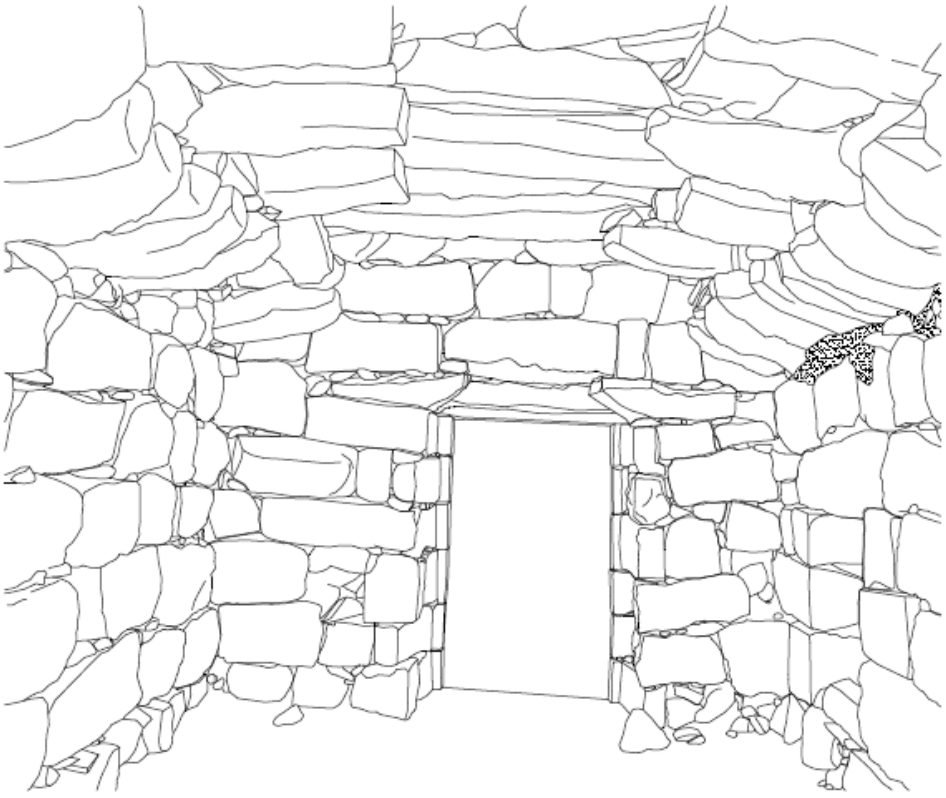
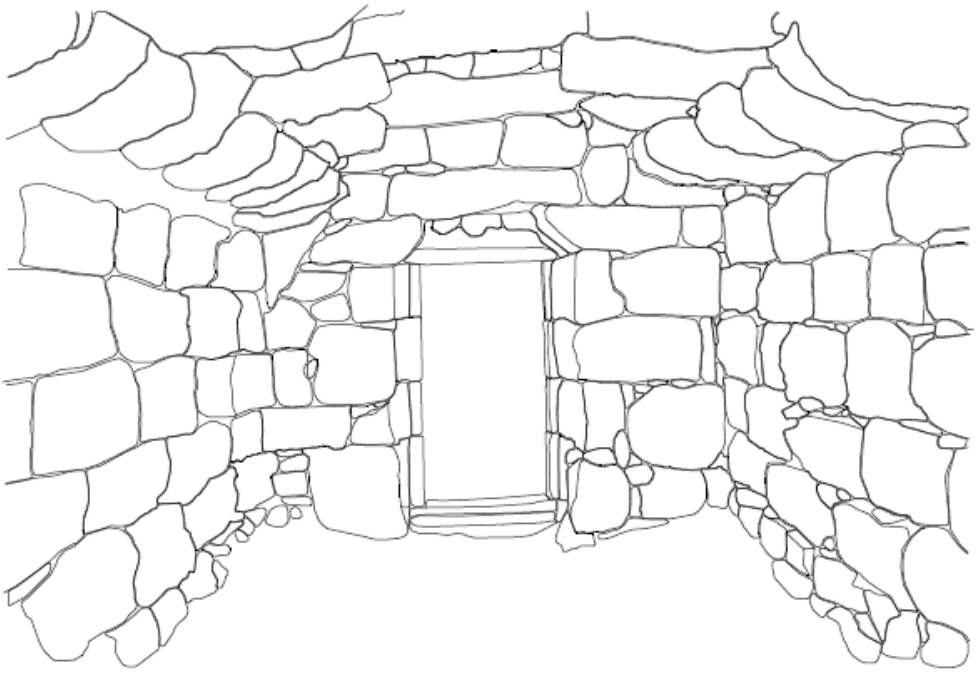
NO	Drawings
1	 Notes: This wall is the West church famous wall, it has four arches. The distance between them is 4.45 m this is the added stone to the house wall. This drwing shows constrction method and clerestory. The small stones row over the keystone of arches is the aisle roofing level. The façade line is uneven. (Number 1 on the plan above).

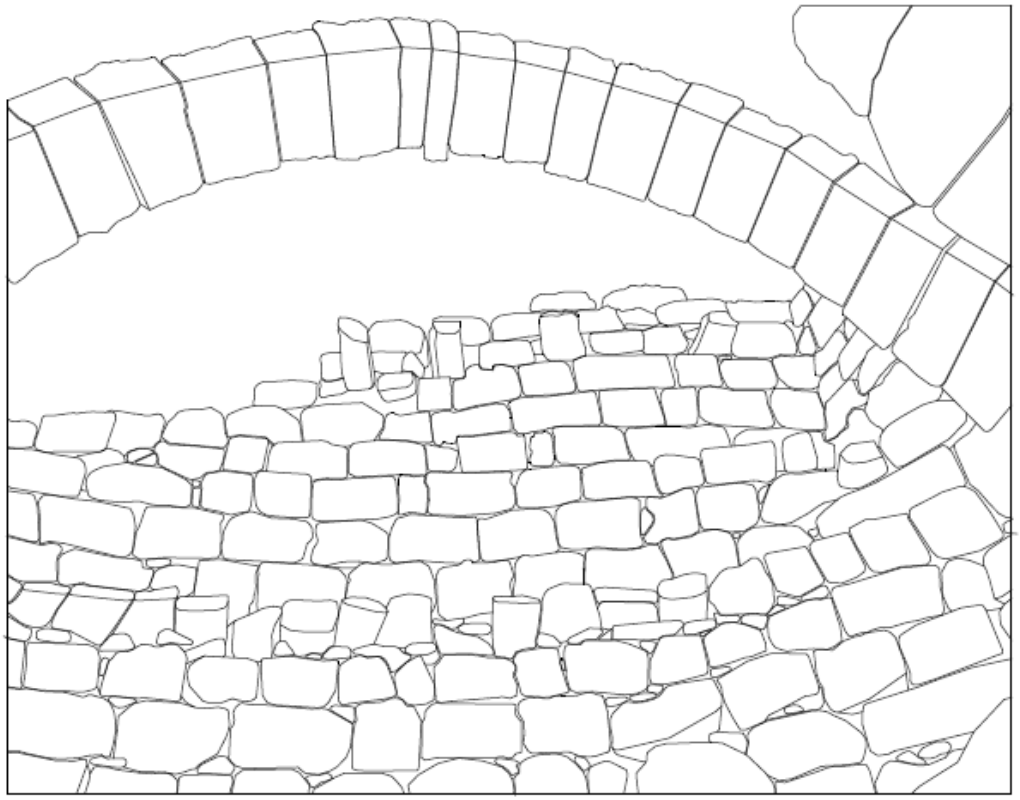
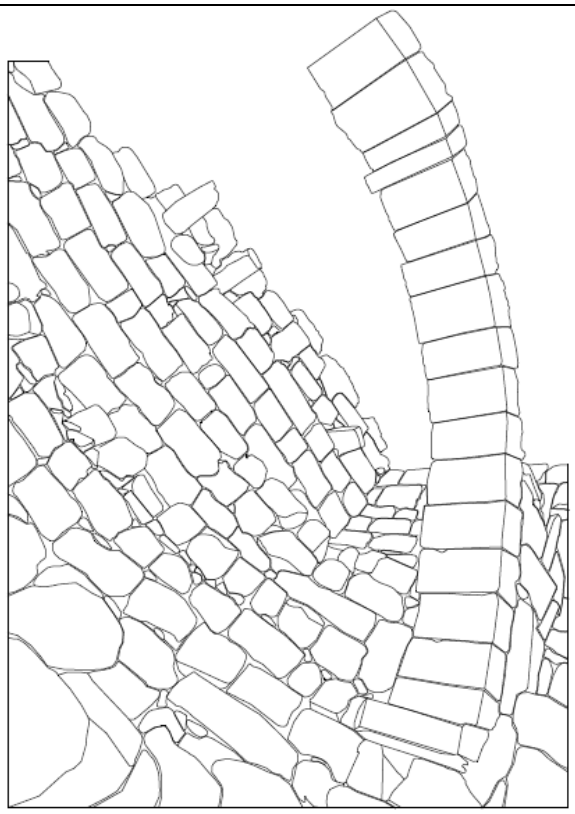
2	 Notes: This wall is the southern wall from inside the church, because of the collapse some part of it is invisible. The wall has the main entrance of church, also it has window with2.25 m height and 1.30 m width. The wall have two doors lead to the tower so they were opened later. The supporting bases for the arches are anchored to the wall. The small stones row over the keystone of arches is the aisle roofing level. The façade line is uneven. The hatching indicate collapse in front of the wall. (Number 2 on the plan above).
3	 Southern wall shows the main church wall, and the added ones for towers. (Number 3 on the plan above).

	 The remains of wall beside the tower. (Number 4 on the plan above).
4	 Façades of tower. (Narthex on the plan above).

5	 One wall of the room beside the apse. (Number 5 on the plan above).
6	 The elevation inside the church shows the added wall and added door in front of the apse. The red hidden line separates the original wall and the new one. (Number 6 on the plan above). On the right side there is a wall of one of service room. The hatching indicate collapse in front of the wall.

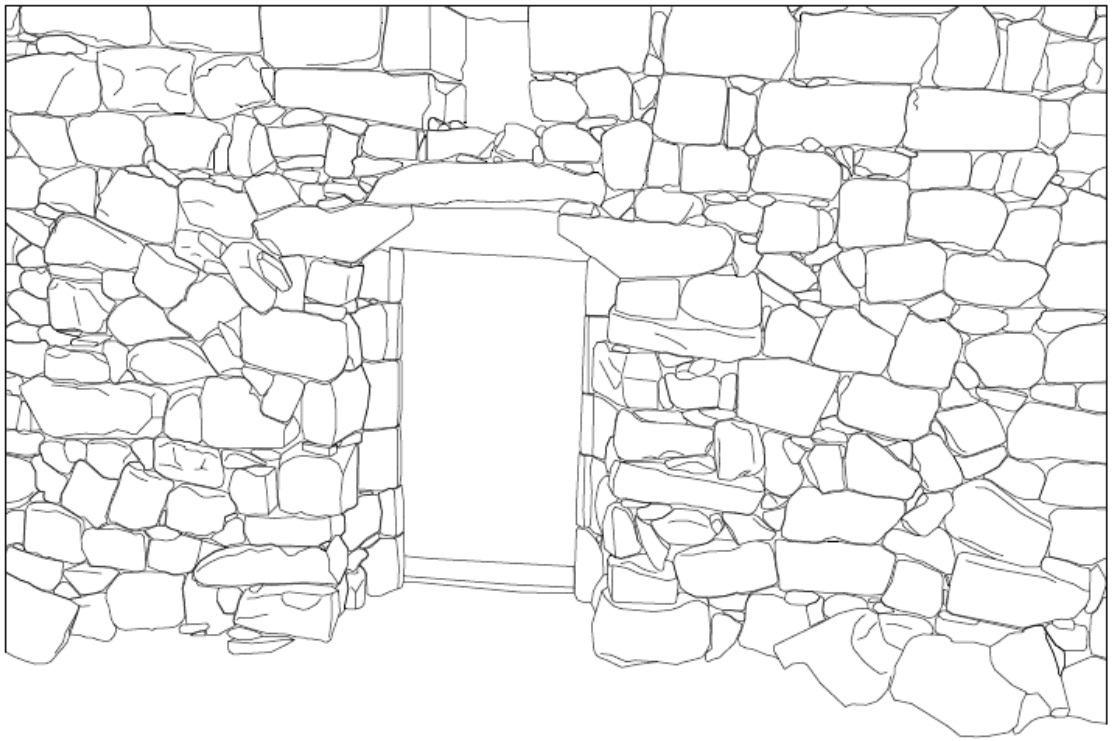
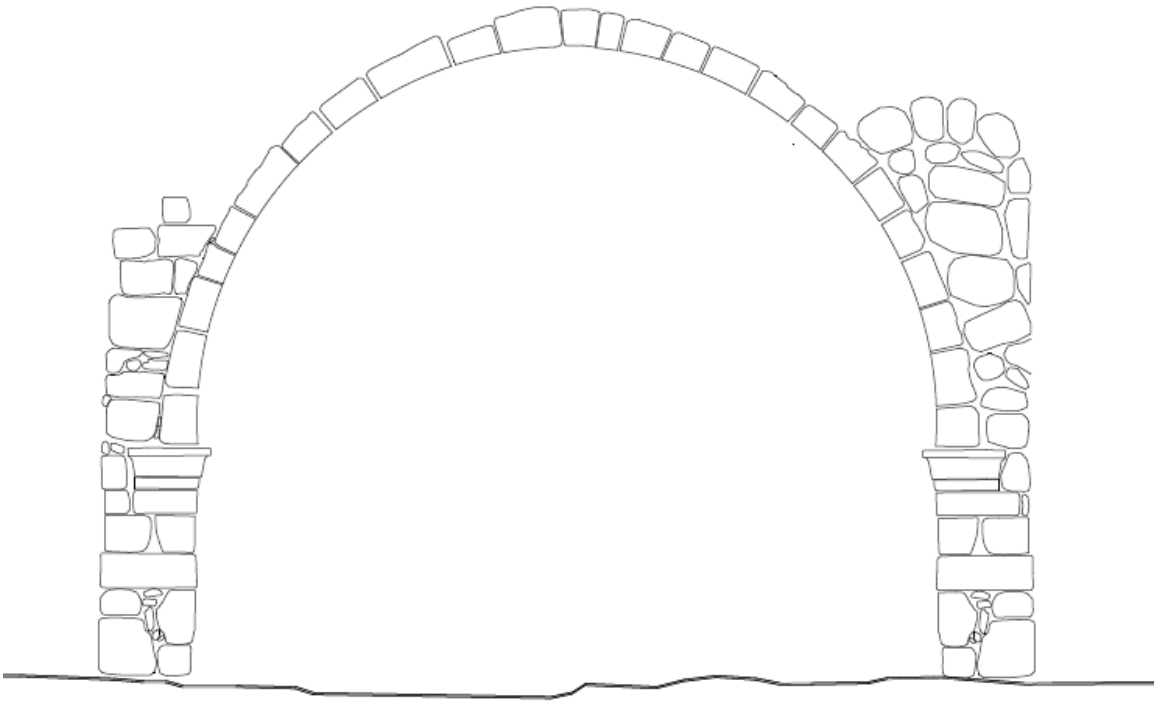
7	 Wall of one of service room. (Number 11 on the plan above).
	 The back Façade from the East. It shows the doors from two rooms to the outside of the church. It's full of collapse. (Number 9 on the plan above).

9	 Shot inside the room. (Number 10 on the plan above).
10	 Shot inside the room. (Number 11 on the plan above).

11	 Shot inside the apse showing the arch. (Apse on the plan above).
12	 Shot inside the apse showing the arch. (Apse on the plan above).

13	 Shot inside the apse showing the arch. (Apse on the plan above).
14	 Shot inside the apse showing the arch and the added door. (Apse on the plan above).

15	 Shot inside the apse showing the arch. (Apse on the plan above).
16	 Perspective for the apse. (Apse on the plan above).

17	 Perspective elevation shows the added door. (Apse on the plan above).
18	 The apse arch. (Apse on the plan above). Scale 1:50

19	 Panoramic shot inside the apse. (Apse on the plan above).

Three-dimensional drawings :

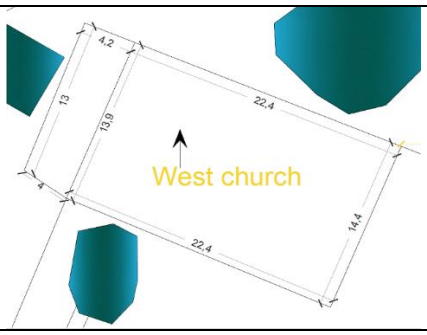
Figure 35: 3D perspective presents the bird eye of this church with its details. By Author

Figure 36: 3D perspective presents the bird eye of this church showing the arches, walls and towers. By Author

Figure 37: 3D perspective presents the bird eye of this church from south direction. Showing the apse and added wall also the arch inside the apse. By Author

Figure 38: 3D perspective presents the ant eye of this church from south direction. Showing the back of the church, arches and clearstory remains. By Author

Table (7): Criteria to describe the state of conservation for West Church

Element value	**Very high** High Medium Low Negligible
Element name	West Church
Location	46m West from Commodus Gate
Dimensions (Dimensions generally measured from left and bottom edges: height given first, then width and finally thickness it applicable)	
Materials & substance	Basalt stone and plaster “paints on some stones distortion”
Use and function	Church
Composition/ form & design (Object's aesthetic, conceptual and physical characteristics)	1. Sharp curvature 2. The design was corbelled 3. Decorative lintel 4. Cornice stones course 5. Stable arches between nave and aisle 6. Different levels along of wall 7. Many periods effected the method of building
Structural condition	Unstable structure \ Collapse \ Cracks (3 of 5) weak
Risks threaten the element (substantiate change which result from time, manner of storage, handling and treatment.	1. Rain falling 2. Climate change 3. Earthquake 4. Illegal behavior (use from local community and traffic and vehicles vibration) 5. Disorganization 6. Looting and demolition
Previous interventions. (Record materials and techniques used in treatment).	Excavations of Churches and E Cemetery (UJP, 1984). Churches cleared, to expose floor levels with mosaic remnants (DoA,1999-2010) W church excavations (UJP, 2017, 2019)
Any potential major restorations	Management for circulation and restoring area to support park
Record of any accompanying photo documentation or other visual/ pictorial aids. (including date of capture and photographer)	

4.3. Southwest Church

This church is adjacent to a group of residential buildings. The walls of the church were built after the walls of houses to the north and west (on the original wall of the neighboring houses, you can see the added church walls). It is uncertain whether the neighboring buildings were used as church auxiliaries or continued to be used as residential houses after the building of the church. The church follows the basilica design as it has a rectangular plan, ends with a circular apse outside it from east direction.

Figure 39 : The way to the Southwest church. Pictures show the apse and outside courtyard. By Author

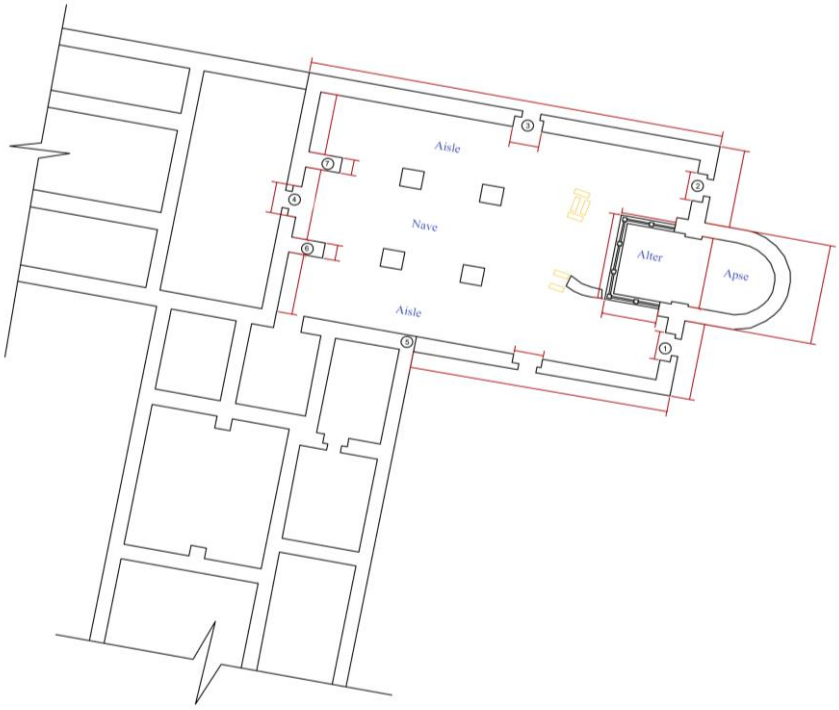


Figure 40: Two-dimensional drawings for Southwest plan with its surroundings. Scale 1:500

The church's South and West walls are shared with neighboring buildings. Entrance to this church is through several doors, the first one located on the western wall opposite the apse and leading directly to the nave. It is not the main gate as usual; according to Umm el Jimal Project data, the west door leads to an animal stable with mangers (UJP, 2017), with 96 cm width, 90 cm depth and 160 cm height. Another entrance is in the southern wall(85cm depth, 100 cm width from outside and 125 cm from inside and 245 cm height).On the opposite side in the center of the wall, there is another entrance with measurements 90 cm depth, 120 cm width from outside and 135 cm from inside, and 190 cm height. Each of these doors has a lower threshold and upper lintel.

Figure 41: perspective shot inside Southwest plan. Shows the Eastern wall with apse. Author

Unique to this church are two doors on each side of the apse (left at 90 cm depth, 100 cm width form outside and 120 cm inside, and 160 cm height and right 90 cm depth, 100 cm width from inside and 132 cm from inside, and 142 cm height). These two doors distinguish the church's plan from others in which such doors lead to the church's service chambers. Finally, there is a door in the southern wall that opens directly into one of the neighboring houses, and may have been built before or after the church (with 90 cm depth, 88 cm width,

and 168 cm height).Therefore, the church had six main doors: four that open to the street, and two that open into adjacent buildings. As for the doors' material, we can infer that they were stone pieces fixed to the same wall through cylindrical holes in the upper and lower threshold of the doors.

Figure 42: Southwest doors details; door’s hinge and lintel inscription(cross). By Author.

Butler expected that there would have been windows for this church at a high level of walls as well as the window in the middle of the apse. What currently exists in the remaining walls of the church is one small vertical window in the northern wall of the church next to the door.

Figure 43: perspective shot inside Southwest church. Shows the western wall from the Apse.

Like any other building in Umm el-Jimal, the walls of this church are two layers of basalt stones filled with small stones and mortar. The wall is almost 90 cm thick and each row is about 30cm in height. Like other churches, the Southwest church underwent collapse and damage over time, but later on, it was cleaned by the Department of Antiquities in collaboration with the Umm el-Jimal Project. Internally, the rectangular church plan is divided into three parts: two aisles, which are separated by the nave. These separation walls have three arches in each, running from the apse (altar screen) to the western wall. The arches are supported by square bases; two bases are in the middle and half one ends on the western wall and the other based on the apse substratum. These base approximately 60 cm wide and 170 cm long. Currently, the church is 22.00 m in length and 11.00 m in width, while the apse is 12 meters in circumference and 3.60 meters in diameter. Each aisle is approximately 3.30 meters wide and the nave is 4.40 meters wide. The apse, crosses relatively differently because of its location outside the rectangular church plan, takes a semicircular shape and tends to slightly oval. It is three steps higher than the nave level. The thickness of its wall is approximately 90 cm. Notable defects were covered with mortar. There are just five rows of stones left of this apse now. Along the northern and southern walls, there is a 50 cm rise above the level of the nave by two steps around 30 cm height. It is a basalt stone covered with mortar and clay that may have been used as place to sit next to the two aisles, or it has been raised to separate the walls from aisles because either the walls were covered with a mosaic, or there were icons hanging on the walls. On the other hand, maybe we can assume this was a space to serve the priest, thus he can put his clothes or whatever he needs at the wall near the apse.

Figure 44: Stones of Southwest church. Shows the inscription and Stoup on the stone. Author

The floor of this church was meant to be covered by mosaic, but this was not finished. The uncovered surface in the current site is a plaster layer on which is carved geometric shapes, lines, circles, and other shapes, which would have been used as a guide when installing the mosaic. Another opinion of this floor surface about the history of plaster floors without mosaics; for example, the north half of the Double Church and the NE Church. The alternative is that this group of builders could not afford to pay for a mosaic floor, and had to be satisfied with this smoot plaster. There are remains of carved stone within a place for the basalt alter screen beams inside the church in the apse which rises above the surface level of the nave. Altar screen space separates the church vacuum (public space) from the area of the sacred altar (private space).

Crosses were carved on some of the church's stones, such as on the door lintel. Some of the wall bases (substrate) supporting the arches are still evident on the current site adjacent to the apse, also next to the western wall as well as on the other side. There are also a number of stone pieces on the site that formed the now-fallen arches.

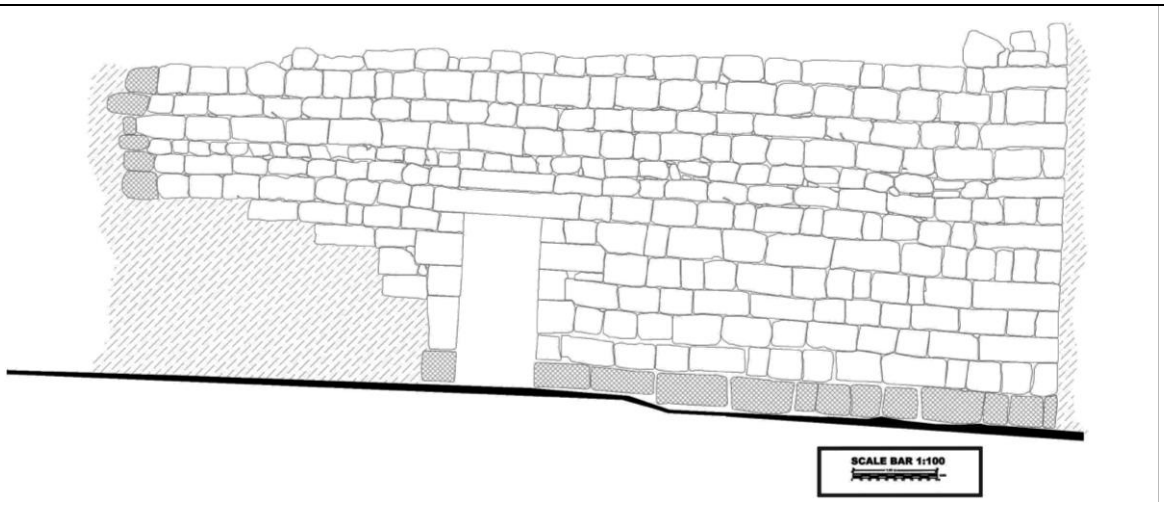
Figure 45: Floor of West church. Shows the plaster layer that would have been prepared as an underlayment for a mosaic floor. Author

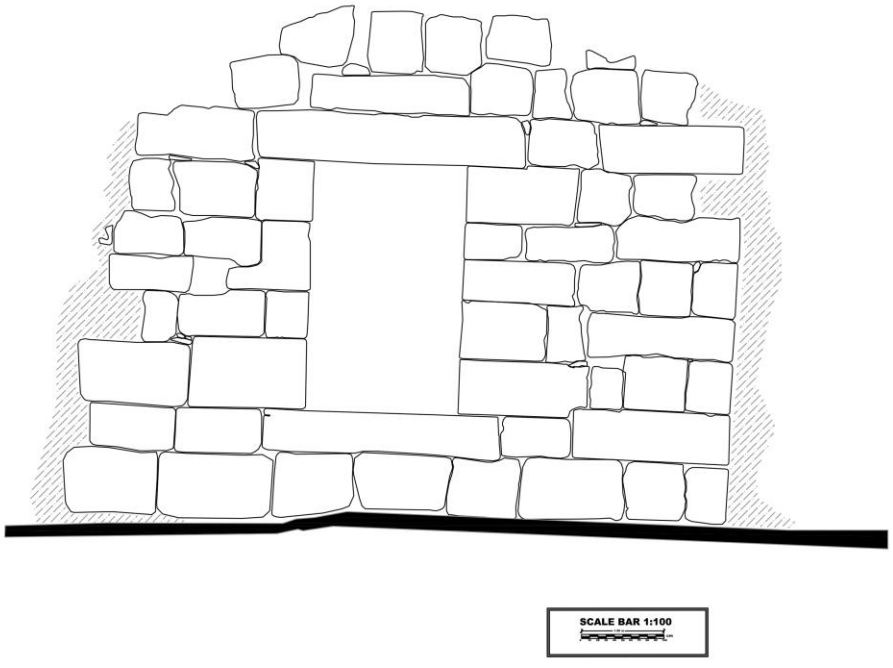
Also, in the current site, there is a row of small stones that continues through the outline of the church's walls different from the previous ones, above the door's lintel level, we may assume it was restored later after the Byzantine era.

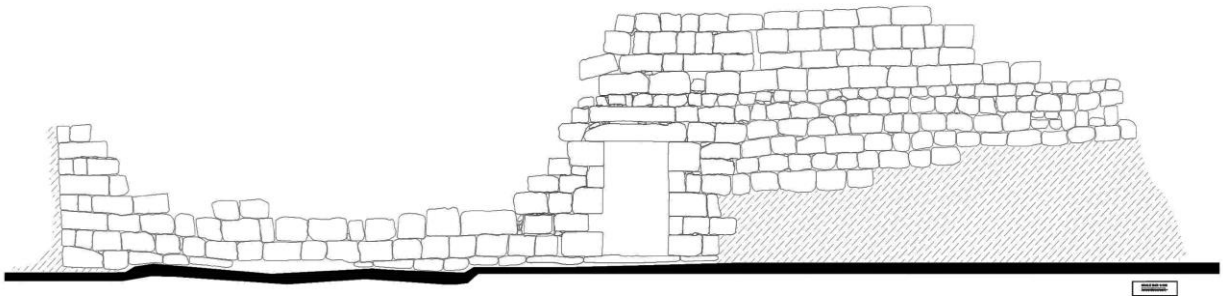
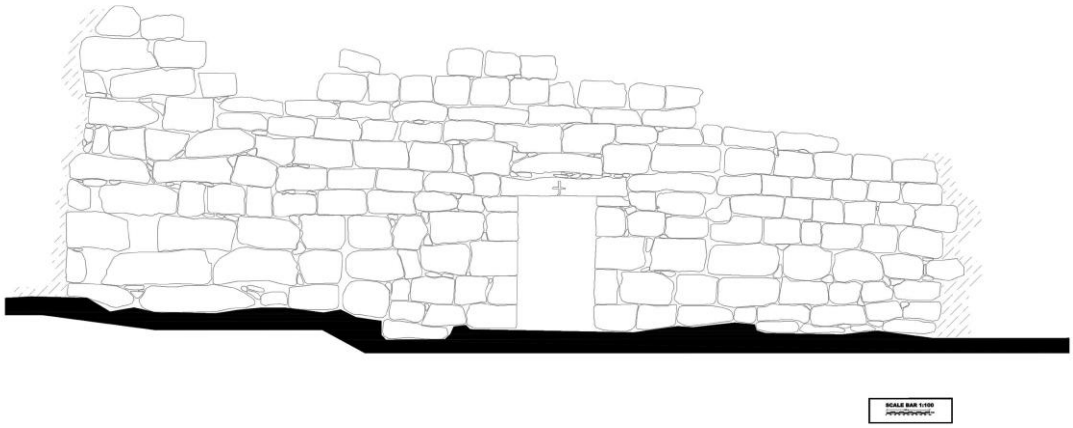
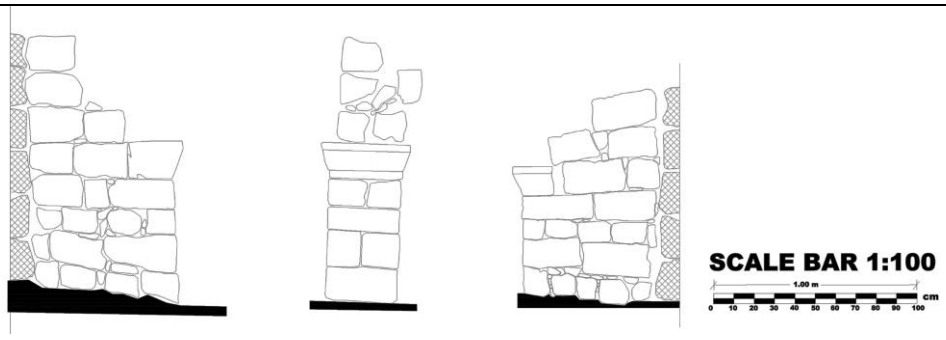
Figure 46: Apse of the Southwest church with altar screen in the foregroundits details. Author.

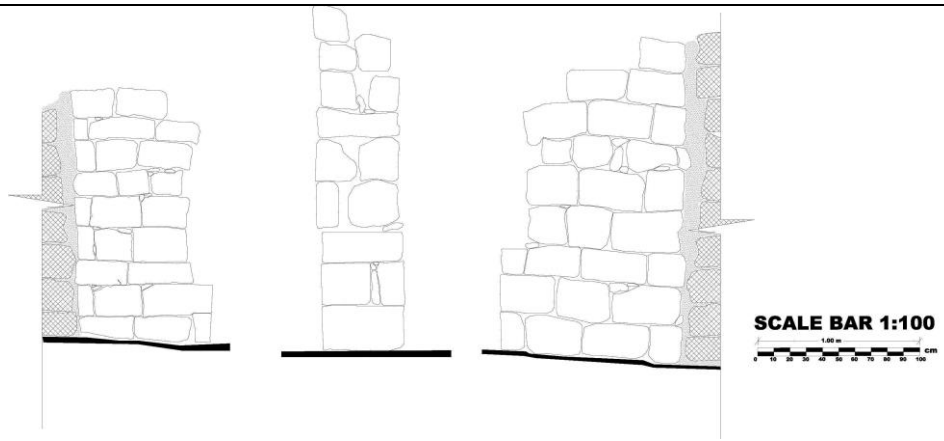
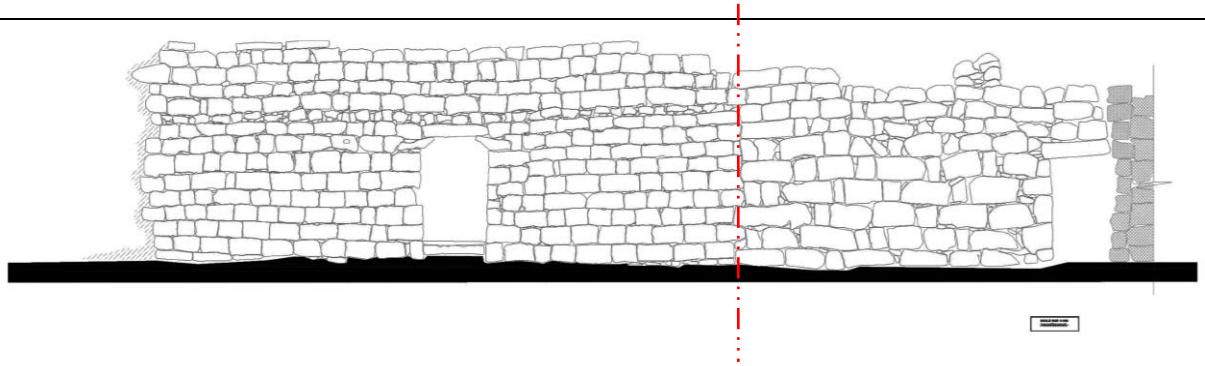
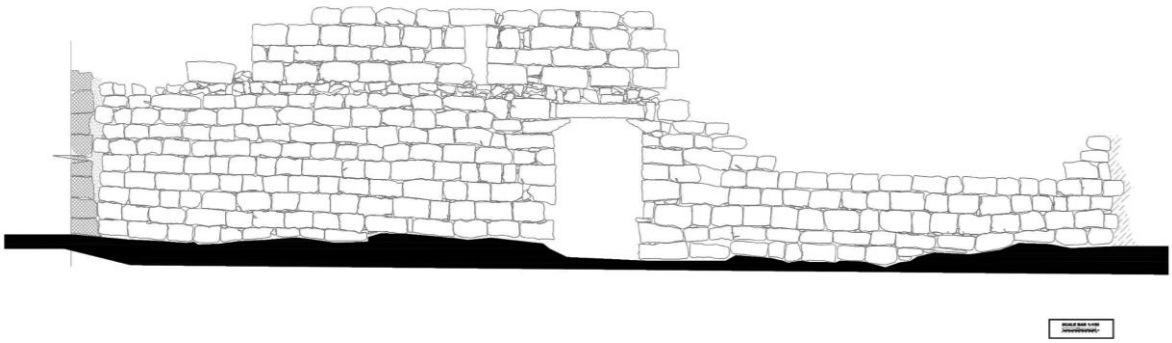
To preserve this church, all its walls, architectural details, sketches and a new site plan are recorded by the researcher. The church is modeled and simulated by 3D MAX program, and produced three-dimensional shots with its adjacent buildings.

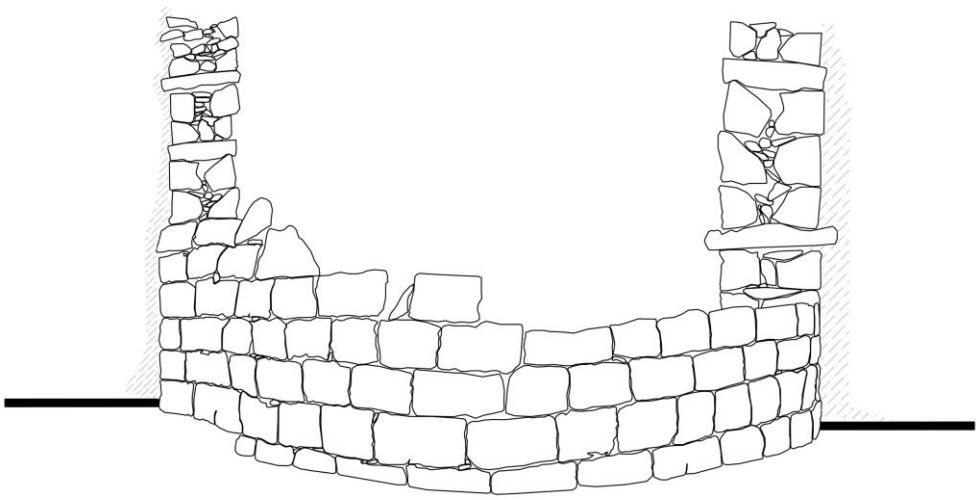
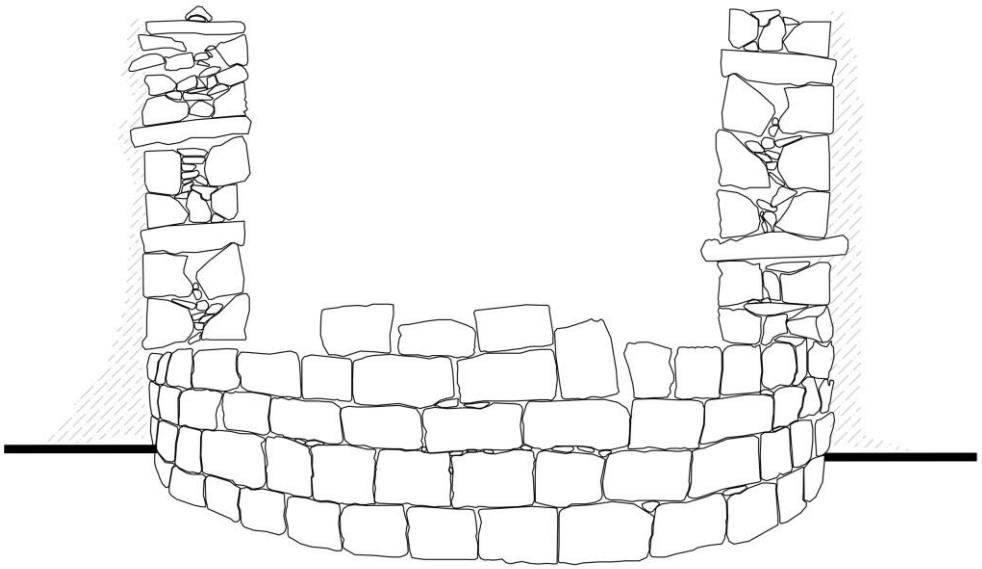
Table (8): Two-dimensional drawings :

NO	Drawings
1	 Notes: This wall is the southern church wall, and this is the added stone to the house wall. This drawing is from the outside. There is one door and the corbeling constrction method is employed. The hatching indicates collapse in front of the wall. Also we can see the small stones over the lintel stone's row. The façade line is uneven. (Number 5 on the plan above).

2	 Notes: This drawings is the apse's left side wall, from outside and inside at the western direction. This side has one door. There are cross carvings on the stone. (Number 1 on the plan above).
3	 Notes: This drawing is the apse's right side wall, from outside at the western direction. This side has one door. (Number 2 on the plan above).

4	 Notes: This drawing is the Northern wall of the church. This drawing is from the outside, and there is one door. The hatching indicate the collapse in front of the wall. We can see the row of small stones row over the lintel stone's row. The façade line is uneven. (Number 3 on the plan above).
5	 Notes: This drawing is the western wall of the church from inside. This site has one door. We can see the cross carving on the lintel stone over the door.This wall connected with two walls that are supporting the arches(see below). The façade line is uneven. (Number 4 on the plan above).
6	 Notes: This drawing is the remains of the northern wall which has the arches. (Number 7 on the plan above).

7	 Notes: This drawing is the remains of the southern wall which has the arches. (Number 6 on the plan above).
8	 Notes: This wall is the southern church wall from inside; we can see the differences of the new added wall (red line). Also, the wall has two doors: the lateral door open directly to house. (Number 5 on the plan above).
9	 Notes: This drawing is the Northern wall of the church from inside. It has one door and one vertical window. Also, we can see the row of small stones row over the lintel stone's row. The façade line is uneven. (Number 3 on the plan above).

10	 Notes: This perspective for the apse from the east. Some of its stones are under the current surface.
	 Notes: This perspective for the apse from the Eastern direction. Some of its stones are under the current surface.

Three-dimensional drawings :

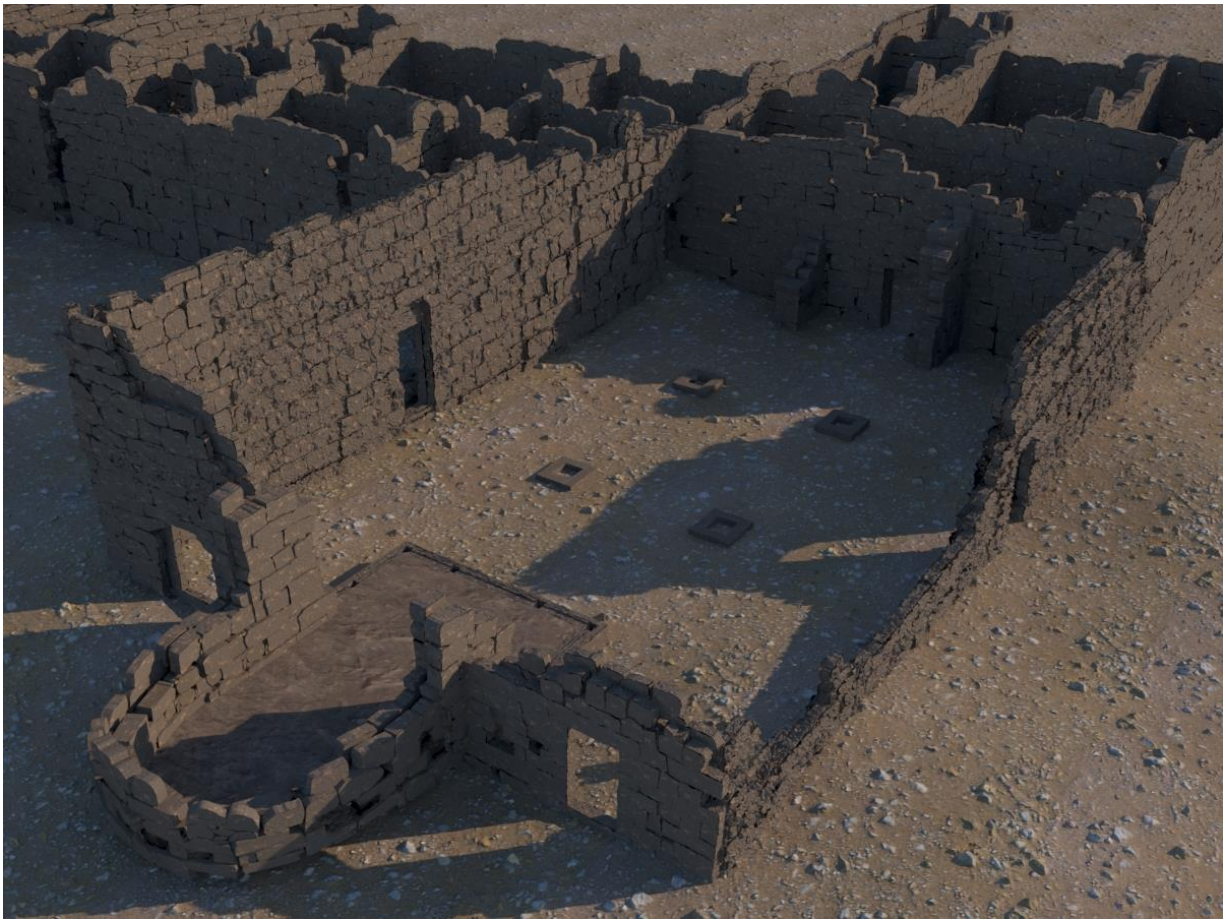
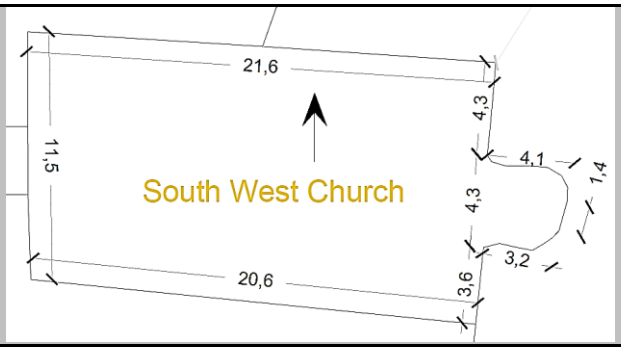


Figure 47: 3D perspective presents the bird eye of this church with doors, walls, arches bases, apse and all details. Sources: by Author

Figure 48: 3D perspective presents the bird eye of this church with neighboring houses wall, also it shows double layers of the wall. Sources: by Author

Figure 49: 3D perspective presents the ant eye of this church, it shows the apse and doorways, also the corbeling construction method. Sources: by Author.

Table (9): Criteria to describe the state of conservation for South West Church

Element value	**Very high High Medium Low Negligible**
Element name	Southwest church
Location	440 m Southwest from Commodus Gate
Dimensions **(Dimensions generally measured from left and bottom edges: height given first, then width and finally thickness it applicable)**	
Materials & substance	Basalt stone and plaster on floor
Use and function	Church/ Basilica
Composition/ form & design **(Object's aesthetic, conceptual and physical characteristics)**	1. The design was corbelled 2. The remains of the unfinished mosaic floor 3. The remains of plastering 4. Circular apse 5. Decorative lintel 6. Base of arches 7. Roofing structural methods 8. Additional rooms 9. Arches stones 10. Church between houses

Structural condition	stable structure “need photos” (4 of 5)
Risks threaten the element **(substantiate change which result from time, manner of storage, handling and treatment.**	1. Rain falling 2. Climate change 3. Earthquake 4. Illegal behavior 5. Disorganization 6. Looting and demolition (human and animals) 7. Graffiti
Previous interventions. (Record materials and techniques used in treatment).	Churches cleared, to expose floor levels with plaster remnants (DoA,1999-2010). Excavation (UJP, 2019)
Record of any accompanying photo documentation or other visual/ pictorial aids. **(including date of capture and photographer)**	     

4.4. Julianos Church

Julianos Church is located in the northeast corner of the archaeological site. In other words, it is on the northwest side of the Commodus Gate (Accredited reference point). The Julianos Church is the oldest church on the site and its building date was taken from the inscription found on one of its lintel stones. Butler based his interpretation on this inscription (Butler, 1913). The inscription is well documented in E. Littmann, Greek and Latine Inscriptions, which in the Library of the Umm al-Jimal Website. The translation makes clear that this is originally a cemetery inscription reused in the church because the stone was a good door lintel (Vries, 1998). Therefore, calling this the "oldest church" based on this inscription is in doubt. There is no exact accuracy in this, but it is documented. The Julianos Church is surrounded by buildings from all sides, its walls are adjacent to the area that formed the walls of neighboring houses, most likely to have been occupied by the church's priests themselves. The church has been heavily damaged, so it has few walls and only some of its features are now intact. It was documented by researchers in the past, sometimes when there was better

preservation, but there are some variations between what actually exists and what they thought occurred because of changing conditions and developing information systems. The information collected here gives the most accurate measurements and plan to date.

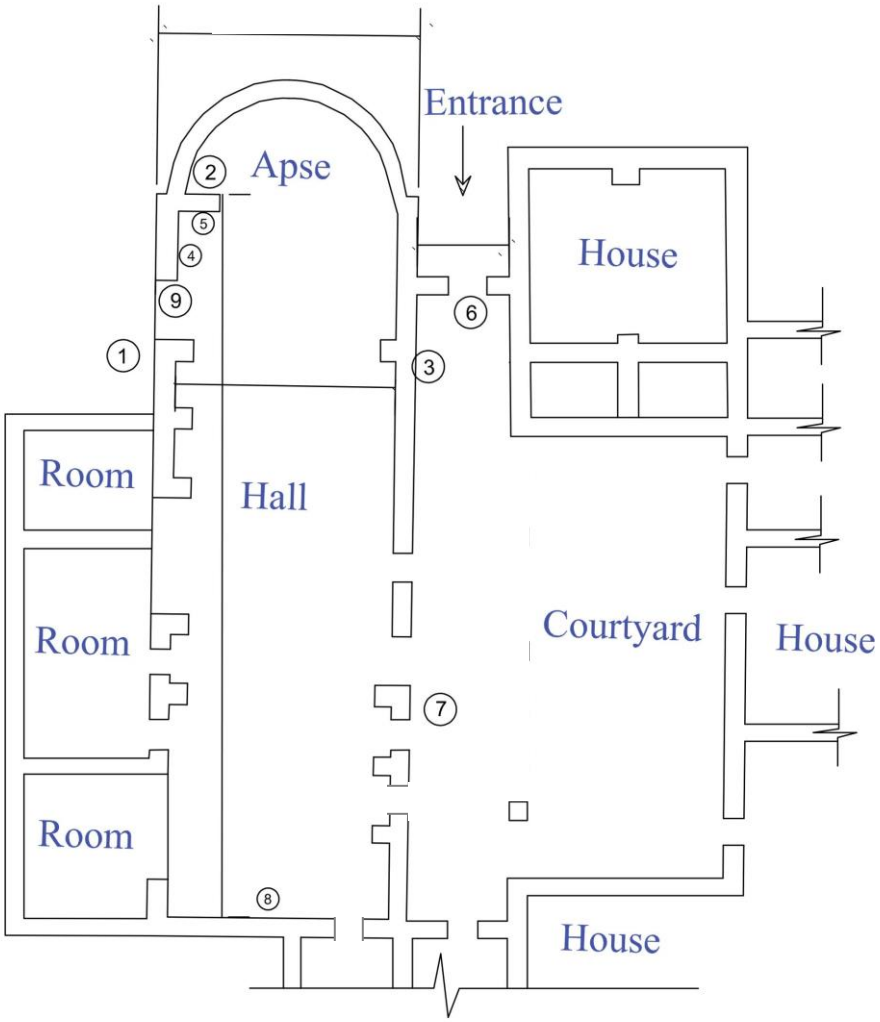


Figure 49 : Actual plan for the Julianos church that is currently on site. Scale 1:200

The plan is a rectangular shape that ends in a half circle (apse) from the east. This church differed from the others with its main entrance and its narthex. This church has a total of eight entrances, and the entrances to the nave were from the south rather than from the west. These entrances can be accessed via the main entrance to the church and associated housing complexes, which are next to the apse in the eastern wall. The door is 1.40m in width and 0.85m in-depth and the door's lintel dimensions are 2.00 *0.40*0.30 meters. One enters into a

wide courtyard surrounded by residential buildings on three sides and a southern church façade on the fourth one.

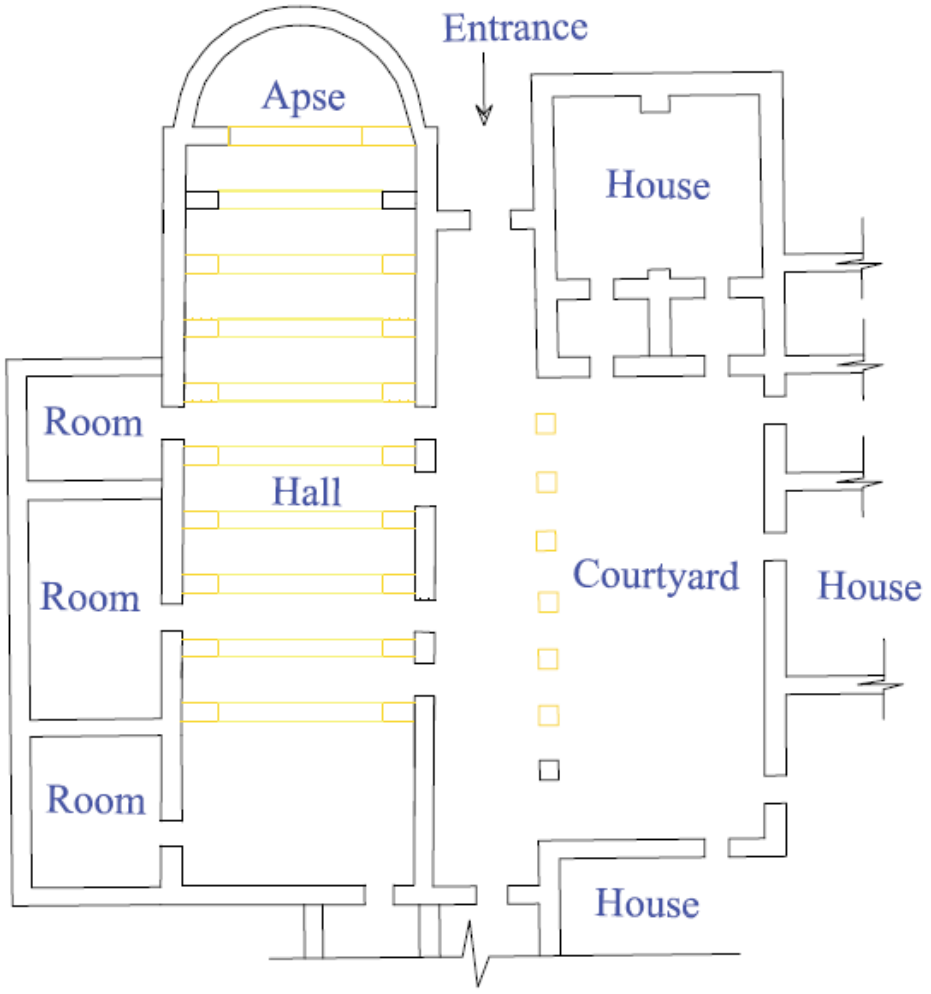


Figure 50: Julianos church plan that was assumed. Source by author. Scale 1:200

A roofed corridor (width of 3.5 m) leads to a row of cylindrical pillars (diameter is 0.50 m with circular bases) at the front of the southern wall (Butler 1913). Doric capitals were found in the site's ruins (Butler,1913). These columns separate the church's southern entrances from the courtyard, which is 18.00 m long, 7.00 m wide, surrounded by buildings from three sides. Six doors were opened into this courtyard. The surrounding houses are two story buildings and some of its stairs are still clear on site. The southern façade has four entrances, three of which were built in the same period and the fourth was added to the building at a later date. When entering the church, columns parallel to the southern façade give the impression of awe.

Figure 51: The Southern wall of Julianos church, the last column of the row. Author

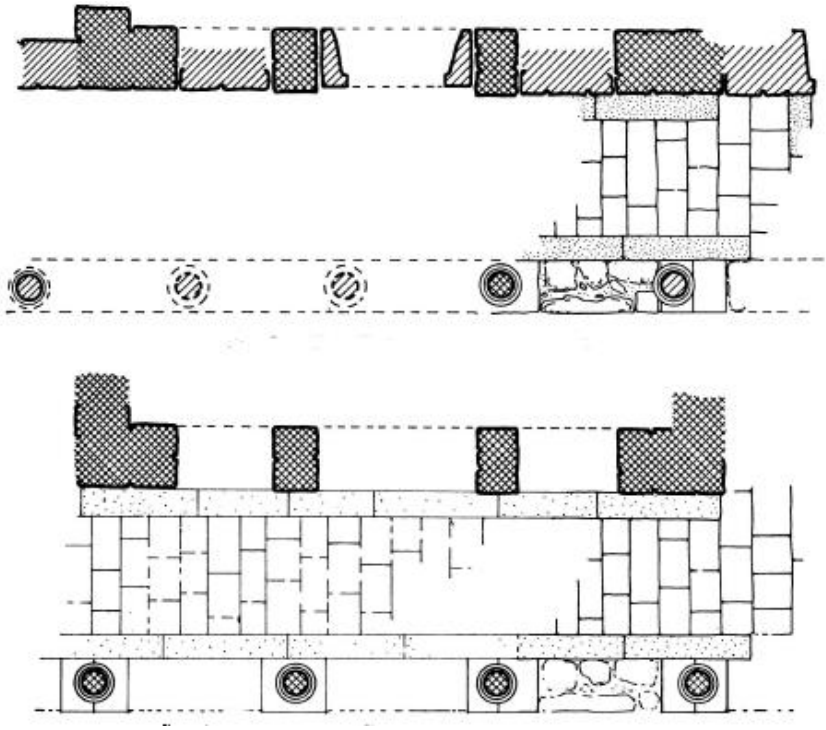


Figure 52 : Corbett plan of doors part of Julianos church, shows the columns' row. Scale 1:50

The western wall had a single entrance in the southern half part leading to the nave from a building adjacent to the church through a rectangular hall. There are three entrances on the northern side of the church, each leading to a room These rooms were used as accommodation for the church's priests and clergy who served the church. All of these doors lead to the nave where the church belongs to hall churches pattern (there are not two side aisles).

Figure 53: photos of southern part of Julianos church, shows the tiles and column. (Corbett & Reynolds, 1957)

Figure 54: The added door on Southern wall of Julianos church. Source by author.

The church's height is 6.5 meters, and the depth of the walls is as high as one meter. Like other churches, it is built from two layers of black basalt walls, including mud and mortar between them. Some of the church stones are trimmed and straight, others are slightly trimmed. As a result of shear defects, they covered it with a coat of plastering to fine-tune its shape. The nave is a rectangular space with 28.00m length and 10.20m width, divided into ten parts through transverse arches of more than 7.00 m lengths and the distance between them is equal to 1.90 m. These arches mounted on the prominent pillars of both the northern and southern walls distributed in each wall ten by ten, the width of each pillar base is 0.75 m, while the western side has increased the distance between the last pillar and the western wall up to 2.50 m (Butler,1913).

Figure 55: The apse of Julianos church. The remains of walls and supporting bases. Source by author.

Figure 56: The apse of Julianos church. Stairs inside the apse. Source by author.

The apse of the church, like the other churches, is semi-circular with a circumference of 11 m (and its radius is 4 m} and a width of 7.85 m (diameter), which is less than the nave width (10.20 m). The apse rises three steps higher than the nave level. These steps could have been a place for priests to sit Arches built on two pillars of the northern and southern walls separate the apse from the nave hall. The width of this arch differs from the others: it is less wide and rises higher. Only the stones forming the apse wall and the stairs in the middle are in place today.

Excavation done by the UJP revealed plaster flooring, but no mosaic. Of especial note is that a large number of ceramic roof tiles were found in the ruins of the church.

Figure 57: The altar screen base stone , inscription on the door's lintel. Source by author.

This church is noted for its inscriptions on the lintels of the doors, especially the Julianos inscription and the cross on the main entrance lintel. This church may have included other interior inscriptions and carvings and other decorations.. There were remains of carved stones in the altar where the altar screen would be installed when Corbett investigated the church, but today these are covered in rubble.

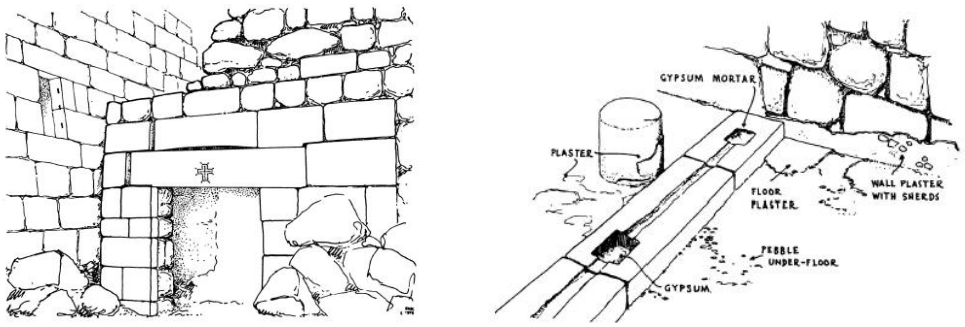


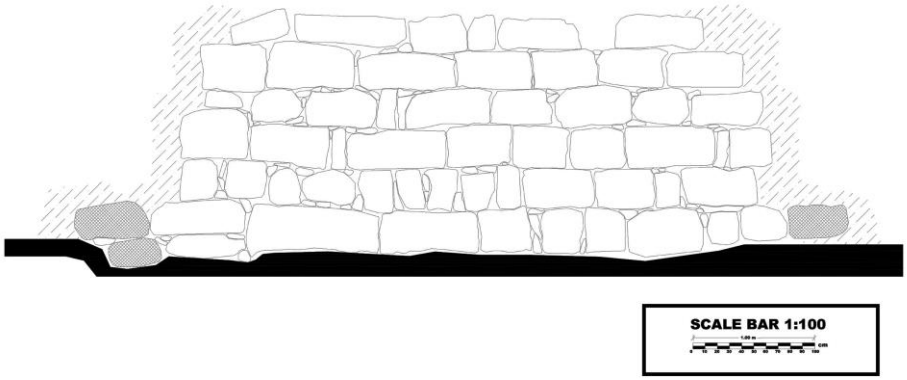
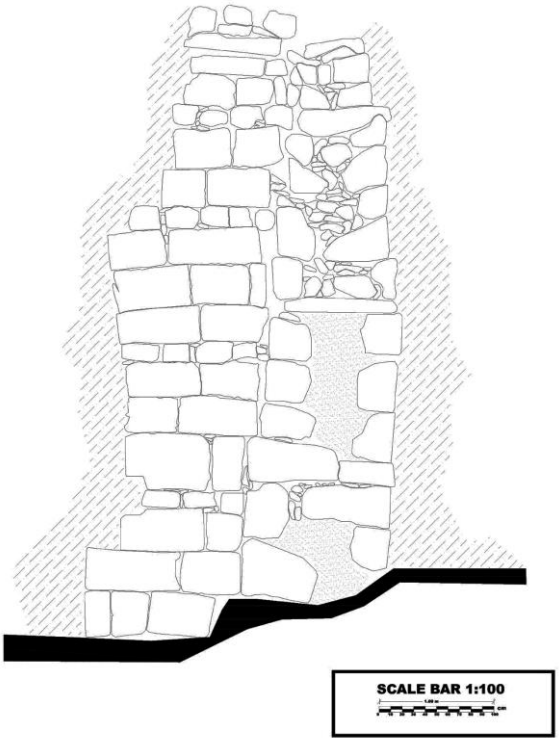
Figure 58: Corbett drawings for main entrance inscription on the lintel and alter of the apse. : (Corbett & Reynolds, 1957)

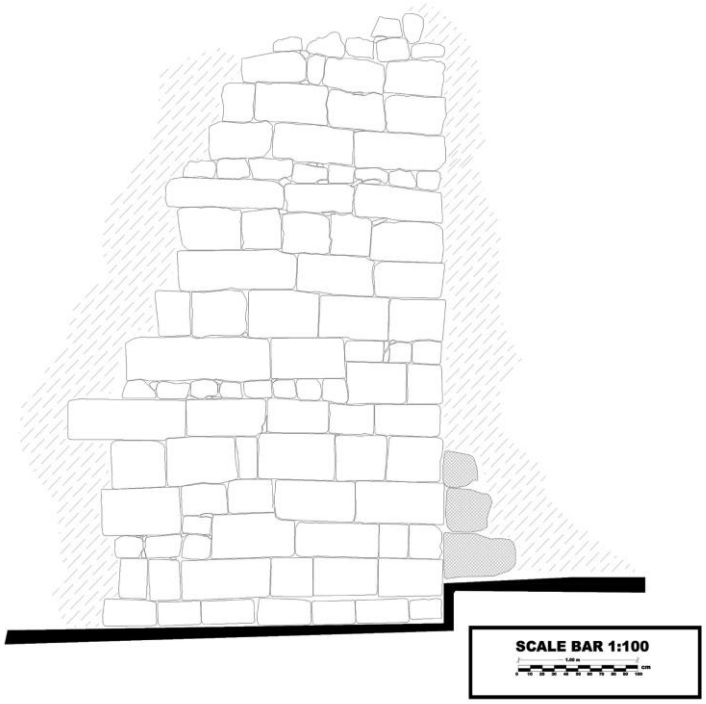
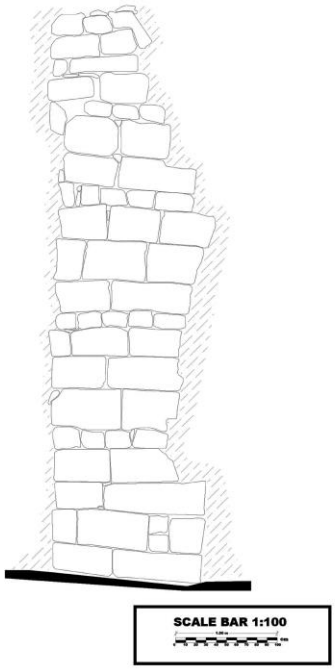
Figure 59: Cross inscription on the main entrance lintel and Julianos inscription. Source by author.

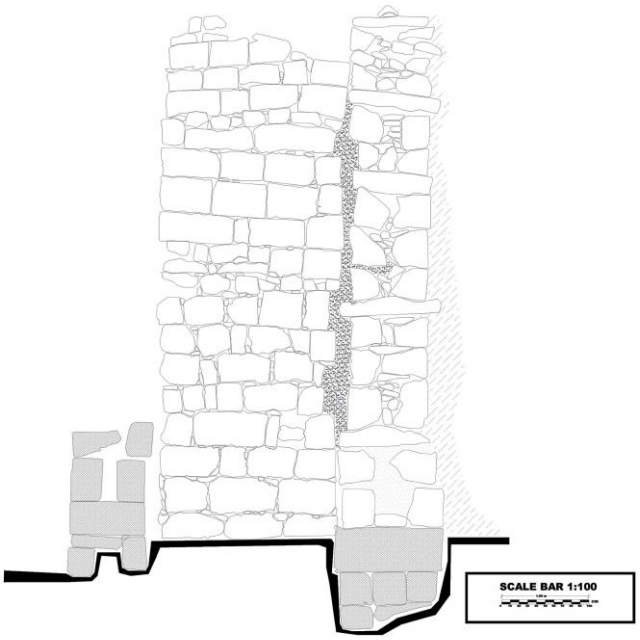
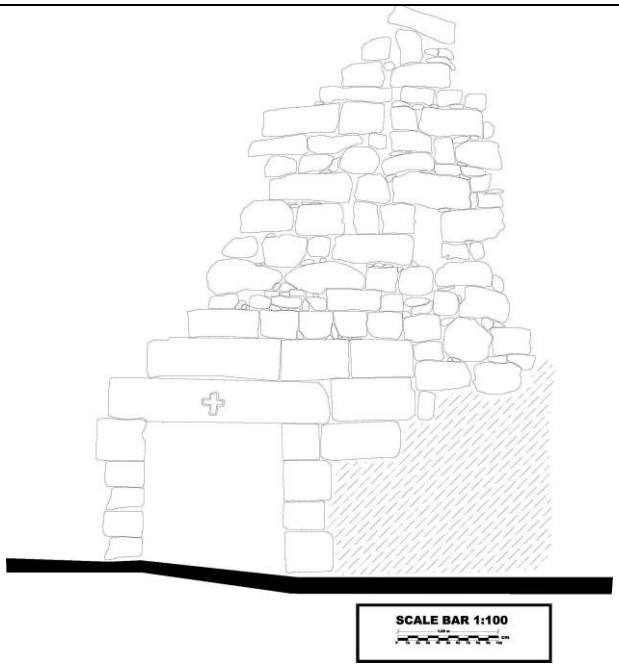
Figure 60: Corbett photo for one of Julianos church inscriptions. (Corbett & Reynolds, 1957)

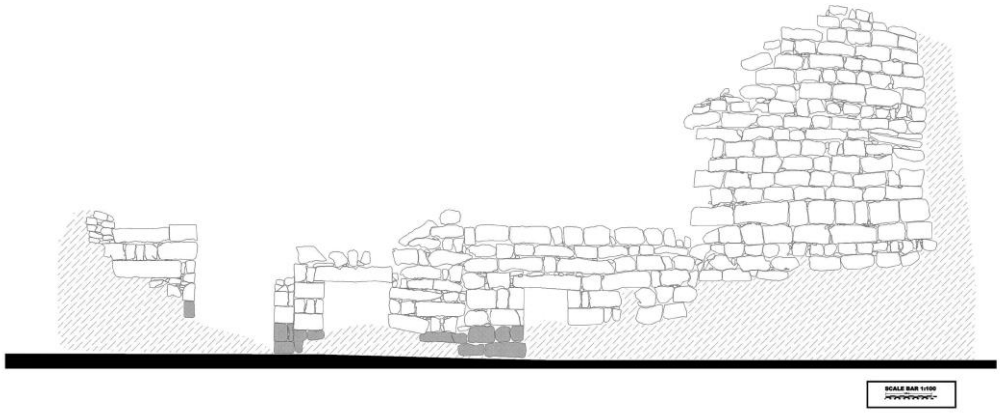
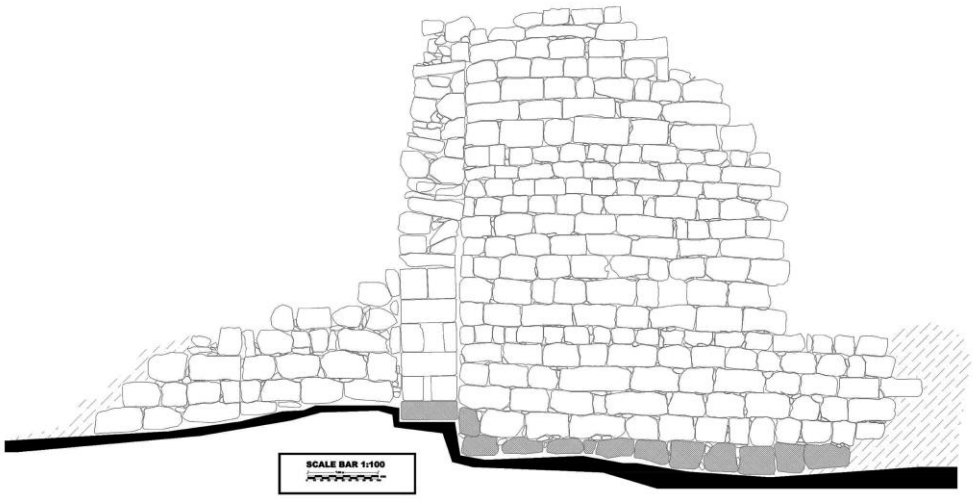
Also, the added door on the south side of the church where the original door opening is wider, so stone pieces were added to the door (see figure). At the time of his research, there were columns in situ but now only one of the columns in the western half of the southern wall exists and the rest are under the collapse. There are also no remains of the western wall now; Corbett had previously suggested that this wall was present before the church and later on it was integrated with the nave when the church was constructed because of the existence of a number of windows at different heights. So, the northern and eastern part of the church were built against existing structures. Corbett notes that the cross carved on the eastern entrance is not as regular as other such designs, and therefore suggests that the lintel was in place before the cross was carved. Therefore, the doorway was in place and in use before the church was built.

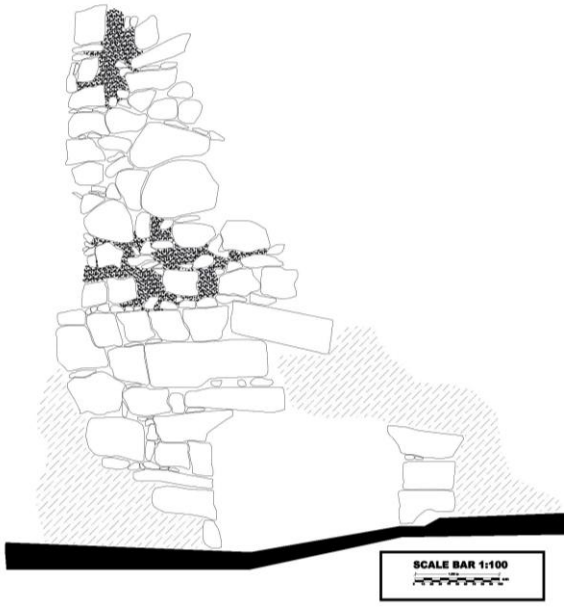
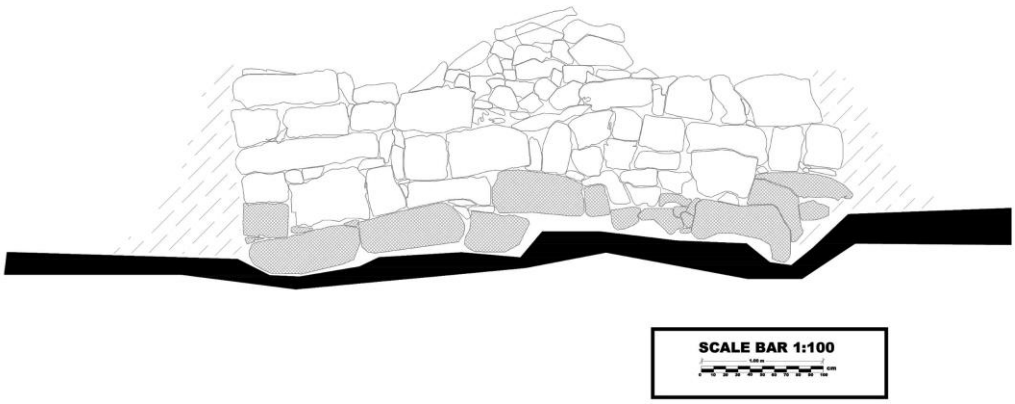
Table (10): Two-dimensional drawings :

NO	Drawings
1	 Notes: The remains of the northern stone wall from the outside. The façade line is uneven. (Number 1 on the plan above).
2	 The remaining stones of the northern wall from inside. The drawings shows the arch base (the apse arch) and part of northern wall. The façade line is uneven. (Number 2 on the plan above).

3	 The remaining stones of the southern wall from inside. The drawings shows the wall next to the apse, which contains well cut stones The façade line is uneven. (Number 3 on the plan above).
4	 The stones of the arch base (the apse arch) from inside. The total height is around 5.10 m. The façade line is uneven. (Number 5 on the plan above).

5	 The remains of the northern wall from inside. The drawings shows the arch bases(the distance between them is 1.90 m), also shows part of northern wall. The façade line is uneven. (Number 4 on the plan above).
6	 The remaining stones of the Eestern wall next to the apse from outside. The drawing shows the main entrance, the cross carving on th lintel, (dimensions of this lintel are 2.00*0.30*0.40 m the distance between them is 1.90 m), and also shows part of northern wall. The depth of this elevation is almost 0.85 m.The red lines indicate collapse in front of the wall. The façade line is uneven. (Number 6 on the plan above).

7	 The stones of the Northern wall from outside. The drawings shows the doors and their lintels and part of Southern wall beside the entry. The red lines indicate collapse in front of the wall. The façade line is uneven. (Number 7 on the plan above).
8	 The stones of the Northern wall from inside. The drawing shows part of Southern wall and another part of the apse stones. Also it shows the arch base. The façade line is uneven. (Number 3 on the plan above).

9	 The remains of the Eastern wall next to the apse from inside. The drawing shows the main entrance and part of Northern wall. The depth of this elevation is almost 0.85 m. The red lines indicate collapse in front of the wall. The façade line is uneven. (Number 6 on the plan above).
10	 The remains of the Western wall opposite the apse from inside. The depth of this elevation is almost 0.75 m. This area is full of collapse in the front of the wall. The façade line is uneven. (Number 8 on the plan above).

Three-dimensional drawings (Done by Author) :

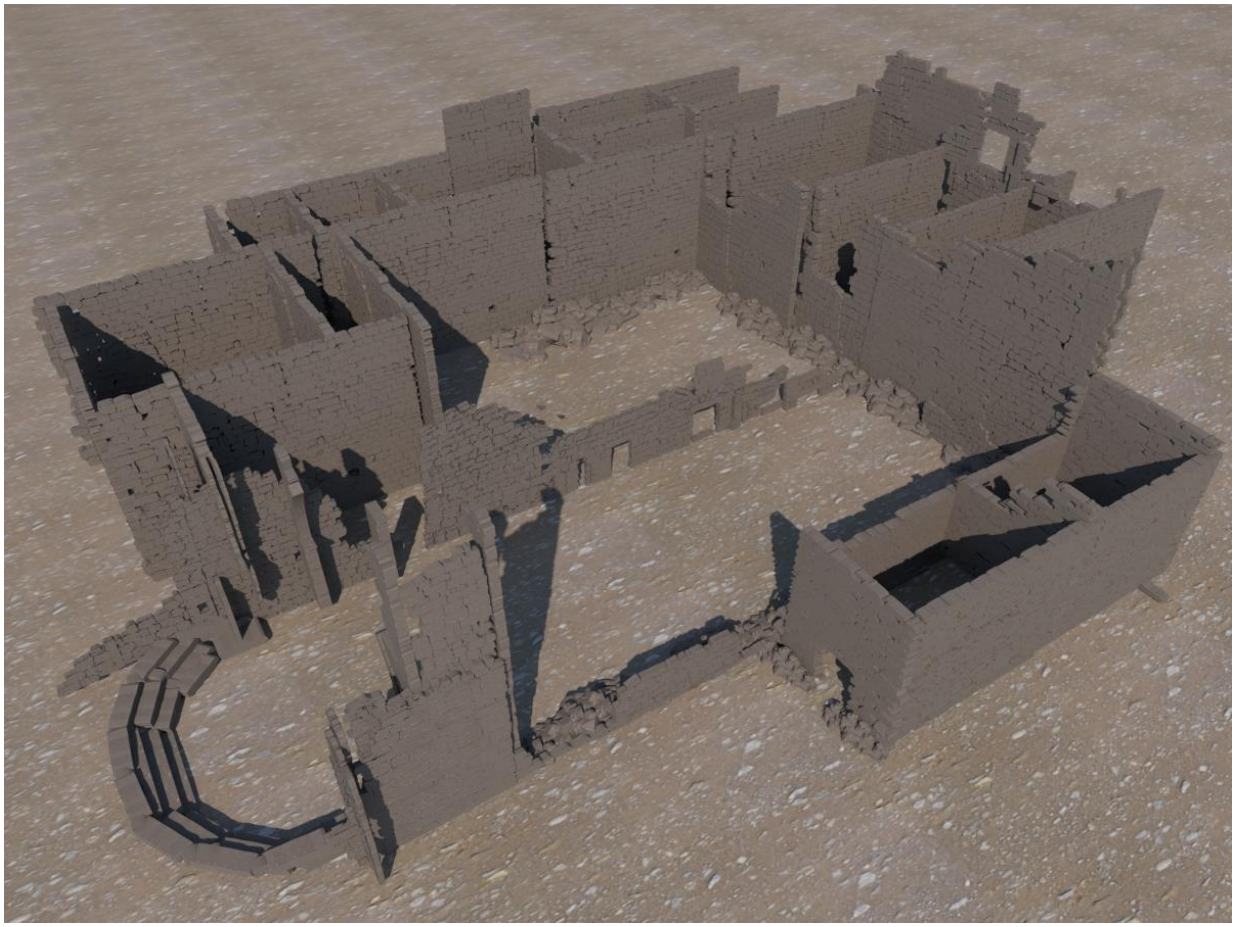


Figure 61: 3D perspective presents the bird eye of this church from the northeast. Showing the apse, Arches' bases, doors, courtyard and remains wall. Also, it shows the neighboring house.

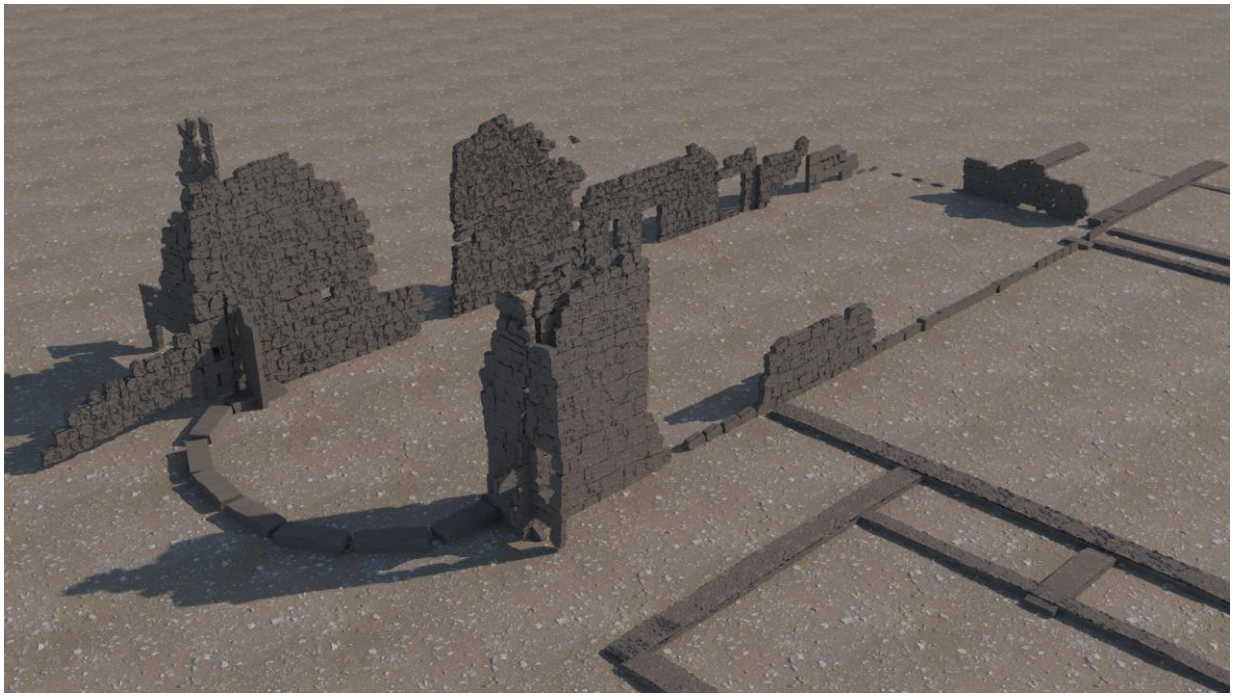


Figure 62: 3D perspective presents the bird eye of this church from the northeast. Showing the current wall stones of the Julianos church site.

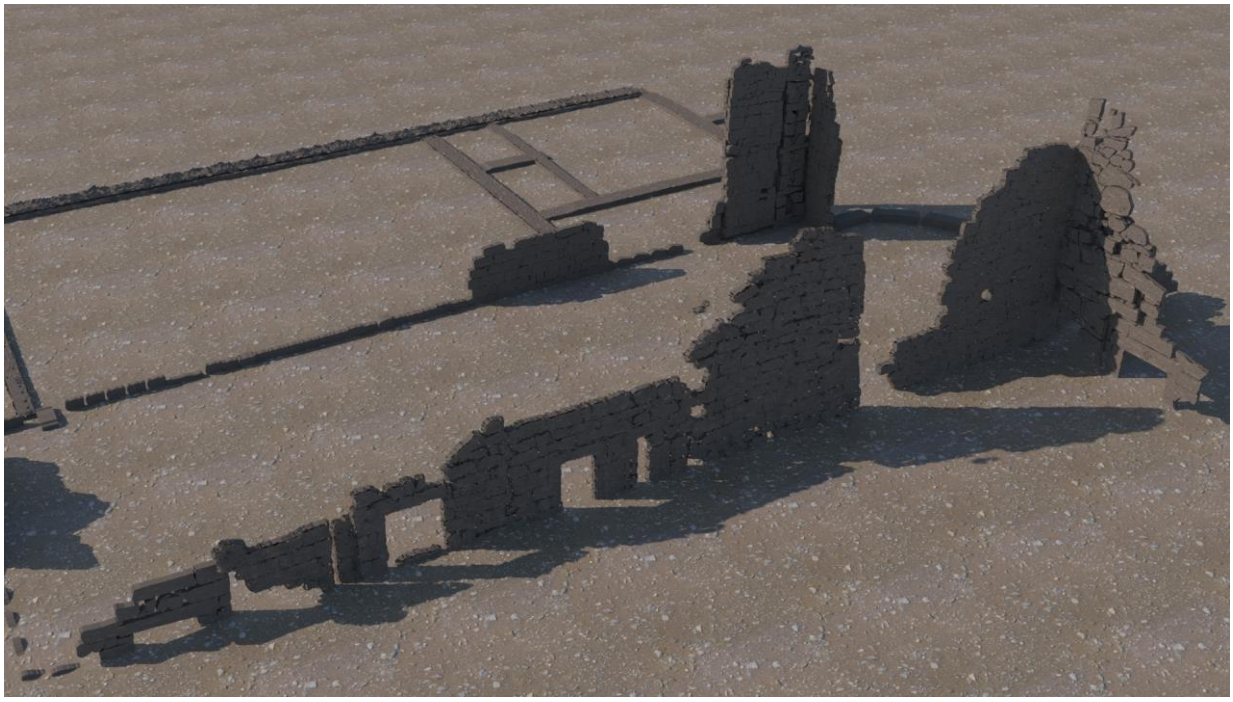


Figure 63: 3D shot presents the bird eye of this church from Southern West direction. Showing the doors and current wall stones of the Julianos church site.

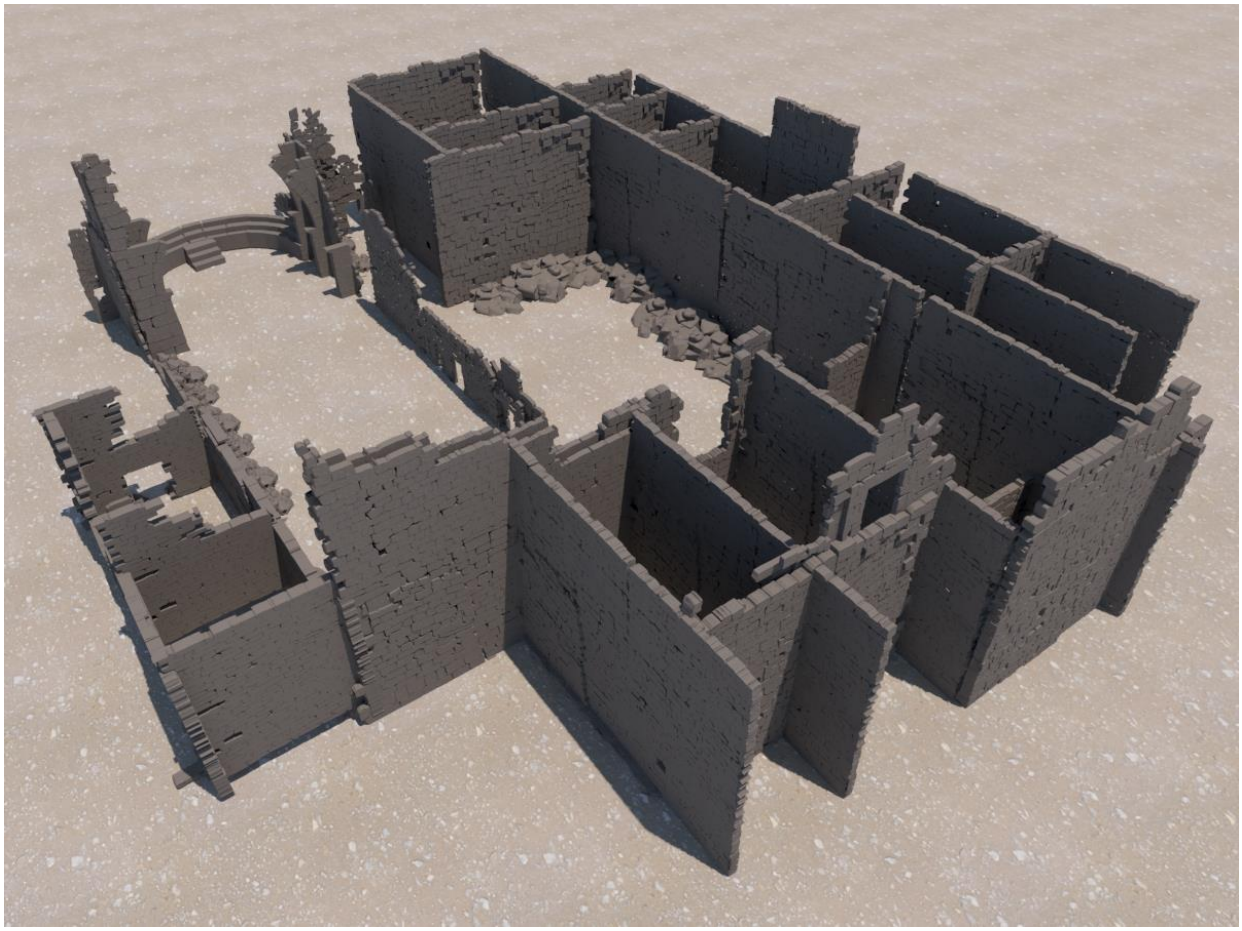


Figure 64: 3D shot presents the bird eye of this church from Southern West direction. Showing the apse, Arches' bases, doors, courtyard and remains wall. Also, it shows the neighboring.

Table (11): Criteria to describe the state of conservation for Julianos church

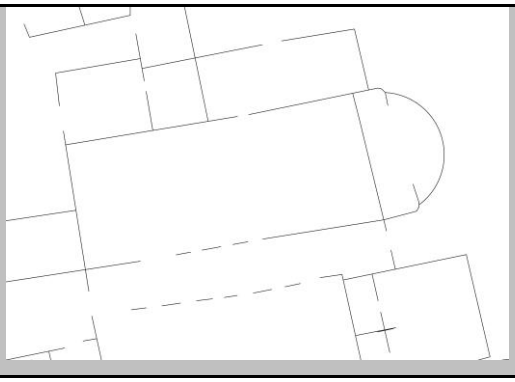
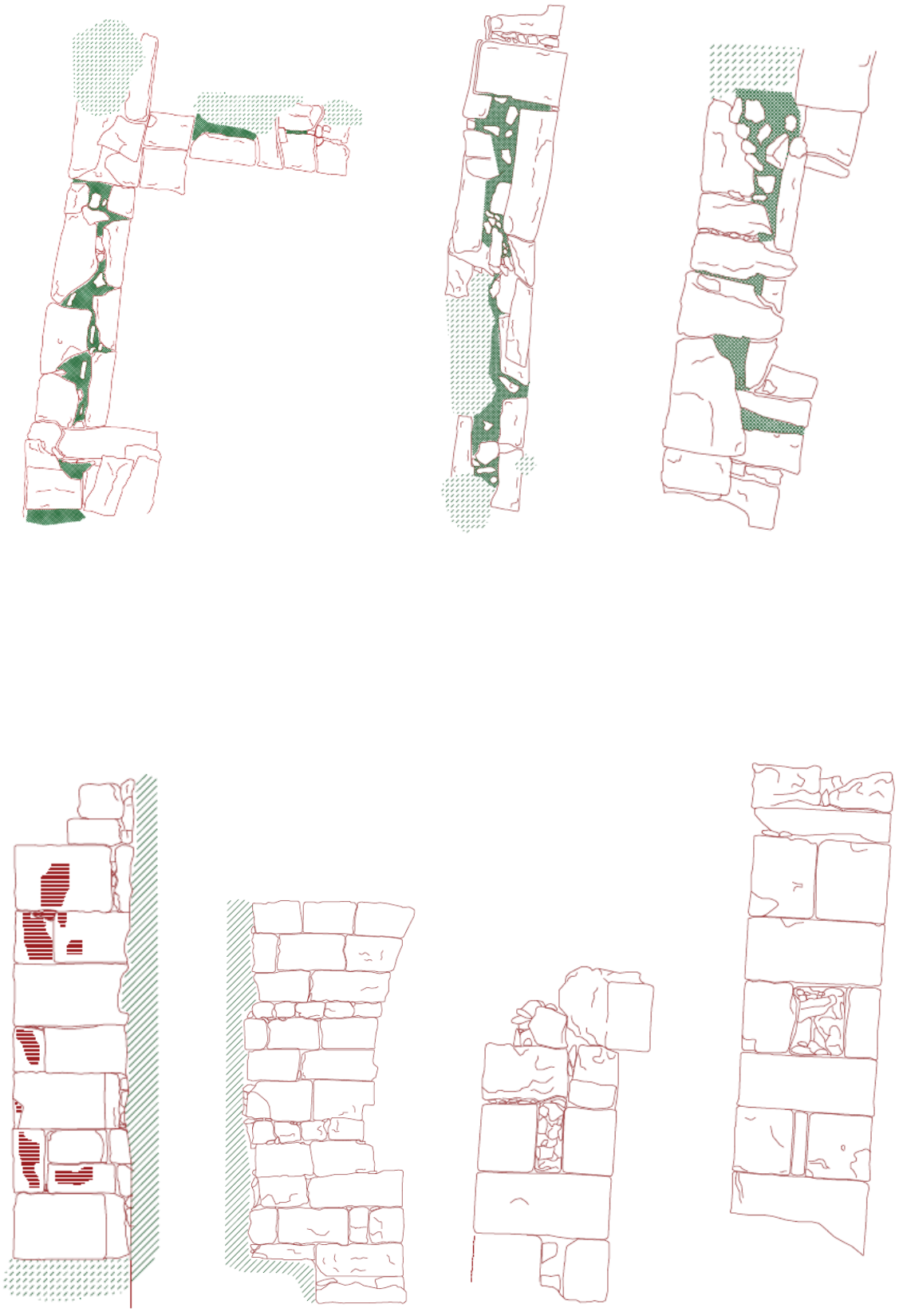
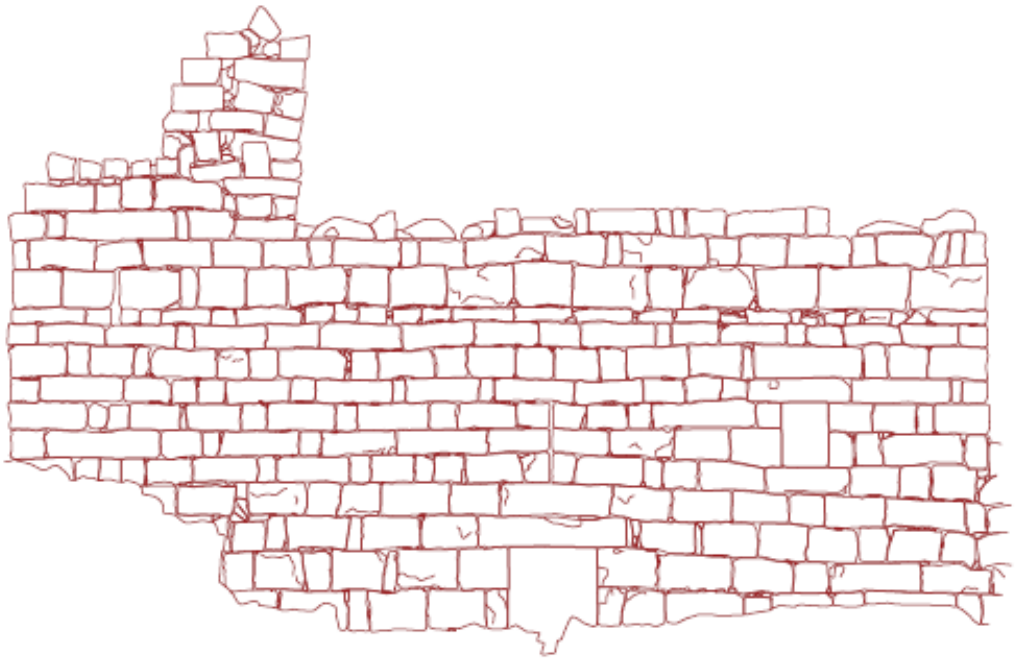
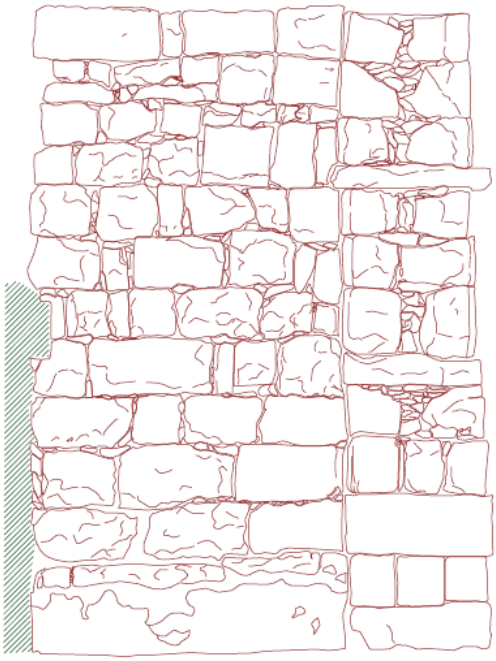
Element value	**Very high High Medium Low Negligible**
Element name	Julianos church
Location	120m northeast from the Commodus Gate
Dimensions **(Dimensions generally measured from left and bottom edges: height given first, then width and finally thickness it applicable)**	
Materials & substance	Basalt stone and plaster on floor Ceramic roof tiles.
Use and function	Church hall/ Basilica
Composition/ form & design **(Object's aesthetic, conceptual and physical characteristics)**	1. The design was corbelled 2. The remains of the mosaic floor on the apse 3. The remains of plastering 4. Semi-circular apse 5. Decorative lintel (inscriptions) 6. Bases of arches 7. Additional rooms 8. Church built against houses
Structural condition	unstable structure (1 of 5)
Risks threaten the element **(substantiate change which result from time, manner of storage, handling and treatment.**	1. Rain falling 2. Climate change 3. Earthquake 4. Illegal behavior 5. Disorganization 6. Looting and demolition (human and animals) 7. Graffiti
Previous interventions. **(Record materials and techniques used in treatment).**	Butler's research, Bert de Vries' research and Corbett's studies. UJP excavations 1998, 2019
Record of any accompanying photo documentation or other visual/ pictorial aids. **(including date of capture and photographer)**	  

Figure 65: Computer drawings of manual drawings done by Andrew Meskill and Gregory DeVries.







Chapter Five
Discussion, Recommendations and Future Study

5.1. Discussing the results

Extensive research and documentation over several months leads to three outcomes: confirmation of the existence of churches on site in Umm al-Jimal based on accepted features of typical church architecture, an accurate record of the current physical state of the three churches studied to assess change over time and risk, and finally to use the study of the existing remains along with known church architecture typology to render accurate hypothetical depictions of the original buildings with special focus on the roofing structures. The researcher took part in several fieldworks at Umm el-Jimal. The presentation of all results of the work over a period of ten months allowed the researcher to determine Umm el-Jimal church situations and conditions that threaten the survival of the Umm el-Jimal archaeological heritage site. The dissertation discussed the architectural features of the churches at Umm el-Jimal focusing on the structural forms, materials, and structures analyzed which provides a framework for the historical and architectural details of the churches. Detailed architectural content has been presented for each church. The researcher has developed a database of architectural drawings for each church, including walls, floors, and other details, such as a lintel and inscriptions during the duration of this study. In addition to the documentation of each of them in three-dimensional images. Also, providing a new actual plan for each of the three churches commensurate with the reality of Umm el-Jimal in 2019. The dissertation also came out with a comparison table between the three churches and the architectural details now available.

The most important part the researcher has reached is how these churches were roofed through new three-dimensional drawings of these churches that have been produced to illustrate how the roof of each church has been taken into account the previous assumptions

and studies and also the most important evidence from the present archaeological site. Each will be discussed separately. Thus, an integrated comprehensive architectural framework has been created for the ecclesiastical architecture of the three churches.

Table (12):Summary of the Analytical Studies for West church, Southwest church and Julianos church, by author.

Church name		**West church**	**Southwest church**	**Julianos church**
Location		Outside the city wall	Inside the city wall	Inside the city wall
Church form		Basilica	Basilica	Hall church
Component of church	Apse	Inside the apse, the shape is semi-circular. Rectangular on the exterior. Circumference 12.00 m and 6.60 m in diameter Rises three steps above nave level.	Semi-circular inside and outside, tends to slightly oval Circumference 12.00m and 4.00m in diameter Rises two steps above nave level.	Semi-circular inside and outside Circumference 11.00m and 7.80m in diameter Rises three steps above nave level. 4 steps inside the center of the apse.
	Arches inside Apse	There is one inside and another one separated the nave and apse, but now it's a wall.	One arch separated the nave and apse.	One arch separated the nave and apse.
	Aisles	Two aisles; 2.85 m width	Two aisles; 3.30 m width	No aisles
	Nave	One nave; 6.60 m width	One nave; 4.40 m width.	One nave 10.20 m width
	Services room	Two lateral chambers with 6.20m length, 3.00 m width and 2.20m height.	No	No
	Narthex	On the west side	No	No
	Towers	Two towers on the west side. Each one is	No	No

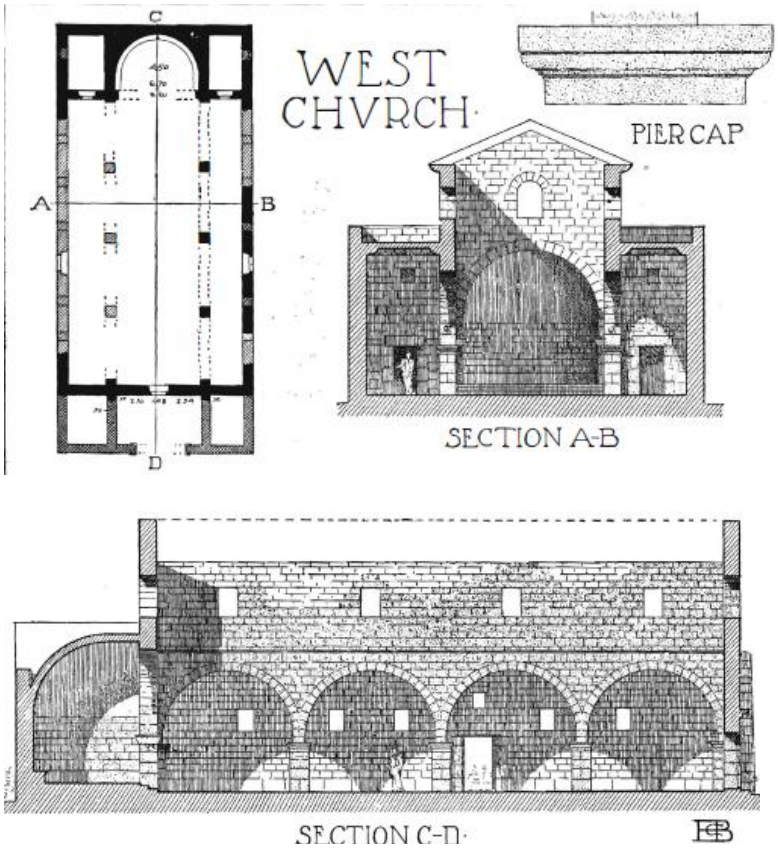
		3.60*4.50 m		
	Courtyard	No ?	On the northern side.	On the southern side.
	Altar screen	Yes, it rose above the nave level and was made of basalt.	Yes, it rose above the nave level and was made of basalt.	Yes, it rose above the nave level and was made of basalt.
Material		Basalt stone, plastering, wood, mosaic (maybe wood)	Basalt stone, plastering.	Basalt stone, plastering, ceramic roof tiles, (maybe wood).
Plan shape		Rectangular; 17.60 m length, 12.40 m width	Rectangular and semi-circular apse; 22 m length, 11 m width.	Rectangular and semi-circular apse; 32.00 m length and 10.20 width.
Construction elements		Rubble-filled walls (two faces of stones filled with stone debris), corbel stones, arches.	Rubble-filled walls (two faces of stones filled with stone debris), corbel stones, arches.	Rubble-filled walls (two faces of stones filled with stone debris), corbel stones, arches
Main entrances		From the west (193*245*85 cm).	From the north (120*190*90cm)	From the East (X*140*85 cm)
Openings (doors & window)		8 doors to the nave at the site now . Two semi-circular and one square window still appear (clearstory).	6 doors to the nave at the site now. One window still appears.	5 doors to the nave at the site now, the others are under collapse. No windows preserved.
Floor		Some parts of mosaic floor & plastering .	Plaster.	Under collapse.
Bases of arches		Half of them still standing and some stones of the rest exist.	Some of the stones are in the church..	Everything is under collapses.
Decorations, Inscriptions		On lintel and arches. Row of ornamental cornice stones.	On lintels.	On lintels.

Building condition	Fairly good, but the apse is full of collapse.	Good, but behind the western wall is collapse.	Poor condition. Full of collapse..
Burial place	Cemetery beside it .	No	No
Surroundings	Stands alone.	Has two walls in common with houses.	Rooms or courtyards on three sides.
Succession of civilizations	Obvious , two ways of building the walls.	Obvious , two ways of building the walls.	Differences of the way of building.
Roofing	Some of corbelling survives.		Ceramic roof tiles were found in the site.
Lighting	Through windows and clearstory.	Through windows, even in the apse.	Through windows, even in the apse.

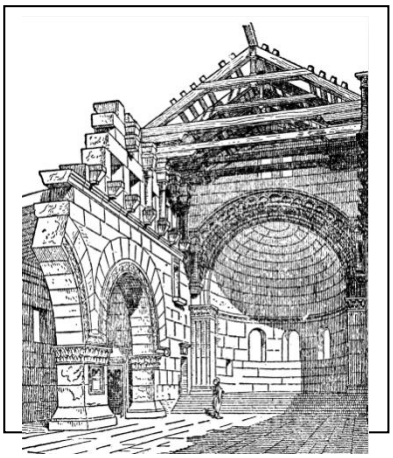
The local stone used in construction at Umm el-Jimal was basalt. The strength and durability of the stone allowed for the easy construction of multi-story homes (or churches, such as the Numerianos church) and churches with upper galleries. As shown in the previous chapters, corbelling and arches were frequently used to support multiple floors and roofs. The methods of roofing are determined by the building's design and the building itself. In this section, each church and its particular architectural characteristics are discussed alongside the three-dimensional reconstructions.

Let us begin by discussing the current proposals of some researchers. Butler debated the details of the West church, he noted that the west end part still has two storeys, and one of the aisles is still quite clear to tell the story of the building. Butler believes that this church does not belong to the buildings of southern Syria, but is fully compatible with the plans and method of construction in buildings in northern Syria and considers it foreign to its neighborhood even in its basalt stones. Butler notes that there are two aisles that separate the church and define the nave, each of these aisles has four arches carried on square piers. The clearstorey wall above the arches was also pierced with square-topped windows. He said that

"The side aisles were roofed with flat slabs of stone resting upon the aisle walls and upon a corbel course above the nave arches." he explains that the roofing system is exactly like Kalb Lauzeh church which is a gable roof. (Butler, 1913)



Butler Drawings for West church plan and section. (Butler, 1913)



Kalb Lauzeh church drawing.[9]

Kalb Lauzeh church[9]

The researcher discusses the details of the West Church whereas the width of the nave was more than double that of the side aisles. Arches support walls between the nave and the aisles, and these arches and their substrates help to support the roof. Because the width of these arches depends on the width of the ceiling, the larger the roof width, the larger the arches width span and thus the width of the supports on the basis of them will increase. This indicates that it is not possible for this distance between the two walls of the arches to be connected by transverse basaltic pieces greater than 5 m (more than nave width, I assumed there is no basalt stone longer than 3 meters in that period) and in line with Butler's opinion that the basalt stone which was used, the quadratic method of construction, and the pruning of the stone correctly and with high accuracy, the researcher exclude the cross-sectional covering of the nave or flat roof. The

exterior walls on the other side of the aisles support part of the roof as well, using the corbeling method (the principle of the Arches on the substrates to carry the ceiling). There is a line of stacked stones different from the rest at the top end of each arch (the keystone of the arch) on this wall.

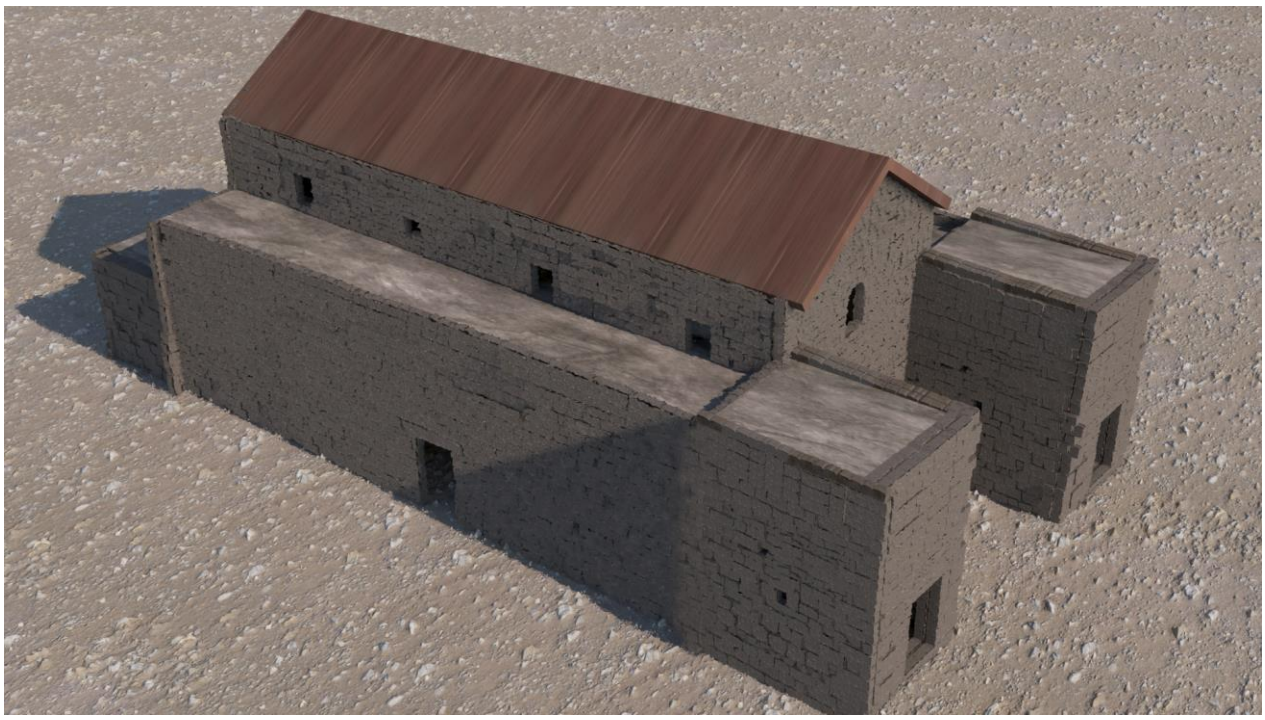


Figure 66: 3D perspective presents the bird's eye view of this church from the southwest. Showing the roof, clerestory, and doors of the West church. Source: Author

Figure 67: 3D perspective presents the bird's eye view of this church from the southeast. Showing the roof, apse, clerestory, and doors of the West church. Source: Author

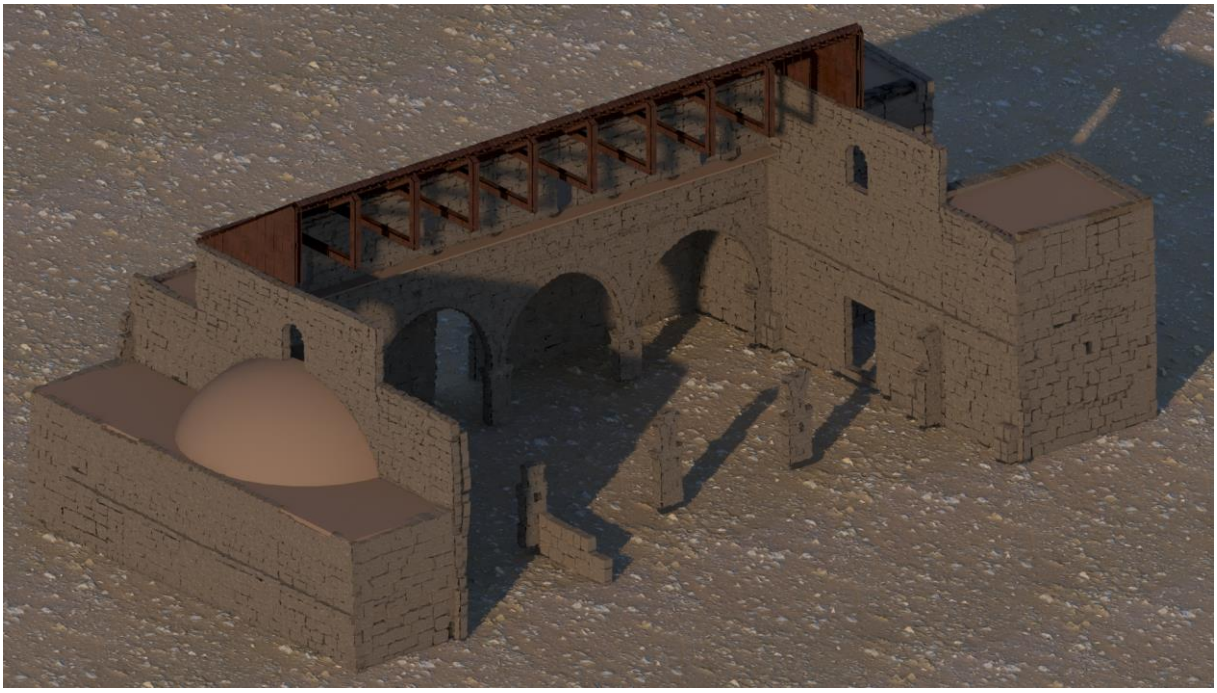


Figure 68: 3D section presents the bird's eye view of this church from the northeast. Showing the roof , apse, arches inside the church, clerestory, and doors of the West church. Source: Author

Due to the different elevations of these arch-supported nave walls and the exterior walls, along with the remains of a clerestory, I believe that the roofing is the pattern of the cantilevered corbel system and a wooden gable. The apse-supported nave wall, which had windows of at least one meter, rose above the roof over the aisles (currently preserved in part). Because there are no signs or earlier records of broken tiles or other roofing material, and because the width of the nave would have required more support in the center if corbelling was used, the most probable roofing material was timber, which has been broken away over time.

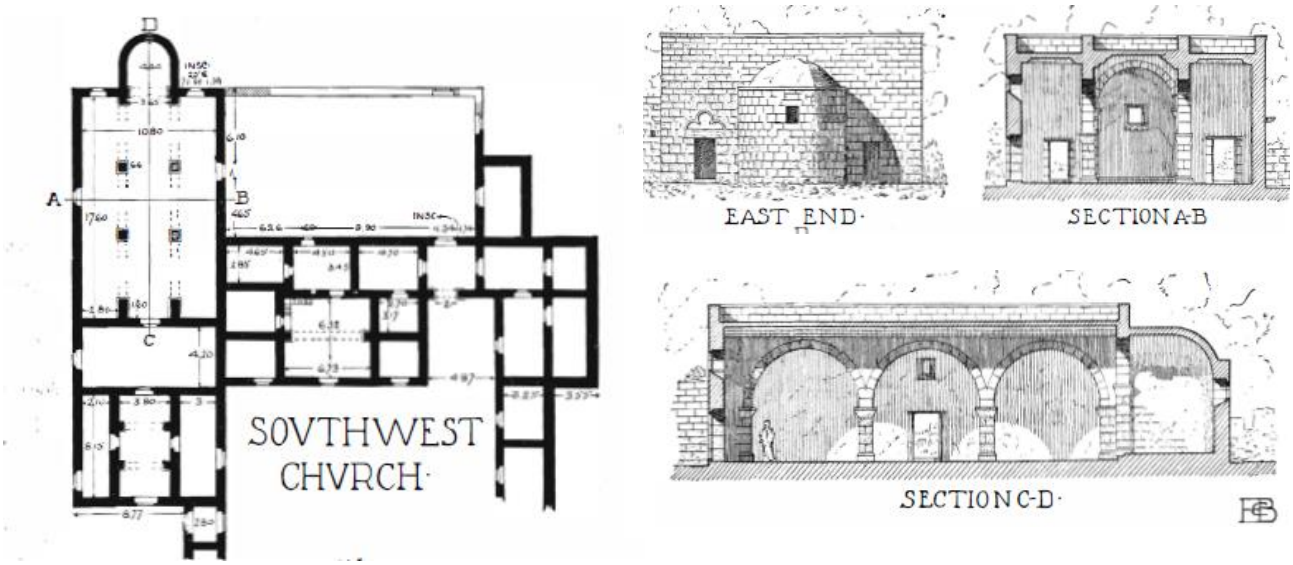
The roof would have been mounted on a group of wood beams fixed by lightweight volcanic mortar and stone breaking as support. Timber was not a commonly used component of Umm el-Jimal's buildings, as it was not easily found in the immediate area; however, it could be imported from the west or south.

Figure 69: 3D section from northeast showing the roof, corbeling, arches inside the church, clerestory, and doors of the West church. Source: Author

Figure 70: 3D perspective inside the West church showing the original condition of the church. Source: Author

Figure 71: 3D perspective inside the West church showing the original condition of the church. Source: Author

This church is one of the churches surrounding by a group of buildings, Butler clarified that it is of a local residential context, but it was not certain for sure whether these buildings belong to the church or vice versa. He documented that the division of this church into three parts by arches walls, which were built on the same height of arches walls capital, where the width of the aisles and the nave almost Identical. Because of the collapse of the arches and the dome supposed to have covered the apse, there is no certain evidence of the roofing method. Butler said " the whole building was covered with a flat roof all on one level. The side aisles were certainly roofed with slabs of stone, and I am inclined to believe that the middle aisle was covered in a similar way". (Butler, 1913)



Butler Drawings for West church plan and section. (Butler, 1913)

A clerestory is unlikely given the small width of the nave, so the roof was likely at one height across the church and would have been supported by corbeling. It is possible that timber and volcanic mortar were used in part of the construction in addition to basalt stone because the walls do not exceed 90cm thick and therefore cannot bear great weight across fairly wide distances. However, no traces of mortar were found on site.

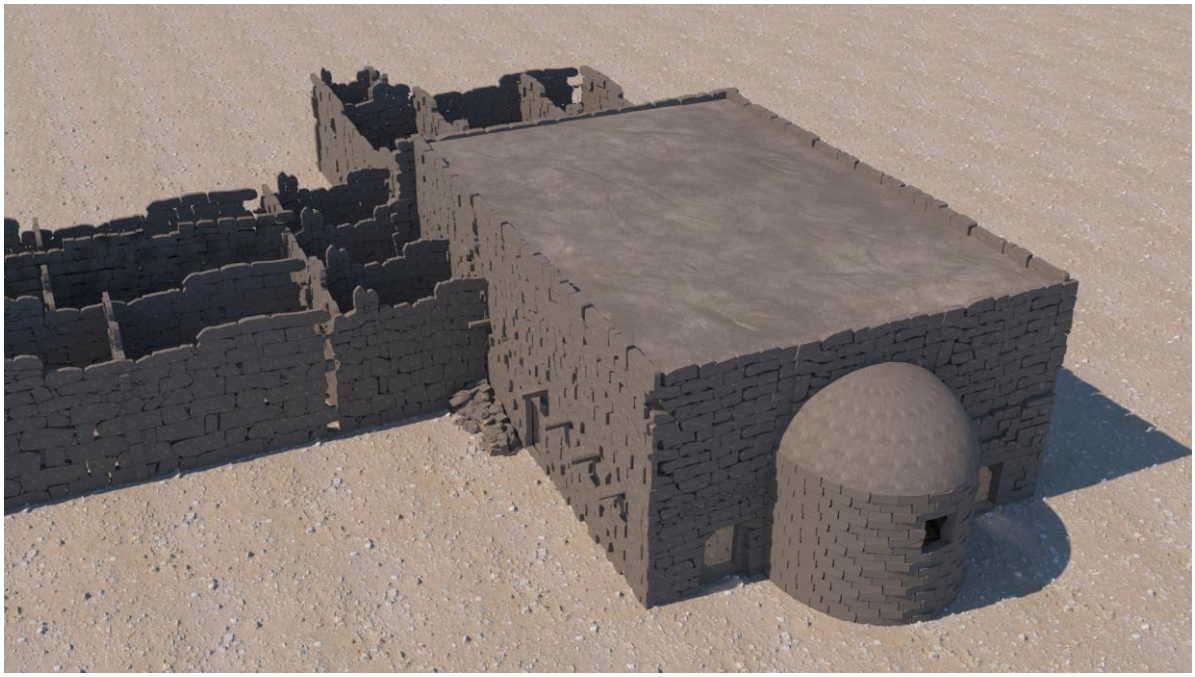


Figure 72: 3D perspective presents the bird's eye view of this church from southeast direction. Showing the roof , apse, neighboring buildings, and doors of the Southwest church. Author.

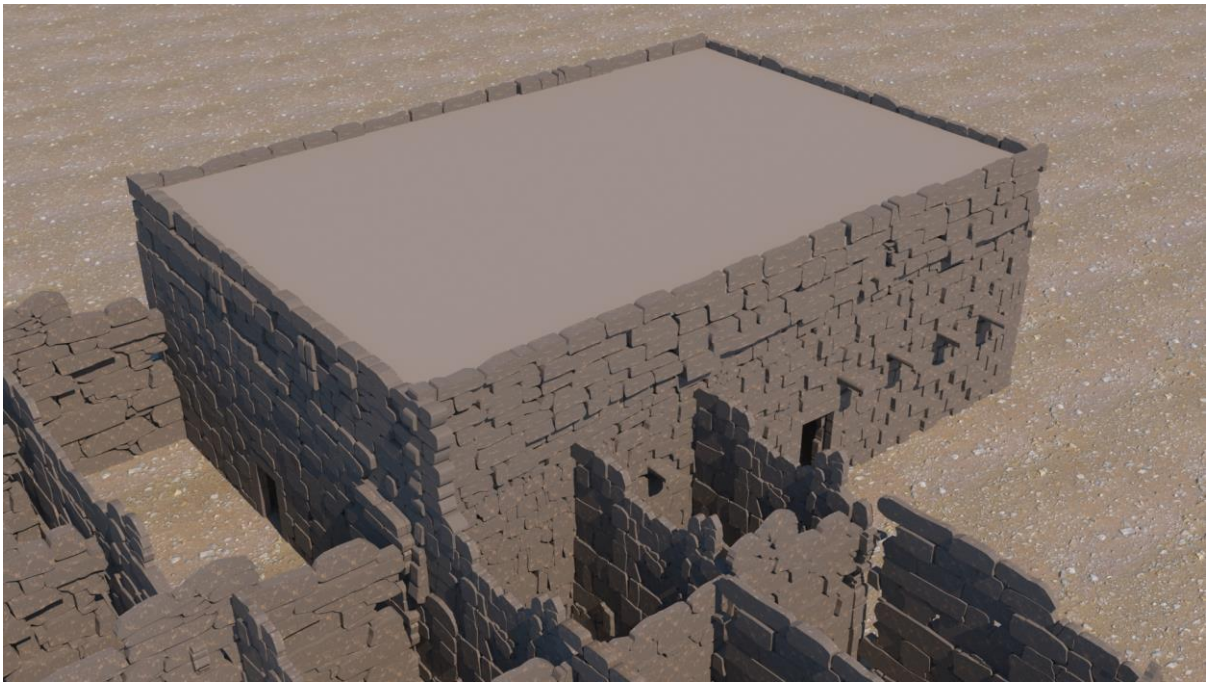


Figure 73: 3D perspective presents the bird’s eye view of this church from southwest. Showing the roof, neighboring buildings, and doors of the Southwest church. Author

This is possibly the use of basalt stone to roof the South West Church on the Nave, and it is visible in the Nave's size. In the Western Church, the width of the nave is greater and therefore the probability of stone is weak and the use of wood is more realistic in calculations of roofing.

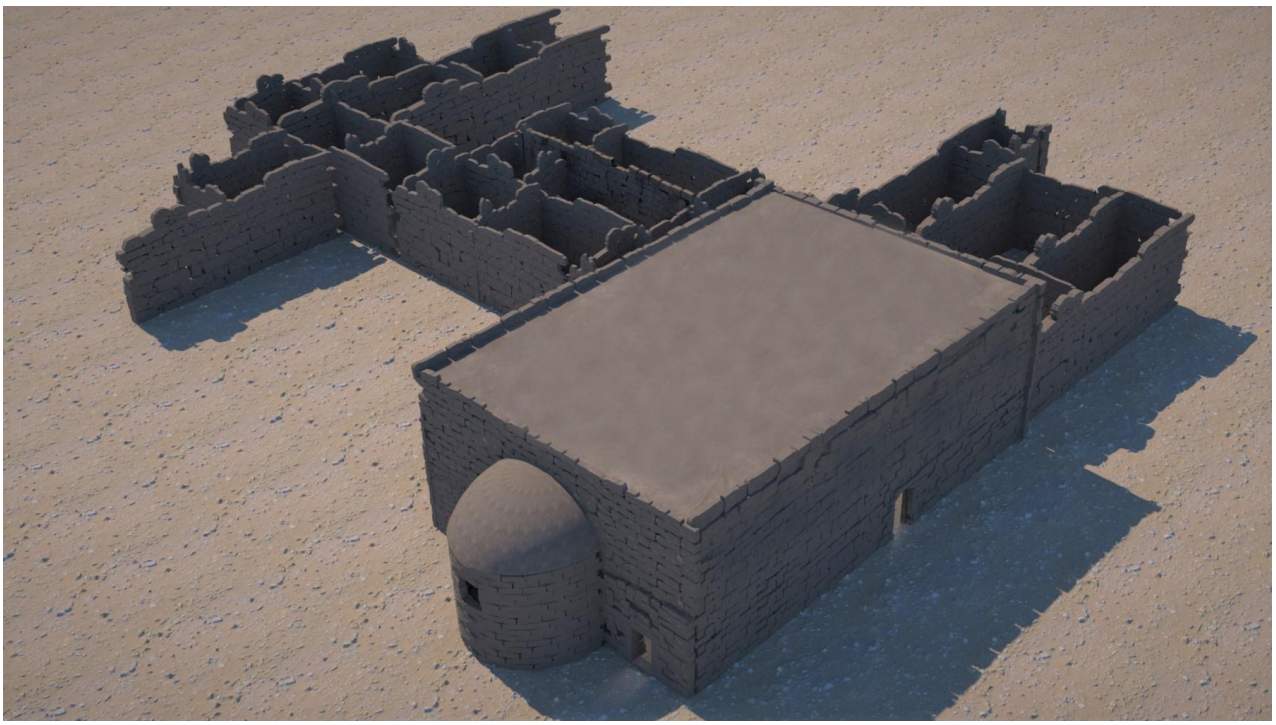
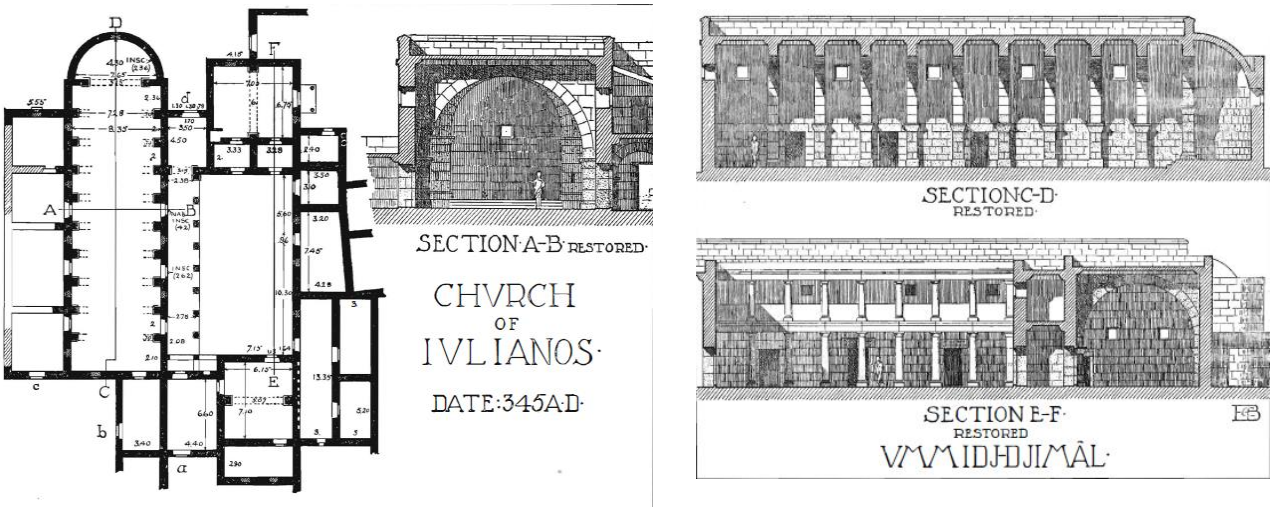


Figure 74: 3D perspective presents the bird’s eye view of this church from Northeast direction. Showing the aps , neighboring buildings, and doors of the Southwest church. Author.

Figure 75: 3D perspective inside the Southwest church showing the original condition of the church. Author.

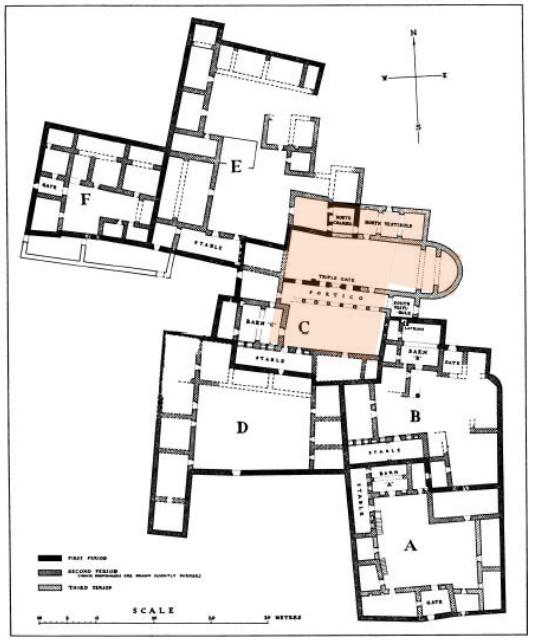
Both the West church and the Southwest church followed the Basilica plan, but Julianos Church followed Hall church plan; therefore, the roofing style is different than the first two examples simply because the church did not have aisles. There have been many studies of this church, but the location itself is the definitive evidence that guides this reconstruction.

Planning, architecture and the presence of the inscription in the church inspired researchers to investigate it. Butler began studying the church and documenting its details. Generally, the Julianos church surrounds buildings on three sides, some of which have been built for it and some not belonging to the church. (Butler, 1913)



Butler Drawings for Julianos church plan and section. (Butler, 1913)

Its boundaries are not easy to trace due to very large debris and poor building condition. But the easiest thing to follow is the simplicity of the design of this church. Walls with trimmed stones and arches emerging from them (its number 10), where the height of the capitals of these columns is at the level of the height of the apse stones. Butler says that the evidence for the existence of Doric columns, their bases, and their capitals led him to the conclusion that the vestibule of the church consists of two floors, as shown in his drawings. As for the ceiling of the church, he concluded that it was a flat roof. (Butler, 1913)



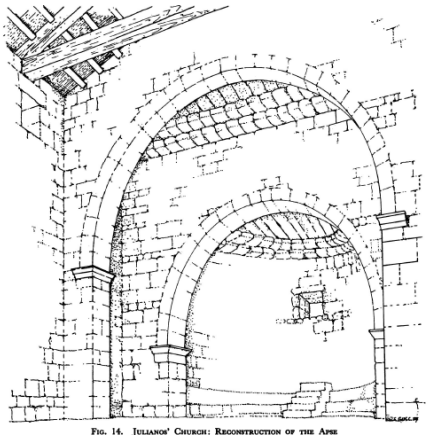


Fig. 14. Julianos' Church: Reconstruction of the Apse

On the left : Corbett's plan for Julianos church and surrounding houses. On the right 3D perspective showing the roof of Julianos church. (Corbett & Reynolds, 1957)

Corbett performed investigations at "julianos' church" at umm-el-Jimal and its goal was to re-examine the evidence for the history of a church building. Corbett deals with this church and the surrounding buildings (five houses). Here we are focused on the house adjacent to the church, which is part of the building as a whole. In general it seems that the church was built as an extension of the house, as evidenced by the difference in the openings in the walls and the difference in its height in the single wall and other evidence, so he concluded that the walls were present and the church was attached to it, and since the three gates in the south wall are parallel to the openings in the northern wall, it is likely that the two walls They were built in the same period and they are also walls of a house and what was built from the church is the eastern part. Corbett said that "the builders of Umm-el-Jemal used their cross-arch and corbel construction as a substitute for vaulting, and not as a substitute for timber. For while they were content to cover the nave with a timber roof they felt that the apse ought to be roofed in stone, and they provided the kind of stone roof that they best knew how to build." The apse of this church is one of the first to be built in the area. The interior of the stairs is covered with plaster, built at least a century after the construction of the eastern half of the nave . The bench and throne may have been from the same period. (Corbett & Reynolds, 1957)

A row of evenly spaced arches cross the nave and support the exterior walls and the thickness of the wall does not exceed one meter, which means that the weight of the roof is not borne by the walls. The ceiling load is distributed over transverse arches, then to walls and pedestals. Thus, it is expected that these arches will support a flat roof; however, it is more likely that it will be a wooden gabled roof covered with ceramic tiles of about 30 * 30 cm in size. These pieces are frequently found in the church ruins (see photo) and are evidence of their existence as part of the roofing. The apse in all previous churches was the circular tilted oval in the church of the southwest.

However, all of them are covered half-domes as most basilica churches Apse roof with one or more openings for lighting (Butler, 1913).

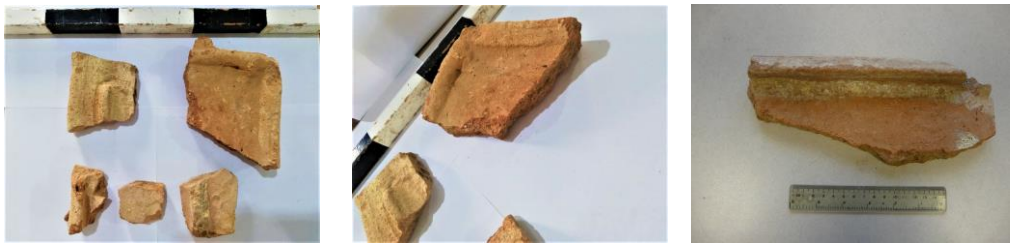


Figure 76: Small pieces of ceramic roof tile are frequently found in the Julianos' church ruins. Author,(the last photo from Archaeological Lab in Michigan)

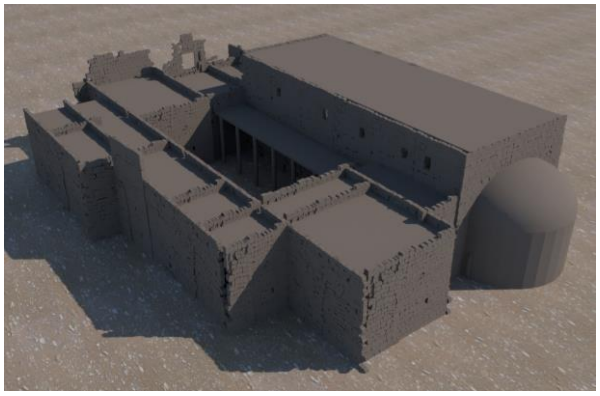


Figure 77: 3D perspective presents the bird's eye view of this church from southeast direction. Showing the apse, neighboring buildings, and openings of the Julianos church. Author

Figure 78: 3D perspective showing the main entrance of the Julianos church from the east. This door leads to a narrow corridor, then to courtyard. Cross carving on the lintel. Author.

Figure 79: 3D perspective showing the courtyard of Julianos church from the south. The doors lead to church hall (nave). A row of columns stand in front of the southern elevation. Author.

The spread of small pieces of tiles on the site now between debris tends to be that the flat roof is not expected to carry them and that the gabled roof is more close to what is present of these churches in Hauran.

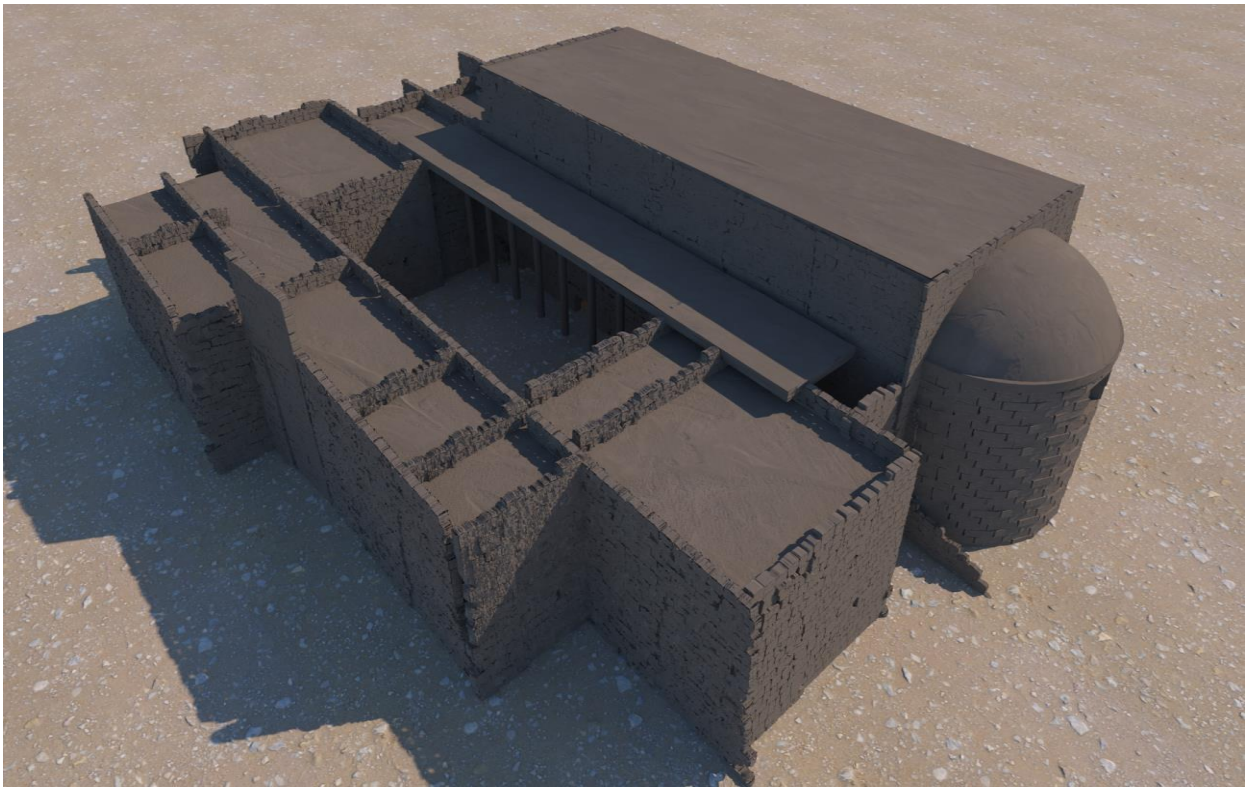


Figure 80: 3D perspective presents the bird's eye view of this church from Eastern West direction. Showing the flat roof, apse, and surroundings of the West church. Author.

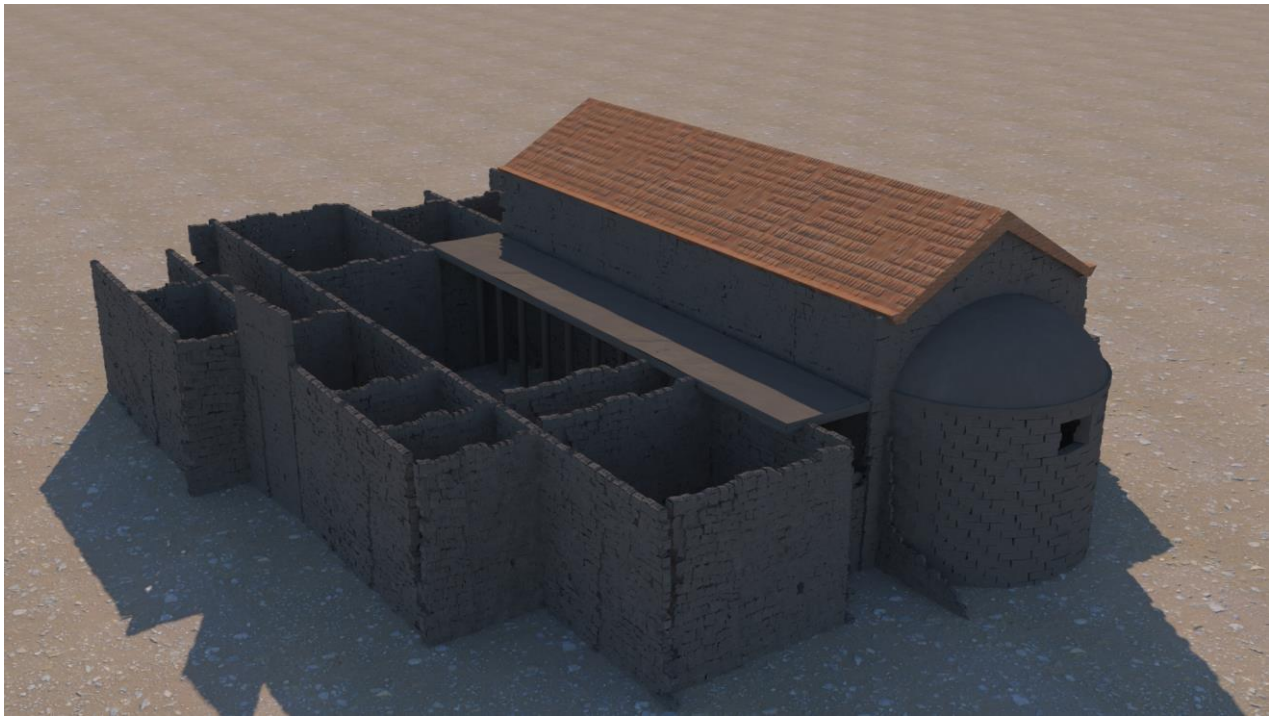


Figure 81: 3D perspective presents the bird's eye view of this church from Eastern West direction. Showing the gable roof, apse, and surroundings of the West church.

Figure 82: Interior shot of the Julianos church showing a set of arches. Author

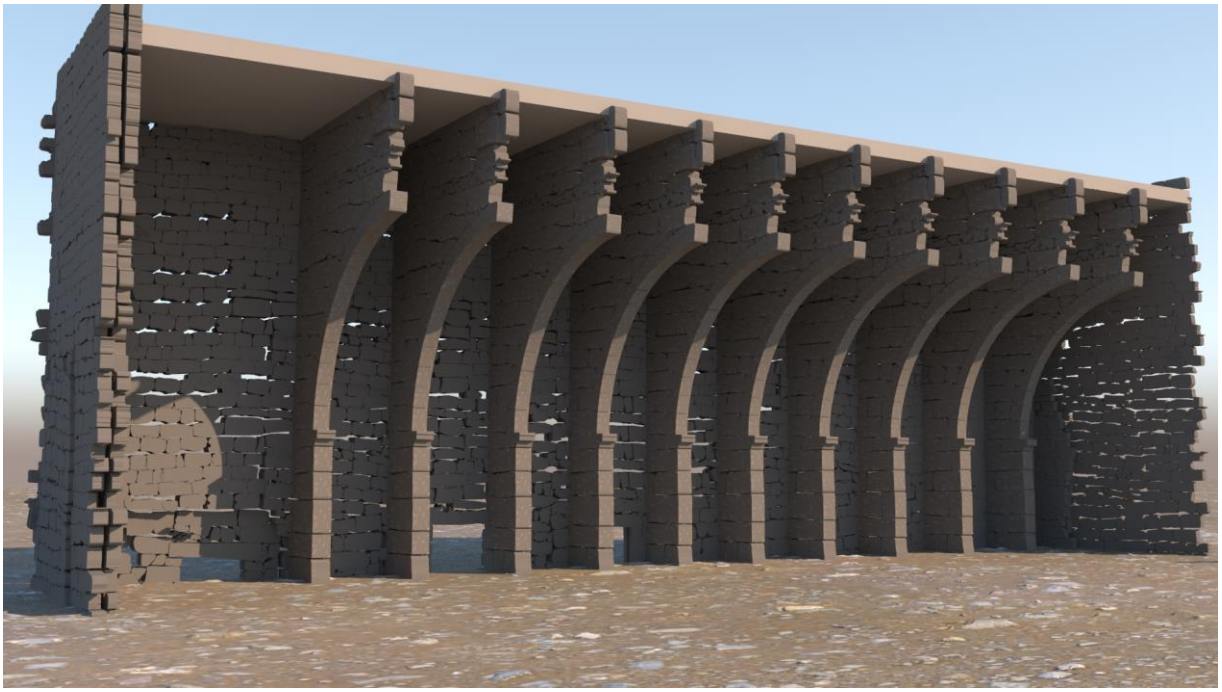
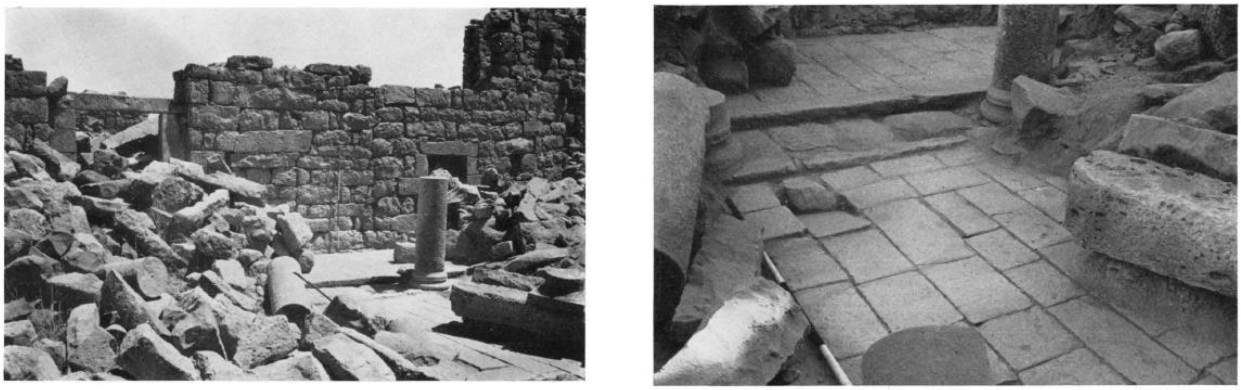


Figure 83: 3D section showing the roof and arches inside the Julianos church. Author

Mosaic floors and their basis are found on these three churches; plaster underlayment in the West Church and smooth floor in the Southwest church. So the greatest possibility is the presence of a number of floors and mosaics on the floors or even the walls in addition to the possibility of the presence of icons. Julianus church is also the same, but the collapse accumulated at the site now makes it difficult to say whether they exist in specific places or even how they are painted. According to previous researches, the roughness of the interior walls and the lack of polishing or pruning of building stones was one of the indications that another layer was placed on top of them. Evidence is clear that wall was plastered and may have had fresco paintings, but none were found..



a. Church: South Façade of Nave

b. Pavement of Courtyard

Figure 84: On th, Left South façade of Julianos nave and on the right pavement of Julianos courtyard. (Corbett & Reynolds, 1957)

5.2. Conclusion

1. The study explored ecclesiastical society and churches, the Umm el-Jimal region and its churches and their specifics, and the essence of the materials used in particular in the building. Specifically, this study situates Umm el-Jimal and particularly, the three churches studied, within the context and time frame of accepted historical theory regarding church architecture. Each of the churches tells its story about their architectural context and therefore their place in UJ society and in detail.

2. Through the study of churches and their patterns and details, three of the archeological site's churches were distinguished, their full dimensions were measured, and all architectural details were mentioned. Thus, the West church, Southwest church and Julianos church have been thoroughly documented providing an accurate historical record for comparison with past and future studies, as well as an update informed by current technological capability. Thus, West church, Southwest church similarly followed the same style of the basilica in terms of aisles and nave and they differed by the presence of an outside apse of the plan and the absence of side rooms for service in Southwest church and its presence in the other church as well, suggesting that the roofing of the West church is gabled -shaped, while the other is a flat surface. These two churches differed from the Julianos church, which followed the hall plan, and the presence of transverse arches that bear the roof, which is likely to be also gabled-shape, as well as the outer apse without service rooms. Many similarities and differences have been documented in detail. Also, the presence of both churches, Julianus and the southwest, between residential context and back to dates and evidence and some noticeable details, we can say that they were built after building what surrounds them. As for the Western Church, it was built on its own and outside the city wall .

3. The analysis provided photographs, two-dimensional and three-dimensional drawings of the site's three churches, and presented computer modeling for each of them, showing their current state and their original state. Comparison of this record with past research and documentation identifies change over time, new capabilities in research and documentation, and identifies potential risk to the structures and site. As a result of using specialized tools and equipment that had not previously existed, the study added some of the details mentioned in this study and sometimes, some details that are available on the site have been corrected, such as one of the doors in the Julianos Church, or the roofing method over another. The digital visualization also gave a model idea to the churches to clarify the image for researchers, which could also be developed in the future The scientific quality of the churches of study in the Umm el-Jimal region has therefore been enhanced for posterity.

4. A conceptual model for the roofing system for each of the churches was produced for the study. Details for each church are discussed creating a hypothecia framework for preservation and future research based on the evidence available and the digital methodology that I used to understand the reconstruction of church roofs. The corbeling system found in the West church and the clearstorey system gives us a high percentage of the assertion that the roof was labeled shape and also the numbers of tiles pieces in the Julianos church and the crossed arches make us feel that the flat roof was not an accurate proposal, either the convergence of measurements of the width of the nave and aisles in the Southwest church and the lack of any evidence that proves to be gabled-shape gives an indication that it is possible that it was actually flat

5. The three churches had different relationships to surrounding buildings, and these were discussed and shown in the plans and reconstructions. This observation comports with the currently accepted narrative regarding Umm al-Jimal that suggests that this community persisted and evolved in spite of, while nevertheless influenced by the empire. The rise of the church and the transformation of existing or addition of new buildings fits documented theory.

5.3. Recommendations

1. Develop and implement a maintenance plan for Umm el-Jimal to preserve the archaeological site in general, including site cleaning and internal effectiveness determination of churches, buildings, military barracks, etc.

2. The site contains 16 churches, some of which are stable and others are in danger of collapse or are full of collapse. The poor conditions have a negative impact on the site, so it is preferable to develop an approach to restore the architectural elements that can be repaired and also to clean up the churches so that they can be explored and appreciated.

3. Conduct a comprehensive study of the archeological site assessment and another detailed study of the rest of the churches. Complete the scientific study of the remaining churches in full detail, as presented in this thesis.

4. When preparing for heritage core rehabilitation and cleaning, planners must investigate the local culture's identity and needs and they must achieve sustainable development.

5. Increasing a sense of belonging to local society can be accomplished through more educational and training programs that enhance the awareness and conservation of cultural heritage.

6. When preparing for heritage core rehabilitation and cleaning, planners must investigate the local culture's real identity and need to achieve sustainable development.

7. Enrich the documentary database created in this thesis for the churches with any details, drawings documentary images or even modeling in the churches ' later years.

8. Highlight the relationships between the archaeological site and the local community and use this as a foundation for maintaining the site.

9. Activate the role of these churches as prayer holy sites from all over the world for current use.

10. Since Umm el-Jimal has undergone collapse many times over the centuries, it is recommended that more effective documentation techniques (such as those used in the thesis) be employed across the cite as these can be used as a reference when reconstruction is necessary.

11. Consider the effect of large numbers of visitors to the site, and provide for necessary services for them and necessary precautions for the protection of Umm al-Jimals churches and the entire site.

Reference

The first century Council of early Christianity, 50 AD. (n.d.).

Abu Aballi, S. S. (2016). Damage Assessment and Reconstruction Model: A Case Study from Umm El-Jimal Archaeological Site, Jordan. *MA Thesis, Hashemite University*.

Abukhafaja, S. (2000). Documentation and conservation of the basilica and the chapel at Yajuz.

Al-Bashaireh, K. (2017). "Dating the Cathedral of Umm el-Jimal, Jordan: Inscriptions and Radiocarbon Dates".

Al-shawa, A. (1993). Restoration of an archaeological building Hercules temple in Amman.

Anderson, C. (2013). Renaissance Architecture.

Athanasius. (2004, January). The Church, its building and meaning.

Atroshenko, J. C. (1985). Origins of the Romanesque: Near Eastern Influences on European Art.

Banks, R. J. (1994, February 1). Paul's Idea of Community: The Early House Churches in Their Cultural Setting. p. 248 pages.

Bevan, E. (1938). Symbolism And Belief.

Bradley. , J., & Muller., R. (1995). Church History.

Brown, S. (1993). The Origins of Christianity: A Historical Introduction to the New Testament.

Brubaker, L. (1985). Types of Churches. *Dictionary of the Middle Ages ol 3, ed Joseph R. Strayer*, pp. 378-82.

Bujard, J. e. (1992). Les Egises Geminees d'Umm er-Rasas. pp. 291-301.

Butler, H. C. (1913). "Architecture. Syria," Publications of the Princeton University Archaeological Expedition to Syria (Div. II, Sect. A, part 3. Umm Idj-Djimal, Leyden).

Butler, H.C. 1929, “Early churches in Syria: Fourth to seventh centuries. Part 1-2 i 1 bind”
Amsterdam: Hakkert.

C. Mango. (2018). Byzantine Architecture.

Cabanne, P. (2013). L'art classique et le Baroque Broché .

Carbonara, G. (2011). " An Italian contribution to architectural restoration".

Clark, D. L. (2007, March). Viewing the liturgy: a space syntax study of changing visibility and accessibility in the development of the Byzantine church in Jordan.

Conant, K. J. (1992, December 4). Carolingian and Romanesque Architecture, 800-1200 (The Yale University Press Pelican History of Art).

Corbett , G., & Reynolds, J. (1957). Investigations at "Julianos' Church" at Umm-el-Jemal. *Papers of the British School at Rome, Vol. 25*.

Cormack, R. (2018). Byzantine Art.

Carbonaran, Giovanni,2012, An Italian contribution to architectural restoration, Frontiers of
Architectural Research 1, 2–9.

Davies, J. G. (1952). The origin and development of early Christian church architecture.

DeVries, B. (1979). Resaerch at Umm el Jimal ,Jordan 1972-1977 Biblical Archaeological 42(1): 49-55.

DeVries, B. (2016). Archaeology for the Future at Umm el-Jimal: Site Preservation, Presentation, and Community Engagement.

Doughty, C. (1979). Travels in Arabia Desarta Vol 1.

Dunn, M. (2003, March 7). The Emergence of Monasticism: From the Desert Fathers to the Early Middle Ages .

Ehrman, B. D. (1997). The New Testament: A Historical Introduction to the Early Christian Writings.

Elliott, T. (1996). The Christianity of Constantine the Great.

Elsner, J. (1998). Imperial Rome and Christian Triumph: The Art of the Roman Empire AD 100-450.

Elwell , W., & Comfort , P. (2001). Tyndale Bible Dictionary.

Filson, F. V. (1939, June). The Significance of the Early House Churches.

First Council of Nicaea. (n.d.). *May to August A.D. 325*.

First Council of Nicaea . (n.d.). *May to August A.D. 325*.

Fletcher , B. (1905). A history of architecture on the comparative method.
Forsyth, Michael, (2007), Structure and Construction in Historic Building Conservation, Black well publishing, U.K., pp. 2, 6, 65–68,211–224.
Haight, R. D. (2004), September 16). Christian Community in History Volume 1: Historical Ecclesiology.
Hale, J. R. (1971). Renaissance Europe, 1480-1520, (The Fontana history of Europe).
Holt, A. (2011, November). The Encyclopedia of Christian Civilization, Chapter: Byzantine Christianity.
Honde, E. (1966). East of Jordan , Jerusalem.
J.A.Hamilton. (2018). Byzantine Architecture and Decoration.
John Louis Petit. (1841). Remarks on Church Architecture .
Johnson , M. J., Ousterhout , R., & Papalexandrou , A. (Eds.). (2012). Approaches to byzantine architecture and its decoration, studies in Honor of Slobodan Curcuc ,.
kimball, F., & Edgell, G. (1972). History of Architecture.
King, G. (1982, July 22). Byzantine and islamic sites in northern and eastern jordan.
Krautheimer, R. (1975). early christian and byzantine architecture.
Komechak, Michael, (1982). "Historical Perspective", Building and Renovation Kit for Places of Catholic Worship, Archdiocese of Chicago, page 9.
Mansbridge, J. (1967). Roman basilica and early christian churches, Graphic History of Architecture.
Mayerson. (1985). The wine and vineyards of Gaza in the Bysantine period.
Merrill, S. (1981). East of Jordan: a record of travel and obsarvation in the country of Moab, Gilead and Bashan.
Michael Whitby, e. a. (2006). Christian Persecution, Martyrdom and Orthodoxy.
Negev, A. (1986). churches. *Archaeological Encyclopedia of the Holy Land.*, pp. 86—9.
Negev, A. (1989). The church of the central negev : An archaeological survey.
Pena, I. (1997). The Christian Art of Bysantine Syria. p. 70.
Pergola, P. (2002). Christian Rome: Past and Present: Early Christian Rome Catacombs and Basilicas.
Perkins, J. B. (2013, August 09). Constantine and the Origins of the Christian Basilica.
Purdy, Martin (1991). Churches and chapel a design and development guide, pages 11-38.
Qaqish, R. (2007). " عمارة الكنائس وملحقاتها في الأردن في العهدين البيزنطي والأموي".
R.Bagnall. (2012)). The Encyclopedia of Ancient History.
Rodney Stark. (1997, May 9). The Rise of Christianity. HarperCollins.
Richard A. Muller, James E. Bradley.(1995). Church History.
Scully, V. (2013). The Earth, the Temple, and the Gods: Greek Sacred Architecture.
Snyder, G. F. (2003). Ante Pacem: Archaeological Evidence of Church Life Before Constantine.
Stark, R. (1997, May 9). The Rise of Christianity: How the Obscure, Marginal Jesus Movement Became the Dominant Religious Force in the Western World in a Few Centuries.
Thomas, J. A. (1994). Theory, meaning and experience in church architecture/ PHD.
trimingham, J. (1979). Christianity among the Arab in Pre -Islamic times.
UJAP. (2014). *The Umm el-Jimal Project.*
UJAP. (2015). *The Umm el-Jimal Archaeological Project Churches Brochures.* Umm el-Jimal: The Umm el-Jimal Archaeological Project.
Vries, B. D. (1972-1981). Umm el Jimal – A frontier town and its landscape in northern Jordan.
Vries, B. D. (1985). Urbanization in the Basalt Region of North Jordan in Late Antiquity: The Case of Umm el-Jimal. Studies in the History and Archaeology of Jordan .
WALCOTT, M. E. (1861). Church and Conventual Arrangement. *With copious references, a complete glossary, and an index.*
Williams, R. L. (2005). Bishop Lists: Formation of Apostolic Succession of Bishops in Ecclesiastical Crises. p. 6.

المراجع العربية

خضر, جورج وآخرون (1981) المسيحيون العرب , دراسات و مناقشات.

زيادين, فوزي (1982) .الحفريات الاثرية" حوليات دائرة الاثار العامة.

حداد, ديار (1991) كنائس مدينة أم الجمال دارسة مقارنة مع كنائس بعض مواقع المنطقة الشمالية الشرقية من الأردن, رسالة ماجستير, , جامعة اليرموك, الأردن.

حجار, عبدالله (1994) كنيسة القديس سمعان العمودي : أثار جبلي سمعان وحلقة.

خميس, سامح فؤاد (1995,May) الكنائس البيزنطية المركزية في الاردن.

الحديدي, عدنان (1996) الاردن و فلسطين; تاريخ و حضارة.

الحصان, عبد القادر محمود (1999) محافظة بالمفرق و محيطها عبر رحلة العصور, عمان – الارز.

الحصان, عبد القادر محمود (2001) , حوليات دائرة الاثار العامة, النتائج الاولية للتنقيبات الاولية في المفرق, عمان.

بسام, كارولين (2010) أثر مواد البناء ونظم الانشاء في تطور الفراغ المعماري لابنية الكنائس في سوريا.

اسعد, ليال (2011) الثوابت و المتغيرات في عمارة الكنائس الارثودوكسية في بلاد الشام.

المديرية العامة للاثار والمتاحف (2012, March 4) عمليات التنقيب في كنيسة أم الزنار في حمص.

أبوعلي, يوسف (2012) تطوير موقع أم الجمال الأثري وتسويقه سياحيا, رسالة ماجستير, جامعة مؤتة, الأردن.

حداد, موفق ابراهيم (2014), البناء بحجر البازلت في البادية الشمالية االردنية دراسة معمارية وتراثية لمدينة أم الجمال التاريخية.

أسامة, علاء الدين (2017, Oct 31) تاريخ العماره منذ فجر المسيحيه.

Website links references

(1) https://en.wikipedia.org/wiki/Architecture_of_cathedrals_and_great_churches

(2) https://www.pitt.edu/~medart/menuglossary/atrium.htm

(3) https://www.beliefnet.com/columnists/stuffchristianculturelikes/2010/04/149-calling-the-lobby-the-narthex.html

(4) https://www.fisheaters.com/churchbuilding.html

(5) https://romanchurches.fandom.com/wiki/Aisle

(6) https://quizlet.com/45408325/test

(7) https://commons.wikimedia.org/wiki/File:Old_St_Peters_Basilica_plan.png

(8) http://www.planetgast.net/symbols/floorplan/floorplan.html

(9) https://www.scmp.com/news/world/middle-east/article/3006976/war-torn-syrias-qalb-lozeh-village-church-inspired-notre

نموذج للعمارة الكنّسية المحلية في الأردن ، دراسة مقارنة لثلاث كنائس في أم الجمال

إعداد
ميس فهمي حدّاد

المشرف
الدكتور جودت سالم قسوس

المشرف المشارك
الاستاذ الدكتور بيرت دي فريز

الملخص

أم الجمال، الجوهرة السوداء ، مدينة كاملة متكاملة ، احتضنت مجتمعات وحضارات متعددت تعاقبت عليها ، تركت محتوى ذو قيمة أثرية ومعمارية متميزة و متفردة. تفنن الأسالف في تكوين وتشكيل هذه الإبداعات. المجتمع الكنسي و جميع مكوناته, المنازل ذات الطوابق المتعددة ، الأسواق و الثكنات العسكرية ، دار الولاية و غيرها من التحف المعمارية التي اجتمعت معا لتنسُج مدينة أم الجمال.

تناول البحث الجزء الكنسي و الفترات المسيحية (البيزنطية تحديداً) التي مرت على تاريخ أم الجمال بما في ذلك الفن المعماري و الأساليب الإنشائية التي أبدع المعماري في تنفيذها باستخدام المواد والتقنيات المتوافرة بطريقة جيدة مع الحفاظ على إظهار جماليتها المعمارية والاستفادة من المواد الطبيعية التي كانت تشتهر بها البلاد . تعد كنائس أم الجمال ذات قيمة فريدة من نوعها ،عددها ست عشر كنيسة، حجارتها السوداء ، دقتها وتكاملها، تشابهت في خصائص و صفات و اختلفت في اخرى . تعمق البحث في دراسة تفصيلية و تحليلية لثلاث كنائس; الكنيسة الغربية و الكنيسة الجنوبية الغربية و كنيسة جوليانوس، منها ما هو منفصل بحد ذاته و منها ما هو مكمل لفراغات سكنية .استعرضت الدراسة مجموعة من آراء الباحثين الذين وثقوا المدينة من قبل, بما في ذلك المسوحات الاثرية . وضح البحث ايضاً التفاصيل المعمارية لكل كنيسة من كنائس الدراسة و خصائصها و تم توثيق كل ما هو موجود فيها على أرض الواقع حالياً وتم مناقشة الأسلوب المعماري و الإنشائي لطريقة التسقيف, وقُدِم نموذج مُقترح لكل كنيسة منها باستخدام البرامج الحاسوبية الحديثة.

The diagram below (26) (Figure) represents the methodology framework, followed by a short description of it (Done by author).