AN ARCHEOLOGICAL AND ANALYTICAL STUDY OF VENETIAN CHURCH FLOORS

A Preliminary Qualifying Project Proposal
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Degree of Bachelor of Science By:

Submitted By:

Hilary Lohnes Hayes
James Liu
Christian A Salini
Alexis Steinhart

Sponsored By:

Archeology Superintendence
UNESCO

Submitted To:

Project Advisors:

Professor Fabio Carrera
Professor Guillermo Salazar

On-Site Liason:

Luigi Fozzati

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www.wpi.edu/~jliu0928/venice/
churchfloors@wpi.edu

Authorship

Each member of our project group contributed equally to the writing, revising, and editing of each chapter of this report.

Abstract

The purpose of this project is to identify archeological opportunities for the Archeological Superintendence of Venice. Our sponsor Luigi Fozzati and the Archeology Superintendence supported our efforts in collecting data from the floors and artifacts of the churches of Castello and San Polo. We focused on the condition assessment and collection of information from the floors and artifacts found in the 22 churches studied. We provided a multitude of map info layers using the GIS system MapInfo as well as a complete and detailed database of condition assessment and information about floors and artifacts. The floors and artifacts were evaluated not only as restoration sites but also as historic relics.

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Executive Summary

The history a city contains is one of the greatest gifts it can provide for its inhabitants. There are three main methods of transferring history though generations: through word of mouth, written documentation, and archeology. Each method compliments one and other, however archeology serves as the means to discover the hidden knowledge of a city. Archeology is the study of the history buried beneath the ground in the material evidence left behind by a civilization. This material evidence includes every aspect of a civilization – the tools, crafts, personal belongings, and even human remains. Cataloging and analyzing these remains can provide accurate depictions of the people and events of the past.

The most bountiful excavation sites are those located in the oldest unchanged parts of a city. As most early civilizations revolved around religion, religious structures like churches have great potential as excavation sites. Churches are described as possessing "staying power", that is they almost never change location and the ground they are built on remains undisturbed despite the passage of time. This happens because the grounds that religious structures are built on are considered Holy, a belief that surpasses organized religion into pagan cultures. If a church should require reconstruction or restoration, a new church or a new floor is built directly on top of the old one.

This is a process very familiar to the city of Venice, Italy. For centuries the churches of Venice have suffered damages from a myriad of causes. They have withstood the destruction of mankind, natural disasters, and the progressing deterioration of time. However, the historical information contained in and beneath them has survived the centuries only to now encounter a greater danger of being lost.

Five centuries ago Venice contained approximately 1,000 churches for her 200,000 inhabitants to attend worship. The Venice of today holds only 60,000 people and many of the churches have closed down or have become museums, schools, or other forms of reuse. Many of the churches that remain open have developed into tourist attractions because of the art and history they hold. They have suffered from an increase in damage from foot traffic or other human destruction. Other churches are only open for one daily service, or for a prayer hour without service. Their condition has deteriorated from the neglect of the church administration. The lagoon has also developed into one of the city's largest growing threats. The flooding

caused by the rising tides (*Acqua alta*) has created major problems for the churches (Figure 1). Water has damaged the surface of the floors and deteriorated the foundations of the churches. The rising water table that has collected under the churches throughout the years has the potential to damage and to destroy. It has deteriorated much of the underlying foundations of many churches, causing them to sink. The floors with sinking foundations have suffered stress damages as well as lowered in height, making them more susceptible to flooding.

Figure 1: The Aqua Alta of Venice

To prevent the water from entering the churches or continually damaging the floors from underneath, the church administration has opted throughout the centuries to raise the height of the floor. They accomplished this by building a second foundation on top of the old floor and then adding a new floor, or by laying new floors directly on top of the old one when the church underwent restoration. This layering or stratification of the church floors covered up tombs and other artifacts on the floors, successfully embedding them in the floor layers. Figure 2 shows an example of a 16th foundation that was constructed directly on top of a 12th century floor in la Chiesa di San Zaccharia in Venice. The design on the 12th century floor can still be seen.

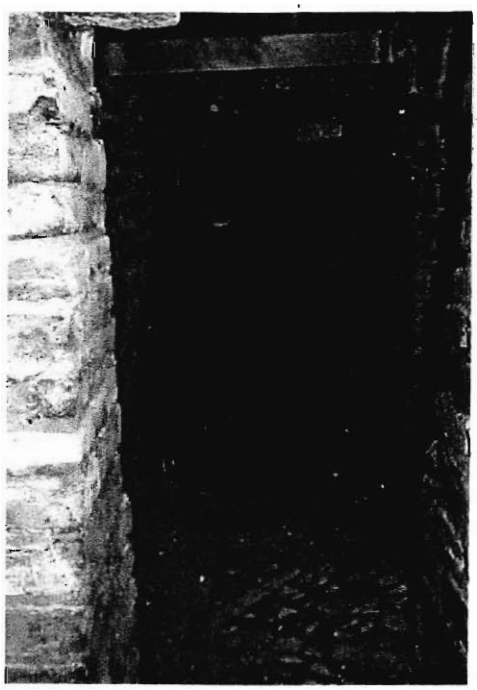

Figure 2: Columns built on a 12th century floor in San Zaccharia

The possibility of information hidden beneath church floors remained hidden in the floor layers until the 1950's. During World War II, the church of San Lorenzo in Venice was partially destroyed by heaving bombing. During the post-war restoration, an abundance of artifacts was found under and in the foundation of the church. As a result the church of San Lorenzo became the first archeological site that the Archeological Superintendence established with the church administration of Venice. San Lorenzo is the church that sparked the Archeological Superintendence's investigations of churches, and is the precedent set for this project.

After the discoveries found at San Lorenzo, the Archeological Superintendence of Venice began locating the churches with high priority as restoration sites. It is only when the church undergoes restoration that the Archeological Superintendence has the opportunity to set up an excavation site. They then can collect and record the information buried in and under the church floors before it is destroyed. In 1966 Venice experienced the highest flood level it had ever seen, which resulted in the destruction of precious artifacts and artwork throughout the city. It drew the attention of the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the organization teamed up with the Archeological Superintendence to promote the preservation of the churches and the history they contain. La Chiesa di San Zaccharia is one example of a successful archeological excavation completed in 1987 by the Archeological Superintendence.

The mission of this project is to facilitate the Archeological Superintendence's search for archeological opportunities. This project is a continuation of a project begun in 2002 by a team of students from Worcester Polytechnic Institute. The 2002 project team explored 22 of the 57 churches in the Cannaregio, San Polo, and Dorsoduro *sestiere* of Venice. They examined the floors and the artifacts on them and recorded descriptions. They also performed condition assessments and measured the elevation of the floor.

The 2003 church floors project begins where the 2002 project ended. We completed examinations of the unfinished churches in San Polo and continued on to evaluate the churches of the Castello region. We then combined our data with the data from the 2002 project to perform a complete analysis of the risk factors and threats the floors and artifacts encounter. We used to the results of our analysis to draw up recommendations for each individual church.

We also analyzed the condition assessments to identify the churches that would be the most likely candidates for restoration in the immediate future. Combining that analysis with our evaluations of the artifacts on the surface and those suspected to be beneath the floor allowed us to flag the churches we considered to be archeological opportunities. We also located the churches that had undergone recent restorations and marked them as missed archeological opportunities. We supplied all of our analysis and conclusions to the Archeological Superintendence.

Finally we examined the designs and engravings on each individual artifact in order to extract their historical information. We created floor plans with the artifacts mapped out and

brief descriptions of their contents or other relevant information for each church. In our database we created queries that allow anyone to search the entries for keywords, names, events, or dates. We hope this information will serve as a foundation for future research for historians, students, archeologists, bibliographers, or any other lovers of the history of Venice.

1. Introduction

From the beginning of mankind, civilizations have developed under the guidance of the religious beliefs of the culture. As a result religious institutions such as churches were the center of many cities and sustained importance to society throughout the centuries. They land they were built upon was considered holy, allowing the buildings and surrounding area to remain undisturbed for hundreds of years. When churches required reconstruction or restoration, their interior and exterior changed while the location and foundation did not. New churches and new floors were built directly on top of the old ones. The result is a collection of history within the churches and the grounds they stand upon that spans the development of the city. This collection of historical information gives churches and their land great potential for archeological study which is the foundation of this project.

The churches of Venice, Italy are among some of the oldest in the world and have the potential to contain vast amounts of history beneath their floors. Venetian churches may contain remnants from their past because their floors are composed of many layers. The floors have been layered one on top of each other in an attempt to raise the level of the church to protect it from a tidal effect known as the *acqua* alta. The rising waters of the lagoon have increasingly deteriorated the foundations of the churches, causing them to sink. This sinking has resulted in decreasing floor elevations at different sections of the church which has distorted the surface and increased the amount of structural and surface damage to the floor. When a new floor is constructed upon the old floor to counteract this effect, any artifacts on the old floors are covered up and trapped within the floor layers. As a result, the overlaying or reconstruction of the floors has possibly concealed a significant portion of the history of Venice beneath the current floor or foundation.

Over the past year, the Archeological Superintendence and students of the Worcester Polytechnic Institute have collaborated to create a database containing information focusing on the current church floors and the artifacts on them. The 2002 project team examined the floors and artifacts in 22 churches of the Cannaregio, Dorsoduro and San Polo *sestieri* of Venice. They recorded detailed descriptions of the different elements of the floors and entered their locations into a geographic information system. The team then assessed the condition of the floors and artifacts through a rating system, which was based on structural and surface damage affecting the

church. They used the results of their condition assessment to speculate upon the causes of damage and solutions to those issues.

This year's project team continued the 2002 project, yet redeveloped it to include an in-depth analysis of the archeological potential of the churches they examined. The project team expanded the study area to include the churches of Castello and to complete the San Polo sestieri. Significant improvements were made in the data collection to further document the floors and artifacts in each church. More detailed assessments were performed to provide more accurate depictions of the conditions of the floors and artifacts in each church. A supplementary collection of data documenting the variation in floor elevations was completed to provide additional information to analyze. In addition, the artifacts were closely examined in an attempt to discover the history hidden in them.

Our detailed data collection of elevations, condition assessments, and artifact information provided a basis to evaluate the potential of the churches of Castello and San Polo as archeological opportunities. We identified the churches with the greatest potential to become excavation sites if they should undergo restoration, as well as identified the churches that we considered to be missed opportunities. In addition we have conducted an in-depth analysis of the causes of surface damage to the floors of Venice. We proposed plausible solutions for each individual church and delivered our recommendations to each church at the completion of our project. The final goal completed by our project team was the emphasis of the importance of interpreting the information from the artifacts in the churches. Through close examination of the church archives and translation of the inscriptions on the inlaid tombstones and plaques set in the floors, we provided historical information about the people and events of past Venice. The history contained in the floors of the Venetian churches supplies invaluable information to the Archeological Superintendence as well as museums, historians, biographers, genealogists, and the general public.

2. Background and Literature Review

For centuries the churches of Venice have suffered damages from a myriad of causes. They have withstood the destruction of mankind, natural disasters, and the progressing deterioration of time. Throughout the history of Venice, the location of the churches never changed. If a church required reconstruction or restoration, a new floor or church was built on the same site because that ground was considered holy. Therefore the churches of Venice are said to possess "staying power". They are some of the oldest buildings in Venice and the grounds they are built on have remained undisturbed.

In addition to these causes of damage, the churches of Venice are now encountering new risk factors. Five centuries ago Venice contained approximately 1,000 churches for her 200,000 inhabitants to attend worship. The Venice of today holds only 60,000 people and many of the churches have closed down or have become museums, schools, or other forms of reuse. Many of the churches that remain open have developed into tourist attractions because of the art and history they hold. They have suffered from an increase in damage from foot traffic or other human destruction. Other churches are only open for one daily service, or for a prayer hour without service. Their condition has deteriorated from the neglect of the church administration.

Finally, the lagoon has developed into one of the city's largest growing threats. The flooding caused by the rising tides has created major problems for the churches. Water has damaged the surface of the floors and deteriorated the foundations of the churches. The rising water table that has collected under the churches throughout the years has the potential to damage and to destroy. It has deteriorated much of the underlying foundations of many churches, causing them to sink. The floors with sinking foundations have suffered stress damages as well as lowered in height, making them more susceptible to flooding.

After the massive flooding in 1966, The United Nations Educational, Scientific and Cultural Organization (UNESCO) began to promote the preservation of the churches and the history they contain. They discovered that for years the solution of the church administration to the problem of damaged floors was to construct new floors and foundations on top of the old ones when the church underwent restoration. This layering or stratification of the church floors covered up tombs and other artifacts on the floors, successfully embedding them in the floor layers. The response from the Archeological Superintendence of Venice was to begin locating

the churches with high priority as restoration sites. It is only when the church undergoes restoration that the Archeological Superintendence has the opportunity to set up an excavation site. They then can collect and record the information buried in and under the church floors before it is destroyed.

The objective of this background is to establish a firm connection between the church floors of Venice, archeology, and the preservation of a city's history. We will do so by examining the church floors: their layouts, styles, materials, foundations, construction techniques and restoration techniques. Understanding the building process of church floors will help us identify the types of artifacts that could be contained in them and their resistance to the effects of water. We will then describe the architectural styles, their correlating time periods, and the burial practices of the Catholic religion. This information will provide insight into specific types of relics in specific areas of the church.

Although they are located in Italy, the Catholic churches of Venice and the ground they stand upon are property of the Vatican. As the Vatican City and Italy are two separate entities, the churches and their administration are not subject to Italian Law. However as our project is governed by both powers, we examined the church administration, archeological regulations set up by the Italian government, and the organizations that enforce them. We enhance our background by discussing the origins of the promotion of preservation of history in Venice by UNESCO and their relationship to the Archeological Superintendence.

2.1. Archeology

Simply stated, archeology is the study of fact. These facts are buried beneath the ground in the material evidence left behind by a civilization. Material evidence includes every aspect of a civilization, the tools, crafts, personal belongings, and even human remains. Archeologists set up excavation sites and carefully dig up and examine anything found in the ground. The information they collect provides a window to the past that allows the general public to view the cultural heritage of places, events and people.

Archeology is broken down into many fields of study. The two central archeological fields of study that concern our project are salvage archeology and restoration archeology. Salvage archeology handles the preservation of specific archeological sites to prevent destruction or loss from unforeseen problems. Salvaging specifically relates to our project because the

churches of Venice have the potential to contain artifacts and history beneath their floors. One of the goals our project team completed was locating the churches with multiple floor layers and assessing the possibility of embedded artifacts.

The second central field of archeology that is integral to our project is restoration archeology. Restoration archeologists attempt to restore artifacts or sites to their original appearance in order to present the purpose and history behind a particular artifact or site. This form of archeology concerned the current floor designs and the tombstones and inlaid plaques visible on the surface. Much of the information located on the surface of the floor is also in danger of being lost. The second goal our project team completed was to identify the artifacts requiring restoration to preserve their historical value. We also considered the possibilities of destroying or losing these artifacts during the restoration process the church undergoes.

2.1.1. Archeological Regulations in Italy

Before arriving in Venice, our team researched the laws and regulations governing our project. Italian Laws regarding archeological studies and artifact recovery are very similar to those of the United States. There are 73 articles[1] dictating regulations regarding the protection of the historical value of any material, movable or immovable, older than 50 years.

The Ministry of Culture Activities and Treasures enforces these laws; it is responsible for granting authorization to private groups to conduct archeological studies and to preserve any objects uncovered on the floors. The regional superintendents make official inspections of architectural sites to determine the existence and condition of any artifacts subject to their law. Any findings are state property by law and must be reported to the regional superintendent. The law also prevents demolition, removal, modification or restoration of identified artifacts without express written consent from the Ministry of Culture.

The Ministry of Culture verifies the preservation and protection of all findings in Venice. The superintendent is capable of enforcing any provisions of these laws as necessary, and at the owner's expense. If proper care can not be provided, the artifact may be purchased in partial or completely by the state to see that these laws are enforced. Violations of these laws result in the

[1] Law # 1.6.1939 n.1089

offender paying for any damages incurred on the materials subject to these laws. This individual or individuals may then be prosecuted through the Italian penal code.[2]

2.1.2. Archeological Superintendence

As previously mentioned any archeological study that relates to art or archeology in Italy falls under the jurisdiction of the Ministry for Culture. The Ministry now consists of eight different departments. The departments, as reconstructed in February 2001, are the *Archivi* (archives), *Lo Sport* (Sport organizations), *Biblioteche e Istituzioni Culturali* (libraries and cultural institutions), *Beni Paesaggistici e Architettonici* (architectural and landscape treasures), *Spettacoli dal Vivo e Cinema* (live theaters and movies), *Arte e Architettura Contemporanee* (contemporary art and architecture), *Beni Storico - Artistici* (historical and artistic conservation and protection), and the *Archeologia* (archaeology). Figure 3 shows the structure of the present day Ministry of Culture. Our project falls under the jurisdiction of the department of *Archeologia*.[3]

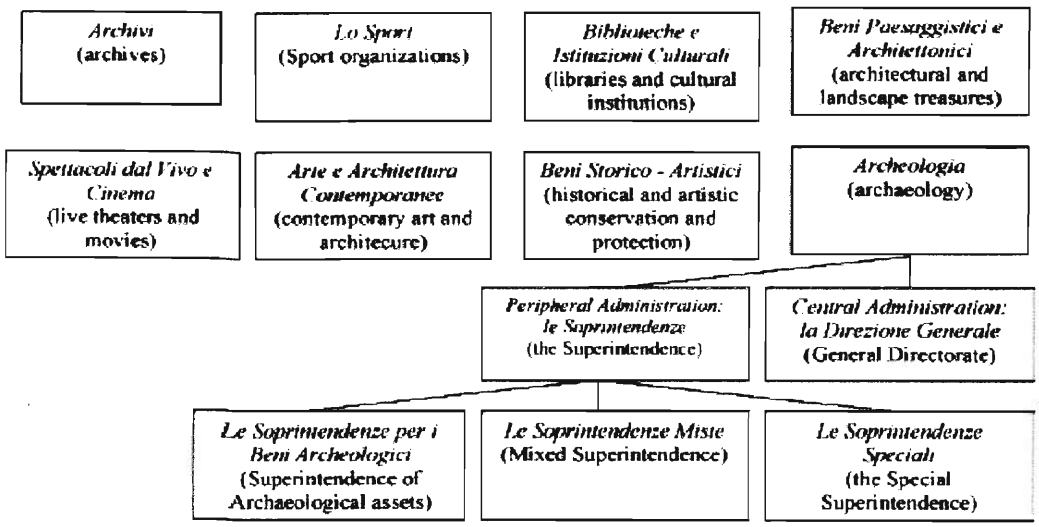

Figure 3: Structure of Present Day Ministry of Culture

The department of *Archeologia* is divided into two separate administrative bodies, the Central Administration and the Peripheral Administration. The Central Administration contains *la Direzione Generale*, the General Directorate, which currently deals with the financial and

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[2] Delaive, Amanda. Kristant, Elaine. Petrowski, Craig. Santos, Luiz. "The Church Floors in Venice, Italy: An Archeological Study and Analysis" An Interactive Qualifying Project for Worcester Polytechnic Institute, 2002.

[3] Supervisory Offices for Architectural and Landscape Treasures <http://www.ambiente.beniculturali.it/eng/index_eng.html>. (06 April 2003).

professional aspects of the Archeology department. The General Directorate has four *Servizi* (services) of management which are

SERVIZIO I - Affari generali, personale e bilancio

(general transactions, staff and budget)

SERVIZIO II - Documentazione dei Beni

(documentation of the assets)

SERVIZIO III -Tutela e Conservazione dei beni

(protection and conservation of assets)

SERVIZIO IV - Musei e parchi archeologici

(archaeological museums and parks)[4]

The Peripheral Administration holds *le Soprintendenz*e, or the Superintendence, which relies on the services provided by the General Directorate to organize its functions. The Superintendence has multiple offices for different regions in Italy. Each office has three departments which define the function of the Superintendence. The largest and most important department is the *Le Soprintendenze per i Beni Archeologici* (Superintendence of Archaeological assets), which deals directly with the preservation and management of the many different archeological aspects in Italy. The remaining two Superintendence's, *Le Soprintendenze Miste* (Mixed Superintendence) and *Le Soprintendenze Speciali* (The special Superintendence), manage the museums, landscapes and other aspects that are not covered by the *Le Soprintendenze per i Beni Archeologici.*[5]

2.1.3. UNESCO

On November 4, 1966 Venice recorded the highest flood level it had ever experienced. The height of this flood reached 1.94 meters above sea level as recorded at Punta Della Salute. The resulting destruction was incredible; many precious works of art and buildings were destroyed or lost. The Venetians realized that the damage from the flood was only part of the overall problem; the real dilemma was the

Figure 4: Acqua alta, high tides, in Venice

[4] MBAC – Ministero per i Beni e le Attività Culturali. <http://www.archeologia.beniculturali.it>. (06 April 2003).
[5] *Direzione Generale per i Beni Archeologici.* <http://www.archeologia.beniculturali.it/>. (19 April 2002).

compilation of numerous issues that spurred from tide erosion over hundreds of years.[6]

The disastrous effects of floods on the city brought the problems in Venice worldwide attention. By the end of November, UNESCO (The United Nations Educational, Scientific and Cultural Organization) had taken responsibility for safeguarding Venice upon request from the Italian representatives. With the alliance of UNESCO, Italy began to stimulate public and private interest in the restoration and preservation of Venice. UNESCO and its member countries worked as supervisors to manage programs and projects that were set up by private organizations.

UNESCO is actively involved with the Archeological Superintendence in the location and restoration of various archeological artifacts in churches. Previous UNESCO sponsored projects served as valuable sources of information to our team. The previous project completed by the 2002 project team proved to be a valuable asset that helped us uncover information about the preservation and restoration of church floors.

2.2. Church Floors and Archeology

Until the discoveries associated with the restoration of the church of San Lorenzo, church floors had been overlooked by the archeological community. San Lorenzo opened their eyes to the possibility of hidden treasures within the church floor layers and foundations. The church remains today the site of a major archeological dig, which has driven the development of our project. Many churches in Venice have been damaged by either natural disaster or human interference and our findings flagged many of them as potential archeological sites.

For our project, an understanding of the structure of Venetian church floors and the materials that make up the floor was necessary. The layers of the floors and foundations of the churches of Venice possess a multitude of construction techniques and materials. Each floor style and layout corresponds to a specific time period and architectural style that reflects the type of artifacts set in them. Many of the older styles and layouts from previous time periods have been covered with more modern styles from the time periods of the renovations. The following sections will explore the different styles and layouts of Venetian church floors, as well as the types of materials used for the floor and foundation.

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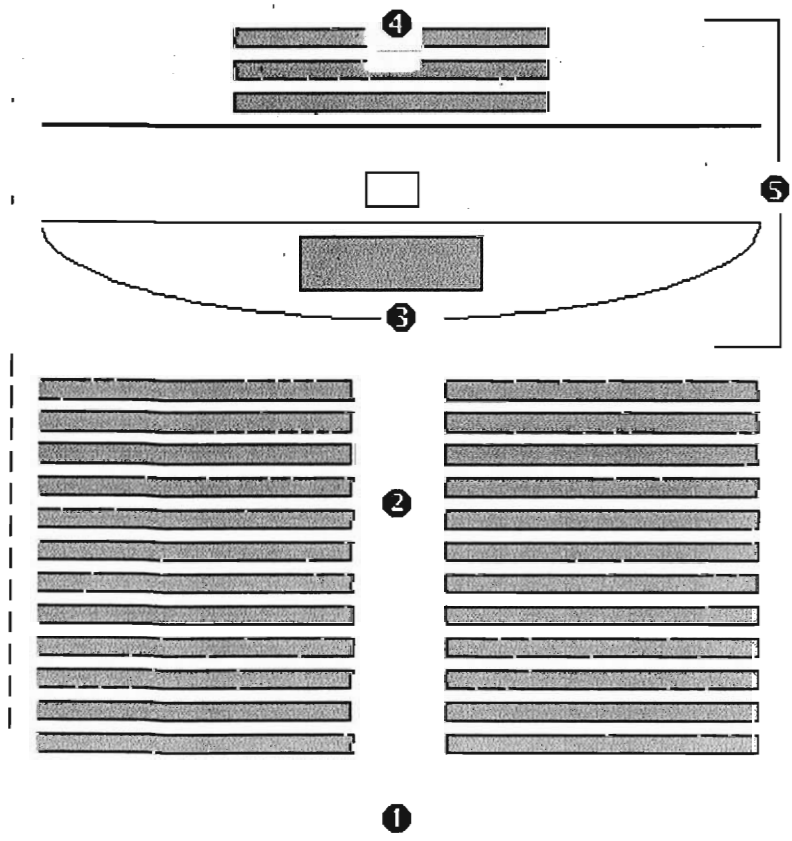
[6] United Nations Educational, Scientific and Cultural Organization website. n.d. <http://www.unesco.org/> (4 April 2003).

2.2.1. Typical Floor Layout

The churches of Venice cover large areas of terrain that are sectioned off in respect to the holy beliefs of the Catholic religion. Each church has is a specific layout and shape that determines the areas for worshiping, sections for the congregation, and the possible locations of the tombs and plaques. With this in mind, the layout of the church floors is significant to studying and excavating the artifacts found on and in the church floors.

Roman Catholic churches are traditionally laid out according to the historic floor plan style as shown in Figure 5. The historic floor contains a pulpit for the clergy, a lectern for the laymen, and three main sections of floor. Each section possesses its own reason to be studied. The nave is the area in which the congregation sits and kneels during a service. This area is the largest section in a church, and also the most accessible to the general public. Most of the wear and tear caused by people occurs on the floors in this area. The narthex is also at high risk for damages because it is the entranceway into the church. It is where the most foot traffic occurs and is also the area most often subjected to the tides.



1. Narthex
2. Nave
3. Altar
4. Apse
5. Sanctuary

Figure 5: Church floor plan layout

The sanctuary, located at the front of the church, is considered the most holy part of the church. As it is the site of many of the church's ceremonies and religious practices, this area contains the most significant and elaborate artifacts and relics. A step usually separates this area from the nave; the height difference signifies the superiority of the priests and church leaders over the laity. This height is usually elevated by steps leading up to the altar. In most churches the steps are found in a multiple of three so as to signify the Holy Trinity. Also called the chancel, this sanctuary includes the lectern, pulpit, apse and altar. The altar serves as the boundary between the laymen and the priests and deacons and is located in the center of the sanctuary. Originally altars were the tombs of martyrs, therefore may be nearby engravings and inscriptions. The apse is the wall of the church located at the back of the sanctuary. It is also called the "east wall" because it faces the holy city of Jerusalem.

2.2.2. Venetian Church Styles

Every church is built in a certain style according to the time period it was constructed in. The churches of Venice have three main styles: Northern European, Byzantine, and Romanesque. Each style has its own unique features and floor layout. Although churches were built to be a certain style, some churches may have undergone reconstructions that would change the style of the church.

The original and oldest style of churches in Venice was Northern European. This is the simplest of the three styles. It contains a flat outside wall with its chapels "inscribed". An example of this is found in the floor plan of S. Marco in Torcello, which is shown in Figure 6. As illustrated by this picture the chapels and apse are within the rectangular flat walls of the church.

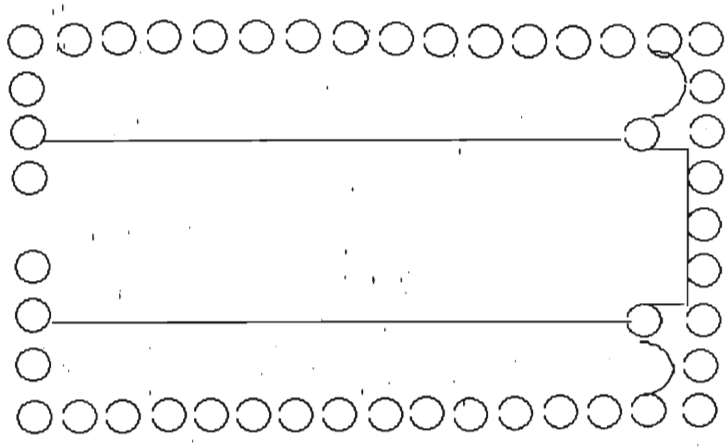


Figure 6: Floor plan of S. Marco in Torcello

After the Northern European style the Byzantine style emerged. This style brought about the side chapels as illustrated in Figure 7, the church of Santa Maria Formosa.

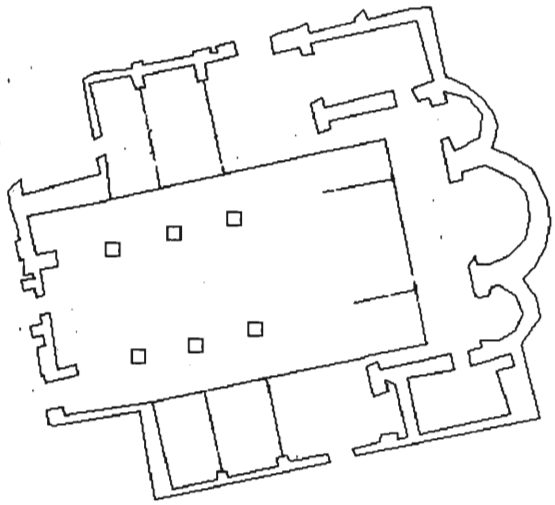


Figure 7: The floor plan of S. Maria Formosa

The Catholic Church during this period also began to have the church oriented east to west, to face the Holy Land of Jerusalem. While Byzantine churches were built with this feature, many of the older churches had to add chapels so that the apse was facing east.

Finally the Romanesque style emerged. San Polo seen in Figure 8 is an example of this specific style. It has the apse at the end of the church and three naves for the congregation to sit. Furthermore there are two chapels, one on either side of the apse or main altar.

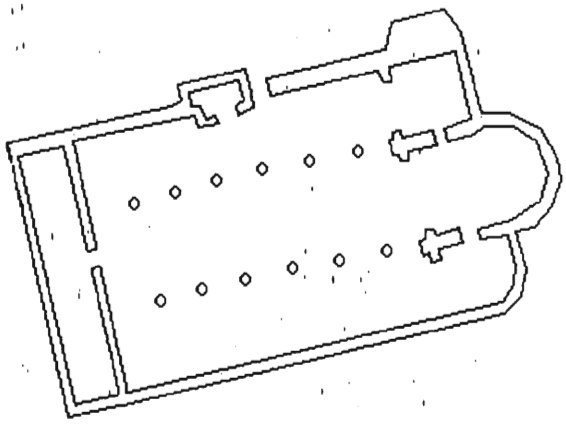


Figure 8: Floor plan of San Polo

2.2.3. Traditional Floor Styles

The styles of the church floors reflect the time period of construction as well as display pieces of artwork. The most common types of floor styles in Venetian churches are mosaics. Mosaic floors are "an inlay of small pieces of various kinds of materials (stone, marble, glass paste, and so on) used to decorate floors and walls"[7]. These small inlaid stones are most commonly found in churches built in the classic style. Figure 9 shows an example of the different geometrical shapes can be seen in the mosaics of church floors.

Figure 9: Example of mosaic on church floors

Some patterns and styles of mosaic floors have their own subcategories. The most common is the Venetian Mosaic, or *terrazzo,* which contains colored marble pieces cut into different shapes and dimensions. These marble stones are scattered over a bed of cement mortar or lime and can be grinded down to make a smooth and sleek finish. There is a very similar mosaic flooring called *battuto* which it is pounded to polish rather than grinded. There also exists a style called *litostroto*, which composes simple geometric designs using marble of diverse colors, shapes and sizes.

Many Venetian churches contain a mosaic style that dates back to the early Renaissance. It consists of red and white marble laid out in a checkered pattern on Istrian stone. There are

[7] Sammartini, Tudy Pavimenti a Venezia , Ponzano, Italy: Vianello Libri, 1999, 200

several other types of mosaics prevalent in Venice exclusively designed by shape, color and pattern. These include the *Opus Alexandrium, Opus Sectile, Opus Tessellatum,* and *Opus Vermiculatum. Alexandrium* consists of two different colored marble patterned on a plain background while *Sectile, Tessellatum* and *Vermiculatum* depend on the cut and layout of the marble. *Sectile* contains different marble pieces cut into various geometrical shapes and placed in an original geometric pattern. It is the most commonly found mosaic floor style in Venice. *Tessellatum* uses small cubes of several colors of marble and *Vermiculatum* uses assorted stone and marble to create irregular furrows that bear a resemblance to worn tracks.

2.2.4. Materials

Most of the floors of Venice were originally built with light weight materials such as wood or brick. Wood has a poor resistance to water, however, and salt water causes brick to split and crack making them poor choices for construction materials. They were soon replaced by the less porous and more resistant marble and Istrian stone. Venetian builders found this to be the best material for construction for it could tolerate everyday tides. In addition to being stable, both were easy to manipulate into unique colors and shapes and the artwork of the floor flourishing.

Although the problem of erosion was temporary solved, the lagoon still burdens the city with its salt water corrosion. None of the floors in Venice are safe from the waters; our task is to identify the floors in the greatest danger of losing their features.

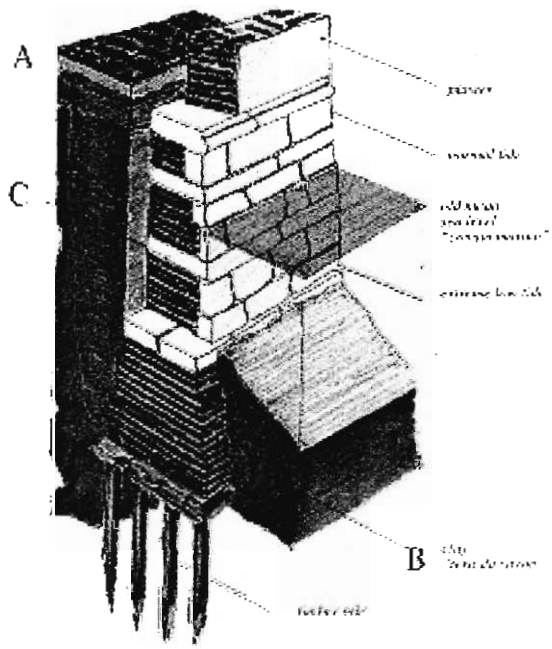


Figure 10: Typical Foundation Construction in Venice

2.2.5. Construction Techniques

Venice became a permanent city until 811A.D, so its original churches were constructed mainly during the middle of the 9th century. The terrain was very damp and unstable and consisted mainly of mud and sand. Architects had to develop techniques that would increase

stability and surpass the poor construction conditions. They created a foundation consisting of a solid and firm ground that provided support for the churches. The foundation was composed of wood pilings and either brick or mortar. The wood was approximately three to four meters long and placed in a spiral or circular formation so that it distributed the weight of the churches. A platform of wooden planks was laid on top of this formation and then mortar was spread to finalize the foundation. Above the foundation was the ground level and builders created a big drainage layer by laying large rocks to let water seep through. Above that was the Venetian technique of waterproofing. They used very high quality clay that was approximately 40 cm thick. The next layer was a layer of sand which evened out the sub-layers, therefore leveling out the floor. Mortar was used to pack down the sand and keep it in place. Finally builders used marble or stone to create an even firmer surface. Figure 8 illustrates the layers of foundation below the churches.

These materials were chosen because they have a resistance to compression and other flexible properties. Builders used stone for vertical structures and wood for horizontal structures to compensate for any shift in the land. As predicted, the tides, floods and time have caused the soil and land beneath the churches of Venice to move. By using wood and stone together, however, the structure maintained their flexibility despite the erosion of the ground. Studying these construction techniques revealed the material compositions beneath the floors and exposed the threats of erosion and deterioration.

2.2.6. Restoration Techniques

In response to the rising tides, many of the churches developed restoration techniques to prevent the foundations from sinking and the floors from deteriorating. The main technique used currently involves digging up the ground beneath the churches and replacing it with a cement tub. This gives a strong foundation and a fairly non-erosive composition.

This process concerns our project because one must dig beneath the churches before laying down the cement. This provides an opportunity to set up an excavation site to find artifacts and other archeological information buried beneath the churches. For once the cement is laid out, the opportunity to find further artifacts, relics and historical information is gone. It is imperative that the churches understand the finality of this restoration technique and take full

advantage of being able to dig beneath the floors and foundations of the churches before the cement is laid.

2.3. Venetian Churches

The architecture and construction period of Venetian churches are integral to understanding the types of treasures that might be held in their floors. The architectural style of the churches can reveal important information about the time period of the churches construction. It can document the approximate age of the floor, and identify whether or not it has been refinished. In some situations the architectural style of the floor determines the archeological importance of the artifacts located on it.

The methods of the administration in the churches in Venice, including their burial practices, are important for the location and restoration of artifacts that lie in church floors. By studying the burial practices of the Catholic religion, we gained prior knowledge about the placement of tombs and the types of people buried within the church walls. This information decreased the total search time and allowed the team to focus more attention on developing ways to protect the artifacts.

2.3.1. Architecture and Time Periods

The time periods of the church correlate with specific architectural styles, construction techniques and layouts of the floors. The use of time periods will supply a starting point for research about the people who composed the congregation and events that took place in the church. Being aware of the city's history will help to provide insight into the type of artifacts that might have been preserved in the floors.

Figure 11: Basilica di San Marco

The Byzantine style survived longer in Venice than in any other city of Western Europe. It reigned from the 6th to the 13th century and is the groundwork of Venetian architecture, but during the 12th and 13th centuries it developed into the Venetian-Byzantine style. Byzantine architecture is distinguished by brick dry brickwork construction, round arches and dome roofs that rest above square bases. The dome roofs were accomplished using two special support devices: an arc across an angle

called the *squinch*, and a curved triangular area of wall surface above each pair of arches known as the *pendentive*. Byzantine structures are characterized by lofty spaces and luxurious decoration: marble columns, mosaics on the vaults, inlaid stone pavements, and sometimes gold coffered ceilings. An example of a church with Byzantine architecture is the Basilica di San Marco which is shown in Figure 11.

The Gothic style replaced the Byzantine from the 13th century to the 16th century. Gothic architecture uses a particular style of masonry construction that is characterized by cavernous spaces with areas of the walls broken up by overlaid tracery. The building materials for Gothic architectures are brick and marble rather than stone. Gothic structures are very tall, yet they preserve as much natural light as possible in the rib vault, flying buttress, and pointed arch through the introduction of stained-glass window panels. An example of a Gothic style church is Santa Maria Gloriosa dei Frari which is shown in Figure 12.[8]

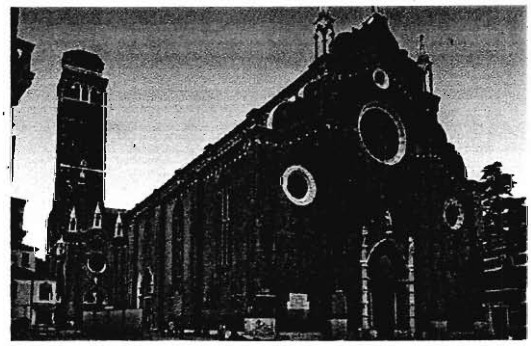


Figure 12: Santa Maria Gloriosa dei Frari

Figure 13: Il Redentore

The Renaissance style of architecture originated in Florence in the early 15th century and spread to Venice, replacing the medieval Gothic style with classical architecture. The main concept behind Classical architecture is the use of proportions as it was considered the most important factor of beauty. The Renaissance architects used this idea to promote harmony between human proportions and buildings. The result was a clear, easily comprehended space and mass that distinguishes the Renaissance style from the more complex Gothic. Renaissance architecture revived many of the ancient Roman forms such as the column and round arch, the tunnel vault, and the dome.
An example of a church with a Renaissance style is the Il Redentore which is shown in Figure 13. Towards the end of the Renaissance period, the architectural style developed into Mannerism and is characterized by sophistication, complexity, clarity, tranquility and novelty replacing harmony.

[8] Howard, Deborah. The architectural History of Venice. New Haven: Yale University Press, 2002.

Baroque architecture appeared in Venice in the late 16th century and lasted until the 18th century. The baroque style has complex plan shapes, often based on the shape of an oval that was meant to heighten the feeling of motion and sensuality by the dynamic opposition and interpenetration of spaces. It is characterized by the quality of grandness, drama and contrast, the curvaceousness, and an array of rich surface treatment. The architects would apply bright colors to create deceptive, vibrantly painted ceilings. An example of the Baroque style is the Santa Maria della Salute which is shown in Figure 14.

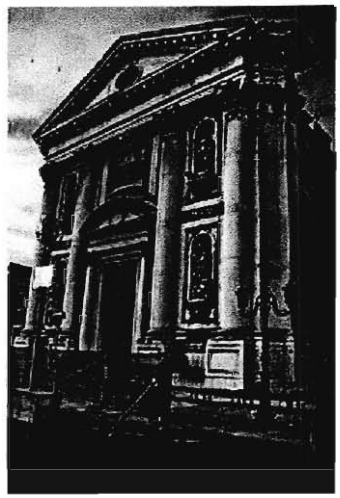


Figure 14: Santa Maria della Salute

The Neoclassicism style came to Venice during the 18th century. This style uses techniques that are more basic than the gaudy Baroque style, and brings back the Roman classical symmetry. The most important Venetian Neoclassical architect was Giorgio Massari, who used more of a Palladian style rather than a Baroque style of architecture. One of his master works is the church of Santa Maria del Rosario

2.3.2. Catholic Burial Practices

The Catholic religion has always believed in burying their deceased beneath the ground, however, burials within the church were a controversial issue for Rome. Throughout the centuries, church burials evolved from a privilege extended to members of the clergy to a symbol of status among the rich and powerful Venetians. Having prior knowledge of the types of people that might have tombs in the church will provide a historical reference for our research.

The earliest Christians burial grounds consisted of family vaults and public catacombs as burials within the church were forbidden to the average individual. The inscriptions on the graves were very simple and gave little information about the person. They mentioned the name of the deceased and a brief prayer for his soul. If the deceased were a member of the three highest orders of the hierarchy, this information was also inscribed. Several of the minor orders as well as consecrated virgins and widows also had their status engraved on their tombstone. [9]

[9] http://www.newadvent.org/cathen/03705a.htm

Originally the only people allowed to be buried in the church walls were martyrs and members of the clergy. The tombs of martyrs were also used as altars for the church. Beginning with the Roman emperors, however, the Catholic Church began to permit certain individuals to be buried within the church walls. These individuals were distinguished persons, possessing great power and riches. To be buried within the church walls or nearby became a symbol of status for religious and governmental figures such as popes, bishops, royal personages, doges, and other dignitaries.

Specifically within Venice there existed guilds of workers which were unified in order to better the lives of individuals within the guild. On example of this was that guilds had specific tombs in which to be buried and any guild member or immediate family members could be buried in that tomb. Figure 15 shows the tomb of the Scuole Grande dei San Rocco in the church of S. Rocco in the S. Polo sestiere of Venice. As time progressed the tombs began to fill with the remains of the people buried in them, therefore in order to make room for more burials, as space was scarce in Venice, the republic of Venice passed a law to remove the sealant at the bottom of tombs. The process of replacing the sealant with a layer of wooden planks, separated by 3 cm of space, allowed water in and flush out the remains in order to recycle the space for further burials.

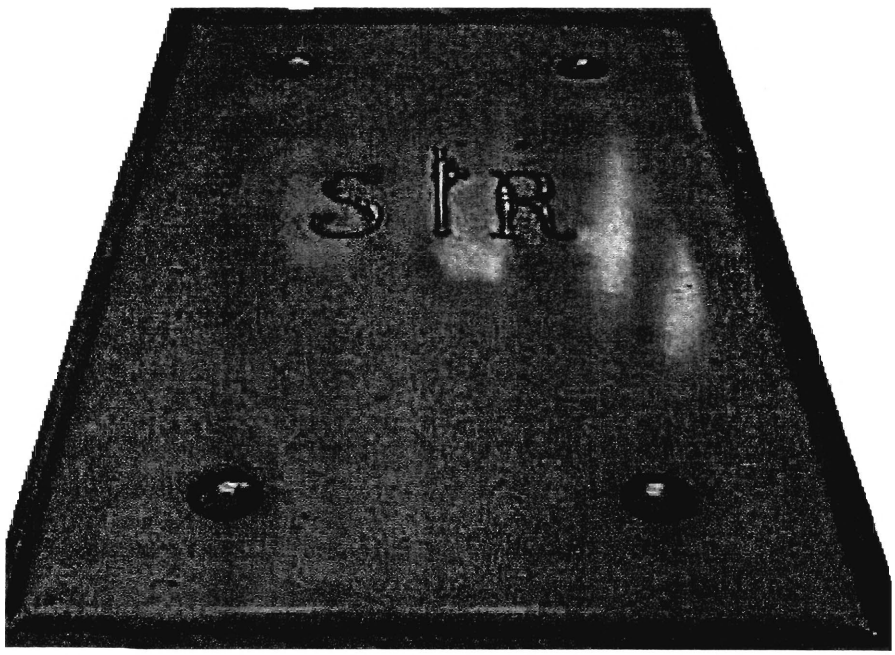


Figure 15: Tomb of the Scuole Grande in S. Rocco

Church regulations insisted that tombs should not project above the pavement or should be confined to the side chapels. However the families powerful enough to be buried in the church had enough money to ensure their monuments would be remembered. Vast works of art and inlaid tombstones were placed on the floor over the graves. At this point in time funerals were considered one of the most important and therefore elaborate catholic practices. No matter what the financial situation of the deceased, money was not spared in securing the passage to the eternal life.

As time progressed the privilege of being buried in the church became only available for royalty and members of the clergy. The arrival of Napoleon to Venice in the turn of the nineteenth century brought many changes to the city. One of the many edicts he passed was the outlawing of burials within the church walls of Venice. In replacement of this burial system he established the island of S. Michele as Venice's primary public cemetery. Although the ecclesiastical administration allowed the burial of priests within the church, Napoleon's edict prohibited this from happening. One of the few exceptions to this was the Scuole Grande as described in the previous section. This was the only scuole to escape the Napoleon edicts. This was crucial to the background of our project because after this time tombs were not raised when floors were raised and therefore it is unlikely to find tombs dating after the early nineteenth century. The privilege of being buried in the church disappeared and when floors were renovated the original tombs were hidden. So while mosaics and other works of art may be admired on the surface of Venetian church floors, they may be covering up the ancient relics of powerful religious and political figures.[10]

2.3.3. Church Administration

In order to examine the church floors in Venice, we worked closely with the clergy and caretakers of the churches. Before arriving in Venice, the team needed to understand the church administrative system and any rules it imposed on its attendees.

One of our first tasks in Venice was be to locate the local administrative offices. The church administration of Venice is called the Curia and is headed by the *Patriarca di Venezia*, or the Bishop of Venice. The current *Patriarca di Venezia* is Angelo Scola. With the help of the Archeological Superintendence, we received his permission and blessing to examine the floors of

[10] Curran, J.J. Cemeteries" Catholic Encyclopedia <http://www.newadvent.org/cathen/03504a.htm> (April 14, 2002)

the churches. The head church of Venice is the *Cattedrale di San Marco Evangelista*, also called the *Basilica Patriarcale*.

Venice and the islands and area surrounding it are sectioned off into sixteen *Vicariati*, which are the English equivalent of vicarages. Table 1 shows each individual *Vicariato* and the regional supervisors as of February 2, 2002, the *Vicari Foraneo* and *Pro Vicario Foraneo*.

Vicari Foranei		
Vicariato	***Vicario Foraneo***	***Pro Vicario Foraneo***
San Marco	Senigaglia mons. Mario	Scattolin don Guido
Castello	Rossetto padre Corrado O.S.M.	Campesato padre Andriano O.F.M.
Cannaregio	Maddalena do Cesare	Panni padre Diego F.d.C.C.
San Polo -- Santa Croce	Costa do Alfredo	Fior padre Leopoldo O.F.M. Conv.
Dorsoduro	Tenderini mons. Seratino	Pizziol don Beniamino
Lido	Bruseamento don Silvano	Zanusso do Cesare
Estuario	Camilotto don Giuseppe	Vianello mons Rino
Mestre	Centenaro mons. Angelo	Celeghin dott. Don Adriano
Carpenedo	Polato don Liviano	Danieli don Narciso
Favaro – Altino	Di lena don Adriano	Fassina don Gianni
Castellana	Casarin do Luigi	Trevisiol don Roberto
Marghera	Trevisanato don Ottavio	Basso do Alfredo
Gamburare	Barbaro don Orlando	Iannotta don Giancarlo
Jesolo	Donadelli don Paolo	Torta don Enrico
Eraclea	Bucciol dott. Don Guido	Girardello don Giampaolo
Caorle	Manzato mons. Giuseppe	Pesce don Aldo

Table 1: The *Vicari Foranei* of Venezia[11]

In the *Vicariati* there are thirty-eight *parrocchie* or parishes in Venice, six on the barrier island of Lido, and five on the islands surrounding Venice. The parishes that contain the churches we examined in Castello and San Polo are highlighted in Table 2.

[11] *Rivista diocesana del Patriarcato di Venezia. Ufficiale per gli atti di Curia.* Arte & Storia. S. Croce, Venezia. 1998.

Vicariato	*Parrochie*	*Altri Luoghi Sacri*
1° Vicariato: San Marco	S. Moise	
	S. Stefano	
	S. Luca	
	S. Salvador	
	S. Zaccaria	S. Giovanni Novo S. Giorgio Maggiore
	S. Maria Formosa	S. Lio La Fava (S. Maria della Consolazione)
	Ss. Giovanni e Paolo (Domenicani)	S. Lazzaro dei Mendicanti S. Maria Assunta o dei Derelitti S. Maria del Pianto
2° Vicariato: Castello	S. Pietro (Salesiani)	
	S. Giuseppe di Paolo (Salesiani)	
	S. Francesco di Paolo (Salesiani)	
	S. Martino	S. Biagio Vescovo
	S. Francesco della Vigna (Minori)	Cristo Re alla Celestia S. Giorgio degli Schiavoni Ss. Giorgio e Trifone S. Giovanni Battista (Ordine de Malta)
	Bragora	S. Lorenzo Martire S. Antonino Martire Santa Maria della Pieta
4° Vicariato: San Polo	S. Silvestro	S. Giovanni Elemosinario S. Giacometto S. Aponal
	S. Cassiano	S. Maria Mater Domini
	Frari (Conventuali)	S. Toma Centroneocatecumenale per it Veneto S. Polo S. Rocco S. Giovanni Evangelista
	Tolentini	
	S. Simeone	
	S. Giacomo dell'Orio	
	S. Pantalon	

Table 2: The *Vicariato, Parrochie,* and *Altri Luoghi Sacri* of Castello and San Polo[12]

[12] *Rivista diocesana del Patriarcato di Venezia. Ufficiale per gli atti di Curia.* Arte & Storia. S. Croce, Venezia. 1998.

There are eighteen *commissioni* or committees in the Curia that compose the *Organismi Diocesani Consiglio Presbiteriale*. These committees control different aspects of religion in Venice. The sixteen committees are listed in Table 3.

Commissioni
Commissione per la catechesi
Commissione per l'animazione missionaria
Commissione per l'ecumenismo e il dialogo
Consiglio della carita diocesana
Consulta della caritas diocesana
Commissione per la pastorale della sanita
Commissione per la formazione permanente del presbiterio
Commissione per il diaconato e I ministeri istituiti
Commissione per la pastorale degli sposi e della famiglia
Commissione per la pastorale della cultura
Commissione per i beni ambientali ed architettonici ecclesiastici
Commissione per i beni artistici, storici, e museali
Commissione per il museo diocesano
Commissione per la pastorale scolastica
Commissione per la pastorale sociale e il lavoro
Diocesana giustizia e pace
Commissione per la pastorale del tempo libero, de turismo, dello sport e del pellegrinaggio
Commissione per la pastorale delle comunicazioni sociali

Table 3: The *Commissioni* in Venezia

Our project will be governed by the *Commissione per i beniali ed architettonici ecclesiastici*.

When we began to visit the churches we were careful to abide by the regulations of the specific churches. The female team members were required to have their shoulders and knees covered. The male team members also could not wear shorts and had to remove their hats. Once in the church, our project team moved silently and respectfully. We also set up specific appointments to examine the main altar and to take pictures as both required special permission and supervision from the head priest of the church.

3. Methodology

The purpose of this project was to gather information about the church floors and their artifacts and to assess their archeological potential for the Archeological Superintendence of Venice. To accumulate this information in an efficient manner we developed data collection methods which we will discuss in the following section. We logged our records into the database created by the 2002 project team, expanding its content in order to help identify possible archeological opportunities. Our database has six main components: ***Introduzione, Informazioni Fondamentali, Pavimenti, Reperti, Condizione Pavimenti, and Condizione Reperti*** (Introduction, General Information, Floors, Artifacts, Floor Conditions, Artifact Conditions). It includes entries and visuals for each artifact and floor as well as their condition assessments. ***Introduzione*** contains a general introduction to the purpose of our project and includes an example of a previous excavation of a Venetian church to show the archeological significance of our research.

We used our information to identify possible archeological opportunities in the different churches of Venice. The Archeological Superintendence is interested in whether threats exist to the floors or to artifacts embedded within or trapped beneath them. The team's analysis of the collected information serves as a foundation for archeological research as it identifies the churches that are primary candidates for imminent restoration and for excavation.

The methodology discusses our domain of inquiry and defines both our subject matter and study area. The following sections explain the methods employed to successfully complete the four main objectives necessary to conclude our project effectively:

1. To collect general information on the churches
2. To document church floor characteristics
3. To document artifact characteristics
4. To demonstrate the usefulness of our findings

3.1. Domain of Inquiry and Definitions

The field of inquiry for this project was archeology, specifically the archeology associated with church floors. Catholic churches are composed of several sections with distinct functionalities such as for prayer, rituals, and ceremonies. Our study included all the floor space within the walls of the church and side chapels. Our definition of a church floor included traditional sections such as the nave, sanctuary, and narthex, in addition to specialized areas such as side chapels or crypts. For our project we defined the following terms regarding churches, artifacts, and floor elevations:

Church: A building originally constructed for Christian worship that still stands and either continues to be used for worship or has maintained the same interior as when it was used for worship. Oratories, Chapels and smaller places of worship connected to the church are also included.

Chapel: A section of a church that is separated from the main floor but is attached to the main hall. A Chapel must have an area in front of its altar larger than 5 square meters, and be distinguished within and outside the church as a separate room from the main church. Figure 16 shows an example of a chapel in San Zaccaria.

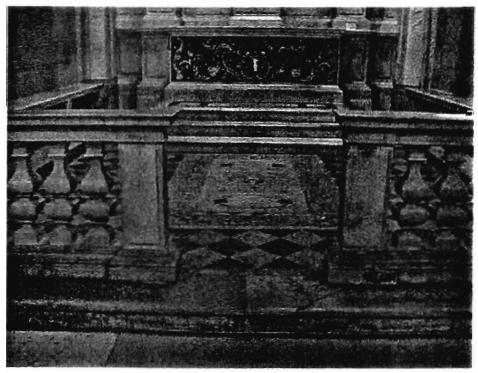


Figure 16: An example of a chapel in San Zaccaria.

Altar: A raised section of the church with its base on the floor of the church. Also includes any other distinguished area of the church that does not qualify as a chapel. A chapel may hold an altar, but an altar is not a chapel. Figure 17 shows an example of an altar in San Zaccaria.

Figure 17: An example of an altar in San Zaccaria.

Artifact: Artwork or other work of human craftsmanship such as plaques, tombstones, or engravings which are separate from the design on the floor. Artifacts can be found on or beneath the floor and include any part of the floor that functions as more than a simply a place to walk.

Floor Elevation: Measured with a laser scope by determining the difference in height between a point on the church floor and a previously determined point of elevation. All previously determined points of elevation reference the absolute zero marker in Venice. The floor elevation was found at the center of each quadrant on the church floor plan.

3.2. Study Area

The study area of this project involved the church grounds in the Castello and San Polo *sestieri* of Venice, Italy. This included the churches investigated by the 2002 and 2003 Worcester Polytechnic Institute project teams. The 2002 project team gathered information on the floors from 22 of the 57 churches located throughout Cannaregio, Dorsoduro, and San Polo. The map below shows the explorations completed by the 2002 project team in red and explorations planned by the 2003 project team in pink in those four *sestieri*.

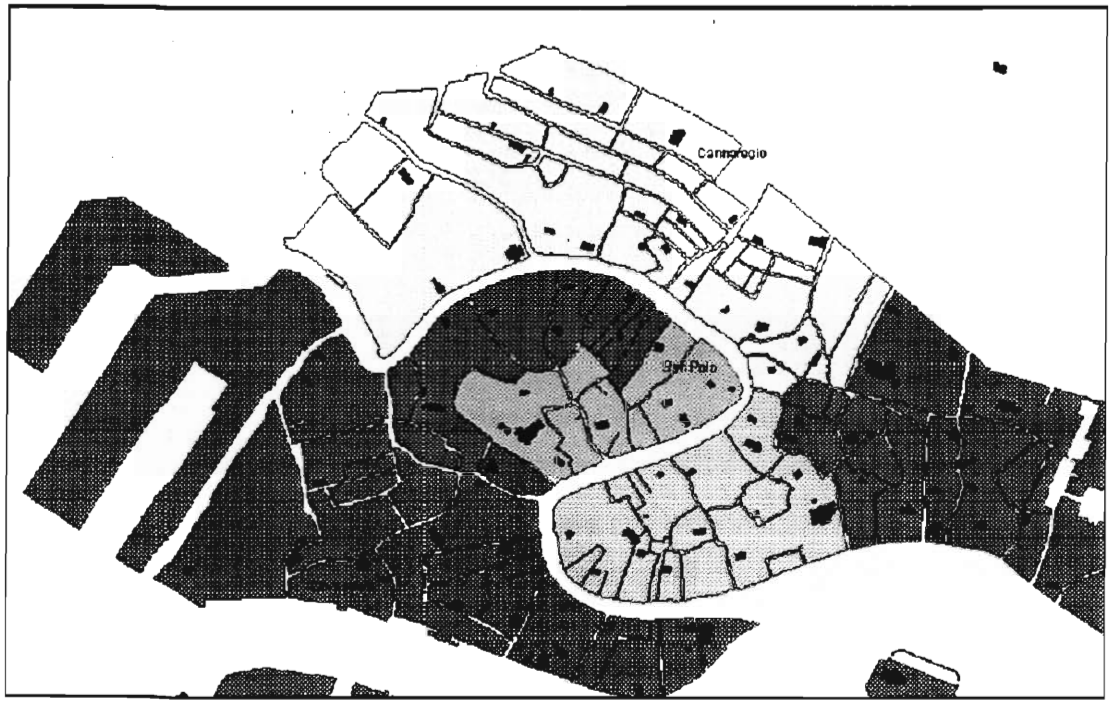


Figure 18: Churches located in the Cannaregio, Dorsoduro and San Polo Sestieri of Venice

Our team began by gathering information from the churches located in Castello and then proceeded to complete the remaining portion of San Polo. Our approach was to complete collecting data in Castello before moving on to San Polo. The following map shows the locations of the churches in Castello and San Polo that we examined.

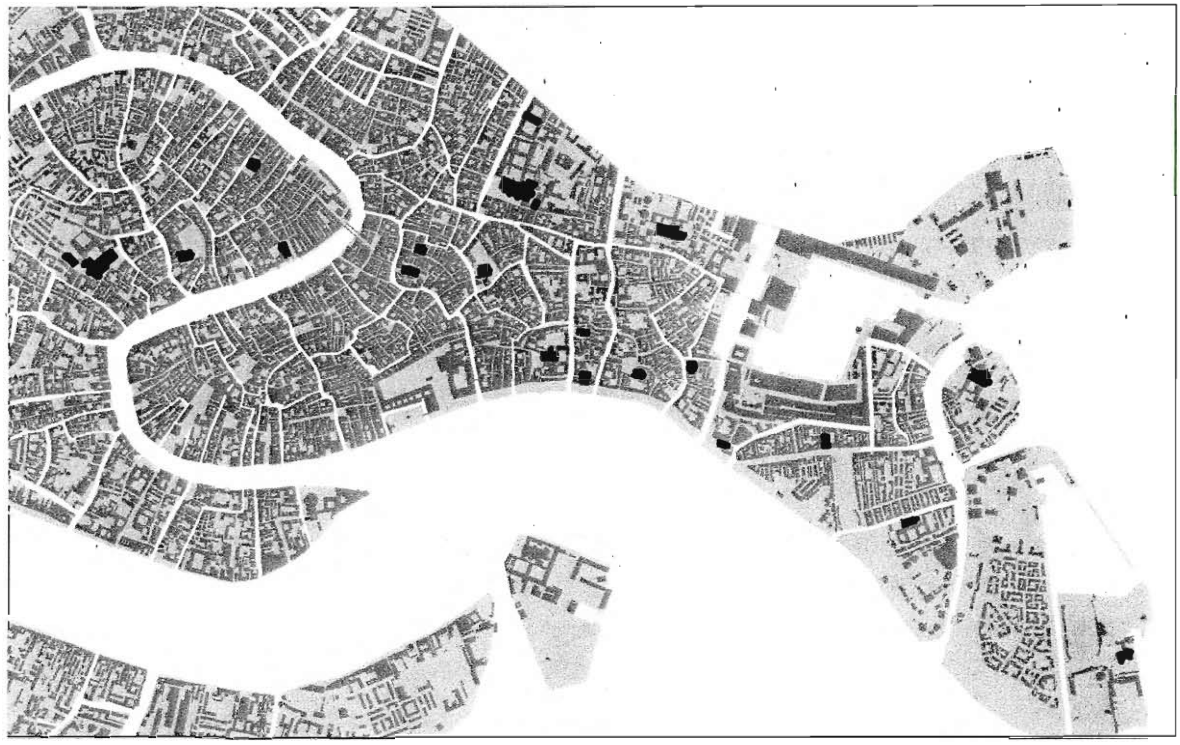


Figure 19: Churches of Castello and San Polo (shown in blue)

3.3. Collection of General Information from Churches

The goal of this project was to investigate all the churches in Castello and finish the unexplored churches in Cannaregio, Dosoduro, and San Polo. The first few days in Venice we developed an organized plan for visiting each church. Time was the most important factor in our decisions; however we also considered the cooperation of the church administration and events occurring within the church like mass and concerts. We then visited one church and completed a sample data collection before revising our methodology and evaluation forms. We tracked the information we collected using predetermined four-letter church codes which were part of a system created in 1993 to identify each church in Venice. (Example: ZACC refers to Chiesa di San Zaccaria)[13]

[13] Aldrich, Brian, Kevin Shea, and David Youkstetter. The Churches of Venice II: A System for Artistic Restoration Analysis. An Interactive Qualifying Project for Worcester Polytechnic Institute, 1993.

3.3.1. Scheduling the Church Visits

Our first step upon our arrival in Venice was to briefly explore all the churches in Castello and San Polo. Our objective was to find churches that were permanently closed, the visiting hours of open churches, the weekly mass times, upcoming special events, and any other details that would affect our data collection. All of this information was logged into to ***Informazioni Fondamentali***, the general information section of our database. Once we gathered this information, we mapped out a route of churches to complete each day for the remaining weeks. Upon completing the churches in Castello, we continued with churches in San Polo. We tried to explore the floor of each church in detail as unobtrusively as possible so as not to upset the church officials or its patrons.

3.3.2. Contacting the Church Administration

The 2002 project team created a survey that was distributed to the priests and caretakers with the intention of collecting the churches' contact information and history. Appendix D holds a copy of this survey. Although the survey was written in Italian in 2002, the response from the church administration was not abundant or especially helpful. Our project team decided to use this same survey as one means of gathering information; however we better prepared ourselves to interact with the Catholic community. The Archeological Superintendence provided official letters explaining our purpose for each church we visited and for the local church administration offices. We carried copies of this letter with us to the churches, and handed them to the caretaker or head priest along with the survey. We then returned later in the week to collect the completed surveys. All of this information was logged into the ***Informazioni Fondamentali*** section of the database.

3.3.3. Team Division to Complete Specific Data Collection

Once we obtained the general information from a church, our group separated into two teams in order to focus on the floors and artifacts separately. The first team documented the floor characteristics and the second team documented the artifact characteristics. Each group member had a copy of the letter from the Archeological Superintendence and the floor plan. Dividing our group increased our overall efficiency; when one group finished before the other, they were able to move onto the next church. Once one team finished the allotted churches for

the day, they either backtracked to help the other team finish or began to record the information into the database. Figure 20 shows a flowchart explaining the separation of teams and tasks. The following sections discuss the undertaking of each team.

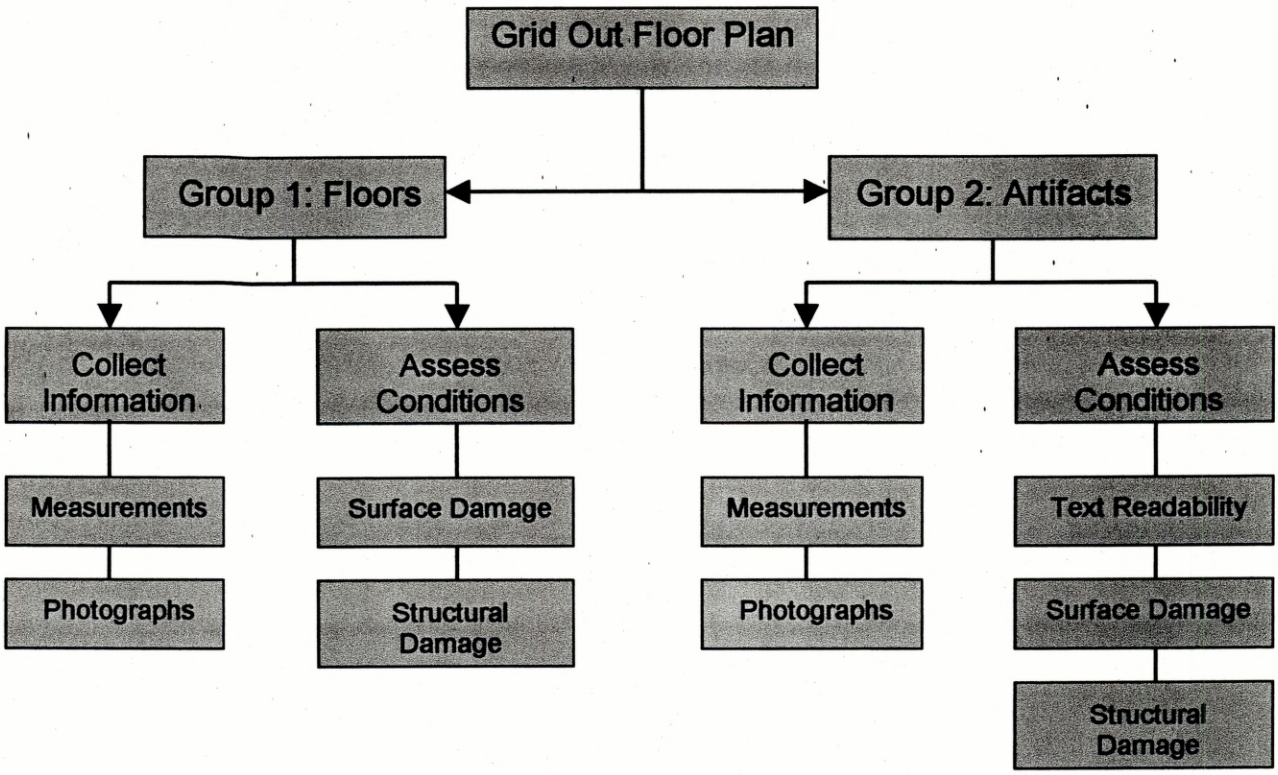


Figure 20: Flow chart of data collection

3.4. *Documentation of Church Floor Characteristics*

The floors group examined the floors by first dividing the floor into a grid to form quadrants from the existing floor plans. The team then took pictures and measurements of the floors patterns and styles, and concluded with a condition assessment of each quadrant. As data was collected, each area or quadrant of the church floor was assigned a floor code. This code consisted of the four letter church code followed by an underscore and a capital letter starting from A, or letters which designates the section defined on a floor plan grid. (Example: MIRA_A).

3.4.1. Division of Floor Plan into Quadrants

To create the grid for each church, the team used a system based on the floor plan obtained from the "Pianni Tipo" provided by the Urban Studies Office and the variation of sizes and shapes of each church and its floor. The team began by taking the existing floor plan of the desired church and separated any sections that were not part of the nave or the sanctuary. When possible, support columns or other immobile objects were used to divide the quadrants. Chapels were assigned their own quadrants. Altars with areas greater than three square meters were counted as separate quadrants. The grid of each church floor plan had no less than four quadrants and up to as many quadrants as necessary. An example of the grid system with labeling is shown for SS. Giovanni e Paolo in Figure 21.

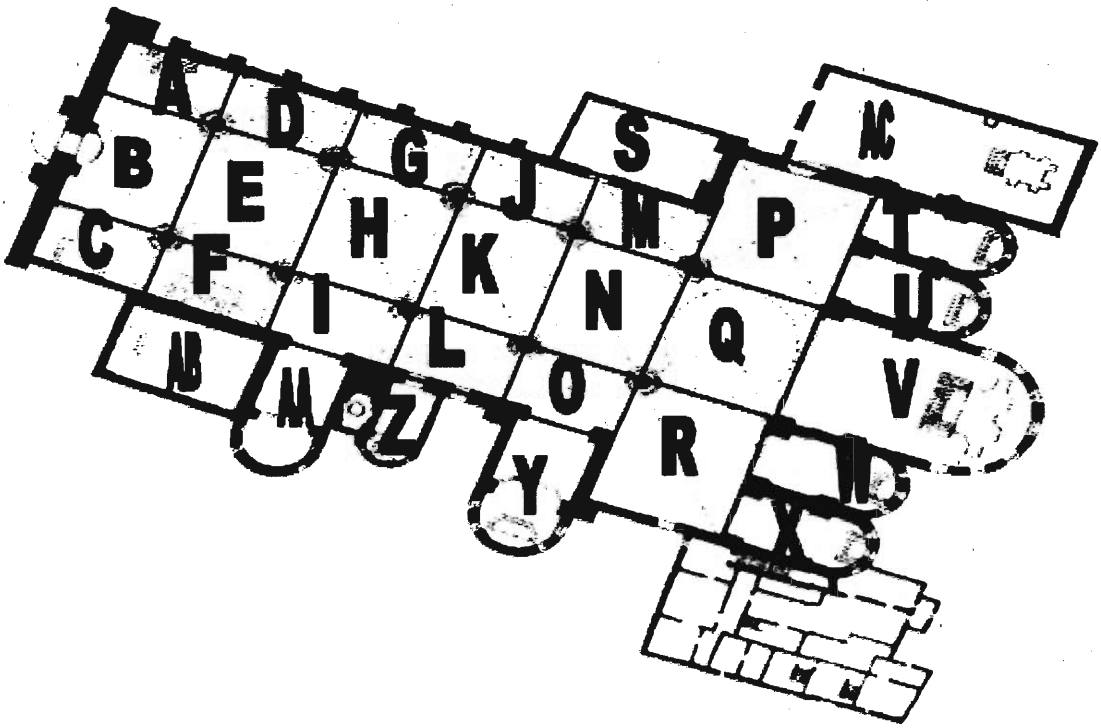


Figure 21: Floor plan for the Church of SS. Giovanni e Paolo divided into quadrants

Each quadrant was labeled with a letter starting with "A"; when there were more than 26 quadrants, the 27th quadrant was labeled "AA" and so forth. First the main floor was labeled, quadrant A being the left most quadrant (facing the altar) at the back of the church. Any raised areas with steps such as chapels and the main altar were not considered part of the main floor. For SS. Giovanni e Paolo, the main floor was composed of quadrants A through P. Then the other open areas of the church like chapels and altars were labeled as quadrants starting with the

left most area and moving in a circular manner. These areas composed quadrants S through AA. Finally rooms separate from the main hall, but still part of the church floor were labeled as quadrants AB and AC.

3.4.2. Collection of Information from Floors

The floors team began to collect data by taking pictures of the main pattern on the church floor. The picture of the main pattern on each church floor was saved into the database as a JPEG file named from the floor code (Example: ZACC.JPG). After taking the picture of the main floor, the team recorded the measurements, artwork or designs of it by completing the form found in Appendix D.1. The form in Appendix D.2 was completed for each side chapel that had a pattern different from that of the main floor.

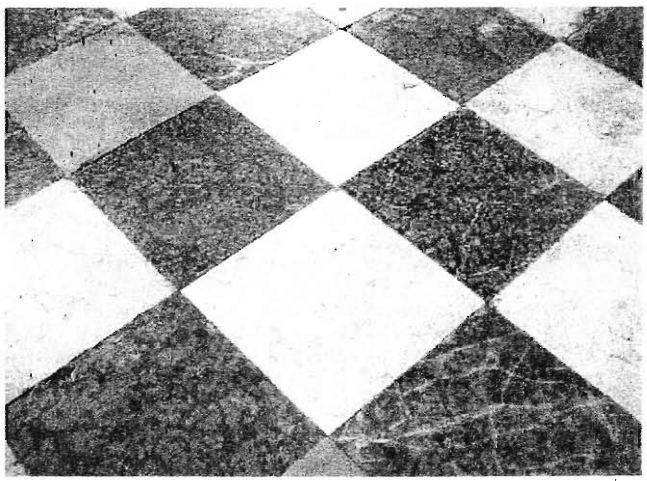


Figure 22: Main floor pattern of SS. Giovanni e Paolo, a red Verona and white Istrian stone pattern

3.4.2.1. Recording Measurements

The floors team used a metric tape measure to measure the length and width of each church floor that did not have their dimensions listed on the floor plans supplied by past projects and the Archeological Superintendence. The length of the church floor was defined as the longest straightedge measurement perpendicular to the wall containing the main alter. The width of the church floor was defined as the longest straightedge measurement parallel to the wall containing the main alter.

The elevation of the floor at the main entrance and the center of each quadrant was found through the use of a laser leveling device and was based on a point of known elevation that referenced the absolute zero marker in Venice. The *Magistrato Alle Acque*, a local branch of the Ministry of Public Works, recorded known elevations of building corners and other ground level objects in the mid 1990's using the absolute zero marker as a reference. Using a leveling device with tripod and laser, the team measured the difference in height between specified points on the

church floor and the nearest point of known elevation, outside the church. Figure 23 shows the floor plan of a church with external points of known elevation marked by the red and blue flags.

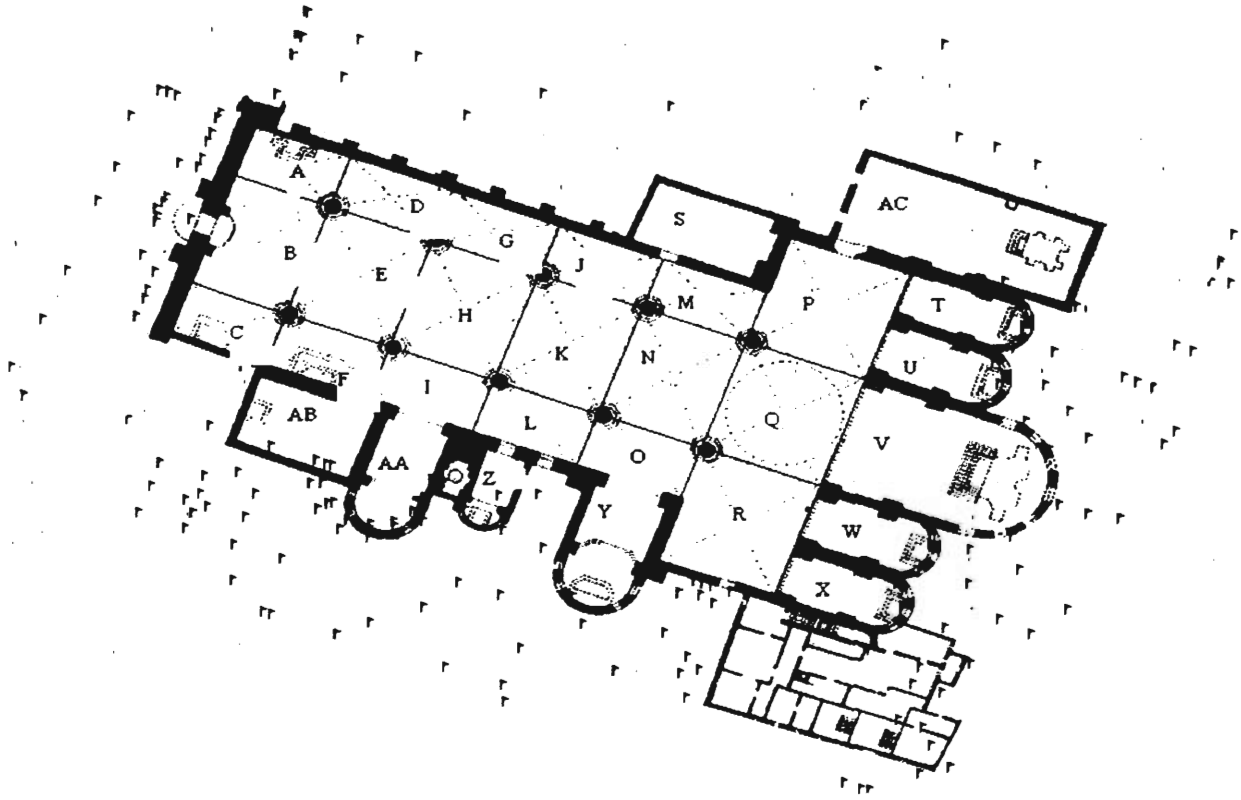


Figure 23: Plan of SS. Giovanni e Paolo with points of known height (red and blue flags) in the area surrounding the church

The floors squad set the tripod on the point of known elevation and aimed the laser at a meter stick, which was placed on the point at which we wanted the elevation. Once the tripod was adjusted and the laser was level, the team recorded the height of the point at which the laser struck the meter stick and compared it to the height of the lasing device. Simple calculations produced the elevation of the floor at the meter stick. Figure 24 shows the measurements and calculations that produce the floor elevation at the desired point.

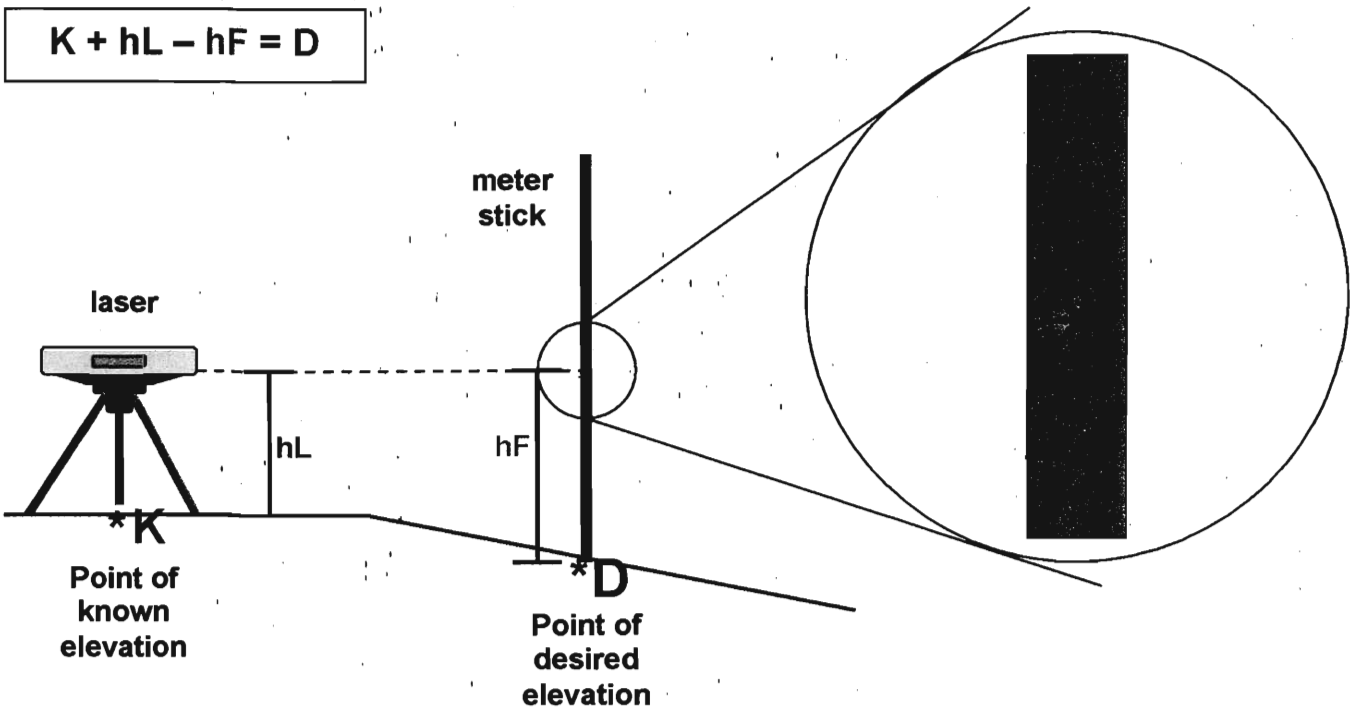


Figure 24: Measurement and calculation of the elevation of a floor quadrant.

The floors squad first determined the elevation of the church at the entrance way so that the entrance way could be used as a new reference point for the rest of the floor quadrants in the church. The squad measured the height at the center of each quadrant in the same manner as described above and recorded it on the forms in Appendix D.3. Each time the laser was moved to a new point, it was recalibrated and its height measured again to produce accurate measurements.

In addition to the height at the center of each floor quadrant, we examined the steps at any side chapels or altars off of the main floor. The steps to each side chapel or altar were counted because traditionally churches built steps in multiples of three in honor of the Holy Trinity. Steps that were not multiples of three could indicate that the floor had been replaced and the steps adjusted at some point in time. In addition to these measurements we also noted any obstructions to our data collection such as carpeting, pews, kneelers, or other furniture.

After all the floor measurements were taken, the floors squad systematically moved through each quadrant documenting the designs and artwork.

3.4.2.2. Documentation of Designs and Artwork

Any artwork or designs found on the floors that are not part of the main floor or chapel pattern and do not qualify as artifacts were documented by our team as part of the floor style. An example of a design located on a chapel floor in San Giovanni e Paolo is shown in Figure 25. Pictures were taken of these images, and they were saved according to their quadrant location with the addition of '_S' to the end of the quadrant's floor code. We chose to add '_S' in order to designate that the picture pertains to the floor style. When there were multiple designs in one quadrant, we added small letters succeeding the '_S' (starting with 'a') for each picture. (Example: GIOV_AA_Sa.JPG). These different floor designs and patterns were still considered part of the church or chapel floor as a whole. Therefore we did not perform separate condition assessments for each design.

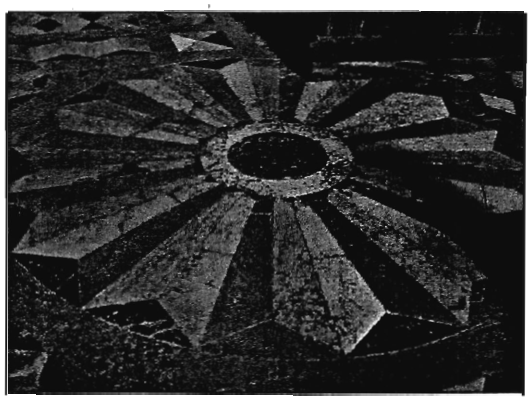


Figure 25: An example of a separate floor design in a chapel in San Giovanni e Paolo

3.4.3. Assessment of Floor Conditions

To assess the condition of the floors, the floors squad completed the form located in Appendix D.3 for each floor quadrant of the church. Before collecting the data, the squad developed a rating system to assess the structural and surface damage on the floors. Following the data collection, the team combined the assessment into one rating system to give each quadrant an overall assessment as explained in section 3.4.4.

3.4.3.1. Structural Issues

To assess the structural problems of the floors, the floors squad separated the structural problems into five categories: Cracks, Holes, Joint Gaps, Floor Detachment and Floor Replacement. To assess these different categories a five point scale was developed for cracks, holes, and joint gaps corresponding to the severity of each condition, as described specifically for each of the three categories.

For each characteristic the team assessed the percentage of each floor quadrant that was the most severe and gave that portion a worst case rating using the severity levels for each

category. Once the worst area of the floor was assessed, a separate severity rating from the same scale was assigned to the remainder of the floor quadrant. Thus each quadrant would receive two ratings that would then be combined to give the quadrant a final rating for cracks, holes and joint gaps. The purpose of rating the floors by percentage of worst case is to assess both the severity of the damage and the frequency of its appearance on the floor.

The percentage of the floor that suffered from detachment or replacement was also recorded for our analysis.

Cracks

In each quadrant, a varying number of cracks were present. Cracks indicate weakness in the floor, and are possible sites for future floor detachment or replacement. These cracks also may indicate hidden problems in the ground under the walking floor and high foot traffic in that area. Different factors were assessed when rating cracks, such as the size of cracks and weather the cracks were considered problematic.

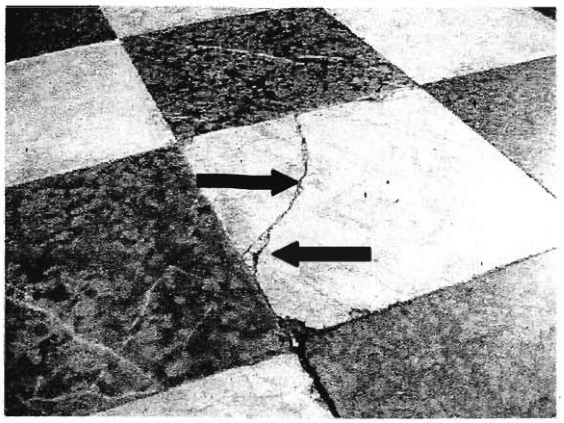


Figure 26: An example of large cracks (shown in the center of the white Istrian tile) and small cracks (shown in the bottom left on the red Verona tile)

The first step determined the effects that large and small cracks had on the structural integrity of the floor. A crack of more than 2 mm at its widest point, cutting into the floor material we labeled as problematic and thus included in our rating. This definition helps our team differentiate between problematic cracks and the cracks that have been repaired with other materials. The second type of crack that was assessed was smaller cracks and surface cracks. These cracks cut into the material but were less than 2 mm wide. Any cracks that had been repaired with caulking material were considered floor replacement.

The team assessed the frequency of appearance and severity of the cracks present on each floor quadrant by rating them with a five point scale that was created by our project team. The scale is explained in Table 4.

Scale	Description
0	Minimal or no cracks present
1	Low severity of cracks Low level of cracks, none are considered problematic
2	Intermediate severity of cracks Either some problem cracks present or many small cracks present
3	High severity of cracks Significant number of problem cracks and many small cracks present
4	Severe level of cracks High frequency of problem cracks and small cracks

Table 4: The five point condition assessment scale for cracks.

Holes

A hole is considered an area of missing floor material that has a depth of at least 1.5 cm. To assess the presence of holes on the floors we used a five point scale that was similar to the scale we developed to assess cracks. This scale is explained in Table 5.

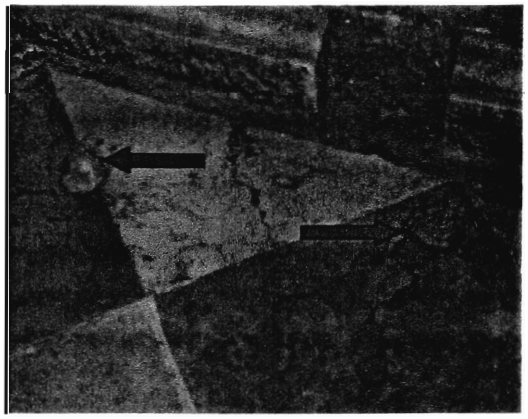


Figure 27: Example of holes in floor tile

Scale	Description
0	Minimal or no holes present
1	Low severity of holes Few holes that present no danger to the floor structure
2	Intermediate severity of holes Multiple holes potentially endangering the floor structure
3	High severity of holes Many holes that threaten damage to the floor structure
4	Severe level of holes Majority of area contains holes damaging the floor structure

Table 5: The five point condition assessment scale for holes.

Joint Gaps

A joint gap was considered to be a larger than usual separation between floor tiles where normal sealant might be added. Figure 28 shows an example of a joint gap in the floor tile. To assess joint gaps that were present on the floors we used a 0 to 4 scale similar to the scales we developed for cracks and holes. This scale is explained in Table 6.

Figure 28: An example of a joint gap

Scale	Description
0	Minimal or no joint gaps present
1	Low severity of joint gaps Few joint gaps that present no danger to the floor structure
2	Intermediate severity of joint gaps Multiple joint gaps potentially endangering the floor structure
3	High severity of joint gaps Many joint gaps that threaten damage to the floor structure
4	Severe level of joint gaps Majority of area contains joint gaps damaging the floor structure

Table 6: The five point condition assessment scale for joint gaps.

Floor Detachment

We considered a missing corner of a floor tile or the loss of whole tiles as floor detachment. Figure 29 shows an example of the loss of whole tiles. The percentage of the surface area of the quadrant that is detached was estimated and recorded for our analysis.

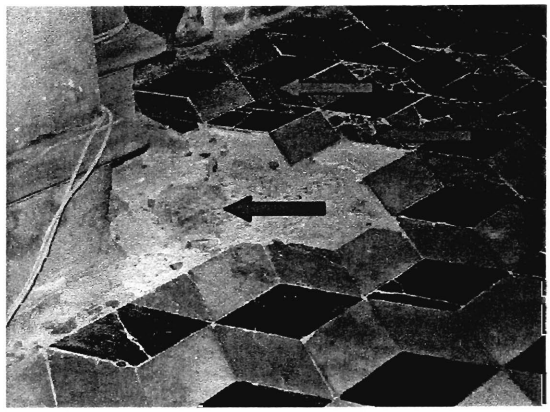


Figure 29:An example of floor detachment

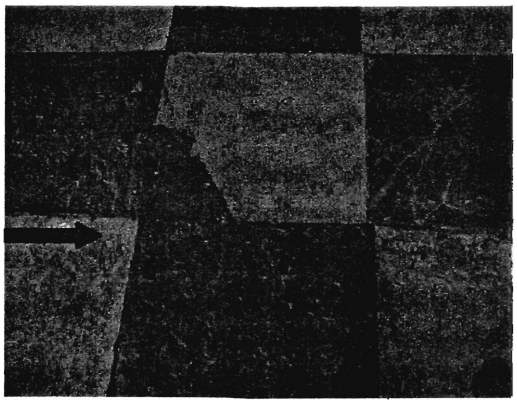


Figure 30: An example of floor replacement

Floor Replacement

Replacement occurs when pieces of the floors have been filled with new materials. This includes whole tiles replacing damaged sections of the floors, as well as the filling of pitting or areas of floor detachment with different materials. The percentage of each quadrant that has been replaced was estimated and recorded for our analysis.

3.4.3.2. Surface Damage

There are many types of surface damage caused by age and the flooding waters from beneath the churches. The team rated the amount of surface damage in each quadrant according to a five point scale that ranged from 0 to 4. This condition assessment scale is described in Table 7. The type or types of damage present in significant amounts on the floor were also identified. The team looked for three main types of surface damage, wearing and fading, pitting, and discoloration.

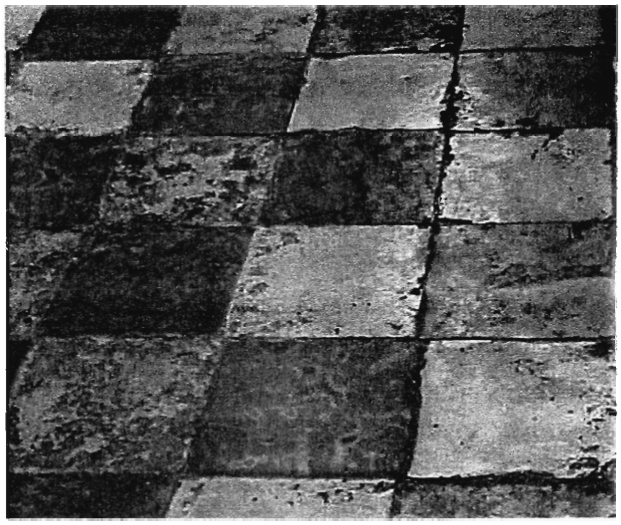


Figure 31: An example of two types of surface damage, wearing/fading and pitting.

Scale	Description
0	Good condition No signs of fading, wear, pitting or discoloration
1	Slightly worn but color and/or design is still visible Noticeable wear, slight pitting, or small areas are discolored
2	Moderately worn and color and/or design is not entirely visible Noticeable wear, moderate pitting, or medium areas are discolored
3	Heavily worn and color and/or design is barely visible Noticeable wear, significant pitting, large areas are discolored
4	Severely worn and color and/or design not visible Noticeable wear, severe pitting, majority of area is discolored

Table 7: The five point condition assessment scale for surface damage

3.4.4. Standard Assessment Formula to Rate Each Floor Quadrant

Once the condition assessment was completed, the data was used to give each floor quadrant a final score. This final score was found using the standard assessment formula our project team developed. This formula takes both surface damage and structural issues into consideration by giving them equal weight. We chose to weigh each structural issue and surface damage equally at the recommendation of several civil engineers. Floors in general are replaced for safety reasons, not for appearance reasons. If a section of a floor suffers from large cracks or holes, the condition is restored by caulking over the problem areas. It is not until the damage level of the floor increases to a point where caulking or other simple solution are no longer effective that renovation is required. Usually a church undergoes an entire restoration at this point and the floor is replaced. Therefore each structural issue and surface damage play equal roles in bringing the floor to this state.

Both the average rating and the worst case floor percentages were used in our calculations. By using both these numbers, we final score represented both severity and frequency. The diagram below explains the final assessment formula for each quadrant.

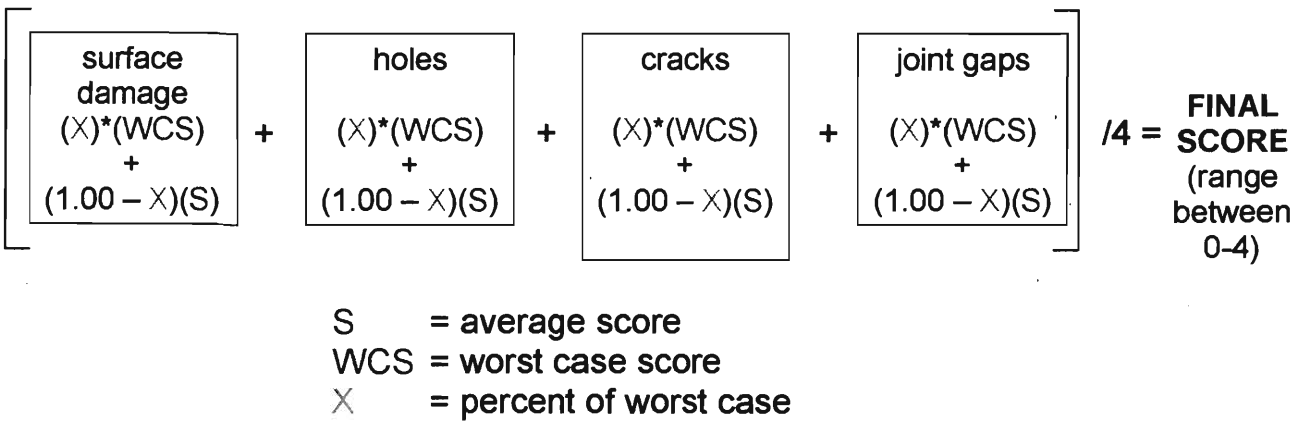


Figure 32: The standard assessment formula used on the floor quadrants and the artifacts

We multiplied the worst case score by the percent of the floor that suffers from that amount of damage, and then multiplied the overall score by the remaining percent of the floor. The sum of these two products provided a final score for each category. As the diagram shows, the four categories are surface damage, holes, cracks, and joint gaps.

Adding these four final scores and then dividing by four provided one complete score for each quadrant that ranged from 0 to 4. A floor with a 0 has little to no damage or issues, and a floor with a 4 scored the highest severity for 100% of the floor in every damage and issue category. This formula provided a way to compare every floor for our analysis.

3.4.5. Identification of Risk Factors

The floors team also examined the church for the pre-determined risk factors of foot-traffic and damage caused from movable objects. The church location was marked if it was either a highly visited tourist attraction or a provincial church. The team also recorded the positions of the walkways, aisles, or other places of high foot traffic inside the church on the floor plan. Special events and masses were also attended to sample the use of the more popular churches. At these events the team recorded the number of people by stationing ourselves with counters at the entrances. The floors team marked the location of mobile objects such as pews, chairs, the pulpit or other furnishings during these events, and whether any special equipment was set up on the floor. This information helped us establish the amount of wear and tear that the average church in Venice suffers due to human causes.

3.5. Documentation of Artifact Characteristics

The second group documented the appearance and condition of the artifacts on the church floors. As the artifacts were discovered, they were assigned a specific artifact code. This code contained the floor code, an underscore, and then a numeric value that starts with 1. (Example: ZACC_A1 is the first artifact in quadrant A of Chiesa di San Zaccaria.)

3.5.1. Collection of Information from Artifacts

The artifacts team began searching the floor for artifacts at the left corner of the back wall that faces the main altar. They proceeded toward the right wall and then turned around and walked back, working their way up to the front in straight lines parallel to the main altar. This ensured that no artifact was missed and

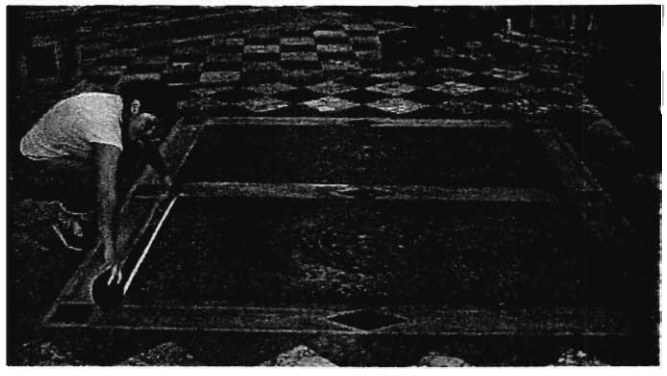


Figure 33: An example of measuring the dimensions of an artifact.

maximized the efficiency of the data collection. Information about the artifacts was recorded onto the form in Appendix D.4.

When the team located an artifact, its position was marked off on the grid of the floor plan for easy entry into the Geographic Information System. The distance from the closest walls to the center of the artifact was then measured. This provided an x and y coordinate for each artifact. The x coordinate was the distance from the gospel wall, and the y coordinate was the distance from the wall that contained the main entrance way. The artifacts team also recorded the dimensions of each artifact.

The team also recorded the magnetic orientation of the artifact at the x and y co-ordinates using a compass. If the artifact had an inscription, the compass was lined up parallel to the straightedge of the text. If it did not, the compass was lined up perpendicular to the highest point of the artwork or design. The number of degrees at the point of orientation was referenced to the original orientation point at the main entrance way.

Each artifact located by the artifacts team was photographed. Pictures were saved in the database as JPEG files named after the artifact code (Example: ZACC_A1.jpg). Engraved inscriptions and specific artwork images like coats of arms required separate photographs. When more than one picture was needed to accurately capture the artifact, we added a lowercase letter after the number starting with "a". (Example: ZACC_A1a.jpg and ZACC_A1b.jpg).

Next, the materials that compose the artifacts were recorded. The artifacts team then wrote a brief description of specific design or artwork before transcribing any text engraved on the artifact.

3.5.2. Transcription of Inscriptions

The 2002 project team developed a system to record the inscriptions on the artifacts and any damages to the text. We used their system and also added our own symbols for different characters we found. We used empty square brackets ([ ]) to designate letters that were missing or illegible. We placed brackets around our

Figure 34: Transcribing, by hand, the engraved inscriptions on the tombs.

guesses of illegible letters or missing letters. Curly brackets ({ }) designated symbols within the text, such as triangles. A caret (^) designated a superscript, and a caron (ˇ) designated a subscript. We used parentheses to designate any artwork that came between the characters, such as a coat of arms. Lastly, we placed quotation marks around any letters that were damaged, but still legible. The chart below shows a clarification of the system we used.

Symbol	Denotation
[ ]	Missing or illegible letters
[ANNO]	Missing or illegible letters guessed to be 'ANNO'
"A"	'A' is damaged but legible
(Coat of Arms)	A coat of arms symbol is located in between text
A (^C)	'A' followed by a superscript 'C'
A (ˇC)	'A' followed by a subscript 'C'

Table 8: The chart of symbols used for text readability

We logged all of the information we collected from the artifacts into the ***Reperti*** section of our database. We also categorized artifacts that contained text in the database by date, event, or historical figure.

3.5.3. Assessment of Artifact Conditions

In order to alert interested parties to the degradation and possible loss of the information on the floors, we developed condition assessments for the artifacts. The artifacts team first recorded the surface damage, structural damage, and text readability on the form in Appendix D.7. They then used that data and a final assessment formula to produce a final score for both the artifacts and their inscriptions. The condition assessment and the final scores were logged into the database in a section called ***Condizioni Reperti***.

3.5.3.1. Surface Damages and Structural Issues

The artifacts team searched the artifacts for both surface and structural damage. Their condition assessment had two goals: first to determine the artifacts that possibly required replacement due to the amount of structural damage; and second to determine the artifacts with information lost or in danger of having information lost due to the amount of surface damage. The specific types of structural damage they looked for were cracks, holes, joint gaps, floor detachment, and floor replacement. Any other types of damage found were also recorded in the notes section of the form. As done with floor quadrants, the amount of structural damage was assessed for the percentage of the artifact that had the worst case, and then for the remainder of it. The different structural damages on the artifacts were rated using the same five point condition assessment scales that were used for the floor quadrants. The artifacts team then used the following five point scale to determine the amount of surface damage:

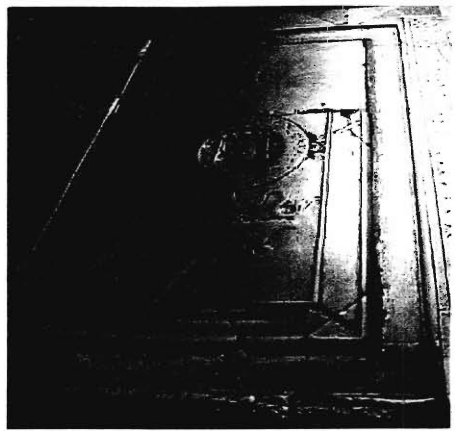


Figure 35: An Artifact suffering from large cracks and surface damage.

Scale	Description
0	Artifact is perfect No signs of any surface damage
1	Artifact is slightly damaged, color/design still visible Noticeable damage and possible need for restoration
2	Artifact is moderately damaged, color/design not entirely visible Need for restoration
3	Artifact is heavily damage, color/design barely visible Need for immediate restoration or conservation
4	Artifact has lost all signs of color/design Artifact is un-salvageable

Table 9: The artifacts' five point condition assessment scale for surface damage

The specific types of surface damage they looked for were wearing, fading, water damage, and pitting. The artifacts team also determined the amount of damage to inscriptions with the following system.

3.5.3.2. Standard Assessment Formula for Inscriptions

The inscriptions contained the most information about the artifact like dates, names, and events. The more damage the artifact was subject to, the less defined the characters.

Once we collected all of our field data on the inscriptions, we used it to rate them according to a standard assessment formula. We developed a formula that determined a score of readability. This score provided a general idea of the status of the conditions of the text inscribed on the floors as the formula used weights to distinguish between perfect, damaged, and unreadable letters.

Figure 36: An example of an inscription of a tomb marker in SS. Giovanni e Paolo

First we recorded a transcription of the engraved letters on the artifact. We then counted the total amount of letters or characters on the artifact. The number of perfectly readable, damaged, or un-readable characters were marked using the readability symbols and then counted. Figure 36 shows an example of this process.

Count Perfect Letters

= 50

Count Damaged Letters

= 5

Count Unreadable Letters

= 3

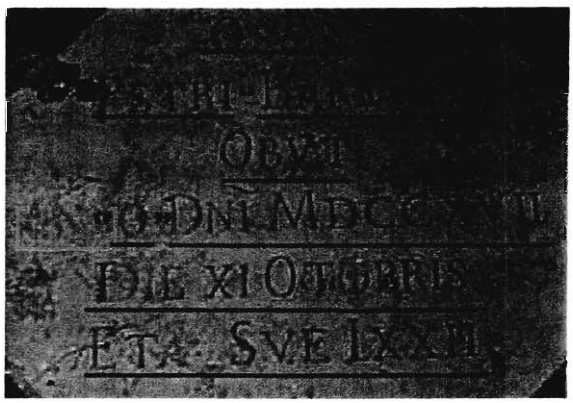


Figure 37: Record number of perfect, damaged, unreadable letters.

We multiplied each number of letters according to the following weights.

Weight	Category
3	Completely unreadable characters
2	Readable but damaged characters
1	Perfectly readable characters

Table 10: The weights given to each damage category of characters

Completely unreadable characters have the greatest surface damage. As there is no chance of retaining any information from the inscription, it has intermediate priority for restoration. Readable but damaged characters have the highest priority for renovation because the information is not completely gone, but is in danger of being lost. The inscriptions containing perfectly readable characters are intact with crisp and sharp letter carving. These characters are given the lowest weight because they do not need any restoration.

We then added the percentage of the three categories out of the total amount of letters to get a score ranging from 100 to 300. Figure 38 shows the results of these calculations for the example tomb marker from SS. Giovanni e Paolo.

Multiply Percent Perfect by 1 **50/58 * 100 *1 = 86.20**

Multiply Percent Damaged by 2 **5/58 * 100 * 2 = 17.24**

Multiply Percent Unreadable by 3 3/**58 * 100 * 3 =** 15.52

Add three products to get final readability score ranging from 100 to 300
86.20 + 17.24 + 15.52 **= 118.96**

Figure 38: Example of a text readability calculation for the tomb marker in Figure 34.

A 100 was a perfect score and meant that no restorations are needed, and a 300 meant that the artifact's information was beyond the point of help. Ratings between 150 and 250 indicated that the text of the artifact was likely in need of restoration.

3.5.3.3. Standard Formula to Rate Each Artifact

Inlaid tombstones and plaques, the main focus of this project, indicate there is information to be found in the remains beneath the floor. The information contained in the artifacts beneath the floor is complemented by the information found on the tombstone above them – artwork, designs, or inscriptions. What is beneath the floor and what is above it contribute equally to the history the artifact contains. Once the surface becomes so damaged that the artwork, design, or inscription is destroyed, a great portion of the historical value of the artifact is lost. However this does not mean that the artifact will be replaced, merely that the information on the artifact is lost.

We used the same assessment formula we created for rating the floor quadrants to evaluate the artifacts. The result is a score ranging from 0 to 4 that evaluates the total condition of the artifact, structural issues and surface damage. Our formula weighs each category equally because again the likely hood an artifact will be replaced depends on the total amount of damage. These final scores were used by our project team in our analysis section.

3.6. Demonstration of the Usefulness of our Findings

The third objective of this project, based on the data collected in the field, was to demonstrate the usefulness of our findings. We have highlighted the information content within the artifacts and identified possible archeological opportunities. Our analysis provides valuable information to the Archeological Superintendence about several issues concerning the churches: churches in locations vulnerable to high tides, the primary causes of damaged artifacts, the potential of artifacts hidden beneath the raised floors, and the churches that face imminent re-finishing of their floors. The overall goal is identifying the churches with visible artifacts or hidden treasures, so that they can be flagged as possible archeological digs.

3.6.1. Information Content of Artifacts

After concluding our extensive collection of field data, we used content analysis to examine the historical importance of any artifacts. We extracted the names, dates, and events engraved in the inscriptions in order to create a foundation of information for further historical research. Furthermore we entered descriptions of the images and artwork that appeared on the artifacts into the database so interested parties can find specific images using keyword searches. Our research provides a foundation for further, more detailed investigations of specific portions of Venice's history. We made all aspects of the data we collected from the churches available to the general public through our database so it can be used in a myriad of research opportunities.

3.6.2. Identification of Archeological Opportunities

The main purpose of this report to the Archeological Superintendence was to identify probable sites of archeological opportunity. Since the Archeological Superintendence does not have jurisdiction over the churches to open dig sites, they must wait for the church to begin renovations and permission from the church administration before they have a chance to carry out archeological digs.

In order for the Archeological Superintendence to conduct these digs, we have developed a means for identifying churches that are vulnerable to restoration in the near future. We also have identified those churches that have already undergone recent reconstruction, where most of the artifacts and the chance to dig under the church have been lost.

3.6.2.1. Possible Restoration in Churches

To identify floors or artifacts at risk to restoration we used the results of our condition assessments. For surface damage and the structural issues (cracks, holes, and joint gaps) we rated with our five point scale, we developed a three level rating system based on the scores on the scale. Table 11 explains the division of the three condition levels, as previously defined in the Methodology.

Level	Score
Buone	0.00 – 1.2499
Medie	1.25 – 2.7499
Cattive	2.75 – 4.00

Table 11: Separation of the three condition levels based on the five point condition assessment scales

Our three conditional levels are *Buone*, *Medie*, and *Cattive*. *Buone* is the lowest condition level and contains the least damaged floor quadrants and artifacts. The range of this level is 0.00 to 1.2499, or the bottom 31.25% of the five point scale. According to our assessment scale, the artifacts that fall into this category contain little to slight damage. The floors are in good condition and not likely candidates for immediate renovation. Therefore the items in this level are not the main focus of the Archeological Superintendence.

The second level is *Medie* and contains the floor quadrants and artifacts that contain average damage. The range of this level is 1.25 to 2.7499 or the middle 37.5% of the five point scale. We made the middle level range a little larger than the other two levels so that it would contain the artifacts and floors that were slightly less than average, average, and slightly greater than average. The result is that our condition level system highlights the difference between the two opposite sides of the spectrum and the middle ground. The artifacts in *Medie* are damaged but salvageable. The quadrants in *Medie* suffer from intermediate surface damage or structural issues. While there is a possibility of renovation, the need is not pressing. The floors are more

likely to undergo restoration then renovation; that is have the damages fixed on the surface rather then the entire floor replaced. These are the floors that should be noted to be investigated in the future for further development.

The level of the most interest to the Archeological Superintendence is *Cattive*. This category contains the top 31.25% of the scale and ranges from 2.75 to 4.00. The artifacts that fall into this level are damaged and not salvageable so much of the information on them is already lost. The floor quadrants in this category suffer from high to severe damage and are the most likely candidates for renovation. These floors are the main focus of the Archeological Superintendence and should be monitored for further development.

As we recorded the percent of the floors and artifacts that were replaced and detached, we adapted our three-level system to apply to percentages. The three levels for these structural issues are defined in Table 12.

Level	Percent
Buone	0.00 – 9.99%
Medie	10.00 – 19.99%
Cattive	Greater than 20%

Table 12: Separation of three levels for floor detachment and replacement.

We also adapted the three-level system to apply to text readability. The division of levels was based on the final text readability scores calculated using the weights of each damage category. Table 13 explains the division of levels by readability score.

Level	Text Readability Score
Buone	100 – 149.99
Medie	150 – 249.99
Cattive	250 – 300

Table 13: Separation of damage levels for text readability

As with the damage levels assigned according to the five point assessment scale, the middle category Medie contains a larger range of numbers. Again this is to differentiate the opposite sides of the spectrum from the middle ground.

In addition to reviewing the condition assessments, we also examined the height of the floors. Churches with low floor heights are more likely to have original floors that contain visible artifacts. Churches with high floor heights are more likely to have been replaced at some

point and hold artifacts hidden beneath the top level. We compared the heights of the church floors to the final assessment scores to determine whether there was a correlation between height and damage. We compared the heights of the church floors and their locations to the known flood zones to determine the churches threatened by the *acqua alta*. The comparison of the floor height and the flood zone location showed which floors were in danger of yearly flooding and therefore susceptible to reconstruction.

After we identified the risks the floors and artifacts possess, we drew conclusions about the potential of churches for restoration and excavation sites. The rating systems we developed identified the churches we believe contain salvageable artifacts and undisturbed grounds. If the church begins construction or restoration the Archeological Superintendence has the option of working with the church administration to recover and restore artifacts. The involvement of the Archeological Superintendence in the restoration and renovation process will ensure that the information the floors may contain and hide will not be overlooked and lost.

3.6.2.2. Churches that have Undergone Restoration

To identify churches that have already undergone restoration by the church administration, we searched for situations opposite of those of the candidates for restoration. We looked for churches with floors that have newer or undamaged floors as those characteristics indicate a restoration has occurred. We examined the floor heights again, looking for high floors that had possibly been raised floors. We searched for correlations between floor heights and church floors with little damage. We also looked for correlations between the number of artifacts and the amount of damage on the floor. The team researched any available church documents and surveyed the priests to determine if the church was redone in the past, and if any artifacts were removed.

4. Results

This project assisted the Archeology Superintendence in examining the churches of Venice for information content and condition assessment. During our project we completed research on the current floors within churches in Castello and San Polo. We collected basic information from 17 churches in Castello and 5 churches in San Polo, and conducted condition assessments on 291 quadrants that were formed from these 22 floors. We also completed examinations of the 660 artifacts located in these churches, recorded information and performed condition assessments.

4.1. Church Floor Characteristics

We examined the churches' floors for information content and assessed their condition. Out of the 22 churches we completed in Castello and San Polo we came across many similar patterns, materials and set up of tombs. There were also many differences that made each church unique, such as the orientation of entrance, specific designs on special areas of the floors, the layout of chapels and altars, and the layout of side rooms. The floors squad observed that the most common floor style was the red and white checkered pattern, consisting of red Verona marble and white Trani marble, or some other variation of this pattern constructed from the same materials.

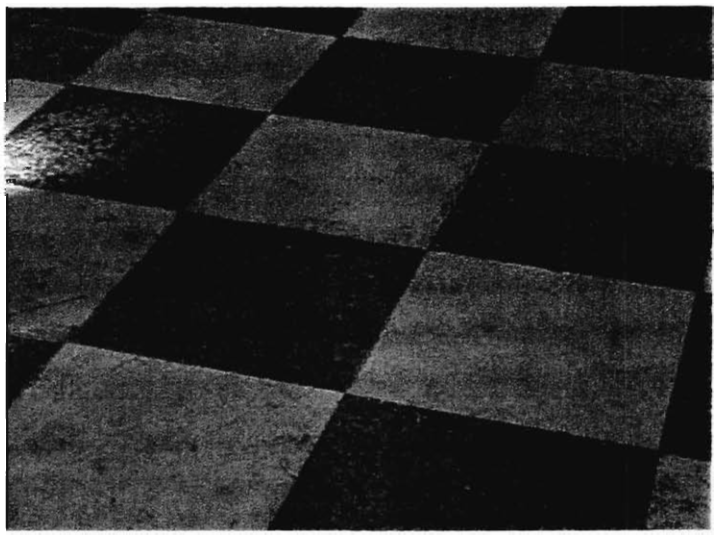
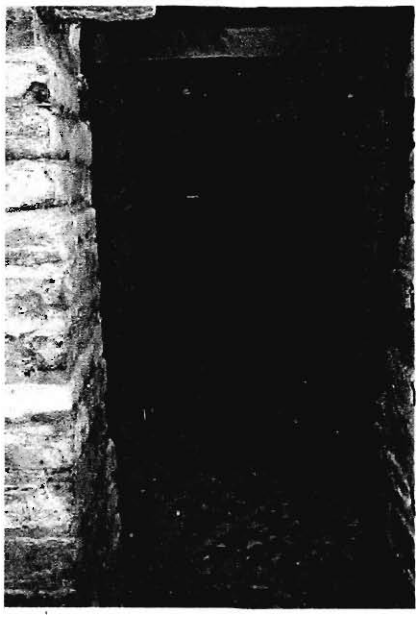


Figure 39: Checkered red Verona marble and white Trani marble

Out of the 22 churches that were visited, 19 had this checkered pattern while three had some variation on it. Of all the floors that were constructed in this pattern, we never discovered any artifact dating back earlier to the 16th century, which leads us to believe that there could have been previous floors beneath the current floor if the church is much older. An example of this is the Chieas di San Zaccaria, where the previous 12th century floor was built



upon with brick columns to lay the foundation for the new floor as shown in Figure 40. From this example we believe that many floors that contain this newer 16th century or later pattern have an older 12th century, or possibly earlier, Venetian floor that may have been built upon.

This is not always the case, often times the current floor of this red and white marble pattern was either laid directly on top of an older layer, and the tombs were either raised or covered up. Other possibilities were that the floor tiles were stripped off of the floor of the church, while the tombs remained, and the floor was re-constructed with a newer floor.

Figure 40: An example of a raised floor in San Zaccaria

4.1.1. Floor Information

Many of the floors we measured suffered from what we call a wave effect. This effect is the variation of floor elevations for the different quadrants within the church, giving the floor a ripple effect. Figure 41 shows an example of this effect in the Chiesa dei SS. Giovanni e Paolo and the nearby Chiesa S. Maria dei Dereliti.

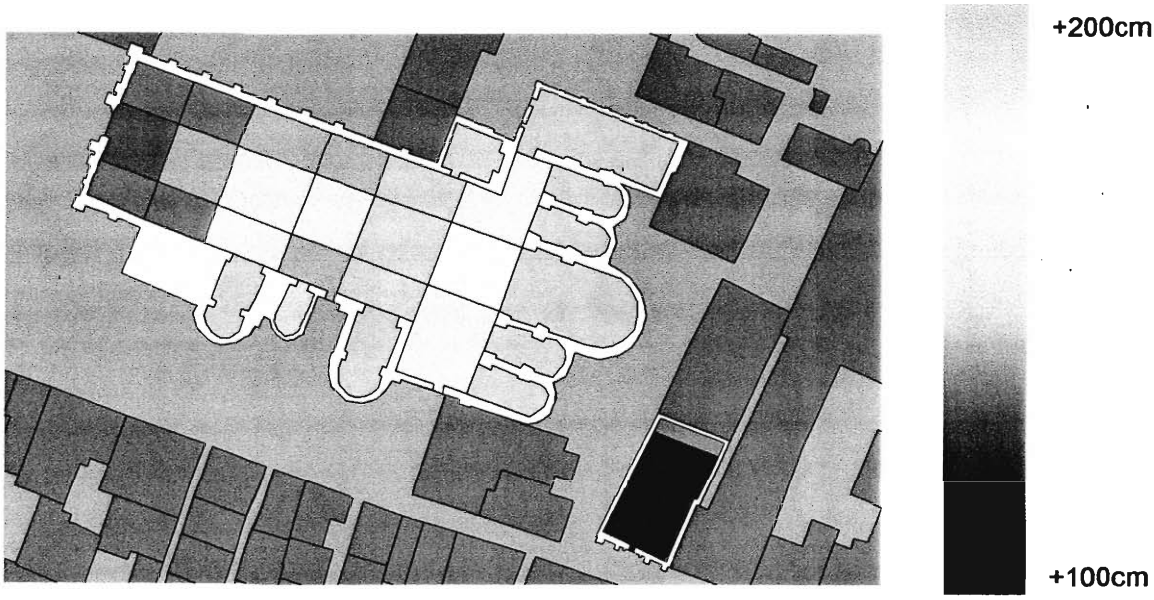


Figure 41:The variation of floor elevation in quadrants in Ss. Giovanni e Paolo and S. Maria dei Dereliti

The highest quadrants of the churches are the chapels and altars because they are raised off the main floor by sets of stairs. This made the main floor the lowest quadrants in the church typically. Figure 42 shows an example of a raised floor quadrant in a chapel in S. Francesco de la Vigna. S. Francesco de la Vigna was one of the few churches that also contained side chapels or rooms with steps going down. Any quadrant that was raised or lowed by steps was not considered the main floor. We then found an average elevation of the main floor. The resulting average elevations per church are shown in Figure 43. These heights will be important in our analysis of the threats to the church from excessive flooding.

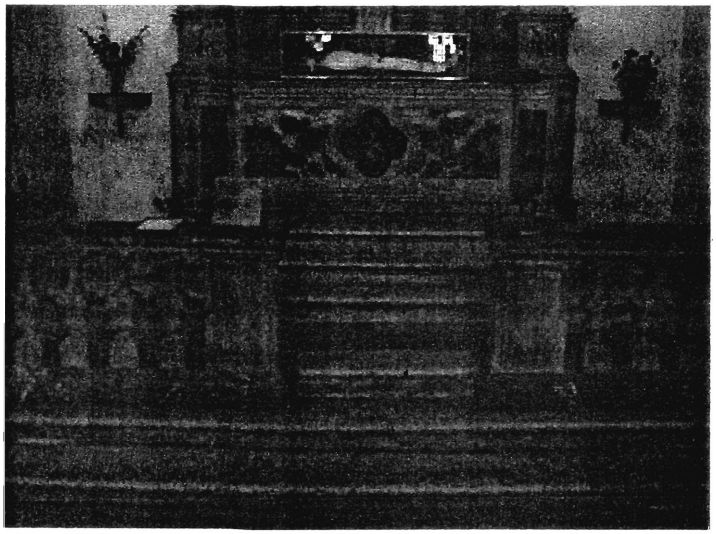


Figure 42: An example of a raised floor in SS. Francesco de la Vigna

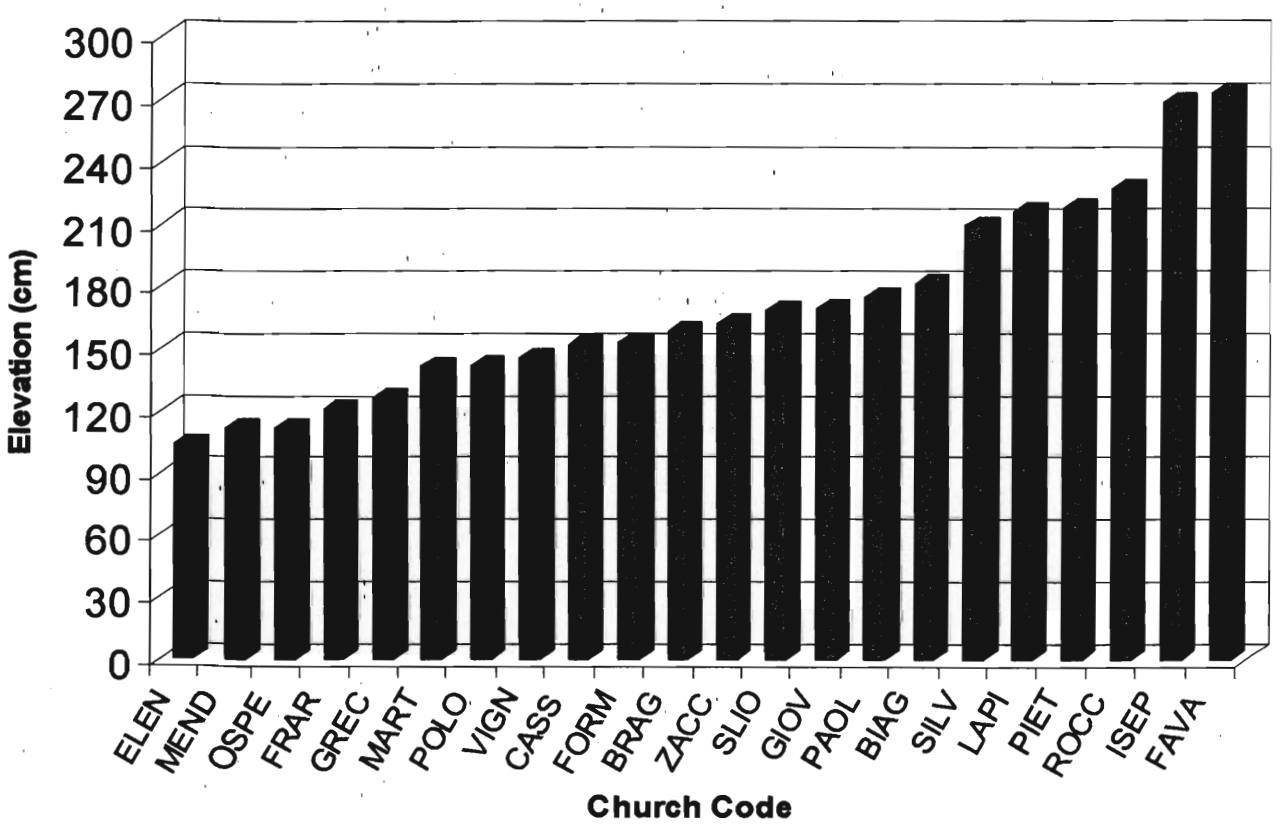


Figure 43: Average elevations of the main floors of all the churches (a list of church codes and names is in the Appendix)

We chose to have three categories of elevation based on the occurrences of floods at certain heights. These elevation cutoffs were less than 130 cm, between 130 cm and 150 cm and greater than 150 cm. Figure 44 shows the percentage of churches that fall into each of the three categories.

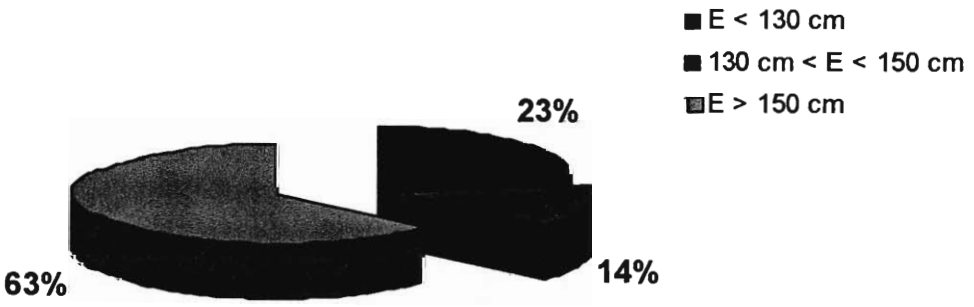


Figure 44: The percentages of churches that fall into the three elevation (E) categories

Of all the church floors we assed, they all had some variation in their floor height. In our analysis section we considered the different causes of this effect. We believe that this difference in height between quadrants provides insight to whether the church has been resurfaced.

An interesting characteristic we observed in some churches was that the height between steps leading up to the altar was different from the height from main floor to the first step. We thought this could be an indication that the floor was either raised or layered, however as we had no evidence to back up this conclusion we could not perform any analysis. The heights were recorded into our database in case they can be used in the future.

4.1.2. Floor Conditions

A condition assessment of the church floors was one of the main components of this project. The results of the assessments were used to analyze the current condition of the existing church floor and to designate the condition of the churches. Each floor quadrant was given a worst case rating and an overall rating by floor percent for each structural issue and surface damage. These two ratings were combined (as shown in the first step of the final assessment formula) to produce a final score for each quadrant. Averaging the final scores of all the quadrants in the church produced a final score for the whole church which is demonstrated through example in this section.

As mentioned in the methodology, the final scores given for structural issues and surface damage were based either on a five point scale or percentage. We placed each individual church floor into one of the three damage levels described in the Methodology for every structure issue as well as surface damage. The individual results for each individual church were logged in the *Condizione Valutazione dei Pavimeni* section of our database and stored in excel files for our analysis section. The tables we created from the excel files are located in the results Appendix.

4.1.2.1. Structural Damage

To demonstrate the results for each category of structural damage, we took the average of the quadrants' scores to produce one number per church. We then divided the churches into the three condition levels explained in our methodology based on the final average scores they received. We put our more detailed results into our results appendix.

Cracks

Figure 45 shows the results of our assessment of the churches in Castello for cracks.

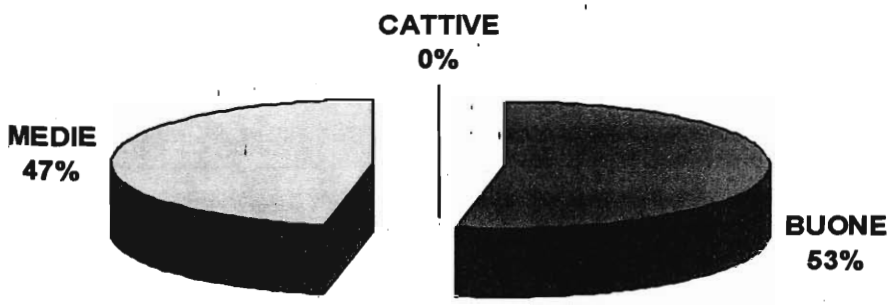


Figure 45: Percentages of churches in Castello in condition level for cracks

As the pie chart shows, 53% of the churches rated on a buone condition level overall, 47% of the churches rated a medie condition level overall, and 0% of the churches rated a cattive condition level. Figure 46 shows a map of the Castello sestere with the churches color coded according to their condition level for cracks.

Figure 46: Churches of Castello showing presence of cracks for the three damage levels

The results for cracks for all of the churches in Castello are listed in the results appendix.

Figure 47 shows the results of our assessment of the churches in San Polo for cracks.

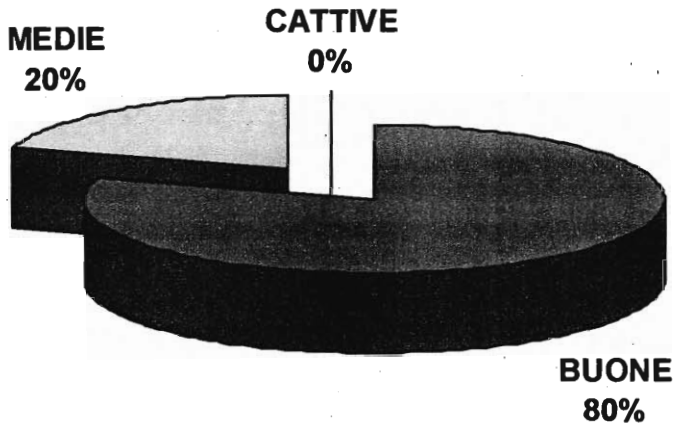


Figure 47: Percentages of churches in San Polo in each condition level for cracks

As the pie chart shows, 80% of the churches rated on a buone condition level overall, 20% of the churches rated a medie condition level overall, and 0% of the churches rated a cattive condition level. Figure 48 shows the locations of the churches in the San Polo sestere and color codes them according to their condition level for cracks.

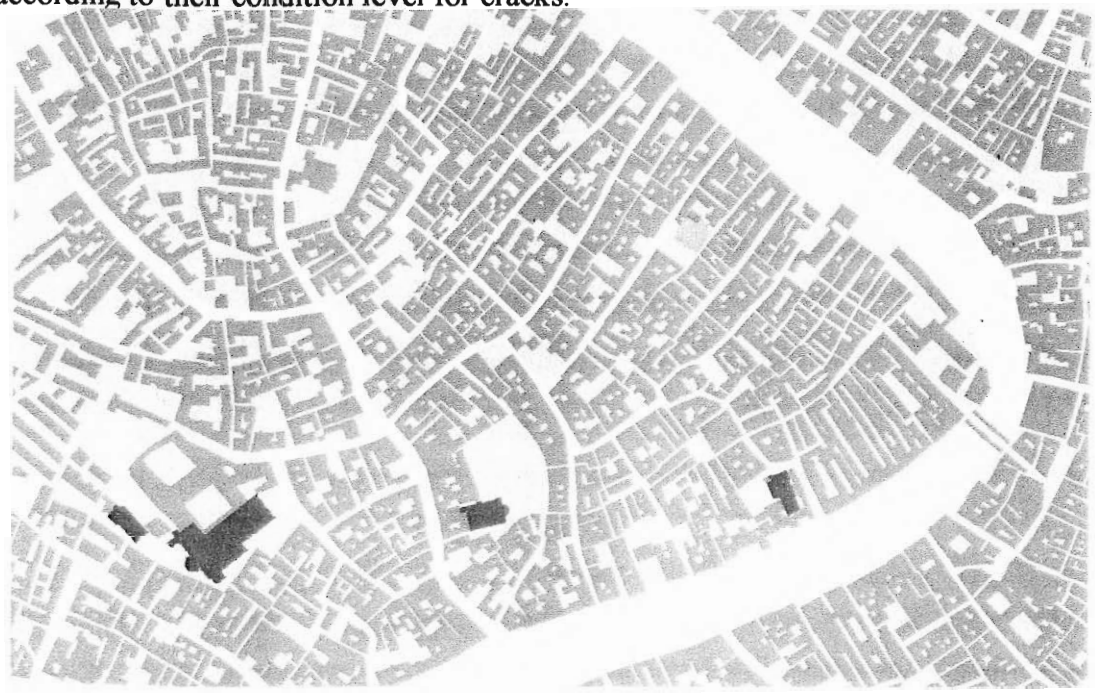


Figure 48: Churches of San Polo showing presence of cracks for the three damage levels

Holes

Figure 49 shows the results of our assessment of the churches in Castello for holes.

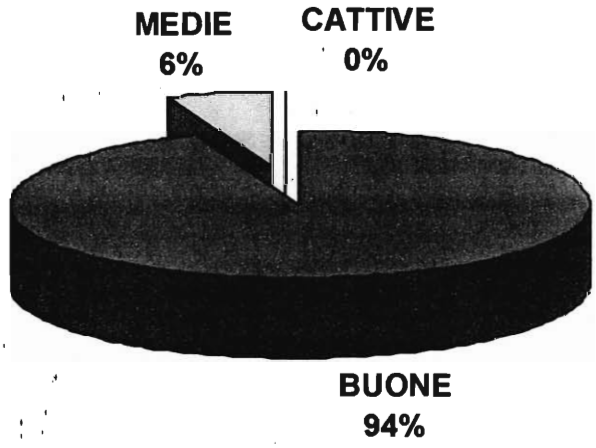


Figure 49: Percentages of churches in Castello in each condition level for holes

As the pie chart shows, 94% of the churches rated on a buone condition level overall, 6% of the churches rated a medie condition level overall, and 0% of the churches rated a cattive condition level. Figure 51 shows a map of the Castello sestere with the churches color coded according to their condition level for holes.

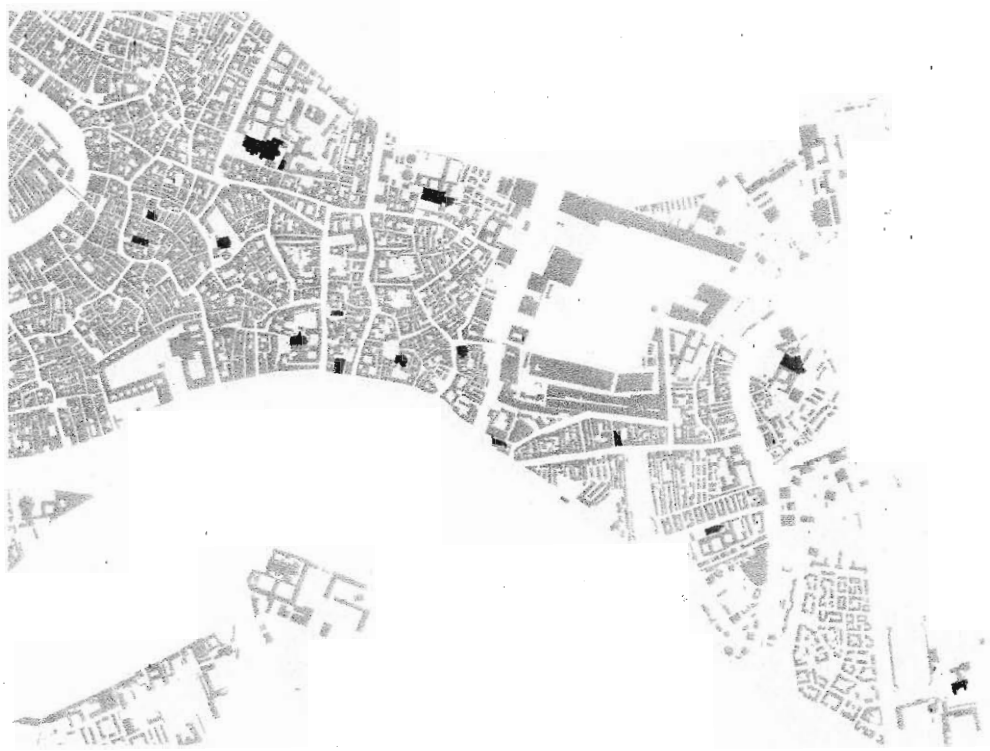


Figure 50: Churches of Castello showing presence of holes for the three damage levels

The results for holes for all of the churches in Castello are listed in Appendix E.

Figure 51 shows the results of our assessment of the churches in San Polo for holes.

Figure 51: Percentages of churches in San Polo in each condition level for holes

As the pie chart shows, 100% of the churches rated on a buone condition level overall and none fell into the medie or cattive range. We did not create a map showing the results of the hole assessment for San Polo because all the churches ranked the same. The detailed results of the assessment of the San Polo churches for holes are located in in Appendix E.

Joint Gaps

Figure 52 shows the results of our assessment of the churches in Castello for joint gaps.

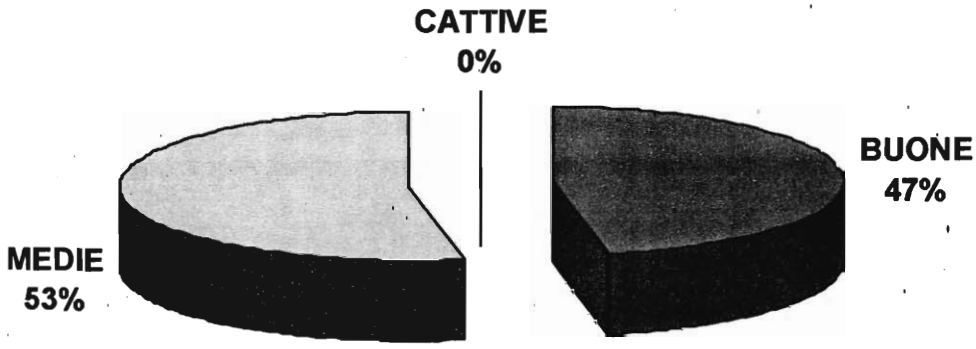


Figure 52: Percentages of churches in Castello in each condition level for joint gaps

As the pie chart shows, 47% of the churches rated on a buone condition level overall, 53% of the churches rated a medie condition level overall, and 0% of the churches rated a cattive condition level. Figure 53 shows a map of the Castello sestere with the churches color coded according to their condition level for joint gaps.

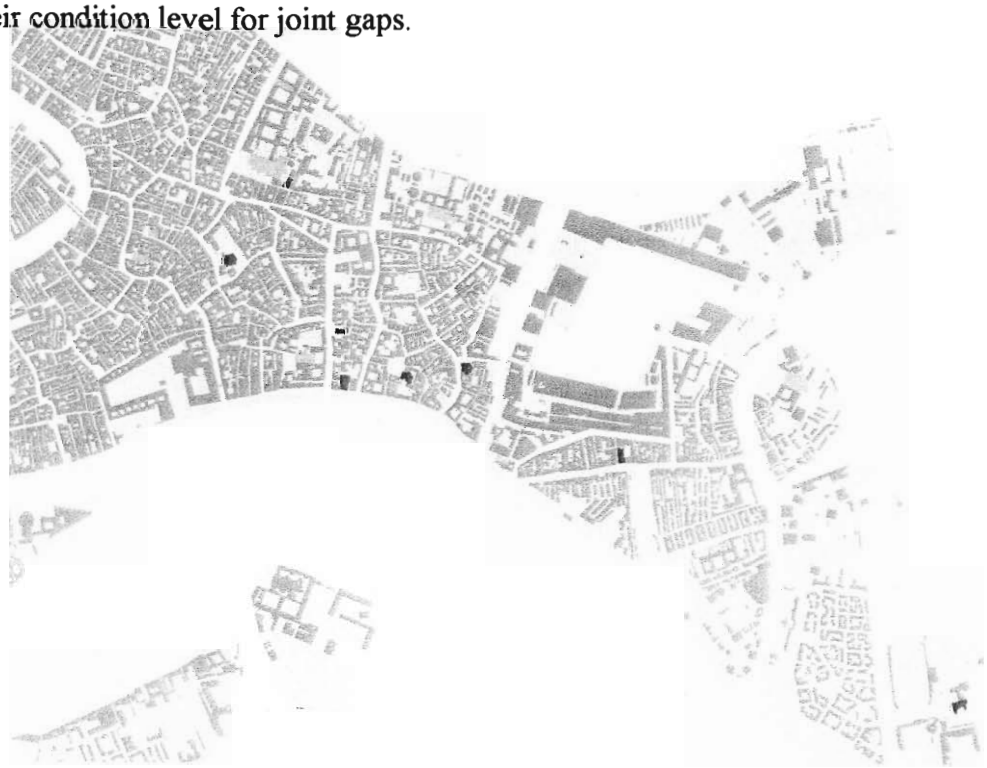


Figure 53: Churches of Castello showing presence of joint gaps for the three damage levels

The results for joint gaps for all of the churches in Castello are listed in Appendix E.

Figure 54 shows the results of our assessment of the churches in San Polo for joint gaps.

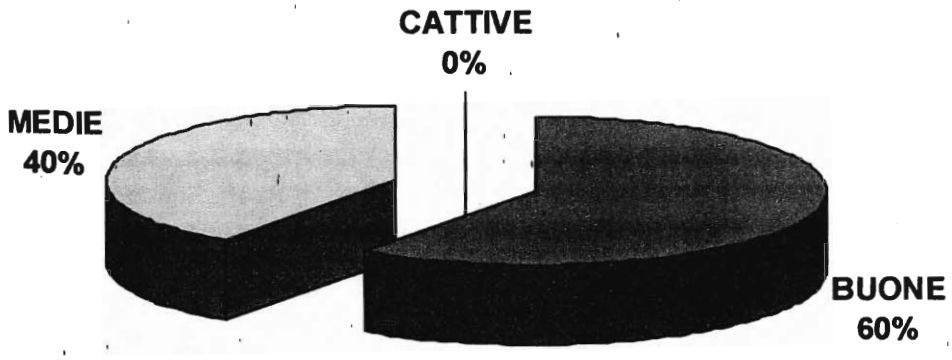


Figure 54: Percentages of churches in San Polo in each condition level for joint gaps

As the pie chart shows, 60% of the churches rated on a buone condition level overall, 40% of the churches rated a medie condition level overall, and 0% of the churches rated a cattive condition level. Figure 55 shows the locations of the churches in the San Polo sestere and color codes them according to their condition level for joint gaps.

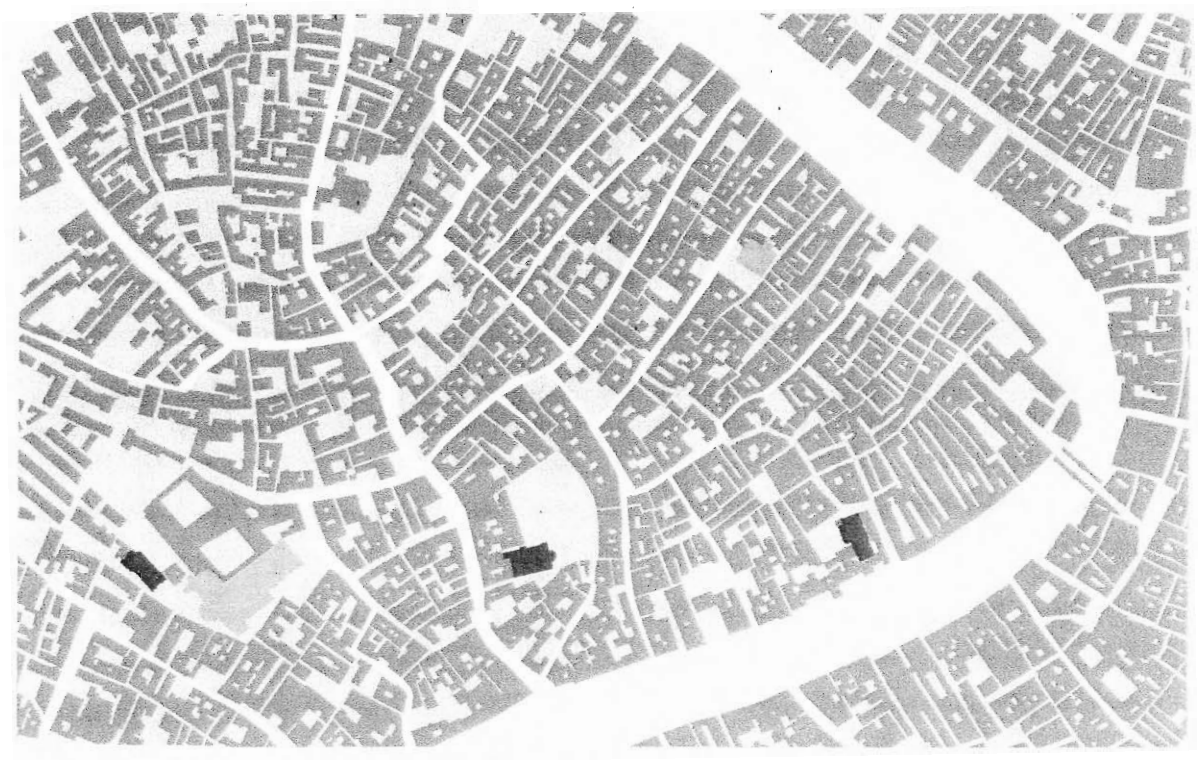


Figure 55: Churches of San Polo showing presence of joint gaps for the three damage levels

The detailed results of the assessment of the San Polo churches for joint gaps are located in Appendix E.

Floor Detachment

For each church, the percent of floor detachment was recorded per quadrant. Combining the number of quadrants and the percentages of floor detachment per quadrants produced a final percentage for each church. Table 11 shows the percentages of the floors that are detached by church.

Church Code	Detachment
BIAG	0
BRAG	16.7
CASS	0
ELEN	0
FAVA	0
FORM	0
FRAR	0
GIOV	1.724
GREC	0
ISEP	1
LAPI	2.83
MART	0.278
MEND	0
OSPE	0
PIET	0.294
PAOL	0
POLO	0
ROCC	0
SILV	0
SLIO	0.357
VIGN	0.15
ZACC	4.33

Table 14: The percentage of floors that suffer from detachment.

The detachment of the churches as a whole were also compared and rated on a scale using the three levels of buone, medie, and cattive. Buone ranged from 0 to >5%, medie ranged from 0 to 10 %, and cattive was anything above 10 %. The pie chart below shows the results of this comparison.

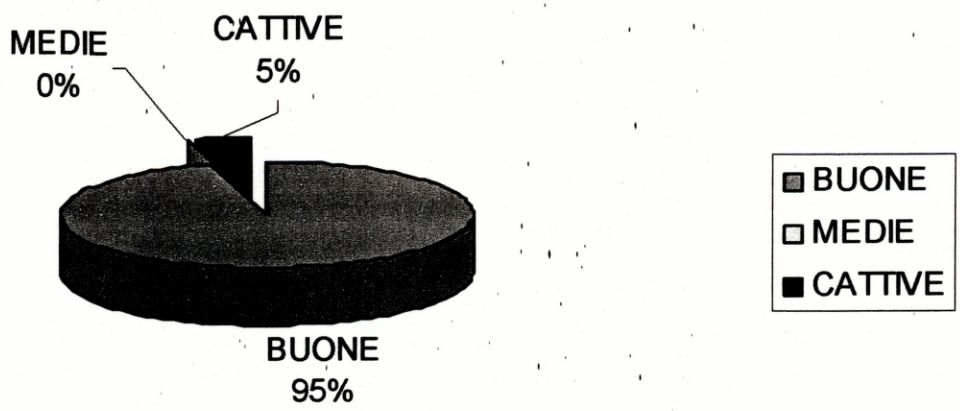


Table 15: Percent of Detachment in Churches

Floor Replacement

For each church, the percent of floor replacement was also recorded per quadrant. Table 11 shows the percentages of the floors that are detached by church.

Church Code	Replacement
BIAG	1.79
BRAG	0.05
CASS	5.45
ELEN	1
FAVA	4
FORM	2.7
FRAR	0
GIOV	6.034
GREC	0
ISEP	3
LAPI	4.17
MART	2.78
MEND	0
OSPE	0
PIET	0.294
PAOL	2.5
POLO	3.077
ROCC	0
SILV	2.5
SLIO	3.214
VIGN	4.25
ZACC	11.4

Table 16: Percentage of each church's floor that are replaced.

The replacement of each floor was also placed into the same buone, medie, cattive range that floor detachment was assessed in. The following chart shows the results of this comparison.

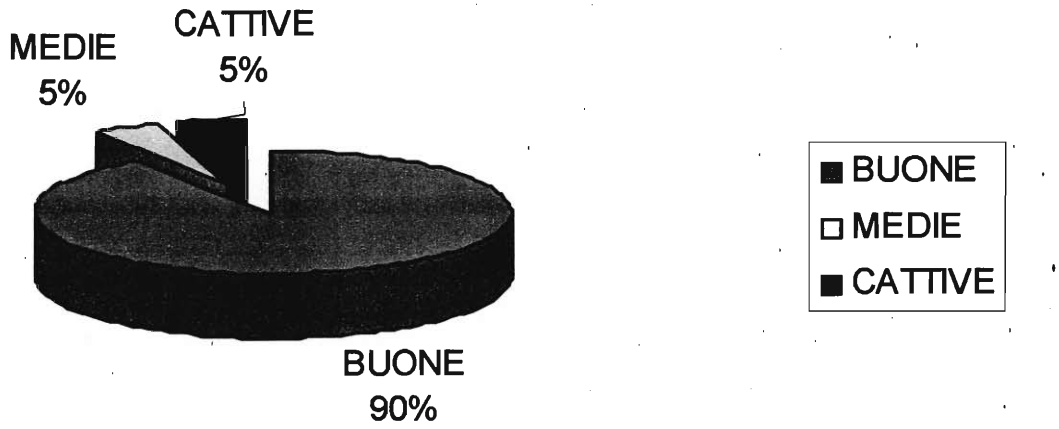


Table 17: Total Percentage of Floor Replacement

4.1.2.2. Surface Damage

Figure 54 shows the percentage of churches in Castello in each condition level for the amount of surface damage to the floors of the churches.

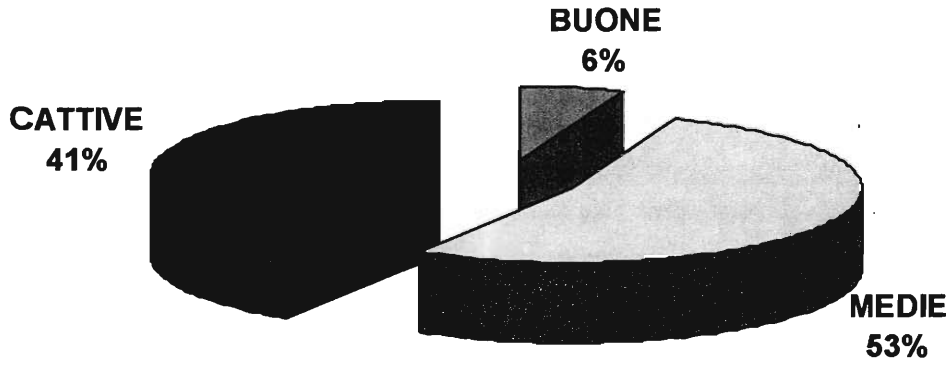


Figure 56: Percentages of churches in Castello in each condition level for surface damage

As the pie chart shows, 6% of the churches rated on a buone condition level overall, 53% of the churches rated a medie condition level overall, and 41% of the churches rated a cattive condition level. Figure 55 shows a map of the Castello sestere with the churches color coded according to their condition level for surface damage.

Figure 57: Churches of Castello showing presence of surface damage for the three damage levels

The detailed results for surface damage for all of the churches in Castello are listed in of the Appendix E.

Figure 56 shows the results of our assessment of the churches in San Polo for surface damage.

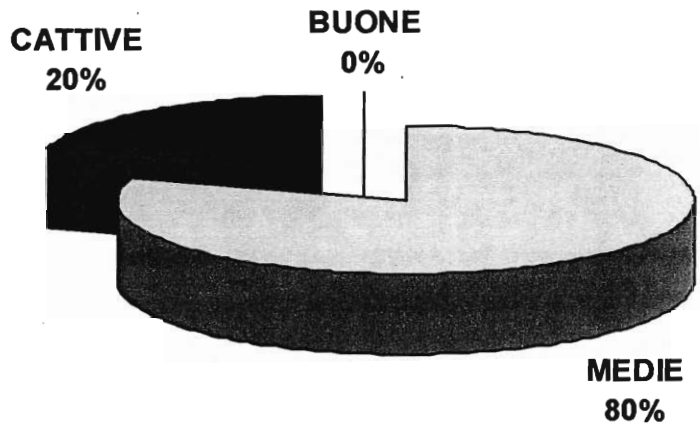


Figure 58: Percentages of churches in San Polo in each condition level for surface damage

As the pie chart shows, 0% of the churches rated on a buone condition level overall, 80% of the churches rated a medie condition level overall, and 20% of the churches rated a cattive condition level. Figure 57 shows the locations of the churches in the San Polo sestere and color codes them according to their condition level for joint gaps.

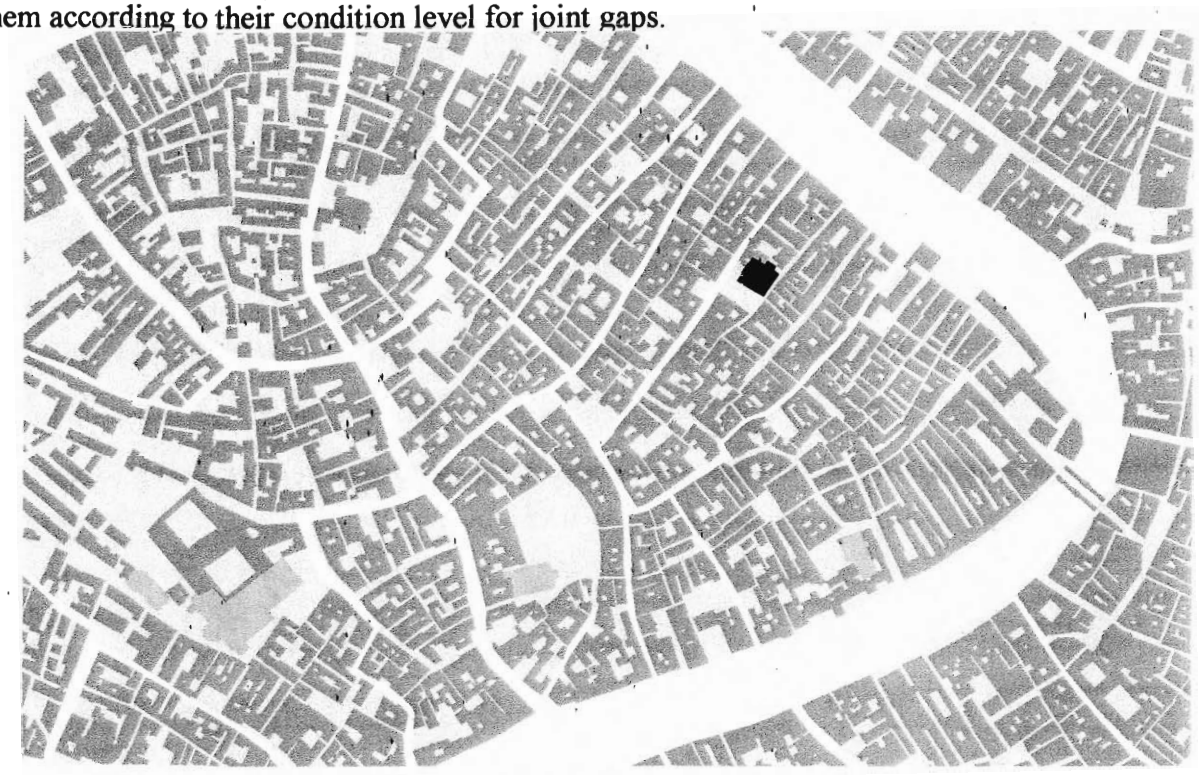


Figure 59: Churches of San Polo showing presence of surface damage for the three damage levels

The detailed results of the assessment of the San Polo churches for joint gaps are located in in Appendix E.

Our condition assessment results show that the churches tend not to differ greatly in the amount of cracks, holes, and surface damage on the floor. The one category that has a wide range of scores is surface damage. This is the category we chose to examine more closely in our analysis section. The five worst churches for surface damage are S. Lazzaro dei Mendicanti, S. Elena, S. Biagio, S. Giorgio di Greci, and Casiano. Figure 58 and Figure 59 show these churches and their average surface damage scores.

Figure 60: S. Lazzaro dei Mendicanti, S. Elena and S. Biagio (left to right)

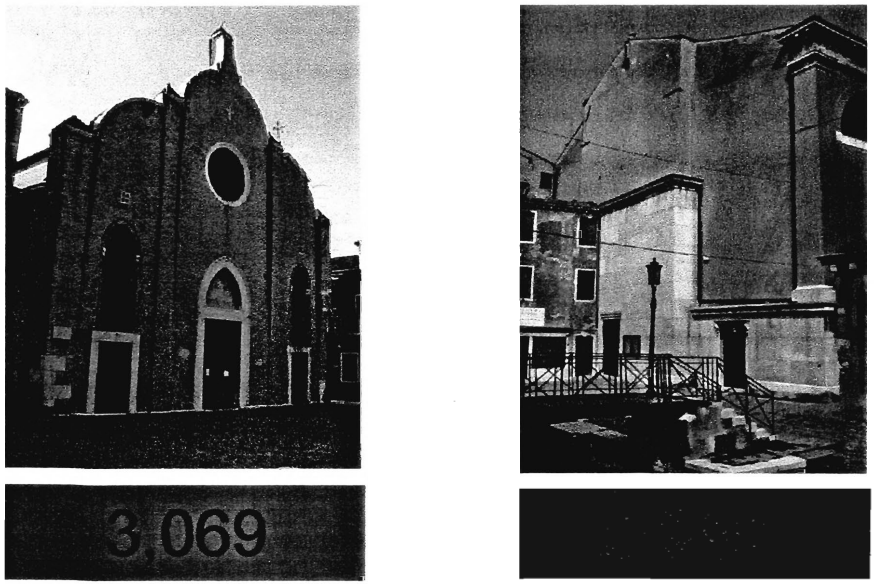


Figure 61: S. Giorgio di Greci and Cassiano (left to right)

The surface damages we looked for were wearing/fading, discoloration, pitting, or other. The most common form of other surface damage was salt crusting. The churches as a whole were identified with the percentage of the type of surface damage. These were further evaluated into the percentage of surface damage per quadrant. The chart below shows the total percentage of wearing and fading, pitting and discoloration in all the quadrants.

Percentage of Church Quadrants		
Wearing/Fading	Pitting	Discoloration
95	90	5

Table 18: Percentage of church quadrants with each type of surface damage

The churches with the worst surface damage in each individual category ended up being 100% of the quadrants to contain the type of damage. For wearing and fading, the most common type of surface damage, the churches with all of its quadrants affected were: San Cassiano, Sant' Elena, Chiesa de la Fava, Chiesa di La Pietá, Chiesa di San Lazzaro dei Mendicanti, Chiesa di Santa Maria dei Dereliti, San Pietro, San Polo, San Rocco, San Silvestro, San Lio, and San Zaccaria.

For the category of pitting, the second most common type of surface damage, there were only 9 churches to have 100% of its quadrants contain pitting. These churches included, San Cassiano, Chiesa de la Fava, San Isepo, San Lazzaro dei Mendicanti, Santa Maria dei Dereliti, San Pietro, San Silvestro, San Lio and San Zaccaria.

The category of discoloration was the only category to have only one church whose entire quadrants contain the specific type of surface damage. This one church was San Lio which also appeared in the previous two listings for types of surface damage.

4.1.2.3. Final Assessment

Once all the data was collected for all of the churches, the final assessment formula was applied to each church floor. The final assessment scores for the churches are shown in Figure 60.

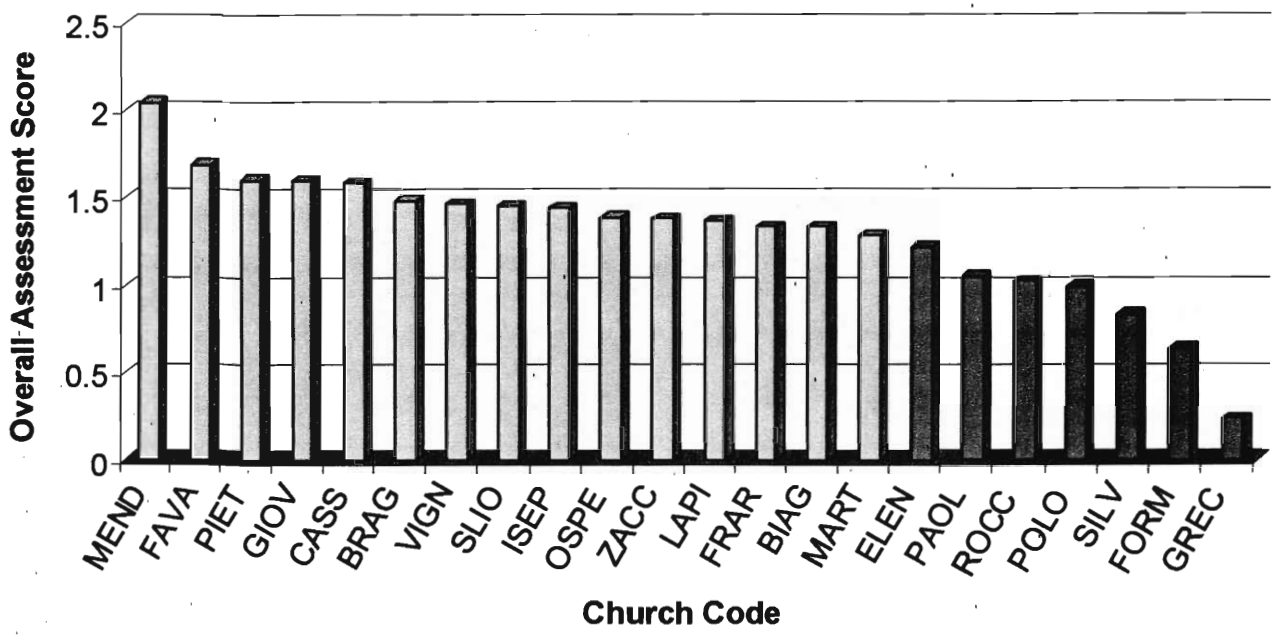


Figure 62: Final assessment scores for all the churches (a list of church codes is in Appendix B)

From this chart we can see that the majority of the churches fall into the medie condition level. S. Lazzaro di Mendicanti contains the most surface and structural damage overall. This church also has the greatest amount of surface damage, which shows that the floor of this church is in the worst condition overall.

4.2. *Artifact Characteristics*

We found 660 artifacts in the 22 churches of Castello and San Polo. There were only three churches with no artifacts, S. Maria Formosa and S. Elena in Castello and S. Silvestro in San Polo. Ss. Giovanni e Paolo contained the most artifacts at 214 and S. Biagio contained the fewest number of artifacts at only one. Larger churches typically had the most artifacts, for example Giovanni e Paolo had 214 artifacts and in its 29 quadrants and Frari had in its 27 quadrants. The smaller churches like Greci had much fewer artifacts, with only 5 artifacts on its 4 quadrants. The table below shows the number of artifacts in each church.

Church Code	Number of Artifacts
GIOV	214
FRAR	67
FAVA	56
VIGN	43
PIET	42
ISEP	35
ZACC	33
SLIO	31
BRAG	30
MART	25
PAOL	21
OSPE	14
LAZZ	13
POLO	12
LAPI	9
ROCC	7
GREC	5
CASS	3
BIAG	1
ELEN	0
FORM	0
SILV	0
TOTAL	**661**

Table 19: The number of artifacts in each church

We found three main types of artifacts: inlaid tombstones, tomb markers and plaques. Figure 63 shows an example of a tomb. Tombstones were some of the most beneficial finds because they contained a wide variety of information. Most contained inscriptions describing the deceased. We found that the more important and influential citizens of Venice and the church personnel tended to be buried on the main altar.

Figure 63:An example of an inlaid tombstone from S. Pietro

Tombs were generally rectangles, but some were square and octagon shaped. They contained a variety of artwork and design; the tomb in Figure 63 has a border of mixed pieces of different colored marble. Many of the larger tombs contained intricate borders, designs, or coats of arms. We documented each of these with photographs and physical descriptions. And example of a coat of arms found on a tomb is shown in Figure 64. This coat of arms was found on a family tomb in Ss. Giovanni e Paolo. The design contains dolphins, which correlates to the name of the family on the tomb "Dolphinus".

Figure 64: A Venetian coat of arms portraying dolphins on a tomb in Ss. Giovanni e Paolo

In the older churches we found tomb markers. Figure 65 shows an example of a tomb marker. These are floor tiles or sections of the floor that mark the place of a tomb that is located under the main floor. When the floors were replaces, the original tombs were covered up and tomb markers were placed on top. Tomb markers don't have the artwork and design that tombs have, however they are important because they signal that there is another floor layer underneath the main floor. Tomb markers also have inscriptions on them describing the people in the

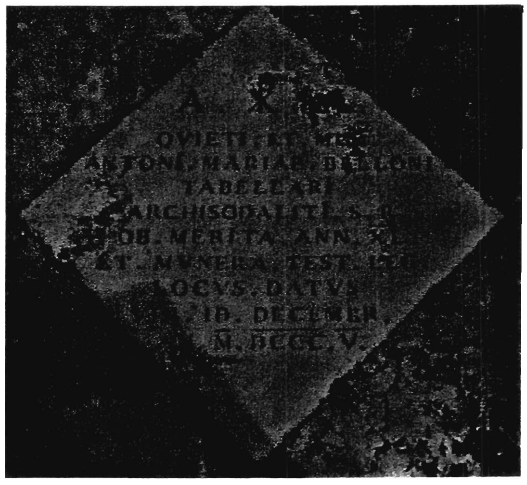


Figure 65: An example of a tomb marker in S. Pietro

tombs they mark. All of this information was logged into our database.

The last type of artifact we found was plaques. These plaques usually marked important dates such as the consecration of the church.

The most simple artifacts were composed of one material, however many artifacts were composed of more than one material. The most common materials we found on the artifacts were marble and stone. The most common marble color and design was the red Verona marble and the most common stone color and design was the white Istrian Stone. Figure 66 shows a sample artifact with the materials composing it labeled. The most common materials used on the tombs were Verona marble, Istrian Stone, and a Iseo black stone.

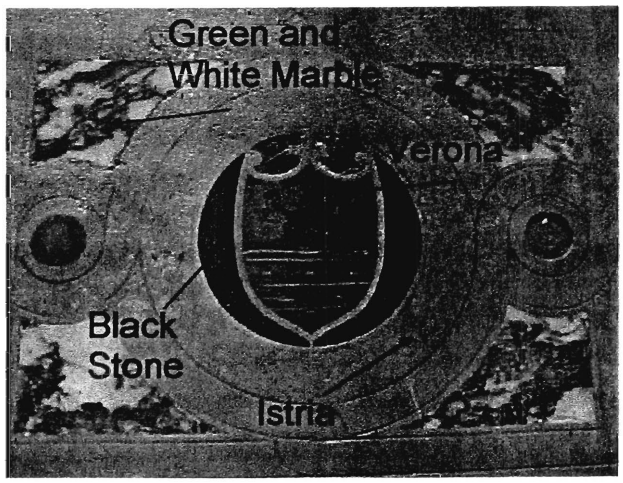


Figure 66: Common materials composing artifacts: Verona marble, Istrian stone, Iseo black stone

We measured the dimensions of each artifact and the distance from the walls of the church. These measurements allowed us to create accurate floor plans with the artifacts mapped out on them for each church. These floor plans were added into a geographic information system. We also took the geographic orientation of each artifact. Roman Catholic churches traditionally face as close to 90° East of North as possible because this is the direction of Jerusalem, which is considered the Holy Land by the Catholic religion. We found this to be true for the most part, with the majority of churches facing from 75° to 110° East of North. There were some exceptions such as S. Pietro and S. Isepo. As these are two of the oldest churches on the island, we considered the fact that the original churches may have been constructed before the edict by the Pope to have all churches face the Holy Land. Most churches that were constructed before this edict

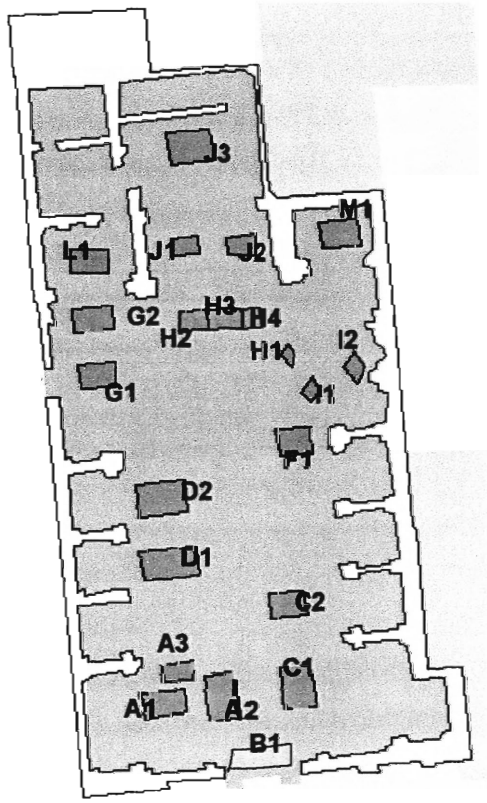


Figure 67:The floor plan of S. Francesco di Paola

added side chapels to make their main room change direction if necessary. However, S. Pietro is on the edge of its own island and S. Isepo is extremely close to a major canal. Additional construction on these churches would have been difficult. The majority of artifacts in the churches faced the main altar, and therefore had the same geographic orientation. The majority of artifacts that did not face the main altar were directly in front (or on top of) a secondary altar or chapel with altar. Knowing the geographic orientation of the artifacts in relation to the main altar allowed us to accurately map them on the floor plan in the correct direction. Figure 67 shows an example of a floor plan we entered into the geographic information system. It is the floor plan of S. Francesco di Paula in Castello.

4.2.1. Inscriptions

Many of the artifacts we found, especially the tombstones, had inscriptions engraved on them. The majority of these inscriptions were written in Latin, the exception being the S. Giorgio dei Greci which is a Greek Orthodox Church. The inscriptions on the tombs found there were written in Greek.

The inscriptions were recorded into the database where they were categorized by date, event, and person. Many of the tombs we found held bodies of religious figures that previously held power in that church. Figure 68 shows the tomb marker of Father Thomas Parvta, a past parish head in the Church of Giovanni e Paolo. As the inscription says, Father Parvta died in 1408. Speaking to the monks in charge of the Church of Giovanni e Paolo revealed that small inscriptions on floor tiles such as this one are usually just markers for the original tombs underneath. As the floor of Giovanni e Paolo was replaced during the 15th Century, none of the artifacts could be older that that. We know that the artifacts that have dates earlier than the 15th Century are markers for tombs located on the original floor.

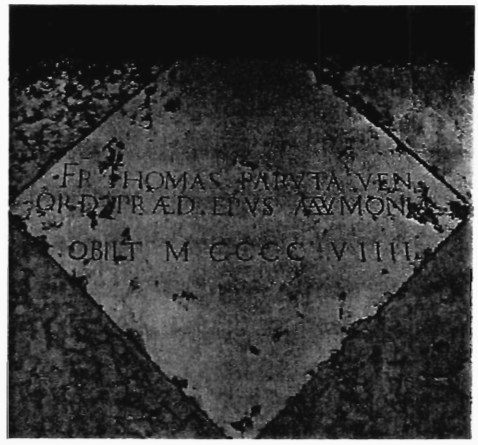


Figure 68: A tombstone marker in SS. Giovanni e Paolo.

4.2.2. Artifact Condition

We performed condition assessments on the 660 artifacts located in the 22 churches we studied in Castello and San Polo. The results of these condition assessments of artifacts were divided into the same three condition levels as the floors: Buone, Medie, and Cattive.

In the following sections we present the results for each structural issue and surface damage. As our floor assessment already determined the overall condition of the quadrants that the artifacts lay in, our objective was to determine the artifacts that were salvageable from the artifacts that are not salvageable. The main factor in determining this is the surface damage an artifact suffered. We then concentrated more closely on this damage category. In order to represent Venice as a whole we combined our results for all the artifacts as a whole, however we found the worst churches in each structural issue or surface damage in order to represent more specific results. The individual results for each individual church are in the *Condizione Valutazione dei Reperti* section of our database and can also be found in the results Appendix.

4.2.2.1. Text Readability

Figure 69 shows the results of our text readability assessment for all the artifacts with text that we examined.

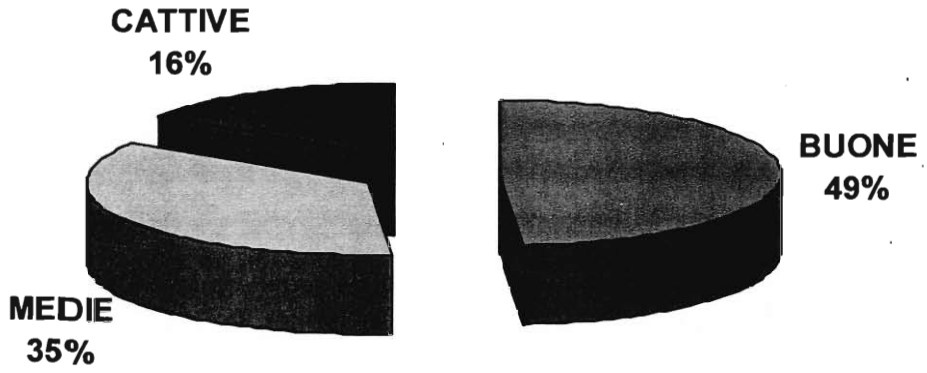


Figure 69: The percentages of total artifacts in each condtion level for text readability

We determined the text readability of the 660 artifacts we located in the churches. Each artifact received a score ranging from 100 to 300. The artifacts in the cattive range are not salvageable, and the information contained in their text is lost. This constitutes 16% of the artifacts in the churches of San Polo and Castello. The percentage of damaged but salvageable

artifacts is 35% – these are the artifacts that have priority for restoration. The final category buone shows that 49% of the artifacts with text are not in need of any restoration.

S. Biago had only one artifact in its church, but that artifact is completely unsalvageable as its text has completely worn away. Therefore 100% of its artifacts fall into the cattive range. Following S. Biago in terms of bad text readability was S. Francesco di Paola. Figure 70 shows the percent of artifacts in S. Francesco di Paola that fall into each condition level for text readability.

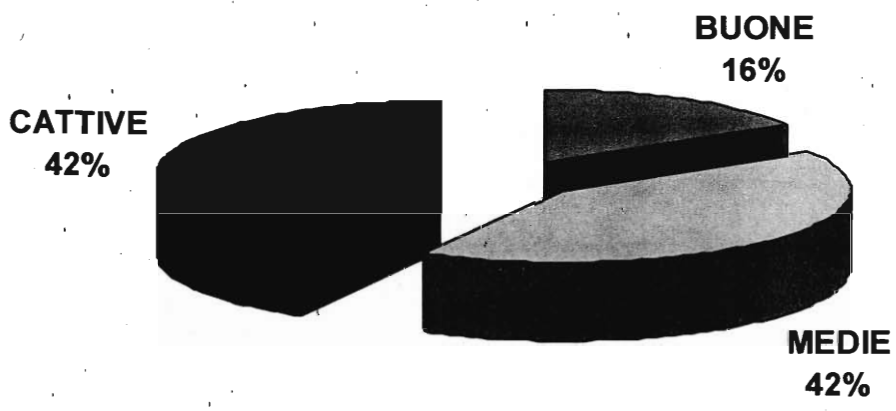


Figure 70: The percentages of artifacts in S. Francesco di Paola that fall into each of the condition levels

The results of the text readability assessment for the other churches and their artifacts are located in in Appendix F.

4.2.2.2. Structural Issues

Cracks

Figure 71 shows the percentage of total artifacts that fall into each condition level for cracks.

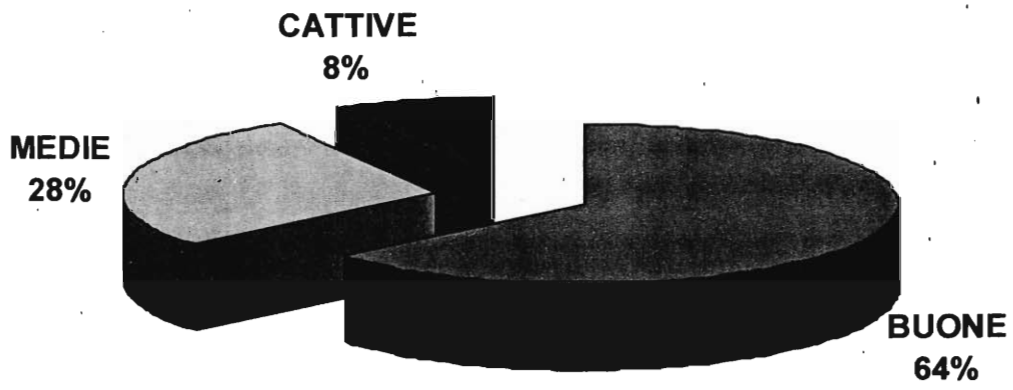


Figure 71: Percentages of total number of artifacts in each condition level for cracks

As 64% of the artifacts landed in the buone range and only 8% of the artifacts were in the cattive range for cracks, this suggests that cracks are not a high priority threat to artifacts. It also suggests that cracks play only a medium sized role in the overall condition assessment of an artifact. The church that had the artifacts in the worst condition for cracks was S. Maria dei Dereliti. Figure 72 shows the percentage of artifacts in S. Maria dei Dereliti in each condition level for cracks.

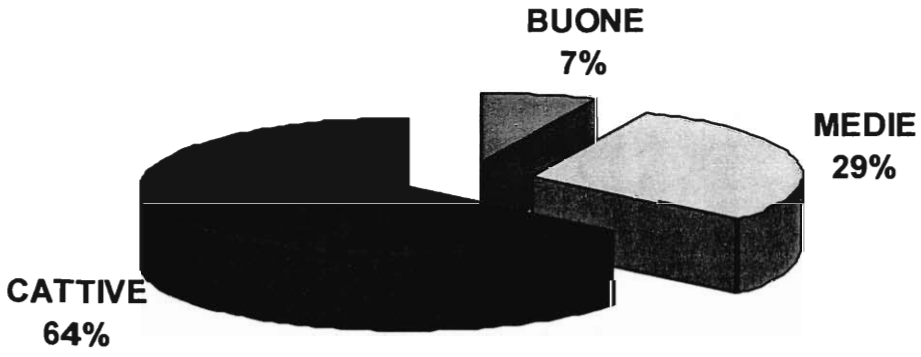


Figure 72: The percentage of artifacts in S. Maria di Dereliti in each condition level for cracks

Holes

We then examined the percentage of artifacts that falls into each category for holes.

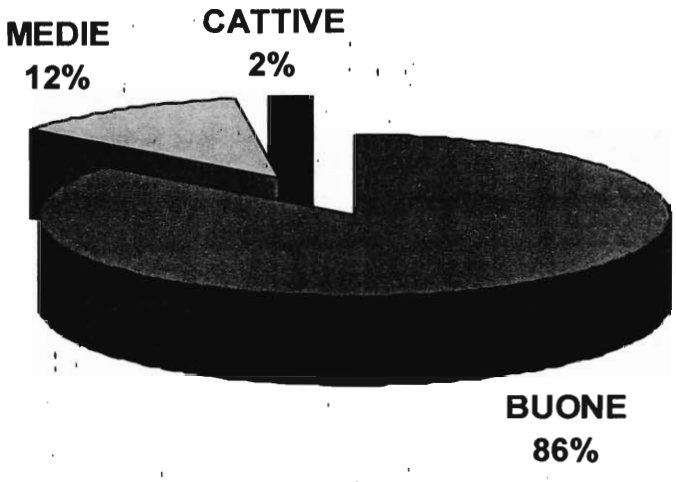


Figure 73: The percentage of total artifacts that fall into each condition level for holes

As Figure 73 shows, the percentage of artifacts in the cattive condition level for holes is only 2% and the percentage of artifacts that fall into the buone condition level is 86%. These numbers show that few artifacts suffer from damage caused by holes, and therefore holes are not a large threat to artifacts. The church with the largest percentage of artifacts damaged by holes was Frari. Figure 74 shows the percentage of artifacts in Frari that fall into each condition level.

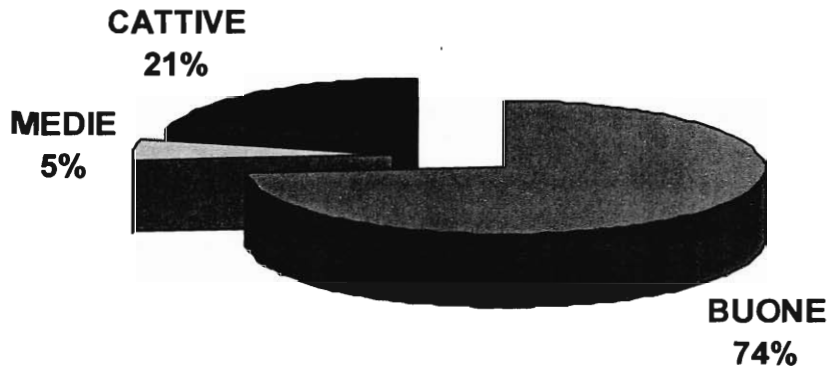


Figure 74: The percentage of artifacts in Frari in each condition level for holes

The pie chart shows that even the worse church has 74% of its artifacts in the buone condition level for holes. Thus holes play a very small role in the over all assessment of the artifacts condition.

Joint Gaps

We then assessed the effect of joint gaps on the condition of the artifacts. Figure 75 shows the percentages of total artifacts in each condition level for joint gaps.

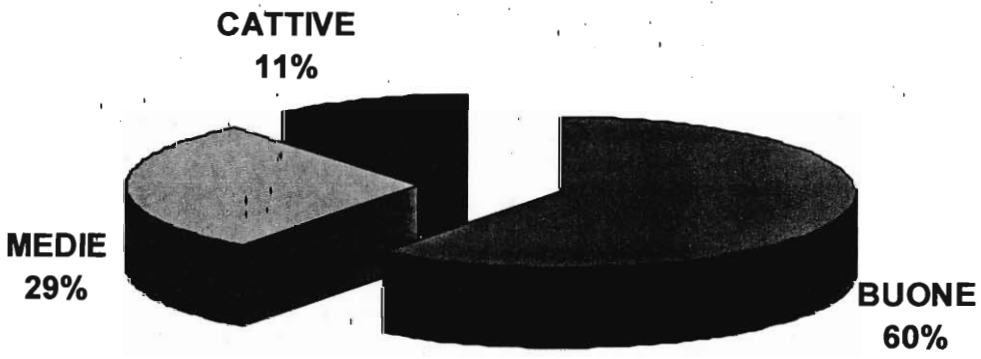


Figure 75: The percentage of total artifacts in each condition level for joint gaps

As the pie chart shows, the percentage of artifacts in the buone condition level is 60% and the percentage of artifacts in the cattive condition level is 11%. These numbers again show that few artifacts were seriously affected by joint gaps. The church with the worst artifacts in terms of joint gaps is S. Maria dei Dereliti. Figure 76 shows the percentage of the artifacts in S. Maria dei Dereliti in each condition level for joint gaps.

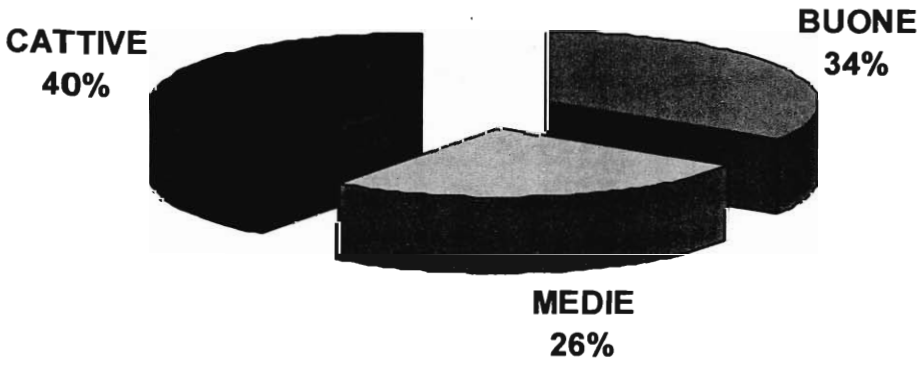


Figure 76: The percentage of artifacts in S. Maria dei Dereliti in each condition level for joint gaps

Although not a vast majority of artifacts suffered greatly from them, joint gaps are one of the most important structural issues to examine. This is because some of the artifacts we found

had very large, deep joint gaps that had not be caulked yet. This resulted in the tomb cover visibly and audibly moving when stepped upon. Tombs with these types of joint gaps can be easily opened with little damage to the original surface.

Material Detachment

The percent of the artifact that suffered from detachment was also noted in our data collection. We then used the same definitions for the damage levels Buone, Medie, and Cattive as we did for floors. The chart below shows the breakdown of percentages for each individual level of damage.

Percent of Artifacts Detached			
Church Code	BUONE	MEDIE	
BIAG	100	0	0
BRAG	100	0	0
CASS	100	0	0
FAVA	100	0	0
FRAR	86	15	9
GIOV	90	4	6
GREC	100	0	0
ISEP	94	0	6
LAPI	100	0	0
MART	100	0	0
MEND	92	8	0
OSPE	100	0	0
PIET	100	0	0
PAOL	100	0	0
POLO	100	0	0
ROCC	100	0	0
SLIO	100	0	0
VIGN	100	0	0
ZACC	85	9	6

Table 20: Percent of artifacts in each level of damage for material detachment.

In the church of the Frari in S. Polo there were three artifacts found which displayed an extreme severity in material detachment. All three of these artifacts were found in quadrant T (FRAR_T1, FRAR_T2, FRAR_T5). Their total percentage of detachment was 90%.

Material Replacement

In the area of material replacement the same three categories of buone, medie, and cattive were used to evaluate the damage in each church. The following table below shows the percentage of each level for each church in the sestiere of San Polo and Castello.

Percent of Artifacts Replaced			
Church Code	BUONE	MEDIE	
BIAG	100	0	0
BRAG	97	0	3
CASS	67	3	0
FAVA	82	11	7
FRAR	79	4	16
GIOV	96	2	2
GREC	100	0	0
ISEP	69	9	2
LAPI	89	0	11
MART	92	4	4
MEND	69	0	31
OSPE	57	7	36
PIET	76	10	14
PAOL	90	0	10
POLO	83	0	17
ROCC	100	0	0
SLIO	100	0	0
VIGN	95	2	3
ZACC	94	0	6

Table 21: Percent of artifacts whose material was replaced in each church.

The worst replaced artifact was identified out of the 19 churches which contained artifacts. Again the church of the Frari in San Polo contained this artifact. The artifact is located in quadrant J (artifact FRAR_J3). This specific artifact was at the high severity of 90% of its material replaced.

4.2.2.3. Surface Damage

In addition to structural issues the artifacts might have, we assessed the condition of the surface of the artifact. The condition of the surface is more important than structural issues when evaluating the artifacts to see if they need restoration.

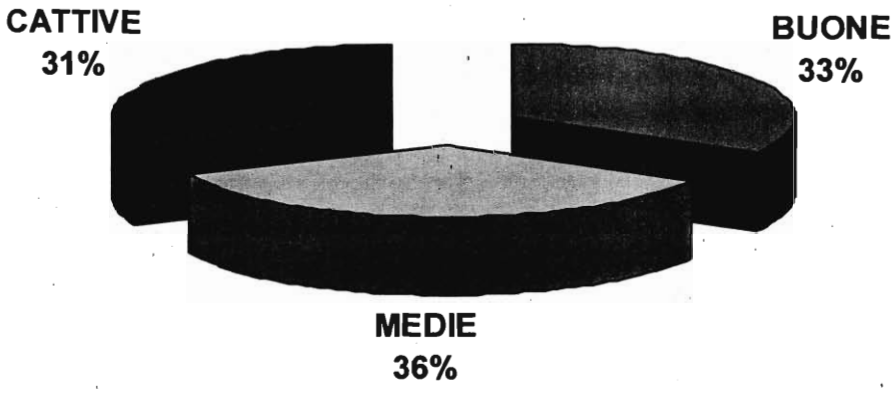


Figure 77: The percentages of total artifacts falling into each condition level for surface damage

Of all the 661 artifacts we found in the churches, 31% of them were in the cattive condition level and 33% in the buone condition level. These numbers show that surface damage is the greatest threat to artifacts. It accounts for the majority of the illegible text in the inscriptions, and determines whether or not the artifact is a candidate for restoration.

The surface damages we looked for were wearing/fading, discoloration, pitting, or other. The most common form of other surface damage was salt crusting. Each artifact's surface damage was identified and then the percentage of damage within each quadrant was found. The chart below identifies the percentage of quadrants which contained wearing/fading, discoloration, and pitting.

Percentage of Church Quadrants		
Wearing/Fading	Pitting	Discoloration
96	65	93

Table 22: Percentage of quadrants with surface damage on artifacts.

The churches with the worst wearing and fading were identified first. These churches all happened to have 100% of its artifacts contain wearing and fading. These 10 churches include: San Giovanni in Bragora, Chiesa de la Fava, Santa Maria dei Dereliti, San Francesco dei Paola, San Lio, San Francesco de la Vigna, San Cassiano, Chiesa dei Frari, San Polo, and San Rocco.

The churches with the worst pitting were also identified and the 8 worst churches also contained 100% of its artifacts to be in poor condition. These 8 churches included: San Giovanni in Bragora, Chiesa de la Fava, Santa Maria dei Dereliti, San Lio, San Cassiano, Chiesa dei Frari, San Polo and San Rocco.

Finally the category of discoloration was identified and only one church proved to have the worst artifacts in the area of discoloration. This church was the church of Santa Maria dei Dereliti (Ospedaletto), and had 100% of its artifacts contain some kind of discoloration.

4.2.2.4. Final Assessment

All the artifacts in the churches of Castello and San Polo were evaluated with the final assessment formula. Table 23 shows the number of artifacts in each church that fell into each condition level.

	Number of Artifacts		
Church Code	BUONE	MEDIE	
BIAG	0	1	0
BRAG	8	22	0
CASS	2	1	0
ELEN	0	0	0
FAVA	34	22	0
FORM	0	0	0
FRAR	12	53	2
GIOV	59	149	6
GREC	5	0	0
ISEP	10	24	1
LAPI	9	0	0
LAZZ	8	5	0
MART	23	2	0
OSPE	1	13	0
PIET	17	23	2
PAOL	10	11	0
POLO	10	2	0
ROCC	6	1	0
SILV	0	0	0
SLIO	29	2	0
VIGN	10	32	1
ZACC	13	19	1
TOTAL	266	382	13

Table 23: The number of artifacts in each church in each condition level for final assessment scores

Figure 78 shows the percentage of total artifacts that fall into each condition level for the final assessment score.

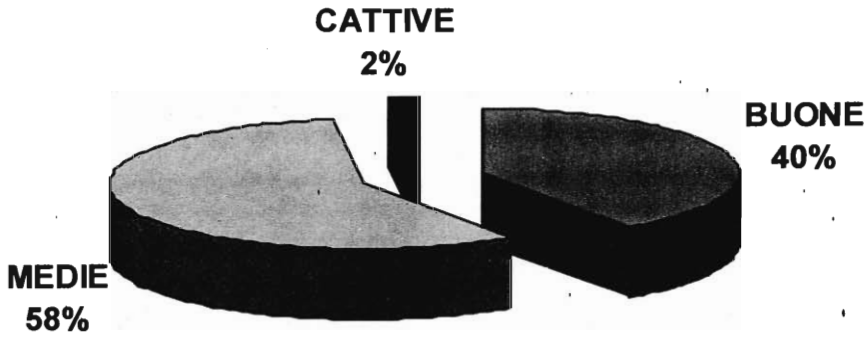


Figure 78: The percentage of total artifacts that fall into each condtion level after the final assessment

These numbers did not seem to accurately portray the condition of the artifacts when compared with the results from the surface assessment. Our objective was to find the damaged but salvageable artifacts; however the damage that the artifacts suffered from was mainly surface damage and few holes, cracks, and joint gaps. Weighing each category equally showed the overall condition structurally and on the surface. While this system worked for floors, it did not accurately portray the artifacts. Therefore we decided to use our surface damage condition results for the majority of our analysis as they portrayed the state the artifacts were in more accurately.

5. Analysis

The information gained by this project supplemented previous work completed on Venetian churches in past projects by performing extensive research and data collection, developing a floor and artifact condition rating scale, as well as assessing the condition of church floors and the artifacts located within. Our main focus of analysis was to expose the threats that exist to the current church floors and the artwork that is embedded within. There are many threats that have been exposed through the course of our research. By doing an in depth analysis of our data, we also determined ways to deal with the threats that were discovered.

Our analysis also helped us identify the churches that had the greatest potential as archeological opportunities and the churches that could be considered missed opportunities. For the opportunities portion of our analysis we considered floor elevation, the number and type of artifacts on the floor, the amount of surface damage the floor suffered, and the age of the church. The following sections discuss our analysis and conclusions.

5.1. Artifact Information

In order to discover some of the history of the churches we studied, we translated some of the inscriptions on the more elaborate tombs into English and into Italian. We chose to translate artifacts from Ss. Giovanni e Paolo because it had a wide variety of elaborate tombs. These translations are located in Appendix X, and the text on the tomb is recorded in our database.

5.2. Condition: Cause and Effect

We examined the results of our condition assessments to determine the causes of the damages that affect the church. We considered elevation, location of movable furnishings, and foot traffic to be the three main causes of damage in the church. We also examined the correlation between artifacts and floors in relation to canal proximity and elevation.

5.2.1. Variation in Quadrant Elevation

As our results show, the floor elevations of each quadrant differ so that the churches of Venice experience a ripple or wave effect. We believe that this variation occurs because the churches are sinking into the marshy ground on which they were built. The water table under the church erodes the foundation of the church and weakens the supports of the building. In our

background we explain the removal of the bottom sealant of tombs in the churches so that water could come up and flush the remains of the bodies out. While this helped create more space for burials within one tomb, the adverse affect was that the protective barrier between the floor and the water table was broken. We investigated the relationship between the number of artifacts in a quadrant in relation to its height. Our results show that there is not an outstanding trend in the amount of artifacts compared to the height of the quadrant. Although there are a few churches which demonstrate a low floor in a quadrant with a high number of artifacts, such as the churches of San Polo and San Lio, a compelling argument can not be presented. This was mostly caused by a high number of artifacts found on the altar or front chapels of the church. Since the altar is typically the most elevated position in the church it is hard to determine whether in fact the floor has sunk due to a significant number of artifacts found on or below its surface.

5.2.2. Vulnerability to High Tides

Figure 79 shows the number of floods in Venice and their heights with the respect to absolute zero from 1927 to 2002. Comparing this information with the results of our measurements for floor elevation shows us which churches are affected by each flood level and also the frequency that the churches experience the possibilities of water damage.

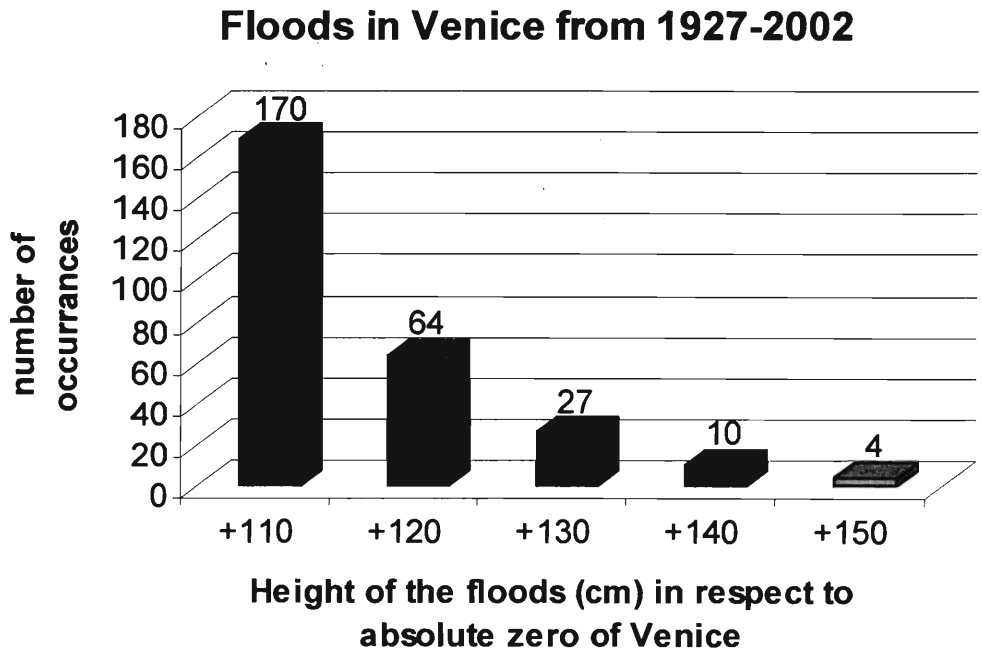


Figure 79: Number of Floods in Venice from 1927 to 2002

Figure 79 shows that flood waters at heights above 110 cm have occurred 170 times from 1927 to 2002. The only church of the ones we studied that was affected by these floods is S. Elena. The churches affected by floods higher than 120 cm are S. Lazzaro dei Mendicanti and S. Maria dei Dereliti. The churches affected by floods higher than 130 cm are Frari and S. Giorgio di Greci. The churches affected by floods higher than 140 cm are S. Francesco de la Vigna, S. Polo, and S. Martin. From looking at the elevations of the churches and the frequency of flooding we concluded that S. Maria dei Dereliti, S. Lazzaro dei Mendicanti, and S. Elena are the churches with the greatest vulnerability to water damage because they have elevations lower than 130 cm above sea level. Therefore we decided the first level of vulnerability to high tides would be churches with elevations below 130 cm with respect to the absolute marker of Venice. We then decided the second category of vulnerability was churches between 130 cm and 150 cm in elevation. The final category was churches with elevations above 150 cm.

5.2.2.1. Elevation and Surface Condition

After deciding our vulnerability levels, we looked at the surface condition of the floor quadrants in each vulnerability level. The following pie charts show the percentage of quadrants in condition level in the three categories. Figure 80 shows the percentages of floor quadrants at elevations below 130 cm in each surface condition level.

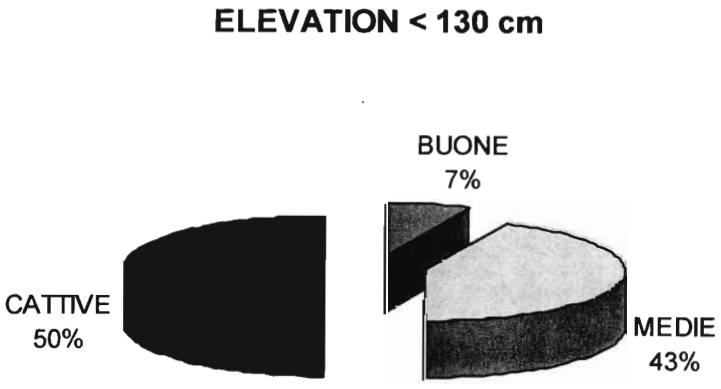


Figure 80: The percentages of floor quadrants at elevations below 130 cm in each surface condition level

Half of the floor quadrants at elevations below 130 cm are in the cattive surface condition level. The remaining quadrants are mostly in the medie condition level, with only 7% of the quadrants

below 130 cm landing in the buone condition level. This pie chart shows that the floors with low elevations are heavily damaged.

Figure 81 shows the percentage of floor quadrants at elevations between 130 cm and 150 cm in each surface condition level.

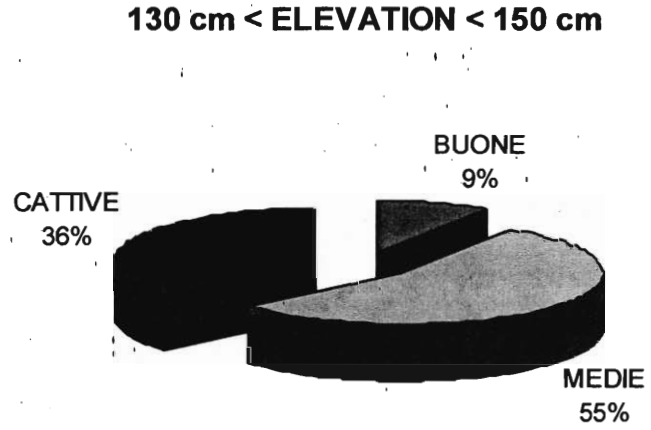


Figure 81: The percentages of floor quadrants at elevations between 130 cm and 150 cm in each surface condition level

This pie chart shows that as the elevation increases the percentage of floor quadrants in the cattive range decreases and the percentage of floor quadrants in the buone and medie category increase.

Figure 82 shows the percentages of floor quadrants at elevations about 150 cm in each surface condition level.

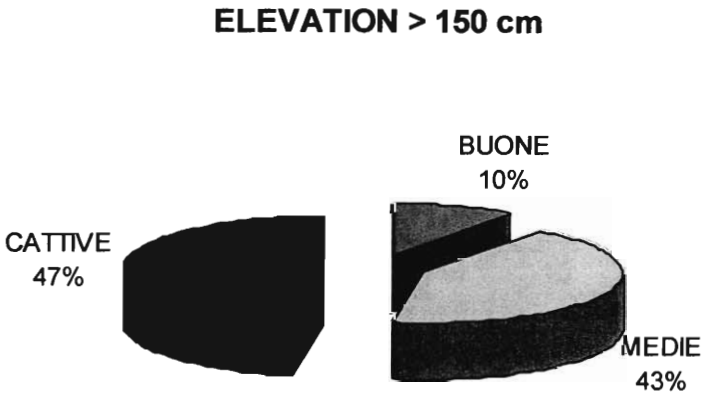


Figure 82: The percentages of floor quadrants at elevations above 150 cm in each surface condition level

Once again as the elevation increased so did the percentage of quadrants in the buone condition level. However, the percentage of quadrants in the medie level decreased and the percentage of quadrants in the cattive range increased. This was not an expected result, so we examined other causes of damage for those floor quadrants. We discovered that 41% of the quadrants in the cattive range contained pews or other movable furnishings. We therefore conclude that the surface damage in these specific quadrants had other causes than flood waters. We believe there is a strong correlation between elevation and surface damage as the lower floors are more vulnerable to water damage from the high tides. Our analysis of the surface condition of the artifacts and their elevation supported this theory.

We found the same trend of increasing elevation and decreasing elevation applied to the artifacts. Since we did not measure the elevation of each artifact, we used the elevation of the quadrant it was located in as the artifact's elevation. Knowing the elevations of the quadrants and the locations of the artifacts allowed us to produce Figure 83, which shows the percentages of artifacts in each of the predestinated elevation ranges.

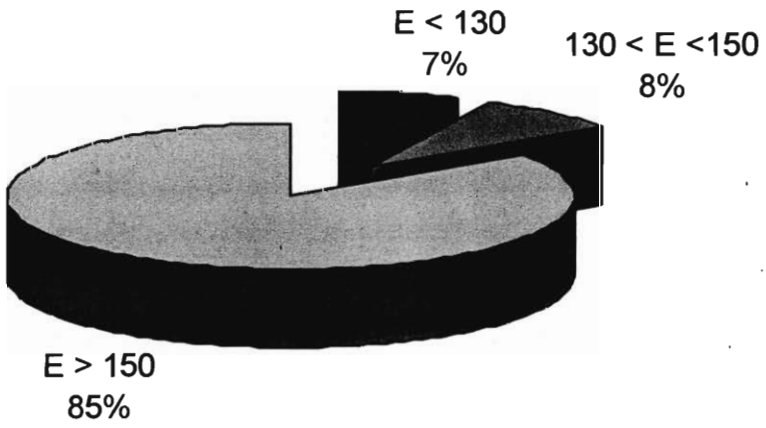


Figure 83: The percentages of artifacts at each elevation range

We then compared the surface conditions of the artifacts and their elevations and produced the same trend we saw in the floor quadrants. Figure 84 shows the percentages of artifacts in each surface condition level that are at elevations less than 130 cm with respect to the absolute zero of Venice.

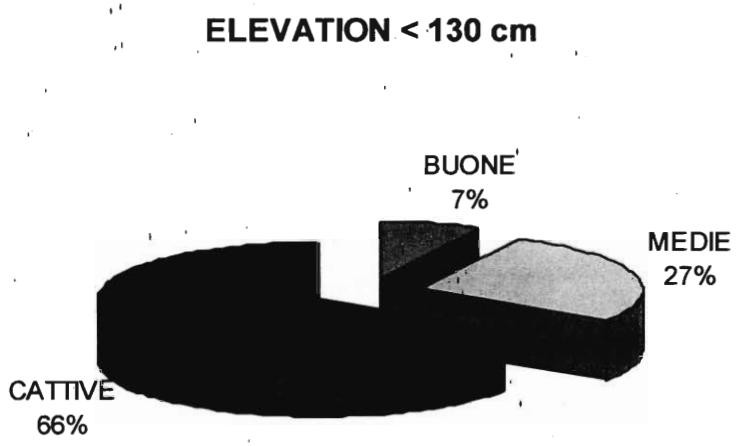


Figure 84: The percentages of artifacts at elevations below 130 cm in each surface condition level

As the pie chart shows, the majority of the artifacts are in the Cattive category which shows that the condition of the artifacts on the lower floors is very severe. Figure 85 shows the percentages of artifacts in each surface condition level at elevations between 130 cm and 150 cm with respect to the absolute zero of Venice.

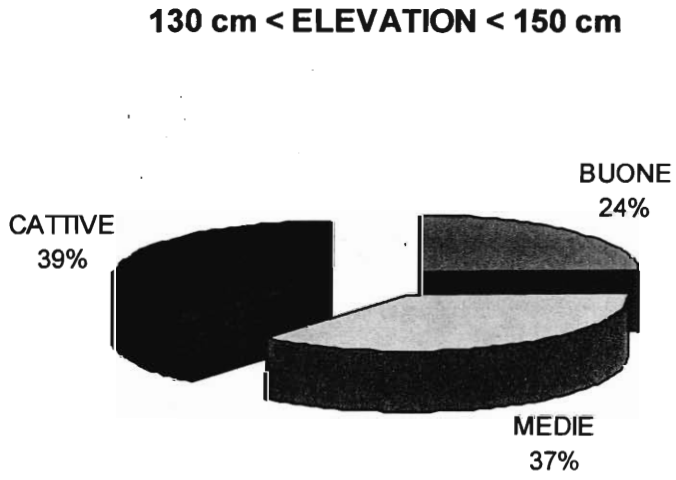


Figure 85: The percentages of artifacts at elevations ranging 130 cm to 150 cm in each surface condition level

The pie chart shows that as the floor elevation rises the percentage of artifacts in the Cattive condition level decreases and the number of artifacts in the Buone condition level increases. Figure 86 shows the percentages of artifacts at elevations greater than 150 cm above the absolute zero marker in Venice in each surface condition level.

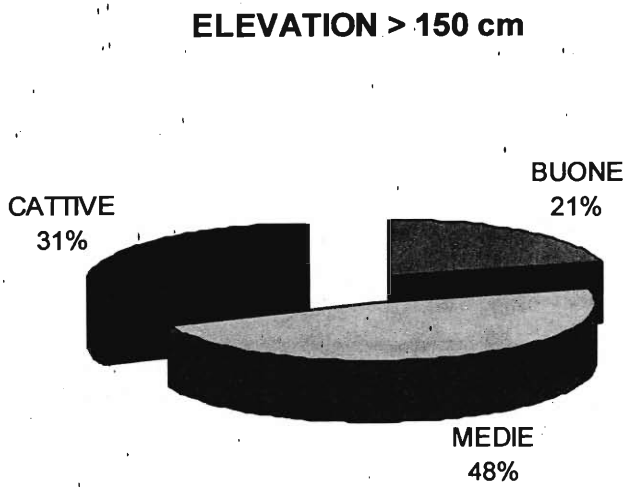


Figure 86: The percentages of artifacts at elevations greater than 150 cm in each surface condition level

As the floor height rises the percent of artifacts in the Cattive condition level decreases greatly and the number of artifacts in the Buone condition level increases greatly. This analysis shows that raising the floor heights is a good solution to the problem of flooding as it decreases the risk factor of water damage. However as the artifacts found on the higher floors were mostly tomb markers rather than tombs, raising the floors covers over much of the historical information the churches possess. Artifacts located on higher floors are less likely to be candidates for restoration, as the floors have probably been raised or restored recently.

5.2.3. Damage Caused by Foot Traffic

We also examined the damage in the church that may have been caused by foot traffic. We marked on our floor plans and in our field data notes the quadrants that contained aisles and entrances. We also recorded where the artifacts were located so we would know which ones were in aisles or in the quadrants that contained entrances. These are the main walkways in the church and would suffer the most wear and tear from the shoes of tourists or patrons of the church.

Figure 87 shows the percentage of floor quadrants in each surface condition level that have the main entranceways.

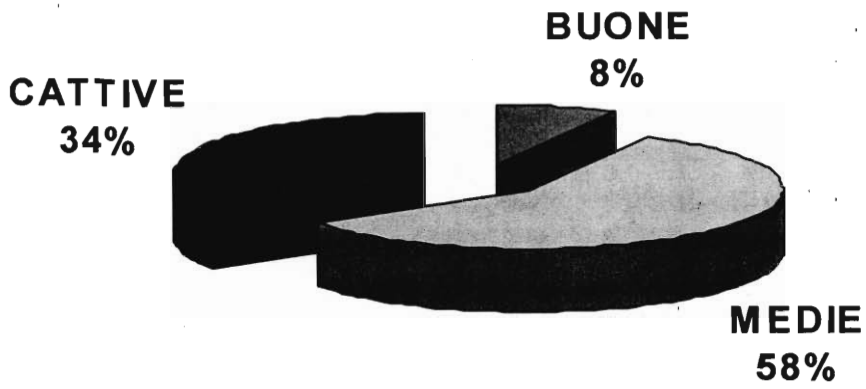


Figure 87: The percentage of artifacts in each surface condition level that contained a main entranceway

Very few floor quadrants that contain entrances fall into the buone condition level. This pie chart shows that it is difficult to find quadrants in the buone condition level by the entranceways. It supports our hypothesis that foot traffic is a threat facing the floors and the artifacts they hold.

We also examined the floor quadrants that contained aisles. Figure 88 shows the percentage of floor quadrants in each surface condition level that contain aisles.

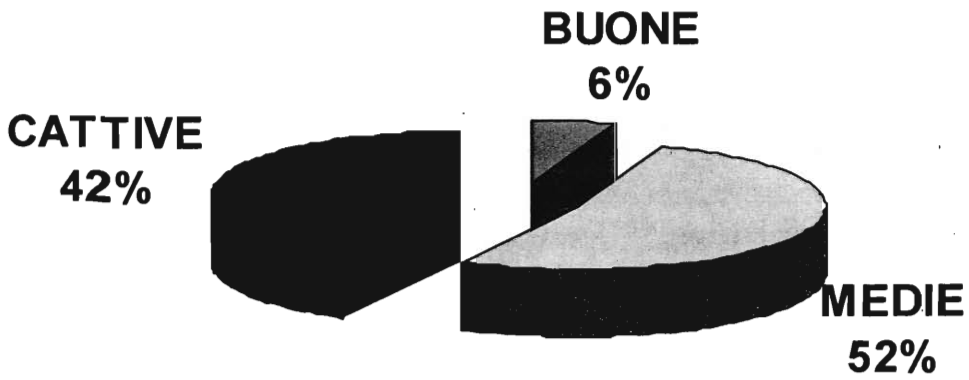


Figure 88: The percentage of floor quadrants containing aisles in each surface condition level

The pie chart shows that only 6% of the floor quadrants that have aisles in them fall into the buone condition level. This shows again that foot traffic is a risk factor facing church floors.

We also marked whether or not the church is a tourist attraction. Of the 22 churches we studies, Ss. Giovanni e Paolo, S. Maria Formosa, S. Polo, Frari, S. Giovanni in Bragora, and S. Pietro are tourist churches. All of them except Giovanni e Paolo and S. Giovanni in Bragora charge an admission fee and are part of a tour offered with the museum tour of Venice. These

churches are more likely to experience more foot traffic than the other churches of Castello and San Polo.

5.2.4. Damage Caused by Furnishings

The final cause of damage we examined closely was the damage caused by movable furnishings. In each of the churches we went to we recorded the location of the pews and marked which quadrants had other movable furnishings in them. Figure 89 shows an aerial picture of S. Francesco di Paola in which the location of the pews is clearly visible. Figure 90 shows the floor plans created for S. Francesco di Paola based on the information recorded. The location of the pews is marked by the brown rectangles, and the floor quadrants (on the right) and artifacts (on the left) are colored coded according to the amount of surface damage. We created these floor plans for each church and were able to find a correlation between pew location and surface damage for both the artifacts and the floor quadrants. Figure 91 contains a pie chart that shows the percentage of floor quadrants in all the churches that contain pews in each surface condition level. Figure 92 contains a pie chart that shows the percentage of artifacts in all the churches that are covered by pews.

Figure 89:An aerial shot of the location of pews in S. Francesco di Paola

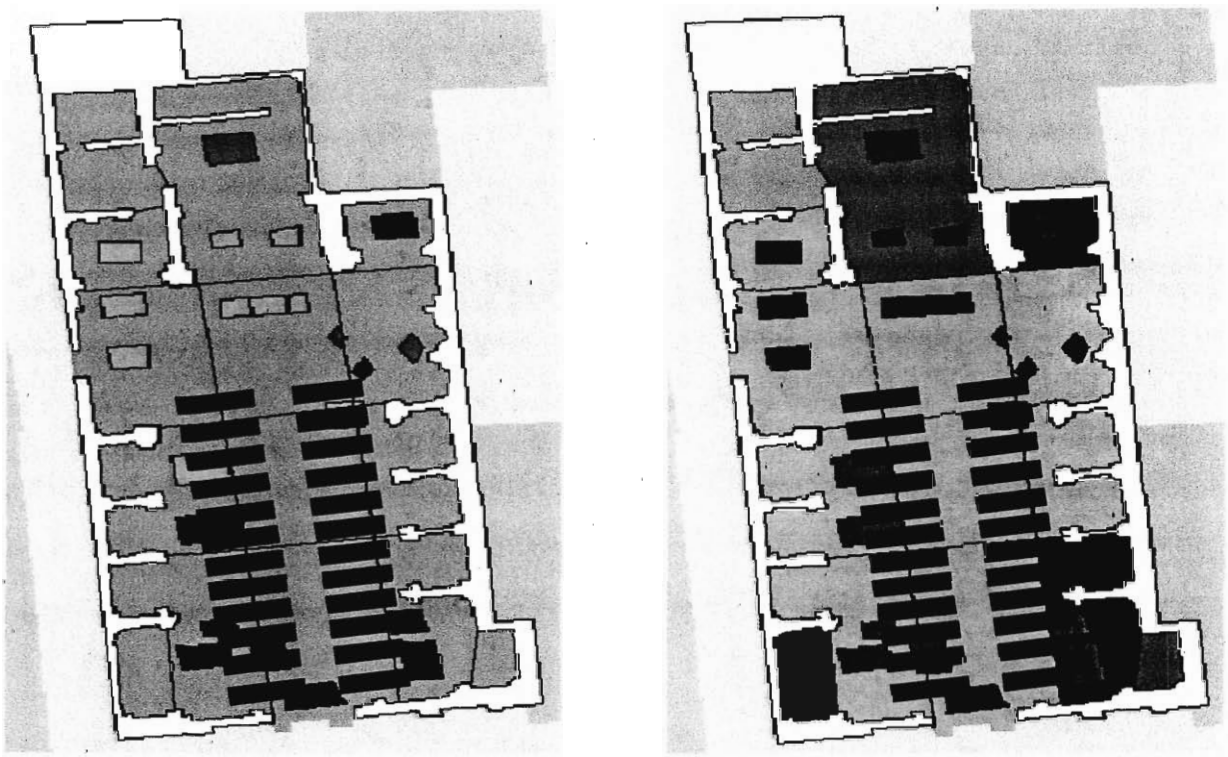


Figure 90: Floor plans containing pew location for S. Francesco di Paolo with the artifacts and quadrants color coded for surface damage (buone = green, medie = yellow, cattive = red)

The percentage of floor quadrants covered by pews that are in the cattive condition level is 51%; the percentage of floor quadrants covered by pews that are in the medie condition level is 45%; the percentage of floor quadrants covered by pews that are in the buone condition level.

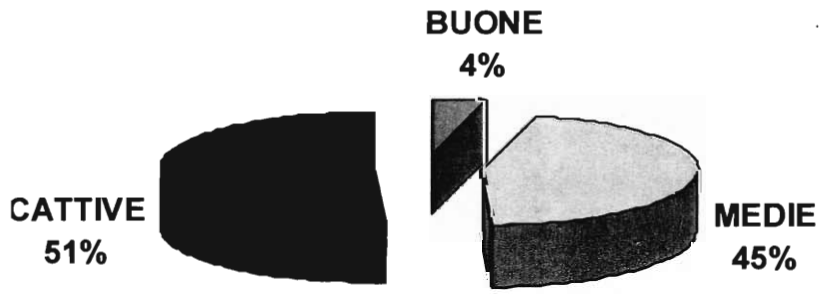


Figure 91: The percent of floor quadrants containing pews in each surface condition level

The pie chart shows that more than half the quadrants with pews have major surface damage and that only 4% of the quadrants with pews are in the buone condition level. These numbers show that it is very unlikely to find a floor quadrant with pews in good condition.

The percentage of artifacts covered by pews that are in the cattive condition level is 29%; the percentage of artifacts covered by pews that are in the medie condition level is 47%; the percentage of artifacts covered by pews in the buone condition level is 24%.

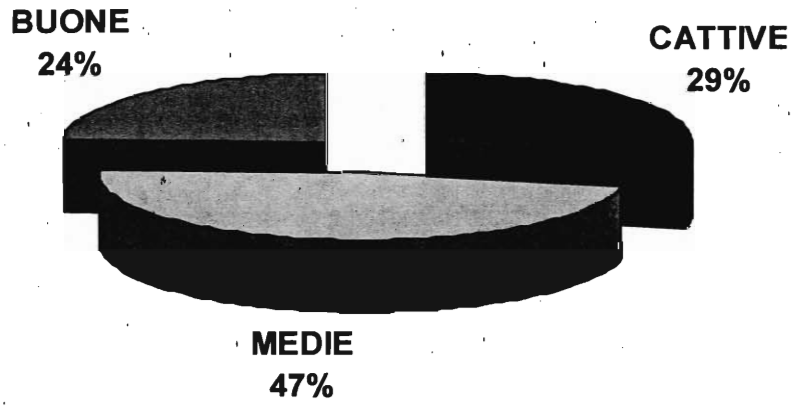


Figure 92: The percentage of floor quadrants containing pews in each surface condition level

Although these numbers are not as drastic as for the floor quadrants, there are more artifacts in the cattive condition level than the buone condition level. Only 24% of all the artifacts with pews on them are in the buone condition level. The effect the pews have on the floors and artifacts can be visually demonstrated in the floor plans of S. Francesco di Paola, which are located above. A clear example of the correlation between pew location and surface damage is the Ss. Giovanni e Paolo. Figure 93 shows the floor plan of the church with the quadrants color coded according to their surface condition level.

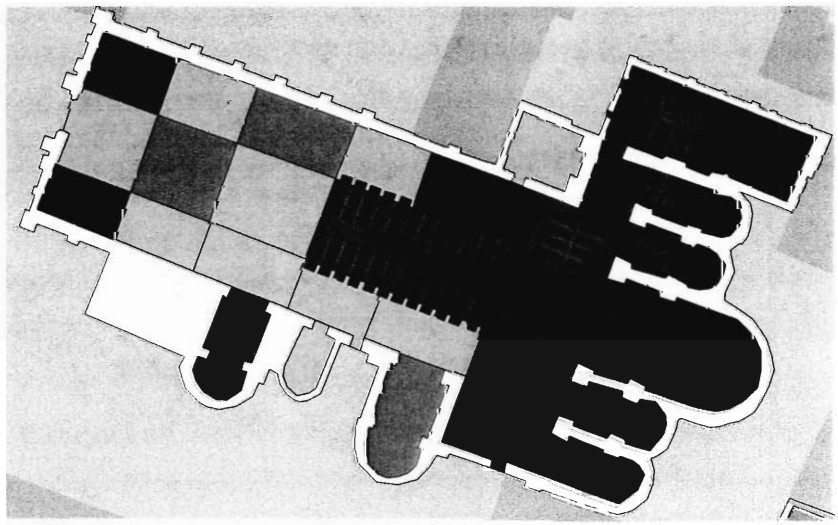


Figure 93:The correlation between surface condition and pew location in Ss. Giovanni e Paolo

The reason for the severe damage from pews is the design of the pew itself. Figure 94 shows the legs on one side of a pew. The pews in the church have four legs and therefore four points of pressure on the floor or artifact. The pews themselves weigh 100 to 200 lbs, but with people on them, the amount of weight increases greatly. The amount of pressure on the floor is enough to crack the marble and cause small pieces to break off to result in pitting. We discuss possible solutions to this issue in our recommendations section.

Figure 94: The legs on one side of a pew

5.2.5. Damage Due to Canal Proximity

Once we found a correlation between the height of the floor and the amount of surface damage on it, we looked for other relationships involving the flood waters. We made a comparison of each church's average surface damage, average elevation, and proximity to a canal. We recorded our results in Table 24. The average surface damage field is color coded according to the three condition levels. The average elevation field is color coded according to the three levels of vulnerability we established earlier in the analysis. The proximity to the canal is color coded in different shades of purple by 0.0100 mile increments.

We found that of the eight churches within 0.0100 miles of a canal, five of them had an average surface damage score that fell in the cattive range. This seemed to show there was a relationship between surface damage and canal proximity. However, when we tried to make elevation fit into the relationship, we found that only two of the five churches had floor elevations in the greatest vulnerability range. One other church had an elevation of about 150 cm, and the rest had elevations much higher. We did find that one of the churches within 0.0100 miles of a canal had an average surface damage score in the medie range and in the second vulnerability level for high tides. However, there was not enough evidence of a clear trend to draw any conclusions. Our information hints that there may be an interesting correlation

between the three characteristics, and further entries and more accurate measurements may lead to some insightful conclusions about canal proximity.

CHURCH	AVE. S. DAMAGE	AVE. ELEVATION (cm)	PROXIMITY (mi)
ISEP		268.5	
MEND			
MART	2.74		
CASS		151.9	
ELEN			
GREC	0.3333		
FORM	1.7786	153.6	
SLIO		168.8	
BIAG		181.3	0.0132
LAPI	2.625	216.1	0.0132
SILV	1.53	201.3	0.0197
FAVA	2.54	72.3	0.0145
POLO	2.1846		0.0277
PAOL	2.1021	175.3	0.0197
GIOV	2.5625	169.5	0.0199
ZACC	2.4	162.1	
VIGN	2.7357		
PIET		218	
OSPE	2.6		
ROCC	2.25	227.6	0.0132
FRAR	2.625		
BRAG		158.5	

Table 24: Three way comparison: surface damage, elevation, proximity

In the table above, the four churches that followed our anticipated trend of low floors, close canal proximity, and high surface damage are outlined in black.

5.3. *Archeological Opportunities*

The final objective was to use the accumulation of our results and analysis to identify both potential and missed archeological opportunities for the Archeology Superintendence of Venice. To determine these opportunities we considered several main factors: the amount of damage in the church, the height of the floor, the number of artifacts on the surfaces, the type of artifacts on the surface of the church, and the history of the church.

Although we consider all the churches of Venice able to provide some amount of historical significance, we analyzed all the data we collected to provide a list of churches that we believe

are highly probably of containing the most amount of information hidden beneath the floors and also have a high probability of restoration in the near future. Conversely we have also developed a list of churches that may contain vast amounts of information beneath the current floor, but the opportunity to look beneath the floor has been lost due to recent restoration.

5.3.1. Possible Restoration in Churches

Churches with the largest amount of structural or surface damager are the churches that are most likely to undergo restoration. As the Archeological Superintendence only have the opportunity to open a excavation site when restorations occur, we considered large amounts of damage as one of the deciding factors for determining the opportunities. We also looked at the history of the church because churches that were destroyed by fire or time were usually reconstructed on the same spot, on top of the old remains. Also some of the churches kept a record in their archives of when the church floor had been refinished or restored. Older churches are more likely to contain multiple floor levels and artifacts beneath them. If a floor has been replaced throughout time, then the floor height is higher. Therefore the combination of old churches with high floors and great amounts of surface damage have great potential as excavation sites when they are restored. Typically the type of artifacts on these kinds of floors would be tomb markers and plaques with the majority of the tombs being on the raised quadrants. If the floor elevation is low and the surface damage is high, then that church is vulnerable to high tides and the opportunity for restoration may occur soon. It is these churches the archeological superintendence will want to focus their attention on, especially if the churches contain large numbers of artifacts.

Using these factors, we came up with the four churches we considered to be the best archeological opportunities for the Archeological Superintendence.

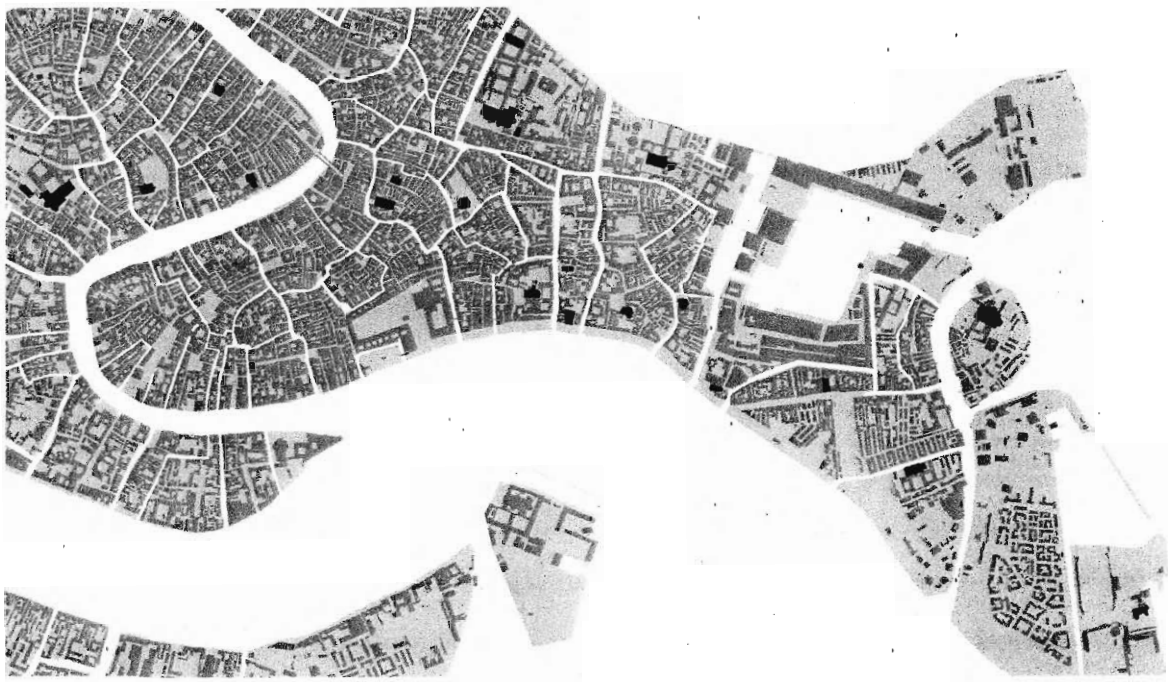


Figure 95: Churches of archeological opportunity (shown in orange)

Chiesa di S. Pietro – This church contains three known floor levels along with sever amounts of surface damage, high floors and many tomb markers. From this we conclude that there are other floor layers below the current floor with the possibility of containing many artifacts below, as suggested by the tomb markers. We also believe that this church will undergo restoration in the future because of its poor surface condition

Chiesa di S. Isepo – This church contains high elevation of main floor, sever surface damage and numerous artifacts. The high elevation of this church along with its many tomb markers suggests multiple floor layers. This church also contains many artifacts which makes it a source for vast amounts of information on and beneath the floor. The severe surface condition of the floor also makes it a probable site for restoration

Chiesa di S. Lazzaro dei Mendicanti – This church contains a low floor elevation and low number of artifacts so therefore the possibility of any relics beneath these floors are very low. There also is severe surface damage but the church is only used for funerals so the need for restoration is not on high priority for this particular church.

Chiesa de la Fava – This church was built on the site of a previous church, contains extremely high floors, along with numerous tomb markers and severe surface condition. These high floors, along with the tomb markers, give great evidence of a preceding floor beneath the main walking surface. The high surface damage makes it a probable site for future restoration, and the fact that it was built on the site of a previous church demonstrates a great opportunity to discover what may eb hidden beneath the current structure.

5.3.2. Churches that have Recently Undergone Restoration

Floors that appear newly reconstructed and contain no artifacts have a better chance of having old floors underneath, and thus contain more hidden archeological opportunities. However the downfall of this is that if the floors has been recently restored it is unlikely that the church will go under construction in the near future, which will prevent the archeological superintendence from excavating the site. We have identified three churches that fall into the category of recently refinished to be a missed archeological opportunity.

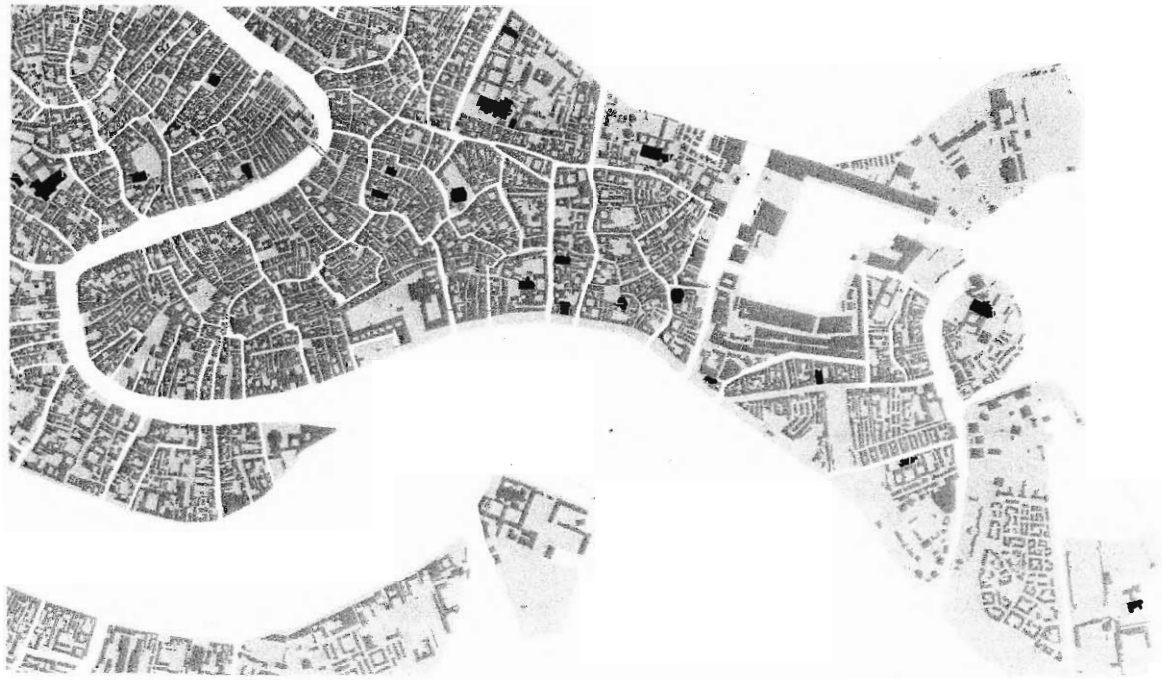


Figure 96: Churches where the opportunity to look beneath the floors has been lost (shown in pink)

Chiesa di S. Martin – This church was recently refinished so therefore a restoration process in the near future is improbable. The church also contained low floors which implied very little chance of numerous layers of floors beneath. This data plus the information that there exists a

low number of artifacts demonstrates that little is to be found beneath these floors due to the small information the church possesses.

Chiesa S. Maria Formosa – This church was recently refinished and therefore a restoration process in the near future is improbable. There were no artifacts contained in this church and although it had high floors the conditions of the floors are in almost excellent condition so the floors will see no restoration and therefore no excavation anytime in the near future.

Chiesa S. Giorgio dei Greci – This church was also recently refinished and its floors are in excellent condition so there is little chance of any restoration that may occur. Furthermore the church is owned and operated by the Republic of Greece and therefore has no ties with the Republic of Venice. This church is privately owned and therefore the Archeological Superintendence has very little chance of any relationship with this particular church.

6. Recommendations & Conclusions

A piece of artwork is chosen for preservation or restoration according to its importance. Venice contains 4230 pieces of public art[14] in addition in addition to the thousands of pieces located in private institutions. The Ministry of Culture has limited funding for the restoration of artwork and so it prioritizes its restorations. They place their focus on the pieces with salvageable historical or artistic value that are in danger of being lost or destroyed. If the meaning is completely lost from a piece, for example if the engraving or design has been worn off, it will not be restored by the Ministry of Culture.

For this reason we performed field work on the artifacts and floors in the churches to determine whether the information they contained was salvageable or unsalvageable and in danger of being lost. Our field work included determining the risk factors and threats the churches faced. As our results and analysis sections show, the artifacts and floors faced five main threats: flooding, movable furnishings, maintenance work, foot-traffic, and neglect from the church administration. Based on our findings, we compiled a list of possible solutions to these issues. We then applied these ideas to each church and composed individual lists of

[14] Public Art Catalog -- Monumenti

recommendations on ways to intercept threats before they cause further damage. We submitted our recommendations to the churches along with the floor plans of the artifacts.

6.1. Preservation of Current Information

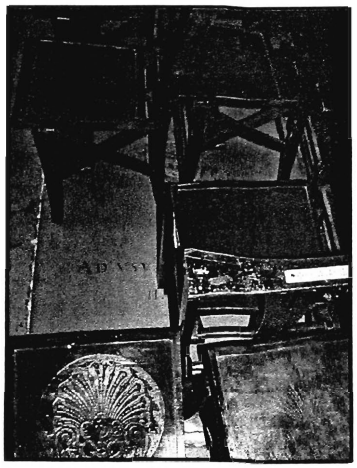


Figure 97: An example of the neglect of artifacts in S. Isepo

Our results and analysis show that the artifacts located on the floors of the churches range from little damage to severe damage. The historical information on the artifacts that are not salvageable is already lost to the general public. The objective now is to prevent more artifacts from deteriorating and to preserve their historical value.

Sometimes the caretakers and priests in the churches neglect or ignore the historic value of the artifacts on their floor. We found examples of the mistreatment of artifacts in many of the churches we visited. Figure 97 shows another example in S. Isepo in which the caretakers have stacked chairs on top of the artifacts on the side of the church.

Our solution to this issue was to first clear the movable furnishings off of the artifacts. Many of the churches have side rooms or chapels without artifacts in them that would be better holding places for extra furniture like chairs. We then recommended that the church administration take an active interest in the histoy on the floor. Each church should have a copy of the floor plan with the artifacts mapped out on it, something that we can provide with the use of the geographic information system. Each artifact on the floor plan should be coded and the information about each artifact attached to the floor plan. For example if there was a tomb on the floor, the information sheet would state the name, occupation, death date, and any other important information the tomb holds. All of this information can be

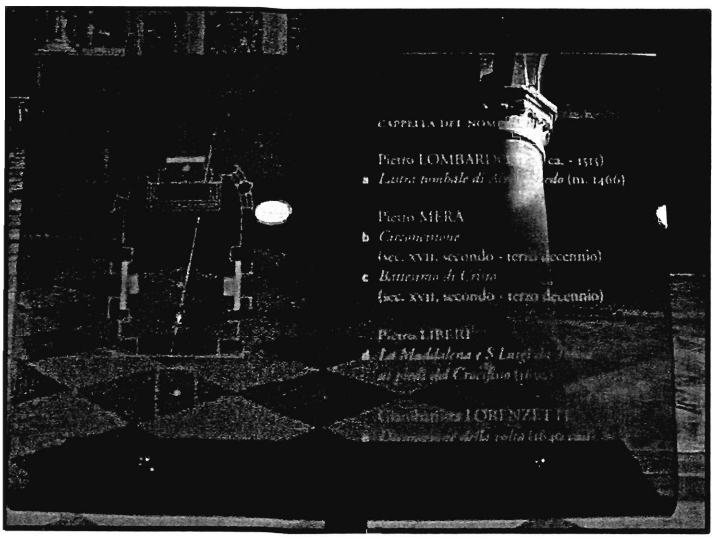


Figure 98: A plaque in Ss. Giovanni e Paolo that identifies the locations of specific designs on the chapel floor

pulled out of the database we created, and should also be stored in the church archives as well as placed by the entrance of the church in order to make people aware of the history in the floor. For the more important or elaborate artifacts, we recommend setting up plaques or placecards that show the artifacts' locations in the church and provide basic information about them. Figure 98 shows a plaque that is currently set up in Ss. Giovanni e Paolo that describes the designs on the floor of one of the side chapels. These information plaques would mark the locations of the artifacts in the church, drawing attention to them so that they are not ignored or neglected. The plauqes would also generate interest in the history of the church and the people it holds

6.2. *Damage Control Solutions*

The main economic support of the city of Venice is tourism. However the amount of damage Venice suffers has increased proportionally with the rising number of visitors to the city. Churches are some of the most popular tourist attractions and the deteriorating condition can be seen on the heavily trafficked areas of their floors. Figure 99 shows several tourists in Ss. Giovanni e Paolo that are walking across artifacts on the floor. We stopped to ask these tourists whether or not they were aware there were artifacts on the floor they were walking. They did not realize there were historical objects on the floors and came to the church to see the monuments and paintings on the walls. We found that regular patrons of the church also did not recognize the historical value of the artifacts in the church. Figure 100 shows a woman on her way through the church to afternoon mass in Ss. Giovanni e Paolo. She also was not aware of any historical value in the artifacts on which she was walking.

Figure 99: Tourists unaware of the damage they are causing the artifact below their feet

Figure 100: A patron of the church unaware of the damage she is causing the artifact below her feet

There are some simple low cost solutions to the problem of foot traffic. First to make tourists and patrons aware of their surroundings, each church should implement the idea of information plaques and keep detailed floor plans available to the general public. For the elaborate or ornate artifacts, we suggest the churches preserve the designs and artwork in one of two ways. The first solution is to create barriers between the artifacts or quadrants and the general public. This has been achieved in Ss. Giovanni

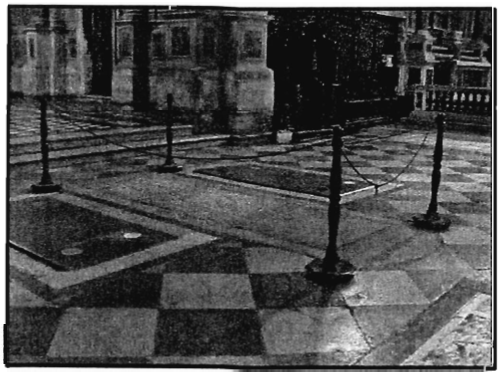


Figure 101: A protective barrier in Ss. Giovanni e Paolo

e Paolo, where an ornate tombstone has been roped off to prevent wearing from foot traffic. Figure 101 shows this tomb and its barrier. We found this to be a common solution for floor quadrants in the majority of churches we visited. Almost all the churches had their main altars roped off, and some had alarm systems set up to prevent people from crossing the protective barriers.

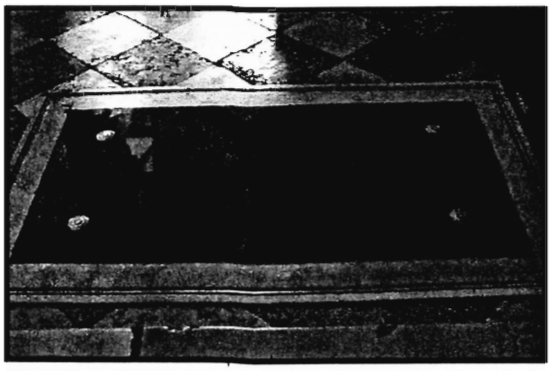


Figure 102: A protective coating on an artifact in Frari

The second solution is to use a sealant or protective coating on the tombs. An example of protective coating can be seen in Frari in Figure 102 The tomb is covered in a thin layer of glass that protects it from foot traffic and other damage causes. However, this solution is only viable for artifacts that are level with the floor.

6.3. Protection from Movable Furnishings

One of the main causes of damage to the floor is the movable furnishings. The main type of movable furnishing that causes large amounts of damage are the pews. The pews damage both the floor quadrants and the artifacts as can be seen in Figure 103. As discussed in our analysis, the main reason why pews cause so much damage is the concentrated pressure from the weight of the pew and its patrons on four points of the floor. Figure 104 is a picture of the legs on one side of the pew. The two points of contact with the floor can be clearly seen.

Figure 103: Artifacts covered by pews in S. Francesco di Paolo

We identified two solutions to this problem. Our first solution was to create a soft barrier between the pew legs and the floor. The easiest material to use as a soft barrier is carpeting as it would cushion the legs of a pews. This solution would lessen the grinding and scraping

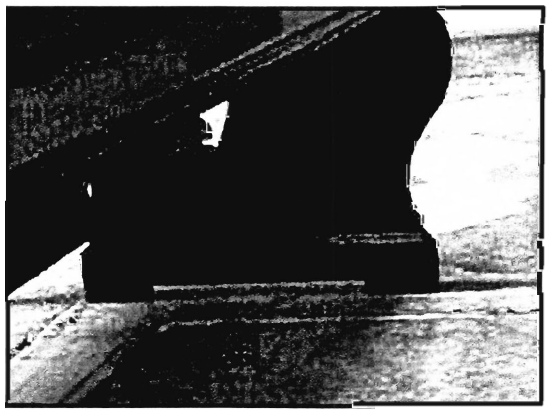


Figure 104: The two points of pressure on the floor from the pew legs

on the floor and artifacts. Carpeting would obscure the artifacts located beneath the pews, however. A second option of material would be some sort of rubber coating that would absorb the weight of the pew and lessen the shock to the floor. This could also be applied to other movable furnishings such as candle stands and kneelers.

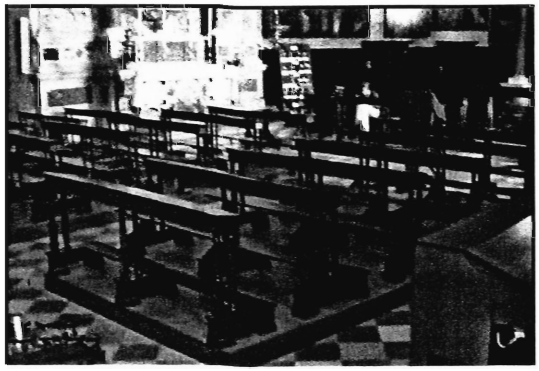


Figure 106: The even distribution of the weight of the pews

Our second solution to this problem was to evenly distribute the weight of the pews by creating a hard barrier between the pew legs and the floors and artifacts. This hard barrier could be as simple as sheets of wood, or as complex as the heating system shown in Figure105. The project team from 2002 came up with a third method of protection from furnishings and that was to redesign the pews to cover a larger surface area rather than four points. The example prototype pew they developed is in Figure 106. We viewed this solution as beneficial to the church as it solves the problem of visibility of the artifacts and weight distribution, however we determined that it is not feasible. Most of the churches do not have money for the upkeep of the church or to restore any artifacts. The church administraion would not have the money to completely replace the pews in every church, and it would not be considered a priority.

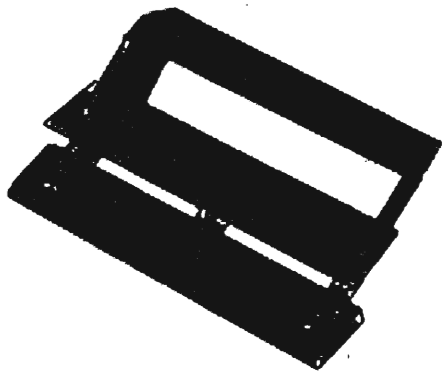


Figure 105: The 2002 prototype of a redesigned pew

6.4. Protection from Church Maintenance

All the churches in Castello and San Polo we visited contained a lot of dirt and grime. Some were worse than others, and we only saw cleaning occurring in S. Maria Formosa. Some of the designs and artwork and engraving on the tombs and plaques on the floors of the churches would be more clearly visible if they were cleaned. However it is important to clean the artifacts correctly so as not to cause further damage to them. Constant sweeping or polishing of artifacts

would be more harmful than beneficial as it would wear down the remaining designs. Once the artifact has been cleaned, the church should take precautions to prevent it from collecting dirt and grime which may hide the artwork and lettering.

Another maintenance issue the church should be aware of is the location of heating systems. We saw in Ss. Giovanni e Paolo that the heating system for the church was located in what was originally thought to be a wooden barrier between the floor and the pews. Figure XX shows this heating system on the floor. One of the benefits of setting the heating system for the church up under the pews is that is creates an automatic barrier that protects the floor. Another benefit is that the floor does not have to be broken or dug into to install such a heating system. A third benefit is that the amount of energy needed to produce an adequate amount of heat would be minimal as the heat would be directly below the patrons and rise to warm them during mass. The final benefit of a heating system like the one in Ss. Giovanni e Paolo is that the heat is near the floor and not by any of the paintings in the church which prevents them from drying out.

6.5. Recommendations for Each Church

Chiesa S. Biagio – The best use of this builiding since it has been closed is to be de-sanctified and reused as another type of building. If any reconstruction should occur the Archeological Superintendence should be notified and allowed to explore what may exist below the floors. Furthermore the one tomb that lies on its surface should be looked into either by church archives or another documentation of its existence.

Chiesa di S. Giovanni in Bragora - The biggest recommendation for this church would be to avoid the chairs located on the main floor. The connecting of these chairs put a great amount of weight onto the floor and the artifacts that are located below them. In order to maintain the upkeep of the church perhaps a small fee for entrance would be of the best interest of the church.

Chiesa de la Fava – A primary observation was the damage caused by the pews on the artifacts and floors. A lifting of the pews to balance and evenly distribute the weight would be beneficial to the floor beneath. Also the tomb markers that

exist should be identified from the archives on who is buried in what tomb and the time of their death.

Chiesa di S. Elena – This church requires much restoration due to its surface damage and salt efflorescence. The best recommendation for this church is to try and raise funds or take donations from its parishioners in order to pay for its restoration. If this proves to be unsuccessful the continuation of asking the church administration for money is the only other option or from an outside source.

Chiesa S. Maria Formosa – The only recommendation for this church is to look into the archives and see if any tombs exist below the current good condition floors. Also the intricate patterns that exist on the floors should be well preserved either by roping off the area they are found in or make travels over them less.

Chiesa dei SS. Giovanni e Paolo – An entrance fee for this church would be the best idea in order to raise funds to maintain the upkeep of the church and its floors. Since this church is a high tourist attraction but not on the chorus route, an entrance fee could be highly profitable. Furthermore furnishings that exist on the floors, such as candle stands, moveable kneelers, and signs, should be placed in areas that are not over tombs or plaques on the floor. Also perhaps more roped off areas that are congested with tombs so as to preserve its appearance and text readability.

Chiesa S. Giorgio dei Greci – The only recommendation for this church is to re-organize the carpeting so that the intricate tombs that lay beneath the rugs can be displayed. Also information plaques could be placed in front of them giving a translation to the Greek inscription that remains on them.

Chiesa di S. Lazzaro dei Mendicanti – The best recommendation of this church is to allow this church to be open to the people of the hospital for prayer services

and other needs of the hospital's patients and their loved ones. Furthermore the pews could be lifted and the weight evenly distributed to relieve the weight that causes damage to the artifacts below.

Chiesa di S. Isepo – The main observation of this church was the furnishings that are piled upon numerous artifacts. A storage room off the main floor should be used to hold these chairs, tables and movable pews. This will alleviate the major damage caused to these tombs. It will also prevent their existence to be ignored and possible historic figures to be identified.

Chiesa La pietà S. M. della Visitazione – The one recommendation would be to move the furnishings off the tombs and plaques so that they can be displayed to the many tourists who enter the church from the waterfront.

Chiesa di S. Martin – The artifacts in this church are all plaques and tomb markers so the church should enter its records and try to find information of the people buried below. Also pews could be raised to evenly distribute the weight.

Chiesa S. Maria dei Dereliti – This church should be opened at least one or two more days instead of the Thurs-Sat 3:30-6:30pm schedule. This would increase the funds they receive from the entrance fee and perhaps be able to start a "tubbing" system to alleviate the high amount of salt collection on the floors and raise the low elevation of the church a bit.

Chiesa S. F. di Paula – The recommendations of this church would be to raise the pews and evenly distribute the weight. Also to provide the public with the names and dates of the parishioners buried beneath the floors. This information should be provided with the other general information at the entrance way of the church.

Chiesa di S. Pietro – In this church carpeting should not cover the artifacts and perhaps an increase in the areas that are roped off. This will prevent the surface

damage to multiply over the entire floor. Since it is such a tourist attraction perhaps it will herd the visitors into better walkways than the ones in use. Also information plaques could be up for the tombs which contain the most prestigious and historical people. Archives should be researched in order to find information about those buried in this church.

Chiesa di S. Lio – The tiles that remain lose on the main floor should be repaired so as to prevent any accidents from occurring or further damage. This should be done in a neat and organized manner however instead of messy caulking. This will maintain the original quality of the floor. Also the pews could be raised and the weight evenly distributed so the artifacts that are below them will not be damaged from the stress of the weight.

Chiesa S. Francesco de la Vigna – The elaborate tomb that lies in the center aisle of the church in front of the altar should be better kept. One way to do this would be to place a protective coating over the top surface of the artifact. The best material to use would be glass because it can sustain a great amount of weight and is also transparent. If this proves to be too costly, perhaps just a roped off area within four small pillars could prevent excessive traffic over this artifact.

Chiesa di S. Zaccaria – The rooms that exist off the main body of the church should be better advertised so as to bring more recognition to the church and allow visitors to see the historic features and rooms that exist. The church could also alarm the main altar so to prohibit tourists from stepping over the current barrier. Furthermore they should research the individuals buried in the front, right side room we label Quadrant O and preserve the names and dates of who is buried there.

Chiesa di S. Cassiano – The one recommendation for this church is to lift the pews to evenly distribute its weight. While in the process of this they could

slightly shift their location so as to display all the tombs and artifacts that remain on the floor.

Chiesa dei Frari – Some of the artifacts in this church could use some restoring because many of them are severely damaged. They should also identify where all the tombs are for the visitors of the church because they are hard to locate. Individuals who are more prestigious than others should have plaques to dictate their historical relevance.

Chiesa di S. Polo – The church should find the original information of the tombs that are in the back quadrant of the church. Perhaps the names and dates of those buried there can be re-engraved on the new tombstones that exist in their place.

Chiesa di S. Rocco – This church should be better associated with the Scuole Grande Museum. This will bring more information about the parishioners of the church and also identify the tombs that exist in front of the altar of the Scuole Grande.

Chiesa di S. Silvestro – A better search for the layers that exist below the main surface layer should be performed. Since there are no artifacts then there is a great possibility for some that exist below the current floor.

7. Bibliography

Aldrich, Brian, Kevin Shea, and David Youkstetter. The Churches of Venice II: A System for Artistic Restoration Analysis. An Interactive Qualifying Project for Worcester Polytechnic Institute, 1993.

Curran, J.J. Cemeteries" Catholic Encyclopedia <http://www.newadvent.org/cathen/03504a.htm> (April 14, 2002)

Delaive, Amanda. Kristant, Elaine. Petrowski, Craig. Santos, Luiz. "The Church Floors in Venice, Italy: An Archeological Study and Analysis" IQP diss., Worcester Polytechnic Institute, 2002.

Direzione Generale per i Beni Archeologici. <http://www.archeologia.beniculturali.it/>. (19 April 2002).

Howard, Deborah. The architectural History of Venice. New Haven: Yale University Press, 2002.

http://www.kencollins.com/glossary/architecture.htm#newplan

http://www.newadvent.org/cathen/03705a.htm

Law # 1.6.1939 n.1089

MBAC – Ministero per i Beni e le Attività Culturali. <http://www.archeologia.beniculturali.it>. (06 April 2003).

Rivista diocesana del Patriarcato di Venezia. Ufficiale per gli atti di Curia. Arte & Storia. S. Croce, Venezia. 1998.

Sammartini, Tudy Pavimenti a Venezia , Ponzano, Italy: Vianello Libri, 1999, 200

Supervisory Offices for Architectural and Landscape Treasures <http://www.ambiente.beniculturali.it/eng/index_eng.html>. (06 April 2003).

UNESCO *Venice, Safeguarding Campaign: Venice and its Lagoon.* 14 June 2001, (5 April 2002). <http://www.unesco.org/culture/heritage/tangible/venice/html_eng/lagunecon.shtml>.

UNESCO *Venice, Duel over Troubled Waters (4 April 2003)* *www.UNESCO.org*

8. Appendix A: Annotated Bibliography

8.1. Archeology in Venice

Brown, Patricia Fortini. Venice and Antiquity. Yale University Press, New Haven & London. 1996.

This source provided illustrated examples of inlaid tombstones and plaques as well as commentary on burial practices for the doges.

Ruskin, John. Stones of Venice. New York: John Riley and Sons, 1884

This book provides a detailed account of all the aspects of construction techniques used in early Venice. This book also offers information on architectural styles used in different time periods in Venetian history. It will provide a good basis for our research on architecture and archeology

ICCROM <http://www.iccrom.org/eng/training/events/courseannoucements/SCO32003.htm>

This site might be able to allow us to get a hold of some people to be able to find more information on the architectural regulations in Venice

Gregorovius, Ferdinand. The Tombs of the Popes, Westminster, Archibald Constable & Co Ltd, 1903.

This book gives a lot of information about the Catholic popes and their burials and tombs. It does not however give a lot of help to the actual tombs of Venice. It may help in the future with the way dignitaries were buried and the documentation one can find on them.

MBAC – Ministero per i Beni e le Attività Culturali. <http://www.archeologia.beniculturali.it>. (06 April 2003).

Supervisory Offices for Architectural and Landscape Treasures <http://www.ambiente.beniculturali.it/eng/index_eng.html>. (06 April 2003).

8.2. Tides and Preservation

United Nations Educational, Scientific and Cultural Organization website. n.d. <http://www.unesco.org/> (27 March 2003).

This website is the home page of one of our sponsors: UNESCO (UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION). It is extremely helpful as it provides names, phone numbers, email addresses, and other contact information for professors, scientists, and historians.

Monastersky, Richard. "Science News: Against the Tide." (Venice, Italy). 24 July 1999. Science News. 18 Mar. 2002 <http://www.findarticles.com/cf_dls/m1200/4_156/55553310/print.jhtml>.

This article was used by last years group. It discusses the various studies conducted to determine the effects the rising water levels have on the city. The article mentions the flood gates that are implemented to protect the city. The article has usefull tide information about how the city is affected, but not specifically the churches.

Ravera, Oscar. The Lagoon of Venice: the result of both natural factors and human influence. Insituto Italiano di Idrobiologia, 2000.

This paper addresses the problems concerning the lagoons, and speaks of the threats that the high tides impose on Venice. It discusses the rising sea level and some effects on the buildings, but nothing specifically on churches.

The TIDE project (European Union funded research project on Venice's lagoon) <http://www.sciam.com/article.cfm?articleID=0008313B-E17E-1D5B-90FB809EC5880000>

This website provided some information about one of our sponsors NAUSICAA (the Veneto Superintendency for Archeology) and their current projects. It was very general and not specific enough for our purposes.

8.3. Churches

Cathedral of San Marco
<http://www.manitoulin-link.com/medieval/sanmarco.html>

This site is useful in looking at some history and information on the Cathedral of San Marco.

Churches of *sestiere* of Castello, Venice
<http://www.invenicetoday.com/art-tour/churches/sest_castello.htm>

This is an excellent site to research the types of churches and dates of construction of the churches of Castello. It gives a picture of the church itself and a brief description of its history, architecture and location.

Churches in Italy
<http://www.invenicetoday.com/art-tour/churches/churches.htm>

This site is extremely useful in having about 100 churches in Venice in alphabetical order, showing their placement in Venice on a map. It also has a brief history for each church.

Churches of *sestiere* of Castello, Venice
<http://www.invenicetoday.com/art-tour/churches/sest_castello.htm>

This is an excellent site to research the types of churches and dates of construction of the churches of Castello. It gives a picture of the church itself and a brief description of its history, architecture and location.

Gregorovius, Ferdinand. The Tombs of the Popes, Westminster, Archibald Constable & Co Ltd, 1903.

This book gives a lot of information about the Catholic popes and their burials and tombs. It does not however give a lot of help to the actual tombs of Venice. It may help in the future with the way dignitaries were buried and the documentation one can find on them.

Kitzinger, Ernst. Italian Church Deoration of the Middle Ages and Early Renaissance: Functions, Forms, and Regional Traditions. Ed. William Tronzo. Johns Hopkins University Press. 1989.

This book provided information about the attitude taken toward churches and the history behind traditional decorations – specifically the mosaics in Sicily and the classical Byzantine system of church decoration could apply to our project.

Oliphant, Margaret. The Makers of Venice, London, Macmillan & Co. 1888.

Although this book is very old and may be outdated it deals with doges, conquerors, painters and famous men of Venice. It gives light into their lives and a brief history about what they did for Venice and its history and culture. This book will be beneficial when finding out where these dignitaries were buried and researching their lives.

Rivista diocesana del Patriarcato di Venezia. Ufficiale per gli atti di Curia. Arte & Storia. S. Croce, Venezia. 1998.

This publication by the Curia of Venice provided extremely useful information concerning the setup of the Catholic Church Administration in Venice.

Brown, Horatio. Studies in Venetian History, New York, E.P. Dutton & Company, 1907.

This is an excellent source for finding information about the city of Venice, its customs, laws and lifestyles. However it is not the best source to find information on specific information needed for this project. It may help with finding information on churches if we know the specific churches we would like to research.

8.4. Architecture

Cummings, Charles A. A History of Architecture in Italy. Cambridge: The Riverside Press, 1901.

This book gives a complete architectural history of Italy. It has specific chapters and sections dealing with the history of the architecture in Venice. In many cases there is specific information dealing with the churches of Italy and Venice

Hale, John. Great Ages of Man: A History of the World's Cultures Renaissance. Time Incorporated, New York. 1965
This source provided general information regarding Venetian art in the Renaissance.

Howard, Deborah. The Architectural History of Venice. 2d ed. New Haven: Yale University Press, 2002.

This book is a source for the architecture found in Venice, Italy. It gives excellent photographs and floor plans of edifices found in Venice, specifically the churches which will be studied in this project.

Plumb, J.H. The Horizon Book of the Renaissance. American Heritage Publishing Co, Inc. 1961

This source provided historical information on doges of the Renaissance era as well as art throught the city. It was not as specific as our purposes require.

Romanelli, Giandomenico. *Venice Art & Architecture.* Vol 1.
Cologne: Konemann, 1997.

This book provides history on paintings as well as the architecture of buildings such as churches, palaces, and other important structures. It also talks about the different styles of Architecture in Venice and the periods that this style was in style. This book is very useful in terms of architecture of buildings and providing history on buildings. The bad part about this book is that it also includes pictures and sculptures that do not pertain to the topic of the project.

Romanelli, Giandomenico. *Venice Art & Architecture.* Vol 2.
Cologne: Konemann, 1997.

This book is the second volume to the *Venice Art & Architecture.* It provides the same information as volume 1 and is just as useful and useless as volume 1.

Sir Banister Fletcher's A History of Architecture. Ed. Dan Cruickshank. The Royal Institute of British Architects and the University of London. 1996.

This book provided illustrated examples of churches in Venice fro 1400-1830 discussing the Early Renaissance, High Renaissance and Mannerism, Baroque, Rococo, and Neoclassical Architecture.

Hamlin, Talbot. Architecture Through the Ages, New York, GP Putnam's Sons, 1940.

This book will be good in classifying the churches that we will be working on. It also has a section on floors that could be constructive in gathering information for the floors of the Venetian churches.

9. Appendix B: Churches of Castello and San Polo

Church Code	Churches	Status
ANNA	Chiesa di S. Anna	Restoration
ANTO	Chiesa di S. Antonin	Closed
BIAG	Chiesa S. Biagio	Closed – Accessible
BRAG	Chiesa di S. Giovanni in Bragora	Open
CADI	Chiesa della Ca' di Dio	Converted – Residential
CONS	Chiesa de la Fava	Restoration – Accessible
ELEN	Chiesa di S. Elena	Open
FORM	Chiesa S. Maria Formosa	Open
GIOA	Chiesa di S. Gioacchin	Converted – Residential
GIOV	Chiesa dei SS. Giovanni e Paolo	Open
GIUS	Chiesa di S. Giustina	Converted – School
GREC	Chiesa S. Giorgio dei Greci	Open
IMEN	Chiesa di S. Lazzaro dei Mendicanti	Converted – Accessible
ISEP	Chiesa di S. Isepo	Open
LAPI	Chiesa La pietà S. M. della Visitazione	Open
LORE	Chiesa di S. Lorenzo	Restoration
MALT	Chiesa di S. Giovanni di Malta	Restoration
MANT	Chiesa delle Suore Mantellate	Converted – Hotel
MART	Chiesa di S. Martin	Open
NOVO	Chiesa di S. Zaninovo	Closed – Storage Facility
OSPE	Chiesa S. Maria dei Dereliti	Open
PAOL	Chiesa di F. da Paola	Open
PIAN	Chiesa S. M. del Pianto	Converted – Hospital
PIET	Chiesa di S. Pietro	Open
SCHI	Scuola S. Giorgio degli Schiavoni	Converted – Scuola
SLIO	Chiesa di S. Lio	Open
VIGN	Chiesa S. Francesco de la Vigna	Open
ZACC	Chiesa di S. Zaccaria	Open

Table 25: Churches of Castello, their current status and corresponding church code

Code	Church	Status
APON	Chiesa di S. Aponal	Closed
ROCC	Chiesa di S. Rocco	Open
GIAC	Chiesa San Giacometo	Completed Last Year
FRAR	Chiesa dei Frari	Open
POLO	Chiesa di S. Polo	Open
EVAN	Chiesa di S. Giovanni Evangelista	Closed
ELEM	Chiesa S. Giovanni Elemosinario	Completed Last Year
TOMA	Chiesa di S. Tomà	Closed
SILV	Chiesa di S. Silvestro	Open
CASS	Chiesa di S. Cassiano	Open

Table 26: Churches of San Polo, their current status and corresponding church code

10. Appendix C: Database Structure

11. Appendix D: Field Forms

General Church Information

Church Code:

Name of Church:

Address:

Telephone:

Parish:

Caretaker:

Hours Open to Public:

Mass Times:

Concerts or Special Events (Y/N):

Notes:

Floor Information Form

Church Code:

Floor Code _____

Number Of Artifacts _____

Year Of Construction _____

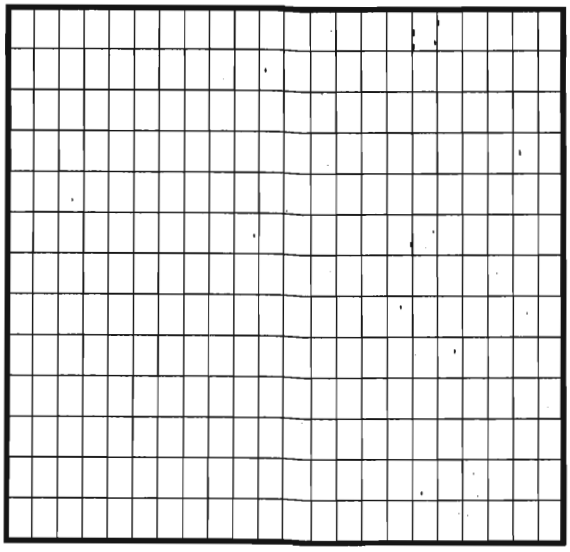
Crypt (Y/N) _____

Floor Style

_____

_____

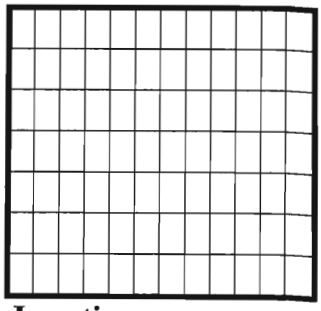
_____



Primary Pattern **Picture Code:**

#	Material	Color

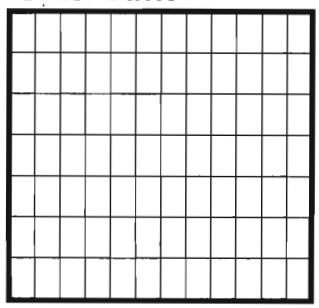
Other Pattern



#	Material	Color

Location:
Picture Code:

Other Pattern



#	Material	Color

Location:
Picture Code:

Elevation at Main Entrance vs Absolute Zero:

Orietation of Main Entrance:

Notes

Chapel Information Form

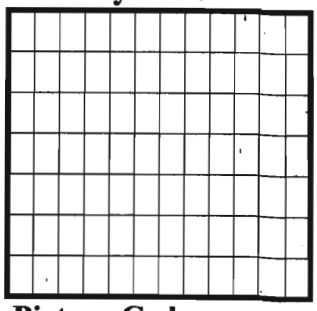
Church Code:

Quadrant

Number Of Artifacts

Floor Style

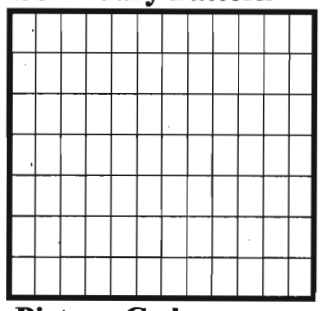
Primary Pattern



Picture Code:

\# Material Color

Secondary Pattern



Picture Code:

\# Material Color

Other Designs

Picture Code:
Discription:

Picture Code:
Discription:

Picture Code:
Discription:

Picture Code:
Discription:

Picture Code:
Discription:

Picture Code:
Discription:

 # Steps to Chapel:

Height from Main Entrance to Chapel:

Notes

Floor Condition Assessment

Church Code:

Floor Code	**Quadrant**	**Date**
Altar (Y / N)	**Number of Steps**	**Height from Entr. to Altar**
Altar (Y / N)	**Number of Steps**	**Height from Entr. to Altar**

Cracks	**Rating 0 to 4**	
Holes	**Rating 0 to 4**	
Joint Gaps	**Rating 0 to 4**	
Surface Damage	**Rating 0 to 4**	

(Check all that apply)

- ☐ **Wearing/Fading**
- ☐ **Water Damage**
- ☐ **Pitting**
- ☐ **Other** _____

Floor Detachment	**Percentage of Quadrant**	
Floor Replacement	**Percentage of Quadrant**	
Carpeting	**Percentage of Quadrant**	

Height of Quadrant (at center) from Main Entrance _____

Notes

Artifact Information Form

Church Code: _____

Artifact Code _____ **Picture Code** _____ **Type Of Artifact** _____

Length _____ **Width** _____ **Shape** _____

Position Of Artifact **X - Coordinate** _____ **Y - Coordinate** _____

Geographic Orientation of Artifact:

Materials

Primary

- ☐ **Brick** ☐ **Istria**
- ☐ **Marble - Color** _____ ☐ _____
- ☐ **Marble - Color** _____ ☐ _____

Other

- ☐ **Brick** ☐ **Istria**
- ☐ **Marble - Color** _____ ☐ _____
- ☐ **Marble - Color** _____ ☐ _____

Short Description Of Art and/or Features

_____

_____

_____

Text/Inscription

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Notes

Artifact Condition Assessment

Church Code:

Artifact Code	**Quadrant**	**Date**

Inscription	**Number of Perfect Letters**	
	Number of Unreadable Letters	
	Number of Damaged Letters	
	Total Number of Letters	
Cracks	**Rating 0 to 3**	
Holes	**Rating 0 to 3**	
Joint Gaps	**Rating 0 to 3**	
Surface Damage	**Rating 0 to 4**	
	(Check all that apply)	
	☐ **Wearing/Fading**	
	☐ **Water Damage**	
	☐ **Pitting**	
	☐ **Other** _____	
Floor Detachment	**Percentage of Artifact**	
Floor Replacement	**Percentage of Artifact**	

Notes

Ricerca Sui Pavimenti Delle Chiese

Buon giorno. Siamo studenti americani del Worcester Polytechnic Institute e collaboriamo con la Soprintendenza r i beni Archeologici del Veneto su un progetto relativo ai pavimenti delle chiese a Venezia. Le saremmo grati per alsiasi informazione Lei ci possa fornire per aiutarci a completare la nostra tesi di laurea. La preghiamo di compilare esto modulo nei limiti del possibile e/o di passare questo modulo a chi potrebbe avere ulteriori informazioni al uardo. Se necessario potremmo lasciarle il modulo e tornare a ritirario tra una settimana. Grazie

ome del Parroco o Proprietario _____

Nome dell'amministratore o del curatore _____

no di Posa del Pavimento Attuale _____

Telefono _____

no/i di Rifabbrica _____

_____

Incendi subiti/anno _____

_____

esistenze Pavimentali

Descrizione	Anno

vori passati al pavimento

Descrizione	Anno	Strutture/Reperti Archeologici	Collocazione Reperti

vori previsti o in corso per il pavimento

Descrizione	In corso/anno previsto

vi Archeologici (passati, presenti o programmati)

Descrizione	Anno

Per ulteriori informazioni contattare Dott. Luigi Fozzati **041-520-0201**

12. Appendix E: Results Floors

Cracks			
Church Code	Buone	Medie	Cattive
BIAG	0,86	0,14	0,00
BRAG	0,54	0,46	0,00
ELEN	0,20	0,60	0,00
FAVA	0,20	0,60	0,20
FORM	0,93	0,07	0,00
GIOV	0,75	0,21	0,04
GREC	1,00	0,00	0,00
ISEP	0,87	0,13	0,00
LAPI	0,67	0,33	0,00
MART	0,78	0,22	0,00
MEND	0,75	0,21	0,04
OSPE	0,00	1,00	0,00
PAOL	0,86	0,14	0,00
PIET	0,29	0,59	0,12
SLIO	0,58	0,42	0,00
VIGN	0,57	0,43	0,00
ZACC	0,80	0,20	0,00

Table 27: Percentage of each church in Castello that falls into the three damage levels for cracks

Cracks			
Church Code	Buone	Medie	Cattive
CASS	0,75	0,21	0,04
FRAR	0,75	0,21	0,04
POLO	0,75	0,21	0,04
ROCC	0,75	0,21	0,04
SILV	0,90	0,10	0,00

Table 28: Percentage of each church in San Polo that falls into the three damage levels for cracks

Holes			
Church Code	Buone	Medie	Cattive
BIAG	1,00	0,00	0,00
BRAG	0,85	0,15	0,00
ELEN	1,00	0,00	0,00
FAVA	1,00	0,00	0,00
FORM	1,00	0,00	0,00
GIOV	0,85	0,11	0,04
GREC	1,00	1,00	1,00
ISEP	0,93	0,07	0,00
LAPI	1,00	0,00	0,00
MART	1,00	0,00	0,00
MEND	0,86	0,11	0,04
OSPE	0,83	0,17	0,00
PAOL	1,00	0,00	0,00
PIET	1,00	0,00	0,00
SLIO	1,00	0,00	0,00
VIGN	0,90	0,10	0,00
ZACC	0,80	0,20	0,00

Table 29: Percentage of each church in Castello that falls into the three damage levels for holes

Holes			
Church Code	Buone	Medie	Cattive
CASS	0,86	0,11	0,04
FRAR	0,86	0,11	0,04
POLO	0,86	0,11	0,04
ROCC	0,86	0,11	0,04
SILV	1,00	0,00	0,00

Table 30: Percentage of each church in San Polo that falls into the three damage levels for holes

Joint Gaps			
Church Code	Buone	Medie	Cattive
BIAG	0,57	0,43	0,00
BRAG	0,92	0,08	0,00
ELEN	1,00	0,00	0,00
FAVA	0,40	0,60	0,00
FORM	1,00	0,00	0,00
GIOV	0,38	0,54	0,07
GREC	1,00	0,00	0,00
ISEP	0,60	0,33	0,07
LAPI	1,00	0,00	0,00
MART	0,72	0,18	0,00
MEND	0,39	0,54	0,07
OSPE	1,00	0,00	0,00
PAOL	0,86	0,07	0,07
PIET	0,41	0,47	0,12
SLIO	0,67	0,33	0,00
VIGN	0,71	0,29	0,00
ZACC	0,53	0,47	0,00

Table 31: Percentage of each church in Castello that falls into the three damage levels for Joint Gaps

Joint Gaps			
Church Code	Buone	Medie	Cattive
CASS	0,39	0,54	0,07
FRAR	0,39	0,54	0,07
POLO	0,39	0,54	0,07
ROCC	0,39	0,54	0,07
SILV	0,80	0,20	0,00

Table 32: Percentage of each church in San Polo that falls into the three damage levels for Joint Gaps

Surface Damage			
Church Code	Buone	Medie	Cattive
BIAG	0,00	0,14	0,86
BRAG	0,00	0,15	0,85
ELEN	0,14	0,64	0,21
FAVA	0,00	0,13	0,88
FORM	0,36	0,57	0,07
GIOV	0,11	0,39	0,50
GREC	1,00	0,00	0,00
ISEP	0,47	0,53	0,00
LAPI	0,00	0,66	0,33
MEND	0,11	0,39	0,50
MART	0,06	0,22	0,72
OSPE	0,17	0,50	0,33
PAOL	0,14	0,64	0,21
PIET	0,18	0,24	0,59
SLIO	0,00	0,50	0,50
VIGN	0,00	0,48	0,52
ZACC	0,13	0,53	0,33

Table 33: Percentage of each church in Castello that falls into the three damage levels for Surface Damage

Surface Damage			
Church Code	Buone	Medie	Cattive
CASS	0,11	0,39	0,50
FRAR	0,11	0,39	0,50
POLO	0,11	0,39	0,50
ROCC	0,11	0,39	0,50
SILV	0,50	0,40	0,10

Table 34: Percentage of each church in San Polo that falls into the three damage levels for Surface Damage

Final Condition Rating	
Church Code	Score
BIAG	1,332
BRAG	1,486
ELEN	1,218
FAVA	1,689
FORM	0,642
GIOV	1,538
GREC	0,231
ISEP	1,441
LAPI	1,373
MART	1,285
MEND	2,041
OSPE	1,39
PAOL	1,052
PIET	1,608
SLIO	1,454
VIGN	1,468
ZACC	1,384

Table 35: Final condition assessment for the churches in Castello

Final Condition Rating	
Church Code	Score
CASS	1,332
FRAR	1,338
POLO	0,992
ROCC	1,021
SILV	0,833

Table 36: Final condition assessment for the churches in San Polo

Floor Elevation	
Church Code	Average Floor Elevation (with respect to absolute zero)
BIAG	181,5
BRAG	158,5
ELEN	103,6
FAVA	273
FORM	153,6
GIOV	169,75
GREC	126,3
ISEP	268,5
LAPI	216,7
MART	141,8
MEND	112
OSPE	112,1
PAOL	175,4
PIET	218
SLIO	168,8
VIGN	146
ZACC	162,5

Table 37: Average floor elevation for the churches in Castello

Floor Elevation	
Church Code	Average Floor Elevation (with respect to absolute zero)
CASS	1,61
FRAR	1,667
POLO	1,489
ROCC	2,351
SILV	2,164

Table 38: Average floor elevation for the churches in San Polo

BIAG	
Church Code	Elevation from Absolute Zero (cm)
A	177,7
B	180,2
C	177,2
D	181,7
E	183,7
F	188,2
G	205,7

Tabella 39: Quadrant elevation for BIAG

BRAG	
Church Code	Elevation from Absolute Zero (cm)
A	155,8
B	156,8
C	152,8
D	153,8
E	154,8
F	153,3
G	152,8
H	167,8
I	219,3
J	172,8
K	159,8
L	162,8
M	177,8

Tabella 40: Quadrant elevation for BRAG

ELEN	
Church Code	Elevation from Absolute Zero (cm)
A	106,6
B	104,6
C	99,6
D	119,6
E	104,6

Tabella 41: Quadrant elevation for ELEN

FORM	
Church Code	Elevation from Absolute Zero (cm)
A	162,6
B	158,1
C	151,1
D	149,1
E	152,6
F	148,1
G	189,6
H	190,1
I	187,6
J	184,6
K	180,6
L	181,1
M	181,1
N	187,1

Tabella 42: Quadrant elevation for FORM

GIOV	
Church Code	**Elevation from Absolute Zero (cm)**
A	164,7
B	155,7
C	163,7
D	164,2
E	166,1
F	164,7
G	166,7
H	175,7
I	178,7
J	166,2
K	171,7
L	169,7
M	170,2
N	171,2
O	172,2
P	176,7
Q	180,7
R	176,7
ST	170,2
T	215,7
U	212,7
V	243,7
W	215,7
X	208,7
Y	202,2
Z	192,7
AA	206,7
AB	198,2
AC	198,2

Tabella 43: Quadrant elevation for GIOV

GREC	
Church Code	**Elevation from Absolute Zero (cm)**
A	131
B	127
C	121
D	144

Tabella 44: Quadrant elevation for GREC

ISEP	
Church Code	Elevation from Absolute Zero (cm)
A	278,3
B	267,3
C	274,3
D	274,8
E	270,8
F	272,3
G	268,8
H	263,8
I	268,3
J	263,3
K	255,3
L	264,3
M	302,3
N	305,3
O	290,3

Tabella 45: Quadrant elevation for ISEP

LAPI	
Church Code	Elevation from Absolute Zero (cm)
A	189,4
B	224,9
C	226,9
D	219,4
E	222,4
F	261,4

Tabella 46: Quadrant elevation for LAPI

MART	
Church Code	Elevation from Absolute Zero (cm)
A	145
B	147
C	142
D	141
E	145
F	138,5
G	139,5
H	139,5
I	138,5
J	183
K	182,5
L	180
M	179,2
N	180
O	179
P	177,5
Q	179
R	179

Tabella 47: Quadrant elevation for MART

MEND	
Church Code	Elevation from Absolute Zero (cm)
A	116,4
B	119,4
C	117,4
D	110,4
E	114,9
F	106,4
G	99,4
H	138,9
I	140,4
J	143,4

Tabella 48: Quadrant elevation for MEND

OSPE	
Church Code	Elevation from Absolute Zero (cm)
A	112,8
B	115,3
C	115,3
D	110,8
E	106,3
F	164,8

Tabella 49: Quadrant elevation for OSPE

PAOL	
Church Code	Elevation from Absolute Zero (cm)
A	179,1
B	178,1
C	177,6
D	178,6
E	177,1
F	176,1
G	169,1
H	171,1
I	172,1
J	216,1
K	219,1
L	215,6
M	213,1
N	222,1

Tabella 50: Quadrant elevation for PAOL

PIET	
Church Code	Elevation from Absolute Zero (cm)
A	216,5
B	222
C	216,5
D	213
E	220
F	213,5
G	210,5
H	216,5
I	212,5
J	207,5
K	214,5
L	212,5
M	258,5
N	290,5
O	325,5
P	292,5
Q	162,5

Tabella 51: Quadrant elevation for PIET

SLIO	
Church Code	Elevation from Absolute Zero (cm)
A	166,5
B	169,5
C	171,5
D	165
E	169,5
F	172
G	165,5
H	169,5
I	170
J	176
K	205
L	181

Tabella 52: Quadrant elevation for SLIO

VIGN	
Church Code	Elevation from Absolute Zero (cm)
A	155,5
B	154,5
C	153,5
D	148
E	144,5
F	143
G	175,5
H	174,5
I	176
J	177
K	170,5
L	139
M	179,5
N	174,5
O	177,5
P	129,5
Q	173,5
R	182
S	185,5
T	186,5
U	178,5

Tabella 53: Quadrant elevation for VIGN

ZACC	
Church Code	Elevation from Absolute Zero (cm)
A	161,5
B	166,5
C	167
D	160,5
E	162,5
F	179
G	151
H	155,5
I	159
J	209
K	168,5
L	260,5
M	175
N	183
O	177

Tabella 54: Quadrant elevation for ZACC

CASS	
Church Code	Elevation from Absolute Zero (cm)
A	154,6
B	158,6
C	152,6
D	149,6
E	156,6
F	150,6
G	146,6
H	153,6
I	144,6
J	168,6
K	223,6
L	172,6

Tabella 55: Quadrant elevation for CASS

FRAR	
Church Code	Elevation from Absolute Zero (cm)
A	184,1
B	136,1
C	178,1
D	179,1
E	129,1
F	170,1
G	112,1
H	121,1
I	118,1
J	114,2
K	126,1
L	120,1
M	116,1
N	121,1
O	121,1
P	169,1
Q	166,1
R	180,1
S	156,1
T	176,1
U	152,1
V	236,1
W	205,1
X	208,1
Y	207,1
Z	237,1
AA	217,2
AB	217,1
AC	217,1
AD	211,1

Tabella 56: Quadrant elevation for FRAR

POLO	
Church Code	Elevation from Absolute Zero (cm)
A	140,7
B	144,7
C	145,7
D	138,7
E	144,7
F	150,7
G	132,7
H	140,7
I	143,7
J	162,7
K	182,7
L	174,7
M	133,7

Tabella 1: Quadrant elevation for POLO

ROCC	
Church Code	Elevation from Absolute Zero (cm)
A	227,8
B	228,8
C	228,8
D	223,8
E	224,8
F	227,8
G	228,8
H	228,8
I	228,8
J	257,8
K	257,8
L	257,8
M	133,7

Tabella 57: Quadrant elevation for ROCC

SILV	
Church Code	**Elevation from Absolute Zero (cm)**
A	212,2
B	216,2
C	210,2
D	209,2
E	213,2
F	205,2
G	208,2
H	209,2
I	202,2
J	278,2

Tabella 58: Quadrant elevation for SILV

13. Appendix F: Resuts Artifacts

Church Code	Number of Artifacts
BIAG	1
BRAG	30
CASS	3
ELEN	0
FAVA	56
FORM	0
FRAR	67
GIOV	214
GREC	5
ISEP	35
LAPI	9
LAZZ	13
MART	25
OSPE	14
PAOL	21
PIET	42
POLO	12
ROCC	7
SILV	0
SLIO	31
VIGN	43
ZACC	33
TOTAL	661

Table 59: Number of artifacts in each church by church code

Church Code	BUONE	MEDIE	CATTIVE	TOTAL
BIAG	0	1	0	1
BRAG	8	22	0	30
CASS	2	1	0	3
ELEN	0	0	0	0
FAVA	34	22	0	56
FORM	0	0	0	0
FRAR	12	53	2	67
GIOV	59	149	6	214
GREC	5	0	0	5
ISEP	10	24	1	35
LAPI	9	0	0	9
LAZZ	8	5	0	13
MART	23	2	0	25
OSPE	1	13	0	14
PIET	17	23	2	42
PAOL	10	11	0	21
POLO	10	2	0	12
ROCC	6	1	0	7
SILV	0	0	0	0
SLIO	29	2	0	31
VIGN	10	32	1	43
ZACC	13	19	1	33
TOTAL	**266**	**382**	**13**	**661**

Table 60: Number of artifacts falling into each of the three damage levels for overall rating by church

Church Code	BUONE	MEDIE	CATTIVE
BIAG	0	100	0
BRAG	27	73	0
CASS	67	33	0
ELEN	0	0	0
FAVA	61	39	0
FORM	0	0	0
FRAR	18	79	3
GIOV	27	70	3
GREC	100	0	0
ISEP	28,5	68,5	3
LAPI	100	0	0
LAZZ	62	38	0
MART	92	8	0
OSPE	7	93	0
PIET	40	55	5
PAOL	48	52	0
POLO	83	17	0
ROCC	86	14	0
SILV	0	0	0
SLIO	97	6	0
VIGN	23	74	2
ZACC	39	58	3
TOTAL	40,2421	57,7912	1,966717

Table 61: Percentage of artifacts falling into the three damage levels for overall rating by church

CRACKS			
CHURCH	BUONE	MEDIE	CATTIVE
BIAG	100	0	0
BRAG	37	40	23
CASS	67	33	0
FAVA	75	25	0
FRAR	54	36	10
GIOV	65	24	11
GREC	80	20	0
ISEP	54	40	6
LAPI	33	67	0
LAZZ	62	23	15
MART	96	4	0
OSPE	7	29	64
PAOL	52	48	0
PIET	69	21	10
POLO	75	25	0
ROCC	100	0	0
SLIO	97	0	3
VIGN	40	51	9
ZACC	52	42	6

Table 62: Percentage of artifacts in each church that falls into the three damage levels for cracks

HOLES			
CHURCH	BUONE	MEDIE	CATTIVE
BIAG	0	100	0
BRAG	87	13	0
CASS	100	0	0
FAVA	100	0	0
FRAR	74	5	21
GIOV	71	26	3
GREC	100	0	0
ISEP	94	3	3
LAPI	100	0	0
LAZZ	100	0	0
MART	100	0	0
OSPE	71	29	0
PAOL	95	5	0
PIET	90	5	5
POLO	100	0	0
ROCC	100	0	0
SLIO	100	0	0
VIGN	77	18	5
ZACC	64	33	3

Table 2: Percentage of artifacts in each church that falls into the three damage levels for holes

JOINT GAPS			
CHURCH	BUONE	MEDIE	CATTIVE
BIAG	0	100	0
BRAG	57	33	10
CASS	67	0	33
FAVA	88	9	3
FRAR	34	40	26
GIOV	57	32	11
GREC	80	20	0
ISEP	34	26	40
LAPI	100	0	0
LAZZ	62	38	0
MART	68	32	0
OSPE	100	0	0
PAOL	57	34	9
PIET	38	45	17
POLO	33	50	17
ROCC	86	14	0
SLIO	87	13	0
VIGN	42	44	14
ZACC	55	21	24

Table 63: Percentage of artifacts in each church that falls into the three damage levels for joint gaps

SURFACE DAMAGE			
CHURCH	BUONE	MEDIE	CATTIVE
BIAG	0	0	100
BRAG	13	60	27
CASS	100	0	0
FAVA	24	56	20
FRAR	8	37	55
GIOV	20	45	35
GREC	80	20	0
ISEP	9	40	51
LAPI	78	22	0
LAZZ	8	69	23
MART	20	64	16
OSPE	0	21	79
PAOL	14	48	38
PIET	17	35	48
POLO	17	17	66
ROCC	57	29	14
SLIO	49	35	16
VIGN	78	22	0
ZACC	42	48	10

Table 64: Percentage of artifacts in each church that falls into the three damage levels for surface damage

TEXT READABILITY			
CHURCH	BUONE	MEDIE	CATTIVE
BIAG	0	0	100
BRAG	30	63	7
CASS	0	100	0
FAVA	49	43	8
FRAR	50	29	21
GIOV	58	36	6
GREC	60	40	0
ISEP	36	43	21
LAPI	100	0	0
LAZZ	30	62	8
MART	71,5	21,5	7
OSPE	11	56	33
PAOL	16	42	42
PIET	54	38	8
POLO	11	56	33
ROCC	83	17	0
SLIO	86	7	7
VIGN	90	10	0
ZACC	90	10	0

Table 65: Percentage of artifacts in each church that falls into the three damage levels for text readability

14. Appendix G: Sponsor Information

Benvenuti

Nel sito della

Direzione Generale per i

Beni Archeologici

La Direzione Generale per i Beni Archeologici svolge funzioni statali in materia di tutela, conservazione e valorizzazione dei beni e delle aree archeologiche e delle strutture museali su tutto il territorio nazionale.

Impartisce direttive agli Istituti Periferici (Soprintendenze e Istituti speciali), ne coordina la programmazione, verifica l'attuazione dei plani e dei programmi nonché il raggiungimento degli obiettivi.

Sviluppa implementa e gestisce il Sistema Informativo Automatizzato per l'Archeologia.

Iniziative Inerenti la IV Settimana per la Cultura