THE APSE OF SAN MARTÍN DE FUENTIDUEÑA

BUILDING CONDITION ASSESSMENT

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M.S HISTORIC PRESERVATION
SPRING 2024

Contents

1. Historical Background

1.1 Historical Context of the Town of Fuentidueña

The town of Fuentidueña (Fig.1), founded on the northern slope of a hill and situated to the left of the Duratón River, lies in the northeast of the province of Segovia, within the autonomous community of Castilla y León. In addition to possessing a rich natural heritage, the municipality is home to an important historical site declared National Monument, largely due to its geographical significance in the Middle Ages.

The fortifications encircling the site stand in good condition and boast three entrances to the town, although the arches of just two have been retained. A substantial castle formerly occupied the summit of the fortress, but now only its ruins endure. Within the enclosure, Fuentidueña accommodated four churches, among them San Esteban and San Salvador, both nearing complete destructions. San Martín, although presently in ruins, maintained its apse and certain doors in a well-preserved state until the middle of the 20th century (Fig.2).

San Miguel (Fig.3), the oldest among the four temples, stands well-preserved, despite several historical additions. Constructed around the 12th century, it boasts a single ashlar nave and a semicircular apse, closely resembling the Church of San Martín. Columns divide the apse into three sections, adorned with capitals that encircle it up to a cornice embellished with corbels featuring anthropomorphic motifs. Careful exterior decoration is evident, showcasing a series of buttresses topped with corbels on a cornice, adorned with figures carved in anthropomorphic and zoomorphic motifs[1]

[1] Andrés Gómez de Somorrostro “El Acueducto y otras antigüedades de Segovia, Madrid”, Imprenta de D. Miguel de Burgos, 1861

The necropolis of Fuentidueña reveals its pre-Roman origins, showcasing sites from the Celtiberian, Celtic, Roman, Visigothic, Jewish, and Muslim periods[2]. A document from 1135 marks the initial mention of the village, appearing under the name Fontedona in connection with the neighboring ancient villages of Sacramenia, Membibre de la Hoz, and Bernuy. King Alfonso VIII repopulated the area by attracting people from Burgos and the lands of Oña after the defeat of Almanzor in the region of Calatañazor. The governance of Fuentidueña subsequently passed into the hands of notable kings like Alfonso X el Sabio and Sancho IV[3]. In the 15th century, it came under the ownership of Don Álvaro de Luna, and three centuries later, it passed to the Counts of Montijo.

Although Fuentidueña experienced numerous attacks, such as the arrival of Abderramán II's aceifas in the 10th century or later incursions by Almanzor, the town swiftly underwent repopulation. From the 12th century until the close of the 13th century, aligning with the construction of the wall, the town reached its zenith, evolving into the Community of Villa y Tierra. To enhance defense, the kings of that era commissioned the construction of the castle atop the hill. On his deathbed in 1204, King Alfonso VIII mandated peace with the King of Navarre. Towards the end of the 1250s the castle was visited by Alfonso X el Sabio and in 1308 by Sancho IV, who granted benefits to Christians who decided to live in the region, since the population was mostly Jewish. The gradual decline of the town likely unfolded in the 14th century due to military and administrative decadence—activities that had once fueled its prosperity[4].

[2] Andrés Gómez de Somorrostro, pp-104-105

[3] José Miguel Merino de Cáceres and María José Martínez Ruiz. "From Fuentidueña to Manhattan: Heritage and Diplomacy in Spain."

[4] Carmen Gómez-Moreno. "Traveling Stones: The Apse of San Martín de Fuentidueña." 1961

The village, currently inhabited by fewer than 150 people, nevertheless exhibits historical remnants that underscore its significant strategic importance in the past. The castle ruins preserve four towers arranged on a pentagonal plan, situated on uneven terrain, overlooking the ancient moat. Certain sections of the castle's masonry, possibly dating back to the thirteenth century, appear to be more modern. In the 20th century, the Ministry of Finance conducted an auction for the castle, leading to its transfer into private ownership.

1.2 Legal Framework and Legal Status of the Apse

Legal status of the town of Fuentidueña

The historic center of Fuentidueña attained the designation of Asset of Cultural Interest (BIC) on March 14, 2007, in the category of a historic site. Within this historical complex, the following monuments were declared BIC:

- The Church of San Miguel in 1931.
- The Church of San Martín in 1931.
- The Chapel of Pilar or the Counts of Montijo on April 20, 1982.
- Ruins of the Hospital de la Magdalena on March 25, 1982.

Upon their designation, all these properties were either in ruins or in a severely deteriorated state. Presently, the Junta de Castilla y León advocates for Tax Credits for private individuals engaged in the restoration of Historic Heritage properties. This initiative has resulted in the acquisition and recent restoration of some properties, such as La Capilla del Pilar, by private individuals.

Legal status of the apse

The ruined church of San Martín de Fuentidueña was conferred the status of a National Monument on June 4, 1931 (Fig.4). Notably, the apse was relocated, contravening Spanish legislation on artistic heritage, which explicitly prohibits the sale or export of any property under this level of protection.

Additionally, the 1930s witnessed more stringent measures against the removal of any Spanish heritage to foreign countries, including the Artistic Treasure Law of 1933 and article 45 of the Constitution of 1931.

Following negotiations for the acquisition of the apse spanning the period from 1935 to 1957, a "Long-Term Loan" agreement was executed in June 1957. Under this agreement, the MET exchanged six recently acquired paintings of San Baudelio de Berlanga, paid 800,000 pesetas to the Bishopric of Segovia, and 250,000 pesetas to the Town Hall of Fuentidueña.

Since the agreement's signing, the monument has been on temporary loan "indefinitely" to The Cloisters, along with the paintings of San Baudelio de Berlanga housed in the Prado Museum.

Legal status of the loan

Currently, the transfer's legal status is irregular, necessitating a clear establishment of competences for protecting cultural property abroad. To elucidate information on negotiations between the MET and the Spanish State and the obligations and rights of each party involved, archives containing information on the transfer were consulted. These include the MET, the General Archive of the Administration in Alcalá de Henares, the Prado Museum's archive in Madrid, the Archive of the Patronage of Segovia, the Archive of the Diocese of the Bishopric of Segovia, and the Historical Archive of the Nobility in Toledo.

Despite reviewing over 200 documents, none provide clarity on the current status of the monument or the obligations and rights of the parties. Faced with this documentary gap, all institutions of the Spanish Central Government and the Autonomous Government of Castile and Leon were reached out. Unfortunately, clear answers were not obtained, highlighting once again the legal gap in which the monument exists.

Following the transfer of the monument in 1957, competencies related to Spanish Artistic Heritage were under the jurisdiction of the General Directorate of Fine Arts, a subdivision of the Ministry of

National Education. This is evident in the "Expediente de Permuta de Obras de Arte, en Depósito Mutuo, entre el Museo 'Los Claustros' y el Ministerio de Educación Nacional," (Exchange of Works of Art, in Mutual Deposit, between the Cloisters and the Ministry of National Education), ratified by the Council of Ministers in Madrid on June 14, 1957. The document outlines a mutual agreement contract specifying the terms of the transfer of the apse.

The only documented contact between the Spanish State and the MET regarding the monument dates back to 1984, when the General Directorate of Fine Arts became part of the Ministry of Culture. This information is derived from a letter authored by Merino de Cáceres, architect of the Directorate General of Fine Arts:

“Approximately eight years ago, in response to an emerging deterioration of the apse with undetermined causes, officials from the New York government took action by enclosing it with a structure made of plastic and wood. The purpose was to shield it from harsh weather conditions and the extreme climate changes prevalent in the area where the Romanesque structure is situated. Since then, the apse has remained concealed from the public eye, denying thousands of daily visitors the opportunity to appreciate it, even though accessibility was cited as one of the reasons for transferring the monument to America.

During our recent visit, following the guidance of the Deputy Director General of Heritage, we observed that the apse is indeed undergoing a process of deterioration, albeit not described as severe. […] In summary, it is recommended that the protective plastic covering be removed to address the issue.

NOTE:

The meeting convened to address the issue was attended by the following individuals:

- William D. Wixon, Director of Medieval Art at The Cloisters
- Timothy Husband, Curator of The Cloisters

- James H. Frantz, Curator of Objects at the MET
- José Merino de Cáceres, Architect of the General Directorate of Fine Arts, Ministry of Culture"[5].

It is evident that, despite the unknown specifics of the Spanish Government obligations and rights, it did play a role in influencing the conservation status of the monument. The technical and financial responsibility for the preservation, however, rested with the MET. Yet, the active involvement of the Spanish Government in the decision-making process has been and remains limited. No other document has been discovered that confirms Spanish interest in the condition of the apse.

With the evolution of Spanish politics, various Ministries have undergone mergers or been established, consolidating their competencies within the current government frameworks. Presently, responsibilities concerning Artistic Heritage have been decentralized to the Autonomous Communities, with the General Council of Heritage of the Junta de Castilla y León handling these matters. Despite this, the Council has disclaimed any jurisdiction over the apse[6].

At a higher administrative level, the Subdirectorate General of Management and Coordination of Cultural Property, a subdivision of the Ministry of Culture and Sports, oversees the supervision of diverse heritage assets classified as of Cultural Interest. Negotiations and Agreements for the Transfer of the Fragment.

After corresponding via email with all the mentioned institutions, both at regional and national levels, we have verified, through correspondence with the Archive of the Ministry of Culture, that the Ministry of Culture is responsible for the protection of the apse. The bodies responsible for

[5] José Miguel Merino de Cáceres and María José Martínez Ruiz, 290-291

[6] Correspondence via email with the General Council of Heritage of the Junta de Castilla y León, between January and February.

"international relations between the two countries" are the Spanish Embassy in the United States and the Ministry of Foreign Affairs[7].

1.3 Dismantling of the Apse

The Spanish architect Alejandro Ferrant, renowned for his extensive experience in projects of similar scale, such as the dismantling of San Pedro de la Nave in Zamora, was entrusted with the task of dismantling the apse for its transfer to The Cloisters (Fig.5).

Although Ferrant had his own working method, the Fuentidueña project adhered to the American instructions, as they required the fragment in its most original state. Meticulous planimetric studies (Fig. 6 & 7), initiated in July 1957 along with intervention protocols, became imperative due to the deviations in the terrain and the asymmetry of the apse. The process is outlined as follows:

1. "Removal of all soil and debris to the original level of the pavement.
2. Establishment of a reference system for both interior and exterior through a triangulation system.
3. Submission of an advance of elevations from the basic references to MET.
4. Numbering each stone, even in its original position, with chalk and documenting it on the plans. Thorough photographic documentation of everything, with six complete copies of the photographs and numbering, to be sent to the museum.
5. Individual measurement of all visible parts of each stone and reference on the plans.
6. Disassembly and shipping of all masonry stones, including those found on-site. Sending samples of each stone to verify their quality against atmospheric agents.

[7] Correspondence by e-mail between January and February of 2024 with the Archive of the Ministry of Culture, the Archive of the General Directorate of Fine Arts and the Institute of Spanish Cultural Heritage

7. Each stone will be systematically lowered to facilitate a definitive numbering (Fig.8). Stones that undergo deterioration during the process will be repaired on-site, utilizing tools such as wrenches, anchors, or others as needed for stone assembly.
8. Avoid despoiling the site for potential excavation or survey, as the MET may express interest in archaeological aspects related to a potential or future structure on the premises.
9. Leave the site in a condition deemed satisfactory by the authorities, and ensure the removal of all debris.
10. Packing and transport instructions will be provided at a later date*"*[8].

Ferrant's team, consisting of 14 or 15 workers, executed the project. They received a weekly payment of 500 pesetas, nearly double the compensation for similar-sized projects.

1.4 Reconstruction at the MET Cloisters

On February 13, 1958, the ship Monte Navajo docked in New York, transporting 839 boxes containing 3,396 ashlar stones.

The reassembly process, guided by Alejandro Ferrant's adherence to guild tradition, was more systematic and mechanized compared to the Spanish approach. The reconstruction relied on the plans created for the initial disassembly, along with photographs, videos, and a document listing the boxes and their contents.

Unpacking the boxes spanned two months, followed by additional time to consolidate the stones and reproduce the most unique capitals and decorations for the exterior. The originals were preserved inside to prevent deterioration.

Upon clearing the space for the work to commence, architects from the firm of Brown, Lawford & Forbes initiated the preparation. Throughout the reassembly (Fig.9), the team encountered challenges

[8] Luis Cortes Meseguer, pp-69-70

such as the unevenness of the base compared to the original Fuentidueña site, the partial collapse of one side, and material losses in some pieces. Despite these issues, the team efficiently resolved the challenges, replacing many pieces with similar limestone extracted from a quarry located 20 km from Fuentidueña.

2 Building Description

2.1 Building Construction and Materials

During the second half of the 11th century, builders erected a large number of churches along the route of the Camino de Santiago. While many of these churches are not preserved today, their ruins attest to the significant role this road played in the development of Romanesque architecture, both in the Iberian Peninsula and other countries. Despite the fact that the churches constructed in Segovia were not directly on the route, it is highly likely that their builders had previously contributed to the construction of temples along the Camino de Santiago[9]. This gave rise to a distinctive style known as Segovian Romanesque, exhibiting similarities to the churches on the Camino but also featuring unique differences specific to the region. Typical constructions in this style often follow a single nave plan culminating in an apse. An illustrative example is the Church of San Isidoro de León, which shares characteristics with temples in Segovia and Ávila, as well as other monuments scattered in more distant towns[10].

In contrast to its stylistic counterparts, the Church of San Martín de Fuentidueña (Fig.10) poses a series of challenges that complicate its constructive, stylistic, and iconographic examination. The primary challenge stems from the state of neglect it has endured since the 19th century, as detailed by Carmen-Gómez Moreno in her article "Piedras Viajeras" (Traveling Stones). Until 1957, the

[9] Carmen Gómez Moreno, pp-54-55

[10] José Miguel Merino de Cáceres and María José Martínez Ruiz, pp-30-31

remnants of the church displayed an almost complete apse, while the nave, along with its bell tower at the foot, was largely destroyed[11]. The discernible remains of the ruins form a mosaic of small stones and mortar, likely plastered together, with some reinforcement using ashlar blocks in the corners of the bell tower. This marked disparity in preservation between the apse and the rest of the structure, along with the difference in their architectural intricacy, proves challenging to explain. In most examples of other Romanesque churches in Segovia, even the more modest ones, ashlar blocks are typically used, as expected in a region abundant in quarries. It is conceivable that the Church of San Martín was initially constructed starting with its apse, and over time, as materials became scarce, it had to be completed in a simpler manner.

Another complicating factor in its study is its challenging geographical location, situated atop a hill that is difficult to access. No document attests to its designation as a monastery, as the only one in the vicinity is San Juan de la Penitencia, constructed before the Muslim invasion and reconstructed after the Reconquest. Furthermore, the decorative elements in the apse of San Martín suggest a non-Cistercian function[12]. It cannot be confirmed that its purpose was to serve the faithful of Fuentidueña, as San Miguel, constructed around the same time, is situated further down the hill and in a better state of preservation. The most plausible hypothesis, in alignment with Carmen Gómez-Moreno's perspective, is that it was part of the castle complex, the remnants of which still exist, functioning as a parish for the nobility who resided there.

The temple of San Martín features a single nave, lacking a dome or transept, and is oriented east-west with a wooden gabled roof. The apse, constructed with ashlar limestone in the region's typical yellow-orange tone, consists of a straight section and a semicircular structure adorned with extensive ornamentation. Decorative elements are carved from stone with a similar appearance, albeit in a more

[11] Carmen Gómez Moreno, pp-55-56

[12] Carmen Gómez Moreno, pp-55-56

grayish tone and finer granulometry. The bell tower, now in ruins, might have served a defensive purpose given the temple's position in front of the old castle. The church also includes a lateral gallery with multiple openings, a characteristic of Segovian Romanesque, although none of them retains their doorways. According to oral tradition, one of these doors may have been relocated to the Church of San Miguel, possibly during a preservation effort. While not confirmed, considering similar examples of churches, the main entrance of San Martín might have been the one situated on the south, adjacent to the door of the adjoining wall[13].

2.2 Stylistic and Iconographic Description

Moving to the apse, often referred to as the presbytery or sanctuarium, it delineates the most sacred space of the temple. This area housed the altar and, by default, the sacristy. The structure of the apse can be described in three main sections (Fig.11).

Starting with the lower body, it consists of a base that slightly protrudes from the rest of the apse. This base is finished with an exterior bevel and an interior beading molding. In the middle body, three flared windows open to the exterior. Each window features a pair of columns connected by a semicircular arch. The sculptures decorating this section exhibit typical Lombard Romanesque motifs[14]. The upper part of the apse is covered by a semi-dome, extending into a prolonged half-barrel in the straight section, reaching up to the transverse arch, which served as the Triumphal Arch during the early Christian stage.

Turning attention to the exterior (Fig.12), four large columns, culminating in adorned capitals, frame the apse. These columns are attached to the wall from the base to the upper cornice and align with a

[13] Luis Cortes Meseguer. “Patrimonio Arquitectónico Español En Estados Unidos: El Caso De San Martin De Fuentidueña (Segovia)”. New York: Instituto Cervantes. 2016

[14] Luis Cortes Meseguer, pp-43-44

series of corbels, mirroring the capitals of the columns. Both the inside and outside of the apse are adorned with double blind arches. Internally, the arches feature small double columns with decorated bases, while externally, they showcase a single column mirroring the contour of the caryatids.

Within the apse's interior (Fig.13), sculptures on the Gospel side depict themes related to the Adoration of the Magi. On the epistle side, the capital alludes to Daniel in the lion's den, where he inserts his hands into the lion's mouth, commanding respect from the animal. Every Romanesque structure is designed with a didactic function, as indicated by the scarce writings of that era. It is widely recognized that during those times, only a fortunate few possessed the ability to read and write. Consequently, these religious structures had to carry significant symbolic and educational importance, imparting biblical passages to the faithful through motifs carved in stone and emphasizing the perils of sin[15].

3 Condition Assessment

3.1 Conservation Campaigns of the Apse to Date

Upon its arrival in New York, the apse's condition became fragile, undergoing numerous and different conservation projects as the field of preservation progressed. Many of these projects, often innovative, sparked discussions among experts regarding their feasibility. The MET archive contains a wide array of correspondence, proposals, and conservation projects concerning the apse, all of which have undergone review. However, the most valuable articles in this section were two[16]. Explanations by

[15] José Miguel Merino de Cáceres and María José Martínez Ruiz, pp-49-50

[16] Jocelyn Kimmel, George Wheeler "Conservation History, Survey of Conditions, Analysis" Unpublished Article. 1999, the MET Archive.
A.E. Charola, L. Lazzarini, G.E. Wheeler, R.J. Koestler "The Spanish Apse from San Martin de Fuentiduena at The Cloister" Preprints of the IIC Congress, Bologna, 1986

José Merino de Cáceres, based on his observations as the General Architect of Fine Arts sent to review the apse by the Spanish Ministry of Culture in 1984[17], have also been considered.

According to information provided by S. Z. Lewin[18],extracted from an earlier document, in the summer of 1958, "every one of the 3300 stones was treated with a preservative which had already been tested on old stone at the Cloisters. This preservative has the property of making the stone more dense and thus more capable of resisting deterioration due to the twentieth-century atmospheric conditions." However, the author claims that this assertion could not be verified by the analyses performed, as there is no trace of any such treatment. On the contrary, a subsequent article from 1986[19] highlights the presence of limonitic iron oxides and calcium oxalate in the stone, indicating the existence of residues from an old treatment[20]. It is also noted that during the summer of 1958, all the stones were treated in solutions of MgF_6Si and Ba $(OH)_2$ through alternate immersion; although by 1966, the pieces exhibited efflorescence of soluble salts on the surface and flaking.

In 1969, a "preservative" treatment based on a Ba (OH)2-urea solution was applied to the dolomitic stones. This treatment, outlined in a subsequent article[21] by S. Z. Lewin, was conducted in response to the issues described in his earlier publication, primarily salt efflorescence, and in accordance with his recommendations for pre-analysis and *in situ* testing. However, as per the 1986[22] article describes,

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[17] José Merino de Cáceres, María José Martínez Ruiz "De Fuentidueña a Manhattan: Patrimonio y Diplomacia en España (1952-1961)" Ediciones Cátedra, 2023, pp-319-321

[18] S. Z. Lewin, "Investigation on Stone Deterioration Afflicting the Fuentidueña Apse" 7/14/1967, Unpublished Article, the MET Archive.

[19] A.E. Charola, L. Lazzarini, G.E. Wheeler, R.J. Koestler "The Spanish Apse from San Martin de Fuentiduena at The Cloisters" Preprints of the IIC Congress, Bologna, 1986, pp 18

[20] Charola, Lazzarini, Wheeler and Koestler, 19 "Recent analyses indicate that the surface of all stones, both wall and sculptures, had been coated in the past with a thin, yellow layer of polychromy". See also "The Spanish Apse from San Martin de Fuentiduena at The Cloister"

[21] S. Z. Lewin, "Preservative treatment of the stone of the Fuentidueña Apse" 1970, Unpublished Article, the MET Archive

[22] Charola, Lazzarini, Wheeler and Koestler, 18

the deterioration of the stone persisted, although it could not be determined whether it worsened or improved following the application of the "preservative" treatment.

Such was the concern for the imminent deterioration of the dolomitic stone that in 1971, a temporary enclosure (Fig.14) made of "wood and plastic"[23] (fiberglass panels and wooden beams) was installed to shield it from inclement weather and extreme climatic changes in the area. According to Merino de Cáceres[24], from that point onward, the apse was "hidden from the public and inaccessible to the thousands of visitors who come daily to The Cloisters, which was one of the reasons cited for the monument's transfer to United States." Due to the scarcity of documents regarding this protective enclosure —its design, construction, effectiveness, or removal— it has not been possible to confirm whether this measure prevented visitors from viewing the apse from both outside and inside. However, anecdotal evidence suggests that prior to the construction of the enclosure, it was possible to see the apse from the outside, whereas currently, the space is closed to the public and functions as a parking lot and a recreational area for museum employees. It's possible that this situation has changed since the installation of the enclosure.

This protection cover was removed more than 15 years later, following advocacy from numerous experts for its elimination, such as the authors of the 1986 article[25]. Notably, Merino de Cáceres visited on November 16, 1984, representing the Spanish Ministry of Culture, to inspect the preservation status and the protective enclosure. During discussions with key figures from the MET and The Cloisters[26], the architect voiced concerns about the cover, advocating for its removal due to the risks it posed to the interior of the apse—increased temperature and humidity resulting in serious

[23] José Merino de Cáceres, María José Martínez Ruiz, 325

[24] José Merino de Cáceres, María José Martínez Ruiz, 318

[25] Charola, Lazzarini, Wheeler and Koestler, 19

[26] William D. Dixon, Director of Medieval Art at The Cloisters; Timothy Husband, Curator at The Cloisters; James H. Frantz, Objects Conservator at The Cloisters

damage. He also noted that only a minimal percentage of the stone was severely deteriorated and suggested that efflorescence could be mitigated through progressive desiccation and the implementation of modern treatments.

However, Merino de Cáceres's visit on behalf of the Spanish State may not have been well-received at The Cloisters. William D. Wixon's correspondence to Tony Frantz reveals that Merino de Cáceres "arrived at The Cloisters without an advance appointment together with a crew from Spanish television" [27] Wixon also included a copy of an article published by Merino de Cáceres on the despoliation of the Monasterio de San Bernardo de Sacramenia and its impact on Spanish heritage. Interestingly, the MET Archive keeps a telegram dated November 7 from the Spanish Ministry of Culture addressed to the MET director, Phillipe de Montebello, stating: "I request your maximum collaboration so that the architect of this general directorate, Don José Merino de Cáceres, may visit the apse in detail"[28]. On the same day, the curator of The Cloisters, Carmen Gómez-Moreno, received another telegram from the same Ministry which read "I inform you that the architect Don José Merino de Cáceres will arrive at the museum in the middle of next week to write a report on the apse of Fuentidueña. Please give him the maximum facilities to carry out his function"[29].

In 1999, the museum carried out conservation work on the base of a column (Fig.15) stored in its warehouse, necessitating transportation due to renovation work of that storage. Upon arrival at the museum, many pieces were found to be in poor condition and were exchanged for replicas made of dolomitic stone extracted from a quarry approximately 20 km from Fuentidueña. This may have been the case with this particular piece.

[27] Correspondence from William D. Wixom to Tony Frantz. November 27, 1984, Unpublished, the MET Archive.

[28] Telegram from the Spanish Ministry of Culture to Phillipe de Montebello. November 7, 1984, Unpublished, the MET Archive

[29] Telegram from the Spanish Ministry of Culture to Carmen Gómez-Moreno. November 7, 1984 Unpublished, the MET Archive

Due to its fragility, safely transporting this piece required prior consolidation treatment. An article from 1999[30] describes the object's poor state of preservation, as well as the high porosity of the stone (90-94% dolomite, 1-5% calcite), ranging from 19% to 27%. Its surface was heavily polluted, with granular disintegration and flaking. Additionally, the original polychromy was flaking off and disappearing from the surface.

The article evaluated the use of consolidants such as ethyl silicates or acrylics in various solvents, but these were discarded after testing on samples. Finally, a treatment based on cyclododecane, melted and applied with a brush to areas with cracks, fissures, and small fragments at risk of loss, was performed. The result was an opaque surface that became practically unnoticeable when dry, achieved by using an air gun to allow the product to penetrate. Subsequently, the rest of the surface was treated with a solution of cyclododecane in a ratio of 3 parts Shellsol OMS to 1-part xylenes by volume, applied with a spray. This product was chosen for its low toxicity, with xylenes added to increase the concentration in the saturated solution.

The article expressed satisfaction with the result, noting a consolidated and stabilized piece that did not lose any fragments during transportation to its new location (Fig. 16).

In 2018, the MET collaborated with Hasselblad and DJI to scan the exterior of the apse using an A6D-100c camera and DJI's M600 Pro drone. Although limited information is available, a YouTube video[31] and a newspaper article[32] detail the process, which was conducted as part of a condition survey. The current state of conservation of the apse after the data review and whether further conservation work was undertaken remain unknown.

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[30] Jocelyn Kimmel, George Wheeler, 1999

[31] Hasselblad “The Met Cloisters and Hasselblad: Documenting the Fuentidueña Apse by Drone”. YouTube, October 11, 2018

[32] James Barron “A 12th-Century Relic Meets 21st-Century Technology”, October 7, 2018, The New York Times

Upon contacting the Spanish Ministry of Culture[33], it was confirmed that the activities carried out were not recorded in the minutes, nor did they receive any notification about the project. This indicates that the MET did not seek approval from the Spanish State for the undertaking

3.2 Analysis of the Current State of the Apse

To better understand the state of conservation, the causes and indicators of deterioration have been divided into intrinsic factors, in this case, due to the characteristics of the limestone, and extrinsic factors. This latter block explores the damage caused by temperature, water, pollution, biodeterioration, and human action. These damages can be seen in detail in the deterioration map in the appendix.

Intrinsic Factors

The dolomitic limestone in the Fuentidueña Apse is highly porous and soft, which favors external agents, along with the passage of time, deteriorating the material to a greater extent than they would with a more resistant stone. This also affected its reconstruction, as many stones broke and had to be replaced by others from a quarry near its original location.

Extrinsic Factors

Temperature

Three temperature-related factors can be identified that pose a risk to the apse: high temperatures, low temperatures, and fluctuations. High temperatures plus sunlight cause chromatic alteration. The Fuentidueña limestone is naturally yellow, and, as observed in some areas, it has become more whitish. It also causes the disintegration of organic materials, leading to a loss of any polychromy

[33] Correspondence by e-mail between January and February of 2024 with the Archive of the Ministry of Culture, the Archive of the General Directorate of Fine Arts and the Institute of Spanish Cultural Heritage

that the sculptures may have had. It also causes salt due to poor water drainage. More temperature means less humidity, causing salt crystallization on the wall.

Low temperatures may have caused the fissures and cracks that are distributed across the surface. Thermal fluctuations favor expansion-contraction cycles, leading to a loss of strength, causing irreversible damage that modifies the crystalline structure of the stone.

Water

The action of water alone can cause stains and aesthetic alterations, such as those under the beading molding (Fig.17). Water, along with the effect of temperatures, causes moisture and drying cycles that increase the concentration of dissolved salts, leading to precipitation if the stone becomes saturated. This deterioration is visible in some areas, such as the upper part of the molding. As a result of this process, the material becomes fragile and can disintegrate the stone superficially or internally. The holes in some stones may be due to the effect of salts. The effect of salts also caused many sculptures to deteriorate. As a preventive measure, four sculptures were brought indoors, and replicas were placed outside.

Pollution

Pollution can reach the apse in the form of gas, which are usually oxides, ozone, chlorides, or sulfates, among others; or in solid form, such as dust accumulation or material from surrounding vegetation. The deposition of these contaminants causes black crusts, as observed in various areas of the façade (Fig.18), or even, by the action of the wind, creates fissures in the surface. To identify the origin of pollutants, it is necessary to carry out analyses of air quality and the depositions.

Biodeterioration

One of the problems that most affects the preservation status of the apse is biodeterioration. Among the biotic factors, small animals can be identified, such as birds, which deposit droppings in areas such as windows or the cornice (Fig.19), which can be difficult to remove, although no bird droppings

have been identified visually. The most pressing biodeterioration comes from lichens and small plants, like moss, which are due to the pH type of the rock, salinity, porosity, high relative humidity, and light. The presence of these organisms can cause anything from different coloration to the original, or water damage

Human Action

Finally, we have human action, which has caused conservation problems derived from previous interventions, such as the cover that was put in place in the seventies. Additionally, the relocation and reconstruction of the apse caused many pieces to break, necessitating their replacement with new blocks.

4 Recommendations

Recommendations to improve the state of conservation can be categorized into conservation and restoration tasks, and preventive conservation measures.

Conservation and Restoration

The overall condition of the apse seems to be stable, but there are some damages that are more concerning than others. At first glance, there are few efflorescence compared to old images, so either the apse is regularly maintained or there is some treatment that has worked up to now. There are areas that are too clean, suggesting that the apse has undergone rather aggressive cleaning treatments. The deterioration that should be addressed is biodeterioration and black crusts, as, in addition to causing aesthetic effects, they may be damaging the stone. Since it's likely that the stone cannot be scrubbed due to its fragility, it would be advisable to study gel-based cleaners that are effective and include a non-aggressive fungicide both to the environment and to the stone. To determine the most suitable method, laboratory analyses and on-site tests should be conducted.

Preventive Conservation

Preventive conservation is the area of preservation that aims to propose measures and actions to prevent or minimize existing or future deteriorations. They are applied in the environment and not on the object itself. I believe it is necessary to improve the current management model of the apse, as the apse, still being owned by the Spanish state, requires permits whenever any conservation plan is to be implemented, slowing down the implementation of such measures. This management plan should be accompanied by a risk management plan, which would review and monitor the status of the apse relatively frequently. This allows for the timely identification of those damages that may damage the apse, minimizing their impact and future conservation treatments that may be invasive

6. Conclusions

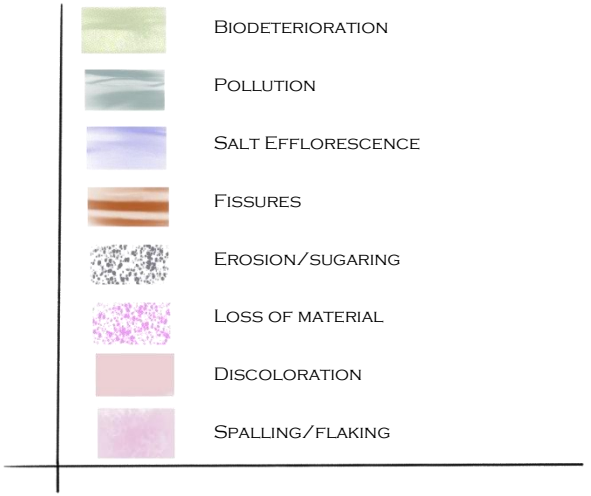
In conclusion, the conservation journey of the Fuentidueña Apse in New York has been marked by a series of innovative yet often debated projects aimed at preserving its fragile condition. From early preservation attempts in the 1950s to modern conservation efforts, the apse has undergone numerous treatments, each yielding varying results and sparking discussions among experts.

Recommendations for future conservation efforts emphasize the need for a balanced approach, including both active conservation and preventive measures. Additionally, streamlining the management model and implementing a robust risk management plan can ensure timely identification and mitigation of potential damages, safeguarding the apse for the future.

7. Appendix

7.1 Deterioration Map

NORTH ELEVATION



7.2 Photographs

Fig. 1 The Town of Fuentidueña. Own Resource

Fig. 2 San Martín before dismantling. Archivo General de la Administración

Fig. 3 The Church of San Miguel, Fuentidueña. Own Resource

MINISTERIO DE INSTRUCCION PUBLICA Y BELLAS ARTES

DECRETOS

De conformidad con los informes emitidos por la Junta Superior de Excavaciones y el Comité ejecutivo de la Junta de Patronato para protección, conservación y acrecentamiento del Tesoro Artístico Nacional, y en virtud de lo dispuesto en el Decreto-ley de 9 de Agosto de 1926, el Gobierno provisional de la República, a propuesta del Ministro de Instrucción pública y Bellas Artes, decreta lo siguiente:

Artículo 1.° Se declaran Monumentos histórico-artísticos pertenecientes al Tesoro Artístico Nacional los siguientes:

SEGOVIA

El Alcázar de Segovia.—Catedral de Segovia.—Iglesias de San Martín, San Millán, San Lorenzo y San Juan, en Segovia.—Puerta de San Andrés, en Segovia.—Convento de Santa Cruz, en Segovia. — Convento de San Antonio el Real, en Segovia.—Torre de Santo Domingo, en Segovia.—Recinto murado y Castillo de Cuéllar.—San Esteban y San Martín, en Cuéllar.—Monasterio de Sacramenia. — Santa María de la Sierra, ruinas.—Iglesia arruinada de San Martín de Fuentidueña.—Recinto murado, Castillo y Torre de San Nicolás, en Coca.—Iglesia de San Pedro, de Dueñas. — Castillo de Turégano.—Iglesia de San Frutos, en Carrascal del Río.—San Salvador, San Justo y Virgen de la Peña, en Sepúlveda.—Palacio, en Martín Muñoz de las Posadas. Castillo del Condado de Castilnovo.

Fig.4 Decree declaring the Church of San Martin a National Monument. June 4, 1931

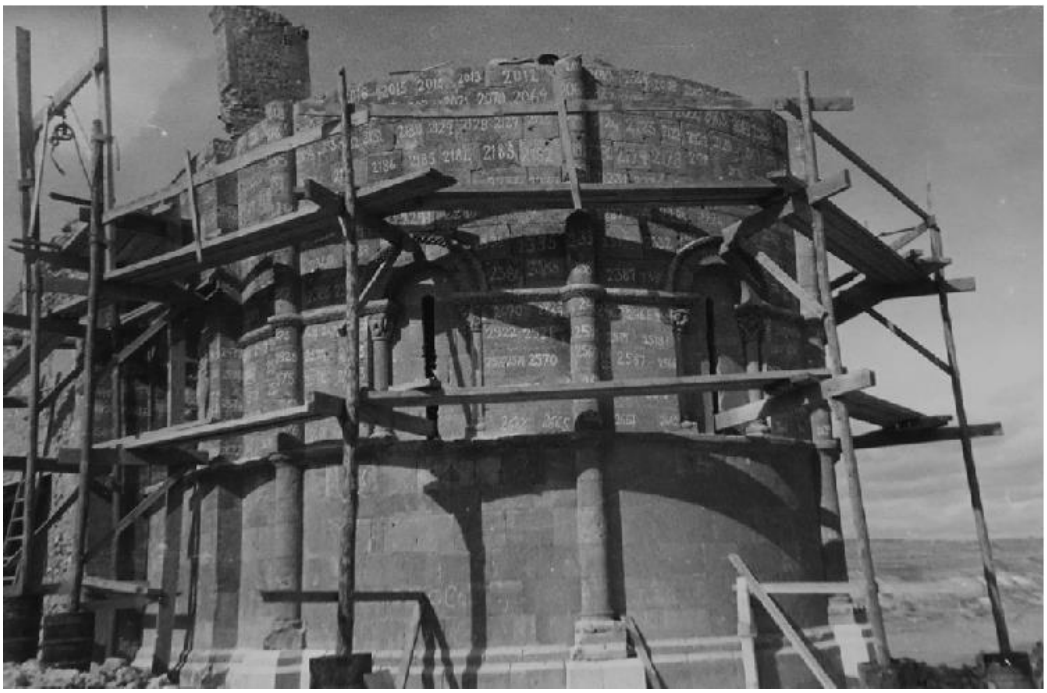


Fig.5 Apse Dismantling. The MET Archive

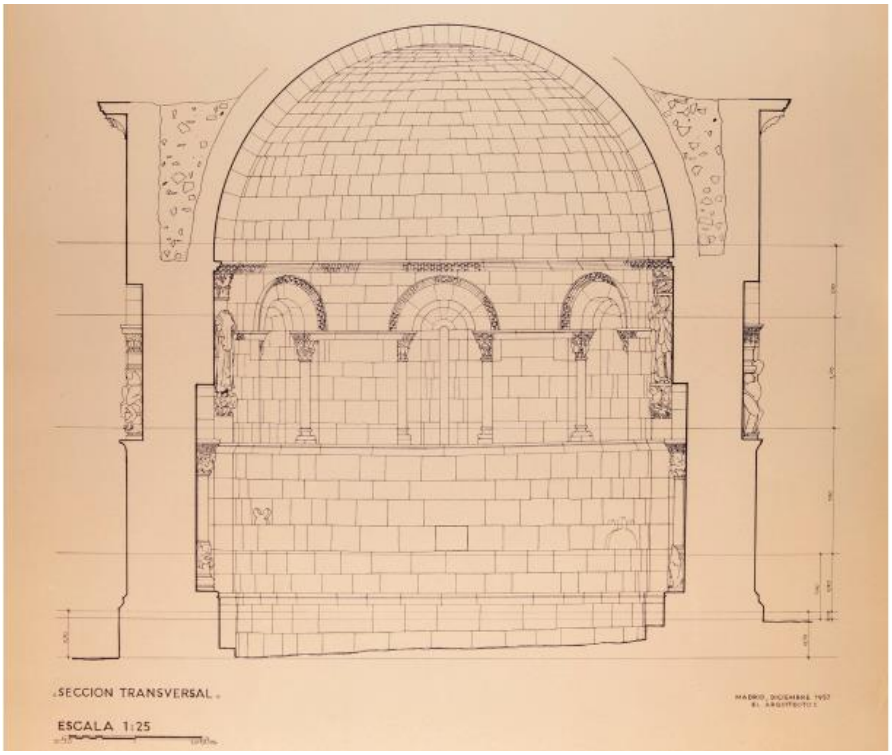


Fig.6 Planimetric drawings. Transversal Section. The MET Archive

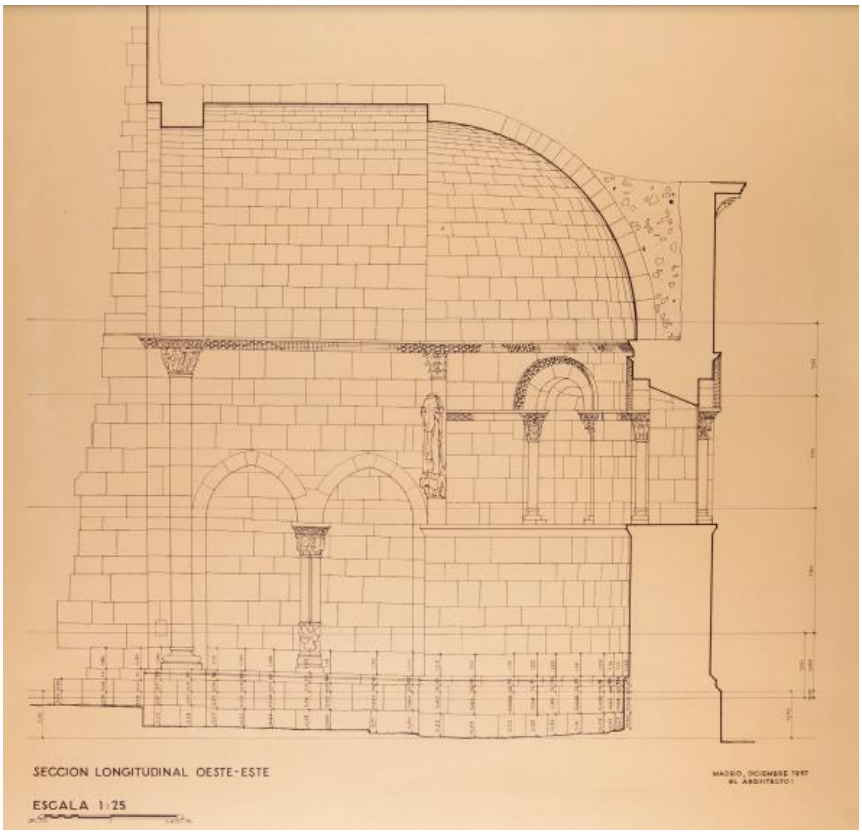


Fig.7 Planimetric drawings. Longitudinal Section. The MET Archive

Fig.8 Numbering Stones for the Dismantling. The MET Archive

Fig.9 Apse Reconstruction. The MET Archive

Fig.10 Apse before dismantling. Archivo General de la Administración

Fig.11 The Apse of San Martín at the MET Cloisters. Own Resource

Fig.12 The Apse of San Martín at the MET Cloisters, details (columns and capitals, corbels, windows). Own Resource

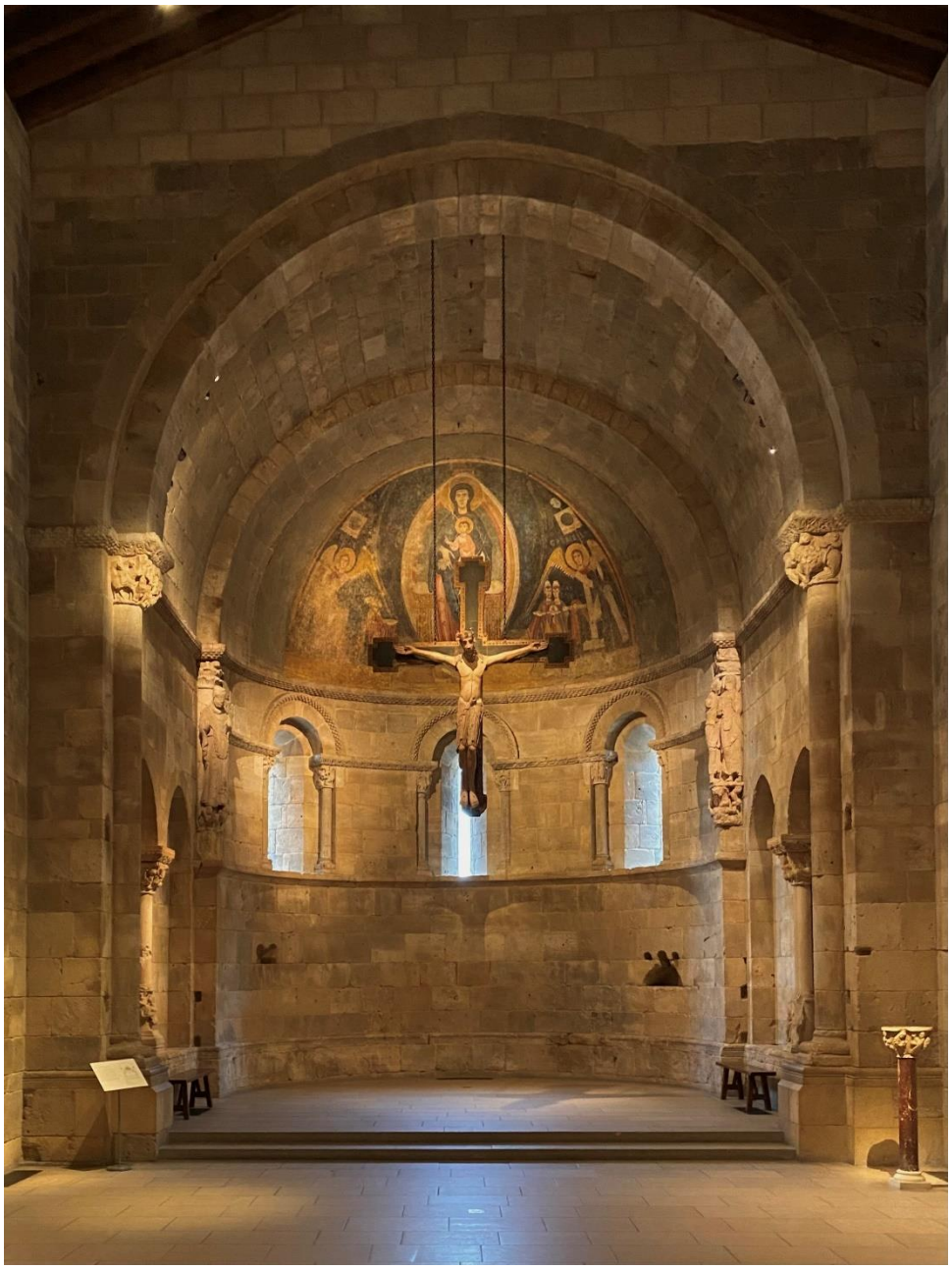


Fig.13 Apse Interior. Own Resource

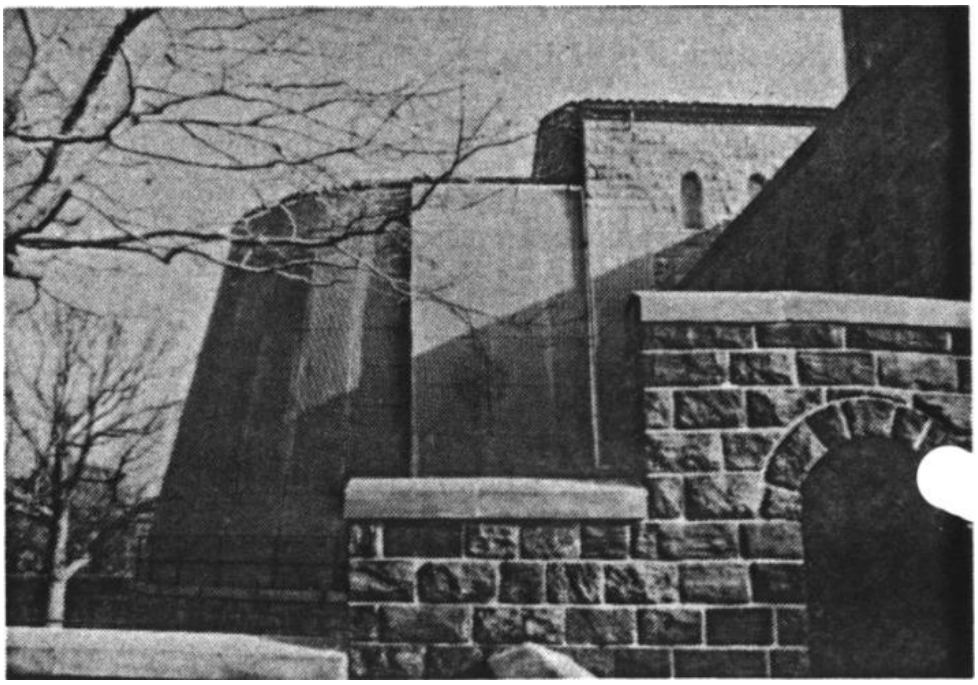


Fig.14 Apse Enclosure in the 1070's. The Met Archive

Fig.15 Column before treatment. The Met Archive

Fig.16 Column after treatment. The Met Archive

Fig.17 Water deterioration under the beading molding. Own Resource

Fig.18 Pollution in the base and under the windows. Own Resource

Fig.19 Biodeterioration in the upper level and under the windows. Own Resource

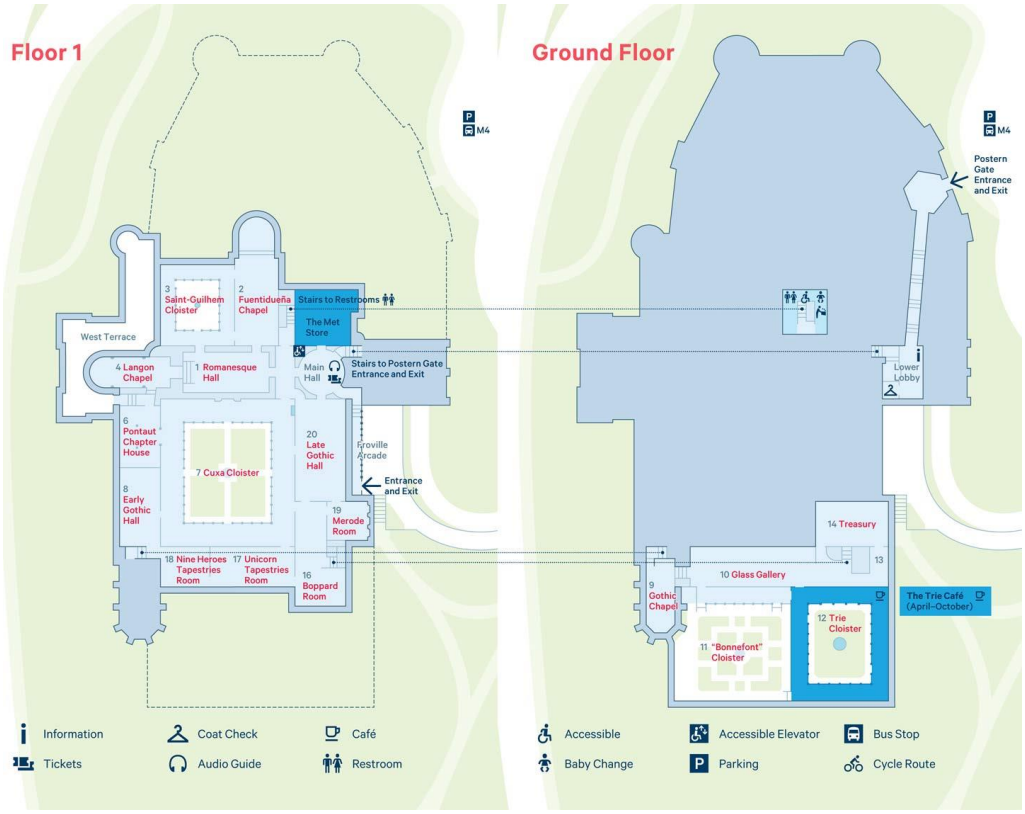


Fig.20 Plan of the Met Cloisters. The Met Cloisters Website.

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