

PORTA NUOVA IN MESAGNE, FROM THE CONTEXT OF THE MONUMENTAL GATES OF THE CITIES IN TERRA D'OTRANTO TO THE RESTORATION SITE

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Abstract

Porta Nuova in Mesagne constituted a monumental entrance to the ancient city within the circuit of the city walls, together with the older Porta Grande and the ruined Porta Piccola. The present contribution illustrates the conservation practices implemented, starting from the cognitive investigation, in the broader context of the architectural language of the city gates in Terra d'Otranto, from the survey phases and the diagnostic study of the building, in order to restore the full usability of the monument. The executive phases were carried out in the consolidation of the rich sculptural-decorative apparatus, in the restoration and protection of the material continuity, compromised by environmental factors, common to surfaces exposed to atmospheric agents, by intrinsic vulnerabilities, determined by a construction *excursus* not completed in a single phase, and, last but not least, by more recent interventions.

Keywords

Cultural heritage, urban fabric, baroque architecture, conservation, structural reinforcement

1. Monumental city gates in Terra d'Otranto

Limes between the paths leading to the rural territories and an introduction to the routes structuring the urban fabric, the gate took on the function of the 'frontispiece of the city', beyond its mere defensive function, with the progressive prevalence in the architectural language of the triumphal expression of military and civil power, reinforced, in certain circumstances, by the dedicatory consecration to the patron saints and protectors of the city.

In the present context, represented by the Province of Terra d'Otranto, investigated among the surviving city gates, the first expressions of monumentalisation of the gateway to the city are recorded between the second half of the 16th century and the late 18th century. The theme moves from the simple manifestation, on the front outside the circuit of the city walls, of the usual 'trptych', consisting of the Empire's insignia, together with those of the local feudal lord and civic emblems, and, then, enriched with inscriptions and sculptural elements representing eminent personalities, political or religious, linked to the local community.

The reinterpretation in celebratory forms of the Arc de Triomphe, as a severe and solemn

expression of military power, began in the dominant city of the Province, Lecce, as part of the broader transformations involving, during the 16th century, among the others, the reconstruction of the Castle and of the city walls. It was in this same context that Porta Napoli, consecrated to Saint Giusto, was placed on the north-west curtain wall of the city (Fig. 1), built between 1540-48 in honour of Charles V of Asburgo and the Viceroy of Naples, Don Pedro de Toledo, designed by Gian Giacomo dell'Acaya (Brunetti, 2006) and commissioned by Ferrando Loffredo. Along the circuit were Porta *Rudiae*, dedicated to Saint Oronzo and Porta San Biagio, both rebuilt during the 18th century, and Porta San Martino, demolished, which opened towards the marina of San Cataldo.

Although it lacks the monumentality of the Triumphal Arch of Castel Nuovo, erected in Naples in the second half of the 15th century, Porta Napoli recalls its predecessor in the use of coupled columns to frame the entrance archway. The round columns, with Corinthian capitals with inverted volutes, set on high plinths, are surmounted by an entablature with dentils and a pediment, in the tympanum of which the royal insignia of Charles V stands out, together with a celebration of the sovereign's military virtues.



Fig. 1: Lecce, Porta Napoli



Fig. 2: Lecce, Porta Rudiae



Fig. 3: Lecce, Porta San Biagio (Quarta, 2020)

The walls are connected with lateral volutes, widely used unifying expedient in Renaissance religious architecture.

The model, exalted by contemporaries, was particularly popular and the *Porta Rudiae* (1703) itself (Fig. 2), derives its distinctive features from it. *Porta Rudiae* reinterprets, however, the twin order with greater compositional freedom in the Corinthian capitals (anthropomorphic motifs, inverted volutes), renews the features of the previous *Porta Napoli* with the typical magnificence of Baroque decorations, and expresses multiple sculptural motifs, the richness of which is unequalled in the other monumental entrances that have come down to us in the Terra d'Otranto. *Porta San Biagio* (1774) refers to its illustrious predecessors (Fig. 3). Framed by smooth-stemmed Tuscan columns on high plinths, the gate displays the coat of arms of King Ferdinand IV of Naples in the centre and the civic emblems on both sides; although in a different architectural order, the upper pediment recalls *Porta Rudiae* in composition, but to a lesser extent and with less emphasis.

The inner fronts of the gateways, facing the urban fabric, are devoid of monumentalisation, except for the smooth ashlar base that emphasises the surfaces of *Porta Rudiae*.

In the other cities of the Province, interventions were promoted by members of the Imperiale, a cultured and illustrious family of Genoese origin, whose consultants included Mauro Manieri, as well as prominent architects from Roman and Neapolitan circles, such as Ferdinando Sanfelice and Filippo Barigioni (Manieri Elia, 1982, 1996). The renovation of previous entrances, at Casalnuovo (Manduria) and Oria, and the construction of new monumental entrances at Francavilla Fontana, responded to a programme of *self-emphasis* (Basile, 2008), as part of the construction of a new city wall and a more general policy of urban development, with the insertion of new routes.

Unicum in the context under analysis is the *Porta del Carmine* (Fig. 4), located at the end of the current Via Roma in Francavilla Fontana. Devoid of an upper pediment, it shows the use of a neoclassical architectural language. Intentionally, it recalls the model of the Roman-inspired triumphal arch with three round arches¹.

¹ The compositional reference leads back to the Arch of Septimius Severus and the Arch of Constantine.



Fig. 4: Francavilla Fontana, Porta del Carmine



Fig. 5: Manduria, Porta Sant'Angelo



Fig. 6: Francavilla Fontana, Porta della Croce



Fig. 7: Oria, Porta Manfredi



Fig. 8: Francavilla Fontana, Porta dei Cappuccini



Fig. 9: Oria, Porta degli Ebrei

Framed by Corinthian half-columns on the main front and Corinthian pilasters on the back, it shows sober Rococo overtones in the scrolls and phytomorphic elements that stand out on the upper wall bottoms. If the hypothesis that the current *facies* of Porta Carmine dates back to the second half of the 17th century is correct, with the probable attribution to Centonze, clear similarities in the declination of the order can be found in the front of the Palazzo del Sedile in the same city, and in the Porta di Sant'Angelo in Manduria (Fig. 5)², whose construction was promoted by Andrea Imperiale or his successor Michele (Cazzato & Cazzato, 2015).

Greater severity reveals Porta della Croce (Fig. 6), erected in 1714 by the masons Davide De Quarto and Goisùè Pozzessere, facing the Convent of Maria S.S. della Croce (Jurlaro & Clavica, 2007). The main façade combines sturdy Tuscan and semicircular columns, on high plinths, with an Ionic entablature and denticulated subcorner. The massive rusticated cushion base, stereotomically set every two rows of ashlar, echoes the lower order of Porta Manfredi in Oria (Fig. 7), renovated a decade later in 1727 by Michele III Imperiale. On the inner façade of Porta della Croce, two smooth ashlar frames recall the rusticated surface on the back of Porta *Rudiae*.

In the second half of the 18th century, in the aftermath of the disastrous earthquake of 1743, Porta dei Cappuccini (Fig. 8) was built in Francavilla, almost contemporary with the reconstruction of the Capuccini's church and convent, and presumably by the same builder, Fra' Liborio da Manduria. The gate, endowed with a greater vertical elevation, articulated in a single barrel-vault, with a round arch, is framed by two half-columns surmounted by a banded architrave. On either side of the columns and pilasters, two other portions appear crowned by barely noticeable volutes in an upward curved connection. The conclusion of the gate is entrusted to an archivolted tympanum that recalls the side volutes at the top.

Within the territorial context of the Imperiale possessions, Porta degli Ebrei in Oria (Fig. 9), located to the west of the city walls and already partly rebuilt in the first half of the 15th century, was also renovated in Baroque style.

Also noteworthy is the reconstruction activity involving numerous monumental gateways in various towns in the Terra d'Otranto during the 18th century, in continuity with the neoclassical language. Galatone's Porta San Sebastiano (1748), although it lacks the elevated elegance of the cases already illustrated, declines the theme of the triumphal arch; it is framed by three bays of Tuscan columns in a semicircular shape, emphasised by pinnacles, without a pediment, bearing the insignia of the University, the feudal lord and the local clergy on the axis (Fig. 10).

In Galatina, the new monumental gateways, realized onto the previous ones, recall elements of the illustrious Lecce and Francavilla *exempla*. Porta San Pietro (Fig. 11), also known as Porta Nuova (second half of the 18th century), framed by mighty pilasters on high plinths, has Rococo features; the volutes and the spandrels, on which the stone statue of San Pietro dominates, following the models of the Porta Sant'Angelo in Manduria and the Porta *Rudiae* and Porta San Biagio in Lecce. Porta Luce (1795) echoes the morphology of the arched pediment of the Porta dei Cappuccini in Francavilla (Fig. 12).

In Copertino, in 1753, following the canonisation of the saint, was carried out the renovation of Porta San Giuseppe, already built in the 16th century as part of the city's refortification works, (Fig. 13). The structure, framed by an ashlar alternating with a smooth face, is framed by a cornice in the durazzesco-catalan style, presumable reminiscent of the previous construction phase. The motif reworked by the Neapolitan *mileu* in the Salento area and, therefore, more recently it's defined as *Leccese style* (Brunetti, 2021), associated with the character austere military architecture³. Analogous to the Leccese-style model is the architectural motif that frames both the castle portal and Porta Cau (1514-19) in Corigliano d'Otranto, feud of the Monti family, from 1465 to 1649.

Porta di Terra in Acaya, the only entrance to the city, dating back to 1535 was also rebuilt in 1792. It shows the insignia of Spanish sovereigns; those of Gian Giacomo dell'Acaya who oversaw its construction, in conjunction with the redesign of the perimeter and urban layout (Brunetti, 2006),

² Framing the central archway is a Corinthian colonnade with anthropomorphic motifs and an upper pediment. On the top are statues of St. Gregory the Great, St. Charles Borromeo and the Immaculate Virgin.

³ The earliest attestations appear in a complete manner in the same city, in the castle portal (1540) and in the gateway to the court, and are subsequently borrowed from civil architecture.



Fig. 10: Galatone, Porta San Sebastiano (Quarta, 2020)



Fig. 11: Galatina, Porta Nuova (or San Pietro)



Fig. 12: Galatina, Porta Luce



Fig. 13: Copertino, Porta San Giuseppe (Quarta, 2022)



Fig. 14: Martina Franca, Porta di Santo Stefano (Quarta, 2022)



Fig. 15: Cavallino, Porta San Giorgio (Quarta, 2022)

and of Andrea Vernazza; on top, the 17th-century statue of St Oronzo was placed, connected by volutes.

In Martina Franca, the renovation in elegant Rococo style of the Porta di Santo Stefano, today known as the arch of Sant' Antonio, one of the four gates that allowed entry to the city, dates back to 1764 (Fig. 14). Framed by pilaster strips with Corinthian capitals, and crowned by a pediment connected by volutes, it bears a statue of San Martino on horseback at its top, and fits in well with the renovation that involved palaces and urban places there, entrusted to the Rococo ornamentation. An epigone in line with Rococo tendencies is the entrance to Cavallino from the Caprarica road, Porta San Giorgio (1787-90), promoted by Gaetano Castromediano di Limburg, Duke of Morciano and Marquis of Cavallino (Fig. 13); further interventions in the monumentalisation of town gates can be found in Montemesola⁴. They date back to the turn of the second half of the 18th century and the beginning of the 19th century. The language used brings back, on the one hand, slender and simplified outcomes of the typology with a crowning *pediment* and, on the other, references to the severe tradition of military architectural language.

2. The monumental entrances to the Terra of Mesagne

In the previous *excursus*, for the completeness of which refer to the in-depth bibliography, there are the three city gates that marked the walls of the *Terra di Mesagne*, dating back to the 15th century, promoted by the Prince of Taranto, Giovanni Antonio del Balzo Orsini. The urban view of the Modern Age, reproduced by Mannarino in 1596 (Fig. 16), allows us to identify the two oldest gates of the *Terra*, Porta Grande and Porta Piccola, crossed by two long paths, with a north-south axis, identifiable with the present Via Albricci and Via Lucantonio Resta. Cassiano de Silva's view (Fig. 17), made between the end of the 17th century and the beginning of the following century, introduces the opening of Porta Nuova to the east, together with the representation of the *extra moenia* expansions.

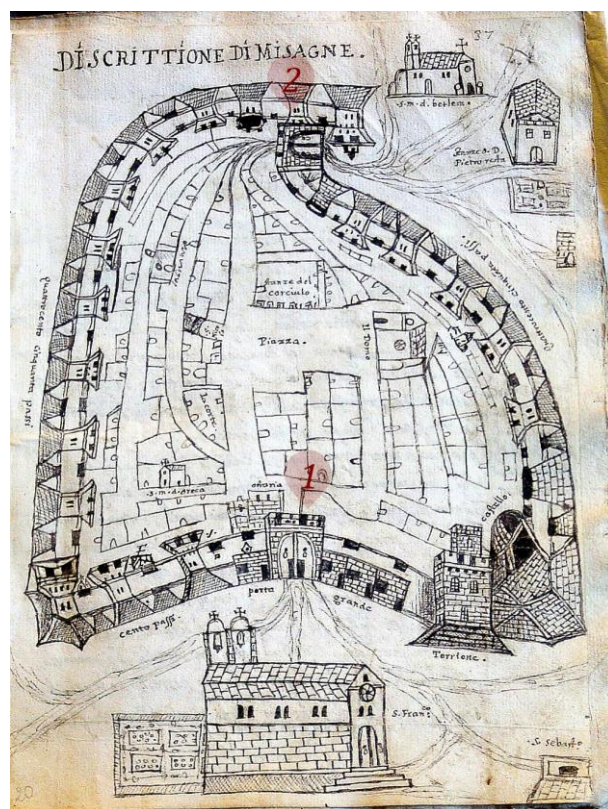


Fig. 16: *Discrittione di Mesagne* (Mannarino, 1596). 1. Porta Grande, 2. Porta Piccola

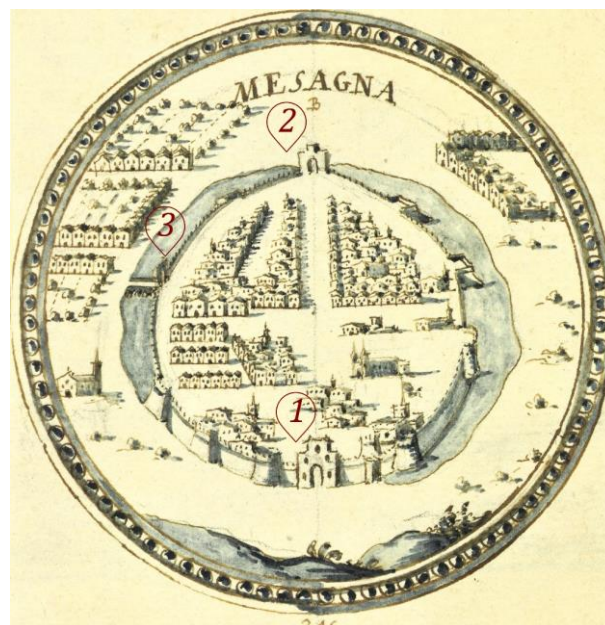


Fig. 17: *Mesagna*, drawn by Cassiano da Silva (Galiano, 2023). 1. Porta Grande, 2. Porta Piccola, 3. Porta Nuova

⁴ Porta San Gennaro (1777) and Porta San Francesco (1804) are reminiscent, with great formal simplification and development in height, of the city gates with upper pediment; their construction was promoted by representatives of the

local feudal family, Benedetto and Andrea Saraceno. The latter is also responsible for the construction of Porta San Martino, with a more severe layout, with cushion-shaped ashlar alternating with the smooth face, and a superior torus.



Fig. 18: Identification of the city gates on the orthophotographic map of Mesagne. 1. Porta Grande, 2. Porta Piccola, 3. Porta Nuova

2.1 Porta Grande

Also known as the Porta Boreale or Porta Napoli (Figg. 18, 19), it faced a broad, unaltered area during the first half of the 17th century, largely occupied by grain pits, easily accessible for the loading and unloading of cereal products and under strict guard.

In 1764, insignia stood there: one, placed in the centre, was to indicate the arms of the previous rulers of the Kingdom; on the right were the enterprises of don Giuseppe Barretta, affixed in the year 1748, following the purchase of the fief of Mesagne. He replaced the previous ones affixed by don Carmine de Angelis. In 1784, the feudal lord Giuseppe Barretta, ordered its demolition, because the Gate was *rovinata e caduta*; however the University and its representatives opposed it in the same year (Greco, 2001).

In September 1784, it was rebuilt according to a project by Martino Grassi from Oria, an engineer originally from Fasano, active in the feud of the Imperiale family, who had already been commissioned in 1783 to project the bell tower for the Chiesa Madre in Francavilla Fontana (Greco, 2001; Cazzato & Cazzato, 2015). The work was



Fig. 19: Mesagne, Porta Grande

carried out by local master masons, Ludovico Caroppo from Mesagne and Gaetano and Giuseppe della Gaita from Casalnuovo (Manduria).

The fornix is distinguished by its massive forms, set on a base of carparo ashlars, endowed with greater strength than calcarenite blocks, arranged in elevation⁵. Lacking any superimposed architectural order, the central prominence alone slims down the membranes, of which the trabeation and the crowning cornice follow the course. The mixtilinear pediment, with a central archivolt, connected by lateral volutes, is typologically similar to the monumental front of the Porta degli Ebrei in Oria, confirming the circulation of a codified architectural language in the cultural *milieu* of its creator.

2.2. Porta Piccola

Located to the south, opposite the Convent of the Celestines and the Church of Santa Maria in Bethlem (Figg. 16-18), the gate was demolished in 1834, for fear of collapse.

Although documentary evidence doesn't allow us to trace its architectural appearance, it's presumable that it must have resembled a simple archway.

⁵ There are numerous monumental buildings confined to the area of reference, including Porta Nuova, the former Convent of the Celestines, now the Municipal Palace, the Sanctuary of Mater Domini (1608), the Chiesa Matrice (1650), and the

Tempietto of San Lorenzo (alterations introduced in the 17th century). This material was also easy to find as it was quarried to the north of the old town, in the locality of la Calina, and therefore widely used.

Its cramped dimensions were no longer suited to the modern requirements of 19th-century urban hygiene. The widening of the path was also motivated by the need to facilitate the crossing of men and vehicles, and was therefore definitively extended with the demolition of the adjacent building.

2.3. *Porta Nuova*

Located at the end of the present Via Martiri della Libertà, at the eastern edge of the ancient city, closed on the sides by a heterogeneous fabric, it was probably built in 1606, at the behest of Mayor Epifanio Ferdinando, in order to allow communication between the ancient urban centre and the *borgonuovo*. The perimeter of the *Terra*, in fact, was saturated, also by exploiting all available areas – vegetable gardens, moats, segments of walls, demolition of ancient factories – so new fabrics were built *extra moenia*.

The site chosen by the *Università* corresponded to the point where a large *cloaca* stood, dug out in the thickness of the walls, and a dwelling, later demolished, near the Church of Santa Caterina, now no longer *in situ*. The construction was in all likelihood entrusted to master engineers belonging to the Profilo family (Greco, 2001; Cazzato & Cazzato, 2015), originally from Copertino, who were involved in the survey of the site and had been active in the city since the mid-sixteenth century with important civil and religious commissions, including the Churches of Santissima Annunziata and Mater Domini.

The year of the completion of the work is not definable, nor are the vicissitudes of the rebuilding or repair of the existing work clear; the inscription at the base of the pediment, on the monumental front, PORTA CAROLO III R ET CARME/LO DE ANGELIS MESSAPIAE/ PRIN, PORTA CAROLO III R ET CARME/LO DE ANGELIS MESSAPIAE/ PRIN PORTA AD CIV SVB/ VRB USV ERECTA A A MDCIII/ READIFICATA A D MDCCII, given the construction of the gate to 1603 and its reconstruction to 1702.

To be clarified is also whether the layout of its base retains, as is probable, the proportions conferred by the Profilo masters. The information inferable from the attribution of the three heraldic coats of arms, moreover, extends the interventions carried out on the building throughout the 18th century.



Fig. 20: East elevation, state of the site before the intervention



Fig. 21: Ovest elevation, towards Via Martiri della Libertà, state of the site before the intervention

3. *Porta Nuova. Morphotypology and first considerations on the state of conservation*

The gate consists of a single round archway with ashlar of different lithotypes, 13.90 metres high. The base, marked by two mighty *carparo* piers, is framed on the main front by pilasters set on plinths and ending in Tuscan capitals, supporting a projecting entablature in *mazzaro* (Figg. 20-21).

The upper fastigium, also in *mazzaro*, connected by lateral volutes, is in line with similar interventions already mentioned in the analyzed context, with gauged Rococo touches in the architectural layout. The rich ornamentation is entrusted to heraldic coats of arms in soft stone, surmounted by ducal crowns and surrounded by putti and volutes.

The coats of arms form a triptych with a clear hierarchical order: in the centre, winged putti on scroll motifs hold the Spanish royal insignia on either side, crowned and covered by three cimierate helmets – a key element for the attribution to Philip III (1598-1621) – divided into four quarters, bearing the arms of Castile and Leon, Aragon, Jerusalem and Hungary.

The attribution to Philip II leads us to date the coat of arms to the first construction of the Porta Nuova; the heraldic sculpture was then recovered and re-inserted into the 18th-century archway and pediment.

To the right of the imperial enterprises, a heraldic triptych with almond-shaped cartouche elements, held by little angels, indicates the attribution to Giuseppe Barretta, Prince of Mesagne in 1748 and his wife Eleonora Gonzaga leading one to believe that the new owner of Mesagne had the insignia walled into the façade of the gate removed by his predecessor Carmine de Angelis (mentioned in the inscription) to affix his own, neglecting to change the content of the dedicatory epigraph for the rebuilding of the monument.

The "forced" insertion of the Barretta insignia into the architectural layout of the pediment is denounced by the tampering of the pilaster that squares the perimeter on its right side, so much so as to compromise its static security, as evidenced by the lesion on the surface of the wall. The last heraldic element of the gate, in 18th century style, corresponds to the insignia of the University of Mesagne; it is placed to the left of the large tri-elmated coat of arms, represented by a small oval

surrounded by scrolls and ribbons with a putto's head and foot, outside the coat of arms, like an ornamental decoration in soft limestone ashlar.

The last work on the building was carried out in 1991, but its consistency was unknown; the detachment of certain projecting elements had previously led to the fastigium being secured by the application of large-mesh *nylon* netting. The surfaces were marred by biological colonisation, micro and macroflora and deposits of pollutants; the joints had been improperly grouted, and the ashlar and decorative devices were alveolized. The fillings between the ashlar of the stone face were inconsistent in terms of material and colour, carried out during previous work on the building. In particular, the fillings on the base of the *carparo* stone, the back of the door and the fastigio were cementitious and overflowing, in front of the fastigio were whitish, made of air lime mortar, and in several cases adhered to the substrate. On the back of the fastigio, exposed to the west, the combined action of physical agents had led to the disintegration of the mortar between the joints, resulting in the infiltration of rainwater, which also affected the front.

4. *Survey operations and restoration site.*

Methodological aspects and critical approach

The intervention, partly financed by the Italian Ministry of Culture and completed by the Public Works Department of the Mesagne Administration, in the years 2020-2021, involved the restoration of the external wall faces, both of the monumental front and back, the consolidation of the sculptural-decorative apparatus, the local repair of angular instability phenomena, the protection of horizontal elements and wall crests, the treatment of the metal sealing elements and the wooden beam, and the lighting enhancement of the monumental front. The historical-critical analysis, with the study of archival and bibliographical sources, and the direct and indirect metric survey, made it possible to clarify chronological aspects and the relationships between the constituent elements of the building, to identify factors of vulnerability and degradation phenomena readable at first glance, at a macroscopic level.

The survey operations were extended to the fronts of the surrounding fabric, in order to clarify also the relationships among the object of study and the morphology of the site, in the face of urban growth.

The three-dimensional architectural survey carried out provides a “digital twin” that can be interrogated at the full scale of the artefact; it is an integral part of the information container of the state of the site, together with the bibliographic-archival and iconographic documentation carried out (Leserri & Rossi, 2023). In order to reconstruct the peculiarities of the context and the geometric and morphological characteristics of the structure in its entirety, the survey used of instrumental techniques, such as laser scanning technology (LST), integrated with digital terrestrial photogrammetry (Cianci & Colaceci, 2022; Valzano, Negro & Foschi, 2017; Attenni,

Bartolomei, Hess & Ippolito, 2017). In order to record the LST acquisitions and allow their alignment and merging in the next phase, artificial markers were placed along the external fronts, overlooking Via Martiri della Libertà; also natural points were used. A FARO M70 laser scanner with a maximum range of 70 m was used for a total of 6 laser acquisitions, with 4× quality and 1/5 resolution (Fig. 22). The individual scans were processed and recorded using FARO’s SCENE software and inserted into the global reference system. After the general control of the scans and superimpositions, collimated with the photogrammetric restitution, the point cloud was

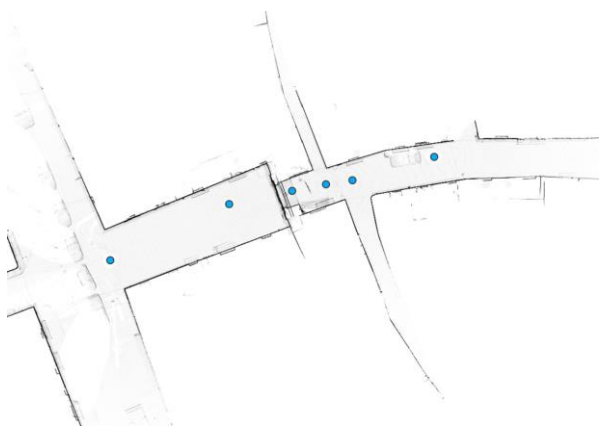


Fig. 22: Survey 2020. Plan of laser scanner acquisitions.
Author: prof. Arch. G. Rossi



Fig. 23: Survey 2020. Point cloud. Author: prof. Arch. G. Rossi

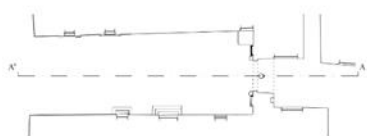


Fig. 24: Survey 2020. Graphic restitution of the urban context of th Porta Nuova of Mesagne.
Authors: Arch. S. Brescia, Arch. C. De Iaco

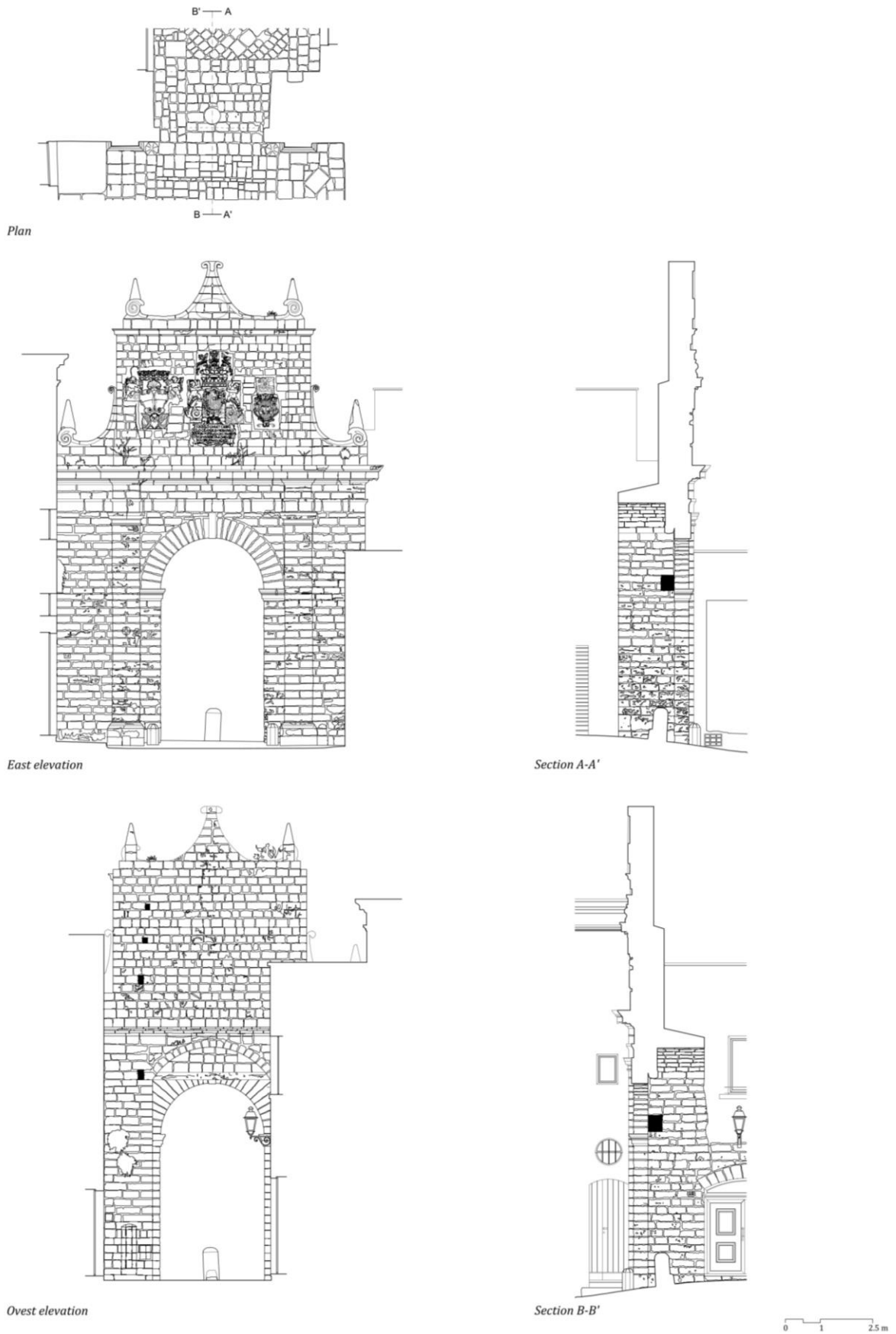


Fig. 25: Survey 2020. Graphic restitution of the Porta Nuova of Mesagne. Authors: Arch. S. Brescia, Arch. C. De Iaco

generated, as a basis for the subsequent analysis of the object parts and the vector processing (Fig. 23). The same software was used to extrapolate orthogonal projection views and to export the point cloud in RPC and RCS file formats (Autodesk proprietary files), for the overall management of the CAD graphic rendering in a three-dimensional environment.

The final drawings necessary for the documentation of the artefact were produced in a two-dimensional and accurate form, in order to reconstruct both the metric and morphological data of the artefact and its material characterization. The number of plans, elevations and sections has been appropriately calibrated, also to allow a simple computational phase of the surfaces, for the quantification of the costs during the drafting of the restoration project. To this end, two scales of graphic reduction have been chosen: 1/100 for the restitution of the surrounding urban context (Fig. 24), 1/50 for the restitution of the building (Fig. 25); the latter, with a particular degree of accuracy and detail, has also made it possible to deepen the contents necessary for the documentation of the state of conservation of the

vestment and the decorative apparatus, constituting a digital technical support for the macroscopic identification of the phenomena of surface degradation. On the same basis, degradation mapping was then carried out in vector form, with precise indications of the restoration work to be carried out (Fig. 26).

Following the installation of the provisional works and the removal of the netting that covered the fastigio, close inspection of the facings, together with tests and material samples, made it possible to broaden the cognitive framework for the definition of a more accurate conservation anamnesis; small areas of detached modelling and pulverisation phenomena were identified by tactile inspection.

During this phase of reconnaissance, the crack that had been identified became more evident, revealing a lesion reinforced with wooden wedges, induced by the aforementioned forcible insertion of the Barretta family coat of arms (Fig. 27a-b). The crack continued up to the entablature and corresponded on the opposite side, where a buttress was placed to support the facing at its

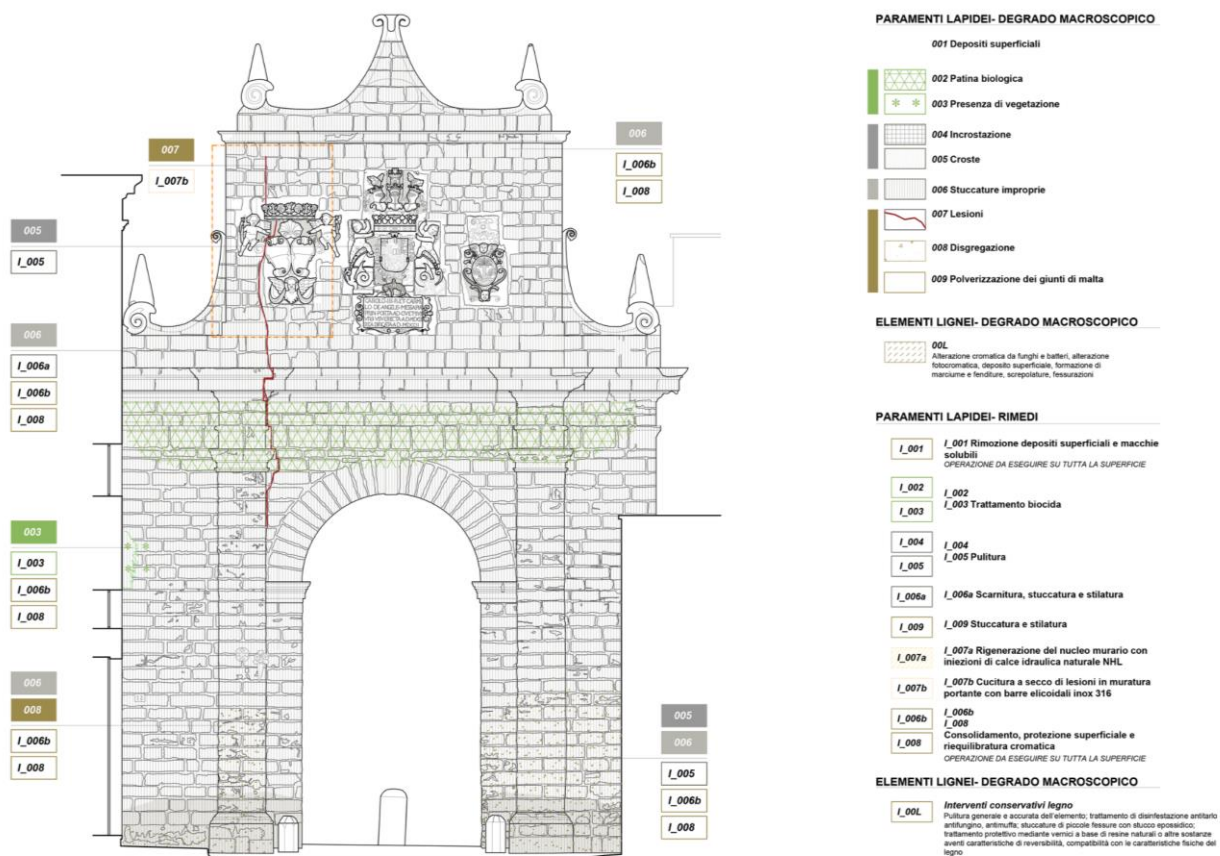


Fig. 26: Deterioration survey and planned conservation works on the east elevation, 2020.

weakest point. The contrasting element was plastered with cement mortar and, after careful removal, a poorly dented masonry texture, previously concealed, was ascertained. Further cognitive essay, in the vicinity of a detached cement portion, on the left side, concealed the key head of a chain in an oxidised state, which runs within the masonry of the adjacent dwelling (Fig. 28). Pins and nails, the result of previous interventions and materially altered, not appreciable macroscopically, proved to be co-responsible for the detachment of a portion of the crowning cornice.

With the start of restoration works, each phase of the intervention (cleaning, consolidation, grouting and final rebalancing) was preceded by its execution in tests; suitable samples were carefully formulated and submitted for prior evaluation (Fig. 29a-b).

Preliminary work consisted in the extirpating the macroflora and removing of surface deposits by brushing, supported by manual low-pressure water sprays and sponges (Fig. 30). A broad-spectrum biocide treatment (Preventol RI50 from CTS) based on quaternary ammonium salts (benzalkonium chloride) in a 3% aqueous solution was then applied to the areas affected by biological colonisation using a brush.

Lime water was applied to the alveolized, disintegrated and pulverised areas of the sculptural apparatus, which was brushed on until it was rejected (Fig. 31). After 20 days of action, support grouting and micro grouting were carried out with a mortar made on site, consisting of Lafarge NHL 3.5 white natural hydraulic lime, with a very low salt content, and very fine local aggregates, in a ratio of 1:3, such as *cocumola* stone powder, mixed with small quantities of carparo and river sand (Fig. 32). The crests of the fastigio walls, which had previously been partly covered with a recent coarse-grained mortar, that was coming off, were repaired using a specific product, aimed at protecting the tops of weathered masonry (Silex by Calchera San Giorgio), based on cold-mixed slaked aerial lime mortar with natural micronised pozzolans and siliceous aggregates, worked with a suitable slope, with a low thickness, to allow the correct drainage of rainwater; the same treatment was also applied to the horizontal and inclined projections of the cornices.

The more tenacious deposits, such as black crusts or carbonate layers located in particular at the jutting sculptural groups, were removed with a



Fig. 27a-b: Cracking on east and ovest elevation



Fig. 28: East elevation, oxidized key head of a chain



Fig. 29a-b: East elevation, cleaning tests

scalpel, which was also used to remove the lichen thalli. Cellulose pulp and sepiolite tablets soaked in a 7% ammonium carbonate solution were applied locally in the undercuts. The joints were then repaired by chiseling away the old mortar (Fig. 33), where it was deemed irrecoverable, preserving those sections where it was materially and chromatically integrated, or where removal would have further degraded the material surface. For the subsequent grouting, different types of mortar were prepared on site, depending on the

type of intervention: white Pantheon Calchera San Giorgio FL 5 hydraulic lime with pozzolan for the grouting of the stone face of the pediment, and amber-coloured NHL 5 Calcesana Calchera San Giorgio natural hydraulic lime for the grouting of the stone face of the base up to the Carparo entablature. The limestone was suitably mixed in a ratio of 1:3 with aggregates of a suitable colour and grain size (0-3 mm) from local quarries (Fasano for the white limestone lithotype, Alezio for the carparo). The surface processing of the same grout



Fig. 30: Cleaning operations of the sculptural modelling



Fig. 31: Consolidation works



Fig. 32: Grouting of alveolized surfaces



Fig. 33: Removal of improper grouting with chisel



Fig. 34a-b: Details of the sculptural models after completion of the works

carried out by dabbing the applied material (exerting light pressure) with a dampened sponge, to bring out the colour of the inert materials and remove any mortar residue from the surrounding surfaces.

To repair the compromised corner, AISI 316 dia. 12 DryFix® steel bars were alternately inserted and installed using Helifix® technology in a special pilot hole in the structural element, with only rotation. This special dry system doesn't require the use of resins or mortar to fix the bar; it is characterised by high tensile and shear strength, low invasiveness and minimal aesthetic impact.

The visible *fontaie* holes on the building, which provided shelter for birds and a place for vegetation to take root, were closed by placing a cut stone block of local calcarenite about 2 cm below the level, so as not to alter the evidence of the hole, and then grouting the edges, accompanied by a sloping, on the lower edge. Finally, the work was completed with the chromatic rebalancing and surface protection of the building, using a lime-water solution, applied in two coats with a brush, pigmented with ventilated natural earth. Then a preserver biocide treatment was applied by spraying CTS's Biotin T, mixed at 3% with de-ionised water (Figg. 34a-b, 35). The metal elements found, such as bolts and oxidised nails, were carefully removed and the

stone edges of the lacuna were grouted; an oxidation stop treatment with Owatrol Oil anti-rust penetrating oil, so as not to alter the natural appearance of the metal support, was reserved for the key head of the chain, after the removal of the cement mortar covering its surface (Fig. 36). The wooden beam under the arch was restored by careful general cleaning, using sorghum and soft-haired brushes, rags, and low-pressure compressed air to remove dust, avoiding the removal of wooden material. To eliminate existing biological agents and prevent any future infestations, disinfection treatment was carried out by brush application of CTS's Permethrin-based wood treatment insecticide Antitarlo Complet. The cracks were filled with a two-component epoxy-based filler (CTS's Balsite W), and then painted with watercolour paint. The protective treatment consisted of the application of a colourless opaque paint based on synthetic resins (Fig. 37).

At the end of the work, a rapid as-built survey was carried out, using terrestrial photogrammetry to document the results of the restoration work. The enhancement works also aimed to create a night scene integrated in the more general urban context, with lighting solutions specifically designed to highlight the decorative apparatus of the pediment with diffused light. The intervention

saw the placement of two lighting fixtures, in place of an existing luminaires, with dazzling light, placed at the side of the building; the choice fell on high-efficiency LED elements, equipped with elliptical optics and a colour temperature of 2700 °K, in line with the general lighting level of the context.

5. Conclusion

The meticulous critical analysis and the surveys carried out, allowed the values of the building to be interpreted in the light of the cultural context of reference, its builders, the languages and the materials used. It has unveiled the intrinsic vulnerabilities in order to make appropriate and culturally shareable choices and to approach the execution phase responsibly, with solutions based on the in-depth cognitive and design work carried out.

Although the design phases were carried out with great care, the subsequent execution phase of the restoration work turned out to be a *building site of knowledge*, where in-depth studies and verifications were indispensable. The additional data acquired was essential to clarify the previous interventions, in relation to the degradation phenomena found, without invalidating the correct execution of the previously planned operations. The activities were carried out according to the design forecasts, with the necessary variations imposed by the results of tests, trials and sampling.

The intervention was carried out through a systematic series of works aimed at "material recovery", based on the principles of physico-chemical and mechanical compatibility of the materials used with those present in the building, reversibility while respecting the authenticity of the artefact, and the minimum invasiveness of the consolidation techniques. It has enhanced the composite character of the lithotypes and given the precious sculptural models the necessary material continuity to allow the building to be preserved in its integrity and fully used by the public.

All the information gathered on Porta Nuova before and during the works and the precise documentation of the procedures followed, together with the as-built survey, constitute the basis for the protection, valorisation and management of the controls for the planning of future conservative interventions.



Fig. 35: East elevation, after completion of the works



Fig. 36: Detail of key head of the chain after completion of the works



Fig. 37: Ovest elevation, after completion of the works

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