Fifteen Unedited Engraved Architectural Drawings Uncovered in Northwest Spain

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Since the 90´s an interest in the study of *montea* has arisen in some Spanish universities. *Montea* are full-scale engraved architectural drawings that were used by the master builder in order to extract the measurements and the forms of the structural elements for a new construction. There is abundant documentary testimony of their use in Spain during the centuries of the Modern Age, practical knowledge of them being required on examinations for architects (Marías, 1992). In effect, they are drawings of columns, pillars, frontispieces, brackets, entablatures, domes and arches of all types, among others, with the breakdowns of stone-cutting. In Galicia they are engraved on the granite floors and walls of cloisters, churches and cathedrals, which has permitted their conservation. All of them attest to the dominion of stone-cutting by master stone masons that worked in the area. The rich architectural patrimony that has endured until the present time is another demonstration of the extensiveness of this knowledge and skill. The master of cathedral construction, Domingo de Andrade, in his book, *Excelencias, Antigüedad y Nobleza de la Arquitectura* (Santiago, 1695), a dissertation about the qualities of architecture and of a good architect, stated that, "and I am not dealing with the five orders of architecture, neither of cuts used in practical stonemasonry… because there is enough written" (facsimile of Sánchez Cantón, F6).

I have dedicated a good part of my time during the last years to the localization, photography, map-making, and study of engraved architectural drawings. My proposal for The Second International Congress on Construction History of Cambridge is to present a study of the fifteen most relevant engraved architectural drawings recently discovered with my team of collaborators between 2004 and 2005. The study contains a series of unedited drawings, some of an extraordinary technical quality, all of them engraved in granite (except one that is located on plaster), the majority dateable to the 17th, the 18th, and perhaps the 19th centuries, that served for the construction of architectural monuments such as the convent of San Francisco of Tui, the church of the Clarisas in Tui, the parochial church of Carnota, the monastery of Celanova, the monastery of Montederramo, the monastery of Poio, the parochial church of San Salvador de Padróns, the fortress of San Damian of Ribadeo and the Cathedral of Santiago de Compostela. In order to correctly identify these engravings, it was very useful to consult Spanish manuals of stereotomy from the 16th to the 19th centuries, prints and manuscripts, such as those by Vandelvira, Martínez de Aranda, Juan de Portor y Castro, Fray Lorenzo de San Nicolás, Juan de Torija, Tosca or Benito Bails, among others, or foreign ones, such as that of Philibert de l´Orme, whose presence in Spanish libraries is amply documented.

We have grouped these fifteen drawings in categories according to their function. There are four principle categories and one miscellaneous category. The five main categories of full scale engraved architectural drawings pertain to the construction of the squint, the arch, the dome, the pinnacle and staircases.

Engraved architectural drawings of the squint

Special attention is merited by the exceptional engraved drawing of a quadrant arch of 2 meters of diameter located in the Plaza de las Platerías on the southern façade of the Tesoro (Treasure) building of the Cathedral of Santiago de Compostela, that may correspond to the squint that sustains what is popularly known as the Pasadizo del Tesoro (fig.1). It appears that this building was constructed between 1685 and 1686 by the Master builder Domingo de Andrade in order to permit more rapid, controlled and safe access from the interior of the Basilica to the room that guarded the treasure of the Cathedral, the second floor of the Renaissance palace constructed by Rodrigo Gil de Hontañón (Taín 1998, t.I, pp. 129-34). It is conceived in the style of a sconce suspended by an enormous squint in a pointed corner, with the intrados decorated by a gigantic Jacobean shell and the cross of the Apostle.

Evidently the drawing does not correspond to the actual arches of the squint which are segmental semiellipses. However, this could pertain to the oblique projection of a semicircular arch above the wall at a salient right angle; the rise of the intrados measures exactly 2 meters as well (the rise does not deform in the projection). For its conception, the architect could have made use of manuals such as *Libro de cortes de piedra* by Alonso de Vandelvira, where this type of construction is explained.

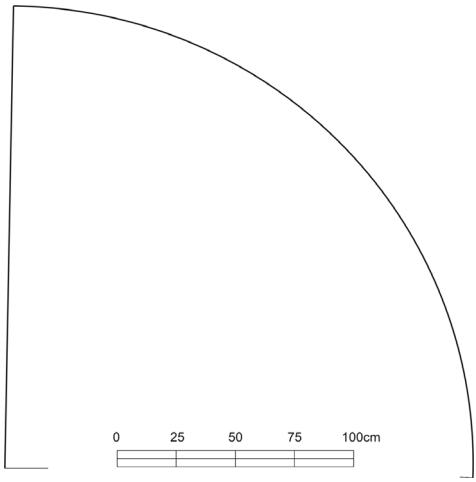

Figure 1. Drawing of a quarter arch (Santiago de Compostela)

Engraved architectural drawings of arches

The most significant of this category may be the architectural drawing of *a semicircular arch* engraved in the mortar on the interior face of the defensive parapet of the fort of San Damian in Ribadeo built in 1744 by the military engineers Juan Vergel and Arnold Hontabat on the ruins of an earlier one and of which there is news of later reforms (Soraluce 1985, pp. 112-3) (fig.2). Fortunately, the 1995 restoration by the architect Ernesto Cruzado Estévez respected the engraving, popularly albeit erroneously known by the name, "El Reloj del Sol/The Sun Clock". Although it has deteriorated considerably over time, it is still possible to distinguish the drawing of the breakdown of the wedge-stones that compose it. Moreover, the orifice in the plaster wall where the point of the compass was nailed in order to trace the two curves of the same still persists on the vertex. Given the longitude of the diameter of the arch, nothing less than 2.79 meters, the engraved drawing would have been dedicated to the construction of one of the interior arcades of the barracks. Unhappily, the new resurfacing of the walls after the last restoration of the building has covered its possible voussoirs which impedes the ability to affirm the same with any rotundity. In order to have created the drawing, given that its elements are basic, the author may have utilized any manuscript or book of stone construction, for example, that cited by Vandelvira (facsimile of Barbé-Coquelin de Lisle 1977, fol. 18r.), *el Arte y Uso de Arquitectura* by Fray Lorenzo de San Nicolás (facsimile of Colegio Oficial de Arquitectos de Aragón 1796, t.I, p.95) or tome V of the *Compendio Matemático* by Tomás Vincente Tosca dedicated to the art of architectural drawing and stone-cutting (edition of 1757, t.V, folio 90).

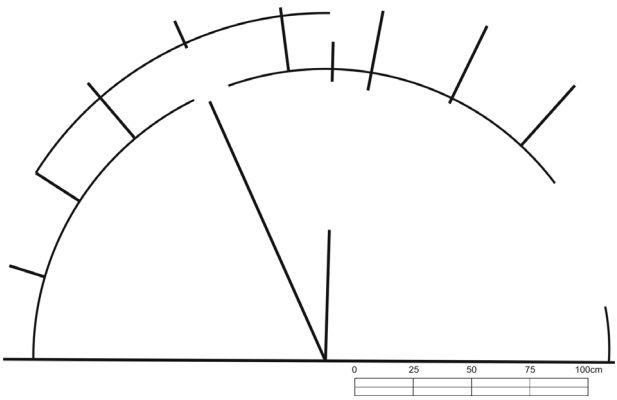

Figure 2. Drawing of a semicircular arch (Ribadeo)

I should also mention here *a quarter arch*, with a diameter of 3.67 meters, found on the pavement of the sacristy of the convent of San Francisco de Tui (fig. 3). Due to its measurements, it could pertain to one of the semicircular arches that sustain the dome of the crossing of the church. In fact, in the area of the tribune of the south aisle, there are indications that there have been problems of

stability: one part of the cornice is dislocated and the arch of the gallery has some disarticulated wedge-stones. Given the grand dimensions of said arches, only half of the structure is represented in the drawings.

Other lines and profiles associated with this drawing are more difficult to interpret. One of those that stands out is the profile that serves as a support point of the studied arch, composed of three mouldings –cymatium, listel and corona – that I think may correspond to the interior cornice of the church. For its conception, the author could have selected among a wide range of architectural texts where the different orders of architecture are analyzed, the most representative being the *Regla de los Cinco Órdenes de Arquitectura* by Vignola.

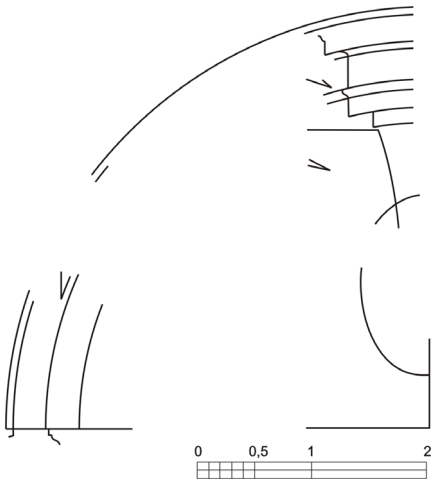

Figure 3. Drawing of a quarter arch (Tui)

On the stone pavement of the church of the monastery of San Salvador de Celanova, in the first part of the north aisle and the south aisle of the lateral naves, remnants of engraved drawings of each of the two *segmental arches* with component wedge-shaped stones can be found (figs. 4 and 5). The origin of the drawing has to do with the history of the building, a basilica of three naves, with a crossing and expanded presbytery that was constructed in 1661, using tracings of the architect Melchor de Velasco, although it has been the subject of various posterior renovations (Folgar 2002, pp. 337-65). The represented arches correspond to those that support the high choir of the church. In the north aisle, there is also an engraved drawing of the spandrel of the coved vaults, with the tracing of its box-work, of great proportions (fig.4).

On the exterior façade of the building that contains the cells of the nuns of the convent of the Clarisas in Tui, the drawing of *a segmental arch* of 2.30 meters (fig. 6) is found that, without a doubt, corresponds to that of the window of the façade of the church. This building, erected

between 1688 and 1693 following tracings by the architect Domingo de Andrade, showed an original window that was later enlarged in order to facilitate the entrance of more light into the high choir and the interior of the temple (Iglesias 2002, pp. 147-52). We suppose that the drawing was necessary in order to orient the working and the disposition of the new wedge-stones. This same drawing has the unique peculiarities that the arch is drawn in an inverted fashion and that its wedge stones are numbered (the numbers 2 and 3 can be read). As in the previous cases, the author may have referred to available books on stereotomy, beginning with the very well known texts of Vandelvira (Barbé-Coquelin de Lisle, fol. 18r.), Fray Lorenzo de San Nicolás (t.I, pp. 91-2) or Tosca (t.V, fol. 110, fig. 9).

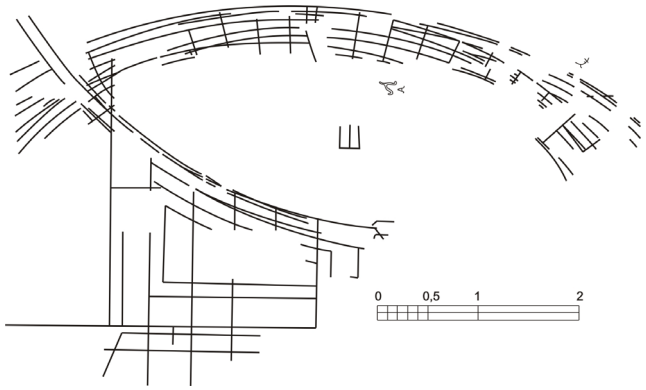

Figure 4. Drawing of an arch and of a spandrel (Celanova)

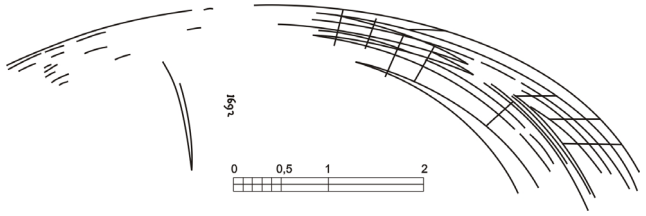

Figure 5. Drawing of an arch (Celanova)

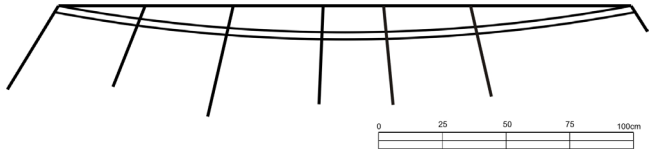

Figure 6. Drawing of a segmental arch (Tui)

Another engraved drawing, located on the southern wall of the church of San Salvador de Padróns, depicts a *the segment of an arch*, in which the wedge stones are drawn (fig. 7). It corresponds to the two that support the beam of the high choir of the church, built in a reformation of unknown date.

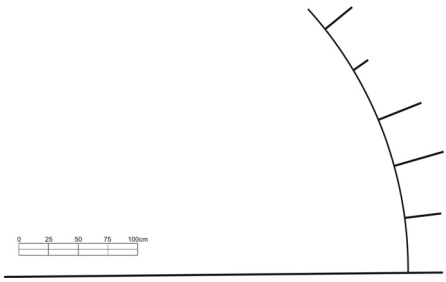

Figure 7. Drawing of a segment of an arch (Padróns)

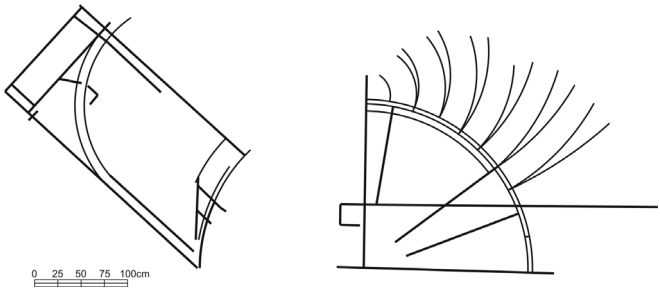

Figure 8. Drawing of a semi-dome (Carnota)

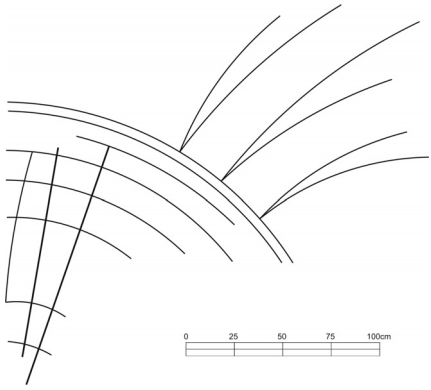

Figure 9. Drawing of a semi-dome (Carnota)

Engraved architectural drawings of domes

On the exterior of the chevet of the parochial church of Santa Columba of Carnota, two drawings of a semi-dome are engraved (figs. 8 and 9). This church, a Baroque building constructed in the 18th century, has the floor plan of a basilica and presents the particularity that its two lateral naves terminate toward the west with vaulted enclosures with one semi-dome in each of them, decorated with three ribs in relief and sustained by two exceptional arches in *torre cavada* -according to the nomenclature of Vandelvira and Ginés Martínez (Palacios 2003, pp. 80-3)- to which the drawings correspond (Soraluce and Fernández 1998, vol. III, pp. 48-9). While the apse of the south aisle is presently an entry vestibule of the church, that of the north aisle does not have a defined function today.

In the most elaborated drawing, the semicircle of the semi-dome is traced; the diameters of the base and the height can be extracted from its measurements. The mouldings of the haunch, the rib on the right and half of the central one that adorn the intrados, as well as the projections of the curved stones and the number of rows with which to enclose the structure are also represented (fig. 8). These same projections of the dome should correspond to the other drawing (fig. 9). For its creation, the author could have once again looked at texts such as those by Vandelvira that explain this type of vaulting on folio 61v. (Palacios 2003, pp. 192-3.). There are remnants of other drawings on the north and south walls of the church but they have been very worn away by the action of the sea wind on the granite and, today, it is impossible to decipher them.

Engraved architectural drawings of pinnacles

On the Romanesque façade of the church of San Salvador de Padróns, a drawing of a pinnacle with a ball and its pedestal is found (fig. 10). This is not a unique case in Spain as others of Gothic date have been located in the Cathedral of Seville (Ruiz de la Rosa 1991, pp. 136-43). This is a very simple drawing that is easy to analyse and corresponds to the six pinnacles that decorate the top of the wall that encloses the parochial atrium, of uncertain chronology. Moreover, it presents the volute of the base of the pedestal that is only evident in the pinnacles that flank the access door to the enclosure.

Engraved architectural drawings of staircases

On the pavement of the stairwell of *the triple cockle staircase* in the convent of Santo Domingo de Bonaval, the engraved drawing of the same is found (fig.11). This work was designed and constructed by Domingo de Andrade between 1695 and 1705, each one of its three helicoidal ramps ends at a different level and they never themselves join or cross (Taín 1998, t.I, pp. 218-35). Originally they served to communicate the north and west wings of the convent where, according to the documentation, the cells of the friars, the wardrobe, the provisions store, the bakery, etc., were

located. The last ramp was used to access the lookout tower. Today, the drawing is quite deteriorated and, unhappily, much of the elements have been lost. It does retain a double circle, separated by 13 centimeters, with the axes marked, and a maximum external diameter of 2.4 meters. The lesser circumference gives the measurement and the form of the eye of the staircase, while the distance to the greater circumference indicates the thickness of the serpentine moulding of the three staircases.

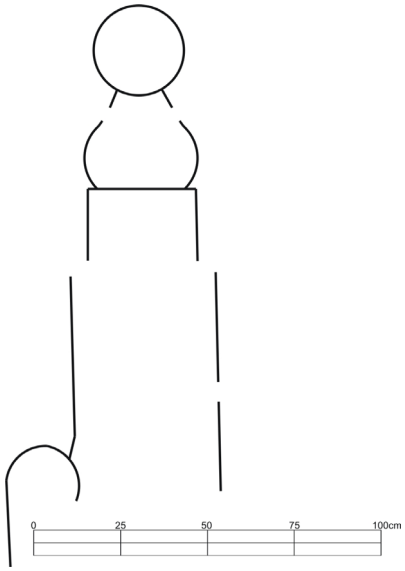

Figure 10. Drawing of a pinnacle (Padróns)

This triple cockle staircase drawing is a unique case in its category. For its conception, the author may have been inspired by texts such as *Cerramientos y Trazas de Montea* by Martínez de Aranda, that explain the construction of a similar staircase, called the *"Snail of Mallorca"* of one or two ramps (facsimile of 1986, pp. 287-91.), the aforementioned manual by Vandelvira (Barbe-Coquelin de Lisle 1977, fols. 50v.-51r. and Palacios 2003, pp. 156-61.), which only analyzes those of one ramp, or the *Cuaderno de Arquitectura* by Juan de Portor y Castro (BL MS. 9.114, fol. 24v.), which also treats only one ramp, the most frequent in 16th century architecture. Italian books on architecture such as that of Vignola, *Le due regole della prospectiva*, in which a staircase of two ramps is studied, or that by Andrea Palladio, *Los cuatro libros de arquitectura*, which treats two of only one ramp and one of four ramps may also have been consulted (translation Akal 1988, pp. 134-41).

Another very particular case concerns the architectural drawings of the *abbey staircase* of the monastery of Celanova engraved in the pavement of the stair well of the same (fig.12). It is a typical cloister staircase with a balustrade hung above a square wellhole, composed of five ramps and five

landings. The last two ramps run above the two vaulted arches and have box-worked intrados. It was built around 1755 in order to communicate the two floors of the processions cloister, the lower Renaissance cloister built around 1550, with the higher cloister of the Baroque period, built then by the architect Fray Plácido Iglesias (Folgar 2002, pp. 357-58.). The patterns of the arches of the staircase, of the mouldings and of one of the casings that adorn it, with its reliefs and reductions, are represented in the engravings. For the design, the author could have studied other similar staircases in other monasteries and Galician buildings, as well as manuals such as that by Juan de Portor y Castro which analyzes a multitude of options for staircases with a square plan, that by Tosca (as an example see t.V, pp. 250-52 and fol. 252, fig. 82) or the treatise on architecture by Palladio within which another example is shown (pp. 134-39).

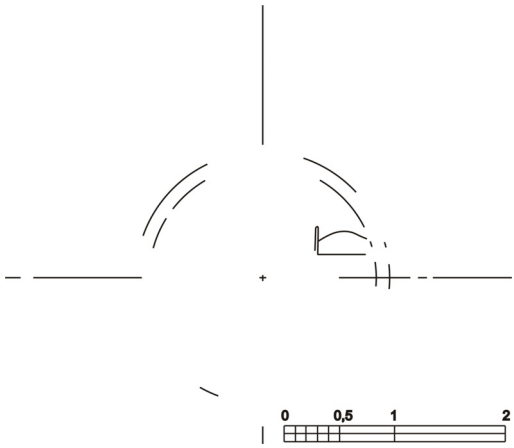

Figure 11. Drawing of a triple cockle staircase (Santiago)

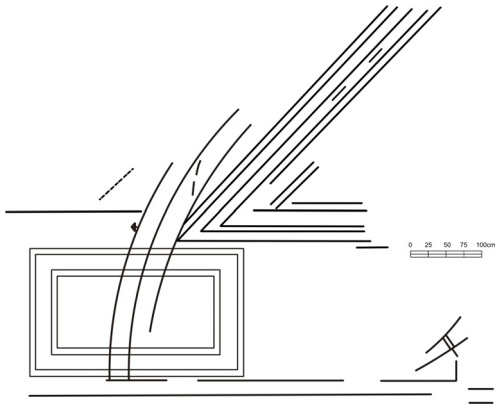

Figure 12. Drawing of a staircase (Celanova)

Other engraved architectural drawings

The last category of drawings discussed herein is composed of engraved architectural drawings that are difficult to identify and sort accurately because they have suffered considerable mutilation which impedes the identification of their proposed use, perhaps because the works for which they were designed have disappeared or because it has been impossible to locate them. I refer, for example, to the remains of an architectural engraving of an arch of great dimensions found in the pavement of the central section of the crossing of the church of the Cistern monastery of Montederramo (fig.13), or to another two engraved in the flag-stone of the cloister of the monastery of San Xoán Bautista de Poio (fig.14), or to the profile of mouldings located in the same cloister (fig.15). The fact that this last one appears close to another one just published which corresponds to the entablature of the buttress supports of the church (Taín, *Goya*, 2003, pp. 344-45), constructed at the end of the 17th century and the beginning of the 18th century, leads one to think that the profile now under study pertains to said temple.

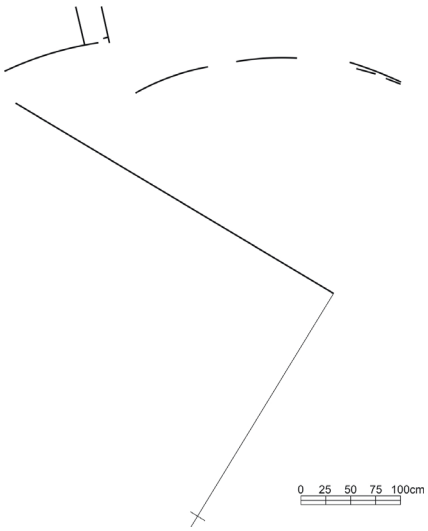

Figure 13. Drawing of an arch (Montederramo)

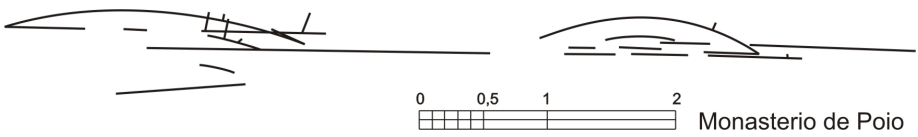

Figure 14. Drawing of arches (Poio)

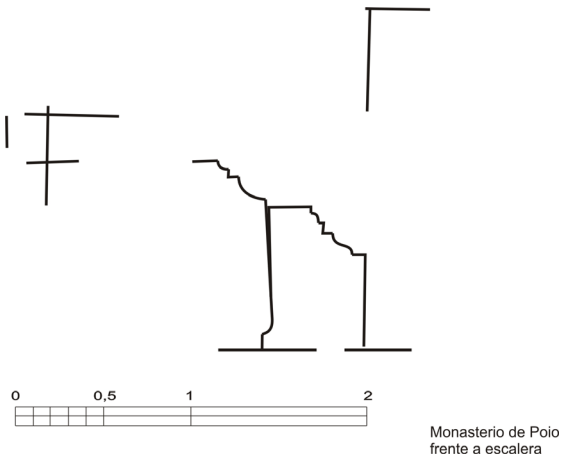

Figure 15. Drawing of mouldings (Poio)

All of the drawings meet the premise that must be kept in mind at the time of identifying the end for which they were intended: all of them are engraved in walls or floors of a specific building because they were useful during its reform (for example, the new window opened in the façade of the church of the Clarisas in Tui), its reconstruction (as is the case of the arch of the church of San Francisco in Tui) or its amplification (as is the case with the Pasadizo del Tesoro in the Cathedral of Santiago de Compostela). It should also be kept in mind that these locations are ventilated and well-illuminated sites that permitted the accurate and efficient development of the work and where the dust and the noise generated by picking the stone did not constitute a problem (for example, in Padróns, the drawing of the pinnacle is found on the exterior walls of the church). Equally, many such drawings appear in covered places, authentic tracing rooms which, it is supposed, were selected in order to avoid rain damage (for example, in Celanova, the drawings are located at the feet of the lateral naves). Unhappily, renovations of the pavements of our architectural heritage in the last decades are associated with the loss of dozens of engraved architectural drawings of incalculable value. In any case, the repertoire of engraved architectural drawings published here is testimony to the advanced state of architectural drawing in Galicia and to the level of knowledge of geometry reached by master stone-cutters.

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