Cracking the Code: Restoration and Discoveries at St Paul's Anglican Pro-Cathedral, Valletta

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St Paul's Anglican Pro-Cathedral (1839–1846) is one of the most important and significant landmarks in Valletta's skyline, and a prominent icon of British presence on the islands and Malta's colonial past. Over the past seven years, it has been the focus of a significant restoration campaign spearheaded by the St Paul's Pro-Cathedral Restoration Appeal Committee and entrusted to AP Valletta's multidisciplinary team.

Commissioned by Queen Adelaide and designed in parts by Richard Lankesheer and by William Scamp, the cathedral's history has been documented and studied from various perspectives,[1] in monographs by Reginald Nicholls Kirkpatrick[2] and Alan Keighley,[3] and in the wider socio-political context of the Anglican presence in Malta, for example in Robin Gill[4] and Nicholas Dixon.[5] Similarly, the building processes and materials used during the construction of the monument were underlined by M. Edwards,[6] Martina Caruana and Ann Gingell Littlejohn,[7] and Conrad Thake,[8] all publications serving as a good basis for the archival and historical research undertaken at the inception of the restoration project. The research also led to the rediscovery of the *Day Book of St Paul's Valletta*, which contains evidence of weekly records of workers and materials employed during the entire construction period of the cathedral and steeple (March 1839 – March 1846)—an analysis which highlights the local distinctiveness of the building.[9]

A transdisciplinary approach was adopted from the early stages of the project, enabling information and knowledge to be collected from various stakeholders and disciplines, and then analysed throughout the lifetime of the project itself.[10] This new knowledge about the monument

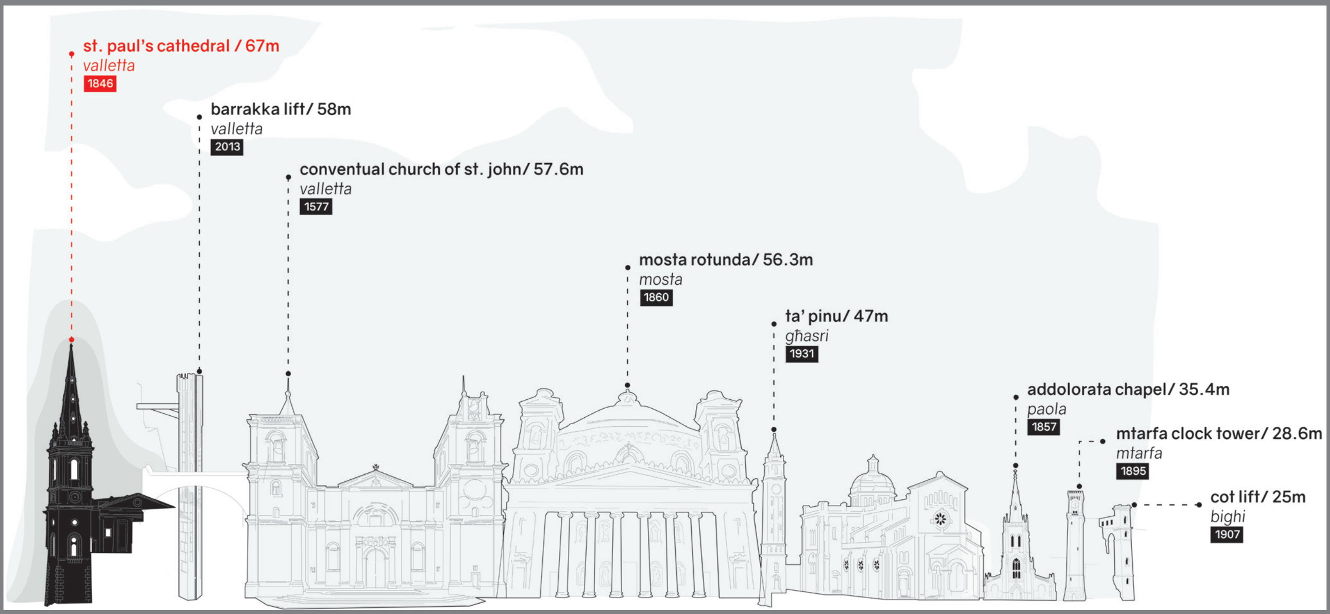


Fig. 1
Graphical comparison of landmarks. Illustration by Elena Bajada – AP Valletta.

was derived from actions ranging from the preparation of a series of studies[11] and non-invasive investigations,[12] from the analysis of site conditions and construction history, and from documentation collated during the project implementation phase itself. This approach informed the design of interventions for the restoration and preservation of the steeple. Restoration works on site began in 2020 with new discoveries on the construction technique of the steeple being made from the early stages.

A unique building: The nineteenth-century project

The steeple of St Paul's Anglican Pro-Cathedral has been an iconic and powerful presence in Valletta's skyline since its construction. At a height of 67m it was by far the tallest building in Malta at the time it was built and maintained this record until the recent era of high-rise buildings (Fig. 1). While there are clear clues as to the modifications and rectifications carried out by Scamp on the Lankesheer church building after 1842, there are indications that the design of the steeple and its location are the direct result of Scamp's design for that building. Lankesheer's proposal, on the other hand, had contemplated a spire as well, but this was a more modest structure situated above the main portico. A study of existing records makes it clear that the intent was to have the church visible upon entry in the harbour.

It is likely that the genesis and the procurement processes, both preceding and contemporary to the church's construction, account for some of the peculiarities it offers. The role played in the development of the church design by the extended period of protracted negotiations involving various authorities between 1814 and 1839 cannot be underestimated.[13] The current building is the result of at least four direct architectural contributions spanning over twenty years. Indeed, at the same time as Queen Dowager Adelaide's pledge to fund the church, architects were invited to submit proposals, and their designs received and paid for. Lankesheer's design for the front façade and street elevation (on the West side) can be seen in the Brocktorff reproductions published at the time. The location of the church, however, included other sites and alternatives and the preliminary clearance of another site in Valletta was carried out for this purpose. By 1838, however, the intent of building a Protestant church with a tower was clearly floated and options evaluated.

The steeple was completed in March 1846, withstanding its first storm on 2 and 4 November that year. Exposure to the harsh weather conditions in Marsamxett Harbour could perhaps account for the disappearance of the four sculpted urns at the tower head level.

Traditional construction methods and novel materials

As much as the spire structure may have looked unfamiliar in mid-1840s Malta, it nevertheless bears marks of the Maltese tradition, setting it at the junction between traditional local construction and British aspirations. The masonry construction adopted made use of high-quality Globigerina limestone, provided weekly to the site from various Maltese suppliers.[14] The courses of varying heights, however, display specific stereotomy patterns and barely visible thin joints which are atypical of local building construction. The local use of embedded iron, on the other hand, is novel, and can be linked to the development of the Naval Bakery in Vittoriosa and the Covered Market (*is-Suq*) in Valletta, both buildings connected to St Paul's Pro-Cathedral as a result of Scamp's involvement. Scamp authored two detailed accounts which are held at the Wignacourt Museum, Rabat, detailing the situation of the work: the first in 1842 following Lankesheer's untimely demise, and the second in 1844, in light of the church's inauguration. These were supplemented by contemporary sketches produced by visiting artists that recorded the progress on site.[15]

Significant and consistent throughout the records of construction bills is the purchase of iron and coal in substantial proportions and the repeated mention of blacksmiths as part of the weekly accounts. This came to light during the early research into the building's history when it was discovered that parts of the masonry structure were reinforced with metal cramps (staples), embedded

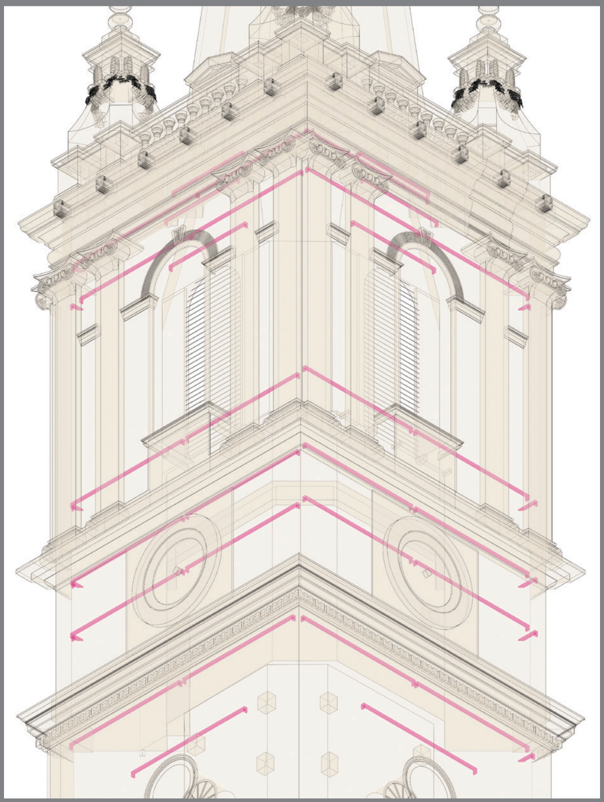


Fig. 2
H-BIM visualisation of embedded iron cramps based on historical and on-site surveys. Modelling and image prepared by Guglielmo Avallone, Luis Rodriguez Lopez, and Daniel Ruiz Lolo, and Ali Akgul – AP Valletta.

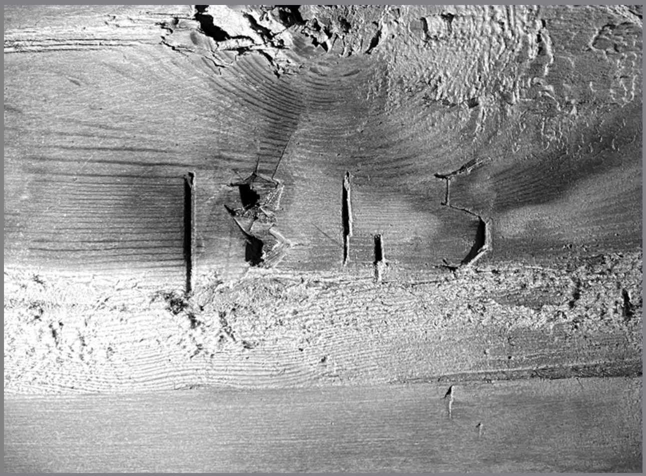


Fig. 3
View of graffiti engraved in the tower timber beams. (Photo: Elena Bajada – AP Valletta)

in the wall thickness. In Scamp's own written accounts these are referred to as chain-bonds. They were found at eight different levels externally and three levels internally of the steeple, running on average at four-metre lengths each, with two cramps per level on each façade in some cases (Fig. 2). At the level of the spire, lead joggles were also evident within mortar joints, particularly on the internal façades as well as within the existing finials. The use of lead has been recorded throughout the steeple assembly, both in conjunction with the metal cramps but also separately in lead-dowelled joints. These details, in what is in fact the first local Victorian high-rise restoration project, were all given special consideration during the restoration intervention planning phase.

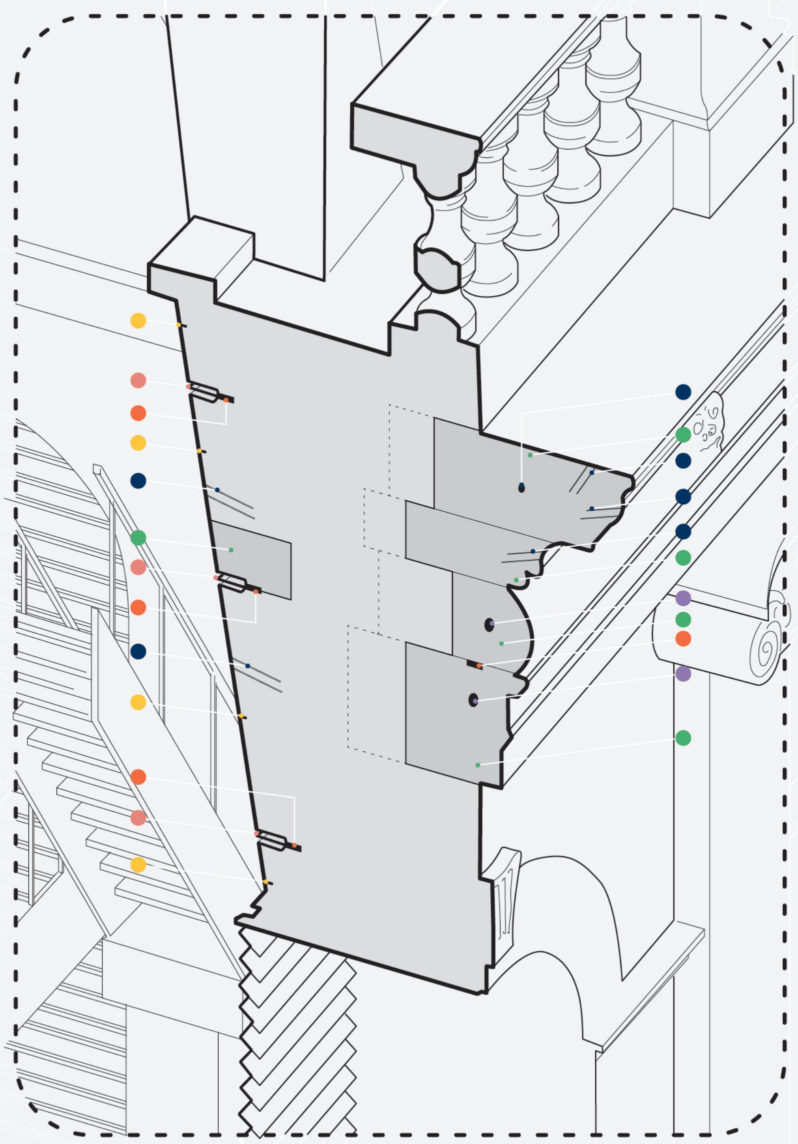
Inside the tower and spire itself, moreover, a timber structure consisting of six levels of platforms supported on beams was assembled hand in hand with the construction of the masonry structure, and undoubtedly served as part of the temporary works. This is still visible throughout the internal faces of the tower and spire where masonry corbels suggest the use of temporary additional timber platforms during the works. Graffiti markings on the timber beams recording the date 1845 were identified at a level which is historically consistent with illustrations (Fig. 3).

All this is significant evidence that, while this building is no stranger to *Melitensia* research or publications, none have yet exposed the overlap between architecture, art history, and construction technology that makes this building unique in the local context. The church and the steeple were constructed using methodologies scarcely used on the local scene in the early British period and, in fact, records and documentation about its construction have been researched only sparingly and infrequently.

Locating the metal cramps

Once equipped with the information derived from preliminary research and study, the design of the intervention on the steeple was undertaken with the aim of ensuring not only the restoration of the masonry surfaces *legend*

- metal cramps
- negative return wire
- anode ribbon
- stone replacement
- dowels
- structural strengthening
- structural arch



INDICATIVE SECTION

but also the preservation and stability of the complex structural assembly of the steeple.

Deterioration patterns shown on the façades were mainly two: severe alveolar decay due to wetting and drying cycles caused by high exposure to wind and to sea sprays related to the location of the building, and cracks due to the expansion of the embedded metal which, in the presence of water and salts, were rusting and the expanding wrought iron causing stresses on the stone and fracturing the brittle limestone blocks. While in some instances these cracks had appeared on the façade, in others the cracks occurred entirely within the thickness of the walls with no external visual indication of the problem.

Combining the study of archival records with an examination of the building structure pointed to a possible relation between surface disruptions and the presence of embedded metal. Initial investigations sought to identify the probable locations of the metal cramps which were not recorded in historical documents. This was achieved by Ground Penetrating Radar (GPR) techniques that gave initial indications of dissimilar materials embedded within the thickness of the masonry, with the presence of metal confirmed through endoscopy (Fig. 4). The exercise was carried out before the scaffolding was erected, giving initial indications which were confirmed to their full extent during the actual works. The hidden cracks provided a particular challenge to detect, and a systematic procedure was devised whereby each and every stone block was tapped on its external surface using a hammer to determine the depth of stone detachment. Approximately 5600 stone blocks were checked across the steeple in this manner.

Repair interventions

The restoration works that followed the investigation campaigns outlined above shed light on various repair interventions in the monument's history which were only revealed during the restoration project and in tandem with further in-situ testing and archival research.

Previous interventions dating from the late nineteenth century to the late twentieth century had never been documented except for the records of the workers' own graffiti in various locations. For instance, metal straps pinned into the external masonry façade were installed during the 1980s in an attempt to brace the north-western and north-eastern corners, and graffiti left in close proximity 'record' the works. This intervention, however, triggered its own set of deterioration mechanisms and cracks due to the expansion of metal bolts used to secure the straps (Fig. 6).

Another case of recent intervention consisted of dowelling at the top of the tower using filled stainless steel pipes, encased in PVC pipes. This ingenious intervention, devised to ensure that the metal does not expand and cause further cracking, was found on the south façade, overlooking the Carmelite Church. A local promotional photograph dating back to the 1990s, discovered fortuitously, shows a scaffolding on the south façade, thus indicating that this intervention was possibly carried out at this point in time. Similarly, smaller timber dowels, carefully integrated behind weak cement and lime mortars, were found on the lower levels of the tower to hold up thinner sections of detached masonry.

These examples of interventions throughout the life of the tower corroborate our initial deduction that deterioration mechanisms related to the presence of embedded metals had been active for several years and had been addressed by the various means available at the time. There is, to date, no evidence to support the idea that a full restoration campaign was ever undertaken at the scale of the current project. This is due, most likely, to the onerous task of erecting the scaffolding and support structures necessary to carry out the works.

Even following the damage suffered during the Second World War, repairs were only carried out in a localised manner. Evidence of these interventions were subsequently confirmed on site where different sculpted

Fig. 4
Visual representation of interventions on the historical fabric, including identified iron cramps and dowels. Illustration by Elena Bajada – AP Valletta.

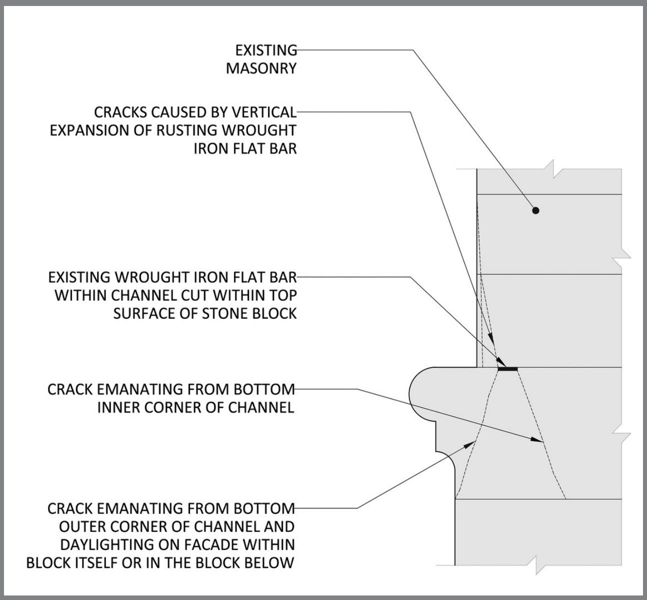


Fig. 5
Section describing the location of embedded metal and the resulting crack pattern. Illustration by Charles Sciberras – AP Valletta.

Fig. 6
Removing past interventions which led to exacerbated corrosion within the historical masonry fabric.
(Photo: Charlene Jo Darmanin – AP Valletta)

works were present and where iron cramps were absent in the reconstructed areas. Irregular stereotomy and, in some cases, even stone replacement, indicated possible previous interventions due to cracked stone, providing clues as to the location of embedded iron (Fig. 5). At the level of the bell chamber windowsill, blocks were found to be sculpted on both the internal and external sides, indicating that the deteriorated stone block was flipped around before the moulded work was recreated on its outer face as part of a restoration intervention. Likewise, capitals and decorative work, such as floral motifs and lion heads, suggested two distinct and previous restoration campaigns.

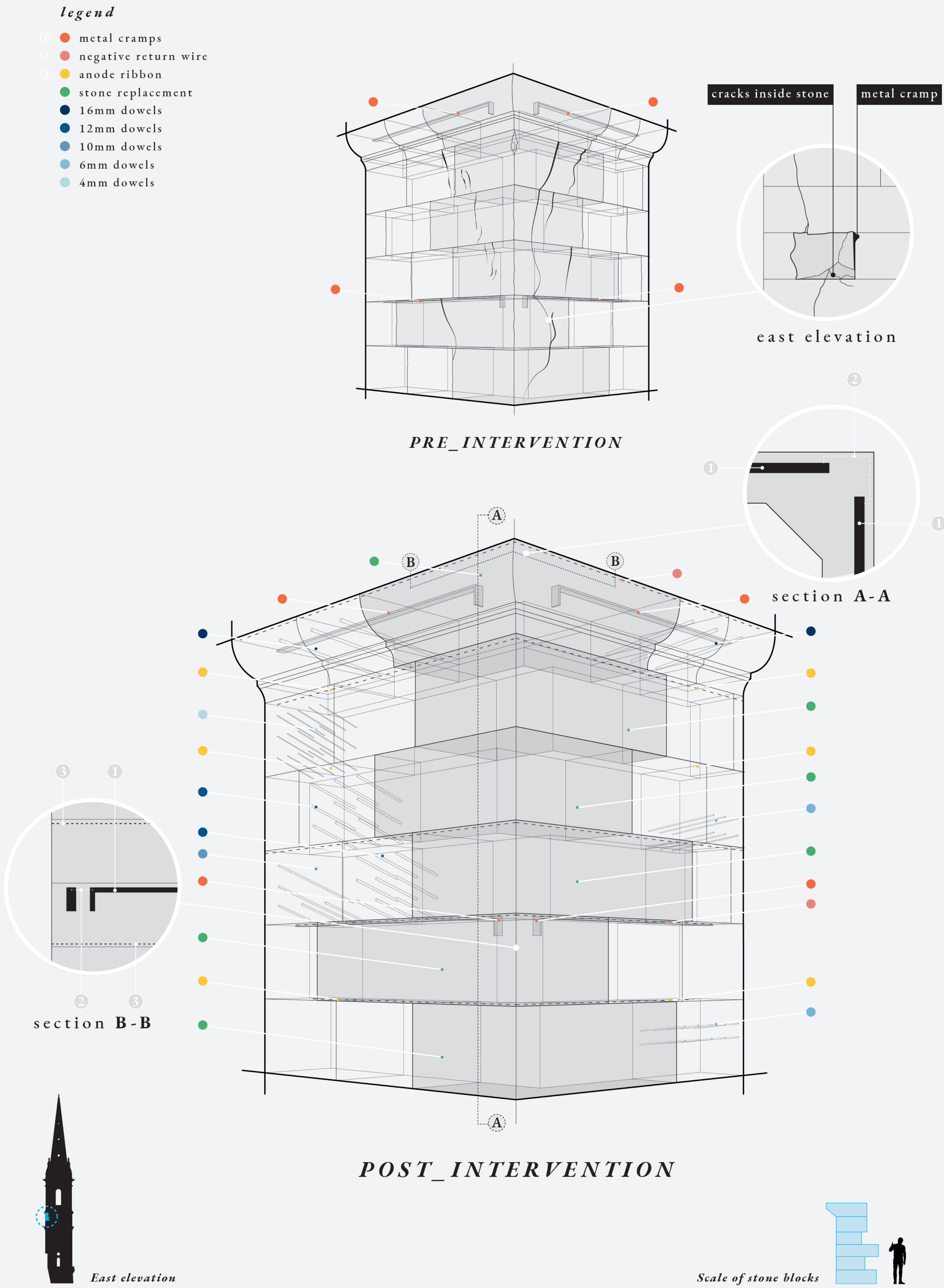
Restoration philosophy

Throughout, the restoration approach was planned in such a way as to retain the intrinsic qualities and values of this historical structure, whilst ensuring the structural stability of the building assembly and its long-term preservation. In general, dowelling of the detached surface combined with lime injection was the preferred method of repair to retain the historical material as well as to guarantee a uniform surface patina established over time (Fig.7).

Wherever required, stone replacement was carried out taking care to respect the original stereotomy. This required the use of large-size stones and a thin joint construction which made it challenging to manoeuvre on site. Each stone block was coded and referenced to photographic records at different phases, with images taken before, during, and after interventions. This was cross-referenced with stone replacement drawings to understand how day-to-day decisions, constantly in flux due to new findings, could affect the structure, stereotomy, and the aesthetic of the steeple.

Overall, the intervention restricted stone replacement to a minimum while most ornamental elements did not

opposite: Fig. 7
Proposed intervention on the tower corner. Illustration by Elena Bajada– AP Valletta.


legend
metal cramps
negative return wire
anode ribbon
stone replacement
16mm dowels
12mm dowels
10mm dowels
6mm dowels
4mm dowels
cracks inside stone
metal cramp
east elevation
PRE_INTERVENTION
section A-A
section B-B
POST_INTERVENTION
East elevation
Scale of stone blocks

require replacement. Motivated by an appreciation of the architectural function carried out by the urns located at the four corners of the tower terraces—that of providing a transition between the tower volumes and the form of the spire—it was decided to proceed with their reconstruction of local hardstone. The details and templates were designed by Innocento Centorrino and based on archival and architectural research, and supplemented by the limited photographs available.

The future

The crack patterns on all the external and internal façades mapped out at the onset of the project served as a basis for a telemetric system of crack gauges and temperature and humidity sensors, which have been deployed in order to assess the real-time movements of the spire over a period of time. The system will monitor any movement and inform any future conservation strategies developed, together with their timely implementation.

Wherever possible, the iron cramps were removed from the masonry structure. When this was not possible, as their removal would have caused too much disruption on the masonry structure, an Impressed Current Cathodic Protection (ICCP) system was implemented. The system involves passing a small current through the cramps to reverse the natural electrochemical corrosion process and, therefore, to prevent the metal from expanding further.

Site data and recording of interventions are critical for the future preservation of the monument. The previous interventions which were exposed, together with those carried out in the restoration exercise of 2022–2023, were modelled using H-BIM technology (Heritage–Building Information Modelling).[16] The early introduction of the technology into the project's cycle, combined with high-definition imagery (through UAV photogrammetry and UAV inspections in 2019) and surveying technologies (including point cloud through laser scanning in 2017), together with archival research, have created a rich digital database crucial to understanding the building and for providing sound guidance as to the intervention adopted (Fig. 8).[17]

The restoration of the masonry and timber fabric of the tower and spire was completed in 2023, through ERDF funding (Operational Programme I – European Structural and Investment Funds 2014–2020) and the tremendous efforts and support of Save the Valletta Skyline Appeal. The rest of the church fabric is still in dire need of repair. Works required include the restoration of the cathedral's façades and the reconstruction of the original roof structure and ceiling soffit. A funding campaign is still ongoing for the completion of the restoration project and for the preservation of the monument in its entirety.

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AP Valletta is a Malta-based award-winning architectural firm specialising in sustainable heritage. Founded in 1991, AP consists of a multinational and multidisciplinary team of architects and other professionals, covering a wide range of services, including architectural and interior design, masterplanning and urban design, structural and civil engineering, restoration, property valuation services and feasibility studies, education, research, and publishing.

Notes

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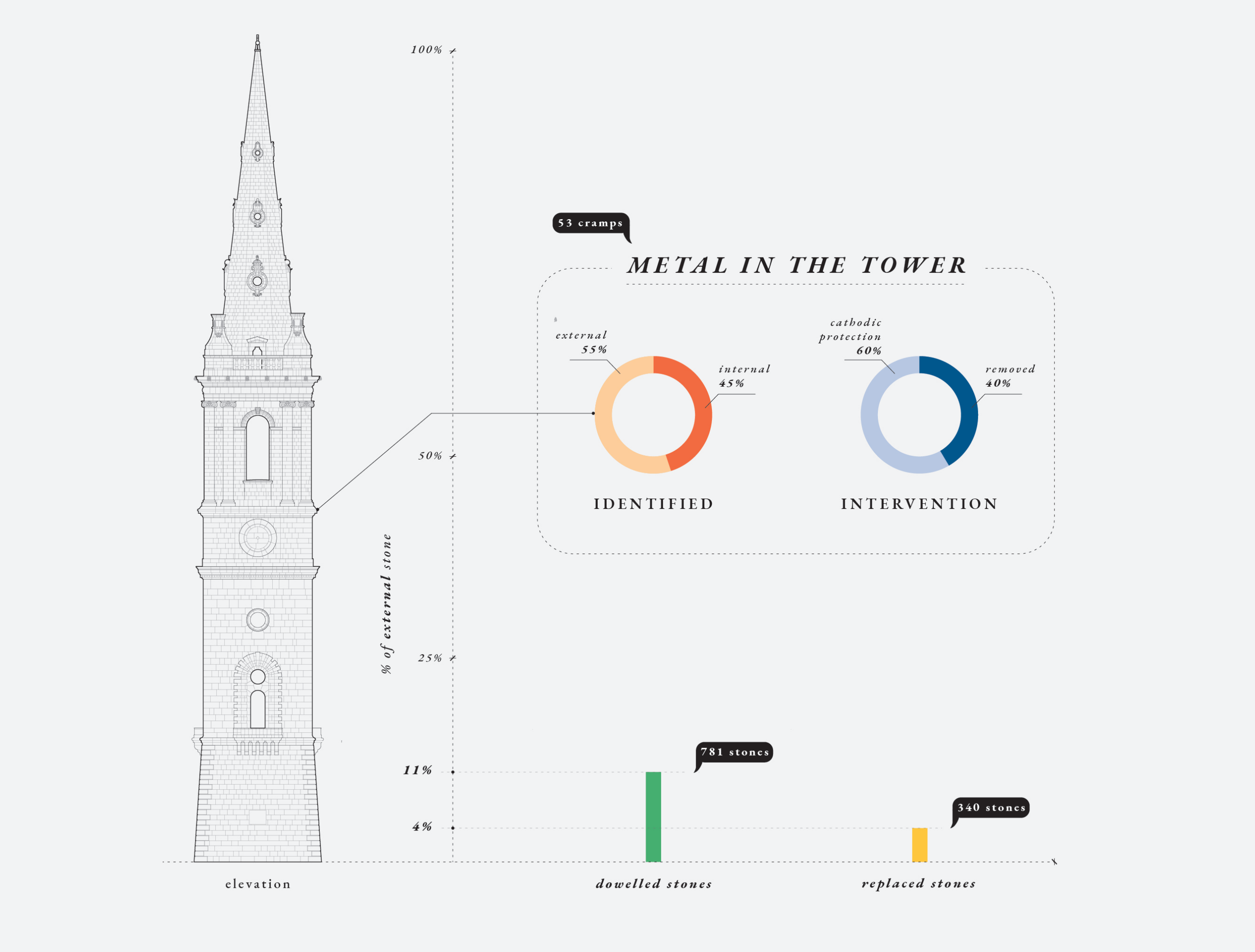

Fig. 8
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