

BRUSSELS HERITAGE

SPECIAL EDITION – 2018



United Nations
Educational, Scientific and
Cultural Organization



La Grand-Place, Brussels
inscribed on the World
Heritage List in 1998

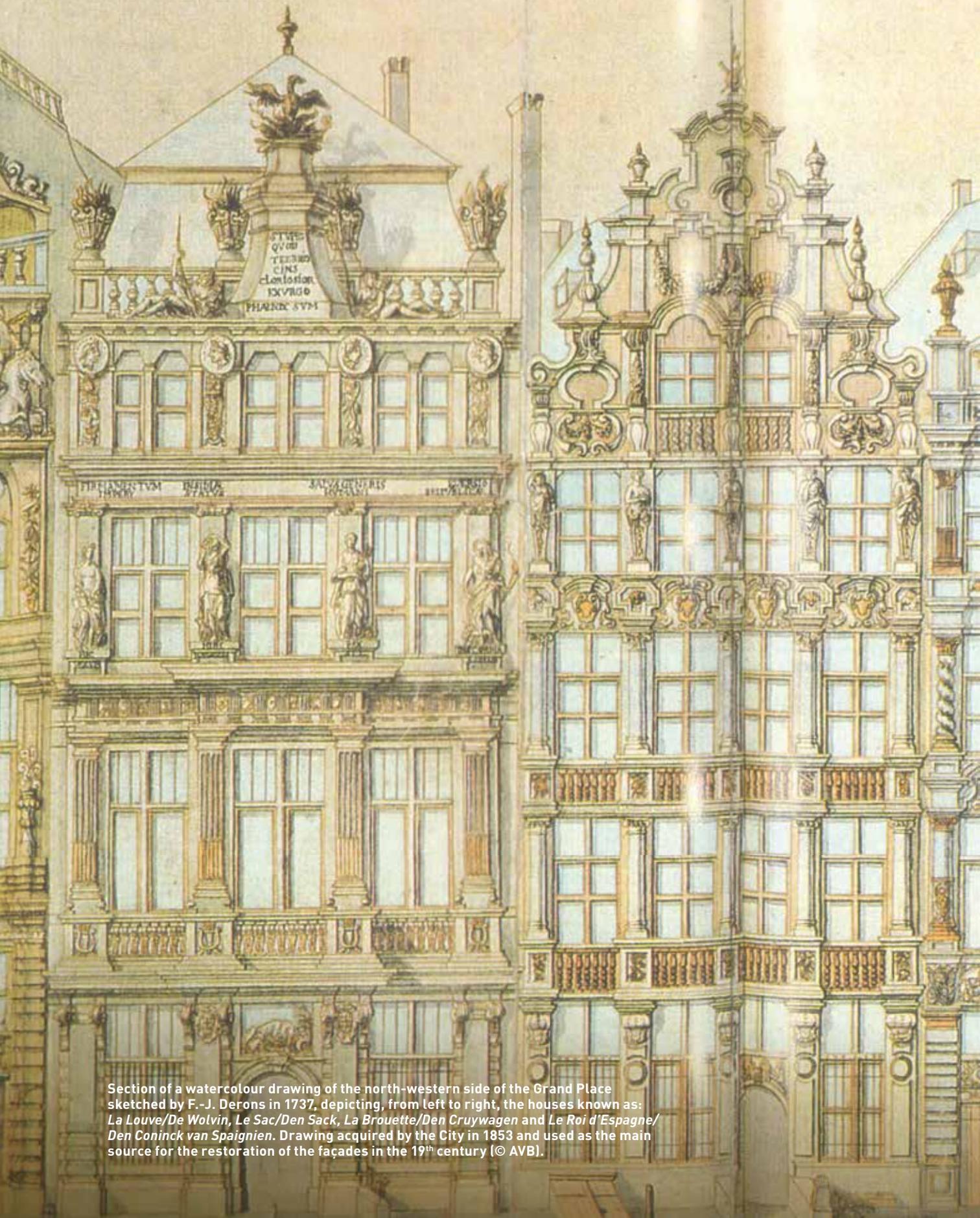
THE RESTORATION OF AN EXCEPTIONAL DECORATIVE ENVIRONMENT

The facades of the Grand Place

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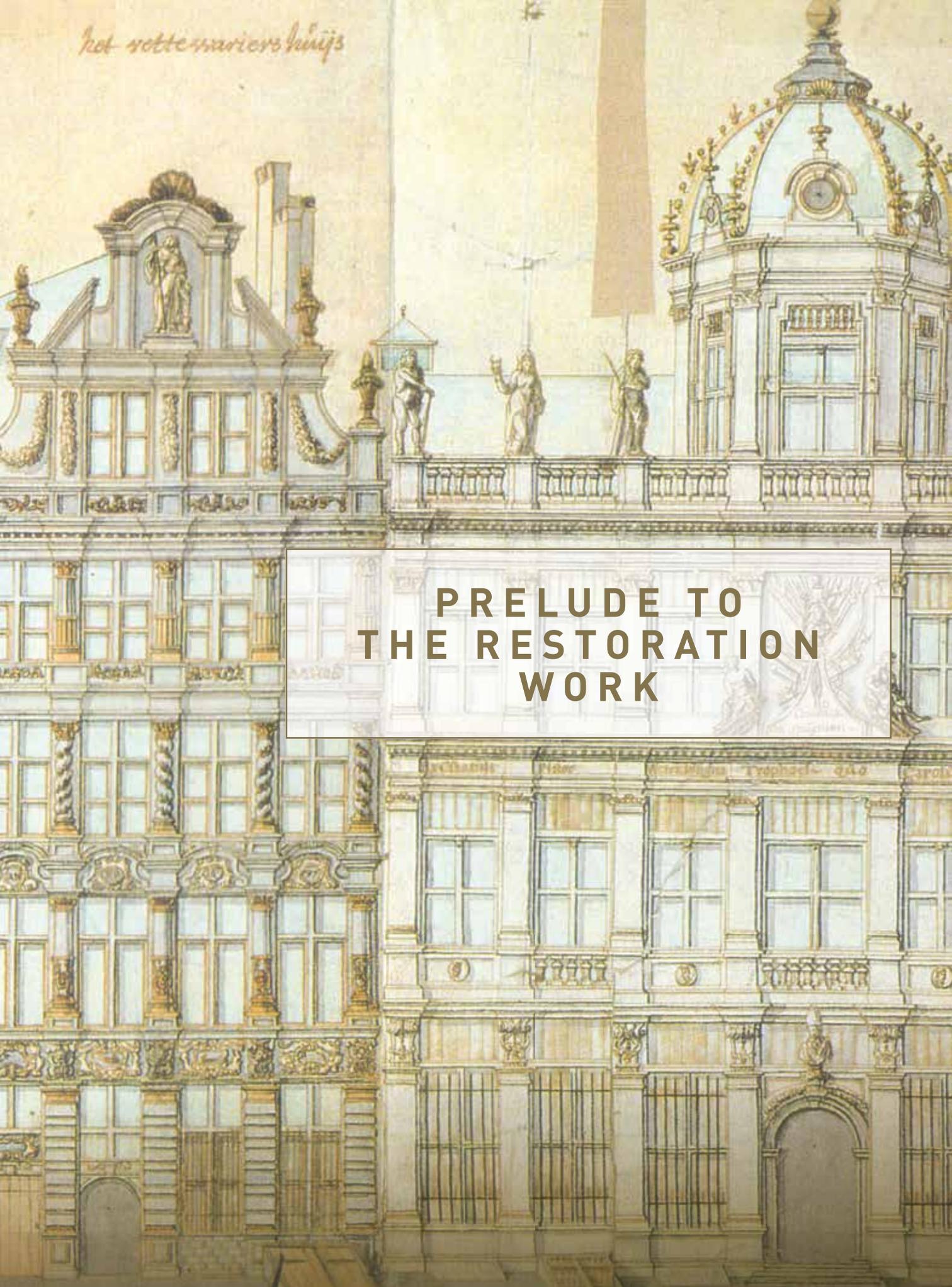
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Section of a watercolour drawing of the north-western side of the Grand Place sketched by F.-J. Derons in 1737, depicting, from left to right, the houses known as: *La Louve/De Wolvin*, *Le Sac/Den Sack*, *La Brouette/Den Cruywagen* and *Le Roi d'Espagne/ Den Coninck van Spaignien*. Drawing acquired by the City in 1853 and used as the main source for the restoration of the façades in the 19th century [© AVB].

het vettewarers huys



**PRELUDE TO
THE RESTORATION
WORK**



PRINCIPLES OF INTERVENTION

L'Âne/Den Ezel. Scaffold with decorative canvas showing a life-size photograph of the façade (© HHU, 2003).

IN 1998, CONSCIOUS OF THE IMPORTANCE OF THIS HERITAGE AND ITS RAPID DETERIORATION, THE CITY OF BRUSSELS TASKED ITS HISTORICAL HERITAGE UNIT WITH THE JOB OF CARRYING OUT A HISTORICAL AND ARCHITECTURAL STUDY OF THE HOUSES ON THE SQUARE. THE AIM WAS TO PRESENT AN OBJECTIVE ASSESSMENT OF THEIR STATE OF REPAIR. Thanks to archival records dating from the mid-19th century, details of all the work carried out, both on the interiors and the façades, were recorded and noted on summary documents, with floor plans and elevations.

As the City of Brussels has been responsible for maintaining the façades on the Grand Place according to an agreement made with the buildings' owners in the late 19th century, a schedule of condition was initiated in the year 2000. This report corresponds to a preliminary diagnostic phase, allowing for an initial visual identification of the types of materials used in the construction of the façades, their state of degradation and any damage, such as cracks, chipped stones or the corrosion of metal components, the deterioration of joints, etc.

As a result of this report, an initial restoration project was planned for the façade of *L'Âne/Den Ezel* (Grand Place No 39), owned by the City. A series of scientific and technical analyses was undertaken in 2001 while preparing the planned restoration. These analyses led, among other things, to the precise identi-

fication of the materials used, the pathologies affecting them and previous work and treatments that had been applied in the past. This helped with determining the techniques to be used for the upcoming project, which was to serve as an example and a test case for the restoration of the other façades on the Grand Place. This three-year preliminary phase was completed in 2004.

Thanks to the experience acquired during this initial project, subsequent renovations were extended to cover each entire block of buildings. This way of working allowed for better project organisation, thereby saving time and money, and offered an improved approach to aesthetics and heritage preservation. Specifically, the work of a single craftsperson or team with an overall vision of the project helped to ensure consistency when renovating the same group of façades.

In addition, the scaffolding was made almost invisible due to being covered in tarpaulins printed with life-size colour photos of the façades. Tourists were not therefore overly inconvenienced by the work. The scaffolding was arranged in a portico, thereby maintaining access to the commercial ground floor of the buildings being renovated. Moreover, explanatory tarpaulins were attached to the hoarding around the sites, providing information on the history of the façades and their restorations as well as technical and practical information about the work in progress.

VILLE DE BRUXELLES.

RECONSTRUCTION
DE LA
MAISON "LE CYGNE"

GRAND' PLACE.

INITIAL
19TH CENTURY
RESTORATIONS

DURING THE 1695 BOMBARDMENT OF BRUSSELS ORDERED BY LOUIS XIV, MOST OF THE HOUSES ON THE GRAND PLACE WERE DESTROYED, WITH THE EXCEPTION OF CERTAIN SECTIONS OF THE FAÇADES AND PARTY WALLS, AS WELL AS FOUNDATIONS OR VAULTED CELLARS. However, it did not take long to reconstruct the devastated buildings.

At the end of the 19th century, the condition of the houses testified to 200 years of tumultuous history. Most of the façades, ransacked by the *sans-culottes* as they passed through¹ in 1793, had lost their decorative elements and inscriptions. Certain major changes, such as the removal of gables and the modification of floor heights, disrupted the architectural coherence of the square.

By 1850, the façades were in an alarming state of repair. Elements that were at risk of falling had been crudely repaired and, in certain cases, simply removed. The City authorities drew the owners' attention to the poor maintenance of their properties and the need to restore them. However, only a handful of owners ended up repainting the façade of their building or renovating the decorative elements.

Under the mandate of the Mayor, Charles Buls², the City initiated a campaign for a systematic restoration of the façades on the Grand Place, made possible thanks to the conclusion of an agreement with the owners of these properties. The façades of the houses were now encumbered by an easement of light and view guaranteeing an unobstructed view of the town hall in order to protect the general layout of the square. Under this agree-

ment, the owners were prevented from carrying out any work on the façade of their buildings without the express written permission of the College of Mayor and Aldermen. The City, in turn, undertook to maintain the properties.

This agreement pre-dated the projects that were carried out between 1879 and 1923. The aim was to restore the early 18th century appearance of the façades, which was considered to be the original. Several different approaches had been recommended, ranging from relatively intrusive restoration work to the complete reconstruction of the façades.

For certain buildings, only the restoration of decorative elements and masonry repair work had been carried out. The work on *La Chaloupe d'Or/De Gulden Boot*, which started in 1878, is a good example of this type of operation. The results of preliminary surveys had determined that there were no structural problems with the façade. The architect therefore confined his work to strengthening the stonework, through the application of a cement render, and replacing the sculpted decorative elements using moulds made from casts created in advance.

A different type of intervention was used in other cases. Detailed sur-

veys encouraged the restorers to limit their work to strengthening the best-preserved areas of the façades and rebuilding the most damaged sections (mainly the gables) as well as those that had been irreversibly modified, such as commercial ground floors. The restoration of the façade of *Le Heaume/Den Helm* (1916-1923) is just one example of a compromise between the recreation of certain sections and the conservation of others.

Reconstruction work on the façades was based on the same principles – the restoration of elements in keeping with their appearance in the 18th century, based on drawings by F.-J. Derons³ – with the result that all the elements were completely replaced. The projects carried out simultaneously in 1897 on *Le Cerf/De Heert, Joseph et Anne/Josephen Anna, L'Ange/Den Engel* and *Aux Armes de Brabant/De Wapens van Brabant* illustrate this radical method of the demolition and reconstruction of façades. The reasons for choosing this method are not clear, as the preliminary examinations did not seem to suggest that such an approach was required. The complete reconstruction of these façades can perhaps be explained by the desire to streamline operations and complete the work in as little time as possible, or the wish to standardise the materials that

had become overly heterogeneous over the course of many years and countless interventions.

This method of working - completely demolishing the façades while preserving the interiors - involved relatively complex techniques. To enable this type of work to be carried out, it was necessary to install scaffolding on both sides of the façade at the same time and to construct a wooden partition inside the building at a distance of around 0.75 m from the existing façade. The window and door frames had been removed and replaced in these partitions. At each level, a steel girder had been placed behind the window lintels and the sole plates, while an assembly of metal beams and corner pieces was used to support the existing structure supporting the floors. These metal components, which were

incorporated into the stone facing, are not generally visible, except in No 23, *L'Ange/Den Engel*, where one of the corner pieces used to support the structure supporting the floors can still be seen at the mezzanine level.

This method of working on the façades, guaranteeing the preservation of the interiors, was principally dictated by the need to enable the property to remain inhabited. It should not be seen as the result of any concern for preserving the archaeological value of the interiors.

One final radical project dating from the 19th century was the complete reconstruction of two houses: the rebuilding of a replica of a small house - *L'Étoile/De Sterre* - demolished some forty years earlier when widening a street, and the

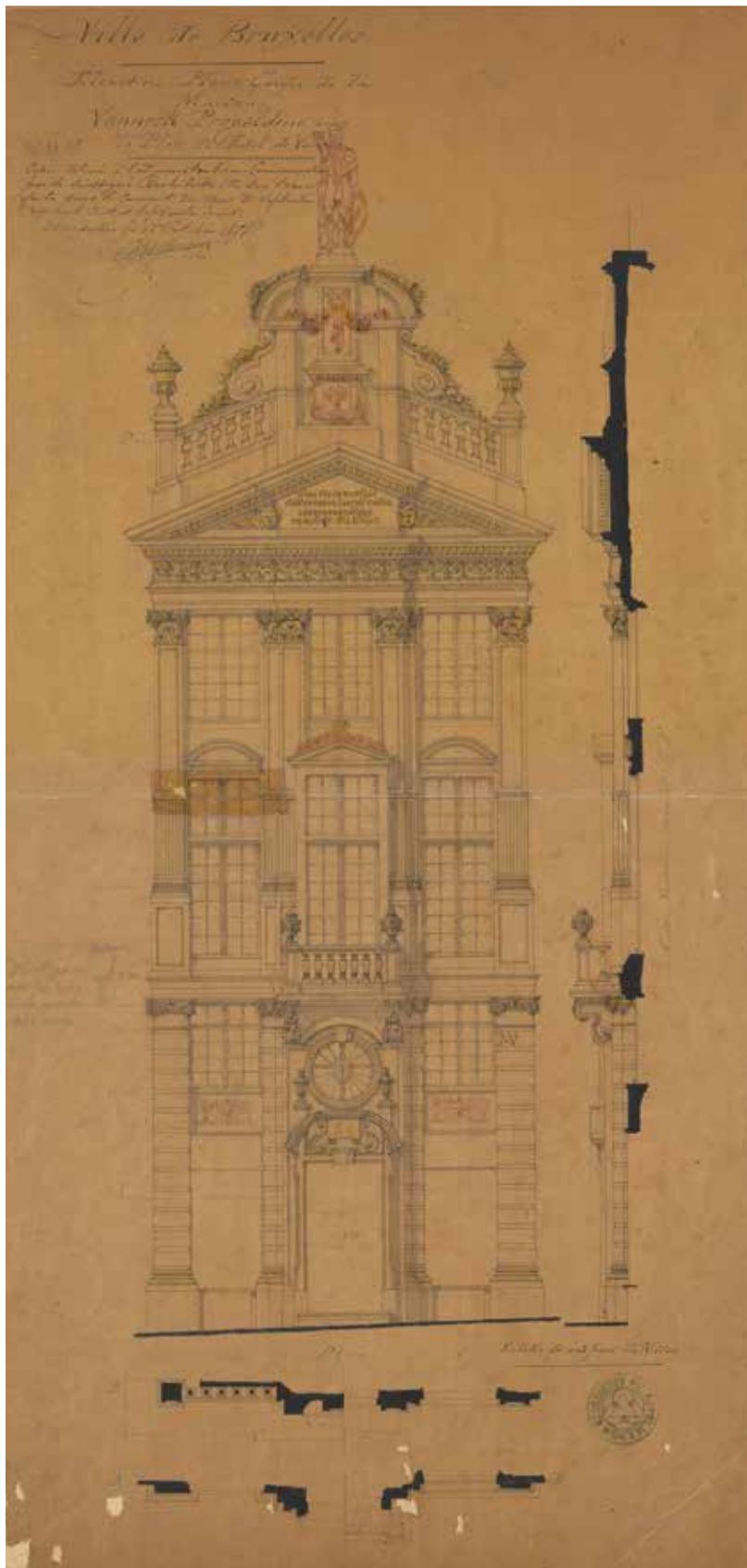
demolition and reconstruction of *Le Roi d'Espagne/Den Coninck van Spaignien*, as part of a restoration operation. These two distinct projects were different in terms of the techniques applied but similar with regard to the materials chosen.

NOTES

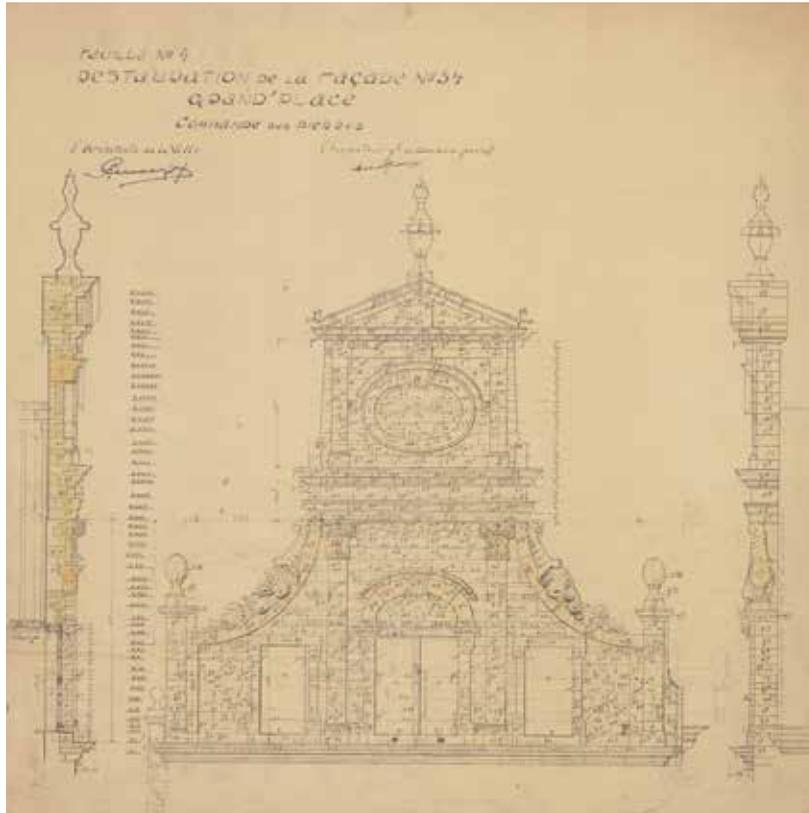
1. *Sans-culottes* – name by which the most fervent republicans referred to themselves during the French Revolution
2. Charles Buls, the Mayor of Brussels from 1881 to 1899, had made the preservation of the Grand Place one of his top priorities.
3. Ferdinand-Joseph Derons (1700-1762) is mainly known for his drawings and watercolours dating from the early 18th century, depicting the houses on the Grand Place that were rebuilt immediately after the bombardment.



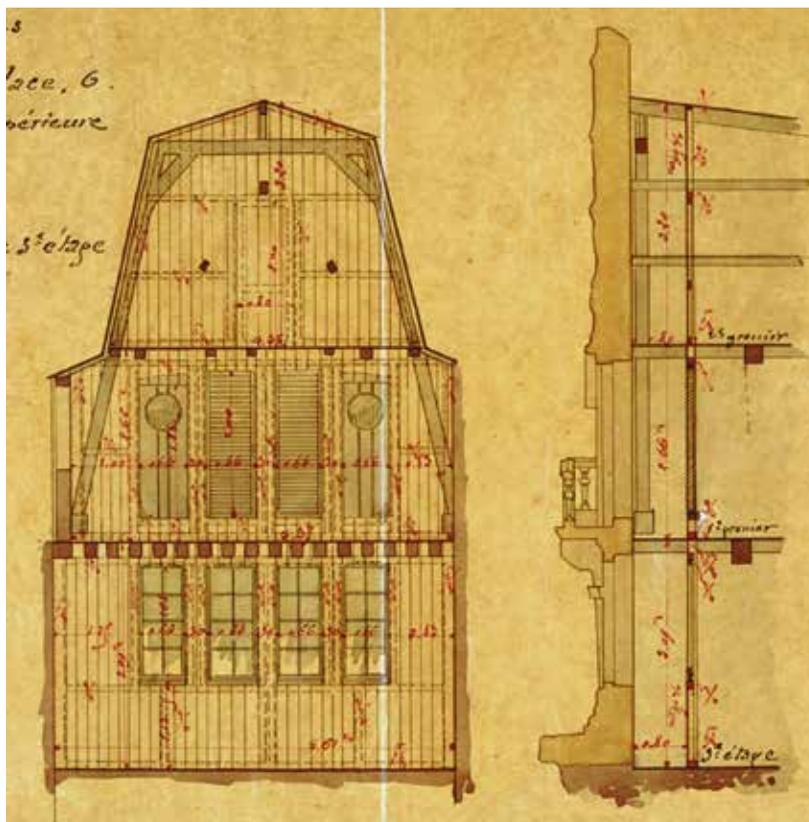
Houses 1 to 7, the Grand Place. Photograph c. 1850-1851. From right to left, the houses: *Le Roi d'Espagne/Den Coninck van Spaignien*, *La Brouette/Den Cruywagen*, *Le Sac/Den Sack*, *La Louve/De Wolvin*, *Le Cornet/Den Horen* and *Le Renard/De Vos* (© É. Vanlaethem coll.).



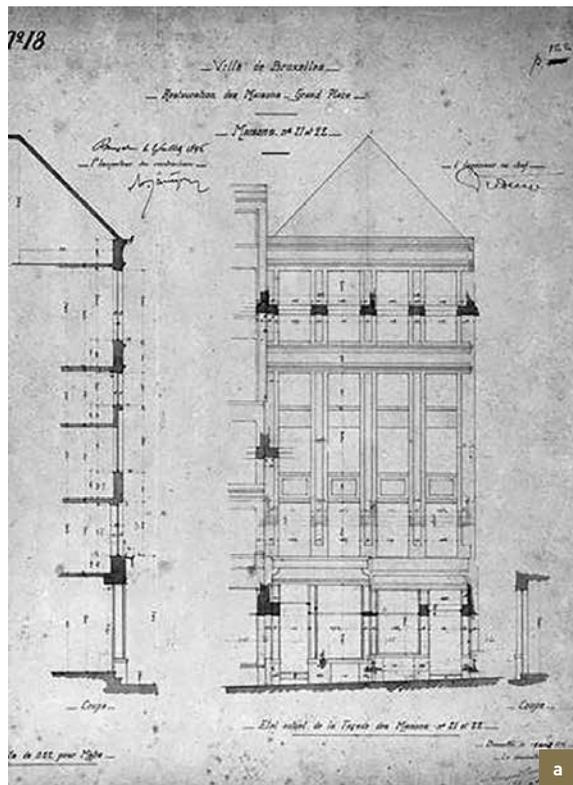
La Chaloupe d'Or/De Gulden Boot. Elevation, plan and cross-section of façade, 17 October 1878 (© AVB).



Le Heaume/Den Helm. Reconstruction of gable, order for stones, undated (© AVB).



Le Cornet/Den Horen. Example of installation of temporary interior partitions on the 3rd floor and the attics. Plan dating from 15 January 1901 (© AVB).



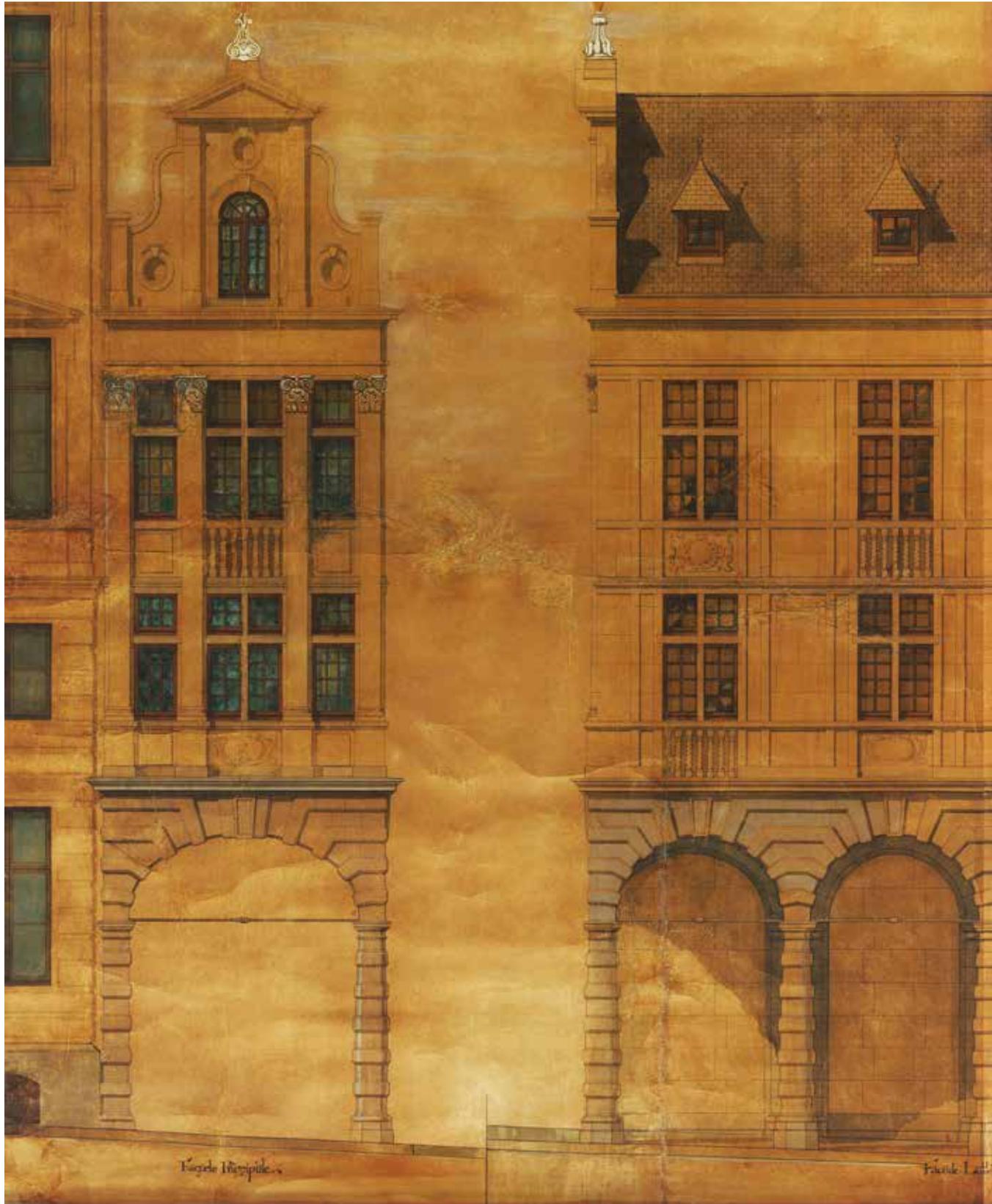
Joseph et Anne/Joseph en Anna. Complete reconstruction of façades. a) Survey of condition before restoration; b) Restoration project (c. 1895) [© AVB].

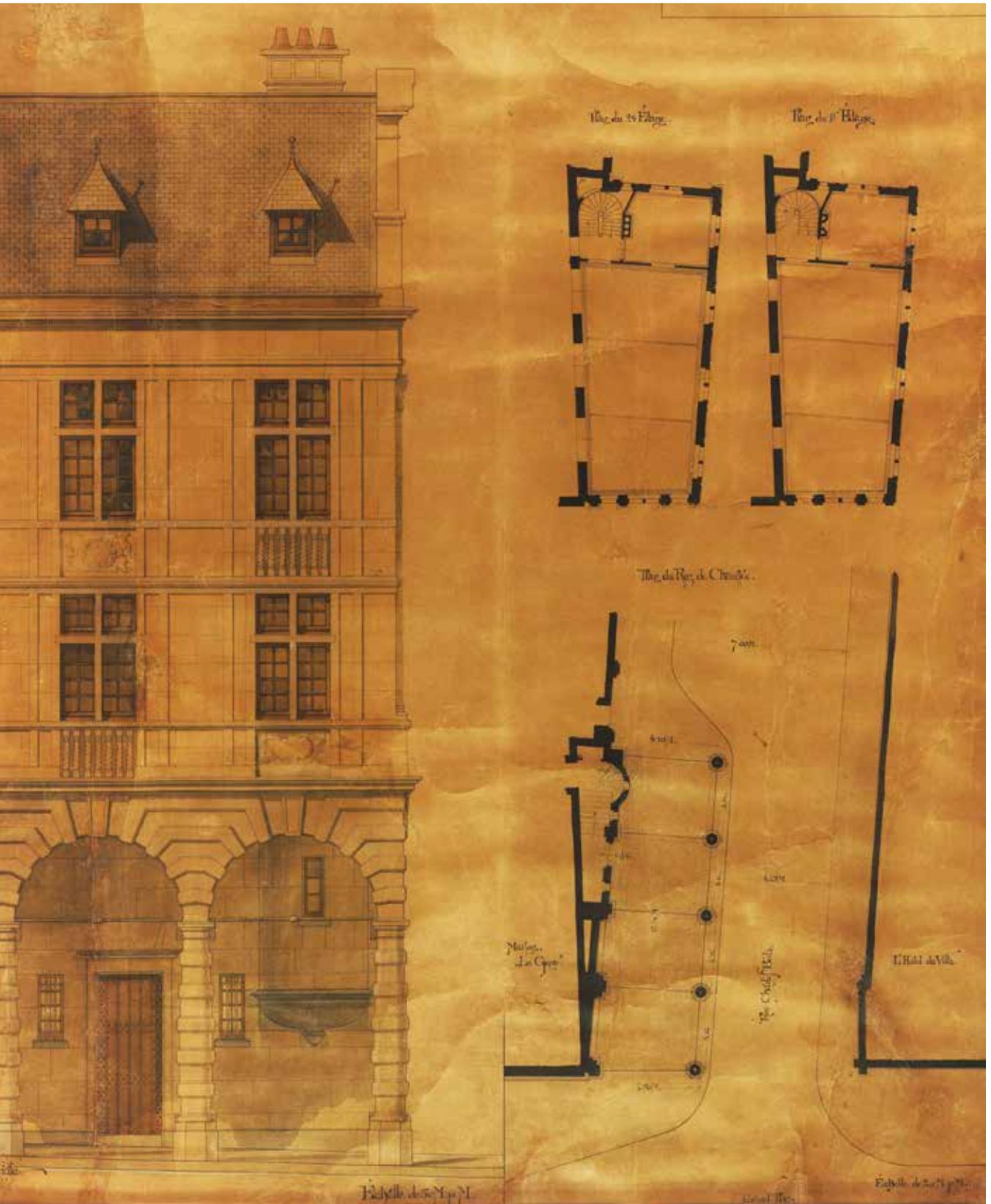


L'Ange/Den Engel - mezzanine, steel corner pieces bearing the old floor supporting structure (© HHU, 1999).

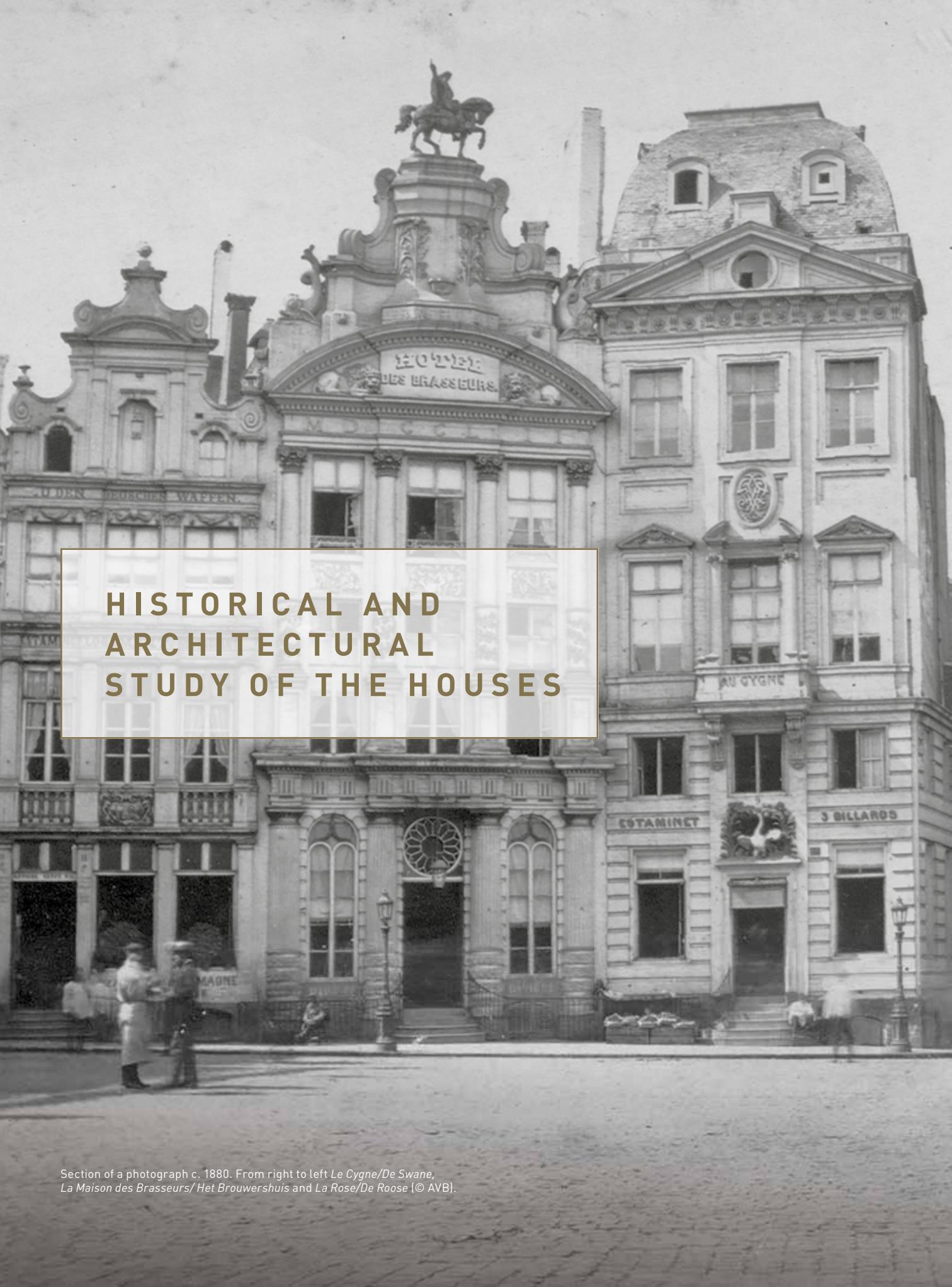


Le Cerf/ De Heert, Joseph et Anne/Joseph en Anna, L'Ange/Den Engel, La Chaloupe d'Or/De Gulden Boot, Le Pigeon/De Duive and Aux Armes de Brabant/De Wapens van Brabant (from right to left). Photograph before the restoration, c 1895 [© KIK-IRPA, Brussels].





L'Étoile/De Sterre. Restoration project on the house by W. Janssens. Elevations and floor plans, 1863 (© AVB).



**HISTORICAL AND
ARCHITECTURAL
STUDY OF THE HOUSES**

Section of a photograph c. 1880. From right to left *Le Cygne/De Swane*,
La Maison des Brasseurs/ Het Brouwershuis and *La Rose/De Roose* (© AVB).

THE HISTORICAL AND ARCHITECTURAL STUDY OF THE HOUSES IN THE GRAND PLACE WAS INITIATED IN 1998 BY THE CITY'S HISTORICAL HERITAGE UNIT ON THE OCCASION OF THE SQUARE'S INCLUSION IN THE UNESCO WORLD HERITAGE LIST. The main objective of this study was to increase knowledge of this heritage through a systematic analysis of the façades and interiors and by identifying the original elements.

The study covered the 30 houses that surround the square. Each one (both façade and interior) was extensively examined in order to compile a record of its history and architectural characteristics. The most important public buildings, the *Maison du Roi/Broodhuis* and town hall, were intentionally excluded as they were the subject of separate studies.

.....
METHODOLOGY

To understand how these buildings are linked together, it was essential to place each house within the context of the block to which it belongs. This is why the work was divided into five parts, corresponding to the five blocks that demarcate the square:

- Nos. 1 to 7, between the Rue au Beurre/Boterstraat and the Rue Tête d'Or/Gulden Hoofdstraat;
- Nos. 8 to 12, between the Rue Charles Buls/Karel Bulsstraat and the Rue des Chapeliers/Hoedemakerstraat;
- Nos. 13 to 19, between the Rue des Chapeliers/Hoedemakerstraat and the Rue de la Colline/Heuvelstraat, and no. 24 Rue de la Colline/Heuvelstraat;

- Nos. 20 to 28, between the Rue de la Colline/Heuvelstraat and the Rue des Harengs/Haginstraat;
- Nos. 34 to 39, between the Rue Chair et Pain/Vlees en Broodstraat and the Rue au Beurre/Boterstraat.

This general overview forms the foundation of this research and survey work, the summary documents of which can be interpreted on the basis of three approaches:

- A study of the main façade overlooking the Grand Place from its reconstruction in 1695 to the present day, in the form of a chronicle of the conversions, repairs and restorations carried out over three centuries;
- An analysis of the interiors conducted after a comparison of on-site observations and information obtained from the City of Brussels Archives. It mainly involves work of a preliminary nature, comparable to the prospecting phase for an archaeologist, the findings of which have been confirmed, complemented and revised via surveys carried out during projects. Any points of doubt were deliberately put on hold as it seemed more constructive to enable other peo-

ple to fill in the "blanks", left here and there, rather than risk introducing confusion via weakly-supported hypotheses. This analysis of the interiors was carried out with the aid of archived plans for each building, redrafted and completed for the occasion;

- A detailed inventory of stored archive documents, by house or group of houses.

The results of this research are presented in a systematic manner, based on a series of methodological rules:

- The content of the study is based mainly on two types of sources: the buildings themselves, which were systematically inspected, photographed and sketched, and written and visual sources stored, for the most part, in the City of Brussels Archives. These documents mainly consist of old plans and the *Cartulaire de la Grand-Place*¹ ;
- The surveys were prepared on the basis of what were deemed the most relevant old floor plans after comparing them with the reality on the ground. The documents obtained are therefore of a highly reliable nature. The floor plans of the different

houses were grouped together by level, to provide an overview of each block;

- The work was designed so that the information can be interpreted in two ways. The first type of interpretation is general in nature and the information is presented in graphical form. It comprises a set of colours, accompanied by a key, providing a clear overview of the main phases in the evolution of the buildings (both façades and interiors) in the course of three centuries. The second details the different interventions, describing them, situating them in time and referring to documentary evidence (iconography, archives, plans and observations *in situ*) for each assertion.

This work tool was developed to initiate the management of the Grand Place as a heritage site; it is mainly aimed at those responsible for public management and heritage professionals. The study can be consulted at the City of Brussels's Historical Heritage Unit and formed the basis of a detailed monograph of the houses in the Grand Place, first published in the year 2000².



	Sections from before the 1695 bombardment
	Post-bombardment reconstructions
	Ad hoc work (between 1750 and 1850)
	Ad hoc work in the 19 th century
	First 19 th century restoration campaign
	Second 19 th century restoration campaign
	Ad hoc work in the 20 th century
	Ad hoc restorations in the 20 th century

NOTES

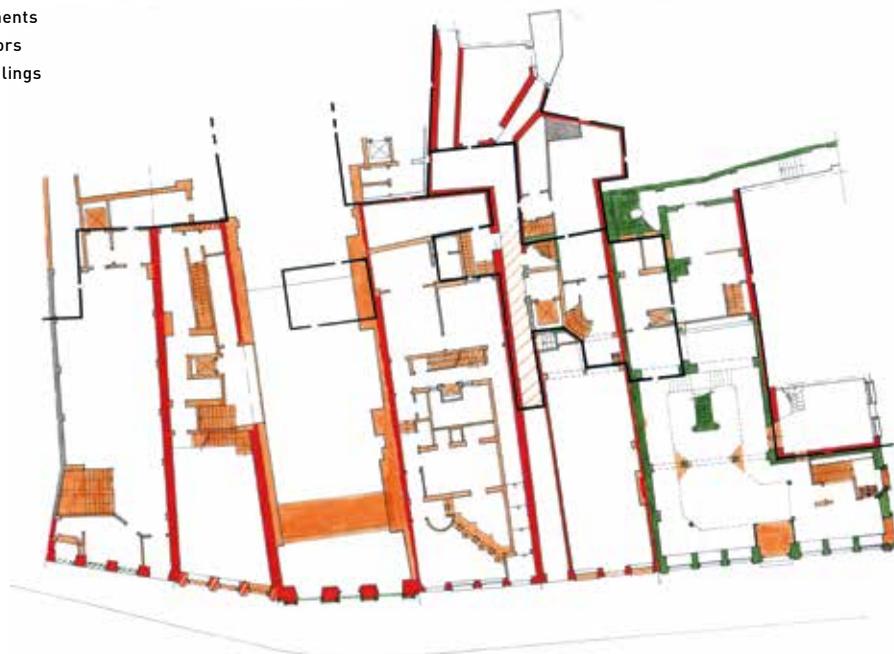
1. Analysis of all the records relating to the Grand Place, which was carried out in the 19th century and remained at the project stage. It is kept at the City of Brussels Archives.
2. HEYMANS, V. (Editor), *Les Maisons de la Grand-Place*, éditions CFC, Brussels, 2000. Republished in 2001, 2007 and 2011.

Extract from the *Étude Architecturale et Historique des Maisons de la Grand-Place*. Summary plans by period of construction created for all the houses numbered 1 to 7, *Le Roi d'Espagne/Den Coninck van Spaignien, La Brouette/Den Cruywagen, Le Sac/Den Sack, La Louve/De Wolvin, Le Cornet/Den Horen* and *Le Renard/De Vos*.
a) Façades; b) Floor Plans.

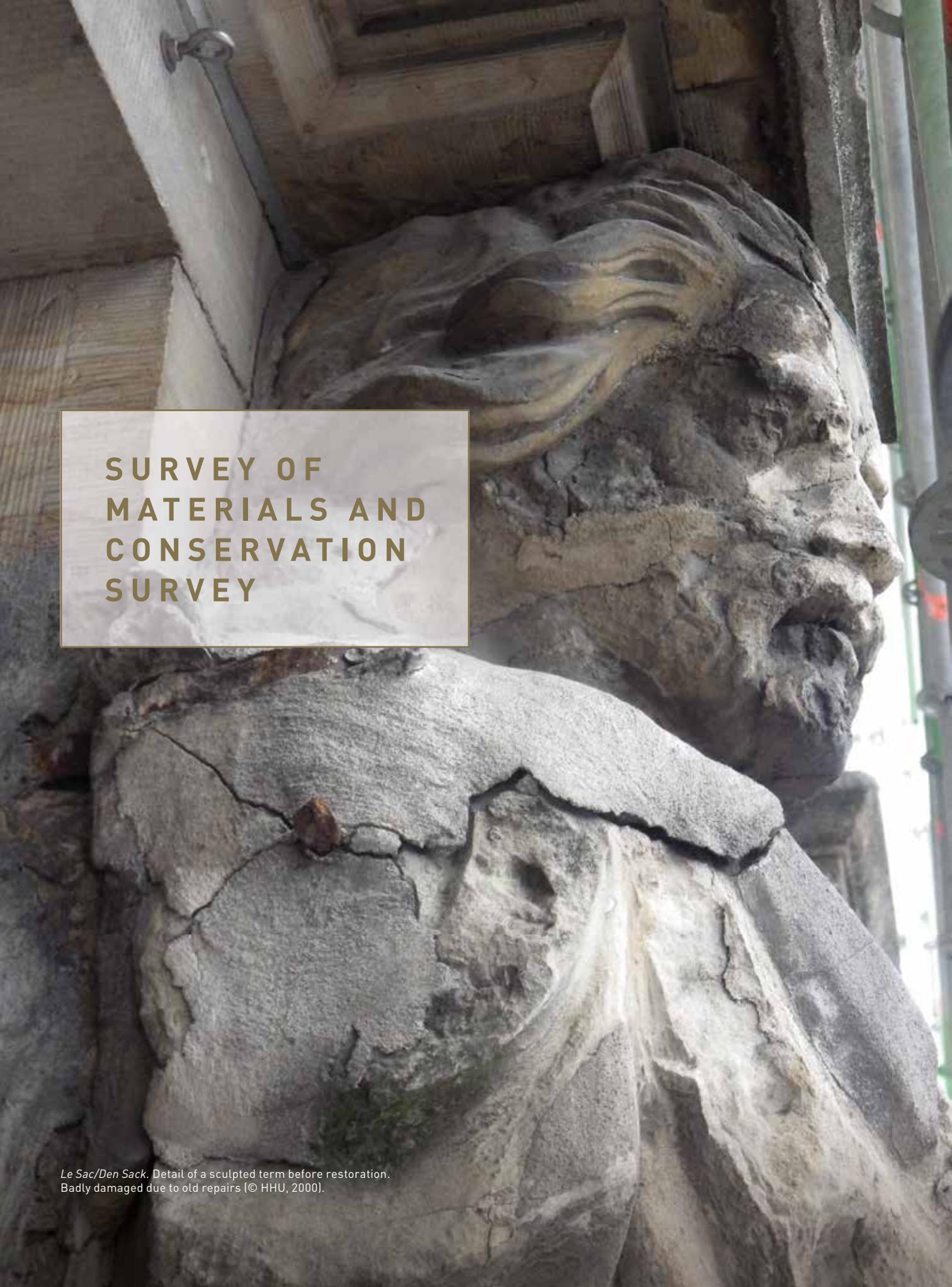


a

- Original elements, dating either from before the 1695 bombardment or from the reconstruction
- Elements associated with the 19th century restoration campaigns and their continuation in the early 20th century
- Work carried out over the course of the 20th century
- Undated elements
- Walls and floors
- Vaults and ceilings



b



**SURVEY OF
MATERIALS AND
CONSERVATION
SURVEY**

Le Sac/Den Sack. Detail of a sculpted term before restoration.
Badly damaged due to old repairs (© HHU, 2000).

THE PHASE THAT FOLLOWED THE HISTORICAL STUDY CONSISTED OF COMPARING THE ARCHIVE DOCUMENTS - PLANS, SPECIFICATIONS, QUANTITY SURVEYS, ETC. - WITH EXAMINATIONS OF THE FAÇADES. While evaluating their state of repair, inspections were also carried out, from a cherry picker, in 2000, 2001 and 2002¹. This examination enabled a detailed survey of the different materials to be produced, as well as a complete schedule of the condition of the façades of the houses on the Grand Place.

These inspections correspond to a preliminary diagnostic phase. This approach enabled the types of materials used in the construction of the façades and their states of degradation to be identified. It also revealed the quality of the pointing and any damage such as cracks, chipped stones, the growth of any biological matter², the corrosion of metal components, etc. This information was reported on two types of documents entitled "Survey of Materials" and "Survey of Architectural Pathologies".



Inspections using a cherry-picker (© HHU, 2000).



SURVEY OF MATERIALS

An inspection of the façades, combined with an examination of archived records, enabled most of the materials used for the original construction³ and the 19th century restorations to be identified. During these operations, major changes had been made, such as the addition of a series of new materials.

In spite of the uniform appearance of the square, certain façades are made from exposed stone while others are partially or completely rendered. Prior to the restorations in the 19th century, the facings of the buildings were oiled, white-washed or rendered. During the restorations carried out under Charles Buls, the materials were either left exposed or a render was applied when the stonework was too damaged or varied (featuring a mixture of different stones, bricks, etc.).

Mainly constructed from Ledian sandstone and blue stone, the facing on the façades was restored using Euville and Gobertange stone⁴. Euville stone was generally used for the facing, while Gobertange stone was mainly used for rebuilding the gables and ground floors. Blue stone was reserved for thresholds, steps, the surrounds of cellar doors, lintels and mullions.

Old bricks were replaced with modern *klampsteen*-type bricks. For ad hoc repairs, the restorers used specific products such as a metallic cement called Bertagna⁵.

In the case of reconstructions, metal elements such as I-beams, square bars dividing the blue stone lintels, etc. were incorporated into the masonry for the purpose of reinforcing the structure of the building⁶.

The woodwork is mainly oak (window frames, cellar doors, entrance doors, etc.).

In terms of decoration, certain elements were gilded or, more rarely, polychromed. While gilding⁷ is not, strictly speaking, a material in the structural sense of the term, it constitutes a major visual element in the decoration of the façades. It accentuates the main sculpted decorative elements and contributes to the aesthetic coherence of the decor of the Grand Place.

NOTES

1. For information, most of the photographs of pathologies and materials presented were updated during the restoration work, often after cleaning.
2. It mainly concerned the proliferation of moss and lichen in this case.
3. Any early 18th century reconstruction after the 1695 bombardment is considered original.
4. Euville stone, an oolite limestone originating in France, was very popular in Belgium during the second half of the 19th century. Gobertange stone is a calcareous sandstone from Brabant, also known as Brussels sandstone. The two types are used both for facing and for sculpted elements.
5. Metallic cement is also known as "Bertagna," after the contractor who used it in Brussels. It was applied for the first time in the Grand Place on the *Le Renard/De Vos* house, as Bertagna wanted the architect Victor Jamaer to test the solidity and adhesion of the product in this way. The cement had previously been used in Paris on a number of prestigious buildings (the Pavillon Richelieu, the Pavillon de Flore, the colonnade of the Palais Royal and the Théâtre Français state theatre, among others). It initially consisted of a mastic (Fontenelle) that was patented in 1865, the exact composition of which is unknown. It was copied by Warest and composed of a metal-based powder (zinc oxide), crushed limestone and sandstone and dye. See the architectural magazine *L'Émulation*, 2^e année, 1875-1876, no. 3, Nov. 1875, col. 23-24.
6. See chapter "Initial 19th century restorations", p. 16.
7. The technical description of gilding is identical in all the specifications for the 19th century restorations: "The gilding applied is composed of 23 carat gold, containing no more than 2.5% of alloy, silver and copper together, supplied in booklets of 25 sheets of a weight that may not be less than 0.45 grams".



- Baelegem
- Euville
- Échailton
- Gobertange
- Blue stone
- Wood
- Unknown material

Le Heume/Den Helm. a) Sketch of façades with survey of materials (© HHU, 2000); b) the façade after restoration (© Utopix, M. Ploton, 2018).

STONES



Le Heaume/Den Helm. Detail of a Balegem stone pilaster (© HHU, 2000).



L'Âne/Den Ezel. Detail of a carved blue stone bossed pilaster (© HHU, 2000).



Le Heaume/Den Helm and *Le Paon/Den Pauw.* Detail of facing after cleaning showing the Gobertange stone facing (on the left) and the Balegem stone facing (on the right) on the façade of *Le Heaume/Den Helm*. The brick masonry on the façade of *Le Paon/Den Pauw* can be seen on the far left of the photo. This was revealed after the removal of loose render (© HHU, 2015).



Side façade of the *Le Heaume/Den Helm* house. Detail of corner facing with Gobertange stone at the top and Balegem stone at the bottom and, on the right, brick masonry. Note the orange hue of the top stone due to the presence of iron in the glauconite contained in the stone (© HHU, 2014).



Le Heaume/Den Helm. Detail of bioturbation in Gobertange stone (© HHU, 2014).



Le Cornet/Den Horen.
Chipped element
made from Euville
stone (© HHU, 2014).



Le Cornet/Den Horen. Detail of a sculpture of a sailor in Massangis stone (© HHU, 2014).

METAL



Le Mont Thabor/Den Bergh Thabor. Rendered side façade. Metal anchor (© HHU, 2008).

SURVEY OF ARCHITECTURAL PATHOLOGIES

The schedule of condition mainly revealed problems relating to stability as well as damage to the stones.

The stability-related problems were mainly connected with the installation of the metal elements that were incorporated during the reconstruction of certain façades. Stone joints were coming apart and the flashing, made of cement or lead, was damaged, leading to water infiltration causing the metal elements to rust. This in turn caused major issues with the cracking and chipping of the stone, as well as structural damage.

The stones showed evidence of natural deterioration due to weather and damage linked to atmospheric pollution. They had formed different patinas, eroding and deteriorating at varying rates and displaying an advanced state of degradation. Moss and lichen covered a large number of elements and sculptures, mainly in the upper sections of the façades. The stone in areas shielded from the rain was covered in a black crust.

The original Balegem stone (Ledian sandstone), the surface of which is wearing away, is now difficult to identify due to the layer of cement (repair work) with which it was extensively covered. The Gobertange stone facing has been badly damaged by atmospheric pollution. The surface has become dulled and rough due to the dissolving of softer areas. This has revealed the regular layers of bioturbation in the stone, that is to say the disturbance of sediments by the activity of living organisms forming little tunnels.

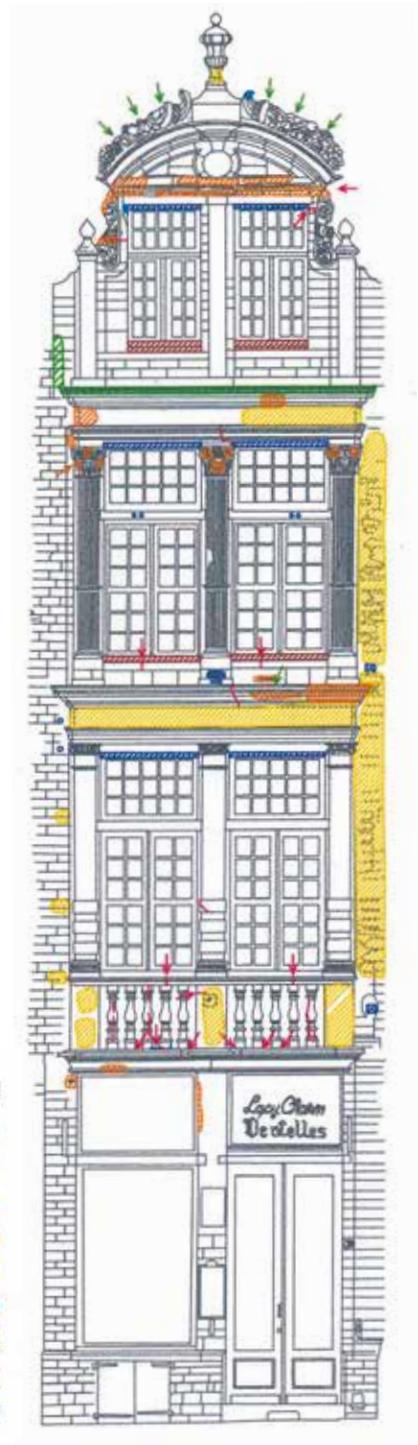
The Euville stone was often very dirty and sometimes badly eroded. While not sensitive to frost, it is vulnerable to the sulphation that

occurs in urban environments. The damage appears as pitting, mainly on the edges and projecting parts of sculpted elements. In these areas, the stone is undergoing granular degradation.

Blue stone generally resists well over time. However, in spite of this, terraces or stylolites (a line of carbon that forms zigzags), often present in this type of rock, can be seen.

The mouldings, stringcourses and entablatures were more badly damaged than the flat surfaces. Projecting elements were, in general, covered by cement or lead, each material being partially damaged or completely worn away.

- Cracks 
- Cracks on non-visible parts 
- Damage to non-visible parts 
- Moss on non-visible parts 
- Damage 
- Repairs 
- Fractures 
- Moss 
- Damaged wood 
- Rusted metal 



L'Âne/Den Ezel. Sketching of façades with survey of pathologies. This survey was supplemented with photographs and descriptions of each damaged element (© HHU, 2000).



L'Âne/Den Ezel. After restoration (© HHU, 2004).

STRUCTURAL PROBLEMS



a



b

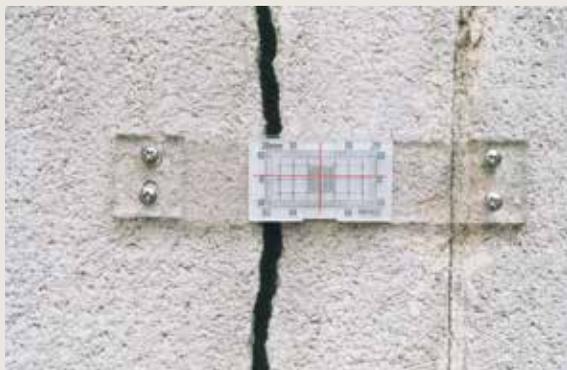


c



d

La Chaloupe d'Or/De Gulden Boot. a) Left side aileron with flower motifs. The element is becoming detached and sliding outwards as a result of a corroding metal pin; b) Idem. Right section. Installation of temporary protective net following the inspection, while awaiting the restoration work; c) Displacement of right pinnacle of gable; d) Idem on left side. Beneath the lead, rust can be seen on the metal pin causing the aforementioned problems (© HHU, 2000).



Installation of crack measuring apparatus in different areas following the schedules of condition and the observation of the presence of cracks. The image shows the façade of *Le Cerf/De Heert*. Euville stone (© HHU, 2000).

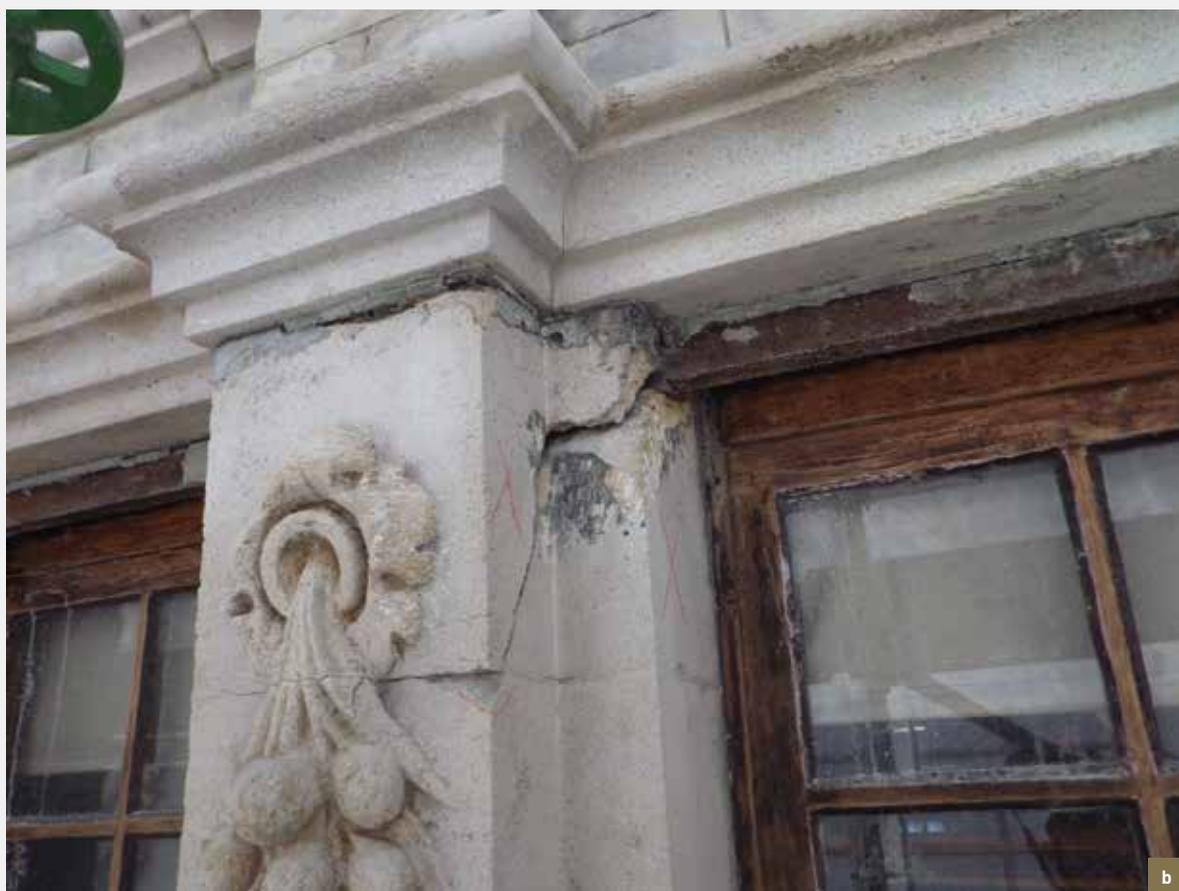


Le Heaume/Den Helm. Bracing of chimney after detection of instability (© HHU, 2000).

CORROSION OF METAL ELEMENTS



La Brouette/Den Cruywagen. Square metal bars dividing the lintels. The corrosion of the bars is causing the stone to fracture. a) Fracturing of elements made from blue stone and Balegem stone. Photographs taken during the restoration; b) Fracturing of an element made from Euville stone (© HHU, 2014).





Le Sac/Den Sack. Corrosion of metal balusters, leading in some cases to the total degradation of material (© HHU, 2014).



Le Renard/De Vos. Corrosion of a metal fixing pin at the top of a statue, causing it to fracture (© HHU, 2014).



Le Petit Renard et Le Chêne/Het Vosken en Den Eycke. Corrosion and development of rust on a metal beam (© HHU, 2014).



La Rose/De Roose. Detail of a corroded and pockmarked zinc vase (© HHU, 2000).



Le Petit Renard et Le Chêne/Het Vosken en Den Eycke. A vase split in two as a result of the corrosion of the zinc (© HHU, 2015).

MOSS AND GREEN STAINING



Le Sac/Den Sack. One of the terms. Statue covered in moss, with old repairs visible (© HHU, 2000).



Le Cygne/De Swane. Allegory of *L'Abondance/De Onvervloed*. Growth of moss. Euville stone (© HHU, 2000).



Le Heaume/Den Helm. Growth of moss on the slope of the pediment. Gobertange stone (© HHU, 2015).

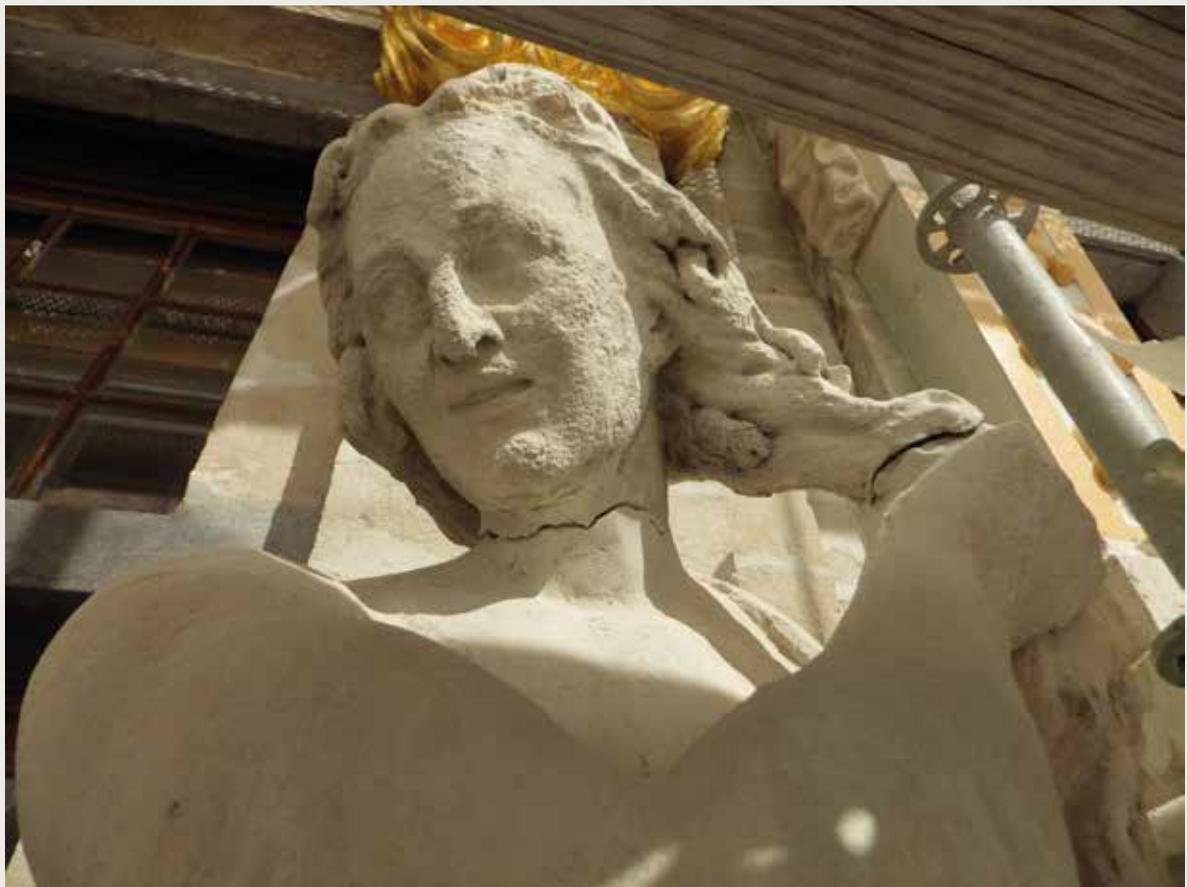


La Brouette/Den Cruywagen. Upper section of the façade. Green staining due to the oxidation of copper decorative elements. a) Overview; b) Detail of staining on the Gobertange stone (© HHU, 2014).

THE STONES - FRACTURES



Le Cerf/De Heert. Euville stone exhibiting fracture caused by the corrosion of a metal anchor (© HHU, 2000).



La Louve/De Wolvin. Statue with broken head (due to the corrosion of a dowel pin) (© HHU, 2014).



La Brouette/Den Cruywagen. Garland of fruit. Broken decorative element. Euville stone (© HHU, 2014).



Le sac/Den Sack. Broken capital (© HHU, 2014).

THE STONES - CRACKS



Le Cerf/De Heert. Cracks in a blue stone due to the rusting of the metal ring (© HHU, 2000).



Joseph et Anne/Joseph en Anna. Crack in the Euville stone facing (© HHU, 2000).



Le Cygne/De Swane. Crack in the original Balegem stone facing (© HHU, 2008).



La Brouette/Den Cruywagen. Crack in the original Balegem stone facing (© HHU, 2014).



Le Pigeon/De Duive. Crack in the blue stone lintel caused by the development of rust on the metal lintel (© HHU, 2012).

THE STONES - CHIPPING, POWDERING...



Le Cygne/De Swane. Powdering of the console (Avesnes stone?) (© HHU, 2008).



Le Renard/De Vos. Powdering of an original frieze (Avesnes stone?) (© HHU, 2012).



La Rose/De Roose. Powdery sculpted element (Avesnes stone?). It has been temporarily covered with a net to prevent it from falling (© HHU, 2000).



La Louve/De Wolvin. Powdery elements on the Euville stone on the right and Gobertange stone on the left (© HHU, 2014).



La Louve/De Wolvin. Powdering of Euville stone on a sculpted element (© HHU, 2014).



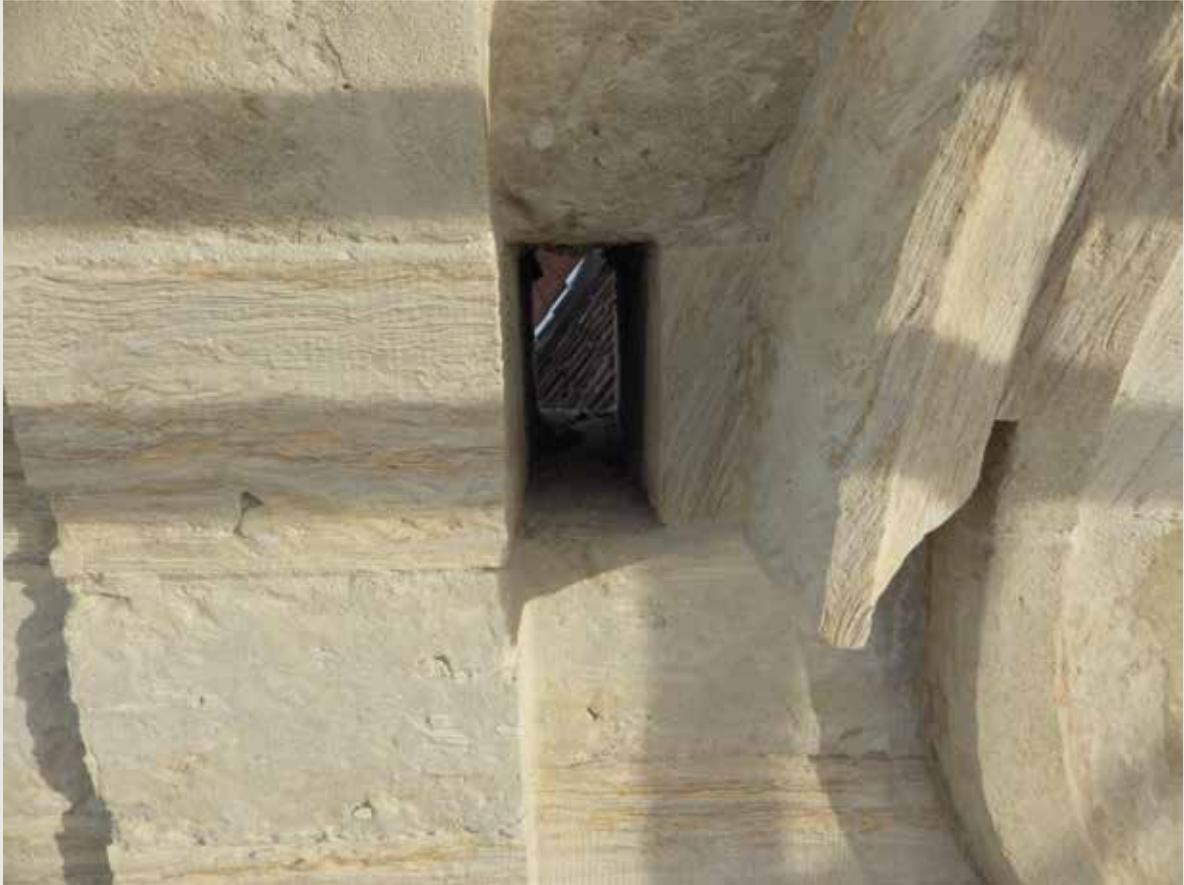
Le Renard/De Vos. Powdering of an Euville stone sculpted feature, causing the rupture of an element (© HHU, 2014).



La Louve/De Wolvin. Detail of elements on the Gobertange stone pediment. Flaking. a) Front view with appearance of bioturbation on the stone; b) Top view of the pediment with flaking stone visible following the removal of the lead flashing (© HHU, 2014).



La Chaloupe d'Or/De Gulden Boot. Details of the statue of Saint Boniface. a) Honeycomb weathering on the scissor-shaped element. Euville stone; b) Detail (© HHU, 2012).



Le Heume/Den Helm. Detail of the Gobertange stone gable displaying the bioturbation typical of this stone (© HHU, 2015).



Le Renard/De Vos.
Euville stone.
Chipping and
powdering of the
nose. Black crust
(© HHU, 2014).



Le Roi d'Espagne/Den Coninck van Spaignien. Pitting of the stone due to the presence of stylolites and the face-bedding of the stone in the balusters. Blue stone (© HHU, 2014).



*Le Roi d'Espagne/
Den Coninck van
Spaignien. Side
façade. Presence
of graffiti. Euville
stone (© HHU,
2014).*



L'Étoile/De Sterre. a and b) Separation and open joints in the Euville stone as a result of structural problems (pressure from corroded metal elements in the floor) (© HHU, 2008).



Joseph et Anne/Joseph en Anna. Open joint between the blue stone and Euville stone (© HHU, 2008).



La Maison des Brasseurs/Het Brouwerhuis. Cement joints created during previous work (© HHU, 2008).

RENDERS



Le Cygne/De Swane. Delamination of the coating of the party wall, on the right (© HHU, 2008).



Le Renard/De Vos. Delamination of the party wall, on the left (© HHU, 2014).



La Chaloupe d'Or/De Gulden Boot. Cement render with wire mesh reinforcement appearing on the surface with presence of rust (© HHU, 2008).



Le Paon/Den Pauw. Cracking of the render (© HHU, 2014).



Le Mont Thabor/Den Bergh Thabor. Side façade. Cracking of the render and flaking of the paint (© HHU, 2014).

PAINT AND GILDING



Le Petit Renard et Le Chêne/Het Vosken en Den Eycke. Medallions with blistering paint, flaking gilding, widespread build-up of dirt (© HHU, 2014).



a

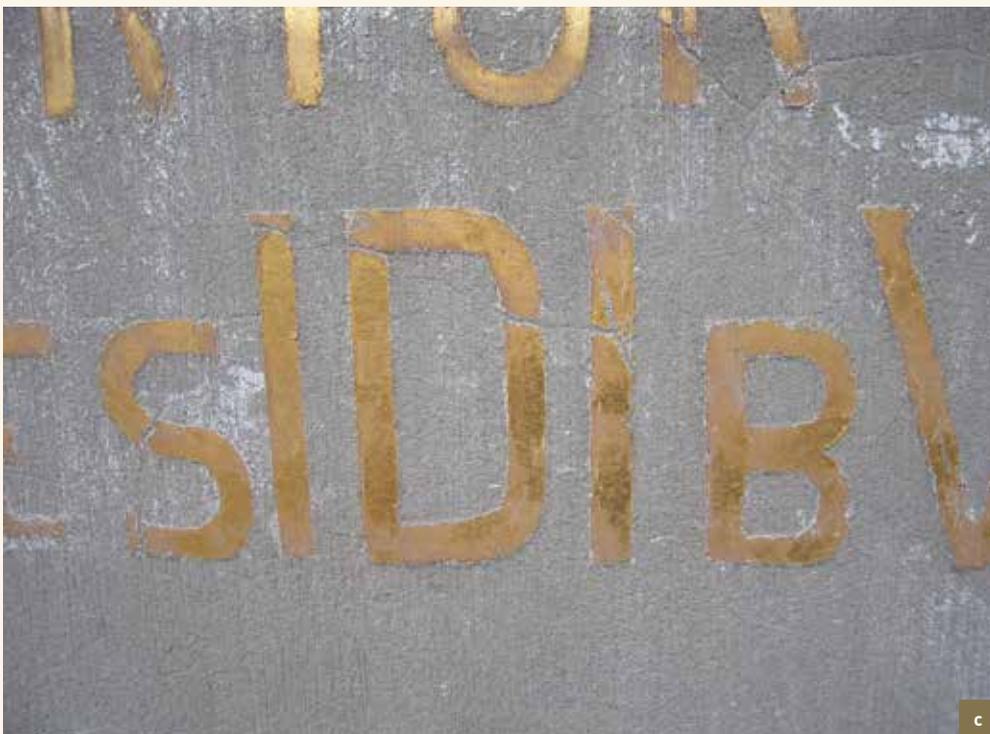


b



d

La Chaloupe d'Or/De Gulden Boot. a) Detail of pediment. Flaking paint and gilding; b) An angel. Build-up of dirt on paint. Gilding missing; c) Detail of inscriptions on the tympanum. Cracked render. Paint missing. Damaged gilding; d) Detail of pedestal of pilaster with flaking paint and gilding (© HHU, 2012).



c



Le Pigeon/De Duive. Detail of a composite capital. Chipping of stone leading to damage to the gilding. General wear and tear of the gilding, build up of dirt (© HHU, 2012).

WOODWORK



Le Cygne/De Swane. Wooden terrace on belvedere. Dislocated elements. Lower sections damaged. Widespread lack of maintenance (© HHU, 2008).



La Chaloupe d'Or/De Gulden Boot. Two window frames with damaged weatherboards and window sills. The frames were modified over time to incorporate ventilation outlets in a random fashion (© HHU, 2014).



Le Petit Renard et le Chêne/Het Vosken en Den Eycke. Badly damaged window frame (© HHU, 2014).



Le Cygne/De Swane and L'Étoile/De Sterre. After restoration (© Utopix, M. Ploton, 2018).

A man in a black jacket is leaning over a large stone bust of a man, possibly a historical figure, on a construction site. The bust is made of light-colored stone and is positioned on a wooden platform. The man is looking closely at the bust, with his hand near his chin. In the background, a dense urban landscape with various buildings and a tall skyscraper is visible under a clear sky. A blue safety net is also present in the background.

PRELIMINARY STUDIES

AFTER A SERIES OF INSPECTIONS AND AN INITIAL DIAGNOSIS, ADDITIONAL PRELIMINARY STUDIES – STRUCTURAL, PETROGRAPHIC, METALLURGICAL, STRATIGRAPHIC, ETC. – WERE COMMISSIONED FROM VARIOUS SPECIALISTS IN THESE DOMAINS. Coring was carried out, samples were taken and different cleaning techniques were tested.

All the operations were overseen by a Supervisory Committee, including various specialists, as well as members of the Royal Commission for Monuments and Sites (CRMS), the Monuments and Sites Directorate (DMS) and representatives of the City of Brussels.

The studies were initiated in 2003, on the “test” façade of *L'Âne/Den Ezel*, which exhibited structural problems in the gable and a significant number of various types of stones that were representative of the pathologies encountered throughout the square. This work then extended to the next blocks as the restoration projects progressed and in accordance with other types of issues detected.

STRUCTURAL ANALYSES

Certain gables were out of plumb by several centimetres. A structural analysis of the buildings, carried out by an engineering firm, confirmed problems with the displacement of the façades due to corroding beams or beam ends, leading to the separation of the stones and

even fracturing. The data from the crack meters installed during the inspections in 2000 showed that the gables had stabilised in the meantime. Nevertheless, the damage caused by the spreading of the rust to the surrounding stones made the dismantling of the gables in each instance necessary, as well as the total replacement of the corroded metal beams responsible for the

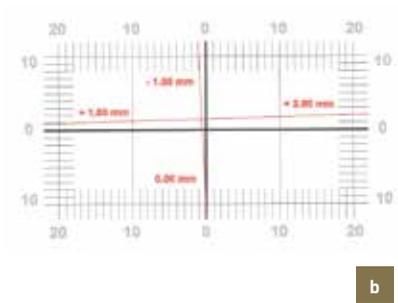
problems. This was the case with *L'Âne/Den Ezel*, *La Brouette/Den Cruywagen*, *L'Étoile/De Sterre* and *La Chaloupe d'Or/De Gulden Boot*. On the lower floors, I-beams or square bars also exhibited signs of corrosion requiring them to be replaced, as with *Le Cerf/De Heert*, *Le Paon/Den Pauw*, *Sainte-Barbe/Sint Barbara* and *Le Roi d'Espagne/Den Coninck van Spaignien*.



L'Âne/Den Ezel. A. Pien removing the render from a party wall to determine the shape of an anchor (© CHE, 2001).



L'Étoile/De Sterre. Structural problems. a) Tilting of gable pediment on the façade facing the Grand Place. Euville stone; b) Separation of stones in the rear façade. Crack meter installed during the schedule of condition (© HHU, 2008).

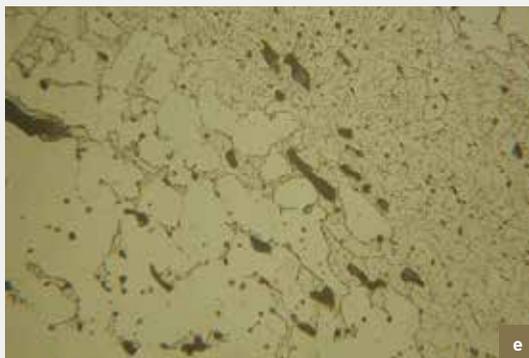


L'Âne/Den Ezel. a) Crack meter; b) Readings recorded (© HHU, 2002).

STUDY OF METAL ELEMENTS ON THE FAÇADE - LOCATING OF METAL ANCHORS IN THE PARTY WALL OF L'ÂNE/DEN EZEL

The purpose of these one-off surveys, which were limited to *L'Âne/Den Ezel*, was to complement the material and historical study of the building. Yet they also had a practical and technical aspect. They were intended to determine whether the metal elements, such as bars or anchors, were still effective. However, locating them had highlighted the possible corrosion of elements not spotted during the visual inspection and therefore other potential damage to the stones. The metal detector helped to provide relatively precise information on the number, location and length of the anchors situated inside the house, within the party walls, of which only a few load distribution plates were visible on the external façade.

Next, targeted surveys revealed their exact shape: one wrought iron tip is anchored in lead within a large block of white stone inserted in the brick party wall. At the other end, the rectangular metal plate is rounded with screw threads, which enable the load distribution plate to be attached by means of a bolt. A metallographic analysis helped to determine the composition of the iron, which is relatively pure, some of its properties, such as its hardness, the presence of inclusions and impurities, and even to identify the corrosion products. The anchors were also analysed, revealing lead of a high degree of purity. Additional analyses on the square bars were also carried out on the façade.



L'Âne/Den Ezel. Metal anchor. a) Locating anchors by means of a metal detector; b) Square plate visible on the façade behind the crumbling facing; c) Stripping of interior plaster in order to see the shape of the anchor; d) Detail of lead anchor in the stone; e) Metallographic study. Micrograph image (a, b, c en d) : © HHU, 2001; e) : © VUB, 2001).

VISUAL ANALYSIS OF STONE TYPES, SIZES AND MARKINGS

The identification¹ of facing *in situ* by specialists proved very interesting, as it showed that the blue and white stones present in the façade were even more varied than the initial inspections had indicated. It also revealed that a portion of the original materials - i.e. those dating from the reconstruction after the 1695 bombardment, indeed from even before that time - had been reused. Once again, consulting historical documents proved invaluable when developing these hypotheses, which, through their practical application on the ground, helped to shed new light on previously assumed knowledge. The restoration operations themselves subsequently confirmed that certain stones had been reused, which was clearly visible from the scaffolding.

Most of the blue stone elements are of the standard variety, which is called *Petit Granit* and is mainly mined in the vast Hainaut basin stretching from Ath to Ligny. Certain stones belong to a variety called *Petit Granit du Bocq*² after the Bocq valley. In *L'Âne/Den Ezel*, the *petit granit* elements exhibit a number of differences in their application, particularly in terms of the regularity and spacing of the chiselling, or the width and perpendicular lines of the lateral sets. These details suggest that, contrary to the description of the repair work produced in 1914, not all the stones were replaced; instead, certain original elements were retained or put back in place. The discovery of marks on the cubed base of the twisted balusters on the second floor reinforces this hypothesis. These marks seem to correspond to the initials of sculptors active in Brussels at the turn of the 17th and 18th centuries. Other indica-

tions of a similar nature have been discovered during recent projects, most notably at the back end of the large blue stone dolphin above the curved pediment of *La Maison des Brasseurs/Het Brouwerhuis*.

As for the white stone, the varieties normally used on the façades of the Grand Place, Balegem and Gobertange, are sandy limestone rocks rich in micro-fossils. They are mainly recognisable from their texture and colour. Gobertange stone, in particular, stands out due to its thin laminations and bioturbation. Alongside these two types, Euville stone from France - a limestone rich in crinoid fossils - can be distinguished by its extremely coarse grain and grey colour. Euville stone poses a number of different problems in terms of damage, such as surface degradation or *pitting*, granular decohesion or *powdering* and loss of definition of the edges or *chipping*. In general, the distribution of the stones does not follow any strict logic or intention but is the result of successive restorations. The surface finish seems to be a relatively coarse type of chiselling, such as may be seen on the Gobertange plinth course of *L'Âne/Den Ezel*.

On this same house, identifying the white stone used for the gilded capitals proves to be more problematic. The cracks or chips need to be examined in order to get an idea. Contrary to the archive documents, which suggested that the capitals had been replaced with Balegem or Gobertange stone, the building as it stands could lead one to identify the material as French Avesnes stone, which we know was also used on the Grand Place for certain decorative elements. Indeed, the capital examined reveals a chalky, finely-grained and relatively soft stone rich in glauconite crystals. Certain

capitals were therefore also most likely recovered, a hypothesis that has been further supported by the findings of the stratigraphic sampling (see above).

Other substitute stones were used in the course of the various restorations, due to the quarries being exhausted or the bed from which the stones were extracted being too thin; Massangis stone therefore began to make an appearance in restorations in the 1980s.



La Chaloupe d'Or/De Gulden Boot. Visual inspection of stones by Francis Tourneur (© HHU, 2002).



L'Âne/Den Ezel. Inspection of capitals by Francis Tourneur. Most likely Avesnes stone (© HHU, 2002).



a



b



c

Stone markings. a) *L'Âne/Den Ezel*. Marking on a cube of blue stone; b) *La Brouette/Den Cruywagen*. Numbered stones. Balegem stone; c) *La Maison des Brasseurs/Het Brouwerhuis*. Marking at the back end of a blue stone sculpted dolphin (© HHU, 2002 et 2014).

MICROSCOPIC ANALYSES OF DIFFERENT NATURAL STONES, CLEANING TESTS AND *IN SITU* CONTROL OF THE WATER ABSORPTION OF CLEANED SURFACES

Various samples were taken *in situ*, on the test façade of *L'Âne/Den Ezel*, by core sampling with diamond-tipped tools (Ø 50 mm). The core samples were examined macroscopically and microscopically, enabling the different types of white stone to be analysed: Balegem and Gobertange in the facing on the façade and Euville in the sculpted elements on the gable.



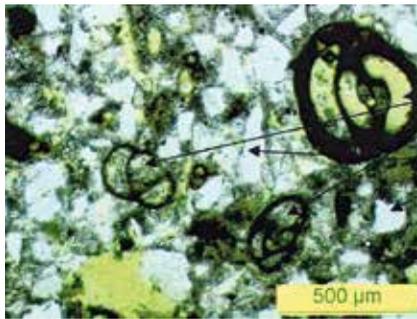
L'Âne/Den Ezel. Taking a core sample of Balegem stone (© HHU, 2002).



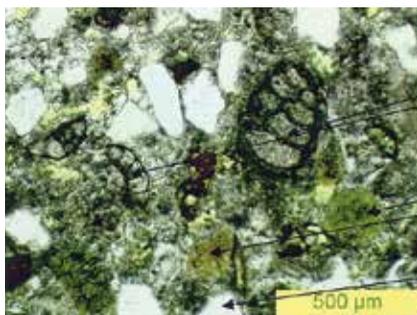
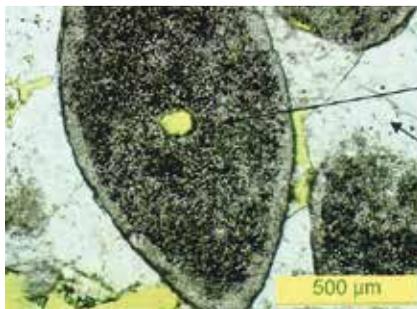
L'Âne/Den Ezel. Water absorption test with Karsten tube (© HHU, 2002).

Preliminary cleaning tests were also carried out, mainly on the ground floor of *Le Cygne/Den Swane* and on *L'Âne/Den Ezel*, using the low pressure hydro-pneumatic swirling vortex technique and micro-sandblasting. Two types of aggregate were used: calcite (Dural 130) and olivine, at a pressure of 2 bars, which enabled the best result to be achieved. Measurements of water absorption were taken on surfaces that had undergone test cleaning in order to determine the need for waterproofing³.

These analyses showed that the façades had received a treatment of this type during a previous restoration campaign. This has proved to be highly effective, although the possibility of future treatments cannot be excluded. These must be carried out using organic solvent-based products that are compatible with the existing materials and whose composition and viscosity vary according to the medium (type of stone, brick, previous treatments, etc.).

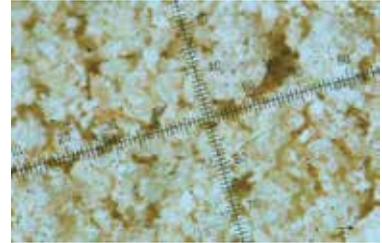
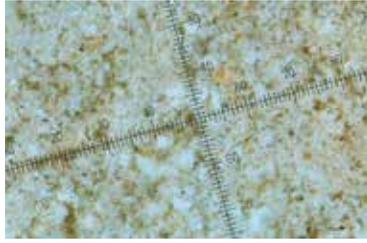


L'Âne/Den Ezel. Macroscopic analysis of stones. a) Balegem stone; b) Euville stone; c) Gobertange stone (© CSTC, 2002).



ANALYSES OF THE MORTAR IN THE FAÇADES

As we have seen, the facings consist of various blue and white stones. The joints can be of varying thicknesses depending on the type of stone. Numerous old repairs can also be found on Balegem stone, carried out, according to the archives, using the metallic cement also known as Bertagna⁴. Samples were taken from the construction joints of the Gobertange and Balegem stones. The photographs of samples taken under the microscope show that the components are visually similar. Chemical analyses also demonstrate their similarity.



Echantillon	M1	M4
Perte au feu 540 °C	4.74 %	4.68 %
Perte au feu 1050 °C	13.11 %	12.39 %
Résidu insoluble	57.7 %	64.76 %
SiO ₂ soluble	2.6 %	2.37 %
CaO	18.48 %	17.85 %
Total	91.89 %	97.37 %
CO ₂	10.46 %	4.05 %
Densité apparente (kg/m ³)	1629	(impossible de déterminer)
Volume des pores (% en volume)	30.3	

Analysis of mortars in a laboratory (© KU Leuven, 2001).

Cement-lime mortars were used, comprising around 200 kg of Portland cement (between 188 kg and 207 kg) and 240 kg of hydrated lime (between 242 kg and 244 kg) per m³ of sand, with a relatively high porosity of 30% of the volume.



La Maison des Brasseurs/Het Brouwerhuis. Sampling of repair mortar (© HHU, 2002).



The restorer taking samples of the render and mortar on the façades of *La Chaloupe d'Or/De Gulden Boot* and *Joseph et Anne/Joseph en Anna* (© HHU, 2002).

STRATIGRAPHIC ANALYSES OF PAINTS, VARNISHES AND GILDING

Stratigraphic sampling and punctures (extractions from the original layer) were carried out on the woodwork, painted stone and gilded decorative elements. The purpose of these examinations was to determine the original appearance of each façade.

Stratigraphic analyses of the window frames revealed a former, original brown-coloured varnish finish beneath numerous layers of very dark brown paint. The varnish corresponds to the work specifications for the 19th century phases of restoration.

The polychrome elements, such as the sculpture of the swan [cygne]

on the house of the same name (the *Maison du Cygne/De Swane*), also underwent a scientific examination. This revealed blue colours used for the background, shades of green used for the vegetation and white enhanced with gold used for the swan.

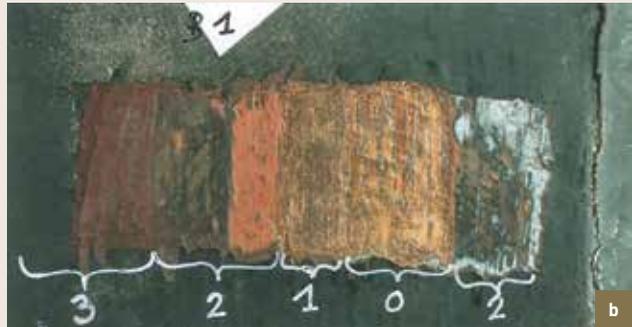
The stratigraphic analysis of the gilded elements of the *Maison du Cygne/De Swane* and the *Maison des Brasseurs/Het Brouwerhuis* indicates several layers of gilding. The façades of the guild houses were particularly ornate and enhanced with gold, which was applied during their reconstruction in the early 18th century. However, according to historical documents, the ornamentation on the houses of private individuals was only gilded in 1953, in anticipation of the 1958 World's Fair. All the façades on the Grand

Place were rehabilitated in preparation for this major event. In this way, the gilded capitals of *L'Âne/Den Ezel* show only a single layer of gilding applied to the stone. The new gilding is applied using gold leaf on amber-coloured mixtion, with an ochre mix.

NOTES

1. See bibliography (the "studies" section) p. 144.
2. Uneven distribution of crinoids, presence of coral fossils.
3. The measurement method used was recommended in the international RILEM 3 recommendations for measurements of water absorption under low pressure using a Karsten tube.
4. As seen above, this mortar was used to seal the joints of the stones hermetically, to repair damaged sections and even to conceal defects altogether.

WOODWORK



L'Âne/Den Ezel. a, b and c) Stratigraphic sampling and macro photograph of a window frame indicating an original layer of varnish (a and b) © M. Decroly, 2002; c) © KIK-IRPA, 2002).

POLYCHROMY



Le Cygne/De Swane. Stratigraphic sampling on the swan. a) General view of the swan with location of sampling; b) Sampling in the foliage; c) Sampling in the plumage (© L. De Clercq, 2004).



La Rose/De Roose. Stratigraphic sampling on a medallion (© L. De Clercq, 2002).

GILDING



L'Âne/Den Ezel. The restorer at work (© HHU, 2002).



L'Âne/Den Ezel. a) View of a capital with stratigraphic sampling (© M. Decroly, 2002); b) Detail of stratigraphic sampling D2. 1. Stone. 2. Black layer (sealer or black crust). 3. Ochre mix. 4. Red undercoat. 5. Gilding on mixtion (© M. Decroly, 2002). c) View of the volute of a capital with sampling D3 (© M. Decroly, 2002); d) Macro photograph to see different layers of paint, suggesting that the capital has been recovered (© KIK-IRPA, 2002).



La Louve/De Wolvin. Detail of doves from the sculpture *La Paix/De Vrede* (Godefroid Vanden Kerkhove, 1872). Gilding in progress. Savonnière stone (© HHU, 2015).