

international working party for
documentation and conservation
of buildings, sites and neighborhoods of
the modern movement

Restoring Postwar Heritage

preservation technology
dossier 8
August 2008

Theodore H.M. Prudon FAIA
Kyle Normandin
Editors

S
U
-
m
o
n
t
r
o
o
r

CONTENT

Restoring Postwar Heritage: Selections from the 2004 DOCOMOMO US Technology Seminars (New York)

- 1 Introduction
Theodore Prudon, Kyle Normandin, Editors

Plenary

- 5 University of Chicago Preservation Guidelines for Contemporary Architecture
Harry J. Hunderman, David S Patterson and Richard C. Blumstead
- 15 Restoration and Rehabilitation of the Zollverein XII Coal Mine Complex: Strategies, Problems, and Perspectives for a World Heritage Site of the Modern Movement
Juliane Pegels

The 20th Century Metal and Glass Curtain Wall

- 27 Comparing the Preservation of the 1920s Metal and Glass Curtain Walls of the Sanatorium 'Zonnestraat' (1928-31) and the Van Nelle Factories (1928-31)
Wessel De Jonge
- 37 The United Nations Secretariat Curtain Wall History, Current Condition, and Future Restoration
Robert Heintges
- 49 Some Notes on the Conception, Implementation, and Future of the Curtain Wall
Elwin C. Robison
- 61 The History of the 20th Century Metal and Glass Curtain Wall and the Evolution of Curtainwall Standardization and Performance Testing
Daniel J. Lemieux and Martina T. Driscoll

Concrete Restoration in Modern Buildings

- 74 The Role of Precast Concrete Panel Technology in Postwar Building Construction
Jack Pyburn
- 80 Postwar Building in France: Le Havre
Frederic Seitz
- 84 Pier Luigi Nervi's Work: Technological Values, Typical Degradations and Conservation Criteria
Nicola Ruggieri and Gennaro Tampone

Stone and Technology in the Modern Movement

- 93 Experiencing Stone, Structure and Cladding
Ola Wedebrunn
- 99 Renovation of the Marble Cladding at Finlandia Hall
Martti Jokinen
- 107 Deterioration of Thin Marble Cladding- Observations from the Inspections of Buildings with Marble Cladding in Europe
Bent Grelk and Bjorn Schouenberg
- 113 Conservation of Stone Facing in Modern Italian Architecture
Sergio Poretti, Rinaldo Capomolla, Tullia Iori, Stefania Mornati and Rosalia Vittorini
- 119 The Restoration of Juan O'Gorman's Central Library of University City, National Autonomous University of Mexico
Louise Noelle Gras

Chroma: Color and Conservation in Modern Buildings

- 125 The NCS (Natural Color System) and its Use in Recording Historic and Contemporary Architecture
Harald Arnkil
- 131 The Public Spaces of Luis Barragan: Losses and Recovery
Louise Noelle Gras
- 137 Mural Painting vs. Architecture: Le Corbusier vs. Eileen Gray
Caroline Constant

Appendix

- A Editors Biographies
- B Authors Biographies
- C Seminar Program
- D Seminar Organizers and Committees

Conservation of Stone Facing in Modern Italian Architecture

Sergio Poretti, Rinaldo Capomolla,
Tullia Iori, Stefania Mornati and Rosalia
Vittorini

This paper illustrates recent conservation and refurbishment operations on the stone facings of two important twentieth century Italian architectural monuments: the Rome Post Office Building by Adalberto Libera (1933–1935) and the Palazzo della Civiltà Italiana in Rome by Giovanni Guerrini, Ernesto Lapadula, Mario Romano (1938–1943). In both cases, the project began with a meticulous investigation of the buildings' architectural and construction features and the peculiarities of the stone facing. In the case of the Post Office Building, the front portico facing reveals a strong degree of deterioration. The construction system employed to erect this building is emblematic of the experimental trend of the early 1930s in Italy: thin stone facings on mixed reinforced concrete and masonry structures. The restoration operation was conducted to salvage the original architectural features whilst also finding new solutions for the original technical defects that caused the deterioration. The Palazzo della Civiltà Italiana is likewise emblematic and its marriage of heavy travertine facing with a reinforced concrete structure is typical of the cultural, economic and political environment of the autarchic period. The operation, currently underway, to restore and employ the building (after years of neglect) required a careful evaluation of the stone facing deterioration causes and an ad hoc conservative restoration project for the facing.

The report focuses on how, in these two cases, the historical reconstruction of the original building solutions and the diagnosis of the causes of deterioration led to the definition of the restoration project solutions.

Introduction

The complete marble facing of Italian public works epitomizes the influence on Modern Italian architecture of the peculiar cultural and economic environment in Italy between the two world wars. Protectionist policies of the fascist regime, intended to support the Italian marble industry and offset by the drastic decrease in exports by encouraging internal consumption dictating the use of marble in public buildings. The regime had political motives as well; stone facing resembles ashlar construction and conjures an image of solidity, permanence, and monumentality. Because of these factors, marble facing is a pervasive element of the building grammar of Modern Italian architecture – and a key focus of conservation efforts.¹

Use of marble facing was experimental from both an architectural and a technical perspective. In fact, the experimental nature of this style often resulted in the deterioration of the facing that buildings of this period suffered immediately after their erection.

Maintenance and restoration of stone facing raises various questions. For example, which tools should be employed to implement consolidation? And, is it correct to indiscriminately adopt the technique – presently the most widely used in Italy – of securing stone slabs to walls by means of adhesive anchors and external spackling? Rather than discuss solutions to these problems abstractly, we will look at two recent restoration experiences.

These case studies involve two monumental buildings erected in Rome: Adalberto Libera's Post Office Building erected between 1933 and 1936; and the Palazzo della Civiltà Italiana, designed by Giovanni Guerrini, Ernesto Lapadula and Mario Romano, with construction begun in 1938 for the Universal Fair of 1942 (which never occurred because of the war).

All analyses and operations, in both cases, were implemented by the "Architettura e Costruzione" Group of the University of Rome Tor Vergata. This group, coordinated by Sergio Poretti, includes Rinaldo Capomolla, Tullia Iori, Stefania



Post Office building on via Marmorata by Adalberto Libera and Mario De Renzi. (Photo: Sergio Poretti, 1990)



Palazzo della Civiltà Italiana in Rome by Giovanni Guerrini, Ernesto Lapadula, Mario Romano. (Photo: Sergio Poretti)

Mornati and Rosalia Vittorini.

Both buildings underwent extensive analysis commissioned by the present proprietors (Poste spa and Eur spa) in view of the restoration operations, and in both cases, the analysis was followed by a conservation project. Restoration operations were completed on the Post Office Building and are still underway on the Palazzo della Civiltà.

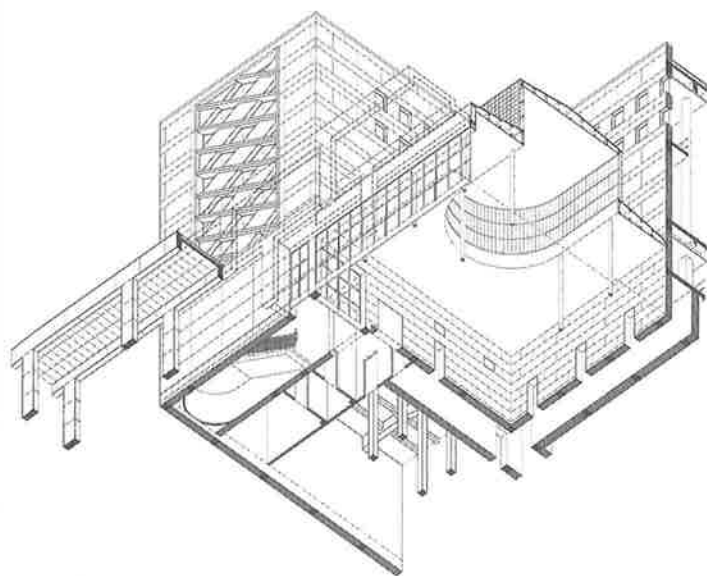
Post Office Building on via Marmorata

The Palazzo delle Poste is faced entirely in travertine.² Violet porphyry from Predazzo was used to face the portico to make it stand out materially and chromatically from the main nucleus. The facing consists of thin slabs (three to four centimeters thick at most), applied directly to the mixed-style construction of reinforced concrete and traditional masonry. This is an unusual method that had not yet been experimented with at length at the beginning of the thirties. The slabs were affixed to the main nucleus of the building by traditional building techniques. Every slab rested on the one beneath it and was joined to the wall by hooks made of reinforcing rods of galvanized iron.

The solution adopted for the portico was far more innovative. There, the thin slabs were joined to the reinforced concrete structure by means of invisible cramps and eyelets. Facing of the pillars was executed by resting the slabs one above the other and using galvanized iron reinforcing-rod hooks, previously inserted into the structure, to prevent the slabs from falling over. Eight hooks suspend the much smaller horizontal slabs from the beams and floor system intrados. The eyelets were necessary to affix the vertical facing to the architrave, which had no resting point. Metal spikes (inserted into conical lodgings half the width of the slab) were mounted on the slabs to allow them to be joined to the main structure.

Soon after the building was completed, the portico slabs began to detach. The few fixed anchoring points proved insufficient for the large dimension of these slabs (2.15 meters long and 1 meter wide), which were also rather hazardously shaped to reduce the discontinuity in cuts. Diverse thermal dilations between the structure (which had no joints) and the porphyry facing led to stress that could not be absorbed by the metal reinforcing rods.

Adalberto Libera, summoned in 1943 by the Technical Office of the Italian Postal System, began to study solutions to this problem. Focused on reducing the facing slab dimensions, his sketches depict facings with the slabs reduced by



Post Office Building: Axonometric drawing (Drawing: T. Iori)

a half, a fourth and even an eighth of the original dimension.

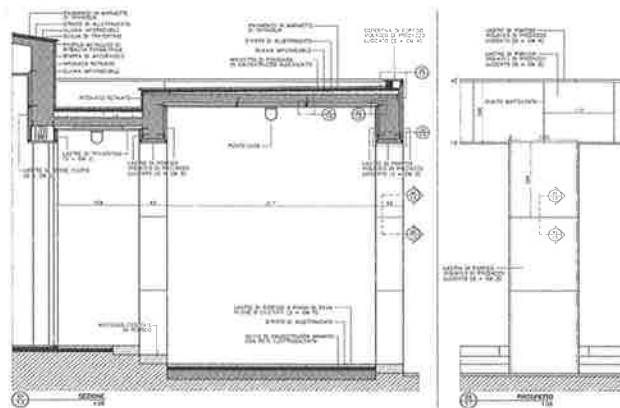
At the end of the Sixties, the entire portico facing was removed as a safety precaution, and between 1966 and 1971 the structure was consolidated and refaced with travertine from Tivoli, thereby eliminating the chromatic and material contrast that had been envisaged by Libera. The surface of the portico intrados was faced with azure glass tesserae.

Finally, in 1997 the Postal Service decided to implement extensive conservation maintenance on the facing. The stone slabs of the main nucleus were consolidated by using stainless steel adhesive anchors, and perforations were sealed with a mixture of putty and travertine powder. An experimental procedure that had been proposed to conceal the adhesive steel anchors — employing the stone wedge that had been removed to insert the adhesive anchors — was not accepted by the building management. Most important, however, violet porphyry was still available, and the portico was returned to its original appearance.

Nonetheless, the construction technique

had to be updated. The slabs were to be affixed only to the structure and not joined to each other in order to permit free thermal expansion. This was implemented by adopting a stainless steel framework that joined every individual slab to the pillars and beams with double expansion anchors. In this way, every slab was held in place independently of the others and was slightly distanced from the structure itself.

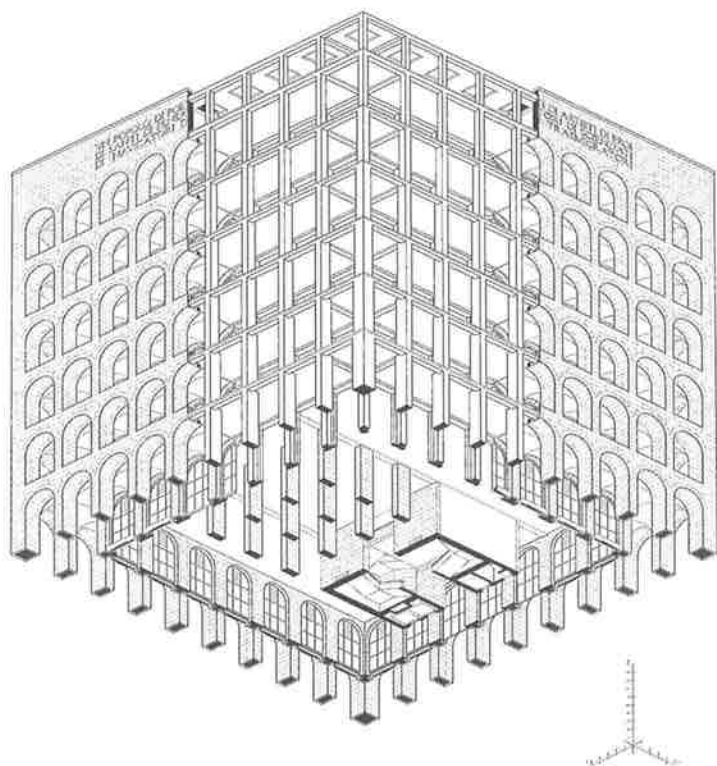
Although modern techniques would have permitted the original large slab design to be erected efficiently and safely, it was hard to overcome the client's opposition. It remembered the damage that had originally been caused by that type of solution. In the end, a solution that had once been



Post Office Building: Conservation Project. (Poretti 2005)

suggested by Libera himself (in his 1943 sketches) was adopted: The dimension of the slabs on the main façade was halved and standardized to four centimeters in width.³

During the executive works phase, a few variations had to be implemented in the project on account of the modest machinery that the contracted construction company possessed. (This issue is rather lengthy and cannot be addressed at this time.)



Palazzo della Civiltà Italiana: Axonometric drawing. (Poretti, 2005)

The Palazzo della Civiltà Italiana

The use of inadequately supported thin slabs caused problems in many of the buildings erected during the first half of the Thirties (including Giuseppe Terragni's Casa del Fascio in Como).⁴ Italian technicians quickly identified the reason for the slab detachment – the main cause was the difference in thermal dilation between the marble and the reinforced concrete structure – and devised more efficient techniques such as the one that was brilliantly employed in the Palazzo Montecatini in Milan.

By 1938, when construction began on the Palazzo della Civiltà Italiana, the situation in Italy had changed dramatically. The autarchic economy and the new architectural strategy of the fascist regime had brought stone facing of walls back into

fashion. However, the slabs lost their initial character as a slender skin applied to the main structure and became thick and massive, thinning as they reached higher. In short, the facing had become an autonomous and self-supporting external shell.

The Palazzo della Civiltà Italiana has an elementary configuration.⁵ It is a gigantic cube perforated by 216 round arches, repeated identically on all four facades, nine per floor on all six floors. The stability of the building is based on its reinforced concrete framework. The framework, however, is complemented by traditional brick masonry on the inside and the external travertine facing. The inner masonry "filling" varied greatly in width (from 3 to 97 centimeters) depending on the progressive reduction of the pillar width in relation to the building height.

During construction, the brick "filling" was raised together, step-by-step, with the travertine slabs, often creating a single heterogeneous but indistinguishable unit. The slabs were adjoined to the brick masonry by means of steel rods. Floor by floor, this elaborate brick and stone structure acquired its own static autonomy, absorbing the load of the travertine ashlar on the archivolt (usually about 15 to 20 centimeters wide), as it was built not only to imitate the arches but also to conserve its static drive. The 17-cm-thick frames that upheld the arches were not completely self-supporting, but were also anchored to the pillars and the floor system above by iron and steel rods.

The complex interactions between the facing and the main supporting structure and the loss in efficiency of the joining cramps have led to the present state of deterioration. This does not, however, present any generalized slab detachment as occurred in the buildings faced with thin slabs. In this case, the deterioration entails local ruptures and loosening of individual elements (mainly the corner slabs due to the load pressure).

Thus, the proposed project presents many analogies with the typical restoration of stone facings in ancient buildings. The restoration aims to secure the detached slabs with anchoring methods similar to the original ones (but made with more resistant

materials); integrate the missing slabs (removed years ago to examine the facing and the underlying structure); substitute the newer facing slabs (which usually have a different color and superficial finish); remove all spackle, putty sealing, cramps, and pins added in previous consolidation operations; and spackle and clean the entire surface. In particular, great attention has been paid to perfectly sealing the joints in order to prevent – as far as possible – water leaking behind the facing, which poses the greatest threat to the pins securing the slabs.⁶

Conclusions

Returning to the question of what solution to adopt in a facing conservation operation, we can draw two conclusions.

The first is that the solution can in no way be determined in a laboratory, but must be defined, case by case, in relation to the building characteristics and the historical reconstruction that details the original project phases, the construction yard work and the elements that caused the process of deterioration. The very history of the architectural work will suggest the procedures to be implemented.

The second conclusion is that the solution does not follow automatically from an investigation, but instead must be perfected while in progress. Even if the objective is to restore a building element by respecting the original solution, or to carry out regular maintenance and conservation operations, all procedures must be developed through a highly detailed, graphical project.

Notes

1. See Sergio Poretti, "Marble Sheeting in Modern Architecture", in *Stone in Modern Buildings. Principles of Cladding* (Roma: Ograro, 2003) 14-18.
2. See Sergio Poretti, *Progetti e costruzione dei palazzi delle poste a Roma 1933-1935* (Roma: Edilstampa, 1990).
3. See Sergio Poretti et al, *Il restauro delle Poste di Libera* (Roma: Gangemi, 2005).
4. See Sergio Poretti, *La Casa del fascio di Como* (Roma: Carocci, 1998).
5. See Sergio Poretti, "Identità e futuro di un monumento", in *Il Palazzo della Civiltà Italiana. Architettura e costruzione del Colosseo Quadrato*, eds. Maristella Casciato and Sergio Poretti (Milano: Federico Motta, 2002) 11-35.
6. Sergio Poretti, "Il Palazzo della Civiltà Italiana: storia e riuso di un monumento moderno", *MdiR monumentidiroma* 1-2 (2004): 81-88.