GBC Italia Masterclass

May 5-6, 2021

For the green professionals

Engineer Enrico Grillo

GBCI HISTORIC BUILDING
ROME AND AMATRICE PROJECTS
GBCI HB projects in central Italy

The location of 3 case studies: Roma and Amatrice
The number of sustainable building is growing:
The new version Roma Green Building map is coming out soon (before the end of this year)
Sequas projects in Roma

**Palazzo Poli: Energetic retrofit**
Early years of 1540s

In collaboration with Architect C. Ferrari

**Chiesa di San Giuseppe dei Falegnami:**
Late 16th Century

In collaboration with offices R.I.S.E
and Studio Croci

**Palazzo Silvestri-Rivaldi:**
Early years of 17th century

In collaboration with DG-ERIC – MIBACT
Case Study: Reconstruction of the roof of Chiesa di San Giuseppe dei Falegnami after its collapse (30th August 2018)

Location
Case Study: Reconstruction of the roof of Chiesa di San Giuseppe dei Falegnami after its collapse (30th August 2018)

Identity

Location: Clivo Argentario, Roma
Year of original construction: 1597
Function: Church
Type of project: Partial renovation
Main structure: Brick masonry with lime mortar and timber roof with terracotta tiles

View of the inside
Case Study: Reconstruction of the roof of Chiesa di San Giuseppe dei Falegnami after its collapse (30th August 2018)

The starting point

View of front facade

View of the collapsed roof
Case Study: Reconstruction of the roof of Chiesa di San Giuseppe dei Falegnami after its collapse (30th August 2018)

The process and the actors involved

Analysis and 3d reconstruction of the timber structure
Studio Croci

View of the reconstructed timber ceiling
Studio Croci

View of the collapsed roof

Building site poster, with all the actors and stakeholders involved
Case Study: Reconstruction of the roof of Chiesa di San Giuseppe dei Falegnami after its collapse (30th August 2018)

A well conserved portion of the principal rafter was saved from the original elements and has been used for the new webs as structural elements.

Replaced timber elements with re-use of some of original parts and their integration for other functions.
Case Study: Reconstruction of the roof of Chiesa di San Giuseppe dei Falegnami after its collapse (30th August 2018)

The new insulation layer in timber fibre in order to preserve the structural and decorative elements

1. Crossed double timber boarding 30+22 mm
2. Vapour membrane 0,5 mm
3. Timber battens 40x80 mm, within insulation layer
4. Timber fibre insulating layer 80 mm 170 Kg/m³
5. Timber fibre insulating layer 20 mm 270 Kg/m³
6. Vapour membrane 0,5 mm
7. OSB panel – 12 mm
8. Waterproof membrane
9. Lime and sand mortar
10. Roofing in clay tiles

MC4 software calculation for the enhancement of hygrothermal performance of the roof. All the materials used in insulation, structure and finishings respond to LEED requisites.

Studio Croci
Case Study: Reconstruction of the roof of Chiesa di San Giuseppe dei Falegnami after its collapse (30th August 2018)

The roof reconstruction operations (completed in August 2019) are documented and visible on the dedicated website: https://www.sangiusepedeifalegnami.org/
Case Study: Reconstruction of the roof of Chiesa di San Giuseppe dei Falegnami after its collapse (30th August 2018)

Building site organization - ESC IAQ WM plans, weekly reports and photographic evidence

<table>
<thead>
<tr>
<th>N.</th>
<th>BMP attività</th>
<th>Implementato?</th>
<th>Necessità di azioni correttive e note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tutte le pendenze e le aree atterrate non soggette a lavorazione sono adeguatamente stabilizzate?</td>
<td>No</td>
<td>N.A.</td>
</tr>
<tr>
<td>2</td>
<td>Le aree e gli elementi natrari presenti (come terre, sabbie, argille, etc.) sono protette con barriera o BMP similari?</td>
<td>No</td>
<td>N.A.</td>
</tr>
<tr>
<td>3</td>
<td>Le barche presenti e le barriere per i sudamenti sono adeguatamente installate (lente al soffitto) e mantenute?</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>I punti di scarico e le acque di ricircolazione sono libere da ogni deposito di sedimenti?</td>
<td>No</td>
<td>N.A.</td>
</tr>
<tr>
<td>5</td>
<td>Le catene presenti sono adeguatamente protette?</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>L'uscita del cantiere previene la viscolazione esterna di sedimenti attraverso le nuote dei mezzi?</td>
<td>No</td>
<td>Non è stato predisposto il lavaggio delle nuote nel portare via i rifiuti, tuttavia tutte le operazioni di manutenzione nel cantiere, grazie alle protezioni, limitano al minimo la viscolazione all'esterno</td>
</tr>
<tr>
<td>7</td>
<td>I rifiuti delle lavorazioni sono raccolti e posizionati in aree coperte o in cassoni a levata?</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

![Image of photographic evidence]
Case Study: Reconstruction of the roof of Chiesa di San Giuseppe dei Falegnami after its collapse (30th August 2018)

The building site: cleanliness and order in construction
THE CHALLENGE: Possible adaptation of the GBCI HB protocol for specific spaces with very low occupancy rate (with very few technical systems installed) such as Churches

Case Study: Reconstruction of the roof of Chiesa di San Giuseppe dei Falegnami after its collapse (30th August 2018)
Case Study: Experimental renovation of part of Palazzo Silvestri-Rivaldi

Location
Case Study: Experimental renovation of part of Palazzo Silvestri-Rivaldi

Identity

**Location:** Via dei Fori Imperiali, Roma

**Year of original construction:** beginning of 20\(^{\circ}\) century

**Function:** Abandoned

**Type of project:** Renovation and substitution of the roof and technical systems

**Main structure:** Brick masonry with lime mortar and timber roof structure with metal sheeting
Case Study: Experimental renovation of part of Palazzo Silvestri-Rivaldi

Architectural features

View of the inside courtyard

View from the superior garden
Case Study: Experimental renovation of part of Palazzo Silvestri-Rivaldi

Project strategies: integration of many different disciplines

- Education, formation and research
- Environmental care
- Valorisation of natural materials and vernacular techniques
- Materials from different productive chains
- Promotion of eco-tourism
- Renewable energies
- Participation and self build
- Labour integration
- Enhancement and intensification of activities in existing spaces
- Renovation of existing buildings and new functions
- Palazzo Silvestri-Rivaldi
Case Study: Experimental renovation of part of Palazzo Silvestri-Rivaldi

Project strategies: technical aspects

- Seismic repair
- Increase of fruition (physical and digital)
- Experimental didactical on-site workshops
- Schools Universities Specialization institutes Professionals
- Valorisation of historic identity
- Natural materials and traditional techniques
- Use of recycled materials and re-use of demolition waste
- Redefinition of relationship with urban tissue
- Passive technological systems and integrated with architectural elements
- Increase of fruition (physical and digital)
Case Study: Experimental renovation of part of Palazzo Silvestri-Rivaldi

Design promoting circular economy approach through GBCI HB protocol

LIVELLO BASE
43 punti
Case Study: Experimental renovation of part of Palazzo Silvestri-Rivaldi

Waste and demolition – logistics and reuse of materials
Case Study: Experimental renovation of part of Palazzo Silvestri-Rivaldi

Identification of materials stocked at the current situation and transport to stock areas
Case Study: Experimental renovation of part of Palazzo Silvestri-Rivaldi

Energetic retrofit: Envelope performance enhancement through insulation of inner and outer walls with timber wool panels and ceiling with timber fibre panels
Energetic update: Design through BIM – integrated technical systems

Case Study: Experimental renovation of part of Palazzo Silvestri-Rivaldi
THE CHALLENGE: Linking sustainability protocols with formation and education to achieve the most out of UN’s SDGs

Thanks to agreements with Universities «Sapienza» and «Roma Tre», and Specialization School of Restoration, several active training courses have been launched in the site-school, supported by the first safety operations.

Experimental didactical on-site workshops regarding the restoration and conservation of built protected heritage.
Case Study: Renovation of residential house in SCAI (fraction of the municipality of Amatrice)

The extension of the 2016 central Italy earthquake
Case Study: Renovation of residential house in SCAI (fraction of the municipality of Amatrice)

The vision of the village, severely destroyed by the 2016 earthquake
Case Study: Renovation of residential house in SCAI (fraction of the municipality of Amatrice)

The village and the cluster, showing the two buildings that will be certified
Case Study: Renovation of residential house in SCAI (fraction of the municipality of Amatrice)

Identity

Location: Scai, Amatrice

Year of original construction: 17th Century

Function: Residential

Type of project: Restoration, structural repair and energetic retrofit, renovation of technical systems

Main structure: Weak stone masonry and concrete beam and block roof structure with terracotta tiles
How the building is now

- Il 24 Agosto 2016

Severely damaged from the earthquake and declared unuseable, but its structural characteristic, such as being low and wide, give us the possibility to renovate the existing building and enhance its safety and energetic performance.
Case Study: Renovation of residential house in SCAI (fraction of the municipality of Amatrice)

Knowledge of the situation: Historic evolution of the building

The cluster we see today is the result of 7 different phases which overlapped building spaces modifying significantly the structural parts after successive earthquakes.
Case Study: Renovation of residential house in SCAI (fraction of the municipality of Amatrice)

Project approach – analysis and evaluation of potentials and risks for sustainable safety and health

We decided to maintain the existing building in order to reduce environmental impact.
Case Study: Renovation of residential house in SCAI (fraction of the municipality of Amatrice)

Design strategies 1: Envelope performance analysis with software MC4 in order to evaluate the best envelope and technological system to be applied, including the use of renewable energy sources (Photovoltaic Panels, Biomass generator, Solar Panels)
Case Study: Renovation of residential house in SCAI (fraction of the municipality of Amatrice)

Design strategies_1: Energetic performance simulation of the single building elements after works

Internal insulation with hemp fiber and clay render
Case Study: Renovation of residential house in SCAI (fraction of the municipality of Amatrice)

THE CHALLENGE: The sustainability protocols as guide lines for the re-construction of central Italy devastated by the 2016 earthquake.

Our main aim is to set a benchmark with this project, and rise awareness on the possibility to use it as a best practice for other buildings in the area.

This gives us an opportunity for a wiser and more sustainable reconstruction process in the whole Cratere area, destroyed by the earthquake.
Thank you.

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Thank you.