



POLITECNICO
DI TORINO

Dipartimento di
Architettura e
Design

Master in Architecture for
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Thesis Title

**Gardella's Lost Legacy:
The Church of Alessandria.**

Study, 3D documentation and
Analysis

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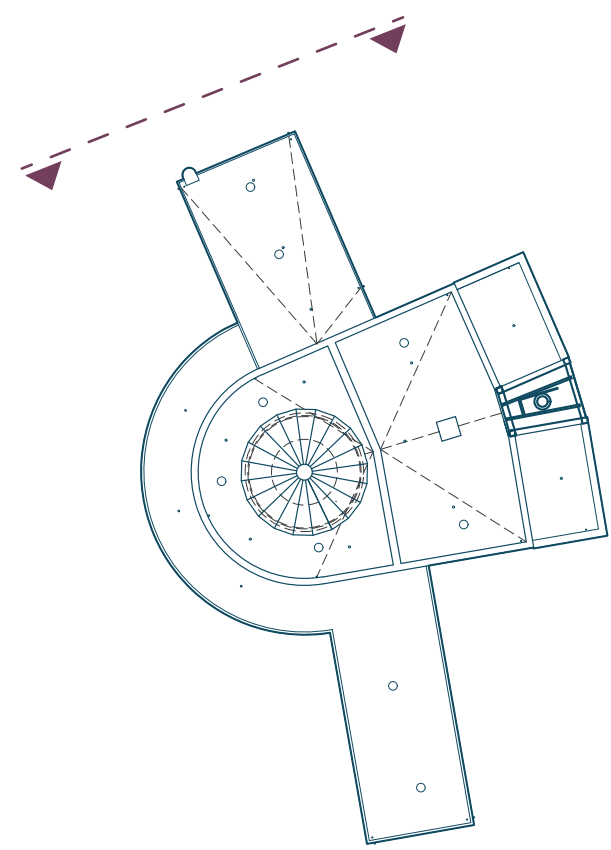
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Board No. 12

- TERRITORIAL CONTEXT
- GEOMATICS SURVEY
- 2D DOCUMENTATION
- HBIM DOCUMENTATION
- MATERIAL ANALYSIS
- CURRENT STATE OF
CONSERVATION ANALYSIS
AND SOLUTIONS
- THE PROPOSAL

The Church Building



Key Plan
Scale: 1:400

LEGEND

DEGRADATION & SYMBOLS

- Plaster change demarcation line
- Visually blocked area
- Wall Perforations
- Scratches/abrasions on paint
- Missing Element
- Medium Intensity Cracks
- Severe Intensity Cracks

Detachement

- D1 Minor - Peeling paint
- D2 Moderate - Exposed plaster

Gap (Lacuna)

- Exposed bricks due to loss of continuity of mortar and paint

Chromatic alteration

- C1 Minor - Continuous surface with tonal variations.
- C2 Moderate - Continuous surface with tonal variations.
- C3 Severe - strong discoloration stains

Chromatic Sampling

- Testing area for Paint finishes

Rising Damp

- Rising damp causing Detachment

Moisture Stains & Leakage (Colatura)

- Moisture causing detachment
- Moisture Stains due to dripping (leaking) water on surface
- Moisture Stains with Biological Colonization

Metallic Corrosian

- Corrosion on Metal columns

Biological Degradation

- Biological colonization
- Presence of Vegetation
- Microbial Growth

Superficial Deposit

- Signs of dirt and grime

NORTH FACADE

List of Materials

Symbol	Photo	Material
●		Brick Wall with plaster and paint finish
★		Bituminous water-proof membrane
▲		Metal coping
⋈		Wooden window frames
#		Concrete Columns
▲		Wooden shutters
◆		Steel Columns
		Wooden planks

Building Services & Systems

Symbol	Photo	Material
		Anchor points
		PVC Pipes (exposed)
		Safe-line for restoration works (hypothesis)
		Technical outlets
		Chimney

Degradation Analysis

Pattern/Symbols	Photo	Degradation and Description	Causes
North facade windows	W9	Missing Elements in Windows This Window (150 x 144 cm) shows similar pattern of deterioration as other windows in the north wing. Here there is visible weathering of wood with possible cracking or splitting. Paint layers are peeling or detached completely in certain areas. Glass panes are missing in the upper left and lower openings. The hardware seems to be broken exposing the interior to environmental factors. Biological growth on window sills and adjacent wall degradation	Continuous exposure to rain, wind and temperature fluctuations causing degradation of wood. Poor sealing / absence of glass has let moisture enter, accelerating wood decay, algae and moss growth. Failure of maintenance and lack of protective coating causing paint peeling. Lack of sunlight towards the north facade, worsening the moisture condition.
	W10	Same size as W9, all the windows on ground floor are temporarily closed with wooden planks as original frame may have been deteriorated due to prolonged exposure to environmental factors or in case of missing elements like glass as in the windows on the upper floor.	Similar reasons of closure as explained for other windows closed with planks.
Moisture related		Moisture stains with biological colonization Vertical black streaks originating from the parapet area and extending downward, suggesting dripping water (colatura) and organic residue. In this case, moss patches and darkened greenish areas hint at the presence of mold or algae colonies, often caused by continuous damp conditions. In case of North Facade, there is a patch of exposed brickwork, suggesting detachment of plaster.	The lack of effective coping and drainage system in the parapet area has let water to run along the wall for long period of time. Dripping water leaves mineral residues and provides a suitable environment for algae or mold to grow. Moisture has also facilitated the growth of microorganism and black fungi. Lack of hydrophobic or protective coatings has allowed water to infiltrate and detach the plaster.
Biological Degradation		Biological Colonization Persistent degradation at the wall base with visible dark greenish discoloration, mainly at the grass-line. It shows presence of moss and algae patches indicating moisture exposure. A clear demarcation between the green-stained area and the rest of the wall indicates interaction with soil moisture. Prolonged moisture exposure has led to biological colonization.	There are multiple causes of this, firstly it is rising damp, a capillary action drawing water from the ground into plaster. Secondly, poor water drainage near the wall, or absence of DPC layer. Thirdly, the consequence of above two factors have allowed biological growth, encouraging moss, algae and fungal growth. The last factor is proximity to vegetation and soil, adding organic matter and promoting microbial colonization.
		Presence of Vegetation Plant and moss growth are visible, particularly in cracks and deteriorated plaster areas on the East and North facade. Vegetation appears to root within openings in the brick or mortar joints. Moisture and organic matter accumulation are evident, facilitating biological colonization and damage to the structure	Existing cracks and voids in plaster or masonry provide entry points for plant roots to anchor. Poor maintenance of parapet or coping above allows water infiltration, encouraging vegetation. Prolonged dampness, insufficient drainage, insufficient exposure to sunlight and absence of biocidal or hydrophobic coatings are all the factors allowing the growth of vegetation.
		Microbial Growth This is only apparent on the north facade. The irregular pattern of dark and light spots are the characteristics of microbial growth. Areas of surface erosion likely caused by reduced sun exposure and poor drainage on the north facade. This type of degradation is linked to chemical damage of the cementitious material such as production of organic acids, sulfuric acid or other compounds which degrade the material.	Damp environment of the surface promoting microbial growth causing chemical damage to the surface. Porous surface of plaster retaining water. Lack of maintenance and accumulated organic matter and environmental pollutants on the surface contributing to soiling and discoloration.
Surface Degradation		Metallic Corrosion Uniform rusting across the surface of the columns. Visible dark orange and brown streaks are characteristics of advanced corrosion. Seems the columns can be structurally compromised due to neglected corrosion and advanced oxidation.	Absence of anti corrosive finish, leaving steel exposed. High humidity and temperature fluctuations, coupled with rain exposure and ground moisture are promoting corrosion. Aging of material can be another reason of deterioration as columns from 1932 have exceeded their protective lifespan. Lastly, poor water drainage / slope of the pavement also leaves the columns in direct contact with water accelerating rusting.
		Superficial Deposit In the corners of roof and wall joints, under the ambulatory ceiling, there are visible deposits of dirt, animal excretion, nesting material or pollutants causing dark marks on the finishes. There seem to be the spider webs as well. These deposits are non biological in nature but result from the presence of animals or insects.	Spiders, or other insects using corner for shelter, depositing organic material like webs, egg sacs or droppings. Since the area is protected from direct sunlight, it is an ideal place for animal colonization. In addition, with winds, there is accumulation of dust and grime causing spots on the surface. Lack of regular cleaning has left long term marks on the finishes.

Solutions & Interventions

- Removal of moss, algae, and dust with a solution of water and mild detergent. A biocidal treatment is needed for preventing regrowth of moss.
- The original and the added wooden frames need to be examined for structural soundness and checking insect infestation or rot. The temporary metal mesh maybe removed for further restoration treatment of the window.
- Epoxy wood consolidant can be applied to a mild decay of wood for consolidation. Crack and gaps in wood to be filled with wood fillers. Then any existing surface finish must be removed and the primer should be applied for moisture and weather resistance. Paint the surface using oil based paint and then glass maybe added according to the requirement.
- Planks should be disassembled with care and the original situation of frames should be analyzed before any intervention. If the planks need to be maintained for a long time, then the maintained of these planks is necessary as they appear to be weathering already with constant exposure to environmental factors.
- The biological growth on the sill needs urgent addressing as it can cause decay also in the rest of the elements of the windows. - The process is already explained in other cases.
- Using soft brushes or low pressure water jets to clean off moss and algae deposits, without damaging the intact plaster.
- application of bio-cleaning solution to kill existing biological growth and prevent regrowth. Using biocide with low VOC (such as QACs, or Hydrogen peroxide) for removal and further growth.
- Degraded plaster should be removed and replaced with new plaster matching with the old one. Lime based grout or mortar should be used to seal cracks and prevent water infiltration.
- Hydrophobic coating maybe applied to the exposed brick or plaster to reduce moisture penetration.
- Improved coping and/or drip edges to improve the drainage situation of the area.
- Using biocides (as mentioned above) to remove existing moss algae and fungi.
- Injecting a silane-siloxane based damp proofing treatment into masonry to block rising damp.
- Installation of drain near the perimeter walls or improving the slopes of the pavement to avoid direct water contact/ accumulation with the walls.
- Application of hydrophobic coating as explained earlier.
- Removing vegetation / plant growths near the base to limit organic deposits and root related damage.
- Carefully removing vegetation manually, ensuring roots are completely extracted to prevent regrowth. For deeper roots, inject herbicide into the root system to kill the vegetation while avoiding damage to substrate.
- Applying biocidal treatment after root removal to kill residue organic matter.
- Sealing of cracks and joints with a compatible mortar to restore wall surface.
- Replacing degraded plaster with breathable plaster to ensure compatibility.
- The rest of the solutions are same as those for biological colonization.
- Treating the surface with biocides to neutralize microbial activity.
- Application of ammonium-based or hydrogen peroxide solutions to remove stains caused by microbial byproducts.
- Preference should be given to Bio based cleaning agents with bio active molecules which are environment friendly
- Application of hydrophobic coatings.
- Improvement of drainage and reducing surface exposure to standing moisture to minimize recurrence.
- Use of wire brushes or sandblasting to remove loose rust and prepare the surface for treatment. Chemical cleaning can also be used for rust removal (such as phosphoric acid). They also stabilize the surface.
- For corrosion inhibition, anti corrosive coatings maybe applied. The primer with zinc-rich formulations to protect the steel from further oxidation to be applied first, and then covering the primed surface with epoxy based topcoat for long term corrosion resistance.
- Enhancing the drainage and assessing the structural stability of the columns for long term solutions.
- Use of soft brush or vacuum to remove spider webs, nests or animal deposits without damaging the surface.
- They should be dry cleaned as using water can damage the finishes and the organic matter may cause staining.
- Check the area for physical / superficial damages caused by animal activity, such as micro cracks or detachment, and repair those areas.
- As the finishes of the overall surface of Ambulatory has multiple detachments and chromatic alterations, it needs to be re plastered/ finished again.
- Using non-toxic, water based insect repellents suitable for building surfaces can help deter re colonization.