

The School of Modern Dance Before Renovation



The School of Plastic Arts Before Renovation



# The Havana School of Arts Complex

## Restoration and renovation of an iconic example of Cuban architecture

If you take a look around the area today, it is difficult to imagine that, up until 1961, there was an 18-hole golf course covering an area of 66 hectares. That was the year when Fidel Castro and Che Guevara decided to completely transform the area, and their plan included turning it into an educational complex dedicated to the arts.

The project was entrusted to the Cuban architect Ricardo Porro, who also coordinated the work, with the aim of turning the new philosophy which had taken root in Cuba into reality: the

result being new architectural forms and a new way of interpreting architectural spaces. Two Italian architects, Vittorio Garatti and Roberto Gottardi, were chosen to work alongside Ricardo Porro. Guided by Porro's ideas, even if the trend in the 1960's was to construct buildings using mainly reinforced concrete, they designed a series of buildings with brick walls covered with terracotta tiles. The buildings had Catalan-style vaulted roofs, known locally as *bòvedas*. They were constructed using the ancient technique, which originated from the Mediterranean area,

of cementing together a number of overlapping layers of tiles. These roofs, which are light and very difficult to demolish, required the use of specialised labour and consultancy work of a specialised engineering team.

The same construction technique was used for the various buildings and, to the naked eye, they seem to be homogenous yet discontinuous at the same time, both open and closed, characterised by both narrow and open spaces, sometimes shady while other times swathed in light from the Caribbean Sea.

There are five schools which make up the complex: two designed by Ricardo Porro (the School of Modern Dance and the School of Plastic Arts), one by Roberto Gottardi (the School of Dramatic Arts) and two by Vittorio Garatti (the School of Music and the School of Ballet).

As a result of internal political problems, however, the work was interrupted in 1965, and after a number of years, only a part of the schools had been completed. The Schools of Plastic Arts, Modern Dance and Dramatic Arts were used as originally planned, while the Schools of Music and Ballet were only partially used. In 1976, the Higher



Photos 1, 2, 3 and 4.

After removing the tiles, the external coverings of the cupolas and the *bòvedas* (Catalan-style vaulted roofs) were waterproofed by applying two layers of Mapelastic on their surfaces. To increase performance of the waterproofing system, the first layer was reinforced with Fibreglass Mesh while it was still fresh.

Photos 5 and 6.

The tiles were laid on the cupolas and on the *bòvedas* with Kerabond adhesive mixed with Isolastic latex. The tile joints were then grouted using Keracolor GG mixed with Fugolastic.



Institute of Arts was created and transferred into some of the buildings, but only until the Schools Authority was in a financial position to maintain their status. In the 1980's, a large part of the structures had unfortunately fallen into a state of disrepair, and had been over-run by the growth of vegetation.

In 1998, the National Monuments Commission declared the zone a protected area, and the World Monument Fund, with the authorisation of the Cuban Government, included the Schools in the list of the 100 world monuments most in danger and waiting to be salvaged.

In 1999 the renovation issue was finally approached seriously, and it was decided to use and complete the original project, with the help of the three designers used right from the beginning. After almost half a century of being left to its own devices, the complex had a number of problems which involved both the architectural structures and the site on which they had been constructed. Also, because of the sheer size of the project, which included 27 different lots, it was decided to start the renovation work of the five most significant buildings, in the following order: the School of Plastic

Arts, the School of Modern Dance, the School of Dramatic Arts, the School of Ballet and the School of Music. This article takes into consideration the renovation operations carried out on the first two, which started in 2003 and which are now entering the final phase. On the 26<sup>th</sup> of January this year, the work was awarded the gold medal in the renovation section at the 6<sup>th</sup> Salòn de Arquitectura Cubana (an exhibition devoted to Cuban architecture), and on the same occasion, it was also awarded a prize from the Cuban magazine *Obras*.

#### **A Careful Analysis of the Site**

Before starting the intervention, a preliminary phase started in 2000 to carry out a series of topographic and architectural assessment tests. Technical surveys were carried out in order to quantify and evaluate the state of deterioration of the constructive elements for each and every School; the ceramic materials were analysed; a study and inventory of the plant life surrounding the site was completed and the drainage system for the rain water was carefully checked, and was found to be in either a poor state or, in some points, completely blocked. Environmental

studies were also carried out, along with a study of the flooding cycles of the torrent which crosses the site.

In fact, the orographic analysis of the site revealed a variety of hillocks and flat land, which is typical of a golf course, and crossed by the Rio Quibù river.

On the basis of the surveys and analyses carried out, a plan was drawn up to restore the environment of the site and, after a few months of further technical discussions with the specialised building companies involved in the project, in 2002 Ricardo Porro gave his seal of approval to the definition of the work phases. The company assigned to the project decided to use Mapei systems, and chose the Mapei Technical Service Department to follow and supervise the work.

The main intervention was based on the restoration and maintenance of the architectural structure, preceded by repairs of all the damages with full respect for the original design features as for both the architectural solutions and the decorative elements, while the internal layout of the old buildings was modified to make them more suitable for the new requirements of the school programmes.





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Photo 7.  
Once the damaged concrete had been removed, the reinforcement rods were exposed. They were then cleaned and treated with Mapefer anti-corrosion mortar.

Photo 8.  
The damaged parts were rebuilt using MapegROUT T60 fibre-reinforced thixotropic mortar and MapegROUT Thixotropic controlled-shrinkage mortar.

Photo 9.  
The restored surfaces were smoothed and levelled with Mapefinish mortar mixed with Planicrete latex.

By implementing the conservation and protection systems tested in Mapei's R&D laboratories, and which had been singled out specifically for the project by the Mapei Technical Service Department, it was possible to approach and find a solution for all the problems mentioned in the technical specifications for the project. Now let's see exactly how.

**The Problem of Graffiti and Vegetation**

Initially, the internal and external surfaces were cleaned using high-pressure hydro-jets to remove all the dirt which had been deposited on them over the years. The walls which had been defaced with graffiti and other kinds of writing were cleaned and treated. For the brick walls, WALLGARD GRAFFITI REMOVER GEL\* gel detergent based on non-toxic solvents was used to remove graffiti without damaging the surfaces. The tiled areas were cleaned using PULICOL\*, a special gel solvent used for removing old adhesive from marble and ceramic tiles, and KERANET\*, in this case in liquid form, a cleaning solution which is particularly suitable for the removal of lime efflorescence from the surface of ceramic tiles.

Over the years, the state of abandonment and the lack of maintenance had allowed the trees to grow right up to the boundaries of the buildings. Before starting to work, the surfaces of the walls had to be treated and disinfected using a 10% solution of bleach to completely eliminate all the weeds and roots.

Then, where possible, the old render and masonry work on the walls, the columns, the porticos and the bòvedas were consolidated by applying PRIMER 3296\*. Because of the micro-particles of acrylic polymers which form the



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structure of this special primer, it has the property of penetrating into the construction materials, thereby consolidating the substrate.

**Reconstruction and Waterproofing of the Structures**

The reinforced concrete structures, such as the gutters and parapets, showed particularly high signs of deterioration. Therefore, the portions of concrete in either a poor condition or at risk of detachment were removed, right down to the reinforcement rods. The rods were then cleaned and treated using MAPEFER\* corrosion-inhibiting mortar made of polymers in water dispersion. At this point, it was now possible to rebuild the damaged portions using MAPEGROUT T60\* fibre-reinforced thixotropic mortar and MAPEGROUT THIXOTROPIC\* fibre-reinforced controlled-shrinkage mortar.

The rebuilding operation was then completed by applying MAPEFINISH\* two-component cementitious mortar mixed with PLANICRETE\* synthetic rubber latex, to even out small imperfections in concrete and to create a

uniform surface after repair work. It was also necessary to renovate, protect and waterproof the cupolas on the buildings and the vaulted roofs of the bòvedas, which were suffering from damage due to damp and detachment of the ceramic material.

For the external coverings of the cupolas and the bòvedas, the expansion joints and the perimeters of the vaulted roofs were first sealed by applying MAPEBAND\* alkali-resistant rubber tape with felt bonded in place using MAPELASTIC\* mortar, and MAPEFOAM\* polyethylene foam cord. The next phase was the waterproofing cycle, carried out by applying two layers of MAPELASTIC\* cementitious mortar on the surface, to create waterproof and protective coatings with a high degree of flexibility.

To improve the already excellent performance characteristics of the MAPELASTIC, especially when it is applied on surfaces which are particularly cracked or subject to stresses such as in this case, the first layer was reinforced using FIBREGLASS MESH\* while it was still fresh.



final characteristics, and sufficient strengths even under difficult conditions. The joints were then sealed using MAPESIL AC\*.

Inside the buildings, the pillars on which the vaulted roofs of the bòvedas and cupolas are positioned were initially consolidated by injecting MAPE-ANTIQUE I\* hydraulic binder, made from inorganic materials with a poz-zolanic reaction.

The tiles which were in a poor condition were then removed and were replaced using new ones, again laid in place using KERABOND\*+ISOLASTIC\*, while the joints were grouted using KERACOLOR GG\* and ULTRACOLOR\*.

*Photos 10 and 11.  
Inside the buildings, the pillars on which the vaulted roofs of the bòvedas and cupolas are positioned, were initially consolidated by injecting Mape-Antique I. The tiles were then laid using Kerabond+Isolastic. The tile joints were then grouted with Keracolor GG and Ultracolor.*

*Photo 12.  
The final protective coat for the concrete was made using Elastocolor Primer, followed by Elastocolor Paint, using a colour similar to the original one.*



### The Correct Way to Lay Tiles

At this point, it was now possible to lay the tiles on the cupolas and on the bòvedas. The tiles were manufactured especially for this project, by following the original indications of the architects. KERABOND\* cementitious adhesive was chosen to bond the tiles, mixed with ISOLASTIC\* flexible latex (instead of water) to improve its

performance and deformability to C2 class requirements (improved cementitious adhesive) according to EN 12004 standards, and S2 class requirements (highly deformable adhesive) according to EN 12002 standards. The tile joints were grouted using KERACOLOR GG\* high-performance grout, in this case mixed with FUGOLASTIC\* liquid additive, to achieve particularly high

### Fighting Damp

Both the external and the internal walls were highly damaged, which over the years had completely ruined the original render, making it crumbly. The first operation was to remove all the areas in a poor condition and, after cleaning all the surfaces, the Mapei Technical Service Department recommended the





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work on old, damaged stone, tuff and brick buildings, was applied on the masonry work. The next step was to spread on a layer of MAPE-ANTIQUÉ MC\* light-coloured dehumidifying mortar, at a thickness of from 1 cm to 3 cm, to even out the surface. This operation was completed by applying MAPE-ANTIQUÉ FC\* light-coloured fine mortar, with a base of hydraulic binders with pozzolanic-reaction, additives, and finely graded natural sand.

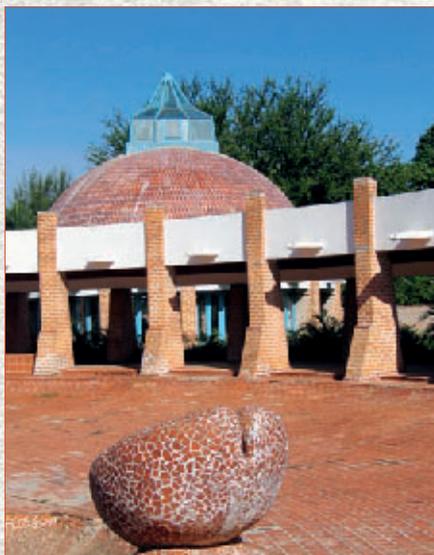
**And to Finish Off: Protecting and Decorating**

For the final protection, ELASTOCOLOR PRIMER\* high-penetration fixing primer was spread on the concrete. This product penetrates deep down into the substrate, and guarantees excellent insulation and a good bond for the successive painting cycle. This was carried out using ELASTOCOLOR PAINT\* protective elastic paint, in a colour specially chosen to be as similar as possible to the original one.

*Photo 13. The parts of the structures covered with ceramic tiles were protected using Antipluviol S and Antipluviol W colourless impregnating solutions.*

*Below. The final result of the renovation work.*

the MAPE-ANTIQUÉ System to bring the walls back to their original splendour, while at the same time to protect them against damp. A 5mm-thick layer of MAPE-ANTIQUÉ RINZAFFO\* pre-packed, salt-resistant mortar, particularly recommended for restoration



Two products from the ANTIPLUVIOL line were used to protect the structure covered with ceramic material. ANTIPLUVIOL S\* and ANTIPLUVIOL W\* colourless impregnating solutions, with the former having a siloxane resin base and the latter a silane and siloxane base in watery emulsion, which protect the surface from the rinsing action of the rain, but without altering its final appearance. When applied on porous substrates, these products penetrate deep down and form a water-repellent layer inside the pores and capillaries. The first part of the intervention, which was to prove long and complex, was carried out successfully thanks to the excellent cooperation between the building company which carried out the work, the designers and the Mapei Technical Service Department. This important restoration project has still to be completed, and at the moment, renovation work is being carried out on the remaining buildings.



**\*Mapei Products:** the products mentioned in this article belong to the "Products for Ceramic Tiles and Stone Materials" and "Building Speciality Line" ranges. The technical data sheets are available on the "Mapei Global Infonet" DVD or at the web site: [www.mapei.com](http://www.mapei.com).

Mapei's adhesives and grouts conform to EN 12004, EN 12002 and EN 13888 standards.

**Antipluviol S:** transparent siloxane resin-based water-repellent compound.

**Antipluviol W:** colourless, water-repellent silane and siloxane-based impregnator in watery emulsion.

**Elastocolor Paint:** protective and decorative elastic paint based on acrylic resins in water dispersion.

**Elastocolor Primer:** solvent-based fixing primer with high penetration properties for porous substrates and curing agent for repair mortars.

**Fibreglass Mesh:** alkali-resistant fiberglass mesh for reinforcing interior and exterior levelling compounds.

**Fugolastic:** liquid polymeric additive for Keracolor FF and Keracolor GG.

**Isolastic:** flexible latex additive to be mixed with Kerabond, Kerabond T, Kerafloor and Adesilex P10.

**Kerabond (C1, becomes C2 and S2 class when Isolastic is added):** cementitious adhesive for ceramic tiles.

**Keracolor GG (CG2):** high-performance cementitious grout, polymer modified, for joints from 4 to 15 mm.

**Keranet:** acid-based cleaner for ceramic tiling. Particularly suitable for removing efflorescent salt and the final cleaning of terracotta. As a powder (concentrated) or liquid (15% water solution).

**Mape-Antique FC:** cement-free, light coloured, fine mortar for finishing dehumidifying mortars applied on stone, brick and tuff masonry.

**Mape-Antique I:** cement-free, fillerized hydraulic binder, for consolidating, by injection, stone, brick work and tuff structures.

**Mape-Antique MC:** pre-packed, cement-free, light coloured dehumidifying mortar for the restoration of damp stone, brick and tuff structures.

**Mape-Antique Rinzafo:** light coloured salt-resistant, cement-free pre-packed mortar to be used before applying Mape-Antique MC, Mape-Antique CC and Mape-Antique LC dehumidifying mortars on stone, tuff and brick substrates.

**Mapeband:** alkali-resistant rubber tape with felt for cementitious waterproofing systems and liquid membranes.

**Mapefer:** two-component corrosion-inhibiting cementitious mortar for protecting reinforcing rods.

**Mapefinish:** two-component cementitious mortar for finishing concrete surfaces.

**Mapefoam:** round closed cell expanded polyethylene foam cord as an aid to elastomeric sealants for the correct sizing of the movement joints. Available in coils where the length is proportionate to the diameter.

**Mapegrout T60:** sulphate-resistant thixotropic fibre-reinforced mortar for the repair of concrete.

**Mapegrout Thixotropic:** controlled-shrinkage fibre-reinforced mortar for the repair of concrete.

**Mapelastic:** two-component, flexible cementitious mortar for waterproofing concrete, balconies, terraces, bathrooms and swimming pools.

**Mapesil AC:** solvent-free, acetic-crosslinking mildew-resistant silicone sealant, available in 26 colours and transparent.

**Primer 3296:** acrylic primer in water dispersion with strong penetrating action for consolidating porous surfaces and unsound screeds.

**Pulicol:** gel solvent for removing adhesive and paint.

**Planicrete:** synthetic-rubber latex for cementitious mixes.

**Silexcolor Marmorino:** trowelable, highly decorative, vapour permeable, fine finished, silicate-based mineral paste coating, for interior and exterior applications.

**Ultracolor (CG2):** fast setting and drying, anti-efflorescence grout for joints from 2 to 20 mm, available in 26 colours.

N.B. The product has been replaced by Ultracolor Plus.

**WallGard Graffiti Remover Gel:** gel detergent for graffiti-damaged surfaces.

## TECHNICAL DATA

**Havana School of Arts Complex** – the School of Plastic Arts, the School of Modern Dance – Havana (Cuba)

**Work:** reinforcing, waterproofing and finishing the cupolas and the bovedas; laying and grouting terracotta tiles on the bovedas and cupolas; rebuilding the damaged concrete sections; protecting and decorating the masonries.

**Years of Construction:** early Sixties

**Years of Works:** 2002 - 2008

**Customer:** Ministerio de Cultura de Cuba (Cuban Ministry of Culture)

**Project:** arch. Ricardo Porro, arch. Vittorio Garatti and arch. Roberto Gottardi  
**Renovation Project:** arch. Universo Garcia and colleagues

**Work Management:** Ministerio de la Construcción de Cuba – MICONS (Cuban Ministry of Building)

**Contractors:** Contingente Nico Lópes, ENIA, ECOING 5, Carpintería Habana del MICONS, Empresa Constructora Puerto Carenas de la Oficina del Historiador

**Mapei Distributor:** Arca '99 (Cuba)

**Mapei Coordinator:** Pedro Graniela (Arca '99) and Renato Soffi (Mapei SpA)