

The Built Heritage and Contemporary Colours

Jorge de Novais Bastos¹

Abstract. The human role in the built environment goes far back in history. Some unique buildings have survived not only to major events (earthquakes, demolition, revolutions) as well as to personal neglect. A building is a living object and much of its survival depends on the deep understanding that the owner, the designer and the rehabilitation technician devotes to it. Many architectural masterpiece buildings result from a combination of several factors – iconic contents, materials tectonics, landscape/site integration, design solution creativity and human response (interest) to the object. This study purpose is to analyse radically different buildings, yet with spatial/ formal links. The Lisbon Marquis de Fronteira Palace and Colorado’s Denver Museum of Modern Art. Both have some common features probably from their Italian “roots”. The different colours extensive use (Marquis de Fronteira) or its absence (Denver Museum of Modern Art), can become a major design challenge where light and silence play an important role.

1 INTRODUCTION

The Palace Fronteira (“Palácio dos Marqueses de Fronteira e de Alorna”, in Benfica), nestled at the Monsanto foothills, has been undergoing an extensive restoration program under the Foundation that manages this Estate. Once located at the outskirts of Lisbon, is now inside the urban Lisbon area, due to the last century fast city growth. A XVI-th century small chapel (1584), where St. Francis Xavier celebrated his last mass before departing to Asia in April 1541, and a hunting lodge existed. The master plan was probably based on the Italian Renaissance arch. Sebastiano Serlio drawings and the generous spatial dimensions created more than three hundred years ago still wonder visitors. The construction probably lasted from 1667-68 until 1675. One construction report by the Marquis Filippo Corsini describing the construction site visit by the Italian Prince Cosme de Medicis on February 7, 1669, mentioned that “a magnificent house is under construction at the Lisbon outskirts” (“*si va al presente fabbricando*”), (see [1], [6],[7]).

After some years of arduous construction works, which began in 1667 or 1668 and lasted until 1675, the Count Dom João de Mascarenhas (1632-1681) went nearly into financial exhaustion, because of the need to convey all the water resources from the Monsanto hill to the Palace location and the extensive earthworks – landfills and excavations, deemed necessary for the garden’s “*parterres*” being created. This remarkable feat of hydraulic engineering and public works surveying succeeded with the excellent integration of the new building under construction, surrounded by man-made magnificent “*parterres*” and reflecting ponds – water tanks (see [4]). With the Great 1755 Lisbon earthquake, the Marquis and his family permanently settled in this Benfica estate permanently, Figures 1, 2, 3 and 4.

¹Full Professor., University of Lisbon – School of Architecture; Portugal
E-mail: jnbastos@fa.ulisboa.pt;



Figure 1. The Fronteira Palace and the Monsanto hill (Lisbon).



Figure 2. Field-Marshal Count Dom João de Mascarenhas.

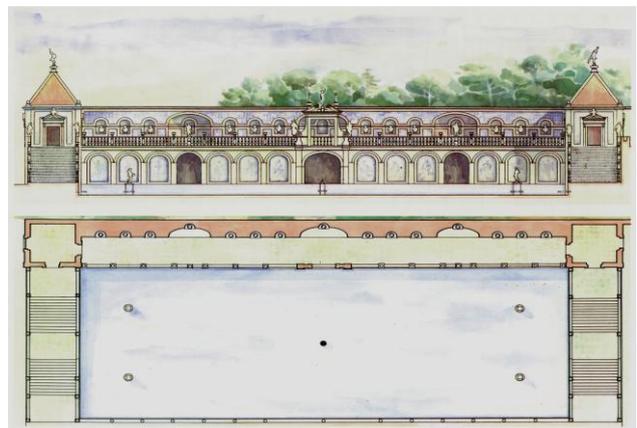


Figure 3. The King’s Gallery (H. Carita and H. Cardoso [4]).

In Denver, Colorado, the Museum of Modern Art (1971), designed by the Italian arch. Gio Ponti (1891-1979), from Milan, the local architects James Sudler and Joal Cronenwett, and having the museum curator Otto Bach as a consultant, (see L. Ponti [9]), represents an interesting example of an extensive plain façade that uses of glazed tiles to create a live, stunning effect on the observer, see Figure 5.

One of this study purposes is to compare similar visual and colour effects based on architectural design solutions built more than then 300 years apart, in order to underline the construction masses against the blue sky hemisphere and the apparently inert volumes which became live with subtle colour and glimmering effects. Artificial intelligence and computer modelling are powerful tools to develop parameter studies and quick changes on architectural solutions. However, field observations on the built heritage and the establishment of strong correlations of different constructed building solutions, even in different eras, can provide an useful design tool for future projects.

An increasingly ageing European population, with a long historical tradition, is well aware of the need to maintain its cultural heritage. Current building techniques and special restoration procedures also need to be assessed before being implemented. Under this restoration process, the Palace and its ensemble underwent an extensive restoration program, on a long term twenty year plan. This important cultural asset well deserves to be preserved.

2 THE FRONTEIRA PALACE ENSEMBLE

An estimated area of 50,000 sq. m., enclosed within a tall stone-masonry wall that helps to create a certain level of intimacy and to protect from vandalism, is occupied by this built ensemble, i.e., the Palace, the gardens, the orchards, the farming plots and the forest, occupies. More than twenty years ago, increasing traffic conditions in this north Lisbon region area, associated with pollution and vibration effects due to the construction of a new expressway and the Sintra railway line tracks duplication, increased the deterioration rate that was observed in the building facades and its structure.

In the early 1990's, the "Marquis de Fronteira" Foundation, started a well-structured, yet discreet, restoration strategy to rehabilitate this three-hundred year old landmark building. The adopted 25-year methodology included both the restoration of the built ensemble and the surrounding gardens. Simultaneously, a public awareness marketing strategy towards cultural and national heritage aspects was established. The visitor's program (public, educational institutions, cultural events, catering, and word-of-mouth), helped to spread the message towards the urgent need to adopt restoration measures with adequate budget estimated in 2,5 mEuro. A state and private funding policy also helped to start a long-term program which became a case study for public institutions and curators under an increasing pressure to maintain and publicise the built heritage under their grip.

The actual building design source of inspiration are the Italian arch. Sebastiano Serlio (1475-1564) classical drawings (see C. Azevedo [1], S. Frommel [14]). Other possibility are Rubens "folio" engravings of the Genoa Palace – Villa Sauli designed by Galeazzo Alessi in 1555-1556 (G. Kubler [3]). Although this unique building ensemble has an unknown author with strong Italian influences, the accomplished final result has a classical proportion and original, creative solutions, Figures 4, 6 and 7.

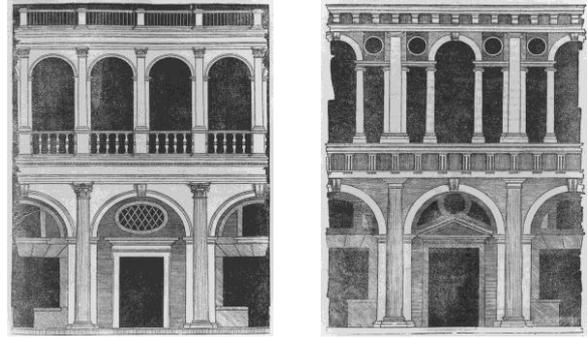


Figure 4 – S. Serlio – “Quarto Libro di Architectura” – (S. Frommel [14]).



Figure 5 – The Denver Museum of Modern Art (L. Ponti [9]).



Figure 6 – The Fronteira Palace - north loggia and entrance.

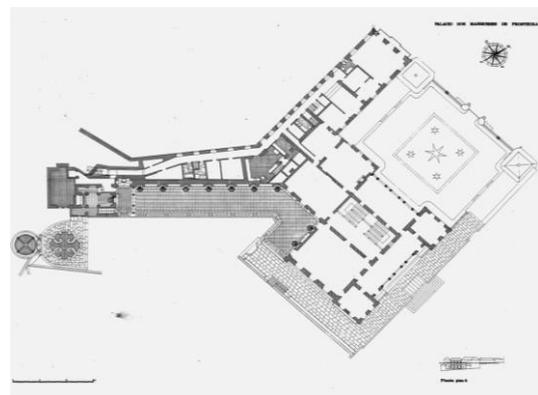


Figure 7– The Palace plan – 1st floor + 4.80m (*piano nobile*).

The Mannerist style building façade, with the loggia main plane slightly recessed from the two adjacent turrets, the ground floor triple arcade with Doric-style columns supporting the first floor triple arcade with Ionic-style marble columns, yields an accomplished final result of classical proportions, see Figure 6. The traditional features - the “azulejos” (glazed ceramic tiles), the painted stuccos, wisely included in the general design makes the whole ensemble unique.

The initial building plan is supposed to have “absorbed” the original hunting lodge and incorporated within its structure the new spatial layout being built. A central square shaped core with the plan dimensions of approximately 12.0m by 12.0m is surrounded, in its corners, by three façade rectangles with an approximate size of 5.0m by 12.0m. Each one of the existing three corners generates a protruding turret with a rectangular size in plan of 5.0m by 6.0m. The total square plan dimensions are 25.0m by 25.0m. The fourth rectangle and corner incomplete turret was, during construction phase, partially demolished to adapt to the existing rock (basalt) foundation conditions and to help create a generous outdoor space - the balcony, bordering the intimate Venus garden. This construction phase solution profusely decorated with deep blue glazed tiles, Greek mythology sculptures, De la Robbia type medallions becomes a meditation promenade between the main building and the Chapel. The first floor is approx. +4.80m above ground level and the roof cornice is at approx. +9.60m, Figure 6. The second floor area occupies the west-wing area at approx. +7.20m from the same basis level, Figure 6.

The traditional construction materials were: (1) stone masonry walls joined with lime mortar. The exterior façade finishing has several lime mortar layers and, the last one, incorporates a dark red oxide pigment that gives the traditional red colour to the wall surfaces; (2) the interior wall surface is made of several lime mortar layers and the last one has a painted stucco surface; (3) the north loggia ground floor exterior pavement is built with limestone slabs joined with lime mortar. The other interior ground floor pavement surfaces are made of ceramic floor tiles; (4) the first floor pavement is built with wood beams supported on their edges into the masonry walls. Wide wood floor boards, with considerable length were used on the final floor surface.

Some areas subjected to earlier renovation works, e.g., the iconic Room of the Battles (1640-1668), Figure 8, a well-detailed, simply conceived pitch-pine floor is used which creates a balanced ambience. This unique space has the walls partially decorated with “azulejos” panels depicting the several battles fought against the Spanish armies during the National Independence Wars (1640-1668) until the armistice was signed between both kingdoms, Figures 8, 9 and 10, (see [6], [13]).

The powerful creative images designed on these panel’s tiles were, probably, conceived by a soldier that was present in all these Battles. These iconic, more than 300-year old tiles, show the brave English allies running out of bullets and keep fighting with their empty muskets, see Figure 9. On other Battle scene, the Palace landlord – Count Dom João de Mascarenhas, after being ambushed, is singly fighting back, the retreating Spanish army General Don Juan de Austria, natural son of King Phillip III, of Spain, Figure 10.

The ceiling double “skin” concept and the wood roof structure improve temperature and acoustical comfort conditions. The ceiling plaster barrel vault shell, painted with soft pastel colours is suspended from the wood roof trusses, Figure 8.

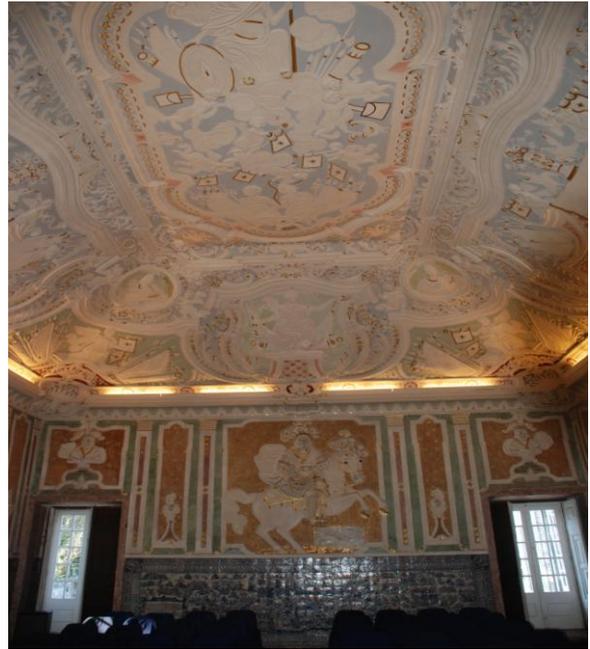


Figure 8 – The Room of the Battles (1640 - 1668).



Figure 9 – The brave English allies and their empty muskets.



Figure 10 – A Battle bravery scene.



Figure 11 – Nature permeating into the Battles Room.



Figure 12 – The Venus Garden – a Monet’s nature vision.



Figure 13 – The Venus Garden – deep blues and reds.



Figure 14 – “Les Singeries” – an entertaining garden panel.

A designer colour master must experience all the possible, endless combinations with each individual component. Three different perspectives can be followed to appraise important colour aesthetics: (1) impression (visually); (2) expression (emotionally); and, (3) construction (symbolically) (see J. Itten by F. Birren [2], J. Albers [5]). From the color wave length for red (800 μm – 600 μm) to the violet (430 μm - 390 μm), that correspond to a correspondent frequency variation of 400 – 470 ($\times 10^{12}$ Hz) up to 760 – 800 ($\times 10^{12}$ Hz), there is an huge amount of colour possibilities to paint the Fronteira Palace surfaces.

However, the traditionally iron-pigment lime base paint which yields the intense red vermilion produces on the visitor’s brain an intense moment of interest and attraction. On the other hand, the deep blue colour is able place the painted surface planes further away, increasing the garden’s spatial dimensions. The deep blue colour wall surfaces surrounding the Venus Garden create an intense emotion and artificially enlarge this private garden which recreates the intimacy of the Islamic gardens existing in the Iberian Peninsula, see Figure 12.

More than 300 years ago, the Palace Fronteira unknown artist designer was able to achieve several major goals: an iconic statement (the intense red building colour underlines the war hero owner message); the cultural tectonics – the use of local, traditional materials (stone masonry, lime mortar, glazed tiles); landscape integration (different types of linked gardens and a forest enclosed in the estate walls); smart ecological sustainable conditions (water supply tunnel lines hand excavated into the Monsanto hill and useful reservoirs/ water tanks adequately located); and, the sun exposition and the incoming Atlantic winds sheltering by the Monsanto hill. Among this extensive construction program, some humorous, creative appointments are inserted to special locations. The garden bench covered with the cats and monkeys glazed tiles was placed near the baroque lake where a tale story is drawn, Figures 13 and 14. The music teacher is lecturing the cats whereas another is punishing. The second moment shows the surgeon-barber shop where a thorn can be removed from the ca’s paw whereas another cat is having a haircut. The design and fabrication of this XVII-th century panel tiles is a major challenge, because of the different temperature melting point for the different colour mineral pigments, see Figure 14.

The King’s Gallery bordering the reflective pond – the Water Tank (50.0m x 20.0m) has special colour effects due to the use of copper pigment glazed tiles made under the Seville tradition, see Figures 15, 16 and 17. These special tiles produce glittering effects under the Sun giving a particular emphasis on the different volumes contour, Figures 16 and 17.



Figure 15 – The Kings Gallery and the Water Tank.

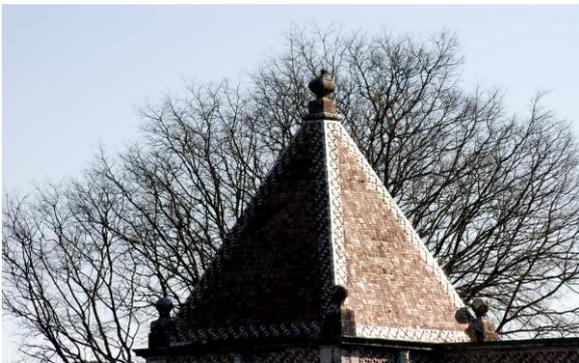


Figure 16 – The pyramid contour underlining.

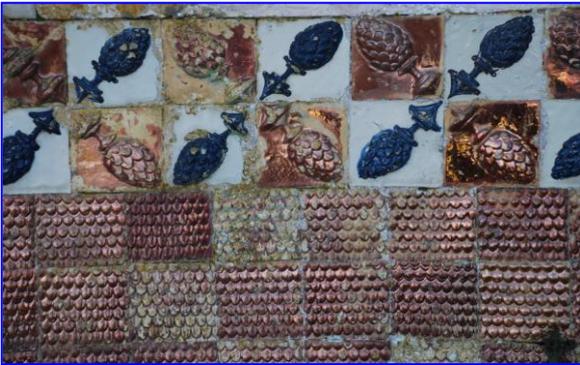


Figure 17 – The different copper pigment reflective tiles.



Figure 18 – The façade contours with a light colour.

Similarly, the main building façades, e.g., North (Figure 6) or East (Figure 18) have both their protruding corner volumes with the central receding Serlian surfaces, “underlined” with a light, cream lime colour, that produces an important visual effect.

3 GIO PONTI AND THE DENVER MUSEUM

In 1957, the Milanese born Italian architect – designer Gio Ponti (1891-1979) publishes a classical book *Amate l'Architettura* where several relevant thoughts related with the Love for Architecture are postulated (see [16])⁹: (1) “Love architecture (L. A.), ancient and modern, because in the scenario it has composed, it has created around us the simultaneity of many ages; it has created the Venice and New York of today.”; (2) “L. A. For the magic it has created around us, around our lives. Think of Venice, think of enormous cathedrals, the sublime monuments, including those that were private palaces and now belong to us because they belong to culture. Their “private beauty” was for the exception, the dream or the folly that originated them. It belonged to one man or one family only, but then a “delayed socialness”, that of History, gave it to all of us.”; (3) “Love modern architecture (L. M. A.); share its ideas and efforts, its desire for clarity, order, simplicity, honesty, humanity, prophecy, civility. L. M. A. : understand its straining towards essentiality, its straining towards an alliance of technique and imagination; understand the cultural, artistic and social movements in which participates; understand its “passion””; (4) “Love the marvellous materials of modern architecture: cement, metal, ceramics, glass; (5) “Demand from them (architects) houses for everyone, happy and perfect for comforting your lives, with highly-civilized, beautiful, serene, luminous, resonant, clear, colored, and pure architecture”; (6) They should make (architects) happy gardens, filled with imagination, as Burle Marx (Brazil) does, and with loving confidences with nature. “

The active Gio Ponti life spanned for more than sixty years with creative master works in several countries and continents: Italy, Brazil, the United States. In this later country, the Denver Museum of Modern Art (1971), or the castle, the fortress, as it is locally known, designed in collaboration with James Sudler and Joal Cronenwett integrates the emotional, total masterpiece work (the “Gesamtkunstwerk”) as Gio Ponti always thrived for, (see [8], [9]). Two six-story juxtaposed cubes have their volumes enclosed by walls which rise above the roof level. These walls are covered with nearly one million of special designed diamond faceted glass tiles, each one carefully set by hand. These wall planes transform the static mass into “vertical dynamic images”.

They change along the day with continuous reflected light, a *chiaro – scuro*, that combined with walls narrow openings create a vivid, dramatic effect. These façade slit windows allow the visitor to glimpse from the inside the Rocky Mountains or the city of Denver and, at night, provide an external spectacle for the passing by inhabitants”, see Figures 5, 19 and 20.

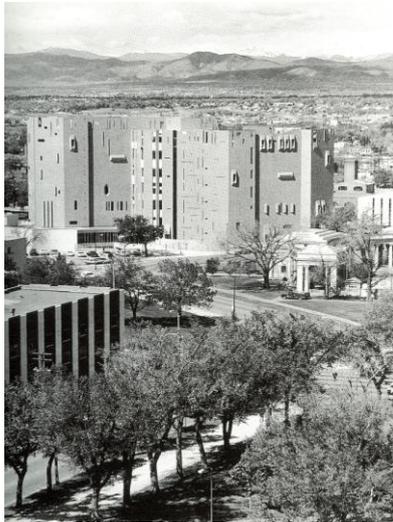


Figure 19 –The Museum and the Rocky Mountains (see [9]).

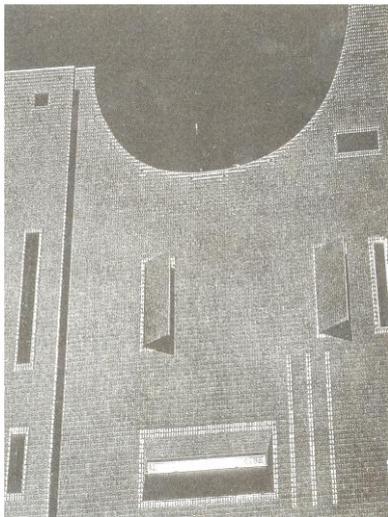


Figure 20 –The Museum façade and the glazed tiles (see [9]).

The importance of light and silence, as mentioned by a contemporary G. Ponti architect, Louis Kahn, is essential to understand our unique built heritage (see [10], [13]). The Renaissance spirit has had a strong influence not only in the Fronteira Palace designer, as well as, more recently in our times in Gio Ponti and other contemporary architects.

4 FINAL OBSERVATIONS

The colour perception within the built environment can become a rich, lively experience. The Fronteira Palace and Gardens, in

Lisbon, is a typical example how the intense red vermillion façades can invite us to visit the building. The Mannerist façade protruding volumes, with their corner edges underlined by the light limestone masonry blocks (ground floor) and the lime mortar yellow colour is an original, Renaissance procedure, to discretely mark these volumes against the clear Lisbon skies.

On the other end of the color spectra are the deep indigo blues used on the garden walls surfaces. In the private Venus Garden, the deep blue colour provides the observer with an unique depth-of-field sensation. This garden view from the Battles Room balcony window creates a Monet type painting in our eyes.

The Islamic Iberian Peninsula garden design heritage by using the Seville copper glazed tiles – the “azulejos”, generates on the observer an extraordinary lively experience with their glittering effects. In the Kings’ Gallery, this special tiles placed along the different volumes’ surfaces (pyramids, turrets, niches) are able to distinctly underline the importance of the constructed phenomena in a subtle, discrete way.

More than 300 years later an excellent Milanese architect and designer, Gio Ponti, adopted a similar concept for the Denver Museum of Modern Art, in Colorado, USA. The use of specially faceted cream colour glazed tiles on extensive façade surfaces, with underlined vivid edges, brings back the memories of the Italian Renaissance master builders transporting all their cultural heritage into contemporary creative, design processes.

The classic arts interplay between colour (or its absence), light and silence are the major objectives to attain an enriching, cultural architectural experience.

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