

Design process of facade colours and an application

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ABSTRACT

Facade colour is one of the most important aspects of settlement, and a major element affecting the general appearance of cities. The facade colours should reflect features of the region and buildings. In this context, before designing façade colours various features of natural and artificial environment, social-cultural background of the society, traditional and natural building materials should be detected carefully.

The aims of this paper are to elucidate colour design process of mass housing, and to explain the colour design of Demirciköy-Bizimtepe Dwellings, in Istanbul, as an application of mentioned process.

1. INTRODUCTION

Facade colours is an inseparable part of architecture and one of the elements for creating meaningful, expressive, discernible architectural environments. Facade colours can modulate a building's appearance, bring it into harmony with its surroundings and make a building appear aesthetics or anaesthetics, well proportioned or distorted, stimulating or monotonous. Therefore, colours and colouring are important pieces in the description and formation of the identity of a region.

Until the 19th century, the building facade colour determiners were the local natural material such as wood and stone. In time, the increase and improvement in building construction materials made it possible to select and use any material in any colour besides painting opportunities, thus a wide range of facade colour emerged. This created many attractive sights as well as many ordinary or unfortunate ones in the city appearance. To prevent the negative appearance of building facade colours, it is obvious that various factors of the city/settlement's/buildings' characteristics such as features of natural and artificial environment and social-cultural background of the society and traditional and natural building materials may crucial roles. In a settlement to avoid inharmonious colour combinations, building facade colours should be designed considering both the building and the environment's characters. In addition, the colour composition of a façade should be designed to have appropriate features in building scale, to emphasise its originality, and in settlement scale; base on the natural, historical, cultural and architectural features of the settlement region.

This study presents some data that may be a guide to some interested parties on façade colour design of mass housing and the colour design of Demirciköy-Bizimtepe Dwellings, in Istanbul, as an application of mentioned process.

2. DESIGN PROCESS OF FACADE COLOURS

While designing a colour arrangement for a single building the designer seems to have several facade colour options. However, it should be remembered that every building is an element of the city, so the selected colours should be in harmony with architectural style as well as the environment surrounding the building ^{1, 2}.

When designing the colours of the facade of an individual building, many factors should be considered: plant life, water elements, climate, historical texture, as well as social-cultural background of the society and both traditional and natural building materials. For mass housings that have multiple buildings, additional parameters should be detected including the site plan, number and location of buildings, building groups, and distribution of buildings in the group as they affect the basic colour selection. Therefore, the colour design of mass housing is more complex than the colour design of individual building. The colours in mass housing should be appropriate to the features of the single building besides all buildings in the settlement, as well as the region where the mass housing is located. In other words, the colour design of mass housings should be done in two basic stages; in

settlement scale and building scale^{3,4,5,6}. Basic criteria of the settlement scale and the building scale can be explained as Table 1. Steps of the settlement scale and building scale are briefly as follows:

a) Settlement scale

1. The determination of the data of natural environment (climate, water resources, green areas, etc.) and artificial environment (historical areas, modern areas, empty land, dimensions, location, architectural style and colours of buildings surrounding) of mass housing.
2. The determination of the colour arrangement options (Table 2) based on the environmental data; the classification of buildings and designing building groups in the settlement.
3. The selection of the most appropriate colour arrangement and colours among the previously determined options and the formation of the colour contrasts, considering building groups in the settlement.

b) Building scale

1. The determination of the natural (water resources, green areas, land slope, etc.) and artificial environmental data (the colour, dimension, location, architectural style of buildings, etc.), and constructional (function, dimension, form, facade architecture, facade materials, etc) data for each building of the mass housing.
2. The selection the colour arrangements and colours of buildings while remaining previously determined colour arrangement for whole settlement.
3. The determination of facade elements that the colours will be applied on (window frame, cornice, fire escape stair, barge, balcony, etc.).

Table 1. Basic criteria of colour design for mass housing.

Settlement scale	Building scale
1. Mass housing settlement – environment relationship The harmony of mass housing colour contrast to natural and artificial environment.	1. Building - building groups relationship Building facade colour coherency in terms of environmental conditions and position in the group.
2. Mass housing settlement - building group relationship 2.1. Coherency of colour contrast among building groups 2.2. Colour harmony of building groups in terms of position in the settlement.	2. Building - façade relationship 2.1. Coherency of facade colour contrast in terms of building features. 2.2. Suitability of coloured surfaces on the facade in terms of area.

Table 2. Colour arrangements⁷.

Colour Arrangement		Features of Colour Components		
		Hue	Value	Chroma
Binary Arrangement	Same Hue Arrangement	Costant	Change	Change
	Same Value Arrangement	Change	Costant	Change
	Same Chroma Arrangement	Change	Change	Costant
Simple Arrangement	Hue Contrast Arrangement	Change	Costant	Costant
	Value Contrast Arrangement	Costant	Change	Costant
	Chroma Contrast Arrangement	Costant	Costant	Change

3. FACADE COLOURS OF DEMİRCİKÖY-BİZİMTEPE DWELLINGS

3.1. General Features of Demirciköy-Bizimtepe Dwellings

Demirciköy-Bizimtepe Dwellings were constructed far from the city centre in a new dwelling zone nearby Black Sea Coasts of Istanbul. This dwelling site was planned by a private cooperative as 106 houses, located on the side of a hill, surrounded by green and forest. Demirciköy-Bizimtepe Dwellings is located on almost rectangular-shaped piece of land, 255 m by 405 m. Height difference is approximately is 50 m in North-South direction of the land.

There are 53 semi-detached buildings which totals up to 106 houses in the settlement. Huge supporting walls were situated among the buildings due to the slope of the land. The supporting walls are covered with greens. Each house is designed as 3 floors (entrance, garden and attic) and a private

garden. The locations of the buildings in the land are shown in Figure 1. The form of buildings is compact in order to reduce the thermal loss. Two different facade materials, wooden coat and plaster with paint were used for each building to reinforce concrete structures. The roofs were already covered with red clay tiles as a certain construction materials were bought earlier by the cooperative administration.

3.2. Colour Arrangements of Demirciköy-Bizimtepe Dwellings

Facade colours of Demirciköy-Bizimtepe Dwellings were designed following the two stages of mentioned above. In this process, first, the factors affecting the colour design were determined and secondly, colour arrangements were selected based on the obtained data. Finally, colours to be used on the facades were determined. Steps can be summarized as below:

a) Settlement scale:

1. There are green elements in the natural environment, and topography of land is too sloppy. Demirciköy-Bizimtepe Dwellings is a suburban settlement and buildings have modern architectural style. There are new contemporary and low raise housing complexes around. However, due to the field topography they are not easily perceived. The settlement region is in a moderate climate. Therefore, there were no restrictions from climatic factors.
2. As known, if a settlement is constructed on sloped land, when looked up to the site, buildings can seem to cover almost the entire visual field, creating a massive appearance. To separate a building from others and to decrease the massive effect of such a settlement, it is useful to use high colour contrast on the facades. On the other hand, in green areas and water sides, cool colours (green, blue, etc) can be suggested to be to harmonise and conserve the natural environment, as well as selecting hue and/or chroma contrasts in small amounts.
3. The settlement was divided into six groups, considering topography of land, site plan, internal and external roads, etc. (Figure 1). Based on the basic specifications determined in the first step, and the mass housing was considered as a whole, and “the hue contrast arrangement” from the colour arrangement options was chosen for settlement scale. Considering the aim to achieve harmony with the green areas around the settlement and the pre determined roof cover colour (red clay tile), the possibilities of facade coating materials hues were chosen from a limited list of options. Thus, two basic hues and four basic colours (green, light green, brown, light brown) were chosen to be applied in this arrangement. From the six settlement groups, three of the groups were coloured in green, one group in light green, one group in brown, one group in light brown. To be environmental-friendly the green colour was chosen to be dominant in the dwelling and other colours were scattered in between groups of green blocks. By this way, when the site is viewed at a certain distance, a harmonious colour arrangement is achieved. The usage of green for 3 groups of buildings works as an adhesive creating a cohesive effect in the colour composition of the settlement. This order may be seen in Figure 1. Munsell colour system symbols of determined colours for the building groups in the settlement scale are given in Table 3.

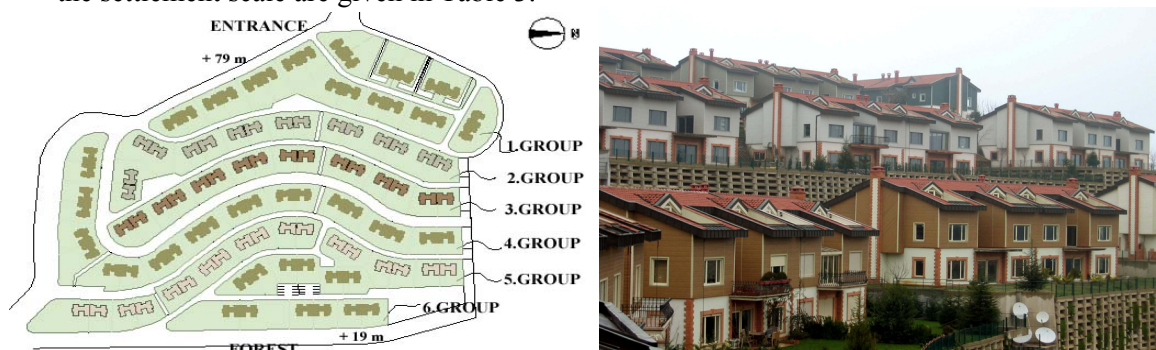


Figure 1. Site plan and a view of the settlement.

b) Building scale:

1. The buildings have modern architectural style and facades are made of wooden coat, paint and stone. The roof coat is made of clay tiles, and the eaves of roof are covered by copper.

The window frames are plastic. Due to the slope of the site, generally the houses appear to be one floored when viewed from the entrance level; on the other hand they have a two-storey appearance from the garden level.

2. A colour arrangement aiming to strengthen the architectural features should be in harmony with the façade construction system and materials. In this context, façade colour arrangements and colours of each building were chosen according to the possibilities of facade materials and colour arrangement determined previously for settlement scale. At building scale, in general, a similar colour arrangement to “same hue arrangement” was applied.
3. Creating a certain effect for observers depends on the existence of one or two of hue, value or chroma contrasts in the visual field. Therefore, to achieve effective and impressive appearances in the colour arrangements, one or two of the façade elements should be chosen as “prominent/dominant element” that has big contrast; and also if the area of the element chosen to be prominent covers a smaller area on the façade visual effect may be more positive⁶. In this dwelling, it is mostly frames and stone coatings were chosen as prominent elements and their colours were selected more saturated/lighted to increase the visual effect. Munsell colour system symbols⁸ of determined colours for the block groups in the building scale are given in Table 3.

Table 3. Munsell colour system symbols of block groups' elements.

Group.	Roof coat	Stone coat	Wooden coat	Paint	Frame
1-Green	7.5R - 5 / 7	9R - 6 / 6.5	10 Y - 6. / 1.5	10 Y - 8.5 / 1.5	10 Y - 9 / 0.5
2-Light green	7.5R - 5 / 7	9R - 6 / 6.5	10 Y - 7.5 / 1.5	10 Y - 8.5 / 1.5	10 Y - 8.5.5 / 1
3-Brown	7.5R - 5 / 7	9R - 6 / 6.5	10 YR - 5.5 / 4	2Y - 8.5 / 1.5	2Y - 9 / 1.5
4-Green	7.5R - 5 / 7	9R - 6 / 6.5	10 Y - 6 / 1.5	10 Y - 8.5 / 1.5	10 Y - 9 / 0.5
5-Light brown	7.5R - 5 / 7	9R - 6 / 6.5	10 YR - 8.5 / 1.5	1.5Y - 8.5 / 1.5	1.5Y - 8.5 / 1.5
6-Green	7.5R - 5 / 7	9R - 6 / 6.5	10 Y - 6 / 1.5	10 Y - 8.5 / 1.5	10 Y - 9 / 0.5

4. CONCLUSION

Colour features besides the physical appearance (dimension, position, shape) and architectural style of buildings that give identity to a street / a square / a settlement are very important in terms of city life and city beautification. If, facade colours are not designed in a certain arrangement, and are not in harmony within the features of both each other and their environments, it is inevitable to result in unfortunate appearances and even colour pollution.

The colour arrangement design of mass housing requires more extensive and detailed study than is needed for a single building because there is more than one building and generally every building has similar architectural features. Because of this, to create attractive, meaningful and aesthetic appearances, features of mass housings should be investigated both at the scales of the entire settlement and single buildings. Further more mass housings' facade colour arrangements need to be designed in harmony with both the architectural and the environmental features of the entire settlement and the buildings within it.

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