

# Improving Streetscape Visual and Aesthetic Values

## A Proposed Methodology for Estimating Values of Aesthetic Judgment and Public Satisfaction

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**ABSTRACT:** design, landscape even on streetscape level. There have been many efforts to conceptualize the term to understand what constitutes aesthetic value. This paper gives an overview of a new approach for modelling aesthetics, starting with Birkhoff aesthetic model and continuing to current ones grounded on mathematical and informative hypothetical concepts. The paper discusses some of the key issues concerning urban design aesthetics, elements and principals in a visualized procedure. This experimental study had been applied on streetscape level as an example to prove that a correlation between perceived visual image and the satisfaction level of city residents could be an effective factor in creating appropriate, attractive and more functional spaces. On the other hand, recognizing the relationship between perceiving aesthetic measure of visual images and time would create new approaches for sensing beauty and measuring aesthetic values based on mind perception. These kinds of approaches would be capable of evaluating architecture design, interior design, urban design projects or any other related fields where aesthetic values are essential for making decisions. Finally, this paper is presenting a unique practice - sponsored by the University of Buraimi and the Governorate of Buraimi- Oman 2014- to improve the city shape of Buraimi and its urban character by enhancing streetscape aesthetic values.

**KEYWORDS:** Aesthetic value, streetscape, city urbanism, perception, measuring aesthetic.

### I. INTRODUCTION

Visual perceptions are mostly accompanied by certain spontaneous feeling of which is separable from emotional, ethical, or rational feeling.[1]The branch of knowledge called aesthetics is concerned mainly with this aesthetic feeling and the aesthetic objects, which produce it. Of primary importance for aesthetics is the fact that the elements/items belonging to a certain class admit of direct intuitive comparison with respect to aesthetic value. [2] To the extent that aesthetics is effective in its scientific purposes, it must offer some rational basis for such intuitive comparisons. In fact, it is of vital problems of aesthetics to determine, those specific characteristics upon which the aesthetic value depends. Aesthetic judgments are mostly administered by a number of factors, for example, symmetry, unity and coherence, ...etc.[3]see Appendix I

The meaning of the word 'aesthetics' is multifaceted and has changed over time. Two key groups of meaning can be recognised. The first is associated with procedures of sensation, as demonstrated by its derivatives, the absenteeism of sensation, synesthetic and instinctive co-sensation. The second group is associated with the notion of aesthetics as deliberated in the humanities, philosophy and art history. In this study, the term aesthetics followed the definition of Jacobsen[3]and Weber[4] which can be briefed as; the neurological phenomenon in which stimulus of one sensory or

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cognitive influential factor leads to an auto, spontaneous experience of satisfaction judgement (or not). In other words, it creates an instant response to perceptual incentives.

This study, at a broad level, aimed at advancing and improving theoretical understanding of the influence of selected urban design principles on the judgments of visual aesthetical qualities of streetscape. Therefore, the study applied certain methodology that took into account to involve and allow non-professionals as well as professionals in its testing process, enabling them to evaluate different proposals of enhancement of streetscape alternatives on an intuitive basis. The study used eleven principals of architecture and urban design key principles of “The Edinburgh Standards for Urban Design” in its analysis and testing procedure.[5] (See methodology section)

Findings would be important for improving urban design recommendations for precise urban locations and intending to help urban designers comprehending some of the elements of making places more attractive and more acceptable by users. Measuring aesthetical values could be considered as a first step for improving perceived visual quality of public spaces. The results would be important also in the field of architectural and urban design. By applying, the findings of this study that concern with measuring aesthetic values of urban design principals and linking them with time of their perception could be as an indicator of success or failure of certain urban design proposals. On educational and institutional level, students entering architecture/urban design departments could be classified according to their mental abilities in perceiving aesthetical values. In addition, by measuring their aesthetical perception at the beginning of some special educational courses and at the end of it, the study findings could measure the progress of their ability and skills in acquiring and realizing vocabularies of architecture/urban design. That could be very effective in altering/modifying courses' syllabus or the teaching methods as well.

## II. AIMS AND OBJECTIVES

The study has three main aims:

1. To measure the effect of aesthetic values of streetscape on citizens' satisfaction that can be considered as the first step for developing and enhancing the visual image of the city.
2. To recognize the relationship between perceiving aesthetic values or ugliness and the time of perception. This correlation shall improve and enhance the streetscape aesthetic values through identifying the most influencing factors.
3. Create a proposed methodology capable of estimating beauty and the degree of public satisfaction, not only on urban design level or streetscape level but also on architecture design level and related fields where aesthetic values are essential for making decisions.

## III. METHODOLOGY: THEORY, PARTICIPANTS AND TOOLS

To improve streetscape visual and aesthetical values for a community or a city, it is crucial to find a methodology capable of being converted to an action plan for measuring satisfaction and dissatisfaction level of users (citizens of the city) and also, recognizing the correlation between the perception of aesthetical values and time.

Recognizing the previous correlation will be considered as a first step to improve the streetscape elements through enhancing their urban design principles. To find such a methodology, an action plan was set depending on participants from different social and educational background categories to represent most of Buraimi City citizens. The study used Ryuzo Ohno et al[6] and Ralf Weber et al[4] methods to measure and evaluate streetscape as guiding lines. In addition, Birkhoff formula for “Aesthetic Measure”[7] was used as a principal formula with an important modification to be objectively measurable. This formula -and its alteration as proposed- is considered the core of this study. The next sections will spotlight in brief on this formula mathematical form, main concept, physiological-psychological aspects and sources.

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## Birkhoff Basic Formula

Birkhoff referred to the characterisation of beauty by the Dutch philosopher Frans Hemsterhuis, “that which gives us the greatest level of satisfaction in the shortest space of time”. [1] Hence, Birkhoff argued that the normal aesthetic experience may be perceived as a mix of three sequential phases:

A realization that the object is characterized by a certain coordination, symmetry or order, or other factors that seems necessary to enhance aesthetic effect. Coded by letter O.

An initial effort of attention that is essential for the act of perception to what called the complexity of the entity, in his analysis he coded it with the letter C;

The weight of value or aesthetic measure that supports this exertion. Coded by letter M.

In his analysis of the aesthetic experience, he suggested that the aesthetic feelings arise primarily because of an unusual degree of harmonious interrelation within the object. Based on that, he considered M, O and C as measurable variables that led him to set his simple equation as:

$$M = O/C \dots\dots\dots [1]$$

Conceivably an annoying consequence of his formulation is happening when the degree of Complexity yields to zero, while the degree of Order takes a positive number, the measure of beauty then will have an infinity end-up result. However, admitting the validity of such a formula, led the research to study individually some of the classes of aesthetic objects to outline the order O and the complication C so that their ratio  $M=O/C$  yields to be numerically measurable figures representing the aesthetic value.

Consequently, it was of this paper main aim to deliberate different simple classes of aesthetic principals related to urban design field in numerical form to solve as best as can be the basic aesthetic dilemma in the mathematical form stated by Birkhoff in this study. Preliminary to such actual application, it was necessary to designate the psychological basis of the formula and the circumstances under which it can be applied.

### - The feeling of effort in aesthetic experience

From the physiological-psychological perspective, the action of consciousness and perception of an aesthetic entity begins with the stimulus of the aural and/or visual organs of sense and lasts until this stimulation and the subsequent intellectual excitation end. [8] To ensure that the act of perception be effectively achieved, there is also essential proper field of attention in consciousness. The attentiveness behaviour has certainly its physiological mutual relationship, which ensures that the motif adjustments essential to the act of perception are influenced when necessary. These alterations are usually made without the interference of motor ideas such as an accompany of all voluntary motor acts, and in this sense, it can be considered ‘automatic’.

From the physiological point of view, the stimulus persuades a nerve current that, after approaching intellectual cortex of the human brain, in part reverts to the edge as a motor nerve current along a pathway of extreme acquaintance, such as responding to any of automatic action.

Now, although these automatic adjustments/alterations are made without the interference of motor ideas, however there is a well-known sense of effort or different strain while the consecutive alterations are called for and achieved. This forms a certain and significant part of the overall feeling characteristic of the state of attention.

On the other hand, the fact that concern of some kind is almost essential for sustained attention would seem to specify that this feeling has not an affirmative (pleasant) manner but moderately a negative one. Moreover, if it is accepted in mind that the so-called spontaneous or auto acts are nil but the outcome of unchanging intended acts usually performed, it is reasonably accepted that there are some nested or stored of the motor ideas formerly elaborated, and that it is these which forms and controls the feeling of effort.

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From such a viewpoint, the sense of effort continuously associated upon perception seems as a summation of the senses of tension that escort the different auto alterations.

## - Modifying Birkhoff Equation (Hypothesis And Argument)

If the earlier analysis were correct, it is logic that the sum of order (O) integral in the aesthetic object, as associated with its complexity (C), produces a derivative sensation for an aesthetic measure (M).

In Birkhoff equation- as mentioned in the previous section- he defined (C) as “an initial effort of attention that is essential for the act of perception”. The problematic issue about this concept is its vagueness and its tools for measuring or estimating objectively or even subjectively. Moreover, a realization that the “object is characterized by a certain coordination, symmetry or order, or other factors” that was expressed by (O), in the basic equation, cannot be defined objectively or measurably but only subjectively. Hence, two slight modifications have been made to the concepts of factors used in this basic equation as follows:

1. The study expressed, identified and replaced (C) with (t); that is “the time of perceiving the aesthetical values and evaluate it numerically”. This modification of concept can fairly represent Birkhoff notion of “an initial effort of attention”.
2. The factor (O) that is “A realization that the object is characterized by a certain coordination as mentioned by Birkhoff; was transformed to (E), that is, ‘the evaluation of those certain coordination that seems necessary to enhance aesthetic effect’. This evaluation will ease the concept of realization/awareness and transform it to quantitative entity and not just qualitative. The numerical evaluation of that coordination (as principles of urban design) was set on a scale of 1 to 13 as will be discussed later in this paper. Hence, the model has been modified to

$$M= E/t \dots\dots\dots [2]$$

The study proposed an argument to this hypothesis on the basis on a rational concept, before proceeding to a more purely mathematical argument. This concept borrows some facts of economic field. Among business firms and companies of a single certain category, which should be considered the most successful? The normal answer would yield to the following form; in each corporation, there is an involvement of a definite investment (i) and a definite annual profit (p). The ratio (p/i) which signifies the percentage of attentiveness on the investment could be considered the economic measure of success.[9]

Similarly, in the perception of aesthetic values belongs to a definite class, there is an involvement of feeling of effort to attain an attention, measured by (t), which is rewarded by a certain positive evaluation, measured (E). It is normal that reward should be related to effort, as in the case of a business company. By comparison, then, it is the ratio E/t which best represents the aesthetic measure M.

The next diagram with the attached legend illustrates the previous analysis of the aesthetic physiological-psychological experience and the basic modification to Birkhoff aesthetic formula and to which it leads. Hence, as can be concluded from figure 1:

- The process starts with an effect that cause a change in aesthetic value- in our case that will be one of the 11<sup>th</sup> principals of urban design chosen by the study. (see next section of methodology)
- This change will be sensed by human organs (eye, ear ..) causing a creation of a signal affecting the cognitive part of the brain.
- The field of sensation will urge another field called the field of tension which is basically related to decision making, evaluation of an action or judging a situation and mostly connected to muscles system by a motor nerve signals.
- This field of tension is responsible for reactions towards the original effect that starts at the beginning of this process.
- The time passed since the recognition of change till making an evaluation is coded by (t)

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- The evaluation itself is coded by (E)
- The aesthetic measure will be calculated as  $M = E/t$

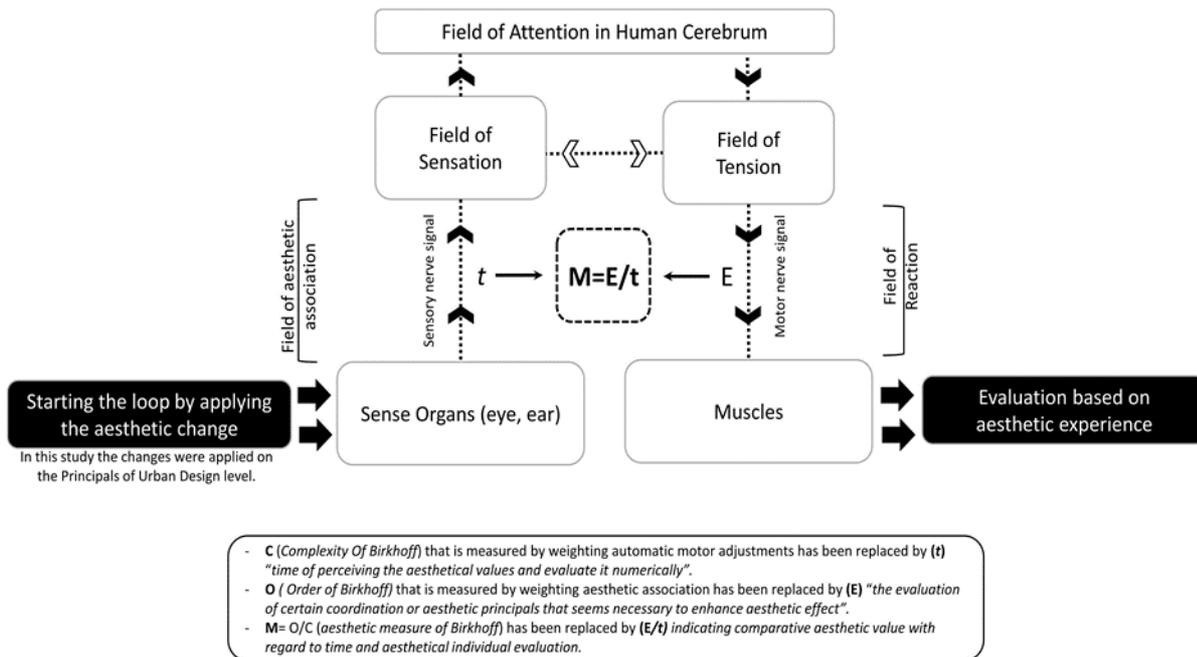


Figure 1: Proposed Aesthetic Formula based on Birkhoff modelling

## Participants

Of 72 volunteers who participated, 32 persons (44%) were men. The median age category was 30 to 40 years, ranging from under 20 to over 50 years of age. There were 55 residents representing (58%) living in Buraimi City. Also, 23 persons (31%) were professionals in architecture, urban planning, environmental protection, civil engineering and related areas of professionalism. An additional 12 participants were from government and Buraimi city council. Students of architecture program at the University of Buraimi have participated with a percentage of (5%).

As has been mentioned in the abstract, this paper is based on an intensive 4 Days workshop held under the sponsorship of University and the Governorate of Buraimi- Oman. Participants from different culture, sex, level of education were involved in the (experiment). The participants were classified into two main groups;

- **Group one:** Architectural Students and professionals who have a reasonable background on the subject dominate this group.
- **Group two:** Layman participants.

## Material

A photographic sequence of images of selected area in Buraimi City, extended over 3 km, from (Hamasa) to (Saaraa) borders' state points between Buraimi and Al-Ain city of UAE. Shots were taken every 100 m starting at the eastern border of the city to the western border. To exclude the factor of asymmetrical illumination by the sun, the photos were taken on an overcast morning in March 2014 between 9:00 a.m. and 1:00 p.m. The photographer position depended on the purpose of the shot. (elevations, perspectives, .....). Three photographs were taken from a slightly altered position

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to avoid only partial capturing of significant buildings. Colour slides were made and presented in (Al-Buraimi More Beautiful) workshop held in 8, 9th of April 2014.

## - Apparatus

Photographs were taken using a 35-mm Nikon FM2 SLR camera with a 50-mm lens and Samsung GT700 12 mega pixels' resolution. Photos modification were made by Adobe Photoshop Cs-5 software to create (Before- After) shots for every taken tested shots.

## IV. PROCEDURE

The study used concepts and definitions of eleven principals of architecture and urban design key principles of "Edinburgh Design Guidance: Urban Design". (David Givan, Emma Rigg, May, 2013) Alterations of (After) pictures were systematically modified by changing one principle and locking the rest.

The order of the original photographs and the modified ones were randomized, marked only by the team. Participants received the (Before-After) shots in disorder manner and were instructed to rate them according to their evaluation and satisfaction based on key principles that were explained and illustrated to them representing streetscape values and aesthetics principles. Using a scale of 1:13, the participants were asked to rank the (45 photos) according to their level of approval and satisfaction. Number (13) represents "Fully satisfied" and number (1) represents "Totally dissatisfied". The (13) ratings scale were paralleled to the common international grading scale of Ryuzo Ohno, Masashi Soeda of Tokyo Institute of Technology in their estimation of "the effectiveness of design guideline regulations for improving streetscapes" published in 2003. (Ryuzo Ohno, 2003)

## - Principals, Field And Weight

The next (11) streetscapes principals had been adopted, explained and illustrated to all participants to be used in the evaluation process. For more details, (see appendix A):

1	Unity and Coherence	5	Proportionality and Balance	9	Domination
2	Simplicity	6	Character and Appearance	10	Repetition and Diversity
3	Gradation	7	Colours	11	Harmony and Contrast
4	Light and Shadows	8	Architecture Elements		

## - Used Technique

Five (5) visual points were selected over nine (9) locations of Buraimi city composing forty-five shots. Those shots (pictures) were named (Before) pictures. (45) pictures.

A manipulation with the use of Adobe Photoshop Cs-5 software was applied to the (Before) pictures. These manipulations were based on changing, adding or modifying the (11) principles of streetscape set by the present study to compose forty-five of (After) photos.

The order of the (45) photographs was set in a systematic way representing the nine locations as letters and the shots as numbers, for example (A-1, B-3, C-2, D-1, E-5 ..... etc.), as appears in figure 2.

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Figure 2. Example of Before/After pictures; presents Area with letter codes and Shots with numbers

Figure 2 represents the satisfaction Vs dissatisfaction of the 72 participants on the 11<sup>th</sup> chosen principals of urban design. The satisfaction and dissatisfaction phase took place twice (Before modification and After). For instance, the first principal (unity and coherence) in the above figure, in (Before phase evaluation), of Area A- Shot 5, 60 participants evaluate the shot with a low score (under 7 out of 13) while only 12 evaluated it with score above 7. However, in (After phase evaluation), 70 participants evaluated the shot with a high score (above 7 out of 13) and only 2 evaluated it with a low score of under 7.

## V. RATING

Participants received the tested material (Before) pictures, as A4 size sheets/papers as illustrated in figure 2, and were instructed to rate them;

firstly, according to the degree of their satisfaction for each of the 11th items that are controlling the streetscape design as proposed by the study and were adopted from a psychological report (The primacy of beauty in judging the aesthetics of objects) (Jacobsen T B. K., 2004 Jun) using anchors of 1: strongly dissatisfied and 13: totally satisfied. The 13th ratings scale is corresponded to the common grading scale of urban design rating systems (Ryuzo Ohno, 2003). A minimum of two items per category was required to generate variance within the data set. Secondly, the participants were asked to rate each of the 11th principles according to the degree of beauty they believe using the same rating scale as can be noticed in figure 3.

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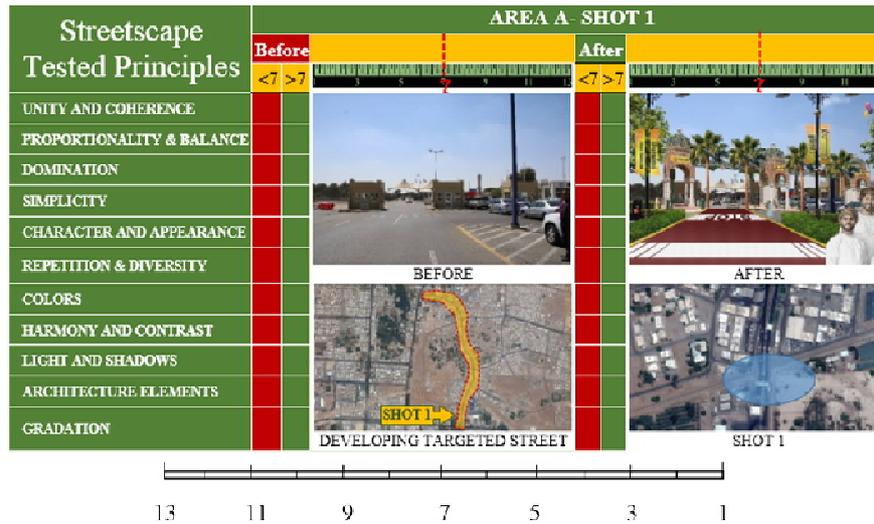


Figure 3. Rating streetscape items according to their occurrence for each shot

## VI. RESULTS

The results were divided into two sections; 1) Satisfaction Vs Dissatisfaction; 2) The relationship between perceiving beauty and time which lead the study into a proposed methodology to recognize beauty or in other words measuring it.

### - Satisfaction Vs Dissatisfaction

The results were recorded for each point of the five areas and presented in charts according to the number of participants who were marked as satisfied or dissatisfied. An average was calculated to express the general vision of the participants for each area as the examples in figure 4, 5.

The recognition of public satisfaction or dissatisfaction could be considered as the first step to realize the existence of a problem. Based on the gained results of the nine location with their five selected visual points, it was obvious that the Buraimi streetscape has a serious problem regarding the quality, existence and misplace of its elements. Moreover, the misappropriate use of applying streetscape principles for streets, squares and pedestrian's paths made the problem even more complicated.

As can be concluded from the next chart, figure 4, which represents results from location A - shot 1 to 5, the first 6 principles (Gradation, Architectural Elements, Light & Shadow, Harmony & Contrast, Colours and Repetition & Diversity) scored the highest dissatisfaction rate (over 90%).

While the next 5 (Character and Appearance, Simplicity, Domination, Proportionality & Balance and Unity & Coherence) scored less and took place in between 75% and 85% rank. On the other hand, in figure 5, satisfaction rates of the manipulated picture showed that high scores were recorded for every principle that has been modified except one (Gradation) that took place in between 75% and 85% rank.

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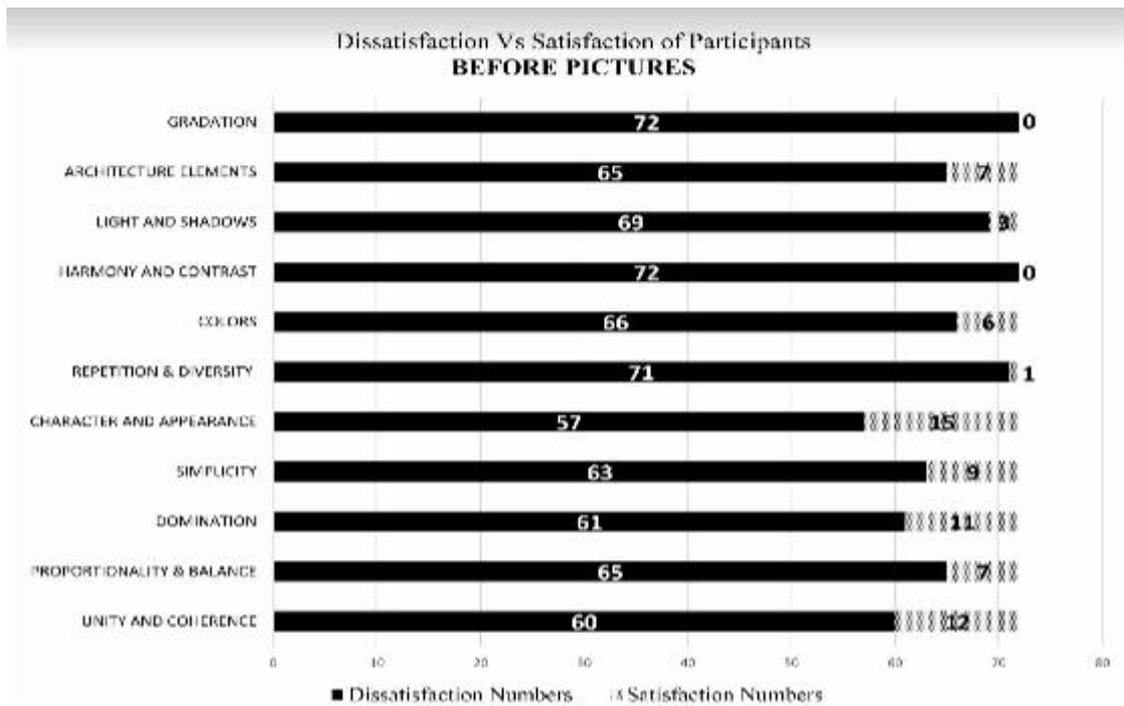


Figure 4. "Area A- Shots 1 to 5 average" Dissatisfaction of Before- Results of 72 participants

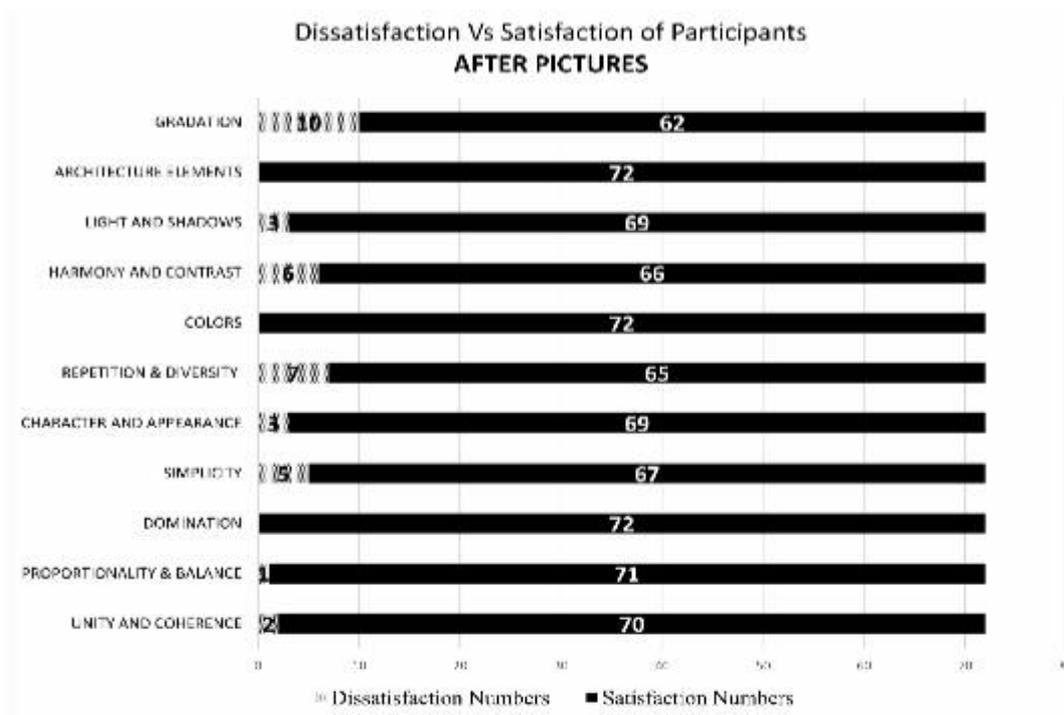


Figure 5. "Area A- Shots 1 to 5 average" Satisfaction of After- Results of 72 participants

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## - Relationships

As being declared in previous sections, the study used Birkhoff model with slight modifications to recognize some relationships related to aesthetic recognition. The process was as follows:

- o Participants were asked to evaluate 45 shots of (After) and 45 shots of (Before) regarding the degree of beauty they believe based on the controlled urban design principals mentioned in the previous sections. Using a scale of 1 to 13, evaluation scores were decoded by the letter (E)

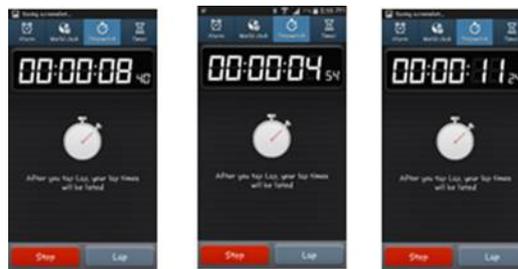
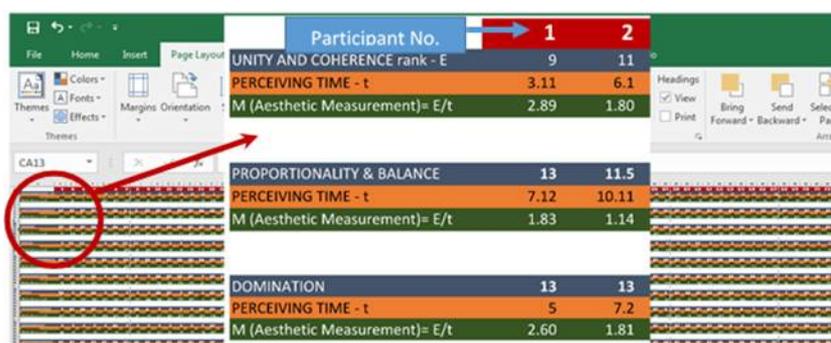


Figure 6. Samples of recorded time (t) accompanied by the determination of evaluation (E)

- o as being illustrated in figure 7, time were measured for each evaluation score by using stopwatches that have been delivered to each participant. Participants were asked to press the stopwatch button once they decided the degree of evaluation. Time was decoded by the letter (t) and measured per seconds.

An analysis of variance for factors that distinguished participated groups as Sex (men, women), knowledge of the Areas-Shots (knowledge: yes, no), and profession (professional Architect, Urban Planner, etc.: yes, no), and the repeated measures of (E) for pictures 1 to 45 was conducted. There was a major main effect that could be realized clearly. This effect indorses that the pictures were evaluated differently with respect to their beauty, however the range of the evaluations was very comprehensive and barely varied between pictures based on given principles of streetscape. None of the variances or any of their interactions that distinguishes groups had main effects or considered significant. These results indicated that sex, knowledge of the area, and profession had no general effect on the aesthetic judgment of the manipulated pictures. For each score of evaluation, we have got (M) that is; the proposed measurement of recognizing aesthetic value.  $M = E/t$  as can be noticed from figure 7.



	Participant No. 1	Participant No. 2
UNITY AND COHERENCE rank - E	9	11
PERCEIVING TIME - t	3.11	6.1
M (Aesthetic Measurement)= E/t	2.89	1.80
PROPORTIONALITY & BALANCE	13	11.5
PERCEIVING TIME - t	7.12	10.11
M (Aesthetic Measurement)= E/t	1.83	1.14
DOMINATION	13	13
PERCEIVING TIME - t	5	7.2
M (Aesthetic Measurement)= E/t	2.60	1.81

Figure 7. Recorded results and obtaining (M) - screenshot

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## VII. FURTHER DISCUSSION ON FINDINGS

From the next charts of figures, 8, 9 and 10 some significant findings can be recorded:

- The average evaluation (E) of the 72 participants showed that a high degree of satisfaction has been achieved. The manipulations and modifications applied by the author for (After) pictures proofed that an aesthetical value has been added to (Before) pictures.

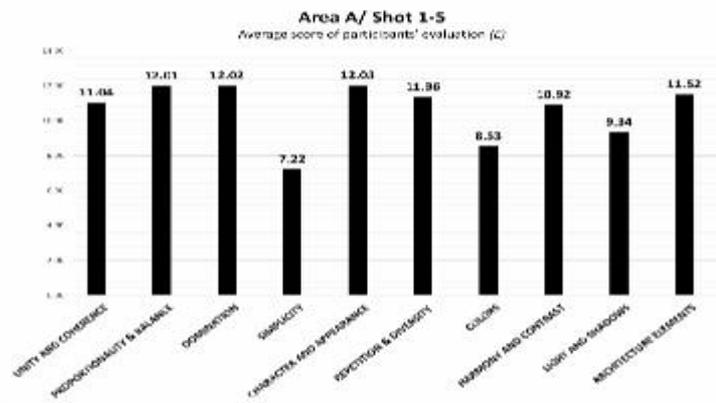


Figure 8. The average of participants' evaluations of (After) pictures shows the high estimation for most of streetscape principles modified and manipulated by author

- Three of the streetscape principles recorded less than expected. These are, respectively, Simplicity, Colours and Light and Shadows as can be concluded from figure 8. The study can recon a similar questionnaire for any development proposed within cities' boundary even if it gets governmental and authorized by local responsible authorities. It is obvious that local general opinion with regard to aesthetical values can be deviated from what is planned or expected.

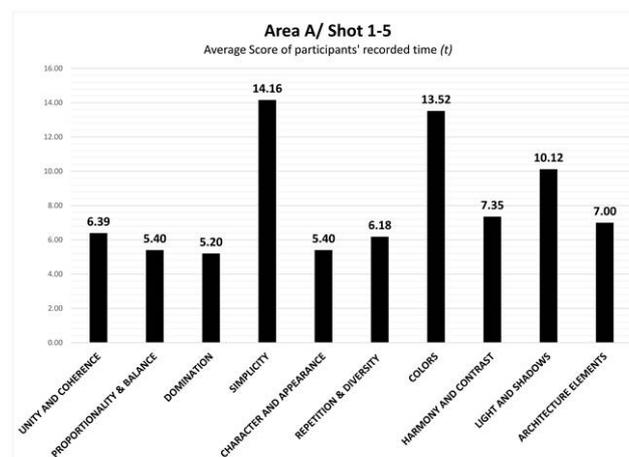


Figure 9. The average score of participants recorded time shows that streetscape principles that scored less scores in (E) took more time (t) to be evaluated

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- By dividing (E) values of figure 8 by (t) values of figure 9, (M) values appear in figure 10 also in a reverse relationship with (t). Noting that values of t were set in an ascending order to facilitate observing the occurring relationship.
- This reverse correlation proves that, recognizing beauty needs less time than spotting ugliness. As appears in figure 11, 12 and 13 of the power trend lines graph of M and t.
- Basic principles affecting aesthetic judgments of streetscapes were explored by having participants rate photos of (Before) real states firstly. A factor analysis of the data obtained in that stage gave a set of four principals affecting aesthetic judgments of streetscapes. This process appears to function independently of specific character of a streetscape, for some areas, it is largely spatially inhomogeneous and may thus, resulted in multiplicity of characters, represent different typical streetscapes.

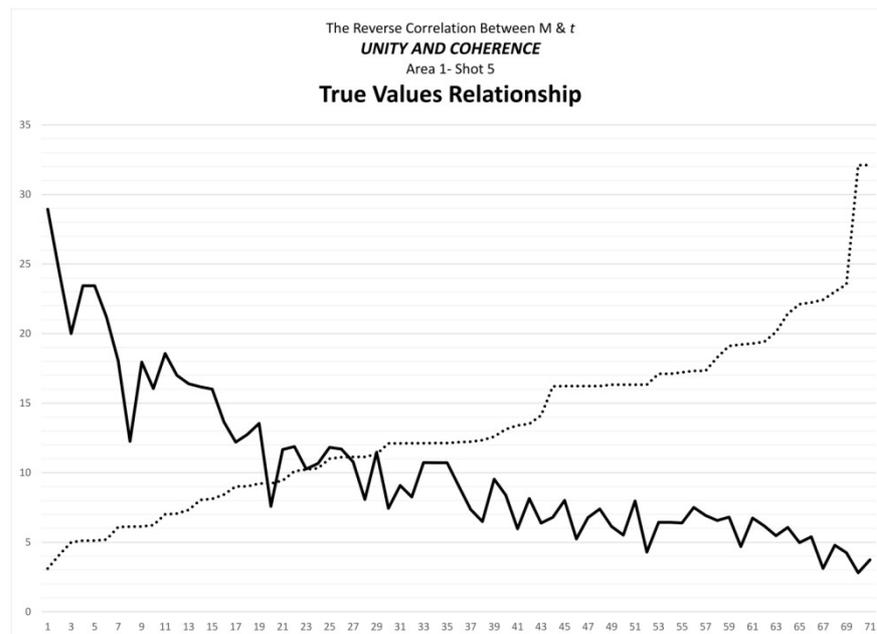


Figure 10. The values of M (participants' evaluation scores (E) divided by the needed time for each evaluation (t)) in accordance with ascending order of (t) (time recorded respectively of each E)

However, additional testing of this process using a different street preferably in a different cultural setting would be valuable. Although the general approach of using photographs to assess urban design states is not new, results have proved that the assessment is a suitable tool:

- for the analysis of aesthetic judgment of streetscape properties, i.e., the determination of hypotheses of the basic factors that affect these judgments (satisfaction and dissatisfaction), and
- for exploring the effects of different urban design alternatives on the aesthetic judgment,
- and finally the determination of certain relationship between recognizing aesthetic judgment, mental perception and time.

The advantages of this technique are the fast and easy creation of a visual simulation for which no specific hardware is required. Photographs and photorealistic images as part of most participants' normal experience are unlike most of architectural graphic standards like as plans and elevations that are readable by experts. They do not signify technical barriers that might affect the assessment findings and results. The whole process is independent of lab equipment and

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extensive computer modelling. It is economic, flexible, and vigorous. Consequently, the present method can be applied to recognise the significant fundamental of urban design or streetscape properties of a condition under inquiry.

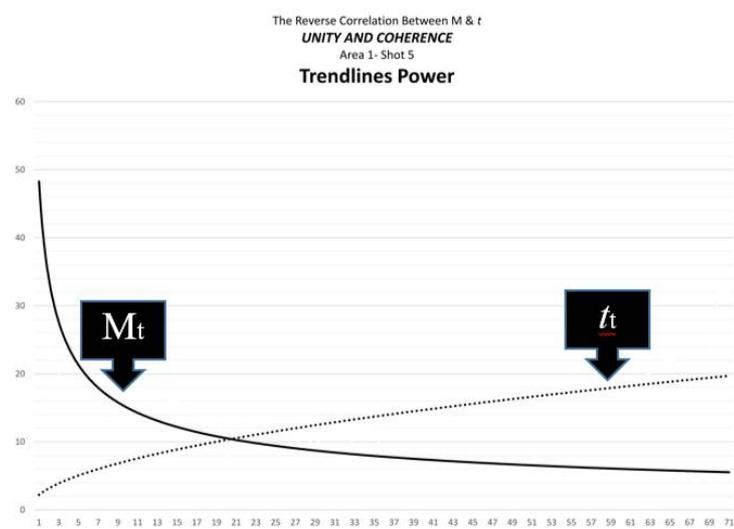


Figure 11. The trend lines power of (M) in accordance with ascending order of (t)

Finally, As can be concluded from figure 11 and 12, a reverse correlation between aesthetic measure and time is occurring, not even on average trend lines, but also for every single principal of the chosen principals. This relationship might be useless or trivial at the moment but it could open doors for further researches on mind perception and similar fields of beauty evaluation as architecture, arts and applied sciences.

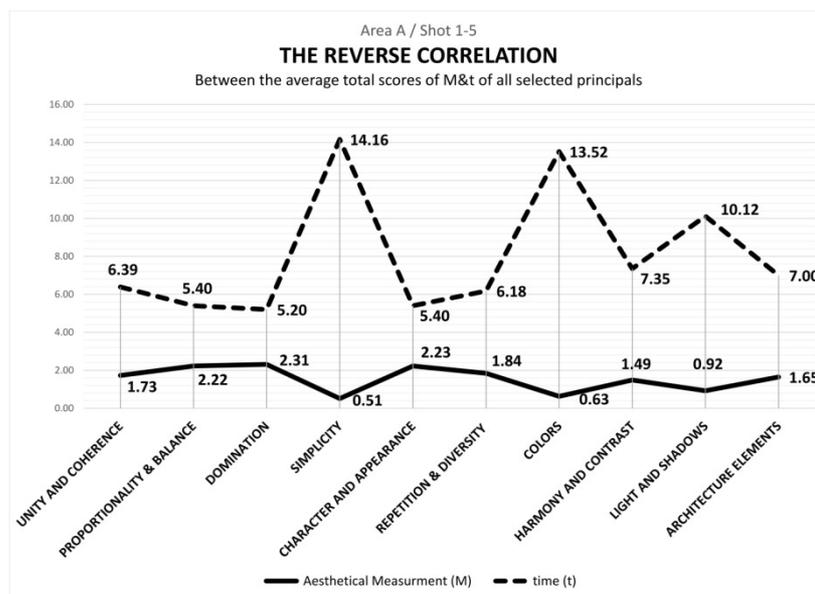


Figure 12. The reverse correlation between the average of all Ms (Es/ts) (aesthetic measurements) and average t (time recorded for the evaluation score)

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However, this type of tests can be applied in any given architecture/ urban design or even a proposed new development projects as a tool for developing recommendations of design or testing the used principles as such. In this specific test, endorsements for specific sections of the street could obviously be drawn from the radically changed ratings of manipulated images. The alterations of images applied showed clearly which of specific principals could be changed to increase the rated visual beauty of specific locations and consequently raise the satisfaction of the public. Not surprisingly, the most influential dimension in aesthetic mental perception in this study were unity and coherence, proportionality & balance, simplicity, repetition & diversity respectively.

Further studies should be initiated to discourse a number of queries overlooked or abandoned in this study. For instance, the study ignored acoustical and all other nonvisual physical information that may affect and dominate visual and aesthetic principals. Another example is the effect of the height-width ratio of the street: is the correlation between street width to the height of the three-dimensional boundaries a factor that should alter the results of this study significantly? Furthermore, the effects of variables of quality, pavement finishing materials and texture were not accounted for.

## VIII. CONCLUSION

This experimental study had been applied on streetscape level as a sample case to measure residents' satisfaction on their streets, nodes and squares. Also, to prove that a correlation between perceived visual image and the satisfaction level of city residents could be an effective factor in creating appropriate, attractive and more beautiful spaces. Moreover, recognizing the relationship between perceiving aesthetical measure of visual images and time would enhance and create new approaches to evaluate architecture or urban design projects on city level. The study used eleven principals of architecture and urban design key principles of "The Edinburgh Standards for Urban Design" in its analysis and testing procedure. Finally, this paper is presenting a unique practice - sponsored by the University of Buraimi and the Governorate of Buraimi- Oman 2014- to improve the city shape of Buraimi and its urban character by enhancing streetscape aesthetical values. The results for the present two tests can be summarized in simple conclusions;

- The strongest spatial principles affecting aesthetic judgments of urban spaces are orderly respected as follow; unity and coherence, proportionality & balance, domination, simplicity, character and appearance, repetition & diversity, colours, harmony and contrast, light and shadows, architecture elements.
- Most of the city residents are not satisfied with the level of street scape design. (figure 4,5)
- An interactive based approach in dealing with public opinion is one of the good approaches to enhance and change city shape.
- Symmetrical and uniform arrangement of the lateral spatial boundaries, preferably formed by vegetation or stylistically uniform architectural elements types have a comprehensive role in recognizing the aesthetical values of street scape.
- The recognition of aesthetical values (beauty) is much easier than the recognition of ugliness. The proof was determined by measuring time of recognition. (fig.10)
- These characteristics correspond to the kind of properties of figure formation originally developed in Gestalt psychology and later adapted to three-dimensional architectural spaces by Weber (1995). In short, visual regularity is a primary factor in the judgment of beauty.

## IX. ACKNOWLEDGEMENTS

I would like to thank the University of Buraimi for initiating such a workshop as an important step in better interacting between the university and community. Also, for the financial support to present the event in the best possible way. Thanks passed to Dr. Ahmad Jamrah the Dean of College of Engineering for his continues support in all stages of this experiment. Likewise, I am grateful too to those who helped me technically and scientifically in finishing this paper, especially, my colleague Dr. Mohammad Refaat and Ms. Maryam Elna'imi of the HR and Marketing department.

# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 3, March 2017

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## APPENDIX I

The next streetscapes principals had been explained and illustrated to all participants as:

### 1. Unity and Coherence

"the framework that connects units together and could be achieved by many ways as: i) repeating groups of plants that are similar in color and breed, ii) using the same style of lighting poles. The high ones in major streets and short ones for pedestrian streets, iii) use streetscape elements in coordination in a repetitive and regular manner such as trees bases, flags, advertisements and commercial flags... etc."

### 2. Proportionality and Balance

To achieve proportion and balance matching elements is a must Moreover, some precautions had to be concerned," For example: i) using very short plants in a place needs high plants is an action that must be avoided ii) using broad leaves trees in a short narrowed pedestrians footpath also is an action that must be avoided. iii) Selecting trees that are grown in a high large-sized scale must not be used in front of small buildings or low-rise ones. iv) to give a sense of balance, order and attraction, symmetrical and asymmetrical concepts must be applied".

### 3. Domination

In the field of urban design, domination of particular item – especially when designing city squares- supports the attraction and attention concept that has to be accompanied with successful streetscape design. "Those items such as fountains or three-dimensional structure, Palm/s, extinguished tree/s have a strong effect particularly when using their natural/artificial colors in the morning and lighting effects at night".

### 4. Simplicity

Simplicity helps in achieving unity for the targeted developing area by selecting less variety. Moreover, it helps in avoiding trees, shrubs, elements and structures multitude.

### 5. Character and Appearance

"That is the main eccentric identity of the targeted developing area, which represents and reflects its environment, history and social characteristics. Precaution selection must take place when selecting special elements from a well-known character to be used in the streetscape developing/designing procedures".

### 6. Repetition and Diversity

Creating rhythm by repeating items such as plants, lighting poles or other elements increases aesthetic value. It is better to use them on streets sides with achieving symmetrical and asymmetrical balance and concepts.

### 7. Gradation

The most common use of progression is in the use of shapes progressing from smallest to largest, or vice versa. Gradation is the use of a change in size of objects from large to small or a change in color from light to dark. (Anon., 2014)

### 8. Colors

Color adds the dimension of real life and interest to the landscape. Bright colors like reds, yellows and oranges seem to advance toward you and can actually make an object seem closer to you. Cool colors like greens, blues, and pastels seem to move away from you and can make an object seem farther from you. Grays, blacks, and whites are considered neutral colors and are best used in the background with bright colors in the foreground. However, to increase depth in a landscape, you can use. (Alvarez, Original publication date September 2010)

### 9. Harmony and Contrast

"Contrast and harmony can also be achieved using plants. Fine greenery verses rougher greenery, round leaves verses spiked leaves as well as color compliments and contrasts. Plant height, color, and texture may be varied from one area to the next but each area should stay consistent within its own theme".

### 10. Light and Shadows

"There are many benefits of streetscape lighting and shadows, it helps improve the safety and security and adds functionality and beauty. Here are the most common areas that could be affected by light and shadows: i) Pathways are important both for safety and for beauty, it is not necessary to use path lights right along the side. Mixing directional path lights with ambient lighting within the streetscape bed for a more natural look. (Anon., 2010-2014) ii) Trees are an ideal contender for up-lighting or cross-lighting. also creating down-lighting effects by placing lights within tree branches and aiming them downwards at garden bed or pedestrians footpath is one of the most common tips. iii) Water features can be lit as well.

### 11. Architecture Elements