QUALITATIVE DESCRIPTION:
LIGHT IN THE URBAN ENVIRONMENT

by

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ABSTRACT

The quality of our built environment is difficult to describe and to regulate; using light as an example, this thesis develops a descriptive framework using elementary, dynamic and connective forms. The combination of these three forms which we are able to perceive create an image of the place. The exchange of these descriptions heighten shared understanding, similar to the tacit understanding shared by architects.

Buildings have been publicly regulated to allow for light to the street throughout history. Qualitative description may offer the public a means of oversight and insight which could create a closer match between the design intention of proposed buildings and the public’s understanding of their urban environment. At the same time, qualitative description will equip designers and the public to develop a shared and accumulated understanding of the interaction of contemporary architecture with public space, particularly given the modern technology.

Description may be presented with many media and tools, literature, art and photography are used in this text. In particular, the sky-dome projection is explained and used as a descriptive tool.

Using light as an example, the thesis (1) explains the descriptive framework, (2) explains light’s characteristics in qualitative and quantitative forms of description, (3) reviews the regulation of buildings for light, and (4) describes a case study: Rockefeller Center in terms of light; the impact of regulation for light on design and puts to practice the qualitative description.

Rockefeller Center is chosen as a case study as it is a large urban building complex which has been acclaimed over decades and has been used as a prototype for many other urban building complexes.

This thesis draws from the work of Susanne Langer, Kevin Lynch and Christian Norberg-Schultz. In particular, Kevin Lynch's work and his support for the the use of the sky-dome projection have founded this work.

Thesis Supervisor Harvey Bryan, Assistant Professor
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To Muriel, my mother,

Laughter in your voice,
Music on your mind,
The beauty that you come from,
You hold forever in blue eyes,
You are the architect on my mind,
Dreaming of the Future,
Dreaming of the Past.
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Over the past few years at MIT many people; friends, faculty and family have given me their support and encouragement. I would like them to know how very much I appreciate them. I hope during the next few years that I will be able to give as much to others.

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QUALITATIVE DESCRIPTION

LIGHT IN THE URBAN ENVIRONMENT
Architecture is the masterly correct and magnificent play of masses brought together in light
- Le Corbusier

Light is a quality in the urban environment which we would never want to deny, however, the feeling of light is very difficult to explain and the effect of light is difficult to capture. Light has a dynamic nature in that it is constantly changing with the daily sunpath, the seasonal elevation of the sun and the climate (cloud cover). Light affects a multitude of aspects in the urban environment: our reading of the street, our reading of other people, our awareness of building detail, the use of urban spaces and the location of events.

Patterns of light and dark, sunshine and shade alter our reading of buildings and urban space. As we walk along a city street we may be aware of the direct sunlight which warms one side of the street, while the other side remains in shade. The faces of passerbys are illuminated by the reflected

1 Jeaneret-Gris, C.E. (Le Corbusier), TOWARDS A NEW ARCHITECTURE, N.Y., Payson and Clark, 1927, p. 29
To the Editor:

A recent article in the Globe depicted the power of the affluent compared to ordinary working people. A highly respected law firm, tenants of a new highrise tower, protected its view of Boston Harbor and the waterfront persuading the developer to reduce the size of a building that would have obliterated this scene.

One wonders about the hundreds of others who work in Boston whose views were blocked not only by the tower this law firm rents, but also by the many other high-rise buildings that exist or are in the planning stages.

These individuals have lost, in addition, the sun's natural light and heat that formerly shone into their buildings. These were God's free gifts to us all, but man is gradually taking them away and giving us vast canyons and wind tunnels that make walking in Boston as dangerous as scaling Mount Washington in the winter. This is also costing money when one considers the diminishing natural light and heat lower buildings now receive. Tenants of the low-rises must substitute electricity for light and oil for heat.

One wonders why people who feel their view should be absolute move into buildings that violate the rights of others.

Boston is losing its aesthetic beauty. When we look around at our historical buildings - Trinity Church, Old State House, Custom House and Quincy Market, which is being swallowed by the vastness of highrise buildings going up around it - one questions why we are allowing all this development to take place.

It's too bad the ordinary person working or living in Boston doesn't have the influence to protect these natural and architectural gifts.

- Frank Donovan
light from the wall of the building edge. We may not recognize the people who share the street, but with use of light, we can read their facial expression. Building details and materials are intensified through light and shadow.

Streets at the bottom of a canyon of highrise buildings, may seem to be always in shade, while shade from buildings or trees can offer wanted relief from the hot summer sun. A sunny corner can become a stage for a street musician or a place of business for the newspaper man.

These are only some of the experiences of the quality of light in urban space. Mr. Donovan's letter to the editor of the Boston Globe reflects a popular opinion of light in the urban environment.

The writer complains of high rise buildings reducing access to daylight.

These concerns which Mr. Donovan questions, views, natural light, vast canyons and wind tunnels, historic buildings ....swallowed by vastness are common

1. Boston Globe, Letters to the Editor, December 30, 1985
concerns in urban settings. These are not anti-urban concerns but rather concerns for an urban quality.

Mr. Donovan describes a law firm attempting to protect their office view to the sea. Their perception of the city is in part based on 'their' view. Mr. Donovan is the man on the street looking up who offers his view. Needless to say, his view is no less correct than the law firm although as he suggests in his letter, his view is perhaps not as 'weighty'.

It's too bad the ordinary person working or living in Boston doesn't have the influence to protect these natural and architectural gifts.

How can we best protect the natural and architectural gifts and how can we create more gifts in the urban environment? The following section is an attempt to enhance the public vocabulary and understanding of the properties of light which affect our perception. By understanding the sources of Mr. Donavan's highly critical view of the urban environment, there is hope to move toward a more positive description in the future.

Regulation is one means of protection which has been instituted over time. The intricate relationship of the design of buildings for public and private use, to regulation by public and private entities requires that both be explored when considering "quality" in the urban environment. Although design of buildings and urban space may be based on a notion of "quality", the regulation of the design may in fact negate the effect. On the other hand, the notion of "quality" as it is intended in regulation may never be made manifest in the building design.

This interpretation is not to ignore that regulation and building construction have been motivated in part by speculation and economic incentives. Instead, it assumes that economic value and quality may be related however not necessarily reliant on one or the other. Chapter Two will review the history of regulation for light; however prior to this explanation, this chapter will examine the description of light as a quality in urban space.

The description of light will be discussed in terms of process and substance. Process is in regards to the method and tools to describe, and substance is the description.

Examples drawn from art and literature will explain and illustrate qualitative description for both
process and substance. Although there are many possible examples to choose from, the work of Claude Monet, Gunnar Asplund and Gyorgy Kepes will be used. They are chosen because of their leadership within and beyond their respective fields in the understanding and presentation of the quality of light.

PROCESS

How can we begin to use characteristics of light: natural, artificial, shade, sunlight, daylight, color, sunpath, and thermal properities to qualitatively consider the urban environment?

Quantitative and qualitative methods can be used as processes to describe light in the urban environment. The difference between the two approaches could be likened to attempting to describe the whole with fragments (quantitative) versus describing the fragments with a whole image (qualitative).

To describe quality, a single characteristic cannot be analyzed in isolation; rather we must devise methods to consider the characteristics in
combination with each other. It is not enough to be able to measure the amount of available light in a particular urban setting. We must also consider the overall effect of the light and how it alters our understanding and reading of a place. We must consider light's symbolic meaning and inferences of use and access. In general, the "feeling" which light and shape offer must be considered.

Quantitative methods will be explained later in this chapter. Qualitative description which involves perception in presentation of information in a complete form or "image" is illustrated here with an example of Monet's paintings.

The "image" was the basis for a shift in European art in the 19th and 20th centuries. The shift from realism to impressionism in painting displayed the changed understanding of the relationship of objects to one another. No longer were compositions framed like a stage set for a play. Rather, complete images were created through suggestions of objects, buildings, and people in relationship to one another. These illustrations were not the literal objects but suggested a completeness of an idea. Fractions of the objects did not reduce the understanding, but rather heightened the
understanding of the alternative interpretation of the scene. So the scene itself, through the eyes of the artist, suggests new meaning to the viewer.

An example of perceptual description, and presentation of an image is Monet’s painting of the facade of Notre Dame. Monet painted this facade a number of times, displaying many alternative interpretations of a particular view at various light conditions. Monet aids us in understanding perception of the built environment as his paintings are of the same view, but with many different qualities or feelings of the place expressed.

Monet’s paintings of water lilies expand understanding of urban space. As in the Notre Dame example, Monet paints the same subject again and again, with the same method of painting, and with an increasing complexity of spatial relationships.

Monet’s water lilies paintings challenge us to restate the actual. Is the actual the water lilies floating in the water or is the actual now as Monet reveals reality as an illusion of spatial exchange and interplay? The position of the floating lilies is defined by their relationship to one another and the space between them. The water too takes on its
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own quality of object as well as the lilies themselves. The water is fractured with color and even blended with the objects of the water lilies in reflection and composition. This presentation of objects and space was painted by Monet again and again, offering a multitude of experiences and understandings given the artists altered perception at different times and in different lights.

Our perception of the urban environment may be thought of similarly to this illusion or perceptual presentation. There is a difference between painting and architecture or urban space. We are not only spatially related to our urban environment but culturally related as well. Suzanne Langer explains this difference as the "Ethnic Domain".

Painting creates planes of vision, or "scene", confronting our eyes, on actual two dimensional surface; sculpture makes virtual "kinetic volume" out of actual three dimensional material, i.e. actual volume; architecture articulates the "ethnic domain" or virtual "place", by treatment of an actual place. 1

In architecture, spatial exchange is relevant to our own position and point of departure. Monet, through the medium of the canvas, has presented his complete image of the qualities of a place. He describes the place in a way that shares information not only of the objects, but of the actual experience of the place.

As Suzanne Langer points out, however, architecture in its complex set of spatial relationships, including our own relationship and our cultural references, is its own qualitative description. The complexity of architecture has led to descriptive devices which assess aspects of the place rather than the relationships within the place. This reductive approach has been used for assessment of the characteristics of light as well with tools such as light meters, etc.

These assessments do not necessarily describe the "quality" of a place. Instead, the description must first come through experience and direct observation. Second, the characteristics of light must be considered relative to one another and to other aspects of the urban environment. Third, possible changes in these relationships must be considered.

1 Langer, Suzanne, FEELING AND FORM, N.Y., Charles Scribner, p. 95
A useful approach to consider qualitative description is to describe, in terms of changes, the forms which we perceive are manifested in material. These forms have to do with our interpretations of an urban place. Three suggested forms here are elementary form, dynamic form and connective form. Our selective reading of these three forms yields an image of a place, similar to Monet's image.

Elementary forms are those forms which we perceive to be material and proportional. A wall and a roof overhang may be perceived as a building. Leaves and a tree trunk, may be perceived as a tree. A set of stairs to a platform may be perceived as a subway. A column may be perceived of as partial support for a building. A door may be perceived to be the entrance to the building. These are all forms which are mutually understood or are elementary forms.

1.8 Building in Northend, Boston, MA by Author

1 Ibid.
Dynamic forms are sensed by sight, hearing, touch, taste or smell. As well, dynamic forms change without necessarily displacing matter. Our perception of daylight, sunlight, views, continuity/discontinuity, patterns, pollution, wind, and noise are all dynamic forms of the urban environment.

Connective forms are those forms which we perceive a connection or a reference to a particular time, vision, memory, culture or use. Connective forms may be literal or implied. The connective form which is literal manifests itself in the material of the urban place. Implied connective forms do not necessarily change the material or the urban space, but suggest a link to use or culture nevertheless through additional information, and therefore affect our perception of the place.

There are many examples of connective form. The examples give here are connective form with memory, movement, and use.

An urban environment may have a connective form in a snow storm. If one grew up with the snow, its connection to early memories of sledding, skiing, and sliding may bring delight. This may be true even though, as an adult in the city, the
settling snow will bring traffic jams and the need to shovel snow.

As another example, a street which may contain many run down buildings and vacant lots may offer a connective image to familiar eyes. This connective form of the street is the link not only of the buildings to one another, but of neighbors who live in the buildings, and experiences which have taken place over time. The same place may be perceived very differently to those who are seeing it for the first time and who share no memories of the place. The inability to acknowledge this connective form on the part of planners and politicians during Urban Renewal in the 1960's led to the razing of many cherished neighborhoods throughout the United States.

Access and sequence of movement also creates a connective form in the urban environment. Linear or wandering pedestrian movement connects urban forms which are adjacent and along a path. Abrupt subway movement connects distant locations to one another. In a sense, a subway system is the connective form which defines the city.
Use also can create a connective form. Commonwealth Avenue on the day of the Boston Marathon, a street which is usually a quiet and elite suburban thoroughfare with large houses weighting each side of the avenue divided by a formal green boulevard, becomes a rowdy urban-like setting as hundreds of people pack the edge of the street, cheering the runners and eating picnic lunches.
EXAMPLE OF DESCRIPTIVE FORM

To understand the use of perceptual "forms" to describe the urban built environment, consider an example of a brass bowl. Although it is made of physical material, I could say that it has three forms which I can perceive and that all three forms in combination with one another to create an image of the bowl.

First, the elementary form is my interpretation of the proportions and shape of the material. For example, I perceive the bowl to have a round cuff and a deep bowl. I also perceive that there are holes in the bowl creating a pattern. The elementary form is spatial and in regards to vision, it might
be documented in plan or section as a reference, but this would not be its \textit{form}. As the word is used here, \textit{form} is what we perceive.

The dynamic form of the bowl might be the lustre which can be seen in indirect light and the glint which is picked up at the tangent of the bowl's round surface to direct light. The dynamic form may also be the shadow which the bowl's shape casts and the shadow pattern which is created by the decorative holes in the bowl. The dynamic form may also be the warmth which we can feel from the bowl after it has sat in the sun for an afternoon or it's icy coldness when left out in the snow. The dynamic form is also the sound that is made when pouring water into the bowl or thumping the bowl with a finger.

The connective form has to do with use, memory, culture, future, and past. For example, the bowl's connective form may be to hold grapes. It could also remind us of other bowls or objects from another country such as Persia, we do not know for sure that it is from Persia, it might have been "made in Japan" nevertheless, its connective form has to do with images of Persia. It could also remind us of a cerimonial bowl for christening babies in the Catholic Church... if this were the case, the connective form of the bowl, our perceived understanding of the bowl would be very different from "a holding grapes form" as it would symbolize to us something holy or perhaps celestial.

This example is an attempt to illustrate the usefulness of considering the different forms which are possible to be perceived. The actual material or shape may not change, however, our understanding of it may change greatly depending on the form which we perceive.

Consider our perception of light in the urban environment in this context. Light, which has been defined as a dynamic form which we perceive interacts with our perception of the elementary form and the connective form as well to create an image. We will recognize these forms at work later in Asplund's description.
1.14 Hagia Sofia, Istanbul

1.15 Ronchamp, Le Corbusier
Light in architecture has been skillfully manipulated to effect "quality" by architects and builders from antiquity, with the Roman Pantheon and the Hagia Sophia, to contemporary architects such as Le Corbusier, Frank Lloyd Wright, Gunnar Asplund, Alvar Aalto, and Louis Kahn.

Many architects and critics have experimented and commented on light as a quality in buildings. In particular, three Renaissance architects, Brunneleschi, Leonardo Da Vinci, and Alberti, begin to consider the description of light. Their observations and methods suggest applications which could be made in a description of the urban environment. These observations have to do with the relationship of light to illuminating structure and design (elementary); light as a relative measure; kinds of light; light as a form-maker (dynamic); and light as a symbolic and spiritual form (connective).

1.16 Diagram of Rib and Web Construction; Eugenio Bapptiste

1.17 Pazzi Chapel Rib and Web dome with oculi inserted; Eugenio Bapptiste
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In the Renaissance Brunelleschi mastered light with the aid of models. He created a uniform light with the use of lanterns, occuli and back lighting which emphasized the design of his building as seen in San Lorenzo, the Pazzi Chapel and St. Spirito. He used advanced building techniques to assist his lighting intentions, for example, the use of a rib and web dome allowed for occuli to be inserted. His lighting technique in turn highlighted the feats of his construction methods.

Leonardo Da Vinci was fascinated by light in architecture as well. He defined light as a compound light, a range which was made up of light and dark. His definition was in contrast to the medieval attitude which abstracted and isolated light as a pure form, and darkness as absolute.

Brightness and darkness, that is, light and shadow, have an intermediary which can neither be called bright or dark, but participate equally in the bright and in the dark; it is sometimes nearer to one that the other.

Da Vinci categorized four types of light in architecture:

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1 Bapistese, Engenio. FILIPPO BRUNELLESCHI: THE COMPLETE WORK, N.Y., Rizzoli, 1981, p. 82

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The lights that illuminate opaque bodies are of four kinds: that is, universal, such as the air which is within our horizon; specific, as that of the sun, or of a window, or door, or other opening; the third is reflected light; while the fourth is that which passes through translucent matter such as linen, paper or similar things but not transparent matter like glass, or crystal, or objects which produce an effect as if nothing were lying between the shadowed body and the light which illuminates it.¹

Leonardo explains his four categories as they relate to the material aspects of the environment. These categories are similar to contemporary categories: universal - daylight; specific - sunlight (or direct light); reflected - reflected; and light passing through translucent material (similar to diffuse light). Returning again for a moment to "process", Leonardo describes these forms of light as they interact with material and somewhat in relative terms, such as the distinction he makes between light through translucent matter and transparent matter. This form of description, rather than in absolute terms, seems to contribute a fuller understanding which we might say is qualitative.

Alberti developed a "reception of lights" theory having to do with the geometry of an object and its ability to reflect. Alberti connected light to architectural form as not simply the condition of visual experience, regardless of what is perceived; it is the revealer of form, of the structure and the volume of material bodies.²

As well, Alberti articulated symbolic use of light in cathedrals. Alberti was the champion of a controversy over the use of light in cathedrals which contradicted the attitude of Pope Pius. Alberti felt that light should be dark and create an "atmospheric frame", while the Pope illustrated his attitude in the Pienza Cathedral, which was a domus vitrea, a "house of glass".²

These concepts of light, (1) relative, (2) in relationship to form and (3) symbolic, begin to illustrate the complexity of light when considered qualitatively.

To further examine light as a quality, consider the visual presentation of the work by contemporary artist Gyorgy Kepes. Like many other visual artists such as Turner, Rembrandt and Klee, Gyorgy Kepes has been

¹ Ibid., p. 58
² Op Cit., Baptiste, p. 82.
1.19 Previous Page: Waterforms, Gyorgy Kepes

1.20 Light Reflection, Gyorgy Kepes

1.21

1.22 Tree Shadows, Gyorgy Kepes
concerned with the essential nature of the visual experience. He has experimented with light; the form of light; our perception of light; and the visual description of light. His work explores the symbolism and imagery of light. Light, as Kepes once put it, is a "lost Eden of the eye", thus attributing light as well as to darkness, its counterpart as symbolism of both moral and mystic in nature.\(^1\)

Through his experiments, Kepes has been able to frame the forms of light which we experience in our everyday environment. Reflection, shadow, light, intensity, movement, patterns and shapes are displayed in his work. While it is symbolic and expressive, the 'object' of his work is a quality. He paints light, photographs shadow and sculptures light moving.

Kepes illustrates light as a quality which we perceive in our every day observations, however we are less prepared to describe our observations. We are able to describe a house, a wall, a street; but it is far more difficult to capture the form of the quality of the street in a particular light, or the reflection from a puddle or the color of the light as it plays against the facade of the building.

Kepes however, clearly illustrates that light is a form in the environment. It is a form which interacts with the built and the unbuilt. This form is altering, tangible to our eye yet it may seem fleeting. This form which Kepes displays could be called a "dynamic" form, while the aterial which we perceive might be called the elementary form.

The descriptive forms, elementary, dynamic and connective as they are used in the description of light will be further illustrated by Gunnar Asplund's diary.

---

From the parapet of the upper city walls of Perugia I can look down on all the tiled roofs of the lower town in the strange gleam of the setting sun. The call to vespers peals from the church tower and from somewhere within a serene hymn may be heard ascending to the skies.

The lower city walls encircle tightly and safely all the houses clinging fast to the ridges and through the great gate the highway creeps down through the valley in strange meanderings, visible for a great distance until it disappears among the hills...

Behind me there must be all the citizens of Perugia exchanging views in the square and on the streets. The strange sinister old palace ramparts still gleam in the setting sun, but inside in the high-ceilinged halls with their shining deep gilt, red and blue tones, it is perhaps no longer possible to distinguish the mild features of the prophets and knights on arches and walls and in the chamber there is only the lustre of the golden surround of the Madonna painting in its Gothic setting in the side-light of the little loophole. The evening is still.

...Outside the city walls there are the churches and the meadows and the hillocks and the mountains from which the water flows down to the sea. And over all is the sky, dark and sombre now, but radiating with sun again—in the morning.

How strange it is with all the people who have banded together in those four or five small towns visible in the far distance, each perched on its own height, where they are just starting to light their lanterns in a vain attempt to keep the darkness at bay. They have made laws, built their towns with a zeal and a joy, and made them rich and pleasing....with fine palaces, gurgling springs and orchards on the slopes, beautiful with blossom in the spring and so good to possess when autumn comes.

- Gunnar Asplund
GUNNAR ASPLUND’S DESCRIPTION

As an example of qualitative description in the form of literature, consider architect Gunnar Asplund’s description of the built environment on his trip through Italy and Greece at the age of 28. The first description is of Perugia as the sun sets over the town and the second is on his approach to a Greek ruin in the midst of a storm.

The poetic nature of his documentation is striking and suggests methods of describing quality in the urban environment. Through his description he offers an image not only of the physical characteristics, (elementary) but the symbolic (connective) and dynamic characteristics as well such as light, sound and movement. He describes to us the quality or the feeling of the place. This quality or feeling may be measured, however, the measurement will always be incomplete in comparison

1 Halmdahl, G., et. al, GUNNAR ASPLUND, ARCHITECT, National Association of Swedish Architects (SAR), Stockholm, Sweden, 1950. p. 25-26
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to Asplund’s full description, which is perhaps more than we can comprehend in one reading.

In this description, Asplund does not state facts (i.e. “the sun is setting”), rather he notes the dynamic form, the relationship of physical elements to the characteristics of light. In writing about the tiled roofs of the town below in the strange gleam of the setting sun, he offers images rather than partial descriptions. He relates the characteristics of the scene to selected aspects. He does not describe every nook and cranny, or every building, rather he selects through his own interpretation, that which he feels will best describe the scene at hand.

He describes the place in terms of his own perception- the highway creeps down the valley in strange meanderings, visible for a great distance until it disappears among the hills. He does not say it has 16 turns and 3 jogs, he describes what he is capable of seeing from his own departure.

Asplund uses metaphor, the lower city walls encircle tightly and safely all the houses and a serene hymn may be heard ascending to the skies. He links symbolism to the description and its relationship to light as well, the strange sinister old palace ramparts still gleam in the strange setting sun, suggesting something eerie about the palace, something more stately than the rest of the village, which seems to have fallen into shade as the sun dips lower.

Asplund’s description of light is manifold and always in relationship to the physical, while revealing many forms, lustre of golden surround of the Madonna’s painting in its Gothic setting in the side light of the little loophole. While talking about the reflectivity of material, his description suggests the architecture as well as the historic reference of a “Gothic setting”.

In describing the sky, dark, sombre now, but radiating with sun again in the morning, he suggests the change and the symbolism of safety and light, as the towns ...light their lanterns in a vain attempt to keep the darkness at bay. As we read the sequence of the description, we can envision our own version of his description with a dynamic reference of change. The sun sets over the town. The town is dark. Then, lanterns are lite which offer light not nearly of the magnitude of the setting sun which has made materials and building gleam previously, rather this is a vain attempt. He
As we approached nearer to the temples out on the wide desolate plain we were overtaken by a storm, a tempest breaking in from the sea, with rain driving flat and horizontal. Grass and bushes were beaten to the ground, and the storm howled fearfully through the ancient temple, stubbornly resisting the elements. There we stood in a complete vacuum each cowering behind a column. The thunder growled and crashed and the lightning flashed and played fearfully over the wide plain.

It lasted half an hour, during which time we almost thought we should find our graves among the ruins of those lovely Greek temples; and then it was all over, the air was still, the sun shone out warm and mild and friendly, the golden yellow travertine of the ancient temple gleamed with renewed beauty and the splendour of the impression equalled that of Gigenti!

- Gunnar Asplund

includes the promise that the sky will radiate in the morning. In our mind we can begin to envision the city in these different states of light through his suggestion of materials and his symbolic relationships.

Asplund is not satisfied with offering a suggestion of a daily dynamic state, but must also include the seasonal changes as well, here particularly in relationship to plants, perhaps the most obvious of physical change in our environment over the year, beautiful with blossom in the spring and so good to possess when autumn comes.

Consider also the second description of the Greek temple. Here is a fantastic documentation which is symbolic in its totality by some twist of fate through the drama of a summer storm. Asplund vividly describes two perceptions of a place which are subject to qualitative variables, in this case a summer storm. It passes quickly and with the introduction of the sun the place transforms to a very different set of observations having to do with materials and impression of the place. Compare the the storm howled fearfully through the

1 Ibid., p. 27
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ancient temple, stubbornly resisting the elements... There we stood in a complete vacuum each cowering behind a column... we should find our graves among the ruins to the golden yellow travertine of the ancient temple gleamed with renewed beauty and the splendour of the impression. The observation during the storm has to do with the temple’s structure, physical and symbolic. Asplund positions himself behind a column, a structural member, becoming a priority in the midst of the storm. His idea that his grave might be found within the ruin, might be symbolic, as is the storm as well in relationship to a temple of the gods, gods of centuries past. The sun however, brings warmth, life, and in turn brings the temple back to life, to the contemporary as Asplund says “renewed beauty”.

Asplund’s description might be said to be complete in and of itself, even though it only partially describes a setting. We are capable of forming an image of the places which he describes. He has carefully documented for us the place, offering information about his own vision as well as the dynamic nature of the place. Our interpretation of his vision is based on our own selection, values and references, as I have offered one such interpretation here.

In both of his descriptions, he has given information to us in regards to the characteristics of light which were explained in the first part of this chapter: sunpath, reflectivity, shadow, color of light, climatic effects, etc. However, he has done so in a qualitative approach using a combination of descriptive forms which yields a great deal of information regarding the place without measurement. This qualitative description using elementary, dynamic and connective forms may be very important for contemporary building regulation and a very necessary one.

To describe a place qualitatively, in addition to experiencing the place, describing relationships and changes in relationships, I would like to suggest that the description must be complete, whatever the form. This is not to say that the description is finished, rather that the description when altered, would change its meaning. With this position then, the description is not additive, we cannot add descriptions together to reach a sum, we can only select aspects of the total which we wish to consider, compare and contrast.
To this point, the qualitative description in terms of process; a complete image, based on perception, using perceptual forms (elementary, dynamic and connective) have been described. Examples of the qualitative description through renaissance attitudes (Brunelleschi, Alberti, and Leonardo Da Vinci); visual presentation (Kepes) and description through literature have been presented.

To further examine the qualitative description of light in the urban environment, it may be useful to examine the characteristics of light, to review the quantitative means of analysis and to suggest the relationships of these methods to a qualitative description.

These characteristics of light are not independent of one another. We may measure these characteristics to catalogue them, however, the combination of elements in the urban environment requires more than measurement for description of quality.
NATURAL AND ARTIFICIAL

Light can derive from either a natural or an artificial source. Natural light is the most powerful source of light and heat in the urban environment. Its effects are directly influenced by climatic conditions. Artificial light is constant and hence, considered more controllable. Earlier, Asplund makes a comparison of the power of natural light to artificial light in his phrase *light their lanterns in vain attempt to keep the darkness at bay*. In this sense, natural light may be thought of as a prevalent condition in the urban environment which is noticed more in its absence than in its presence. Again returning to Leonardo Da Vinci, in his “metaphysical” understanding of light (as Moshe Barasche describes), Da Vinci held that all light was varying degrees of shadow or varying degrees of the absence of pure light.

Considering the quality of light in the urban environment, the absence of natural light becomes a critical aspect to consider. Although natural light is seemingly without cost, access to light in the urban environment has become a commodity resulting in regulation, as will be described in Chapter Two.
Regardless of the source, light can be manipulated by the designer to create an effect in a building or urban space. This effect has been referred to as a form. As Da Vinci explained, it is the absence of light and the existence of light in combination which creates the dynamic form. Both artificial and natural light may be part of the dynamic form as Gyorgy Kepes has illustrated through his experiments, however, only the characteristics of light from natural sources will be reviewed here.

1.27 Frank Lloyd Wright proposed this highrise building for the national Life Insurance Company in Chicago during the early 1920's. The design allowed for natural light and ventilation to reach the offices of the dense building. The availability of light to the outdoors may be manipulated and maximized in the same way through building set backs and reflective materials.
DIRECT, DIFFUSE AND REFLECTED LIGHT

Earlier, Da Vinci’s four types of light were described as universal, specific, reflected, and transluscent. Contemporarily, light is generally considered to be direct, diffuse, or reflected. Diffused light is light which is scattered by sky or cloud cover to form a more equal light than direct light. Objects which are illuminated by diffuse or reflected light may be easier to read than objects illuminated by direct light which may create hard shadows.

Reflected light is returned from mirrored surfaces, such as the surfaces of buildings or
Light: A Dynamic Form

streets. Light may also reflect off natural materials such as the surface of water or the surface of snow. Light surfaced buildings reflect light while dark surfaced buildings absorb light.

The type of light which is reflected can also vary. Light surfaces which are matted will reflect a diffused light while shiny surfaces will reflect a specular light which can be glaring and even blinding. Reflected light can create rich patterns and increase our appreciation of a building's form or material.

Illuminated images are reflected in mirrored surfaces and water, such as the mirrored image of Trinity Church on the facade of the John Hancock Building in Boston. Such a reflection could be said to be a connective form of light as well as a dynamic form as the reflection of hand crafted construction in the mirror of modern technology, suggests the passing of time in space and brings these two buildings together in one image.

Direct, reflected and diffuse light are in part dependent on the climate and in part dependent on the built form and material. Again, these forms of light, although they may be analyzed separately, are

1.29 Andre Kertesz, "New York". Reflective surfaces can create a connective form.

Opposite Page: 1.28 Bill Brandt. Reflective light can highlight materials and form when contrasted with non-reflective surfaces.
found generally in combination with one another creating dynamic forms

CLIMATE AND LATITUDE

The two natural sources of daylight: sun and skylight (clear, or overcast) are affected by relative latitude and by weather patterns or climate. Latitude affects the angle of the sun to the earth and the length of the sunpath. The lower the latitude (closer to the equator), the higher the angle of the sun. The higher the latitude (closer to the poles) the lower the angle of the sun.

The length of the sunpath during a day in a particular season effects the availability of light and shadows. It has many implications in terms of use and understanding of urban space. For example, in Scandanavia where the sunpath is very short during the winter, artificial lighting play an important role in illuminating space and in a sense redefines the urban space. The artificial light in the dim Scandanavian winter day creates a range or an umbrella of light, which may seem to have an

1.30 Andre Kertesz, Budapest, November 1920
effect of reducing the elementary dimensions of a street.

Climatic changes will affect the type of skycover: either clear or overcast. An area which tends to have more overcast or rainy days, will be experienced differently than sunny areas. For example, compare Los Angeles to Boston. Los Angeles has predominantly sunny weather which offers a bright sky cover (although with inversions this atmosphere may change to smog.)

Light's reflection on light colored building materials adds to the general brightness. Bright light is an expectation not an exception in Los Angeles.

Boston, on the other hand, has frequent rainy and overcast days. The dark surfaces of "the brick city" may seem to darken the urban setting, or suggest warmth through the massive surfaces.

As well, the variation and richness of the brick color may be intensified by the diffuse light from cloud cover and dampness. The same bricks might seem to lose their rich color under bright sunshine.

In the same sense as this comparison of the interaction of climate with the quality of the urban environment, a cool climate will benefit from the thermal warming of the sun, while a warm climate generally must consider protections from the sun's warmth.

The following maps illustrate zones of clear days, cloudy days, sunshine and hours of sunshine. Climate and latitude are the basis for natural light in any given area.
1.31 Clear Sky Conditions Map
(less than 30% cloud cover)
high: 180 days or more
medium: 100 to 180 days
low: less than 100 days

1.32 Cloudy Day Map
(greater than 70% cloud cover)
high: more than 160 days
medium: 80 to 160 days
low: less than 80 days

Source: Egan, CONCEPTS IN ARCHITECTURAL LIGHTING
SUNLIGHT AND DAYLIGHT

Both daylight and sunlight may be present in our urban environment simultaneously. Depending on the season, the angle of the sun's rays change in relationship to the earth. In the summer, the angle of the sunpath to the earth is higher in the sky, while in the winter the sun is much lower. Shadows cast by building obstruction of sunlight is directly correlated to the orientation of the building and to the sunpath.

Daylight is diffuse light which can either emanate from an overcast or a clear sky. The source of daylight is from the entire skydome. Daylight is obstructed by the bulk of the buildings at all time of the day. Daylight is considered more constant than sunlight as orientation affects brightness, not availability of light.
Sunpath diagrams have been developed by many researchers over the years. Victor Olgyay promoted the sunpath diagram shown here. The diagram may be easily read for the altitude and azimuth for any given month, day and time of the year. The altitude indicates the angle of the sun to the earth. The azimuth indicates the angle of the sun in relationship to the North-South Axis in plan. Each arc on the diagram represents the path of the sun during a particular month.

The outer-most arc represents the month of December and the winter solstice (shortest day of the year) while the inner-most arc represents the month of June (longest day of the year).

Using these diagrams, considering a building's orientation to the cardinal points the shadows cast by a building can be calculated for any time in the day. Since sunpath diagrams were developed, shadow diagrams have been easily calculated and utilized by architects.


1.34 Sun Path Diagram:
SUN, WIND AND LIGHT, G.Z. Brown et al.
planners and others. Today, many large architectural firms have plotted entire cities in computer programs to yield exacting shadow diagrams for proposed buildings.
Daylight had not been as fully accepted as an architectural concept until the development of sky vault projections. Recently, daylight as an urban design consideration has lead to zoning guidelines in San Francisco, New York City and Boston. These guidelines will be discussed further in Chapter Three.

In 1954, the Swedish architect Gunnar Pleijel\(^1\) published a technique for measuring the percentage of unobstructed sky at any urban location. This technique uses a sky vault projection to analyze existing conditions and to predict the impact of proposed buildings on the amount of daylight in an existing context. The method of evaluation is a useful qualitative as well as quantitative tool as it evaluates daylight similar to our perceptual understanding of daylight.

Pleijel used his invention, the globoscope (a forerunner of today's fish-eye lens), to photograph the skydome. These photographs can document daylight at

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any desired location by recording a distorted, however proportional, impression of the surrounding buildings on both sides of the street.

Light to the street is assessed by measuring the amount of the sky-dome which is unobstructed by a building in the fish-eye photographs.¹

The daylight cutoff angle created by a building's roof edge can easily be found and masked with the use of a transparent overlay sized to the diameter of the fish-eye image. The overlay helps to measure the building's angle of elevation, which is the angle between the horizon and the roof edge. From the overlay the amount of light to the street can be determined on the fish-eye photograph by extending the vertical edges of the street side property lines to the zenith and subtracting the obstruction mask from the resulting pie shaped form.

The fish-eye technique can also be used to determine the amount and duration of sunlight striking urban open spaces. This is accomplished by using a sunpath diagram transparency as an overlay on the fish-eye photograph taken of an open space. The number of hours per day of sunlight at any reference location and at any particular time of the year can be determined using sunpath overlay transparencies. This technique can also be used to develop guidelines to guarantee solar access to open space during a specified portion of the day. The same application can be made to determine thermal radiation on surfaces exposed to light.

Opposite Page: 1.39 Skydome Projection (Step 1) 1.40 Obstructing Mask: Subtracted from "pie of possible available daylight at a given site, where pie is not obstructed, daylight is available. (step 2)

1.41 Sunpath Overlay on skydome: where sun path is not obstructed by building direct sunlight will reach the street.
LIGHT TO THE STREET

Daylight and sunlight offer light to the street when unobstructed by building bulk. For sunlight, street orientation affects the amount of direct sunlight which can reach the ground. An east-west street will experience sunlight during the morning and afternoon, and may receive sunlight throughout the day depending on the height of the buildings, the width of the street and the altitude of the sun. North-south streets may also experience sunlight, however depending on building height and street width, the actual direct sunlight may be limited to the mid-day hours of the day when the sun is directly overhead.

Daylight to the street, on the other hand, is obstructed by building configuration and width of the street. As daylight is relatively unaffected by orientation, the amount of daylight will not change due to street orientation.

Light on an urban street can illuminate the surroundings. To many, a naturally lit street may seem friendlier, and more open than a dark and shadowed street. Over the centuries, light on a street has been associated with cheerfulness and general good feelings, expressed by such lyrics as "walk on the sunny side of the street". This may reflect a popular attitude about light in an urban setting.

LIGHT AND DARK

As Leonardo Da Vinci suggested, light is best understood through the contrasts of varying relative intensities or brightness rather than by absolute terms such as footcandles. The juxtaposition of light and dark allows for contrast and comparisons.
Shade and shadows are created by the absence of direct light on a surface. The obstruction of light casts shadows in relationship to the angle of the sun or the source of light.

Patterns of light and dark add to the understanding of architectural detail, sense of depth and perception of urban space. The play of light and shade offers a diversity of experiences and added complexity to the built environment.

Excessive direct light can cause harsh and glaring contrasts. While more subtle light can create long shadows which outline detail. Certain architectural cornice and window detail are specifically designed to create a dramatic shadow. Without adequate light which creates shadow and contrast, building detail may be ignored. For example, shadows which dominates a building facade may also diminish our understanding or reading of a building facade's detail.

THERMAL

Sunlight warms surfaces, people and air. The thermal characteristics of light gives us seasonal changes as the sun's rays come closer to the earth in the
spring and summer. When light warms surfaces which are massive, heat can be retained and accumulated.

Shade on a hot summer day is more than welcome, it offers relief in the heat of the summer, and reduces the potential thermal gain which accumulates in mass such as concrete and bricks. The urban core is frequently nine degrees warmer than the surrounding country as the thermal storage capacity of the building is much greater.¹ Thermal radiation is a function of the solar path of the sun, peaking in the late afternoon. The heat from sunlight and daylight can be stored in adjacent building mass which continues to radiate heat after the sun has set. Awning, vegetation and building shade can help reduce this potential gain.

The thermal capacity of the urban environment affects our comfort and use of a particular space. On a hot summer afternoon a broad open space such as Boston’s City Hall Plaza will be as deserted as on a bitter cold winter day. Along the shaded edges of the space, people prefer to walk to their destination.

PLANTS

Natural vegetation affects the quality of light in the urban environment as well. Deciduous trees respond in a seasonal way to our need for shade in the summer and for direct sunlight in the winter.

COLOR

Natural light has a color quality as well, composed of a range of light rays from the electromagnetic spectrum. Natural light can highlight the quality of the color of materials. Natural light is composed of a range of light rays from the electromagnetic spectrum. The spectrum of light can be altered depending on the angle of the sun and the cloud cover. The color of the light may seem to be more red in the morning or evening when the sun is lowest in the sky. This is due to the absorption of a certain part of the electromagnetic spectrum as it passes through layers of atmosphere. A rainbow is an illustration of the visible spectrum. Other rays such as ultra-violet and the near-infrared are also present in natural light, but these rays are not perceived through human eyes.

The color of natural light changes throughout the day, in different seasons and depending on the pollution in the atmosphere. The color of light interacts with the color of the material of buildings and the urban environment in general, particularly on water or shiny surfaces. The color of light in the early morning or late evening, a pinkish hue, can offer a very exciting and special experience. Such buildings as the main building of MIT which stands unobstructed to the sun's rays as it sets, seems not only to change form but to actually come to life in this pink hue of the evening. The same can be said of the Charles river, particularly in the winter when surrounded by snow, and of the view of Beacon Hill as one looks across the river. Even in summer, the green trees along the Charles river seem to take on an intensified color as the sun sets.

Northern light, which renders a bluer hue, is said to be a less harsh light and one which painters prefer to paint as it does not distort the color of objects. Although a northern orientation to light holds no thermal qualities, an urban setting with this orientation may offer a rich experience of the color of materials.
This is a question of the measurable. Nature, physical nature is measurable. Feeling and dream have no measure, have no language, and everyone's dream is singular. A man is always greater than his works because he can never fully express his aspirations. To express oneself in music or architecture, one must employ the measurable means of composition or design. The first line on paper is already a measure of what cannot be expressed fully. The first line on paper is less.

- Louis Kahn

1.42 Kahn: Yale British Art Museum
CONCLUSION

We may measure light, the sky-dome, the brightness, the thermal gain, but to address qualitatively the presence of light in an urban environment we must find ways to describe and document similar to Gunnar Asplund's description in a complete way. Kahn suggests that this is impossible, perhaps this is true, however, with practice we may become better at trying to express our understanding and aspirations. Perhaps we could think of the description of qualitative feeling as an attempt to preserve as a reference what is fleeting and unattainable.

Taking the example of light, what approach could be taken to describe completely the experience of light at a given place. We must describe through direct observation and use tools of description which are capable of reflecting our perception. The description must be complete in its form. The description may use metaphors, and symbolism to assist in the documentation. The description must also be able to document change in urban space.

To summarize the description of light in the urban environment must be in relationship with other dynamic forms of the urban environment, such as wind, pollution, etc., the physical form of buildings and in relationship with meaning or references to culture, use, time, visions and memories. Only by describing light in some form, relative to these aspects will we be able to begin to understand the quality of light in our environment.

This seems like a rather tall order and to what purpose? The purpose is clear. Billions of dollars are spent each year on construction. New building in the twentieth century is on a scale never before seen in the history of the world. Yet, with all the planning, resources and time which goes into this building, the actual "feeling" which is being created goes ignored and excused as intangible. As we go on to create more man-made spaces, larger projects, such as the under-ground worlds of Tokyo and Montreal, the "feeling" may become more important. Without some form of documentation, we will continue to hold mysterious our own needs for our built environment. When we are able to begin to talk about these feelings, then we will be more able to address them in built and unbuilt form.
2.1 Gustave Dore, "Over London By Rail", 1851
This quote is from the Boston Globe Letters to the Editor found in Chapter One. Mr. Donovan is not the first to complain of loss of light to the street as a result of high-rise buildings nor is this concern a phenomenon of the current century. Public protection of light dates back to the ancient Greeks and Romans. Throughout history, regulation of daylight has affected the design of buildings.

What are the best tools to evaluate light in an urban setting? Can similar tools be applied to other aspects of the urban environment such as wind? What approach has been most effective in regulation, and are there other public control mechanisms available for urban quality?

The following chapter, through a historic overview, will address these issues.

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1 Boston Globe, Letters to the Editor, December 30, 1985
In the 19th and early 20th century, in Europe and the United States, a correlation between light and public health made access to light an important concern.

The connection of light and health manifested itself in public controls and the concept of light as a public right. In England, the availability of natural light was insured earlier in the British Law of Ancient Lights (1189) and embodied into statute law in The Prescription Act of 1832. Under this Act, if a window in a building enjoyed uninterrupted access to natural light for a twenty year period, that access to light could not be interrupted by new construction. Under the law, an owner of a building could acquire a right to unobstructed light across an adjacent property, just as property acquired.

Whereas, in the true economy of health and comfort, no single house or city should ever stand thus, squared by the four cardinal points, if it can be avoided. On the contrary, it should have its lines of frontage northeast and southwest, northwest and southeast, where such a disposition can be made without injury in some other respect; that so the sun may strike every side of exposure every day in the year, to dry it when wet by storms, to keep off the mould and moss that are likely to collect on it, and remove the dank sepulchral smell that so often makes the tenements of cities both uncomfortable and poisonous to health.

- Horace Bushnell

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1 Bushnell, H., WORK AND PLAY, N.Y., Scribner, C., 1868
In Paris in 1902, building heights and projections were regulated by a *limiting cross section*. The regulated height of a building was based on a multiple of the width of the street plus a circle arc drawn at the top, within which the section of the building was to be built. The rear facade of the building and frontages on light courts were also regulated in the same way. It also took into account sloping streets, requiring specific heights based on thirty meter (100') frontages. The goal was to offer an abundance of light and air throughout the structure. "The City of Light" as Paris has been called, may be attributed in part to this regulation.

In the United States, regulations pertaining to light came into being in the early part of the 20th century in response to the ability to build taller buildings in an increasingly dense urban environment (e.g. the Equitable Building, New York City, 1915). In 1891, Boston was one of the first American cities to restrict the height of buildings to 2.5 times the width of the street. In district "A", heights were restricted to a maximum of 125 feet.

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1 Atkinson, THE ORIENTATION OF BUILDINGS, N.Y., Wiley and Sons, 1912, p. 118

2 Ibid. p. 120
In district "B", the remainder of the city, narrower streets were further restricted to 1.25 times the width of the street.

In the vicinity of the Massachusetts Statehouse on Beacon Hill in Boston, the height limit was 70 feet to allow the gold dome of the Statehouse to be seen from afar. On Commonwealth Avenue, where Olmstead had designed a broad boulevard connecting the Boston Garden to the Fens as part of his "Emerald Necklace", the height was limited to 70 feet. The results of these early height restrictions imposed on the Back Bay retained a quality which makes Boston a unique American city in contemporary times.

**ATKINSON'S STUDIES**

In 1912, Boston architect William Atkinson published *THE ORIENTATION OF BUILDINGS OR PLANNING FOR SUNLIGHT*, a survey of existing laws and attitudes. He explained his own technique for quantifying the effect of orientation, building height and building shape on light to the street.
FiG. 69. - Cross section of street running southeast and northwest, looking northwest. The angles of sunlight are shown as they would be at the summer solstice. Lat. 42°-0' N.

FiG. 74. - The skyscraper and the street. The left-hand diagram is a cross section of a street bordered by buildings of reasonable height; the right-hand diagram a street with a wall of skyscrapers on either side. The street is supposed to run east and west and the shadows show the angle of sunlight throughout the day, at the vernal and autumnal equinox. Lat. 42°-0' N.

2.6 -2.10 Atkinson's Studies of availability of light and street wall

FiG. 68. - Similar diagram for street running east and west, looking west. Lat. 42°-0' N.
His summary of existing regulation showed that American cities such as Portland, Baltimore, Cleveland, Chicago, St. Louis, St. Paul, and Seattle, as well as Boston, had building height restrictions, while New York City, Philadelphia and Detroit had no restriction on building height. In Indianapolis, a height restriction pertained only to the neighborhood in which the city monument stood. This restriction seemingly had very little to do with access to light. In Toronto, as well, there was no apparent direct correlation to light in its height restriction. The building height was not to exceed over five times the least horizontal dimension of the building.

Atkinson studied sunpath; the relationship between street-width and building bulk and daylight to the street; and aspects of light and health. His study was sensitive as well as complete. In suggesting a regulation for daylight he offers some exceptions. The effect of a few scattered tall buildings in darkening the streets is not serious, but the effect of a solid wall of skyscrapers would be extremely so.

Rather than a simple building height restriction, he advocated that the regulation should relate the building to the proposed site. He proposed a 1.25 height-to-street width, with a slanting plane at an angle from the opposite side of the street to the point of the restricted height. Any cornice or decoration should fall within those guidelines as well. This suggested regulation, stricter than the Paris regulation, was to have great impact on American cities during the next 50 years.

On the final page of Atkinson's book he asks a question in regard to the height of buildings, illustrated with two sections of an urban street. One followed his proposed regulation allowing light to reach the opposite side of the street. The other is similar to many city streets today with very little light reaching the street due to the height of the building in relationship to street width. Atkinson asks, which of the two should be typical of American city planning of the twentieth century? The question he leaves to the reader is a question which haunts us today.

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1 Ibid., p. 137-139
2 Ibid., p. 124
OLMSTEAD AND THE DEVELOPMENT OF F.A.R.

Frederick Law Olmstead also felt the site was important in terms of height regulation. In 1910, in an address to the Second National Convention of City Planning, he stated that an arbitrary limitation on the percentage of lot to be occupied by building if applied to a whole city is obviously crude and unfair. This attitude, similar to Atkinson's attitude that a few skyscrapers were not necessarily bad, foresaw the use of the Floor-Area-Ratio (FAR) as a regulatory tool.

The FAR is the number of times the overall lot area can be multiplied resulting in the total allowable floor area for the building. The FAR has been used as a convenient quantitative measure and has increasingly become synonymous with building economies. This concept will be explained later in this chapter.

Building and zoning regulation on a large scale versus a local or specific scale has been a controversy.

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throughout this century. Only through awareness of the exception can a regulation be successfully applied in an urban setting. Regulation must have variables which allow for local conditions.

NEW YORK BUILDING COMMISSION

After the publication of Atkinson's work, the first attempt to develop zoning standards for the U.S. was made with the establishment of the New York Heights of Building Commission. The commission studied various legislative controls adopted in other countries, solicited the opinions of interested parties regarding the idea of controls, and identified existing physical features of the city. In 1915, the commission recommended that New York City should be zoned on the German system, according to existing uses and building types, and that maximum building heights should be established for each district. Many of these recommendations soon found their way into legislation via the 1916 Zoning Ordinance.

2.13 New York 1916 Height District Map

2.14 Atkinson's Proposed Limiting Building Height

2.15 1916 Sky exposure plane
NEW YORK CITY’S 1916 ZONING ORDINANCE

The 1916 Zoning Ordinance was the first comprehensive municipal attempt to legally guide and control the physical form and function of a city. Although the ordinance was relatively simple and straightforward and was stated in the text on a few pages, the legislation was to have impact for decades (up to the present). Cities across the country modeled their zoning guidelines after the 1916 ordinance. It affected the legal, architectural, planning and real estate development professions particularly.

The ordinance guaranteed minimum street-level standards of light and air with two approaches based on Atkinson’s work; the street-wall and the sky-exposure plane.

The street wall concept dictated that the maximum allowable height of the building-wall on the street was to be a multiple (1.0, 1.5, 2.0, etc.) of the street width. Five "height districts" were defined by perceived utility, neighborhood character, and pedestrian activity. Each district was designated a multiple of street width which would define allowable height. For example, Fifth Avenue, with its low scale buildings and carriage retail trade, was designated a lower height district than surrounding streets and avenues.

The sky-exposure plane was based on street width and street-wall height. It indicated the amount of the skydome that would be unobstructed by buildings from a pedestrian perspective at the center of the street. The lower the height district, the smaller the angle of the sky-exposure plane and the more light which reached the street.

A tower was allowed to cover no more than 25% of the area of the site. Under the 1916 ordinance, building bulk was required to conform within an allowable maximum "zoning envelope". Buildings which conformed strictly to the zoning envelope rose from the street to their allowable street wall height and then began a series of set backs in order to remain within the sky exposure plane. When the floor area became no larger than 25% of the site, a tower of unlimited height was allowed.

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1 New York City Planning Commission, 1916 Zoning Resolution (amended to 1945), City of New York, 1945
2.16 Wedding Cake Building type, NYC
The 1916 ordinance has resulted in some repetitive building designs characterized by the "wedding cake" buildings. Nevertheless, many buildings with a broad range of diversity such as the Empire State, RCA, McGraw Hill, and Seagram Buildings were also products of the 1916 ordinance.

In summary, the 1916 ordinance was not an arbitrary limitation as Olmstead had criticized but rather the ordinance correlated a relationship between building height and width of the street. Through the division of the city into districts, it suggested a local quality in different areas of the city which was to be maintained. If the bulk of a proposed building conformed to the maximum limitations defined by the zoning envelope, a specific building design would result. However, the intension of the ordinance was to suggest a variety and range of building bulk configurations which would allow for light to the street.

GEORGE FORD AND BUILDING BULK

The drafting of the 1916 ordinance, particularly the concept of the "zoning envelope" within which the form of a building was restricted, has been credited to the work of George B. Ford, director of the New York Regional Planning Bureau.¹

Ford, trained as an architect in the United States and at the Ecole des Beaux Arts in Paris, was an international leader in the city planning movement. In his book, BUILDING HEIGHT, BULK AND FORM, published posthumously in 1931, Ford explored building bulk configurations for qualities of natural ventilation, light, light to the street and other factors such as safety. Through his studies of building bulk, he advocated placement of the bulk of the building in the center of the site.

Ford added an economic analysis of daylight to his extensive review of planning attitudes and scientific studies. The subtitle of his book, How zoning can be used as a protection against uneconomic types of building on high-cost land² indicates his persuasive argument to the development industry for higher quality buildings.

¹ Ford, G., BUILDING HEIGHT, BULK AND FORM, Cambridge, Harvard University Press, 1931, see preface
² Ibid.
He states that "indeed, there is an almost universal feeling that light is one of the most important factors affecting the profitableness and permanance of larger bulk buildings." The link between profit and daylight has not been exploited as a planning argument to date. Ford comments in his book on the initial opposition to the 1916 Zoning Ordinance and its gradual acceptance as access to light, air and views became a matter of good business.

Ford felt a useful argument for the zoning ordinance would be to translate the value of natural amenities in urban settings into "dollars and cents". He suggested that if such data were available, zoning for natural amenities could assure a reasonable rate of return on investment. This translation to a dollars and cents return on investment manifested itself in zoning in the concept of the FAR, however, the natural urban amenities were seemingly not included in the calculation. Instead, with the FAR standard, potential rental space became the critical measure for zoning regulations.

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1 Ibid., p. 7
The 1916 Zoning Ordinance was the model zoning standard for many American cities for approximately 40 years. New York City did not substantially change the ordinance until 1961 with a new Zoning Resolution. By this time most cities in the U.S. either had adopted a new type of zoning or were in the process of doing so.

The Floor to Area Ratio (FAR), used as a basis for the 1961 zoning resolution, is the ratio of total allowable floor area of a building to overall lot area. Although the FAR has become a convenient quantitative measure, it does not control the placement of building bulk on a site or necessarily address issues of light to the street as did the intention of the 1916 ordinance.

In the 1960's, to encourage the inclusion of public amenities in proposed building projects, a bonus system increased the allowable FAR and building height. In New York City perceived amenities such as plazas, commercial space on the street level, open space adjacent to the site would allow for a higher FAR and a taller building. A discretionary review process accompanied this incentive approach. The discretionary review process frequently disregarded issues of light and air to the street.

Buildings built in New York City under the FAR approach considerably reduced pedestrian access to daylight as the building bulk frequently was concentrated straight up from the property lines. The result of many of these buildings was the creation of the "canyon effect".

Under the bonus system, the optimum prototype was the "tower in the park" reminiscent of Le Corbusier's vision for a future city. This prototype has been criticized by planners and architects as creating isolated, individual buildings which do not successfully integrate with the urban fabric. Other criticism of this building type includes the creation of wind-swept and uninhabitable plazas intended to be urban amenities.

1 The Urban Design Council of the City of New York, "Housing Quality: A Program for Zoning Reform", 1976, p. 5
In too many sections of the city, the sense of place is being eroded by a slowly advancing glacier ....of buildings entirely lacking the ambition of design except for the furnishings in their lobby.

- New York City Mayor John Lindsey

2.18 Huxtable, A.
In response to the increasing dissatisfaction with new construction, the City of New York explored alternative forms of zoning in the early 1970's. The Housing Quality Study was an attempt to achieve quality in neighborhoods through a zoning system with "quality points". These quality points were based on 37 elements which the study evaluated categorically. The zoning proposal did not mandate a minimum standard in order to build, or offer FAR bonuses to qualitative amenities voluntarily included, as previously described with the discretionary review process of the 1960's.

The intention of the quality system was to calibrate quality in a neighborhood. The study hoped to identify and then codify commonalities in criteria which assure neighborhood harmony across neighborhoods.

The study represents an interesting acknowledgement of the need to publicly address the quality of the urban environment in specific terms. The concept of "elective zoning", through attempting to present "trade-offs among real world choices" as an institutional system and the acceptance that goals are not necessarily achievable, is also a unique position in zoning regulation which raises many questions.¹

Michael Kwartler, an architect who played an important role in developing the study through a public process, confirmed that the study was existential in the sense that quality could not be defined, particularly given the plural nature of New York City and the variety of culture and economic-based value systems.² The assigned range of values were determined through empirical studies and public input.

Kwartler added that the public process of developing the Housing Quality Study seemed to demystify architectural approaches for those who participated. Simple tools such as street wall began

¹ Ibid., p. 12
² Interview with Michael Kwartler January, 1986, by the author.
NEIGHBORHOOD IMPACT

1. STREET WALL SETBACK

GOAL
To maintain neighborhood scale by matching new and existing setbacks.

COMPLIANCE

(A/B)100 = %: when the proposed setback is more than the existing setback
(B/A)100 = %: when the proposed setback is less than the existing setback

PREFERRED (A) PROPOSED (B) SCALE
edge of the edge of proposed Built Up Non Built Up
existing building building nearest *50% = .00
nearest the existing building 60% = .38
proposed building in A is set back 70% = .79 NOT
is set back A B feet from the 80% = 1.51 APPLICABLE
street property feet from the street property 90% = 2.40
line (see street 100% = 4.55
wall setback #1)

*Minimum permitted

2.19 Streetwall Setback: Quality Criteria from NYC Housing Quality Study
The regulation, passed in 1976, has been used particularly in odd shaped sites with some success. In practice, this performance approach allows for an optional combination to indicate acceptable design.

Similar to George Ford's suggestion that quality should be translatable into economic terms, the Housing Quality Study suggests that qualities are additive. This approach may be likened to the "bonus system" used in the 1960's, which resulted in dissatisfaction by many Manhattan residents. The difference is that the bonus system provided for additional allowances for added amenities, while Housing Quality allows a project to be built based on a critical amassing of perceived qualities. The process of qualitative description presented in Chapter One suggested that quality has to do with the aspects in combination to create a whole image, not an additive approach.

Consideration was given to weighting particular neighborhood qualities differently depending on locally defined criteria. In this way, the unique aspects of the City might be reinforced through an acknowledgement of the homogeneity of its neighborhoods. This point may be a source for an integration debate nevertheless. As it stands, Housing to break down to understandable terms the concept of "scale".

The four categories which the study covered included: Neighborhood Impact, Recreational Space, Security, and Apartment Design.

The study attempted to formulate and standardize the discretionary approach through assigned numerical grading. The numerical approach seems arbitrary, nonetheless, an attempt was made to express in more specific terms the elements of public concerns for the built environment.

The study is vague in its definition of qualities, particularly in terms of sunlight, shade and daylight. The study does not recognize or describe the dynamic qualities of light or its interaction with the urban environment. For example, the goal under "Shadow on buildings", to minimize shadow cast on existing buildings, seems to lack acknowledgement of the path of a shadow and the potential benefit of shadow in the summer.¹

¹ Op Cit. Housing Quality, p. 24
Quality does not differentiate assigned quality points by neighborhood. As well, the study does not acknowledge the connective forms such as symbolic or cultural concerns manifested in the built environment such as city monuments, historic structures, etc.

**CONTEMPORARY ZONING**

The negative effect of the discretionary review and bonus process resulted in new directions for zoning. New York City initiated another zoning study for Midtown Manhattan in 1980. San Francisco soon followed with a sun and light study and Boston undertook a daylight study in 1984. These studies, find their roots in the early work of Atkinson and Pleijel, described in Chapter One, and look toward preserving openness on the street and protecting the right of pedestrians to daylight.
In 1980, Midtown Manhattan revised its zoning ordinance. The placement of building bulk on the site and light to the street were once again key concerns. However, the 1961 Zoning Ordinance was based on the FAR and a discretionary review process which resulted in a number of urban design problems.

The New York City zoning revision of 1980 reviews performance based on street perception. Under this revision, the design of new buildings must maintain the context of their surroundings, as perceived by a pedestrian in the street. This perception is a function of a building's mass (i.e. bulk), street-wall, height and length, and the placement of the building's mass on the site. These elements predict the effective light to the street.

Under the performance approach of the 1980 ordinance, a four part performance test evaluates a proposed building on a point system. The building

1 Department of City Planning, "Midtown Development Project- Draft Report", City of New York, 1980
must score 85 points out of a possible 100. The crucial test is for daylighting. This part of the test is worth 60 points, with a mandatory minimum.

The daylighting test uses an evaluation chart which is a modified version of a sky vault diagram called the Waldram Diagram to measure the amount of daylight to the street. The chart is a grid of daylighting blocks which quantify the daylight to the street from the top and around the sides of a building. The proposed building is masked onto this grid. The blocks of the grid which are unobstructed by the mask are multiplied by weighted values and then totaled, resulting in a daylight equivalence score.

Although this approach was an important step to protect daylight, it has generally proved too complex to become an effective urban design tool. The New York City Planning Commission responded to criticism of the system with an alternative prescriptive approach to overcome the complexity of the performance approach. This more restrictive approach has been the most common mechanism of compliance. Similar to the sky-exposure planes of the 1916 ordinance, the 1980 prescriptive approach uses "sky exposure curves" to define the allowable shape and bulk of proposed buildings.
2.23 San Francisco’s proposed Height Envelope, adjacent to Union Square

2.24 San Francisco’s Solar Access Plane
SAN FRANCISCO

In 1983, the City of San Francisco commissioned a study which would explore the effect of high rise buildings on the quality of its urban environment. Although the evaluation of light to the street was very similar to that of New York City, the resulting guidelines were based on the work of Ralph Knowles and the concept of a solar envelope. This alternative approach is more restrictive in an urban environment with existing highrise buildings.

The San Francisco study investigated a number of public open spaces and city streets for sun and light access during critical times of the day (from about 10:00 AM to 2:00 PM). Sunlight access during these hours was deemed necessary to ensure active use, particularly for outdoor lunch-hour activities. For each open space studied, solar access criteria was established and a sun profile plane was generated. The sun profile plane was then used to shape the height envelope within which a new building would be required to conform. Thus, the envelope (also called the solar fan) as defined by the sun profile plane sets parameters of the shape and height of the largest possible building on a given site which will not shadow an adjacent open space.

Solar access criteria for San Francisco streets was developed in a similar manner as those for open spaces. Downtown San Francisco has only four basic street orientations (north-south, east-west above Market Street and northeast-southwest, south-east north-west below Market Street); therefore the development of solar access criteria was simplified. For example, along east west streets above Market Street, criteria was established to allow solar access for six months of the year (March to September) during the majority of the day. A sun profile plane was generated (from the north sidewalk) to establish an envelope within which buildings on the south side of the street would be required to be built.

The approach used in the San Francisco study provides for selective solar access to public streets and open spaces. However, as much of San Francisco's

1 Institute of Urban and Regional Development, UC Berkeley, "Sun and Light for Downtown San Francisco", April 1983
existing downtown does not meet the proposed guidelines, widespread conformance to this approach will be difficult to achieve. As proposed solar access criteria for streets would create uneven zoning practices along downtown streets.

For example, the height of buildings along the south side on an east-west street would be less than those along the northside of that same street. In contrast to San Francisco, cities which use access to natural light as a means to regulate bulk and setback from the street generally specify the light from the skydome - daylight - rather than sunlight. The San Francisco study uses solar access criteria to control development adjacent to public open space. This useful model could become overly restrictive or unrealistic if not applied with room for exceptions.

**BOSTON STUDY**

In 1984, a similar study to the work in New York and San Francisco was made of daylight in two center-city Boston areas. The study used the sky-dome projection technique described in Chapter
One to evaluate the amount of daylight which would reach the street. The process was similar to Pleijel's globoscope projections, using an equal-distance lens to photograph and document the skydome at specific points in the areas of study.

From the sky-dome projection photographs, building obstruction of daylight was assessed on a building by building basis accounting for setback, placement of building on the site, design of building bulk, and notching of the building corners. The percentage of daylight obstructed was evaluated for each building offering a quantitative comparison as well as a visual comparison based on the obstruction illustrated by the photographs.

The study using a sky-dome projection was particularly appropriate for Boston due to its curving street patterns. This random fabric of streets, unlike the grid pattern of New York or San Francisco, is not easily evaluated based on a few examples. Unique and varying widths of streets required careful analysis to generate a full picture of existing conditions.
Notes: These skydome projections indicate that the combination of buildings at any given place in the urban environment cut off daylight to the street. For example, the Custom House Tower cuts off light to the street, however the overall impact is not as great as One Exchange Place (obviously a bulkier building) but also due to its placement on a narrow Boston street.
Notes: Skydome projections for the Boston study were quantitatively evaluated using the method explained in Chapter One under "Skydome Projections". These maps indicate daylight cutoff on a building by building basis. The higher the percentage, the higher the amount of light cut-off to the street. These maps can be useful to offer a contextual reference for a district or neighborhood. The maps however, do not replace the actual photograph in terms of qualitative information for a particular site.

2.29 Daylight Map of Boston's Financial District: Percentage of Sky Obstructed.

2.30 Daylight Map of Boston's Boylston Street: Percentage of Sky Obstructed
Based on a study of two urban areas—Boylston Street and the Financial district, further documentation of the downtown area was made. The recommendations for the study resulted in suggested daylight cutoffs for different areas of the city and the requirement for a sky-dome projection analysis (with assistance from a computer program) for all proposed building under consideration by the Boston Redevelopment Authority.

The computer program (BRADA) adjusts the daylight value for reflectivity of material in addition to calculating daylight obstruction. Light materials reflect light to the urban environment while dark materials absorb light.

The Boston study examined Floor-to-Area Ratio (FAR) as a zoning tool to protect daylight versus a sky-exposure approach. The following example illustrates that FAR is not a precise measure of the loss of daylight. Buildings with similar FAR could result in various amounts of daylight to the street while buildings with low FAR’s could significantly reduce daylight depending on the placement of the bulk on the site.

EXAMPLE

The following example illustrates the problematic nature of using an FAR approach to protect daylight. This example takes two hypothetical buildings proposed for the same site. Both buildings have identical FAR’s, however the designs for the two buildings are quite different.

In Figure 2.31a, this building occupies the site as a large rectangular solid while the building in Figure 2.32a has much of its upper stories set back on the site as well as having its corners notched. The impact of these two buildings can be compared by constructing a projection that is identical to the fish-eye photograph’s projection.

Such a projection can be constructed by drawing the plan and elevation of the building; corners defining the shape of the building are located in reference to the center of the street. In this

1 This example comes from a paper written by Professor Harvey Bryan and the author entitled "Zoning for Daylight: Referencing the Past to Build Cities of the Future". See Chapter One.
2.31 Proposed Building Designed as a Rectangular Solid, with 82% of the Sky Obstructed.

16 Story
115,200 ft²
FAR = 12

2.32 Proposed Building Designed to set back on site, with 75% of the Sky Obstructed.

12 Story
115,200 ft²
FAR = 12
example, that point is 40 feet from the buildings as the street is 80 feet wide, with no initial setback from the property line in either case.

By drawing lines connecting the center of the street to the critical corners of the building, a series of angles were determined. These angles were then used in conjunction with the altitude angle overlay to mask the buildings onto the skydome projection (see Figure 2.31b and 2.32b).

The percentage of light to the street was calculated by dividing the pie-shaped property envelope into 100 units. This was done by multiplying the altitude angle overlay's ten equal increments which will always be fixed) by the azimuth angle - the angle in the plan that is formed between the center line of the street and the edges of the street side property line - which has been divided into ten equal increments. These increments will vary depending on property dimension and street width.

With the pie-shaped property envelope so divided, the number of units of unobstructed sky could then be subtracted from 100. The remainder represents the percentage of the building's property envelope which is obstructed by the building. This method of evaluation is identical to how the percentage of light obstructed was determined in our preliminary survey of existing downtown buildings.

In comparison, although Figure 2.31 and 2.32 have identical FAR's, it is clear that the building in Figure 2.32 is more sensitive to issues of light (i.e. 7% more light to the street) due to the building's design. Figure 2.32's placement of bulk to the back of the site, street-wall (20 foot setback at 60 feet) and notched corners were features that made this building more sensitive to light even though it is 48 feet taller than the building illustrated in Figure 2.31.
THOUGHTS ON FUTURE REGULATION

Over time, attempts to protect the urban environment, in particular access to light, have been a critical factor in public review of building design. The regulation of a building based on a natural quality is not easy. As discussed in this chapter there are many approaches which have been suggested including, street-wall height, sky exposure plane, zoning envelope, economic success correlated to natural quality, floor to area ratio, bonus approach, assigned value, solar envelope and sky-dome projection.

From these many approaches a number of key issues regarding regulation emerge to be considered. The process of regulating a proposed building for the health and welfare of the public implies that the building will affect the public. The building will be built on a specific site with a specific orientation to its context. The combination of aspects of a site interrelate to offer a particular experience uniquely situated in relationship with the remainder of the city. The standard approach to regulation for qualities such as light is brought to question when one considers the uniqueness of a place.

As shown in this chapter, Atkinson suggested the correlation of zoning regulation to the width of the street. The achieving of daylight obstruction, as studied in Boston with sky dome projections is a more refined attempt to regulate based on a site's unique properties.

On the other hand, the discretionary process in New York City in the 1960's displayed an almost total collapse of site specific regulation being set with regretful results. Instead, the sum of bonuses allows arbitrary densities, heights and bulk of buildings.

The separating out of one element to evaluate such as daylight without connection to other qualitative elements distorts our understanding of a place. For example, within the area of light, daylight is only one attribute; sunlight, shadows, thermal properties and reflectivity are all aspects of light which exist in combination.

The design of a building affects many more natural properties than light. Wind, visual access, and views, for example, must also be considered. Therefore, if through regulation or evaluation we must separate out particular attributes for analysis,
then perhaps we must develop a means to analyze them in combination or to recombine the attributes in a final consideration. The regulation must refer to the relationship of the elements and the relative significance of the elements.

To increase their effectiveness, three concepts need to be added to the regulatory approach: priority, exceptions and adjustments. These concepts all suggest that regulation need not be overly restrictive. Priority may be given to one aspect of the design of an urban building which creates a successful urban environment in spite of other downplayed qualities. For instance, a narrow, dark, but historic street may fail a regulation but succeed in the public's judgement due to its romantic context and popular use.

There can be exceptions to a regulation as long as the exception is not the rule. As Atkinson pointed out, it is not one skyscraper, but a wall of skyscrapers which is detrimental to the urban environment. The exception to the rule is not possible if the regulation is too tightly defined. Perhaps however, we need some mechanism to know when the exception is appropriate.

Adjustments to regulation are also necessary like an adjustment for reflective surfaces. While a building might obstruct daylight, its reflective surface may make up for the obstruction.

The intent of this chapter has been to explain the uniqueness of place in considering regulation and the need for regulatory systems which allow for special conditions. The regulatory process is perhaps most useful when it likens our perception of urban space in methodology. The sky-dome projection method with the Waldram diagram is particularly useful for this reason.

The sky dome projection method is a useful tool because it simulates the way by which we perceive urban space. When we walk along a street we do not see a skydome projection however, we do experience a sense of the buildings cutting off our visual access to the sky overhead. When we look up from a Manhattan “canyon”, we see a similar image of buildings parting to allow the sky to come through.

Even without evaluating the equal distance photograph quantitatively, the visual presentation offers a great deal of information regarding the relationship
between daylight and the height and configuration of a building. It also tells a great deal about a particular place. It offers a comparison of the surrounding building to one another. A given photograph may indicate a canyon-like effect or an open area with a single tower. The tower may seem relatively negative given the remaining available light.

The photograph may also be correlated with other factors such as sunpath diagrams or thermal gain diagrams to indicate other relationships. This layering process does not replicate the experience of being within a space; however, it does offer information about the relationship of a variety of “qualities”. Other methods of regulation could be developed through perception and description such as street wall and views as well as orientation or landmarks as Yoshinobu Ashihara¹ and Kevin Lynch² have explored.

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More interesting still are the radical tendencies, recently evidenced by a few of the most successful and far-seeing buildings, of which the Empire State Building and the New York Life Building in New York are perhaps the most striking examples. In both cases, as a matter of sheer good business and self protection, the owners have voluntarily give up the great bulk of building which would normally rise directly on the street and they have set their buildings well back from the street lines and lot lines all around above the fifth story, the portions of the rentable area thus foregone immediately above the fifth story being concentrated higher up in owers in the center of the plot, where good light can be permanently assured.

- George Ford

As Ford suggested, the reluctance to accept the 1916 Zoning ordinance on the part of the building industry transformed to common design practice within a few years. A similar attitude might be taken with the skydome projection. The most effective regulation for building design loses its identity as a regulation to be incorporated into the understanding of good design. If in fact, the regulation becomes “good design” as it is perceived by the public, a natural process of experimentation, reform and reassessment will further develop and make more sophisticated the methodology by a variety of users. In this way the skydome projection approach and other methodologies based on perception of a specific place may be useful design tools yielding positive building design results in a multitude of situations.

1 Op Cit. Ford
3.1 Views of Rockefeller Center
I was born in Pawtucket and left there when I was a child. For years I carried around with me a memory of mountains that surrounded the place. When I had grown up, I revisited the neighborhood and what was my surprise to find that the mountains had shrunk to little hills. My point of view had altered. The same is true in respect of art...

The new buildings (Rockefeller Center) which are being erected have a note of difference in them which our eyes are not yet accustomed. We must see the beauty in them. When we do, then we shall look at the older buildings from a different standpoint and we shall be able to appreciate the beauties of both the old and the new.

- Raymond Hood

One of the most criticized and risk-associated building complexes built in the depths of world wide depression in the 1930's, Rockefeller Center has become one of the most economically successful and popular urban settings in the United States. As Raymond Hood, one of the principal architects on the team of designers for the project points out, over time our point of view changes and so our perception of a place. This is most certainly the case with Rockefeller Center.

In 1933, Lewis Mumford wrote in his "skyline" column in the New Yorker that Rockefeller Center is much ado about nothing. Seven years later, reflecting on the success of the complex, Mumford wrote Rockefeller Center has turned into an impressive collection of structures.

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2 Mumford, L., "The Skyline: Rockefeller Center Revisited", The New Yorker, May 4, 1940, p. 73
In addition to Mumford, Rockefeller Center has been studied, documented, and criticized by urban theorists and architects such as Le Corbusier, Charles Moore, Alan Balfour, Manfredo Tafuri, Siegfried Gideon, and others. It has also been used as a model for large scale urban developments such as Embarcadero Center (San Francisco) and International Place (Boston). It has been labeled by some the first "urban enclave".

The history of the design and development of Rockefeller Center is a fascinating story and case study, particularly in terms of a group process. Hood, who died in 1934 before the project was completed, has been credited with many of the Center's design themes. He begins his article on its design in January 1932 by diplomatically recognizing the many contributions to the concept:

How definitely the day of the architectural one-man show has passed is borne out with unmistakable emphasis in the planning of Rockefeller Center ... certainly no man can cope successfully with the problem that one of our great buildings imposes on the architect. ¹

addressed, as well, the use of description can be illustrated.

The previous two chapters reviewed the characteristics of light in an urban setting and regulation for light. As well the usefulness of description based on perception and perceptual forms such as elementary, dynamic and connective have been discussed in Chapter One. Chapter Two discussed the link between economics and quality; multiple aspects and quality leading to the need for exceptions, and priority and adjustments. This chapter, through a case study of Rockefeller Center, will begin to specifically examine these ideas.

RAYMOND HOOD AND THE 1916 ORDINANCE

Although Rockefeller Center was the joint project of architects, investors and politicians; Raymond Hood is perhaps the most interesting and key figure to consider in relationship to the "quality" of the building complex and the urban setting.

It is well known that the primary investor in the Center, J.D. Rockefeller was particularly concerned that the center be a financial success. The project for which the architects were selected seven days prior to the Great Crash of 1929 on Wall Street was certainly set in a fate linked to the crisis of economic success and failure.

Raymond Hood as well as J.D. Rockefeller has been viewed by his critics as a capitalist, concerned primarily with economic success. Hood's writings could be interpreted in this way, however, as Alan Balfour suggest he claimed to act as a servant of capitalism, not to architecture but this was surely a pose.
Although Hood, like Ford, used dollars and cents as an argument for his design intentions, Hood could be portrayed as a man who was clever enough to know the context of the times, the depression, and appreciated pragmatism. His kind of pragmatism said that sometimes it was "worth it" to spend a little more. For example, Hood insulted his client for the Daily News building for not agreeing to put a marble ceiling in the lobby, saying that he reminded him of *a man who buys tickets to the opera and arrives in his overalls*.  

Hood delighted in the limitations of the zoning ordinance which demanded a discipline to *make real architecture and real beauty*. Hood explained the overall scheme of Rockefeller Center in terms of the 1916 ordinance with a particular concern for light and views.

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1 Op Cit. Kilham

2 Ibid.
The scheme we adopted was of obvious simplicity. the zoning law allowed us to cover the entire site without setbacks to an approximately uniform level of 100 ft. above the ground. Above this point we took advantage only of our 25 percent tower rights on each block. In the middle block the tower right is concentrated in a single great unit in the center. On each of the other two blocks, it is divided in two, a tower at each end. This gives a staggered tower plan, like a five spot card. In the towers is concentrated the office space which is thus as ideal as possible, since every office has a protected outside view and light. In the lower part, i.e. below the 100 ft. level, are concentrated theatres, stores, and all those rental spaces that require direct contact with the street and can be artificially lighted and ventilated.

Within the limitations of the ordinance, the zoning envelope, pragmatism and optimum savings did not take precedence. For example, the numerous set backs of the RCA building were not required by the zoning ordinance, rather they were in celebration of the set back concept and the new symbol of the city, in the same spirit as the expressive and exploratory drawings of Hugh Ferriss.

Even Hood's concept of roof gardens for the center was based on an acknowledgement of the guidelines and intentions of the 1916 zoning ordinance in NYC.
...the gardens (will be) generally at the zoning law level, above which only the towers rise, they are not walled around by solid blocks of buildings... as the example of Radio City is followed... the sight lines from all the towers are lengthened, as the roof garden area spreads from block to block... Thus the effect of open space among the great towers is created - the precise effect at which city planners have been aiming. 

Here, Hood pushes beyond the stated limits of the ordinance through setbacks to maximize light by use of the roof for gardens. The design is more than an affirmation of the public sentiment or a literal translation of the regulation, but rather a designer's interpretation and creativity to meet the goal of openness.

Nevertheless, his argument for roof gardens were prefaced by the economic goal of utilizing the roof space and heightening the enjoyment by the surrounding offices, which could possibly raise rental income.

...the outlook from the skyscraper windows - the spectacle not only of the towers but of the city as a whole spread out below... Since there still are - and presumably always will be - many more low

3.4 Landscaped Roof, Proposed 1932, Weinrich, J.

buildings than towers, the face of the greater number of buildings which we see most plainly is, and will continue to be, that face which is the roof. An aspect which we have disregarded for an unconsciouable time, thus becomes more important than any of the remaining four faces...

...the city architect can no more afford to neglect the roofs that continually spread out below him than the country architect can afford to neglect the planting about a house...  

As much as Hood may have presented himself as a pragmatist, who considered economy and public regulation as primary, and not the romantic or altruistic architect, this image was a screen. In the Daily News Building and Rockefeller Center, Hood continued to push for design attributes like the fountain in Rockefeller Center, using arguments of economy. Hood was concerned with the overall image of the complex and acknowledged positive attributes for the general public,

the advantage of turning our light courts out so that they furnish light and air to our neighbors as well as our selves.

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1 Ibid. P. 49
2 Op cit. Hood, R.
3.6 Plan for RCA Building
Base compared to 36th floor (due to set backs), Tafuri

3.7 Final Design Study, 1935, John Weinrich
The design intention of Rockefeller Center was clearly to offer light externally and internally regardless of high densities. Hood followed many of the guidelines which George Ford¹ and others had developed as rules-of-thumb for natural lighting such as bay sizes.

we have stretched the 27' of lighted space that experience has proved is the maximum to be allowed to provide adequate to all parts of the building (internally)... As each elevator shaft ended, we cut the building back to provide adequate light and air to all parts of the building. ²

The final overall plan of the center, spread over three city blocks, was a result of a series of compromises in design intention over a period of ten years. The idea of a center plaza, however was carried from the initial stages to completion. The opening of the center of the three block area still distinguishes Rockefeller Center from the other series of highrise buildings now in the vicinity.

As well the combination of building massing with set backs, appropriate placement of bulk on the site with the sunken open space and light reflective building materials, offers a unique experience of natural light as was intended by Hood.

This lighting effect contributes to the total experience of the center which has led to descriptions of the center as “Architecture as Theatre" or as "America's showplace" or “a city within a city”. Rockefeller Center has become the prototype for the Urban Enclave, a group of buildings distinct and exclusive from the remainder of the city. Raymond Hood however, never intended it as such. Rather, he envisioned Rockefeller Center as part of a larger urban network of similar type, linked by subway, raised walkways and green space in the spirit of Le Corbusier's Plan Voisin and La Ville Radieuse.¹

¹ Ford, G., BUILDING HEIGHT, BULK AND FORM, Harvard University Press, Cambridge, 1931. See Chapter Two
² Op cit. Hood
The Center and the sunken plaza, in fact does connect directly to the New York subway system, a design decision which links the center to the urban fabric rather than isolating it.

Hood and the other designers went beyond the regulation to create Rockefeller Center. Due to the large site they were afforded the luxury of not strictly conforming to a “zoning envelope” as the wedding cake buildings maximized floor area under the regulation. Obviously, the massing of the buildings is not the only aspect of the project which makes it uniquely popular. Nor is the existence of open space; as only the next street over on Sixth Avenue, the “New Rockefeller Center” buildings, The Exxon, McGraw-Hill and Celanese Buildings, modeled after Rockefeller Center with sunken open spaces, offer a very different experience and have not been nearly as acclaimed. Alan Balfour describes this contrast as

To the east (Old Rockefeller Center) a powerful yet humane architecture sensitive to light, air, to scale, a product of romantic functionalism and creative opportunism, in contrast to the west (New Rockefeller Center) to a one-dimensional, good taste, gift-wrapped architecture, developed to contain the greatest amount
of space permissible and through improved technology able to ignore all natural constraints.

Tafuri, as well, quotes Peter Blake who criticizes the New Rockefeller Center's arbitrary use of open space.

Where the old Rockefeller Center grouped its buildings to create a variety of streets, malls, and a single landscaped, sunken plaza, the new Sixth Avenue is a chaotic agglomeration of piazzas, piazzettas, piazzettinas, arcades and 'courts.' Where the motto of the Beaux Arts period was 'when in doubt, do a boulevard,' the motto of some of today's architects seems to be 'when in doubt, do a plaza.'

Through qualitative description, the distinction between the quality of Rockefeller Center and other replicas of the center may be determined. Considering the forms created in an urban space as described in Chapter One, elementary, dynamic; and connective, what can be said about the quality of Rockefeller Center. Perception, relationships of objects and change in relationships will be considered with the qualitative description. Particularly forms of light as a quality

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1 Op cit., Balfour, A. p. 232
will be described, however, as earlier proscribed in Chapter One, the description will necessarily address other aspects of the urban environment.

DESCRIPTION OF LIGHT IN ROCKEFELLER CENTER

The following descriptions are presented as particularly relevant to the quality of light in Rockefeller Center. These quotes by Frederick Lewis Allen, Mumford, Gideon and Le Corbusier offer a collage of information.

I recall sitting one afternoon in the restaurant on the British side of the plaza and looking out on the people strolling by, the yellow and green umbrellas, the silver water coming down over the fountain steps below Prometheus and beyond, the shadowed rear wall of the Time Life Building. I tried to think what the scene reminded me of, and realized it was a ship board scene, full of animation and sunlight and a sense of holiday... notice how many people constantly strolling down the promenade that slopes westward and how many of them (if the weather is suitable) pause to sit on stone copings of the little fountained pools and look about...

1 Frederick, Lewis Allen, "Radio City: Cultural Center?" Harper's Magazine, April 1932, p. 535
In this romantic description Allen uses metaphor to describe the summer scene, "a shipboard scene" and includes people passing, strolling and promenading to intensify the sense of movement in the bright light. He also draws our attention to the reflective light of the water, "silver water" and the contrast of shade to sunlight," the shadowed rear wall of the Time-Life Building". Allen sets a stage in his description from which a particular quality of the experience can be gained. This slice of the total experience of Rockefeller Center over time, contributes to the total image of the place and might be called the "context of existance".

ELEMENTARY FORM

The walls and masses of Rockefeller Center with the depression of the sunken garden juxtaposed to the stepping tower of the RCA Building, intersecting streets part of the larger city grid; contribute to the elementary form of Rockefeller Center. The light

1 Mumford, Lewis, "The Skyline: Rockefeller Center Revisited," The New Yorker, May 4, 1940. p. 73.
...the play of mass against mass, of low structures against high ones, of the blank walls of the theatres against the vast checkered slabs of glass...

- Lewis Mumford
colored granite walls punctuated with rhythmic windows against flattened pilasters are also part of the form.

These masses may be measured, and their proportions may be related to one another. In terms of light, here the skydome projections are used to indicate the relationship of the elementary form of the center to daylight at different places within Rockefeller Center. The skydome projection is a relative measure to understand daylight in a specific site based on our perception.¹

Considering light as we approach Rockefeller Center from 5th Avenue, the skydome projection taken from the sidewalk of 5th Avenue facing the Plaza and the RCA Building displays that the buildings on the opposite side of 5th Avenue block out much daylight while the configuration of masses in Rockefeller Center allows for a wedge of daylight which is punctuated by the RCA building.

As one walks away from 5th Avenue, between the two small buildings (La Maison Francaise and the British Empire Building) which frame the RCA

¹ See “Skydome Projection”, Chapter One
3.15 Between two 7 story buildings facing RCA Building

3.14 Skydome Projection from 5th Avenue
building, the daylight is cut off by the two buildings and the direction of the daylight changes from north to south on 5th Avenue to east to west toward the RCA building. Still the RCA building cuts off a wedge of the potential daylight, with light coming from the two sides of the building.

Once past the two small buildings, and standing directly in front of the sunken plaza, the skydome is unobstructed on both sides of the RCA building. If one walks around the sunken plaza to stand directly in front of the RCA building, the daylight is significantly cut-off by the building. However, the total dome is most open at this point due to the sunken plaza. The Time-Life Building (to the left) and the International Building (to the right) cut into the daylight as well.

The daylight or the amount of exposed skydome is much greater than the amount found on 6th Avenue where the tower on base buildings of "New Rockefeller Center", previously mentioned tower straight from the street. Regardless of the large initial setbacks, daylight is significantly cut off from the street.
3.17 Directly in front of RCA Building (Larger Scale Photo)
3.19 6th Avenue

3.20 AT&T Building
The light on the East-west side streets is also much less on the side streets of Rockefeller Center. An even more drastic comparison is found only three blocks away in front of Phillip Johnson's AT&T Building. Here, the building rises straight from the site lines and cuts off nearly all potential daylight on that side of the street. Regardless of an open, grotto-like plaza at its base, light as an amenity was not considered by the designer of this building.

Returning to Rockefeller Center, the amount of direct sunlight at any given place in the center can be determined by overlaying a sunpath diagram on the sky dome projections. The illustration shows the hours which the sun will not be obstructed by buildings for the sunken Plaza.

The skydome projection not only displays the effect on daylight by the form of the buildings on the immediate area within Rockefeller Center, but includes any effect of surrounding buildings which might also impede light to the area. In this way, the use of the skydome projection includes the context of the site as well as the particular building in question.
3.22 Skydome Projection from Sunken Plaza

3.23 Sunpath Diagram
3.24 Sunpath Diagram overlayed on Skydome projection
note: From this overlayed sunpath, we can see that direct sunlight to the sunken plaza is less than might be expected. In winter months, November and December, very little direct sunlight reaches the plaza. The summer months, during the morning and early afternoon sunlight will reach the plaza. The space between the two low buildings (to of photo) allows for a significant corridor of light to reach the plaza in the middle of the day, throughout the year.
...out of these well calculated masses one becomes aware of a new fantastic element inherent in the space-time conception of our period. The interrelation which the eye achieves between the different planes give the clearly circumscribed volumes an extraordinary effect, somewhat like that which a rotating sphere of mirrored facets gives to a ballroom when facets reflect whirling spots of light in all directions and into every direction.

- Sigfried Giedion

The cutoff of daylight is more than just availability or amount of light. As seen in the sequence of these photographs of the approach to the RCA building. The amount of daylight can become a form as well as the building form. The progression of daylight forms, can have a direction. It can emphasize a particular building as seen in the first three photographs as the daylight outlines and opens to the RCA building at the Plaza.

It must be emphasized that the daylight form is comprised of the totality of the context, rather than one single building alone. The size of the site, then, allowed the designers the flexibility to manipulate the daylight form to "set a stage" for the RCA building. In most urban settings, this is not the situation. Therefore, the skydome projection can be a useful tool to understand existing daylight conditions which must be considered, and to suggest future conditions.

*Giedion, S., SPACE, TIME AND ARCHITECTURE, Harvard University Press, 1941, p. 845*
In relative terms, daylight takes on a dynamic form in Rockefeller Center as from the dark street it immediately opens the street and draws the viewer toward the RCA building with the even more open and bright area. In combination with the light reflective surfaces, the light in the plaza is intensified.

Direct sunshine on the reflective, mirrored surfaces of the regular, as Mumford calls "checkered" windows reflect a unique dappling of light on the neighboring buildings. This effect is not only a dynamic form, as it alters through the day, but it also suggests a connection between the buildings in addition to homogeneous materials and building design (or a connective form).

The reflective glass when lit by external natural daylight against the rough granite surface offers an almost rhythmic sensation which accelerates the energy of the plaza (rough - smooth - rough - smooth - rough...) similar to the acceleration of the additional setbacks of the RCA Building which seem to heighten and exaggerate the 70 story building.

The shadows of the mass of the buildings across the plaza, juxtapose a dynamic form on the elementary form of the buildings.
The multi-colored flags which march around the plaza are illuminated in a translucent way by direct light when unfurled by a breeze or stretched out by a wind. The animated color of the flags further add to the motion of the place at particular times.

Gold Prometheous and other gilded statues and art work glint in direct sunlight. The forms of art take on shadows and highlights which emphasize the three dimensional quality of the entire place.

The additional sparkle of artificial lighting is also part of the dynamic form of light over the seasons. As in winter the plaza is decorated with small festive twinkling lights and in spring, yellow daffodills fill the role of bright illumination in combination with natural light.

From inside to the outside, the yellow incandescent light of the offices illuminates the windows of Rockefeller Center, offering a multitude of framed lights which can be noticed when at dusk as the natural light lessens or on a dark and cloudy day.

The deep revealed entrances to the buildings of Rockefeller Center create a shadow zone, while artwork found above the threshold attempt to mitigate the shadow reflected natural light.
...the most ambitious project of municipal magnification since Babylon....Gone is all human scale; these raw pylons, obelisks, ovoids and pyramids have nothing to do with man; their scarps and tall cliffs crush him and his soul as of the sheer walls of the Grand Canyon. But the beauty of these walls, that do not shame man but only humble him, is not here and therefore beneath them he cannot bow, he can only cringe.

- Ralph Adams Cram

This is the center of things, this is the mainspring of the metropolis of the Western World. And also this is the Future... embodied in actual stone and steel for all to see.... despite all that Marxists may do to woo them; in Rockefeller Center they see Paradise Regained.

- Frederick Lewis Allen

A thousand feet of height in store, steel and glass, standing up in the magnificently blue sky of New York, is a new human event in human history which up to now had only a legend on that theme; that of the Tower of Babel...

-Le Corbusier

3.28 Entrance to RCA Building, Sculpture by Lee Laurie "Genius of Mankind"
CONNECTIVE FORMS

Light becomes a connective form in Rockefeller Center first through the dramatic animation of the elementary objects which draws the passion of its critics. The dynamic form of light suggests a place alive, with energy, part of the present. With the combination of crowded use by tourists, children skaters and business people, the animation, the perpetuity of the place cannot be denied.

Balfour connects the lighting to a theatre of culture, enterprise and capitalism, as the centerpiece, the RCA tower has been shown to be revealed with daylight.

Le Corbusier connects the contrast of the RCA building against the sky to a moment in history, a technological age and an image of the future.

The connective form could simply be said to be the openness of the place, bright light in combination with public access; in a strange contradiction to the private ownership emphasized by the homogeneity of building; in all indicating the liberal nature.

Rockefeller Center has a literal connection to the surrounding urban fabric and a symbolic connection to an idealized image of urbanity. Like other visions of the city such as those offered by Ferriss and Le Corbusier, Rockefeller Center connects to hopes, and dreams in an exaggerated model for the future. The theatrical daylighting which Balfour discusses, and has been described through the use of skydome projections is a part of this built vision. The image which is created by Rockefeller Center supercedes its elementary form lending a lasting contribution to the overall image of New York City.


3 Jeanneret, C.E. (Le Corbusier), WHEN THE CATHEDRALS WERE WHITE: A JOURNEY TO THE COUNTRY OF TIMID PEOPLE, New York, Reynal & Hitchcock, 1947, p. 45
CONCLUSION

Rockefeller Center has been used as a prototype by many designers, however, the qualities which Raymond Hood and others achieved in Rockefeller Center have seldom been replicated. The explanation to the inability to repeat the qualities may be the lack of emphasis on the use of descriptive tools. Instead emphasis on economic indicators and use of modes of presentations internal to the architecture and planning professions may misplace the focus of the design. Mr. Donovan's frustration expressed in his letter to the editor of the Boston Globe found in Chapter One, suggests the need for a sharing of descriptions by the public and the design professions.

Descriptions of Rockefeller Center as a "A City within a City" or "the first urban enclave", debase the intricacies of the design of Rockefeller Center and the combination of site and conditions. The center has been connected to the city from its initial intention to its contemporary form. By reviewing the form of light of Rockefeller Center, we can see that the Center opens to the surrounding urban area rather than closing and withdrawing from the urban network. The connection to the city of New York can be seen literally when one stands at the Sunken Plaza; where one sees first the common buildings of Rockefeller Center, but beyond these, even more dense contemporary buildings can be seen. The connective form can be understood by further studying the center.

Hood acknowledged the relationship to other nearby buildings as earlier quoted referring to the benefit of light and air which would be gained by the neighbors to the site. His "Manhattan 1950" project, a visionary exploration of urban ideas suggest the designer's intended connective form for the Center.

A literal, elementary interpretation of Rockefeller Center has resulted in the urban enclave prototype as exemplified by building developments such as International Place in Boston by Phillip Johnson. The development includes three towers and an internal central atrium. The developer of the project recently described the collection of building massing as "an urban village", implying a likeness to Rockefeller Center. This blatantly illustrates the use of cliche images which become meaningless to describe a place.
Unlike Rockefeller Center, International Place closes off light to the streets which surround it including the Chadwick Iron Works and other historic buildings within the neighborhood. The internal atrium space from within the "urban village" is located south of the towers and will always be in shade; with no potential for natural lighting regardless of the glass roof suggesting a daylit internal environment. The atrium is not only roofed, but also walled in by the building masses of International Place preventing views to the urban surrounds, further reinforcing a separation from the historic area of the city.

All these aspects are in direct opposition to the description of light in Rockefeller Center as presented here, yet these characteristics are common to many contemporary building complexes (urban and suburban) which their designers may suggest are based on the Rockefeller Center model.

Furthermore, International Place does not employ light to emphasize the building complex and the connective form as the RCA building is highlighted by the openness created by the sunken Plaza and as is revealed by the procession through the British and French buildings (low buildings located on 5th Avenue). Rather, International Place relies on the neighborhood to remain low-rise, to allow light to highlight its form. Even without additional neighboring development, the description of the quality of light as it is experienced at International Place will be one of dark streets. In particular, this will be the case from Washington Street (the central business district) from which most users will approach the complex.

The elevation shown here will most likely never be experienced; as an overpass highway is adjacent to the site and cuts off the view. Although this form of a description is the tradition of the design profession, its meaning has been forfeited by misleading presentations oriented toward an emphasis on Floor to Area Ratios which indicate maximum rentable space. To further address these issues, the example of International Place could be expanded beyond the description of light. I believe further analysis would reveal that the complex is in fact not as economical a complex as might be possible at the site due to the multiple towers requiring separate elevator banks and extensive building skin.
The question of economy versus quality is a misnomer having to do with the use of vocabulary and definition. While Raymond Hood advocated economy, he did so in the context of a greater agenda. Raymond Hood and George Ford would agree that buildings which rise straight from the site lines to towers over 200' are uneconomical as they destroy natural light and ventilation which give value to the property. With the contemporary urban enclave there is a need to integrate a descriptive approach to reach a fuller understanding of the urban environment which is being created.

Raymond Hood and the designers of Rockefeller Center not only considered the elementary building massing, but were equally concerned with the dynamic forms created through light, climate, air, etc. They worked toward connective forms; not only connecting Rockefeller Center to the city, but connecting to images which are built through the relationship of details, material, building bulk design, light, air, art, cultural use and the people who use the place.

Although Rockefeller Center is relatively small, and heavily guarded with only pedestrian activities of watching skaters, lunching, or taking photos; the center is not only a monument to a past decade or a liberal dogma. Its use, perpetual motion and change speak to its connection to the present.

One wonders if the contemporary references to Rockefeller Center will ever offer the same image of an urban place, either today or fifty years from today.

By reviewing Hood's words we can see that he presented not only a vocabulary, but a process having to do with interconnection of many things. Here these interconnections have been called forms, elementary, dynamic and connective. Phillip Johnson described the Palladian windows of the towers of International Place in Boston to "be like wallpaper". This "paper" attitude toward contemporary design cannot be likened to the depth of forms found in the design of Rockefeller Center.
INTRODUCTION

The previous chapters reviewed the properties of light, the effect of light on our understanding of urban space, and the regulation of light. This final chapter will present several conclusions and possible directions for future study. The goal of this section is to indicate a technique for understanding the built environment and to find a better fit between regulation and the design of urban buildings.

Light has been used as an example of “quality” in urban space. As explained in Chapter One, in urban space, there are many characteristics of light which exist in combination: sunlight, daylight, thermal gain, thermal protection, reflected light, reflected glare, north light, south light (colors), and the time of day or the time of the year the space will receive light. Building bulk, configuration, material, height, and detail are only a few of the ways in
which a building will affect the quality of light as explained in Chapter Two.

Light, of course, is only one aspect which we may consider "quality" in the urban environment. Other natural and man-made aspects include ventilation, wind and views as well as historic sentimental and symbolic manifestations in physical form.

Quality in the urban environment is not a check list. Quality is a combination of elements which are not static. The combination of buildings, open space, light, wind, historic reference and use may come together in one urban environment to offer a particular setting which we might generalize as a quality.

Although architects and planners are trained to quantify categories which are considered "qualities", it is the dynamic combination of elements which form a complete experience and an image which we are able to describe.

Kevin Lynch talks about quality as something which must be experienced.

Much useful information is recorded in these standard exhibits, but they leave out even more. Professionals tend to use them as mnemonic devices, once they have actually experienced a place or as stores of information which must be renewed and tediously reworked for each new and particular problem. They rely on field reconnaissance, discussions with knowledgeable local residents, and repeated resurveys. Thus it is difficult to compare the quality of two places, except for some gross features, such as size or average density. No one, however experienced, is able to look at the standard data for a city and evaluate that city's quality.

- Kevin Lynch

Issues of presentation and storing of information create a dilemma for the architecture and planning professions. As Lynch suggests, the storing of information is a cumbersome process but necessary due to our memories' limitations. The method and form of the information storage is reflected in our design of buildings and public regulation of buildings. For example, the use of a "foot" for measurement

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Descriptive Review

is a form of information gathering and storage which reflects and implies human scale.

As well, the method of presenting information and its form, has a great deal to do with shared understanding, a critical aspect of design in the plural culture in which we live. The concept of description for public oversight as presented here is a challenge to articulate information which cannot be easily stored by quantitative devices and to bring in a whole form a presentation of quality as we perceive it in the urban environment.

PERCEPTION OF URBAN BUILDING

We perceive buildings not as a plan, elevation, or perspective drawing which the architect may offer, rather we experience buildings—urban buildings—from inside and outside and from transitions between the two.

- Kevin Lynch

1 Op. Cit., Lynch p. 345
Our experience of buildings is relative to our own position in the environment. We experience them from the outside in relationship to other buildings and from below looking up. Buildings cast shadows on us and sun is sometimes allowed to warm us. Wind blows on us as a result of the building.

We experience buildings in relationship to other people and as references for orientation in the city. Buildings remind us of the past or suggest the future. We may perceive buildings as symbols of power and institutions.

As we move from the outside to the inside of a building we perceive a transition which may be physical, dynamic and symbolic. From within, windows frame other buildings and urban space in different ways. A high rise building offers a view which may not have been available from any other place in the urban environment. The new perspective is not only the skyline of the city but the network of streets, the electricity of the traffic and the detail of the private rooftops. It allows for a voyeurism in the city where we may choose what direction we wish to look. The view from the highrise brings to
focus the roof tops and elevation of other high buildings.

We seldom view one building as a totality in an urban setting. The meaning of buildings such as Le Corbusier’s Ronchamp would be lost in the crowded network of urban streets. Only buildings such as San Francisco’s Transamerica Pyramid, and the World Trade Center and Empire State Building in Manhattan have become icons which are identifiable in elevation and massing by the general public. For example, a miniature statue can be purchased of the Empire State Building and every New Yorker has a symbolic image of this building.

Nevertheless, buildings and urban design proposals continue to be presented to planning review boards in the limited architectural language of plans, elevations, models and perspective drawings. Based on these representations, proposals are evaluated, discussed, approved or disapproved. These same presentation drawings are made available to the general public via print and electronic media. Popular opinion of a proposed building is frequently based on an artist’s rendition or a photograph of a model.
Urban space is experienced through a chain of perceptions linked together to create an image. Contrary to the architect's elevations or the snapshot of the model, which focus on the object quality of the building, it is the intrinsic relationships of objects to one another which we perceive as spatial. The object's qualities are suggested for our imagination to fill in an image, while what we actually "see" are fractured aspects of the building; the entrance, the street-wall etc. However, the image which is formed is complete even though the fractured elements are not.
Inherent in the following theoretical framework is the conviction that no individual design professional has the singular responsibility for the creation of an urban setting. By its nature, the city is a dynamic composition of ideas and people. The social, political, and economic conditions of the city manifest themselves in a physical form which the designer can only hope to anticipate.

Visionaries such as Frederick Law Olmstead could foresee saplings grown to grand oaks and the small city of New York of his day, becoming the Manhattan we know today. Even Olmstead worked with a palette of the urban context which interrelated with his design. The "Emerald Necklace" in Boston is not an urban design in isolation, rather it is successful in combination with its surroundings. Although individuals may have a sweeping impact, the role of architects and planners must be viewed as that of a facilitator for public intention and understanding.

For appropriate design, it is in the interest of design professionals to listen to the public and to make more accessible information which may help both the designer and the public to understand the urban environment better.

The dilemma of regulating for "quality" in our culture is not only the need to understand the perceptual semblance, but the need to understand the multiplicity and pluralism in our society. This multiplicity of values and spatial experiences makes the urban environment seemingly indescribable and uncontrollable. There is not one person witnessing the city, rather there are hundreds and hundreds.
Regulation could be thought of as one of many ways in which the public influences and contributes to our urban environment. As seen in Chapter Two, regulation is a powerful influence over the design of buildings.

Beginning with Paris, the sky-exposure arc is a reference for the Parisian curving roof (also attributed to Mansard's attempt to circumvent tax regulation).

The 1916 Ordinance resulted in the "Wedding Cake" building type. The visionary work of Ferriss, Hood, and Sullivan which idealized the form of the skyscraper, has also been attributed to a response to the 1916 ordinance. According to Ford, building prototypes such as the Empire State Building can be attributed to a minimum standard taken as an economical design concept and expanded upon.

1 Tafuri, Manfredo, "The Disenchanted Mountain", THE AMERICAN CITY, Cambridge, MA., MIT Press,

The slab-on-base building prototype of the 1960's is also attributable to encouragement by bonus incentives. The 1961 New York City Zoning Resolution offered a range of bonuses for perceived public amenities such as open plazas at the street level.

As architects respond to the current New York City zoning guidelines, some buildings take the form of a sky-exposure curve in a so-called "ski slope" configuration, attempting to maximize rental space. From these examples, public oversight, in combination with contemporary opinion, can have a pervasive influence on architecture and the formation of the urban environment. The form of this oversight, not only the specific regulation, impacts design as well.

Chapter Two reviewed many different means of regulating building including prescriptive, performance, discretionary, bonus, and voluntary. From these methods of regulation, suggestions can be made in regards to future and alternative regulation of urban buildings. The effect of regulation and design may be unintentionally negative if the method and means of the regulation is not carefully devised. There may be an alternative approach other than (or
4.9 Hugh Ferriss
4.10 Ski-slope Building
in addition to) regulation which could assist the design of urban buildings, as suggested in the descriptive approach detailed in Chapter One.

To begin to consider an alternative approach, Raymond Hood offers some insight. Although Hood was an advocate for economy and adherence to public regulation; Hood went far beyond the stated limitation of regulation or economy. His design agenda was far greater than pragmatic compliance as can be clearly seen in his "Manhattan 1950 Project". Without violating the state limits, Hood argued under the guise of economic incentives for quality. His romantic vision of "hanging gardens" and the image of the skyscraper, were as much a guideline to Hood as the 1916 ordinance. The difference however may by the quantitative articulation of the regulation and economy which allows historic record to credit these factors with design success.
4.12 Buckminster Fuller's Proposed 2 mile Hemispherical dome

4.13 John Portman's Renaissance Center
The development of technology calls into question the appropriate method of regulation. Modern technology has released building design from adhering strictly to environmental constraints such as access to light, protection from wind, rain, and snow, and thermal protection. Historically, these constraints have been clues of the symbolic and intuitive relationship of humans and their existence in a place. While in the past shelter was designed to respond to the dynamic local climatic and regional conditions, today, technology's structural and infrastructural flexibility and capacity allows designers to optionally ignore environmental clues. We may modify the internal building environment to create ambient temperature and light regardless of building configuration.

To date, however, the urban environment is not as easily manipulated by mechanics (although Buckminster Fuller and others have suggested possible approaches to achieve this goal). The capacity to build previously infeasible heights, and densities may put special emphasis on public regulation on behalf of urban outdoor space. The tendency is to legislate tighter restrictions, more precise standards, with the capacity of technology. Rather than increasing precision, an alternative approach might be to become more specific in regards to the qualities of urban space which are desired by the general public and to allow the designer to determine the means to achieve them.

Far more than Rockefeller Center, they are cities within cities. In the John Hancock Building, for instance, people can live, work and participate in social life without ever leaving the gigantic anti-urban machine.

This, indeed, is the real substance of these inventions, in spite of their intended aim of serving as eloquent symbols of the metropolis and its dynamics. It is not emerging urban masses that erupt on the skylines of Manhattan, Chicago, and other American metropolises but, rather, antiurban paradoxes, artificial technological "miracles." Here the laws of urban growth in the American city are overturned. The insertion of such structures in the two dimensional grid of the city tends to negate the city itself in a desperate effort to escape its irrationalities.

- Manfredo Tafuri

1 Op Cit., Tafuri, M.
CHANGE

The concept of "quality" in the urban environment is not necessarily constant. Our definition of "quality" changes over time, altering our understanding of a place. In one sense, our values change, influenced by social, political and economic realities. On the other hand, transformations of physical form, the dynamic aspects of the natural environment, or the function and number of people using a space may change the urban place. All these changes will affect our perception, reading, and understanding of a place.

Change occurs in the environment on an annual, seasonal, and daily basis. The orientation and reorientation to the natural environment is perhaps the most critical form of change which affects our perception.

While some elements change, other elements remain in the same form. The relationship of the constant elements to the changing urban environment will alter our perception as well. For example, a historic building will be perceived in an entirely different context when surrounded by high rise buildings then when it was originally constructed.

Rockefeller Center is another example of a change in perception. When it was first proposed, it was to be a high-density commercial development in the midst of a residential, lowrise district. Today, Rockefeller Center might be considered underbuilt, particularly in comparison to the Trump Tower, AT&T and IBM Building Triangle only a few blocks away.

Again, advanced building technology has altered our design intentions and form of regulation. As well, technology has changed our perception of the urban environment, particularly computerized
information systems, telecommunications and transportation has altered our understanding of the city in terms of use and images.

The altering images of the city based on change in the urban environment suggest the limitations of public oversight and input in design of buildings.

DYNAMIC REGULATION

With this dynamic altering of understanding, how can public regulation of the urban environment hope to keep pace? Without a dynamic regulatory system, the regulation becomes a static element within a dynamic body. Yet, even this static element changes in terms of our perspective. For example, a height limit of 180 feet in a particular area at one point, may have been thought of as a generous limitation. If this limit remains in force in one area, while in another area, the limit is raised significantly, over time the perception of the 180 foot limit will change to a perspective that it is a very restrictive limit.

Although holding some aspects constant for public good may be positive in the constantly altering world of the urban environment, the world which Max Weber describes as an "electric transformer", perhaps regulation does not reflect the constantly changing world in which we live. As the Housing Quality Study attempted, a more flexible regulation of the city could assist. The regulation might have more to do with the "reading" of the "qualities" of the city or the way in which we perceive the city at a given time and our future image of the city.

PUBLIC FOCUS ON URBAN SPACE

The public may be most effective in focusing oversight or regulation on the quality of the space between buildings, the relationship of buildings to one another in addition to the proposed buildings. This attitude is partially formed in the recent San Francisco zoning ordinance which uses the maintenance of solar access in open space as a basis for regulation. Unlike the New York City incentive programs from the 1960's which gave bonuses for
open space but did not consider the quality of the place, the San Francisco ordinance places priority on open space and considers a building in terms of its affect on that quality. The San Francisco ordinance, however, seems to be overly restrictive in its focus on the specific design elements of individual structures.

In addition to the design of large urban spaces, a similar approach could be taken for the desired quality of streets and sidewalks. Other aspects of "the space between buildings" which may be considered include:

(1) the relationship of buildings to one another;
(2) the relationship of the individual to the buildings or viewpoint;
(3) the relationship between people within the relationship of the buildings;
(4) the relationship of the buildings to an intrinsic understanding of the space which the building occupies or the history of the space/land itself.

This does not mean that buildings would not be considered as part of the zone of public control. Aspects of a building such as the facade of the building and its material, the bulk of the building or massing, and the entrance of the building all affect the quality of the space between buildings.

The descriptive approach as suggested here, would describe the quality of the space between buildings. The description would be based on our perception of the qualities and would necessarily take a form which is complete using perceptual tools and "perceptual forms" such as elementary, dynamic and connective.

**DESCRIPTION FOR PUBLIC OVERSIGHT**

The perception of the urban environment is an understanding or "reading" of a place. The sharing of this "reading" with others, modifies and reinforces the perception of society and in turn, contributes to the formation of the environment.

One method of regulation or public oversight would be to develop a perceptual vocabulary which the public and architects could use. Description through use of a common vocabulary in the public and private realm of urban design could heighten mutual understanding of urban space. In particular,
this mutual understanding may be helpful as a "qualitative reading" of space with collective and individual perspectives.

The descriptive vocabulary could be similar to the "tacit" understanding of form or formal language and formal metaphors in which architects are trained. The exchange of information through "form-language" and images such as the aerial view of Siena, Italy, is an appropriate mechanism of description which conveys not only technical information, but "meaning" and "feeling" as well. On some level, however, this language becomes a private language privy to those introduced and trained by it.

As the tacit understanding is a useful means of conveying information, to extend and broaden the language to the public could strengthen public formal literacy, the ability of the public to better describe and hence critique its urban environment, and the ability of the designer to act as facilitator of urban space.

The recommended perceptual vocabulary uses the example of the sky-dome projection. As discussed in both Chapter One and Two, the sky-dome projection describes an aspect of the urban environment as
we perceive it and relates more than one element of the urban environment in its description.

If a vocabulary through words and visuals, were developed which illustrated or described our perception of the environment, a series of such descriptions matched to a particular proposed design, might adequately replace a regulatory approach and offer far more information to the general public.

The vocabulary could combine three forms which we perceive in the urban environment: for the purpose of explanation here called; Elementary, Dynamic, and Connective Forms. Suzanne Langer explains this concept of perceptual forms in terms of light-

> unusual lights bring out new forms (in a building), but all forms are beautiful, and every change yeilds a complete, perceptual mood.¹

Urban space may be described in many mediums: poetry, art, music, literature, film, and photography. Each of these forms of communication can be used to interpret urban space. They are not a replacement for actual experience, as their essential nature edits, distorts, selects and orders. However, interpretations received through these media can expand and enrich our understanding. Neither the media nor our own description can be exacting. When the description becomes too precise, a mimesis or "super-real" we lose information about our own relationship or understanding of the actual experience. The mimesis becomes a substitution for the actual experience rather than a description of it. The mimesis does not offer an expressive metaphor, but rather is an experience in and of itself. Therefore, to increase understanding through use of media, we must accept an implied interpretation, a version of our understanding of the actual experience.

In the process of exchanging versions of our perception, we are influeced by other versions. The exchange of interpretations creates a kinetic chain of accumulated understanding. As versions of the urban space are shared, we gain greater appreciation for the diversity of perception as well as the commonalities. With a common framework, we can begin to describe urban space not by dissecting it, but rather by reviewing and understanding which aspects impact and form our perception

¹ Ibid.

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To be shared and exchanged with other versions, our version of urban space must be

(1) easily understood;
(2) acknowledge illusion and perception (memory, change, and movement);
(3) capture the relationships of elements as well as the elements themselves;
(4) refer to levels of self-consciousness or our position within the description;
(5) allow for exceptions, alterations, and modifications.

The framework described in Chapter 1 of descriptive forms with elementary, dynamic and connective forms which we perceive in the urban environment as well as the sky-dome projection is an initial attempt to develop a qualitative framework. The framework, like Asplund’s description is intended to be complete, yet not finite, in the sense that it is not the only possible framework which might be developed. Needless to say, any descriptive framework, must serve a purpose to describe that which is perceive. The use of the descriptive framework may not change architecture, or change the urban environment. It may only heighten our understanding and our ability to “see” the places in which we live and work for no greater purpose than to be able to acknowledge the quality which we appreciate in the place.


Bosseman, P., et. al. SUNLIGHT AND LIGHT FOR DOWNTOWN SAN FRANCISCO, Institute of Urban and Regional development, University of California, Berkeley, 1983.


Conway,D.J. HUMAN RESPONSE TO TALL BUILDINGS, Dowden, Hutchinson and Ross, Inc., Stroudsburg, PA, 1977.

Cram, Ralph Adams, “Radio City - And After”, The American Mercury, July 1931

Department of City Planning, MIDTOWN DEVELOPMENT PROJECT - DRAFT REPORT, City of New York, 1980.


Giedion, S., SPACE, TIME AND ARCHITECTURE, Harvard University Press, 1941, p.845


Jeanneret-Gris, C.E. (Le Corbusier) TOWARD A NEW ARCHITECTURE, Payson & Clarke, 1927.


Langer, Susanne. FEELING AND FORM, NY, Charles Scribner.


Mumford, Lewis, "Skyline" column in The New Yorker, 1933 and May 4, 1940.

New York City, Department of City Planning, MIDTOWN DEVELOPMENT PROJECT - DRAFT REPORT, City of New York, 1980.

New York City Planning Commission. 1916 ZONING RESOLUTION (AMENDED TO 1945), City of New York, 1945.


Rockefeller Center Weekly, GUIDE TO ROCKEFELLER CENTER, NY, 1935.


