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Unknown date

THE DESIGN THEORY - A Systematic Approach
A MASTER'S REPORT by Vivekanandan Ramasamy
ACKNOWLEDGMENT

MY SPECIAL THANKS TO PROF. FRED S MATTER AND PROF. KENNETH CLARKE FOR THEIR USEFUL GUIDANCE WHICH ENABLED ME TO COMPLETE THIS REPORT

[Signatures]
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INTRODUCTION

Any Artist irrespective of the kind of the work he does whether paintings or sculptures or graphic arts or designing buildings needs a systematic approach to his solution to achieve the goal in a most satisfying manner. But, Unlike painting or similar Arts, in the designing of a building, the mistakes due to an unsystematic approach cannot be interpreted as a part of the art since it delicately involves both form and function in the right combination.

This combination of form and function varies from project to project, place to place and user to user. We do not know how many Designers (Architect) really study the type project(Function), the place it fits (Community, Site, Building) and the type of Users before they visualise the combination. But we do know that most failures occur within the building because of the lack of a systematic approach.

A Systematic approach is a way of combining various systems in a set of patterns by giving priorities to each system depending on its importance to the project to the users or to the architects. Our aim here is in two parts. In part one the methodology is developed for all systems and in part two, a project is selectd as an example and those parts of the overall methodology involved with the specific project are selectd and utilised to achieve a 'Typical Design'.

This Typical Design will be developed to a preliminary level. It will be then analised to trace the decision making process back throughout the initial pattern sets. In this way the systematic approach can be tested with a series of feed-back loops to check for completeness and consistency in application.
Definition of Systems....
Different Phases of Systems....
Dimensions of System and its Classifications....
An 'Approach' to the Problem....
Design Strategy....
Development of Typical Design Strategy....
Programmatic Chart....

PART ONE......SYSTEMS AND APPROACH
DEFINITIONS OF SYSTEMS

'A System is a combination of Devices, Techniques, Kinds of Behavior, Rules of Procedures, and People intended to perform some function or collection of functions'.

A System may be classified under two main categories as:
(1) System as a whole and
(2) System as a part (It is also termed as Generating System)

SYSTEM AS A WHOLE is an abstract way of looking at an object which exhibits holistic behavior as a result of the interaction among the parts within the object.

SYSTEM AS A PART is the activity of a group of elements which themselves combine to generate an activity or an object.

Both 'System as a Whole' and 'Systems as a Part' can be elaborated under the common sub-divisions (1)*Purposeful Activities and (2)Unpurposeful Activities.

Music and Art are the perfect examples of purposeful activites in 'System as a whole'. Music and Art have been created with the Listener and Viewer respectively as the main purpose. But, They are systems which can be understood or felt only in oneness.

The Solar System is an example of An unpurposeful activity in 'System as a Whole'. It does have the characteristic of not having any goal or objective in itself, the functions of it are always constant and the system is a completed one.

Business, buildings and transportation systems are some of the purposeful activities in 'System as a Part'. These systems are the combination of various subsystems to achieve certain goals and objectives. Still these system have always been incomplete ones and tend to grow.

Growth of a tree is a fine example of unpurposeful activity under this category. It is known that a tree follows a system to grow and that the growth of it is never completed.

Despite these contrasts there have always been a kind of bond between the two kind of systems as most of the 'Systems as a Whole' partly or fully are generated by the combination of various generating systems.

*Any process that produces a response(output) when an excitation (input) is applied to it, can be called a System.

Relating this system to our example, music can be viewed as a System as a result of inputs and outputs like man, instruments etc. But, then Music is composed of a number of major sub-divisions, each responsible for the entire system. These are called sub-systems. Of course, these sub-systems can be further subdivided. This process of subdividing can be continued until further subdivisions become irrelevant to the problem in hand.

Any of these subdivision which directly relates to our problem in hand are termed as components of that system.

Likewise, The problem can be a component, a sub-system or a System.

For example, if we take house as a program, then house is a system. But, if we consider a neighbourhood as our program then, the house is a sub-system. If our problem is to be a City, the neighbourhood become sub-systems and house is component of the system.

So, The definition of a System is clearly an extension of one's objectives with respect to a particular program.

DIFFERENT PHASES OF SYSTEMS
1. Conceptual Phase - During which the idea and requirement for a system, are Born.
2. Definition Phase - During which detail design, development production and testing of the actual elements of the system must take place.
3. Acquisition Phase - During which system is constructed and formulated.
4. Operation Phase - During which the system is ready to be operated and the mission of the system can be fulfilled.

TYPICAL DIMENSIONS OF SYSTEMS
1. Fundamental - It is the identification of Physical and Basic Structural aspects of a system.
2. Values - It is concerned with social life and Civil Rights, Behavioral Science, Pleasures, Individual life, Sensitivities, Modes of conduct, Essential beliefs, Involvement of others, Cultural and Aesthetic properties.
3. Measures - It is the determining factor for a certain standard of living and a comfortable environment through objectives and goals.
4. Control - It sets the limitations in investments, labor and maintenance
of the betterment of the program.

5. Interfere - It links the clauses of fundamentals, values, measures with criterias and design strategies.

6. Future - This is the anticipated changes in each specification. The future dimension also reveals the growth, current stage or delay of specifications.

<table>
<thead>
<tr>
<th>DIMENSION OF SYSTEM</th>
<th>INTERPRETATION OF DIMENSIONS OF SYSTEMS IN TERMS OF BUILDING</th>
<th>GROUPINGS</th>
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<tr>
<td>Fundamentals</td>
<td>Rules &amp; Regulations, Bye-laws, Access, and Service facilities</td>
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<td>Culture, Heritage, Tradition, Contemporary values etc</td>
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<td>Measures</td>
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<td>LUMINOUS, THERMAL, SONIC, ATMOSPHERIC, AND STRUCTURAL</td>
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<td>Control</td>
<td>Setting limitations in investments, maintenance, labor etc</td>
<td>TIME &amp; COST</td>
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<tr>
<td>Interfere</td>
<td>Approaching the program (building) with the typical design strategy</td>
<td>-</td>
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<tr>
<td>Future</td>
<td>Preparation and Application of programmatic chart</td>
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</tbody>
</table>
AN 'APPROACH' TO THE PROBLEM

Each one of us has different methods of solving any particular problem whether it is physical or analytical. But the decision to attack a problem leads us to a keyword 'How'. That is how to start, how to formulate and how to present a problem. This method can be defined as APPROACH.

A solution seeking approach consists of a definition of the system involved (theory), the importance and extent of each system (analysis) and the methodology of implementation.

According to Gerald Nadler, the author of the book 'The Planning and Design Approach' there basically four types of approaches:

1. Do-Nothing Approach
2. The Chance Approach
3. The Affective Approach
4. The Rational Approach

1. Do-Nothing Approach- It is the kind of approach one adopts when he or she feels the particular problem in hand cannot be solved by human beings and it can be solved only by the supernatural powers. For example, people in some of the ancient civilizations, when there were floods, famine and other problems, simply did nothing except to have a belief that it was a wish of god and only he could solve it.

2. The Chance Approach- The action in this approach is based on the undetermined experimental basis. This is a typical method of Einstein's 'Finding without seeking'. (eg. The method of cultivation and fire)

3. The Affective Approach- This depends mostly on mental intuition, inner

#From the Book 'The Planning and Design Approach' by Gerald Nadler published by Wiley-Interscience
feelings and insight. This process is not an experimental one, but it involves a tedious process of accumulation of knowledge in a random manner. Then, one has to wait to get a proper loop between those bits or the desired result itself (Archimedes Principle). The disadvantage in this approach is that most of the solutions in this method are out of one's personal experience and in most of the cases, the particular person who experiences, cannot explain his methodology. So, for others his methodology may be an irrational one.

(4) The Rational Approach- It is a scientific way of solving the problem. Any solution with a rational approach has its own theory behind it to explain the process. It has sequences in thoughts and goals in a systematic manner. Normally, the rational approach follows basic principles. Such as:

Linearity- in which the growth of the process is always linear towards one direction. The recycling movement is very rare. (ex. Scientific formulae)

Optimism- in which the problem is approached with the attitude of positivism and with the determination of getting the solution.

Objectives- each and every element of the problem is taken as a physical problem and it is solved with certain determination, methods and with the expectation of certain results.

Formulation- in which the various elements of systems are described and arranged in sequence and even the extent of each element is defined.

None of these approaches can be adopted directly for our solution-seeking process.

Chance and the Affective approach do not have methodologies or objectives towards the solution.
The Rational approach is strictly a research phase of collecting data, materials and application techniques. It does not perceive the problem in physiological and psychological aspects which are part of the solution. So, we will have to derive a kind of approach which will be a combination of all positive points in each and every type of approach we have discussed so far.

So, starting with the linear method of the Rational Approach, we divide the program into various elements and collect the data as much as possible with the determination of solving the problem, that is, with optimism and objectives. Then, we apply Affective Approach by giving psychological and physiological importance to the program which would give the chance for relationship between each element and further would give alternate solutions, if the progress of the program stagnates or stops.

Applying this strategy in the design process with the help of the systems involved is termed as 'SYSTEMS APPROACH'.

STRATEGY IN DESIGN PROCESS
(1) Define the problem- Divide the main problem into groups, subdivide into segments and further subdivide into various elements, until those elements become irrelevant to our problem.
(2) Extend the Problem- Find out the useful in each and every element which has been derived from the major elements and try to find out the possible extent of each category with respect to our problem.
(3) Alternate- Try to formulate the solutions within each element and find relationships by integrating those solutions to the rest of the elements. If it is difficult, then explore alternative solutions by using creative ideas and methods.
(4) Solution- Find a set of relationships for all the elements and formulate this as the solution. While doing this provide flexibility for further changes and improvement.

(5) Presentation- Put forth the solution in discussions, charts, opinions, polls, etc., with the actual users, audience and other designers.

(6) Implementation- Revise and Implement the solution to the actual problem.

DEVELOPMENT OF A TYPICAL DESIGN(BUILDING) STRATEGY

1. PROBLEM DEFINITION - Type of Building, Type of Users, and Functional Limitations.

2. PROBLEM EXTENT - Community Level, Site Level, Building Level, Various Systems Levels and Elements of Design Level

3. ALTERNATIVE - Flexible Solution using Criteria of the specific program and the development of the Elements of Design.

4. SOLUTION - Derivation of Typical Design from the various Design solutions.
PROGRAMMATIC CHART

PROGRAM

BUILDING SITE COMMUNITY CRITERIA SYSTEMS INVOLVED

CONCEPT AND CHECK-LIST

DERIVATION OF ELEMENTS OF DESIGN

FLEXIBLE DESIGN SOLUTIONS WITH ALTERNATIVES

TYPICAL DESIGN

PRESENTATION

ANALYSIS
Selection of the Project for case study....
Setting the Program....
General Systems involved in a Building....
General Criteria for the Student Housing....
Program at Three Levels....
Elaboration of the Concept....
Application of the Concept....
Preparing the Check-List....
Description of the Check-List....

PART TWO......APPLICATION OF CONCEPT
1. **SELECTION OF THE PROJECT FOR CASE STUDY**

PRIVATE FIRM'S PROPOSAL FOR A STUDENT HOUSING COMPLEX IN TUCSON, ARIZONA ON THE SITE SURROUNDED BY UNIVERSITY BOULEVARD IN SOUTH, EUCLID AVENUE IN WEST, BY FIRST STREET ON THE NORTH AND TYNDALL ON THE EAST.

2. **SETTING THE PROGRAM**

DESIGNING A TWO-STOREYED RESIDENTIAL COMPLEX WITH THE FOLLOWING REQUIREMENTS:

- 40 Studio Units
- 40 Single Bed Rooms
- 30 Double Bed Rooms
- Recreation Hall (Multi-Purpose Hall)
- Lounge & Office
- Garden
- Car Parking for 85 Cars
- Mechanical Room
- Laundry Room

3. **A. GENERAL SYSTEMS INVOLVED IN A BUILDING**

- **LEGAL SYSTEM-** Which deals with policy making regarding rules and regulations, bye-laws, zoning at the city, site and building level and sets the standards for transportation, power and for other services.

- **SOCIAL SYSTEM-** Which identifies and studies the behavioral aspects of the people who are involved with the
program directly or indirectly at community, site and building level. It deals with the distance sets, privacy and integration between type of users.

**STRUCTURAL SYSTEM-**
Which is the study of the classification of various structural elements like Rigid Stick (Beam & Column), Rigid Slab(Block wall & Planar Slab), Filament(Tensile Structure) and Membrane(Tented & Inflated Structure), and the selection of the suitable elements for the specified program.

**TIME & COST CONTROL SYSTEM-**
Which analyzes the components of the time and cost control factors like Predesign analysis, Budget Analysis, CPM. preBid Conference etc.

**LUMINOUS SYSTEM-**
Which draws the guideline for the character fluctuation (for different activities) which creates luminous awareness. Artificial Lighting system in particular, gives the guidelines for deciding factors for proper luminous environment.

**SONIC SYSTEM-**
Which deals with the Communication signal (Spatial intimacy & Voice level) and Noise intensity(Back ground noise, Impact noise, & Reflected noise).

**THERMAL SYSTEM-**
Which is the study of the macro & micro climate of the region and the site throughout the year and the attempt to bring the thermal condition
ATMOSPHERIC SYSTEM-

Which deals with the pollution of air which is caused by industries, hot & dusty wind, freezing cold wind, odor from various units and analyses the method of controlling these different types of atmospheric pollution by various methods.

AESTHETIC SYSTEM-

Which deals with the Metabolic Mechanism (Thermal, Atmospheric and Acqueous), Perceptual system (Luminous and Sonic) and Skeleto-Muscular (Spatio-Gravitational). It also deals with the factors which influence one's environmental (Unconsious and Fatigue) condition.

B. GENERAL CRITERIA FOR THE STUDENT HOUSING*

Living Units are the place to Rest, Sleep, Study, Socialize and to Relax. Those Living Units have to be provided with the environment which shall enable the students to enjoy those activities in a secure and comfortable manner. That comfortable environment is tabulated under seven main categories. They are:

(1) SAFETY & SECURITY-

Which provides the protection from nature, man, and other environmental hazards.

(2) CONVENIENCE-

Which helps the daily activities to be performed

*From Mr. Darouian's master's report
with a minimum physical effort and maintain a healthy and contemporary standard of living.

(3) SOCIAL INTERACTION - Which encourages acceptance, self-assurance, a sense of belonging and comfort and avoids loneliness, mental depression and self-pity for every individual.

(4) PRIVACY - Which gives relaxation and self-realization and avoids the danger of over dominance and manipulation by others.

(5) IDENTITY - Which differentiates oneself from others, one's place from another, through auditory or verbal communication for self expression and social recognition.

(6) FLEXIBILITY - Which sets proper settings in the environment to give the people a freedom of choice.

(7) VARIETY - Which creates complexity in the environment for physical and psychological stimulation.

4. THREE LEVELS OF THE PROGRAM - GENERAL DEFINITION

I. COMMUNITY LEVEL - Which deals with climatic conditions, transportation, services and the direct relationship between the neighbourhood and the site.

II. SITE LEVEL - Which deals with the analysis of the site, slope, soil condition etc and the relationship to the surroundings, service system etc.

III. BUILDING LEVEL - Which deals with the interpretation of the
elements of design, with the program requirements and with development of the overall design itself.

5. ELOBORATION OF THE CONCEPT

Which deals with the application of systems approach by using the criteria previously set forth as guidelines at the three levels of the program.
6. APPLICATION OF THE CONCEPT

The purpose of the concept application is to see that every criteria involved in this student housing project (i.e., Safety and Security, Convenience, Social Interaction, Privacy, Identity Flexibility, and Variety) is properly considered in relationship with each and every system of the design (i.e., Legal, Social, Structural, Time and Cost control, Sonic, Thermal, Atmospheric and Aesthetic) at all three different levels (Community, Site and Building).

The Analysis begins at the community(I) with Legal(A), as the First Sub-System. This is cross referenced with all the criteria one by one (Safety & Security-1, Convenience-2 etc). After the completion of the Legal Sub-System, the next Sub-System begins(Social-B). The process is as follows:

**STEP-1**
- I.A.1- Community-Legal-Safety & Security
- I.A.2- ,, ,, -Convenience
  ...
  ...
  ...
- I.A.7- Community-Legal-Variety

**STEP-2**
- I.B.1- Community-Social-Safety & Security
- I.B.2- ,, ,, -Convenience
  ...
  ...
  ...
- I.B.7- Community-Social-Variety

When the analysis is completed at the community level(I), the same procedure is followed at the Site level(II) and the Building level(III).
### THE CHECK-LIST

<table>
<thead>
<tr>
<th>I. COMMUNITY</th>
<th>SAFETY &amp; SECURITY (1)</th>
<th>A1</th>
<th>B1</th>
<th>C1</th>
<th>D1</th>
<th>E1</th>
<th>F1</th>
<th>G1</th>
<th>H1</th>
<th>I1</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONVENIENCE (2)</td>
<td>A2</td>
<td>B2</td>
<td>C2</td>
<td>D2</td>
<td>E2</td>
<td>F2</td>
<td>G2</td>
<td>H2</td>
<td>I2</td>
<td></td>
</tr>
<tr>
<td>SOCIAL INTERACTION (3)</td>
<td>A3</td>
<td>B3</td>
<td>C3</td>
<td>D3</td>
<td>E3</td>
<td>F3</td>
<td>G3</td>
<td>H3</td>
<td>I3</td>
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</table>

<table>
<thead>
<tr>
<th>II. SITE</th>
<th>PRIVACY (4)</th>
<th>A4</th>
<th>B4</th>
<th>C4</th>
<th>D4</th>
<th>E4</th>
<th>F4</th>
<th>G4</th>
<th>H4</th>
<th>I4</th>
</tr>
</thead>
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<tr>
<td>IDENTITY (5)</td>
<td>A5</td>
<td>B5</td>
<td>C5</td>
<td>D5</td>
<td>E5</td>
<td>F5</td>
<td>G5</td>
<td>H5</td>
<td>I5</td>
<td></td>
</tr>
<tr>
<td>FLEXIBILITY (6)</td>
<td>A6</td>
<td>B6</td>
<td>C6</td>
<td>D6</td>
<td>E6</td>
<td>F6</td>
<td>G6</td>
<td>H6</td>
<td>I6</td>
<td></td>
</tr>
</tbody>
</table>

| III. BUILDING | VARIETY (7) | A7  | B7  | C7  | D7  | E7  | F7  | G7  | H7  | I7  |

(A) LEGAL  (B) SOCIAL  (C) STRUCTURAL  (D) TIME & COST  (E) LUMINOUS  (F) SONIC  (G) THERMAL  (H) ATMOSPHERIC  (I) AESTHETIC
COMMUNITY(I)-LEGAL(A)

- SAFETY & SECURITY(1)
  a. Police protection
  b. Fire protection
  c. Protection from nature (Threat of flood, Wild animals etc)

It deals with policy making regarding rules and regulations, Bye-laws, zoning at the community level and sets the standard of living.

- CONVENIENCE(2)
  a. Service facilities like Water, Sewage, Power etc.
  b. Distribution of usage of land.
  c. Medical facilities

- SOCIAL INTERACTION(3)
  a. Different groups of people within the neighbourhood community.

- PRIVACY(4)
  a. Separate service system (Electricity, Water, Sewage etc.) for easy maintenance and care which links the main system.

- IDENTITY(5)
  a. Preservation of Historic Buildings, Monuments, etc

- FLEXIBILITY(6)
  a. Flexibility in Town planning regarding Density, Traffic system, Land-use System Architectural system etc
..VARIETY(7)
  a. Application of town planning which includes traffic system, zoning, environmental planning etc.,

COMMUNITY(I)-SOCIAL(B) ..

Which identifies and studies the behavioral aspects of the people who are involved directly or indirectly to the proposed building at the Community (neighbourhood) level. It also deals with the distance sets, privacy and integration between those people.

..SAFETY & SECURITY(1)
  a. Volunteer groups in the neighbourhood.
  b. Encouragement for better acquaintance within neighbors.

..CONVENIENCE(2)
  a. Forming volunteer groups to keep the neighbourhood clean, to avoid drugs and alcohol, to Block watch, to conduct sports activities etc.
  b. Provision of Child care and Nursery facility.

..SOCIAL INTERACTION(3)
  a. Provision of public spaces like parks, clubs, play area etc.
  b. Opportunities for Public Festivals and Clubs, Play area etc.

..IDENTITY(4)
  a. Identification of each Group of Age, Cultural background, Educational level, Occupation etc.
..PRIVACY(5)
  a. Segregation of Residential buildings from Commercial, Educational, Industrial and other buildings which can change the Residential environment.

..FLEXIBILITY(6)
  a. Exemptions in mixing the different types of building in Residential area. (eg. Child care center, Nursery school etc).

..VARIETY(7)
  a. Allotting different size and shape of the plot to achieve different design in each plot.

COMMUNITY(I)-STRUCTURAL(C) ..

..SAFETY & SECURITY(1)
  a. Choosing particular type of Construction and Material for particular (in terms of Climate, Soil condition, Site condition etc) region for proper safety and security.

..CONVENIENCE(2)
  a. Particular types of construction and materials are selected for easy and time saving construction within certain region.

..SOCIAL INTERACTION(3)
  a. Structure to attract the social gathering (eg. Eiffel tower of Paris, Pyramid of Egypt).
..PRIVACY(4)
a. Maintaining the balance between covered structures (Residential, commercial buildings etc) and open structures (Bridges, T.V tower etc).

..IDENTITY(5)
a. Some structures are used as a landmark for some region (e.g., Eiffel tower of Paris, San Francisco Bridge etc).
b. Some of Structures are identified by its regional character (e.g., Deep slope roof where there are lot of snow)

..FLEXIBILITY(6)
a. Having different options in selecting the type of structural system and as well as the materials.

..VARIETY(7)
a. Selection of composite materials for structural system.

COMMUNITY(I)-TIME & COST(D) ..

..SAFETY & SECURITY(1)
a. Public hearings for the public project is preferred.

It analyzes the factors which affects the public money and as well as time and draws the guideline for the positive use of both.
a. Construction of Public parks, Monuments, Stadiums etc to promote social interaction.

.. PRIVACY(4)
  a. Responses for the use of money can be heard. But, the solution shall be drawn only by experts.

.. IDENTITY(5)
  a. Picking the possible difficulties in the use of money and time involved and identifying the proper solution.

.. FLEXIBILITY(6)
  a. Discusses the maximum and minimum limitations of money and time before and as well as during the construction of the project.

.. VARIETY(7)
  a. Different sources of money.

COMMUNITY(I)-LUMINOUS(E)

This emphasizes the necessity of the proper lighting system throughout the neighbourhood for various purposes and for various activities.

.. SAFETY & SECURITY(1)
  a. Proper street lighting.
  b. Steady flow of Electricity for the whole neighbourhood.

.. CONVENIENCE(2)
  a. Proper street lighting

.. SOCIAL INTERACTION(3)
  a. Proper lighting system for better visual contact.
..PRIVACY(4)
   a. All components of the luminous system to be concealed with very few exceptions like switches, fittings etc.

..IDENTITY(5)
   a. Different system and colors in illumination to be adopted for different functions to identify the purpose, activity, and the shape of the object.

..FLEXIBILITY(6)
   a. Discusses the possibilities of different lighting system and components depending on the requirements.

..VARIETY(7)
   a. Application of different levels of illumination for the same activity or place during the typical day.

COMMUNITY(I)-SONIC(F)...

..SAFETY & SECURITY(1)
Which identifies the various noise level in and around the neighbourhood and sets the comfort level for better..CONVENIENCE(2)
sonic environment
a. Relationship between the Heavy traffic zone like Interstate and Highways and the adjacent neighbourhood.

..SOCIAL INTERACTION(3)
COMMUNITY(I)-THERMAL(G)

It is the study of the macro-climate and micro-climate of the region and an attempt to control its thermal environment.

a. Provision of Auditoriums, Arenas, Churches etc.

..PRIVACY(4)

a. Different noise level groups like Low noisy zone, Medium noisy zone and Highly noisy zone to be created within the neighbourhood.

..IDENTITY(5)

a. Identifying the various sources of noise.

..FLEXIBILITY(6)

a. Provision of different sound sources.
   (eg. Music hall, Church etc)

..VARIETY(7)

a. Relationship between the source of noise to other units in terms of Distance, Type of Barriers, Landscaping etc.

a. Application of Heating and cooling system in the cold and hot region respectively.

..CONVENIENCE(2)

a. Controlling the external thermal condition by growing vegetation and landscaping.

..SOCIAL INTERACTION(3)

a. Relationship between the climate of the region and the tourists attraction.
   (eg. Florida in winter).
b. Provision of Swimming pool and other outdoor games in summer and provision of indoor games facility for winter.

..PRIVACY(4)
a. Maintaining the thermal comfort zone by both passive and active air-conditioning system.

..IDENTITY(5)
a. Identifying the region with the macro-climate and micro-climate.

..FLEXIBILITY(6)
a. The thermal environment can be controlled by various passive and active air-conditioning system using natural and as well as by mechanical devices.

..VARIETY(7)
a. Various seasons involved in a region in an year (eg. Spring, Summer, Fall etc).

COMMUNITY(I)-ATMOSPHERIC(H)..  

..SAFETY & SECURITY(1)
It deals with the pollution of air which is caused by Industrial zone and as well as highly polluted areas.

a. Segregation of neighbourhood from the Hot & Dusty wind, Freezing cold wind.

and analyzes the method of controlling this environment

a. Introduction of various methods to filter impure air.
SOCIAL INTERACTION(3)
   a. Sufficient proportion of open and green space to be given.

PRIVACY(4)
   a. Controlling the atmospheric environment by proper zoning of Industrial area and other highly polluted areas.

IDENTITY(5)
   a. Identifying the various levels of impurity in the atmosphere and also the sources of it.

FLEXIBILITY(6)
   a. Giving the options in the application of various solutions in controlling the atmospheric environment.

VARIETY(7)
   a. Application of solutions in zoning, landscaping etc.

COMMUNITY(I)-AESTHETIC(I)

SAFETY & SECURITY(1)
   a. Creating Historic preservation zone to restore Historic Buildings and Historic district zone to maintain the regional character and also for the Vernacular Architecture.

CONVENIENCE(2)
   a. Application of Aesthetical factors in
all functional elements.

..SOCIAL INTERACTION(3)
a. Specific Regional characters like
   Weather, Landmark, Landscaping etc
to attract people.

..PRIVACY(4)
a. Offering of communal private spaces like
   Picnic spots, Parks, Gardens, Public
   outdoor seating areas etc.

..IDENTITY(5)
a. Application of Aesthetic elements like
   color, texture, materials, etc in various
   communal spaces.

..FLEXIBILITY(6)
a. Compromising the quality of the aesthetic
   elements by viewer's personal taste,
   knowledge, culture, educational background
   etc.

..VARIETY(7)
a. Application of different elements to give
   different aesthetic perception of various
   systems involved in the community.
SITE(II)-LEGAL(A) ..

..SAFETY & SECURITY(1)
It deals with the Legal aspect involving the site planning like the Relationship between two adjacent plots, Between the plots and the adjacent roads, Between the plot and the proposed building and also the parking space, Landscaping and the Service system.

a. Making the decisions like Set-backs of the proposed building, Fixing the proportion of the occupants of the site to the area of the site, Finalising the type of usage of the site, etc to avoid various environmental and health hazards.

..CONVENIENCE(2)
a. It links the various sub-systems like Communication, Electricity, Gas, Water, Drainage etc from the immediate surroundings to the proposed site.

..SOCIAL INTERACTION(3)
a. Allowing different groups of people to use the site without discrimination.

..PRIVACY(4)
a. Selection of the privacy levels which depend on the function of the site and as well as the building.
Public buildings like Monuments, Museum, Library, Shops etc-minimum privacy
Public offices and private offices -moderate privacy
Residential Buildings-absolute privacy
Nuclear plants, Army, Navy and other similar buildings-restricted entry.
IDENTITY(5)
a. Identifying the site by zones.
b. Choosing the proper zone for the maximum benefits for the developers and the actual users.

FLEXIBILITY(6)
a. Finding the flexible aspect of the bye-laws in selecting the functions of the site.
   (eg. Selecting the particular zone from the multizone site)

VARIETY(7)
a. It discusses the legally allowed different uses of land like commercial use, Residential use, Industrial use etc.

SAFETY & SECURITY(1)
a. Provision of physical and visual barrier to define the boundary to avoid trespassers.
b. Separating pedestrian path and vehicular path to avoid accidents inside the site.
c. Providing speed breakers within the site.
d. Display of warning signs according to the specific cases (eg. Beware of dog, Beware of wild animals etc).
..CONVENIENCE(2)
  a. Well-defined entry point to the site for vehicular and pedestrian.
  b. Separate parking space for inmates, workers and visitors.
  c. Placing of the proposed units inside the site considering the Heirarchy of planning forces such as Privacy, Circulation, Orientation, etc.

..SOCIAL INTERACTION(3)
  a. Provision of various spots within the site to encourage interaction and closeness between the users, between the users and administrators, users and the visitors.

..privacy(4)
  a. Separation of units like; building, garden, and other social spaces within the site with the maximum possibility of privacy of each unit, but not to disturb the interaction facility.

..IDENTITY(5)
  a. Giving the identity for various units of the site space planning, shape, color, texture, etc without deviating from the general concept and identity on the whole.
..FLEXIBILITY(6)
  a. Use of space for multi-purpose use.
     (e.g. swimming pool for recreation, social interaction, exercise etc)

..VARIETY(7)
  a. Application of different kinds of social space within the site.

SITE(II)-STRUCTURAL(C) ..

..SAFETY & SECURITY(1)
  a. Study of regional condition, specific soil condition, site conditions etc for the safe design of the structure involved within the site.

..CONVENIENCE(2)
  a. Study of the physical condition of the site, soil conditions, vegetations, existing building and other elements helps the designer to do better structural planning.

..SOCIAL INTERACTION(3)
  a. Application of structures like Sunshades, Sculptures and special structures to enhance a better social system.
..PRIVACY(4)
a. Discuss the extent of the privacy the site can afford to hide the structure.

..IDENTITY(5)
a. Identifying the type of structural system and its value in the proposed site.
   (eg. Archeological findings, Structural system of the existing building)

..FLEXIBILITY(6)
a. Selection of different structural systems and the elements for the proposed building.

..VARIETY(7)
a. Application of different systems as well as the elements in the maximum possible ways (eg. in the compound wall, porch, building, water tank, covered parking, broadcast towers, antennas, etc.)

SITE(II)-TIME & COST(D) ..

..SAFETY & SECURITY(1)
a. Feasibility of the market value of the proposed site.
b. Study of the proposed project in terms of cost and time to be spent.
..CONVENIENCE(2)
  a. Discuss the need of the site development like filling, digging, laying roads and the uses of the special tractors and cranes for the convenience of the construction.

..SOCIAL INTERACTION(3)
  a. It stresses the importance of allotting certain funds for the social space like Garden, Swimming pool etc.

..PRIVACY(4)
  a. Drafting the hidden cost and time factors which involved in the development of the site.

..IDENTITY(5)
  a. Comparing the cost of the site to the adjacent sites.
  b. Analysing the initial cost involvement of the project and as well as the future projections.

..FLEXIBILITY(6)
  a. Giving the various methods in adjusting and limiting the time and cost involvement in the construction.
  b. Discussion of solutions caused by unforeseen circumstances.

..VARIETY(7)
  a. Finding the different strategies in developing the time and cost factor especially in the development of the site (eg. Sloping site may
require special kind of equipment, tractors to work with, delay in construction time during snow etc.

SITE(II)-LUMINOUS(E) ..

..SAFETY & SECURITY(1)

Study and the application of proper and uniform lighting system by using both artificial and natural elements to enhance the regular function of the various units.

a. Proper and uniform distribution of the lighting within the site for the safety and security of the users.
b. Eliminate dark spaces in site planning.

..CONVENIENCE(2)

a. Considering the importance of different intensity of lighting for different functions of various units.

..SOCIAL INTERACTION(3)

a. Finding the possible linkage between the luminous system and the social space and apply the solutions.

..PRIVACY(4)

a. Allowing only the necessary intensity of light for the respective functions.

..IDENTITY(5)

a. Identifying the functions and space by the intensity of light, pattern and the light fittings.

..FLEXIBILITY(6)

a. Application of different intensity, color, type of fittings with the possibility of
It involves the study and the application of minimum bearable noise level and maximum audible level and sets the standard in providing the distance sets between the users with relation to the activity involved in the particular unit.

It involves the study and the application of minimum bearable noise level and maximum audible level and sets the standard in providing the distance sets between the users with relation to the activity involved in the particular unit.

a. The minimum noise level shall be maintained to enhance a better conversation between people especially in the social space.

b. Allotment of spaces by categorizing into various noise zones (High noisy zone, medium noisy zone, and low noisy zone).

a. Application of specific needs of audible level for certain functions.

a. Distinguishing various spaces and functions with relation to the sound level.

a. Application of variation in the elements of the lighting system.
...FLEXIBILITY(6)
a. Maintaining the sound level between the maximum level and minimum level.
b. Maintaining the average distance sets between the users and between the units.

...VARIETY(7)
a. Study of different types of sound involved and utilising them for a better sonic environment. (eg. Breezing trees, Music, etc.)

SITE(II)-THERMAL(G)

...SAFETY & SECURITY(1)
a. Recommendation and application of proper planning, design and usage of building materials to protect the users and the building interiors from the extreme conditions of the weather. i.e., Extreme cold and extreme hot climate.

...CONVENIENCE(2)
a. Analysing and applying the comfort zone of the specific region.
b. Application of the comfort level of the users and as for the specific functions.
c. Study of bioclimate of the site and making the best use of it to attain the comfort level of thermal conditions.
...SOCIAL INTERACTION(3)
 a. Application of social spaces with relation to the thermal comfort level such as shaded trees, swimming pool etc.

..PRIVACY(4)
 a. Maintaining the specific need of the thermal environment for the various units and the functions.

..IDENTITY(5)
a. Differentiating the maximum and minimum thermal condition (both prevailing and provided).

..FLEXIBILITY(6)
a. Provision of different thermal conditions by both natural (growing trees, shrubs and grass) and artificial (by building swimming pool, sun shades etc) methods.

..VARIETY(7)
a. Maintaining the different thermal conditions by adopting different methods.

SITE(II)- ATMOSPHERIC(H) ...

..SAFETY & SECURITY(1)
a. It restricts the extreme conditions of atmospheric pollution from the sources like various gas and nuclear radiations.
..CONVENIENCE(2)
   a. Application of simple solutions like zoning the various units by giving priorities in terms of pollution control.

..SOCIAL INTERACTION(3)
   a. Application of pollution free social spaces like gardens, swimming pool, and other landscaped areas.

..PRIVACY(4)
   a. Maintaining the various pollution free levels within the site depending upon the activities as well as the people involved.

..IDENTITY(5)
   a. Identifying the space by odor and by other effective atmospheric environmental differences. (smell of gas in the parking lot, smell of flowers in the garden etc).

..FLEXIBILITY(6)
   a. Application of pollution control by both natural (by growing trees, shrubs, grass etc) and artificial (by using screen wall) methods.

..VARIETY(7)
   a. Application of variations in providing the pleasant smell and as well as in subsiding the bad smell.
SITE(II)-AESTHETIC(I)

..SAFETY & SECURITY(1)
  a. Application of Historic preservation zonal codes within the site for the general security of the traditional/regional architectural characters.

..CONVENIENCE(2)
  a. Application of aesthetic perception in designing the functional elements like lamps, name boards, landscaping, seatings in the garden, floor patterns etc.

..SOCIAL INTERACTION(3)
  a. Application of better aesthetic environment particularly in the social spaces like gardens, swimming pool, meeting places, etc.

..PRIVACY(4)
  a. Application of private spaces like indoor gardens, swimming pool, sculpture, fountains etc with aesthetic environment.

..IDENTITY(5)
  a. Maintaining the common aesthetic characters of color, texture, materials etc in the same type of functional units. (eg. lamps, sign boards, compound wall etc)
..FLEXIBILITY(6)

a. Flexible usage of color, texture and materials in both natural (trees, shrubs, grass etc) and artificial (lamp posts, pavings, exterior surface of the building etc) aesthetic elements.

..VARIETY(7)

a. Application of different methods of altering and improving the aesthetic environment of both natural and artificial natura. (eg. Planting the seasonal trees which give different color and appearance in the different seasons of year)
It sets the minimum standards of design, maintenance and construction of the new building and also sets the standard of living for the users through the application of rules and regulations and building bye-laws.

..SAFETY & SECURITY(1)

a. It sets minimum standards in building safety elements like emergency exits, fire alarm system, provision of heating system, design of handrail etc.

..CONVENIENCE(2)

a. It sets the standard for some of the functional elements like width of the corridor and the stairway, day light factors, ventilation, open space vs building space, etc.

..SOCIAL INTERACTION(3)

a. Gives the opportunity for different type of people to use the building irrespective of age, sex, religion and community.

..PRIVACY(4)

a. Regular maintenance and inspection of any violation of the building laws especially regarding safety features such as Fire extinguishers, emergency doors, fire alarms etc.

..IDENTITY(5)

a. Imposition of regional architectural features where local design review codes exist.
b. Application of exhibited regulations such as no smoking sign, exit sign, etc.

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.. FLEXIBILITY(6)

a. Decision of a particular section of building bye-laws among the general condition. (eg. Selection of the particular zone-commercial or residential or industrial etc, when the proposed building falls under the multi-zone.

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.. VARIETY(7)

a. Every clause of building bye-laws leads to many kinds of restrictions. (eg. Height restriction can lead to the restriction of the total use of the floor space index)

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.. SAFETY & SECURITY(1)

a. Application of mechanical security system and locking system.
b. Application of regular vigilance of security guards.

---

.. CONVENIENCE(2)

a. Application of anthropometric dimensions for distance sets and deriving areas for various functions.
b. Application of psychological factors in determining privacy and integration level.
c. Appointment of full-time supervisors for the general maintenance.

.. SOCIAL INTERACTION(3)
   a. Application of social spaces like garden, swimming pool, etc within the building.

.. PRIVACY(4)
   a. Separation between users (male and female) and separation between units (toilet, bed room, living room, etc)

.. IDENTITY(5)
   a. Distribution of common elements of both form and function throughout the design especially which encourage the higher interaction level (eg. landscape)

.. FLEXIBILITY(6)
   a. Open plan possibilities.
   b. Interior furniture arrangements.
   c. Application of multi-purpose use of space.

.. VARIETY(7)
   a. Application of variation in various units of the building in design, interiors, lighting, etc.

BUILDING(III)-STRUCTURAL(C) ..

.. SAFETY & SECURITY(1)
It involves the study of a. Determination of the size of the
the existing soil conditions and the total structural load of the building and thus determining the type of foundation, columns and roofing system.

..CONVENIENCE(2)
a. Selecting the easier and cheaper way of construction and materials with reference to the type of project, total cost of the project, availability of the construction materials in the local markets etc.

..SOCIAL INTERACTION(3)
a. Application of cantilevered porches and sunshades.
b. Column free long span structures for the multi-purpose recreation hall.

..PRIVACY(4)
a. Selection of wall panelling.
b. Application of the enclosing materials such as face brick, granite, concrete, tiles etc.

..IDENTITY(5)
a. Intentionally exposing some or all of the structural materials for aesthetic and cost saving purpose.

..FLEXIBILITY(6)
a. Application of flexible structural
system to facilitate the future expansion.

..VARIETY(7)
a. Derivation of different type of structural system and the material usage depending upon the design situation.

BUILDING(III)-TIME & COST(D)..

..SAFETY & SECURITY(1)
a. Justify the capital cost by calculating the investment return and profits in terms of both time and cost.

..CONVENIENCE(2)
a. Work out the entire detail of the cost and time involvement of the project up to the point of deciding the rental value or selling value per square feet of the building or of total land as per the case.

..SOCIAL INTERACTION(3)
a. Allotting enough time and cost to develop the social spaces in terms of both aesthetic and functional aspects to encourage high interaction level.

..PRIVACY(4)
a. Drafting the hidden costs like repair, alterations, maintenance, future
additions etc.

..IDENTITY(5)

a. Identifying the value of the project by its location, money spent on the project, interiors, maintenance, selling value, rental value etc.

..FLEXIBILITY(6)

a. Anticipating the inflation rate in the cost and unexpected change in the construction schedule.

..VARIETY(7)

a. Proposing the future addition.
b. Application of various ways to reduce the construction cost and maintenance cost to the minimum.
c. Allotting money for minor alterations. (paintings, landscaping etc)

BUILDING(III)-LUMINOUS(E)

..SAFETY & SECURITY(1)

a. Shielding the living units from the direct glare from the sun.
b. Application of at least the minimum of illumination level in terms of intensity, reflectivity, color etc.
..CONVENIENCE(2)
   a. Application of the standard requirements of illumination levels for various activities and units.

..SOCIAL INTERACTION(3)
   a. Application of maximum illumination level at all types of social space to enhance a better interaction level between the users of the building.

..PRIVACY(4)
   a. Maintenance of the required privacy level in illumination.

..IDENTITY(5)
   a. Application of different intensity, color, and lighting fixtures for the different activities.

..FLEXIBILITY(6)
   a. Giving various options in the illumination level for the same activity but within the maximum and minimum levels.

..variety(7)
   a. Application of different lighting system, different intensity, different colors, different fixtures etc for different functions and units.
It sets the standard for the proper audible environment to different units, different functions and to the different users by controlling both internal and external sonic disturbances.

..SAFETY & SECURITY(1)
   a. Controlling the extreme noisy condition to avoid any hearing impairment.
   B. Controlling the continuous irritant noise to avoid any psychological damage to the users.

..CONVENIENCE(2)
   a. Use of proper zoning of the various units to set the distance between them.
   b. Use of sound absorbing materials like carpets, and other insulation materials.
   c. Controlling the noise from the mechanical equipment.

..SOCIAL INTERACTION(3)
   a. Provision of better acoustical social space.

..PRIVACY(4)
   a. Isolation of quiet units from the noise source within the building.

..IDENTITY(5)
   a. Maintaining the required audible level in each unit by using proper planning, by furniture arrangements,
It studies and maintains the human thermal comfort level to maintain the proper environment by using both natural (growing trees, grass etc) and artificial methods (mechanical) by carpeting, and by other sound absorbing materials.

..FLEXIBILITY(5)

a. Altering the sonic environment by applying simple solutions like opening/closing windows, changing the distance sets between the furniture etc.

..VARIETY(7)

a. Creating different sound sources to maintain interest in the sonic environment (music, conversation, sound of the breeze, trees etc.

..SAFETY & SECURITY(1)

a. Selection of the type of cooling and heating system to be applied to protect the users from the extreme climate conditions in both summer and winter.

..CONVENIENCE(2)

a. Study of thermal comfort level of the users.

b. Application of the thermal comfort level by using both mechanical and natural methods.

..SOCIAL INTERACTION(3)

a. Maintaining the thermal comfort level
in the social spaces like recreation hall, lobby, balconies etc to encourage better social interaction.

..PRIVACY(4)
a. Better insulation between walls and roofs, weather striping and other factors which maintain the constant thermal environment.

..IDENTITY(5)
a. Maintaining the required different thermal environment for the different areas, for different functions and for the different seasons.

..FLEXIBILITY(6)
a. Application of different methods of adjusting the thermal environment by using both passive and active methods. (eg. insulation, mechanical means, sun shades etc)

..VARIETY(7)
a. Maintaining various spaces like living units, lobby, balconies, recreation hall etc with different thermal environment but within the comfort level.

BUILDING(III)-ATMOSPHERIC(H).

..SAFETY & SECURITY(1)

It deals with the pollution contents of air, hot and dusty breeze, freezing cold

a. Application of proper fire alarm system including fire extinguishers and emergency exits.
wind, odor etc and it also analyses the method of controlling them.

b. Provision of at least the minimum size of the windows for ventilation.

..CONVENIENCE(2)
a. Calculation and the application of the convenient ventilation to avoid unnecessary odors from the units like kitchen, toilets etc
b. Application of exhaust fan in the kitchen and the toilet.

..SOCIAL INTERACTION(3)
a. Application of pollution free outdoor landscaped area.

..PRIVACY(4)
a. Maintenance of the constant pollution free environment within the building irrespective of the units.
b. Application of the specific atmospheric environment as per the requirements.
   (eg. computer room)

..IDENTITY(5)
a. Identifying the time and place of the source of the pollution (cooking time in the kitchen. (eg. garbage disposal, toilet etc)

..FLEXIBILITY(6)
a. Application of options in altering the existing environment (eg. opening windows, screens, louvers, exhaust fans, air conditioning, etc)
It emphasizes the application of aesthetic elements in the architectural and building system with the additional emphasis on vernacular and traditional architecture for the safety and security of the cultural heritage.

..SAFETY & SECURITY(1)
  a. Application of various building elements with relation to vernacular and traditional architecture for the safety and security of the cultural heritage.

..CONVENIENCE(2)
  a. Interpretation of functional elements into aesthetic elements (e.g., stairs, handrail doors, windows, etc).

..SOCIAL INTERACTION(3)
  a. Application of pleasant environment in both functional elements and aesthetic elements.

..PRIVACY(4)
  a. Application of aesthetic treatment for walls, roofs, floors, especially for interior.

..IDENTITY(5)
  a. Maintaining a common aesthetic character throughout the building.

..FLEXIBILITY(6)
  a. Application of short-time change by repainting, changing fabrics, etc.
  b. Planning the long-time change like renovating the building.

..VARIETY(7)
  a. Application of different architectural elements as aesthetic elements.
Development of Graphics from the Check-List....
Elements of Design from the Graphics....
Design Solution(Theoretical)....
Alternate Solution....
Typical Design....

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PART THREE.....TYPICAL DESIGN
DEVELOPMENT OF GRAPHICS FROM THE CHECK-LIST....
I.A.1 Community-Legal-Safety & Security

a. Within the city limits providing police protection, fire protection etc.,
b. Not too close to downtown to become an inactive area at night. (Usually after the regular 8 to 5 working hours, the downtown is temporarily inactive until next day).

I.A.2 Community-Legal-Convenience

a. Layouts are properly done in accordance with the town planning standard with all service facilities.
b. Usage of surrounding land is distributed for various activities due to a variety of zoning classifications.
I.A.3 Community Legal-Social Interaction
Not Applicable

I.A.4 Community-Legal-Privacy
Not Applicable

I.A.5 Community-Legal-Identity
Division of various zones for different purposes including Historic district zone to maintain aesthetic value

I.A.6 Community-Legal-Flexibility
Zoning changes are applied such as changing a commercial zone to a residential zone and a residential zone to an educational zone depending upon the requirements at the various time periods. (eg. Expansion of the university campus)
<table>
<thead>
<tr>
<th>I.A.7 Community-Legal-</th>
<th>Site is located with residential, educational, and commercial buildings in the immediate vicinity</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.B.1 Community-Social- Safety &amp; Security</td>
<td>Volunteer groups in the neighbourhood association</td>
</tr>
<tr>
<td>I.B.2 Community-Social- Convenience</td>
<td>Housing for student community is close to university campus with Banks, Shops, Restaurants and other facilities closeby</td>
</tr>
<tr>
<td>I.B.3 Community-Social- Social Interaction</td>
<td>Shops, Restaurants, Fast food places nearby encourage social interaction</td>
</tr>
<tr>
<td>I.B.4 Community-Social- Privacy</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>I.B.5 Community-Social- Identity</td>
<td>Identified by the university area and the west university district neighbourhood</td>
</tr>
<tr>
<td>I.B.6 Community-Social-Flexibility</td>
<td>Not Applicable</td>
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<tr>
<td>I.B.7 Community-Social-Variety</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>I.C.1 Community-Structural-Safety &amp; Security</td>
<td>Rigid steel construction of beams and columns are used in multi-storey apartment building construction throughout Tucson because of cheap construction</td>
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<tr>
<td>I.C.2 Community-Structural-Convenience</td>
<td></td>
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<tr>
<td>I.C.4 Community-Structural-Social Interaction</td>
<td>Not Applicable</td>
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<tr>
<td>I.C.5 Community-Structural-Privacy</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>I.C.5 Community-Structural-Identity</td>
<td>Not Applicable</td>
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<tr>
<td>I.C.6 Community-Structural-Flexibility</td>
<td>Type of construction is flexible depending on the project, architect's decision, time &amp; cost, material availability etc</td>
</tr>
<tr>
<td>I.C.7 Community-Structural-Variety</td>
<td>Exterior finishes of structural elements are varied</td>
</tr>
<tr>
<td>I.D.1 Community-Time &amp; Cost-Safety &amp; Security</td>
<td>Choosing the appropriate materials for the hot and dry climate</td>
</tr>
<tr>
<td>I.D.2 Community-Time &amp; Cost-Convenience</td>
<td>As the cost of labor is high, fast construction methods and standard materials from factory shall be adopted</td>
</tr>
<tr>
<td>I.D.3 Community-Time &amp; Cost-Social Interaction</td>
<td>Not Applicable</td>
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<tr>
<td>I.D.4 Community - Time &amp; Cost - Privacy</td>
<td>Not Applicable</td>
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<tr>
<td>I.D.5 Community - Time &amp; Cost - Identity</td>
<td>a. Time and Cost of the construction can be identified by exterior finish. (e.g. Cheap finish of stucco, medium cost of tiles or high cost marble/granite b. The total area and the maintenance can reveal the financial standing to certain extent</td>
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<tr>
<td>I.D.6 Community - Time &amp; Cost - Flexibility</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>I.D.7 Community - Time &amp; Cost - Variety</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>I.E.1 Community - Luminous - Safety &amp; Security</td>
<td>Street lighting system is to be improved as most of the students are expected to walk to and from the university campus</td>
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<tr>
<td>I.E.2 Community-Luminous-Convenience</td>
<td>Neighbourhood lighting distinguishes street and platform thus giving safe traffic especially for pedestrians</td>
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<tr>
<td>I.E.3 Community-Luminous-Social Interaction</td>
<td>Lighting system helps to know each other in a better way and enhance interaction (Good luminous environment helps to identify each other and encourages various activities)</td>
</tr>
<tr>
<td>I.E.4 Community-Luminous-Privacy</td>
<td>Not Applicable</td>
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<tr>
<td>I.E.5 Community-Luminous-Identity</td>
<td>Different types of lighting are to be used for different purposes like street lighting, advertising boards etc. The idea is to relate the proportion and style of the fixtures for the proposed building</td>
</tr>
<tr>
<td>I.E.6 Community-Luminous-Flexibility</td>
<td>Not Applicable</td>
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<td>I.E.7 Community-</td>
<td>As intensity of natural light is varied, interesting light and shade can be created at both site and building level (eg. Different shades created by trees, sunshades, balconies, windows, etc.)</td>
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<td>I.F.1 Community-</td>
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<td>I.F.2 Community-</td>
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<td>I.F.3 Community-</td>
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</tbody>
</table>

Diagram:

- Proposed site map with proposed zones labeled:
  - Medium heavy traffic zone
  - Medium noisy zone
  - Medium quiet zone

- Symbol: Police helicopter providing protection

- Note: Exterior noisy environment attracting social interaction outside.
Immediate surroundings are with commercial buildings like offices, restaurants, etc, residential buildings and also with medium traffic roads defying enough privacy for the proposed building.

Various units in the neighbourhood can be identified by their noise level and the type of noise. (eg. traffic noise, play area, parking space, etc)

Decision of growing trees at town planning level preserves ecology system thus preventing soil erosion, failure of rain, etc.
<table>
<thead>
<tr>
<th>I.G.2 Community-Thermal-Convenience</th>
<th>Study of thermal conditions and/or collection of climatic data (refer appendix).</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.G.3 Community-Thermal-Social-Interaction</td>
<td>Climate (particularly in winter) encourages social interaction by bringing people from cold climate region.</td>
</tr>
<tr>
<td>I.G.4 Community-Thermal-Privacy</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>I.G.5 Community-Thermal-Identity</td>
<td>Tucson climate is identified by its hot and dry climate</td>
</tr>
<tr>
<td>I.G.6 Community-Thermal-flexibility</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>I.G.7 Community-Thermal-Variety</td>
<td>Applicable as it has four seasons namely summer, fall, winter and spring. (refer hourly observation chart in appendix for temperature and humidity)</td>
</tr>
</tbody>
</table>

**DATA TO BE COLLECTED:**
1. Summary of temperature and R.H. data
2. Sunpath diagram
3. Comfort zone chart
4. Calculation of overheated & under heated period
5. Solar intensity at different periods in a day
6. Wind speed and direction
<p>| I.H.1 Community-Atmospheric Safety &amp; Security | Industrial zone is placed away from the densely populated area |
| I.H.2 Community-Atmospheric Convenience | Transportation system has to be modified to avoid major through traffic within neighbourhoods (Euclid road connects the two major roads speedway and sixth street) |
| I.H.3 Community-Atmospheric Social Interaction | Not Applicable |
| I.H.4 Community-Atmospheric Privacy | Residents units are located away from the traffic polluted downtown and from the industrial pollution |
| I.H.5 Community-Atmospheric Identity | Atmospheric condition of the particular area can be identified by the activities involved in that area (eg. Traffic pollution, Industrial pollution etc) |</p>
<table>
<thead>
<tr>
<th>Code</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.H.6</td>
<td>Community-Atmospheric-Flexibility</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>I.H.7</td>
<td>Community-Atmospheric-Safety &amp; Security</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>I.I.1</td>
<td>Community-Aesthetic-Safety &amp; Security</td>
<td>The city code restricts the demolition of historical building and sets certain areas as historic district zones to preserve vernacular architecture</td>
</tr>
<tr>
<td>I.I.2</td>
<td>Community-Aesthetic-Convenience</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>I.I.3</td>
<td>Community-Aesthetic-Social Interaction</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>I.I.4</td>
<td>Community-Aesthetic-Privacy</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
I.I.5 Community-Aesthetic-Identity

As many styles are involved, the specific style is identified by its various elements like roofing, cornices, materials, arches, etc.

I.I.6 Community-Aesthetic-Flexibility

Not Applicable

I.I.7 Community-Aesthetic-Variety

Many styles are involved as shown in the drawings.
<table>
<thead>
<tr>
<th>II.A.1 Site-Legal-Safety &amp; Security</th>
<th>Application of bye-laws</th>
</tr>
</thead>
<tbody>
<tr>
<td>II.A.2 Site-Legal-Convenience</td>
<td>Site has the possibility for the immediate connection of all service systems like gas, telephone, electricity etc</td>
</tr>
<tr>
<td>II.A.3 Site-Legal-Social Interaction</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>II.A.4 Site-Legal-Privacy</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>II.A.5 Site-Legal-Application of bye-laws</td>
<td>Part of the site and its surrounding fall under a historic district zone ie the architectural character of the proposed building shall have traditional or vernacular or regional style</td>
</tr>
</tbody>
</table>
II.A.6 Site-Legal-Flexibility

Not Applicable

II.A.7 Site-Legal-Variety

Though site falls under various zones like commercial zone, mixed zone and residential zone, only residential zone is selected for the program

II.B.1 Site-Social-Safety & Security

Separation of vehicular and pedestrian traffic by providing two access points for the site, one for vehicles and one for pedestrians

II.B.2 Site-Social-Convenience

a. Physical barrier is provided between interior and exterior of the site by providing low walls, by growing shrubs around the site to keep out trespassers

b. There are three possible entry points recommended, one entry for the vehicles and an other two for pedestrians
II.B.3 Site-Social-Social Interaction

c. Division of zoning within the site i.e., parking zone, public zone and private zone

Possible social interaction space at the site level are entry points outdoor landscaped area and parking space if provided with landscaping like trees, shrubs, seatings etc.

II.B.4 Site-Social-Privacy

Both physical and visual barrier (partial) shall be done by boundary wall and landscaping around the site.
| II.B.5 Site-Social-Identity | a. Prominent main entry  
|                            | b. Difference between service entry and main entry  
|                            | c. Scale of the compound wall, trees, height of the building to be proportionate to the human scale.  
| II.B.6 Site-Social-Flexibility | The site is restricted to students, management and workers. Visitors may be allowed.  
| II.B.7 Site-Social-Variety | Within the site, variety of people like students (male & female), management, visitors and workers are allowed.  

![Diagram of main entry and service entry](image)
II.C.1 Site-Structural-Safety & Security
Not Applicable

II.C.2 Site-Structural-Convenience
Study of the physical condition of the site shows that it is elevated by six feet on southeast corner and slopes downwards to north-west corner of the site. So it is suggested to flatten the site equally with three feet high.

II.C.3 Site-Structural-Social Interaction
Not Applicable

II.C.4 Site-Structural-Privacy
Not Applicable

II.C.5 Site-Structural-Identity
Not Applicable
<table>
<thead>
<tr>
<th>II.C.6 Site-Structural-Flexibility</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>II.C.7 Site-Structural-Variety</td>
<td>Structure for compound wall, porch etc will be varied from the building structure</td>
</tr>
<tr>
<td>II.D.1 Site-Time &amp; Cost-Safety &amp; Security</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>II.D.2 Site-Time &amp; Cost-Convenience</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>II.D.3 Site-Time &amp; Cost-Social Interaction</td>
<td>A Certain amount must be added in the budget for the development of social space like landscaping, sit-outs etc</td>
</tr>
<tr>
<td>II.D.4 Site-Time &amp; Cost-Privacy</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>II.D.5 Site-</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Time &amp; Cost-</td>
<td></td>
</tr>
<tr>
<td>Identity</td>
<td></td>
</tr>
<tr>
<td>II.D.6 Site-</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Time &amp; Cost-</td>
<td></td>
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<tr>
<td>Flexibility</td>
<td></td>
</tr>
<tr>
<td>II.D.7 Site-</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Time &amp; cost-</td>
<td></td>
</tr>
<tr>
<td>Variety</td>
<td></td>
</tr>
</tbody>
</table>

**II.E.1 Site-**

**Luminous-**

**Safety & Security**

Efficient artificial lighting is stressed in parking lot during the night time apart from the regular lighting system.

**II.E.2 Site-**

**Luminous-**

**Convenience**

Adequate and proper luminous system is to be followed throughout the site.
II.E.3 Site-Luminous-Social Interaction

Adequate lighting in the social space encourages social interaction.

II.E.4 Site-Luminous-Privacy

Enough luminous privacy in the dwelling units compared to social space and car parking. Exterior lighting closer to living units may create discomfort. So, exterior lighting shall be placed away from the windows of the living units.

II.E.5 Site-Luminous-Identity

Within the luminous system identity can be given by different types for different activities. (Flood lighting for parking space, Decorative lighting for landscaping and social space, general lighting for corridors and other service areas.)
II.E.6 Site-
Luminous-
Flexibility

Intensity of light, fittings can be flexible in adopting specific style particularly in outdoor areas.

II.E.7 Site-
Luminous-
Variety

Within the luminous system different types are used for different activities.

II.F.1 Site-
Sonic-
Safety &
Security

Not Applicable

II.F.2 Site-
Sonic-
Convenience

Site is divided into two zones ie, quiet zone and noisy zone. Buffer zone by landscaping may be created in between two zones. (Bushy trees filter sound to a certain extent and grassy areas absorb more sound compared to plastered surfaces which are reflective)
II.F.3 Site-Sonic-Social Interaction

Locate social space away from the major noise generation from Euclid avenue.

II.F.4 Site-Sonic-Privacy

Not Applicable

II.F.5 Site-Sonic-Identity

Sonic environment can be identified by the various activities involved (different levels in corridors, living units, swimming pool, recreation hall etc).

Sonic environment need not be rigid. It can be flexible except near the living units.

II.F.6 Site-Sonic-Flexibility

Not Applicable

II.F.7 Site-Sonic-Variety

Not Applicable

II.G.1 Site-Thermal-Safety & Security

Not Applicable
<table>
<thead>
<tr>
<th>II.G.2 Site- Thermal- Convenience</th>
<th>Study of macro and micro climate is not needed as the proposed site is plane and barren land (refer appendix for methodology in utilising the thermal condition)</th>
</tr>
</thead>
<tbody>
<tr>
<td>II.G.3 Site- Thermal- Social Interaction</td>
<td>Pool and landscaped area encourages social interaction especially in summer. So care should be taken to provide a better environment in all respects.</td>
</tr>
<tr>
<td>II.G.4 Site- Thermal- Privacy</td>
<td>Private outdoor area within the site shall be provided especially for summer</td>
</tr>
<tr>
<td>II.G.5 Site- Thermal- Identity</td>
<td>Various thermal conditions may be created within the site so that they can be identified (shaded trees give moderate shading, shaded corridors give good protection from direct sun, and the swimming pool gives the coolest environment.</td>
</tr>
<tr>
<td>II.G.6 Site- Thermal- Flexibility</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>II.G.7 Site- Thermal- Variety</td>
<td>Not Applicable</td>
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</tr>
<tr>
<td>II.H.1 Site- Atmospheric Safety &amp; Security</td>
<td>Site is safe from heavy pollution but still suffers from pollution by the heavy traffic in front of the site on Euclid avenue</td>
</tr>
<tr>
<td>II.H.2 Site- Atmospheric Convenience</td>
<td>Dust and other impure particles can be filtered by growing trees and shrubs especially on the side facing Euclid avenue</td>
</tr>
<tr>
<td>II.H.3 Site- Atmospheric Social Interaction</td>
<td>The social space like fountains and gardens which have pure air encourages interaction among people</td>
</tr>
<tr>
<td>II.H.4 Site- Atmospheric Privacy</td>
<td>Living units shall be away from the source of pollution ie from Euclid avenue or adopt another solution to reduce the effect of the pollution</td>
</tr>
<tr>
<td>II.H.5 Site- Atmospheric Identity</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>II.H.6 Site-Atmospheric Flexibility</td>
<td>Not Applicable</td>
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</tr>
<tr>
<td>II.H.7 Site-Atmospheric Variety</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>II.I.1 Site-Aesthetic Safety &amp; Security</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>II.I.2 Site-Aesthetic Convenience</td>
<td>Selection of Sonorian traditional style (Spanish-Mexican) among the three different styles ie, the Sonorian tradition style, Anglo-Territorial style, and Bungalow form style</td>
</tr>
<tr>
<td>II.I.3 Site-Aesthetic Social Interaction</td>
<td>Social space can be attractive to encourage more interaction by growing flowering gardens, and planting different types of trees like seasonal, evergreen and regional</td>
</tr>
<tr>
<td>II.I.4 Site-Aesthetic-Privacy</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>II.I.5 Site-Aesthetic-Identity</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>II.I.6 Site-Aesthetic-Flexibility</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>II.I.7 Site-Aesthetic-Variety</td>
<td>Growing gardens, different types of trees, design of lamp posts, outdoor seating, brick paving etc at the site level creates effective aesthetic environment</td>
</tr>
</tbody>
</table>
Refer "Building code" under R-5 zone. Some of the major points are:

Sec. 23-166

a. Residential density: 87 units per acre maximum
b. Usable open space per dwelling unit minimum: 300 square feet
c. Building setback shall be a distance equal to 60 percent of the building height but not less than 20 feet from the property line
d. Floor area ratio, maximum: 6.0

Open to all irrespective of age, economical, ethnic etc within the students community

Only limited density is allowed to give enough privacy (87 units per acre maximum)
III.A.5 Building-Legal-Identity

Selection of specific historic style (Sonorian style)

III.A.6 Building-Legal-Flexibility

Not Applicable

III.A.7 Building-Legal-Variety

Not Applicable

III.B.1 Building-Social-Safety & Security

a. Recognizable number of occupants.
b. Limited number of entry and exit
   (one entry and exit from Euclid and First street)

III.B.2 Building-Social-Convenience

a. Collection of anthropometric standards for space planning
   for the units like living room, dining area, kitchen, bed room,
   toilet, corridor, office, lobby, etc.
b. Linear pattern circulation of hallways gives direct access to the living units.

c. Decision of the basic lay-out of the typical unit

d. Provision of living units closer to social space like pool, garden, office etc.
### III.B.3 Building-Social-Social Interaction

- Social space provided in the center to encourage social interaction.
- Provision of recreation space like multi-purpose hall, landscaping along the hallways, pool in the center of the building etc.

### III.B.4 Building-Social-Privacy

- Entrance veranda for each unit is needed to have the feeling of privacy as the entry door directly opening into the public corridor invades privacy.

- Lobby space for each unit is to create privacy for bed room and toilet.
III.B.5 Building-Social-Identity

a. Different groupings (studio, single bed room units, double bed room units) are done to give identity for each type.

b. Units are staggered to give private space to enter each unit separately.

II.B.6 Building-Social-Flexibility

a. Due to the restricted area of the site, open plan is not possible inside the living units.

b. Recreation hall and balconies may be used for multi-purpose.
### III.B.7 Building-Social-Variety

All the living units are oriented either towards pool or landscaped or exterior view of garden to create variety in visual, sonic, aesthetic feelings etc.

### III.C.1 Building-Structural-Safety & Security

Calculating and deciding the type of structure and the thickness of columns and roof with the help of anticipated number of floors (may be a maximum of three floors with the future expansion) and weight involved (6" steel columns, 9" to 12" steel joist, 6" to 9" wooden beams and 2"x4" wooden frame construction are proposed for the building).
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>III.C.2</td>
<td>Building-Structural-Convenience: Not Applicable</td>
</tr>
<tr>
<td>III.C.3</td>
<td>Building-Structural-Social Interaction: Not Applicable</td>
</tr>
<tr>
<td>III.C.4</td>
<td>Building-Structural-Privacy: Not Applicable</td>
</tr>
<tr>
<td>III.C.5</td>
<td>Building-Structural-Identity: Not Applicable</td>
</tr>
<tr>
<td>III.C.6</td>
<td>Building-Structural-Flexibility: 2&quot;x4&quot; frame interior construction allows flexibility in modification and expansion</td>
</tr>
<tr>
<td>III.C.7</td>
<td>Building-Structural-Variety: Corridors, living units, multi-purpose hall may have different materials and the type of construction to give variation (circular steel columns for corridors, and balconies, steel section with 2&quot;x4&quot; wooden for</td>
</tr>
<tr>
<td>III.D.1 Building-</td>
<td>For the reduction of construction time, labor and material cost, 2&quot;x4&quot; frame construction (for interiors only) is encouraged in addition to steel</td>
</tr>
<tr>
<td>Time &amp; Cost-</td>
<td></td>
</tr>
<tr>
<td>Safety &amp; Security</td>
<td>living units, wooden frames for outdoor seating etc)</td>
</tr>
<tr>
<td>III.D.2 Building-</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Time &amp; Cost-</td>
<td></td>
</tr>
<tr>
<td>Convenience</td>
<td></td>
</tr>
<tr>
<td>III.D.3 Building-</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Time &amp; Cost-</td>
<td></td>
</tr>
<tr>
<td>Social Interaction</td>
<td></td>
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<tr>
<td>III.D.4 Building-</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Time &amp; Cost-</td>
<td></td>
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<tr>
<td>Privacy</td>
<td></td>
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<tr>
<td>III.D.5 Building-</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Time &amp; Cost-</td>
<td></td>
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<tr>
<td>Identity</td>
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<td>Section</td>
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<tr>
<td>III.D.6</td>
<td>Building-Time &amp; Cost-Flexibility</td>
</tr>
<tr>
<td>III.D.7</td>
<td>Building-Time &amp; Cost-Variety</td>
</tr>
<tr>
<td>III.E.1</td>
<td>Building-Luminous-Safety &amp; Security</td>
</tr>
<tr>
<td>III.E.2</td>
<td>Building-Luminous-Convenience</td>
</tr>
<tr>
<td>III.E.3</td>
<td>Building-Luminous-Social Interaction</td>
</tr>
<tr>
<td>III.E.4 Building-Luminous-Privacy</td>
<td>Lighting system should distinguish interior and exterior space by intensity, appliances, color etc.</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>III.E.5 Building-Luminous-Identity</td>
<td>Different types of lighting for different activities like spotlight for dining, table lamps for living, roof light for bedroom etc clearly to define the activities.</td>
</tr>
<tr>
<td>III.E.6 Building-Luminous-Flexibility</td>
<td>The intensity of both natural and artificial lighting can be altered by closing the curtains or by using low or high intensity bulb for the lighting.</td>
</tr>
<tr>
<td>III.E.7 Building-Luminous-Variety</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>III.F.1 Building-Sonic-Safety &amp; Security</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>III.F.2 Building- Sonic- Convenience</td>
<td>Application of buffer zone in between pool area (noisy) and living (quiet) units</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>III.F.3 Building- Sonic- Social Interaction</td>
<td>Swimming pool enhance interaction</td>
</tr>
<tr>
<td>III.F.4 Building- Sonic- Privacy</td>
<td>Proper sound insulation materials shall be used on common walls (2&quot; rigid insulation)</td>
</tr>
<tr>
<td>III.F.5 Building- Sonic- Identity</td>
<td>Various units can be identified by the different sound level (living, recreational, pool etc)</td>
</tr>
<tr>
<td>III.F.6 Building- Sonic- Flexibility</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>III.F.7 Building- Sonic- Variety</td>
<td>Not Applicable</td>
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<tr>
<td>Section</td>
<td>Description</td>
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<td>------------------</td>
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</tr>
<tr>
<td>III.G.1 Building-</td>
<td>Walls and roofing materials shall be protective to external thermal condition (Gypsum plaster, rigid insulation, metal deck, asphalt pebbles etc)</td>
</tr>
<tr>
<td>Thermal-</td>
<td></td>
</tr>
<tr>
<td>Safety &amp; Security</td>
<td></td>
</tr>
<tr>
<td>III.G.2 Building-</td>
<td>Orientation of all units to avoid extreme heat of west and east sun</td>
</tr>
<tr>
<td>Thermal-</td>
<td></td>
</tr>
<tr>
<td>Convenience</td>
<td></td>
</tr>
<tr>
<td>III.G.3 Building-</td>
<td>Pool and shaded areas can act as a place for social interaction particularly in summer</td>
</tr>
<tr>
<td>Thermal-</td>
<td></td>
</tr>
<tr>
<td>Social Interaction</td>
<td></td>
</tr>
<tr>
<td>III.G.4 Building-</td>
<td>Direct sunlight can be kept from penetrating living units by using sunshades, shadow of trees, balconies, roof projections etc</td>
</tr>
<tr>
<td>Thermal-</td>
<td></td>
</tr>
<tr>
<td>Privacy</td>
<td></td>
</tr>
<tr>
<td>III.G.5 Building-</td>
<td>Thermal variation occurs in balconies, indoor space, below trees and inside the pool</td>
</tr>
<tr>
<td>Thermal-</td>
<td></td>
</tr>
<tr>
<td>Identity</td>
<td></td>
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<tr>
<td>Section</td>
<td>Description</td>
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</tr>
<tr>
<td>III.G.6</td>
<td>Building-Thermal-Flexibility&lt;br&gt;Comfort zone can be adjusted by mechanical device inside the living units.</td>
</tr>
<tr>
<td>III.G.7</td>
<td>Building-Thermal-Variety&lt;br&gt;a. Possible variation inside the living units by opening windows.&lt;br&gt;b. Thermal condition can be varied by landscaping in the social space.&lt;br&gt;c. Thermal energy can be gained through windows in winter.</td>
</tr>
<tr>
<td>III.H.1</td>
<td>Building-Atmospheric-Safety &amp; Security&lt;br&gt;Provision of cross ventilation for all living units, if possible.</td>
</tr>
<tr>
<td>III.H.2</td>
<td>Building-Atmospheric-Comfort&lt;br&gt;Purifying the air by air conditioning the living units. (optional to the occupants)</td>
</tr>
<tr>
<td>III.H.3</td>
<td>Building-Atmospheric-Social Interaction&lt;br&gt;Outdoor sitout, garden and other landscaped area provide social interaction.</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
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</tr>
<tr>
<td>III.H.4</td>
<td>Building-Atmospheric-Privacy</td>
</tr>
<tr>
<td></td>
<td>Not Applicable</td>
</tr>
<tr>
<td>III.H.5</td>
<td>Building-Atmospheric-Identity</td>
</tr>
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<td></td>
<td>Not Applicable</td>
</tr>
<tr>
<td>III.H.6</td>
<td>Building-Atmospheric-Flexibility</td>
</tr>
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<td>Not Applicable</td>
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<tr>
<td>III.H.7</td>
<td>Building-Atmospheric-Variety</td>
</tr>
<tr>
<td></td>
<td>Not Applicable</td>
</tr>
<tr>
<td>III.I.1</td>
<td>Building-Aesthetic-Safety &amp; Security</td>
</tr>
<tr>
<td></td>
<td>Application of sonorian style of architecture for the aesthetic elements for the building</td>
</tr>
<tr>
<td>III.I.2</td>
<td>Building-Aesthetic-Convenience</td>
</tr>
<tr>
<td></td>
<td>Expressing the functional elements as the aesthetic elements</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>III.I.3 Building-Aesthetic-Social Interaction</td>
<td>Special consideration shall be given in the social space to encourage interaction (by growing flowering gardens, pleasant trees, well-designed and colorful seating area, color lights etc).</td>
</tr>
<tr>
<td>III.I.4 Building-Aesthetic-Privacy</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>III.I.5 Building-Aesthetic-Identity</td>
<td>Special character shall be used apart from the vernacular style to give identity which is the architect's personal option. (color of the walls, ceilings, materials of the floors, handrail details, furniture design, kitchen cabinets, toilet details and materials etc)</td>
</tr>
<tr>
<td>III.I.6 Building-Aesthetic-Flexibility</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>III.I.7 Building-Aesthetic-Variety</td>
<td>By different treatment like color, texture, style, we can give variety in aesthetic feeling (stucco sand color, metal coping, hollow metal painted window frames, wooden painted doors and frames, metal coping, metal stairs, stone base, etc)</td>
</tr>
</tbody>
</table>
ELEMENTS OF DESIGN FROM THE GRAPHICS....
(i) Selection of R-5 Zone (II.A.1)

Application of R-5 Zone
Building Code
<table>
<thead>
<tr>
<th>SELECTION OF MAJOR ELEMENTS</th>
<th>DERIVATION OF DESIGN ELEMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ii) Separation of vehicular and pedestrian traffic by providing two access points for the site one for vehicles and one for pedestrians</td>
<td>Position of car parking in the site</td>
</tr>
</tbody>
</table>

![Diagram](image-url)
<table>
<thead>
<tr>
<th>SELECTION OF MAJOR ELEMENTS</th>
<th>DERIVATION OF DESIGN ELEMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(iii) Possible entry points for the users with respect to convenience</td>
<td>Selection of Entry and Exit points</td>
</tr>
</tbody>
</table>

![Diagram](image)
<table>
<thead>
<tr>
<th>SELECTION OF MAJOR ELEMENTS</th>
<th>DERIVATION OF DESIGN ELEMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(iv) Division of Zoning within the site (II.B.2)</td>
<td>Location of Swimming pool and the living units</td>
</tr>
</tbody>
</table>

![Diagram showing zoning and design elements]
<table>
<thead>
<tr>
<th>SELECTION OF MAJOR ELEMENTS</th>
<th>DERIVATION OF DESIGN ELEMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(v) Control from the centre of the Building (III.B.1)</td>
<td>Location of office, security, first-aid room, and maintenance</td>
</tr>
</tbody>
</table>

![Diagram of control from the center of the building](image)

![Diagram of design elements](image)
<table>
<thead>
<tr>
<th>SELECTION OF MAJOR ELEMENTS</th>
<th>DERIVATION OF DESIGN ELEMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(vi) Linear pattern circulation gives direct access to the living units (III.B.2)</td>
<td>Corridor pattern for the living units</td>
</tr>
</tbody>
</table>

![Diagram of linear pattern circulation](image1)

![Diagram of corridor pattern for living units](image2)

- Linear pattern circulation
- Corridor pattern
- Living units
- Security
- Swimming pool
<table>
<thead>
<tr>
<th>SELECTION OF MAJOR ELEMENTS</th>
<th>DERIVATION OF DESIGN ELEMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(vii) Position of the Social space in the center of the building for better social interaction and to provide privacy (III.B.2)</td>
<td>Location of the Swimming pool, Garden and other Social space</td>
</tr>
</tbody>
</table>

![Diagram of Social Space and Living Units](image1)

![Diagram of Living Units and Swimming Pool](image2)
(viii) Entrance verandah is needed to have the feeling of privacy as the entry door directly opening into the public corridor invades privacy (III.B.4)

<table>
<thead>
<tr>
<th>SELECTION OF MAJOR ELEMENTS</th>
<th>DERIVATION OF DESIGN ELEMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entrance verandah in front of the living units</td>
<td></td>
</tr>
</tbody>
</table>

![Diagram of entrance verandah](image)

![Diagram of floor plan](image)
(ix) Orientation of the living units with respect to proper luminous and thermal condition (III.G.2 & III.E.3)
<table>
<thead>
<tr>
<th>SELECTION OF MAJOR ELEMENTS</th>
<th>DERIVATION OF DESIGN ELEMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(x) Cross ventilation helps to purify the air and also helps to maintain the natural thermal comfort</td>
<td>Position of the windows</td>
</tr>
</tbody>
</table>

![Typical Plan](image)

![Living Unit (Living, Dining & Bath) and Service Area (Kitchen & Toilet)](image)
DESIGN SOLUTION
STUDIO UNIT

CORRIDOR

AREA = 304 SQ.FT
ORIENTATION FOR BETTER THERMAL CONDITION

CROSS VENTILATION FOR BETTER THERMAL AND ATMOSPHERIC CONDITION

STUDIO UNIT

Lobby space to CORRIDOR give privacy, identity and the sense: AREA = 304 sq.ft belonging

HIGH SILL WINDOWS FOR PRIVACY

COMMON DUCT WALL FOR BETTER SERVICE SYSTEM COST REDUCTION AND MAINTENANCE

SEPARATION OF SERVICE AREA WITHIN THE UNIT

PLANTS AND SHRUBS TO CREATE AESTHETIC ENVIRONMENT AND AS WELL AS PRIVACY
ORIENTATION FOR BETTER THERMAL CONDITION

COMMON DUCT WALL FOR BETTER SERVICE SYSTEM, COST REDUCTION AND MAINTENANCE

LOBBY SPACE TO GIVE PRIVACY TO BEDRM AND TOILET

HIGH SILL WINDOW FOR PRIVACY

PLANTS AND SHRUBS TO CREATE AESTHETIC ENVIRONMENT AND AS WELL AS PRIVACY

AREA: 517 SQ FT

CROSS VENTILATION FOR BETTER THERMAL AND ATMOSPHERIC CONDITIONS

LOBBY SPACE TO GIVE PRIVACY, IDENTITY AND THE SENSE OF BELONGING

SINGLE BEDRM UNIT
TYPICAL SOLUTION......
<table>
<thead>
<tr>
<th></th>
<th>REQUIRED</th>
<th>PROVIDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>STUDIO UNITS</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>SINGLE BEDRM UNITS</td>
<td>40</td>
<td>33</td>
</tr>
<tr>
<td>DOUBLE BEDRM UNITS</td>
<td>30</td>
<td>24</td>
</tr>
</tbody>
</table>

**KEY SECTION A-A**

**SCALE: 1" = 32'0"**
CONCLUSION.....
AN ANALYSIS OF THE WEAKNESSES OF THE PRELIMINARY DESIGN

WEAKNESSES:

a. Lots of Exterior space is wasted

b. Many offsets may increase the cost of the building

c. Maintaining the level difference between recreation space and the living units may increase the cost of the building

d. Windows of living units facing north will loose heat in winter

e. Lack of enough privacy for swimming pool

f. Provided number of units does not meet the requirements

REASONS:

Space is compromised for cross ventilation for all living units and for social space

Offset is the result of the convenient interior circulation for each living units and to achieve cross ventilation

The level difference provides privacy for the living units facing the recreative space

Summer period is longer than the winter in tucson

Swimming pool acts as a social interaction space

Space is compromised with exterior and interior garden space, and private lobby for each unit
The Design does have certain problems in achieving a complete success which is the direct cause of the restrictions in the methodology of the design process. Since this methodology is also responsible for the partial success of the design in terms of form and function, let us analyse both the positive points and negative points of using the proposed methodology.

Positive points:

a. As the final design arrives through a format anyone can verify the design at any stage of the development.

b. A Logical approach is possible in every stage of development.

c. Architects need not to be experts in the given complicated project. They can simply follow the check-list which can save them time in research.

d. Although going through the methodology is a time consuming aspect, the result is a beneficial one that avoids any serious problems in the post occupancy stage thus reducing time and money in the long run.

e. The methodology permits one to analyze the importance of each system involved in the project.

f. The methodology gives one the choice for priorities within the systems.

Negative points:

a. Criteria vary from project to project so the check-list must also vary.

b. The check-list has its own restriction by falling within the application of certain formula which may affect the creative method of interpretation of various systems.

c. The methodology may restrict or change any preconceived concept of the architects.

d. This design process is time consuming.

e. The methodology does give the option of considering many systems but only in the linear sequence.
APPENDIX..........
ARTICLE I. DIVISION 13. "R-5" RESIDENTIAL-COMMERCIAL ZONE

Sec. 23-163 PERMITTED PRINCIPAL USES. The following are principal permitted uses which shall only be allowed in connection with and part of a high rise building or complex of buildings which are functionally related.

Residential, including Dwelling and Apartment Houses.

Colleges and Schools, public and private.

Hotel, Inn, Motel and Motor Hotel.

Library and Museum.

Professional Office, Semi-Professional Office and Clinic.

Theater within a completely enclosed building.

Underground Utility Vault and Services but none above ground.

Sec. 12-164 PERMITTED ACCESSORY AND COMPONENT USES. The following accessory and component uses shall be allowed only in conjunction with a high density residential use. These accessory and component uses must be part of a high rise building or complex of buildings which are functionally integrated. No wholesale activity is allowed nor are merchandise nor supplies allowed to be stored or displayed outside a completely enclosed building.

Adult Care Home (subject to provisions of Section 23-506 and 23-519). (Ord. 6023, 8-6-81)

Art Gallery and Studio.

Bank, Safe Depositary and Trust Company.

Barber and Beauty Shop.

Book Store, new and used.

Church and other places of worship.

Club and Lodge.

Cocktail Lounge and Bar.

Delicatessen and Grocery Store.
ARTICLE I. DIVISION 13. ""R-5"" RESIDENTIAL-COMMERCIAL ZONE

Dry Cleaners.
Drug Store.
Florist Shop.
Foster Home.
Gift, Curio and Jewelry Shop.
Governmental uses, except of warehousing.
Group Foster Home (as regulated by Sec. 23-146).
Haberdashery and Dress Shop.
Liquor Store for packaged sales.
Newsstand.
Parking Garage and Parking Lot.
Receiving Foster Home (as regulated by Sec. 23-146).
Recreational Building and Community Center Building (including accessory outdoor recreational uses but excluding sports stadium).
Restaurant and Café including sale of alcoholic beverages for consumption on-premises (including outdoor facilities).

SPECIALIZED TREATMENT HOMES, upon issuance of a certificate of zoning compliance by the Zoning Administrator. The certificate may be revoked by the Zoning Administrator where it is found that the Specialized Treatment Home generates noise, traffic, on-street parking and similar nuisance-like impacts in excess of that which might reasonably be expected to be generated by other permitted residential uses in the immediate vicinity.

DEVELOPMENT PLAN REVIEW. Prior to issuance of any permit for construction or use of any parcel of land for other than a single family residence and its accessory uses, a development plan shall be submitted to the Planning Director for review and approval under Sec. 23-409.

ARTICLE I. DIVISION 28 "H" HISTORIC DISTRICT AND LANDMARK ZONE

Sec. 23-455

Purpose. The purpose of this zone is to promote the educational, cultural, economic and general welfare of the community, and to ensure the harmonious growth and development of the municipality, by encouraging the preservation and rehabilitation of historic districts as well as historic sites and structures therein and of isolated historic landmarks. The historic zone designation is to be superimposed over existing zones where there is a group of surviving related structures in their original setting or an individual historically important structure which give an historic dimension to the City. This zone is intended to encourage the retention of early structures, keep them in active use and in their original appearance, setting and placement rather than to modify uses in the underlying zones. It is also intended that new or remodeled structures, located within historic districts or landmark areas, be designed and constructed to harmonize with structures located within the immediate vicinity, in order to preserve property values. Provide for future development and to promote an awareness of the heritage of Tucson among both residents and visitors to the community.

Definitions. Within historic districts or landmark areas, unless the context otherwise requires, the following words and phrases shall have the following meanings:

A. Alteration means any aesthetic, architectural, mechanical or structural change to the exterior surface of any part of an existing structure. Applicants are advised to refer to the Secretary of the Interior's Standards for Rehabilitation when tax certification for rehabilitation is being contemplated.

B. Artisan means one who practices an art or one trained to manual dexterity or skill in a trade.

C. Development Zone means a certain designated area in the vicinity of the lot to be developed in which certain historic and architectural features have been identified and shall be maintained and reinforced by the new development for the enhancement of the historic district. The development zone is determined as follows:

1. Where a lot is an interior lot - the development zone includes that lot, plus those lots on either side of that lot fronting on the same street in the same block and all those lots on the opposite side of that street, except such portions of the development zone which fall outside the boundary of the historic district.

2. Where a lot is a corner lot - the development zone includes that lot, plus the corner lot diagonally opposite to that lot, plus all lots fronting on the same two streets in the same block, and all lots on the opposite side of those streets, except those portions of the development zone which fall outside the boundary of the historic district.
ARTICLE I, DIVISION 28 "H" HISTORIC DISTRICT AND LANDMARK ZONE

3. Where a lot is located adjacent to an historic zone boundary - the development zone shall include that lot, all lots located within the same block, and those lots located on the opposite side of any street adjoining the same block, as well as those lots located on the opposite corners, except such portions of the zone which fall outside the boundary of the historic district.

D. **Height** means the vertical distance measured between the highest part of a structure and the finished grade at the midpoint of the front facade of the principal structure, excluding chimneys, mechanical equipment and other miscellaneous additions.

E. **Historic Site, Historic Structure, or Historic Landmark** means a site or structure, including signs affixed thereto, which:

1. Is documented as dating from a particular significant period in Tucson's history, i.e., Pre-Colonial (Before 1775), Spanish Frontier (Colonial) (1775-1821), Mexican Frontier (1821-1853), Territorial (1854-1912) or Post Territorial (After 1912);
2. Is associated with the lives of outstanding historical personages; or
3. Is associated with significant historic events or occurrences; or
4. Exemplifies the architectural period in which it was built and has distinguishing characteristics of an architectural style, method of construction or be the notable work of a master builder, designer or architect whose individual genius influenced his age; or
5. Contributes information of archaeological, historical, cultural or social importance relating to the heritage of the community.
6. Relates to events, personages or architectural styles which are at least fifty years old. However, outstanding examples less than fifty years old should be evaluated on their own merits.
7. Relates positively to buildings in its immediate vicinity in terms of scale, size, massing, etc., such that its removal would be an irreparable loss to the setting.

F. **Intrusion** means a structure which detracts from the district's sense of time and place.
Residential Kitchens

Dimensions of the Human Figure

Kitchen, especially if there is not ready access to the bedroom. A mirror is desirable.

Critical Dimensions

The "critical dimensions" for working space are illustrated in Figs. 1-4. These dimensions are recommended on the basis of research and do not necessarily coincide with either current practice or currently available cabinets and equipment. With requirements for counter space in particular, are based on research covering operations of individual work centers. Overlapping is permissible if work or adjacent centers is not being carried out simultaneously.

Fig. 2 Minimum counter-width dimensions.

Fig. 3 Comfortable working heights.
LIVING ROOM—FURNITURE SIZES AND CLEARANCES

LIVING ROOMS must serve a wide variety of activities. Thus, furniture can add greatly to the usefulness of living areas if it is adaptable in type and use to a number of different purposes.

Accentuating doors give a working basis for planning sufficient space for general living activities. Dimensional information includes only a few of many available types and sizes of furniture. Dimensions of groups refer to measurements necessary for comfortable and convenient use.

Necessary planning considerations include provision of adequate floor and wall space for furniture groupings, separation of soft seats from areas of activities, ease of access, and a maximum of flexibility. Doors in constant use should be placed so that traffic between them will not interfere with furniture groups.

Flexibility implies the varying uses to which space may be put. The sleeping group on the right, for instance, requires space, sin; the same floor space as the card-playing group, the sets, below, may be a convertible bed. Thus, furniture of other areas—such as reception, sleeping, dining, and even storage—may be applicable equally to living rooms.

Residential

BATHROOMS
Residential

BEDROOMS

![Diagram of a bedroom layout]

**FURNITURE CLEARANCES**
To assure adequate space for convenient use of furniture in the bedroom, tables near the sleeping quarters should be placed as shown in Figs. 2 and 3. A 42" clearance between bunk beds or between beds and wall is adequate. A 24" clearance at the foot of the bed should be provided. A 12" clearance on either side of the bed should be provided. A 30" clearance in front of the chest of drawers is necessary.

**FURNITURE ARRANGEMENTS**
The length of doors and windows should permit alternate furniture arrangements.

![Diagram of furniture arrangement]

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**DINING AREAS**

By Glenn H. Betz and Alexander Kirk, Housing Research Center, Cornell University

**DINING ROOM**
The principal factors to be considered in planning the dining area are as follows:
1. Number of people to be seated.
2. Size of the room and its size and placement of furniture.
4. Type of furniture and storage space for china, glassware, silver, and linens.
5. Recommended space dimensions, based on recent research, are provided below.

**SIZE OF PLACE SETTINGS**
1. The maximum width required for each place setting is 21 in.; however, if the space is limited, a width of 18 in. may be used. A 24 in. width is usually adequate, the minimum is 15 in.
2. The space required for each place setting is 14 ft., including the 10 ft. for the table and 4 ft. each side.
3. The dimensions listed are for one person served at each table, and the table should be at least 30 in. wide for easy movement.

**PASSAGE BEHIND CHAIRS**
1. The minimum width recommended is 36 in., with a satisfactory width being 42 in. The space required for each place setting is 14 ft., including the 10 ft. for the table and 4 ft. each side.
2. The dimensions listed are for one person served at each table, and the table should be at least 30 in. wide for easy movement.

---

**Table 1. Inside dimensions of drawers for storage of silverware**

Adapted from Residential Housing for Rural Homes in the Western Region, Report 111, University of Arizona Agricultural Experiment Station, Tucson, June 1931.

<table>
<thead>
<tr>
<th>Item</th>
<th>Weight, lb.</th>
<th>Height, in.</th>
<th>Depth, in.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 each forks, knives, spoons, 12 teaspoons, 6 tablespoon, 2 serving pieces</td>
<td>11</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>12 each forks, knives, salad forks or spoons, butter spreaders, napkins, 18 teaspoons, 6 tablespoon, 2-piece serving set, 2 serving pieces</td>
<td>14</td>
<td>20</td>
<td>3</td>
</tr>
<tr>
<td>12 each forks, knives, spoons, salad forks or spoons, butter spreaders, 24 teaspoons, 6 tablespoon, 2 serving pieces</td>
<td>17</td>
<td>18</td>
<td>3</td>
</tr>
</tbody>
</table>

**Table 2. Dimensions of stacks of folded table linens**


<table>
<thead>
<tr>
<th>Item</th>
<th>Space 18 in. deep</th>
<th>Space 24 in. deep</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 large tablecloths, 2 place mats, everyday use</td>
<td>14 x 15</td>
<td>14 x 20</td>
</tr>
<tr>
<td>2 medium tablecloths, everyday use</td>
<td>13 x 15</td>
<td>13 x 20</td>
</tr>
<tr>
<td>2 small tablecloths, everyday use</td>
<td>14 x 15</td>
<td>14 x 20</td>
</tr>
<tr>
<td>3 small tablecloths, everyday use</td>
<td>14 x 15</td>
<td>14 x 20</td>
</tr>
<tr>
<td>2 small napkins (2 sheets of 6)</td>
<td>7 x 10</td>
<td>7 x 15</td>
</tr>
<tr>
<td>2 large napkins (2 sheets of 6)</td>
<td>8 x 13</td>
<td>8 x 16</td>
</tr>
<tr>
<td>6 place mats, everyday use</td>
<td>13 x 15</td>
<td>13 x 16</td>
</tr>
<tr>
<td>1 table pad</td>
<td>13 x 17</td>
<td>13 x 19</td>
</tr>
</tbody>
</table>

---

**Fig. 1. Size of place setting**

**Fig. 2. Passage behind chairs**

**Fig. 3. Leaving the table**
### TABLE 1: SUMMARY OF TEMPERATURE AND R.H. DATA BY HOURS FOR: TUCSON, ARIZONA

| Lat: 32°14' | Long: 110°51' | Elev: 5281 ft |

Based on hourly observations through the year 19[...]

<table>
<thead>
<tr>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>JUL</th>
<th>AUG</th>
<th>SEP</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:00</td>
<td>3:00</td>
<td>6:00</td>
<td>9:00</td>
<td>12:00</td>
<td>15:00</td>
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<td>58</td>
<td>58</td>
<td>58</td>
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</tr>
</tbody>
</table>

### TABLE (3-1): BIOCLIMATIC NEEDS BY REGION:

<table>
<thead>
<tr>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>JUL</th>
<th>AUG</th>
<th>SEP</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
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<td>000</td>
<td>000</td>
<td>000</td>
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<td>000</td>
</tr>
<tr>
<td>UNDERHEATED PERIOD</td>
<td>OVERHEATED PERIOD</td>
<td>RADATION (KCAL / H)</td>
<td>WIND (M/SEC)</td>
<td>SPECIFIC HUMIDITY</td>
<td>SHADING</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DESIGN CRITERIA</td>
<td>UNDER HEATED</td>
<td>OVER HEATED</td>
<td>KEEP THE HEAT IN AND COLD TEMPERATURE OUT DURING SUMMER.</td>
<td>KEEP THE HOT TEMPERATURE OUT IN WINTER.</td>
<td>NO EVAPORATIVE COOLING IS REQUIRED</td>
<td>MAXIMIZE SUNLIGHT PENETRATION IN WINTER</td>
<td>PROTECT OPENINGS FROM DIRECT SUN.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant

(1) Applicable, not significant at this level.
<table>
<thead>
<tr>
<th>Description</th>
<th>Conductivity (W/(m·K))</th>
<th>Conductance (C)</th>
<th>Resistivity (1/Ω·m)</th>
<th>Resistance (Ω·m)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air Film:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selling air (IN)</td>
<td>1.46</td>
<td>4.00</td>
<td>0.17</td>
<td>0.16</td>
</tr>
<tr>
<td>Moving air (OUT) 7.5 mph</td>
<td>2.00</td>
<td>8.00</td>
<td>0.25</td>
<td>0.19</td>
</tr>
<tr>
<td>15 mph</td>
<td>4.00</td>
<td>16.00</td>
<td>0.25</td>
<td>0.19</td>
</tr>
<tr>
<td><strong>Walls:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brick (common)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interior 5 in (half brick)</td>
<td>5.00</td>
<td>2.00</td>
<td>1.00</td>
<td>0.20</td>
</tr>
<tr>
<td>Interior 10 in (one brick)</td>
<td>2.00</td>
<td>8.00</td>
<td>0.25</td>
<td>0.19</td>
</tr>
<tr>
<td>Stone (limestone or sandstone)</td>
<td>12.50</td>
<td>5.00</td>
<td>1.00</td>
<td>0.20</td>
</tr>
<tr>
<td>12 in (30.5 cm)</td>
<td>5.00</td>
<td>2.00</td>
<td>1.00</td>
<td>0.20</td>
</tr>
<tr>
<td><strong>Roofs:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete (sand and gravel aggr.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 in</td>
<td>12.00</td>
<td>6.00</td>
<td>1.00</td>
<td>0.20</td>
</tr>
<tr>
<td>8 in</td>
<td>0.74</td>
<td>3.70</td>
<td>1.25</td>
<td>0.50</td>
</tr>
<tr>
<td>12 in</td>
<td>0.55</td>
<td>2.75</td>
<td>1.67</td>
<td>0.83</td>
</tr>
<tr>
<td><strong>Insulating Materials:</strong></td>
<td></td>
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<td></td>
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<tr>
<td>Styrofoam (heat-resistant)</td>
<td>0.20</td>
<td>0.20</td>
<td>2.00</td>
<td>0.50</td>
</tr>
<tr>
<td>1/4 in</td>
<td>0.21</td>
<td>0.21</td>
<td>2.00</td>
<td>0.50</td>
</tr>
<tr>
<td>1/2 in</td>
<td>0.31</td>
<td>0.31</td>
<td>1.75</td>
<td>0.44</td>
</tr>
<tr>
<td>2 in</td>
<td>0.41</td>
<td>0.41</td>
<td>1.25</td>
<td>0.31</td>
</tr>
<tr>
<td>Asphalt sheeting 1/2 in</td>
<td>0.17</td>
<td>0.17</td>
<td>3.50</td>
<td>0.88</td>
</tr>
<tr>
<td>Asphalt felt (two layers)</td>
<td>0.12</td>
<td>0.12</td>
<td>2.62</td>
<td>0.66</td>
</tr>
<tr>
<td>Blanket and batt (fiber) 2 in</td>
<td>0.03</td>
<td>0.03</td>
<td>0.67</td>
<td>0.17</td>
</tr>
<tr>
<td><strong>Plastering Materials:</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Stucco plaster</td>
<td>0.00</td>
<td>0.00</td>
<td>1.00</td>
<td>0.20</td>
</tr>
<tr>
<td>Cement plaster 1/2 in</td>
<td>0.20</td>
<td>0.20</td>
<td>0.25</td>
<td>0.06</td>
</tr>
<tr>
<td>Gypsum plaster 1/2 in</td>
<td>0.09</td>
<td>0.09</td>
<td>0.25</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>Finishing Flooring Materials:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terrazzo tiles 1 in</td>
<td>12.50</td>
<td>6.25</td>
<td>0.00</td>
<td>Negligible</td>
</tr>
<tr>
<td>Cement tiles 1 in</td>
<td>0.10</td>
<td>0.10</td>
<td>0.20</td>
<td>0.00</td>
</tr>
<tr>
<td>Cement mortar 1/2 in</td>
<td>0.00</td>
<td>0.00</td>
<td>0.20</td>
<td>0.00</td>
</tr>
<tr>
<td>Drainage sl. w. concrete 3 in</td>
<td>1.41</td>
<td>0.71</td>
<td>6.71</td>
<td>1.34</td>
</tr>
<tr>
<td><strong>Wood:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardwood (oak) 1 in</td>
<td>0.10</td>
<td>0.10</td>
<td>0.91</td>
<td>0.19</td>
</tr>
<tr>
<td>Softwood (white) 1 in</td>
<td>0.06</td>
<td>0.06</td>
<td>1.03</td>
<td>0.22</td>
</tr>
<tr>
<td><strong>Metals:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheet metal</td>
<td>450.00</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Aluminum</td>
<td>1530.00</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td><strong>Glass:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single 1/8 in, 0.064 transmission</td>
<td>1.70</td>
<td>0.25</td>
<td>0.93</td>
<td>0.19</td>
</tr>
<tr>
<td>Double 0.25 in air space, 0.61 transmission</td>
<td>0.50</td>
<td>0.30</td>
<td>1.72</td>
<td>0.34</td>
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</tbody>
</table>

AESTHETIC SYSTEM - STUDY OF VERNACULAR ARCHITECTURE
BUNGALOW FORMS
(1900 through 1940)
Bungalow is a word the British originally derived from the word Bunglow, meaning house in the Bengal Style—Bengal being a region in northeastern India and East Pakistan. Examples of this style range from most primitive, unpretentious planning contributions of the small, single story house or cottage, usually thatched or tiled and surrounded by a veranda. Though it grew out of the American cottage tradition, the bungalow was born new and definite contributions to the evolution of home planning in the direction of informality and unpretentiousness. Use of common natural materials, integration of house and landscape setting, simplification of design which most often drew from Japanese or Spanish sources. From the basic building block of small size, simplicity, low pitch roof and a porch or veranda, Americans have derived many different types of bungalows, which as much as any other kind of house, led to the adoption of the "living room" and "outdoor/indoor living space." Themes emphasized are climatic adaptation and harmony with the landscape, craftsmen in units with heavy timbers, upturned eaves, stucco walls and arches. Bungalows have a variety of full-width porch types, but in all structures the porch is constructed by resting the posts upon a cross beam span which is supported by two concrete or brick columns or pillars. In Tucson, there are variations of the same type. The California Bungalow: housing type structure with low pitched roof and wide front veranda, constructed of brick but covered with adobe or stucco plaster. The Spanish Pueblo Bungalow: housing type of rectangular or box design with flat slided roof, trim, viga and wall buttering. It is also constructed of brick covered with adobe or stucco plaster. Incredibly popular style, inexpensive middle class housing informal in plan, elevation and detail.

THE SONORAN TRADITION
(Spanish-American vernacular tradition)
Before Arizona Statehood, examples found in all stages of Tucson regional adobe vernacular architectural development. The indigenous Sonoran style, characterized by flush-framed adobe building facades set directly at the front of property line; heavy flat mud roof with high parapet walls, stuccoed or left exposed, round wood beams (vigas), thick-walled deck, roof deck, projecting dormers (ramadas) penetrate the parapet wall at roof level, stone foundations and cloth ceilings (vendio). Horizontal mass with doorways generally recessed and window openings limited to bottom half of exterior wall surface. Floor plans could display a central hall (placita) or could reveal a series of rooms parallel or perpendicular to the street, corner fireplaces and pounded dirt floors. Later examples used dimensioned lumber for both beams and roof decks, but heavy mud roof was retained as well as incorporation of stone facing at wall base to prevent erosion.
**SPANISH COLONIAL REVIVAL**
(1915 through 1935; some revival as early as the 1890s in California and the Southwest)
These structures have red-tiled roofs; if the top is flat it may have tile parapets. Arches are a frequent feature, but are not universal as in mission styles. Walls are plastered, with a variety of textures. Plaster ornamentation is elaborate and concentrated around openings. Portals (principal entry way) are of piers and lintel type, or they can be recessed if they are recessed, they may spring from columns or piers. Balconies are a common feature with wrought iron and wood commonly on them. Windows themselves can be symmetrical in placement. These structures usually have no more than two stories, and if there is a pent, it is rarely enclosed. A favorite feature is the parapet, a structure of piers or piers carrying beams and arches work for climbing plants.

**MISSION REVIVAL**
(1880 through 1920)
The Mission Revival style originated in California, growing out of a disenchantment with the 19th Century lifestyle. The style was well-received in its own time, as it was perceived as an original alternative to the architectural styles dominant on the West Coast at the time. As the style gained popularity, it spread throughout California, and the south western states. It was accepted warmly in Tucson around the turn of the century, possibly due to the symbolic imperors of the pasting mission styles in the region.

Arch are one of the most general features of the style (these are usually semi-circular). The arches are characterizedly free of moldings. Roofs are most often tiled, few in pitch and either hipped or stopped at the ends against shaped gables of curvilinear outline. Occasionally the roof may be entirely hidden by a parapet. Ornament in the mission style is distinguished from many buildings of the Spanish Colonial Revival that followed it by the complete absence of sculptural ornament. Among other features, balconies are frequent. Turrets or towers capped by domes or pyramidal roofs are also common, especially on larger buildings.
• **ANGLO TERRITORIAL**  
(After 1880, railroad, until 1917)  
A purely Anglo architectural expression, little  
remnant of Sonoran building tradition. no  
longer in any way regional in character.  
Buildings located at center of lots with front,  
side and back yard. Generally structures  
vaulted brick wall construction with segment-  
al arched openings (after opening of  
brickyard), although frame construction  
techniques were also employed; irregular plan  
forms, use of wood detailed porches (hinges  
stuck or incorporated under principal  
roof). A wide variety of timber and  
roofs, hipped or gabled or combination  
of both, roof forms get more complex with  
gables (ridge gable roofs). Brick chimneys of  
corrugated clay and wood shingles roof  
surfaces, an increasing number of prefabri-  
cated building components imported from the  
East via railroad. Such architectural transplants  
offered no adverse response to landscape  
not to existing climate conditions but indeed  
marks the pinnacle in territorial style  
architecture sophistication, often elegantly  
detailed.

• **QUEEN ANNE REVIVAL**  
(1880 through 1910)  
Any continuity of architectural development  
was lost in widespread proliferation of imported  
stylés. The development and completion  
of the Southern Pacific's transcontinental route  
of 1880's made possible the greatly acceler-  
ated acquisition of new architecture, both  
new and revival. Among the innovations  
during this period were the Queen Anne  
Revival, which in Tucson had less impact  
compared to other western states such as  
California. Nevertheless, buildings of this  
arthropod mode were rich and exuberant  
in texture, color, forms and massing. Brick  
and stone on first floor, wood shingles or  
clapboard on upper level. Round turrets,  
ornamental towers and detailed bay windows.  
Small scale detailing and chimneys used as  
decorative panels on exterior of houses.

• **ART DECO**  
(C.1920)  
First widely popular style in the U.S. to break  
with revivalistic tradition of Beaux-Arts and  
period house. Strive to express the machine  
age. Essentially a style of decoration applied  
to jewelry, clothing, furniture, as well as  
architecture, buildings. Ornamentation is usually low relief,  
geometric designs and parallel straight lines.  
Featuring zigzags, chevrons, stylized floral  
motif, flowing and raking designs. Materials  
characterized by concrete, smooth-faced stone  
and metal accents, polychrome with wood  
colors, terra cotta, glass colored mirrors.  
Building forms were simple and streamlined  
and vertically stressed, also structural piers  
with no ornament. In Tucson the perpetua-  
tion of the architectural style is almost  
minimal.
**ROOFS**

Most roofs on older residential buildings are one of the following shapes: gable, hipped or a combination of gable and hipped roofs. The majority of roofs in the West University Neighborhood were originally wood shingles. For grade wood shingles are the most historically accurate replacement material.

When replacing your roof, select a material and a pattern that is historically appropriate to West University and to your house. If you have documentation for the original roof or an early roof on your house, use roofing material that is similar in size, shape, texture and color. If you do not have specific documentation, look at the roofing on similar buildings that are similar to your house.

Do not alter the roof line of your building.

Maintain the original size and shape of dormers on the street sides. Any proposal for the introduction or alteration of existing or new dormers on the house will be considered on an individual basis by the Historic District Advisory Board.

Do not introduce skylights visible from the street sides of a roof.

No solar panels will be permitted on the roof. **ROOF SHAPES**

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**PORCHES**

Porches are the focal point of the West University Houses. They frame and protect the main entrance no matter what style. They dictate how decorative details constructed with a variety of building materials.

Queen Anne porches have turned posts with elaborate wood trim at the porch roof. Spanish Colonial Revival displays buttressed and canted surrounds and mission tile at the porch roof line.

Most porches are supported on heavy, square columns of masonry, or wood posts on masonry bases in keeping with the proportions and materials of the house. They are often stuccoed. Low walls are more common as porch boundaries than are wood railings. Iron balustrades are not used.

Maintain the original porch on your house.

Use as much of the original materials and ornament as possible if repair or restoration is necessary.

Do not use wrought-iron columns and railings, steel pipe columns, or horizontal railings.

![Diagram of roof shapes and porch railings]
MATERIALS: Masonry.

If it is necessary to replace brick, use bricks that match as closely as possible the color and composition size of the original brick. Soft brick should be replaced with soft brick to ensure homogeneity. Install bricks in the original pattern.

Do not use cinderblock as a substitute for brick or adobe.

Brick surfaces that have been stuccoed should remain stuccoed. These bricks frequently are soft, and will deteriorate if exposed.

Suggestions: When repointing the masonry on your building, be sure that the composition of the new mortar, as well as the color and the width, are similar to the original mortar. The introduction of different materials into Portland cement will behave differently from the original mortar and cause later problems such as cracking.

If you are cleaning old masonry, surfaces, use a gentle detergent. Sand blasting is not recommended because it defaces or causes severe damage to brick and stone. It also accelerates erosion by allowing water to enter the pores.

If you need replacement bricks, older bricks are available. Water sealants on brick are not recommended.
3. ALVIN TOFFLER, The Third Wave. Video tape
5. FRANCIS FERGUSON, Architecture, Cities and the Systems Approach. George Braziller
6. GERALD NADLER, The Planning and Design Approach. Whiley-Interscience
18. URIEL COHEN AND LANI RYZIN, Research in Architecture.