HOW THE OTHER HALF BUILDS

Volume 1: Space

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Unless otherwise indicated, all plans and sections are drawn to 1:100 scale; location plans are 1:1000.
Introduction

As a result of the rapid and extraordinary growth of Indian cities such as Bombay and Calcutta, as well as of many smaller centers, the shelter problems of the urban poor in less-developed countries have increased in scale, and in severity. Conventional resources have become stretched to the limit and are now insufficient to deal with this situation, with the result that most low-income urban housing in India has been provided by the so-called informal sector, which exists, and thrives, outside the traditional market economy. The informal sector, which can be found in every less-developed country, is characterized by decentralization and fragmentation, flexibility and by the small scale of its entrepreneurial activities. Informal sector housing has been affected by a number of factors: large families, economic decisions and trade-offs which are complicated by the fact that there are usually many wage-earners, and sporadic incomes. Unlike conventional housing, the housing of the poor almost always combines living and working activities.

Despite its often spontaneous and improvised character, the informal sector has provided virtually the only delivery vehicle which has had any success in providing appropriate, low-cost solutions to the shelter problems of the urban poor. The site of the Centre for Minimum Cost Housing has been to understand this new phenomenon, with a view to developing technologies and methodologies that will be suitable to application in the context of these new circumstances.

Existing informal sector housing, often termed slums, represents a solution rather than a problem. It is, moreover, a solution that appears to deny conventional planning orthodoxy. The priorities of the slum-dweller are frequently not those of the municipal authorities. Space takes precedence over permanence. A porch may be built before a bedroom; a work place may be more important than a private bedroom. The apparent inversion of values is especially evident in the public spaces. Whereas planned sites and services projects usually incorporate rudimentary, minimal circulation spaces, the public areas of slums are characterized by richness and diversity.

There is nothing basic about “basic housing”—an inaccurate and misleading term. Architects and planners are only beginning to understand the complexity of the housing requirements of the urban poor. Present-day “standards” are a poor tool indeed in this process. They reflect a view of optimal solutions that is not only culturally inappropriate but also inadequate. A new set of settlement standards needs to be evolved. These standards should seek to accommodate, rather than to reorganize. They should reflect the (sometimes harsh) reality of the urban poor, and they should respond to their special needs, not to an idealized set of criteria.

How to begin? Surely, by looking at how the poor actually live. This study is the result of site surveys carried out in June 1984 in four slums in the city of Indore: Kulabnath Ka Bhatta, North Toda, Firoz Gandhi Nagar and Adarsh Bijaan Nagar. The physical survey involved daily visits to these settlements, the preparation of measured drawings of selected locations, accompanied by observational notes and, in most cases, photographs. This raw material was later analyzed, redrafted and assembled into its present form. This work was done at the Vastu-Shilpa Foundation, in Ahmedabad, and at the...
1. House Extensions

There exists, in slum housing, a complex hierarchy of what we have called house extensions: spaces in front of the home that are nominally part of the public realm, but that have acquired a private character through use, and through various physical modifications.

The simplest, and smallest, of these extensions is the stoop, often no more than an enlarged step, made out of beaten earth, stone or concrete. The stoop is usually less than in wide, and is used as a step, as a seat, or as a workbench.

The size of the stoop is usually constrained by the width of the street, or the type of traffic on it. When the street is wider, or when there is very little traffic, the extension may be enlarged to leave the minimal required circulation area in the center of the street. The most common form of this kind of extension is the platform, up to 20 deep. The change of level clearly demarcates the private area, controls traffic, and is inexpensive to build. It can accommodate a wide range of activities, including food preparation and cooking, grain drying, and certain types of household work. The platform can also be used as a sleeping space, both during the day, and at night.

1. HOUSE EXTENSIONS
2. WORKPLACES
3. SMALL SHOPS
4. TREES
5. PUBLIC STRUCTURES
6. VEHICLES
7. ACCESS STREETS

House Extensions take different forms, and represent a mediating zone between the house and the street. Another kind of space is the Workplace. A wide range of commercial activities take place in and around the house, and require different sorts and sizes of space. Related to income-generation, likewise, are Small Shops, booths and kiosks, frequently a part of the dwelling or attached to it.

Streets and other public spaces are greatly influenced by the presence of Trees, which have physical, social and sometimes religious significance. Streets are also marked by the presence of Public Structures such as public water taps, temples and plinths. A separate section of this study has been devoted to the Vehicles that circulate in low-income urban settlements.

Finally, we have studied the widths and character of the Streets themselves.

The Vastu-Shilpa Foundation of Ahmedabad has been a close collaborator in this work. We would like to express our appreciation to Prof. S.V. Boshki, its director, for his inspiration, and for his assistance in matters great and small; also his able collaborators, especially Himanshu Parish. We would also like to acknowledge the financial support of the Special Programs Branch of the Institutional Cooperation and Development Services Division of the Canadian International Development Agency (CIDB) which has supported a larger project of which this study is a part. The Indore Development Authority was extremely helpful in providing information, advice and documentation, especially Mr. M.G. Bhatti, Chief Town Planner and Messrs Jape and Karandikar.

We would like to thank Mr. Alain Bertaud, of the World Bank, for his stimulating advice and suggestions.

Mitoid Kobylnsky, Director Centre for Minimum Cost Housing Montreal

A further elaboration of the porch is the outdoor room, a roofed platform which achieves a greater measure of privacy through the use of walls on one or two sides. The outdoor room can accommodate some fairly private activities such as washing.

Large extensions, which could qualify as yards, were less common in the dense slums we visited. Where yards do exist, they are used for gardening and keeping animals.

Why do people build house extensions? Plots are extremely small, and many activities cannot be accommodated inside the house. The porch or platform is a feature of Indian rural housing that people understand, and which is easily integrated into everyday life. The public nature of this part of the house allows a greater contact with street-life. And, of course, platforms and porches are inexpensive.
STONE SEAT (left)
This is an example of the simplicity of the form and arched extensions that extensions can have. A stone slab, 25cm wide, once above grade serves as a place to sit. It is also used to dry utensils and allows storage underneath.

TWO-LEVEL EXTENSION (above)
This is an example of an extension which gains more living space. The extensions occur at both the ground floor and on the upper floor. The cow dung platform at grade has reduced the effective street width to about 16m. The upper extension is constructed of stone pavers set on a wood framework, supported from underneath by wood posts.

PRIVATE-PUBLIC EXTENSION (above)
This slightly raised platform is paved with stones; one corner is used as a wash place. At the front a clothes line is stretched between two wooden posts that will eventually support horizontal wooden elements to carry the roof. It will be a few years, according to the occupants, before this improvement will take place.

TWO-LEVEL EXTENSION (top-right)
An extension in two halves: a wash place and a water cistern at the lower level and an outdoor living and sleeping area at slightly higher level. The open drain runs along the full length of the extension and is covered with a stone slab in the front of the house entrance. The slab serves as a step to the platform, a simple and direct design solution.

RAISED PLATFORM (above)
A tree-protected platform that is used as an extension. The section closer to the house is used to store firewood and as a washplace, and is lower than the platform around tree. This extension platform is accessible from either side of the tree. The outer edge of the platform is used by passersby on the street as a seat.
**Location Plan**

**Plan and Sections: A small extension (K.K. Bhatta)**

**SMALL EXTENSION (above):**
A cow-dung floor and a tin roof supported by bamboo make up this simple extension. A low foot high parapet demarcates its limit. The roof covers an area of almost 200 sq ft, which is large enough for storage of a bicycle and for other activities.

**SMALL WASHPASTE (above):**
This is a modest extension, with a small wash place (300 x 200 cm) covered with stones, and the other section raised approximately 20 cm off the ground and covered with cement plaster. The extension is partially covered with inclined wooden supports that are embedded in the ground and carry heavy members which in turn are used to support metal sheets. The partial cover provides rain and sun protection. It is worth noting how the open drain is diverted to increase the stable work space.

**IMPROVED EXTENSION (below):**
A small extension with a wash place that is inclined leaving the rest of the space to be used for sitting or reclining. The extension is not wide enough to accommodate the full length of the bed and the occupants have placed bricks under two legs of the bed. During the survey it was observed that users need approximately 24 wide extensions to accommodate the full length of a bed, a standard piece of furniture, and frequently the only furnishing, in low-income Indian homes.

**WASHPASTE-SITTING (above):**
A raised platform that functions as an extension as well as a transition space. It is considered to be a part of the "pucca" (permanent) house and the lower planks to convert this into a half covered and enclosed room.
A series of extensions on a dead-end street has produced a very rich character. Originally the wide, public right-of-way is reduced to about 2.5m and even this is used as a place of work.
**OUTDOOR ROOMS**

**FREE-EXTENSION (above)**
Here is an example of how trees become part of the dwelling space. It is common to see extensions built around trees and the tree used to support the roof of the extension and even the house itself. In this example the tree also supports a clothes-line. The density is inferred by the plan and section indicating the road width and the extension of the neighboring dwelling. Being about 2.4m wide, the road facilitates communication and social contact.

**MULTI-FUNCTION EXTENSION (right)**
There are many activities accommodated under the roof of this extension including cooking, bathing, utensil cleaning, water storage under the water tap, extra beds and bicycles. A wide variety of building materials have been used, including stone, mud, tin, wood and a mud-plaster (kind of wattle & daub).

**TWO EXTENSIONS (above)**
Two extensions are located in this courtyard and are of a simple nature with a roofed bench for sitting. One for the roof and stone for the bench, which is supported on bricks, are the simple materials used. A stone basin allows access for washing water, washing and clothes washing.

**GROUP EXTENSIONS (left)**
A set of extensions, these extensions vary in depth from 1.6m to 2.4m and are stretched across the entire width of the dwelling which they service. Compared to the depth of these extensions the road width varies between 2.7m to 3.0m which indicates that the outdoor living areas are more important to the user than the public right-of-way. This is also made possible since the traffic on these roads is limited to smaller vehicles such as rickshaws, scooters and bicycles. The dwelling units in these settlements are extremely small, and that is one more reason that the outdoor living places are important and prominent.
DECORATED EXTENSION (above)

The extension at this dwelling has been elaborately "landscape." The owner had a stable job in a nearby industry and also appeared to be a "gada" (sage landlord). This is a large, low mounded extension with many decorative plants as a border to the area and its own place of worship (not the god Shiva). One room of the dwelling unit has been rented out along with an accompanying area of the extension. The main area of the extension is "zoned." A semi-public area exists near the road where members of the community come to worship at the shrine. The second "zone" is the open courtyard and the third is a private area at the doorstep of the dwelling where the women sit to clean grain and wash utensils. In this private zone is also a well place.

EXTENSIONS (below-opposite)

This group of dwelling units is located on a road sloping down towards the river. The land here has erosion and water runoff problems requiring the dwellings to be built on pilings as indicated in the section drawing. The road remains muddy because of the water runoff from the neighborhood. The dwellings and their extensions have maintained a rural character with their fences, animals and activities. Boats are kept in under a roofed area. The activities taking place in these extensions include bathing, clothes drying, cleaning grain, washing utensils, and cooking. Note that some carpentry work is being done as the owner is constructing an addition to his dwelling.
2. Work Places

It has long been known that slums are not only places for living, but also places for working. The popular term "informal sector" precisely describes this phenomenon. Just as the urban poor take into their own hands the provision of inexpensive, appropriate shelter, so also do they participate in economic activities whose importance, and complexity, has only recently been recognized.

These economic activities take many forms. Some of them are, in effect, service industries serving the slums directly. Inexpensive, usually recycled, construction materials and building components are produced for immediate, local consumption. Carpentry, metalwork, and certain food processing fall into this category.

Another category of work activities involves producing items, such as fabricating brooms, animal harnesses and cigarette-making, for the broader urban market. In many cases raw materials are purchased in the city, and reprocessed into sellable items. Often a complex chain of sub-processors and retailers are involved. The raw material for making sandal-soles—tire treads—are bought from suppliers who first strip and separate the treads from the tire walls. People who sort garbage collect the scrap from throughout the city, sort it, and then sell it to specialized jobbers, who in turn sell it to scrap merchants.

There are also many work activities which qualify as cottage industries, that is, the raw materials are provided by entrepreneurs, who purchase the finished product from the slum worker. Kitchen utensils, in rough, unfinished form, are filed and polished in the slum, and returned to the hardware merchant. Clothes are assembled from pieces provided by jobbers.

Our visits to the two Indore slums demonstrated not only the variety and complexity of the types of work involved, but also the variety of spatial requirements that the different work activities demanded. They varied from as small as 2 square meters, in the case of paper-bracelets, to as much as 30 square meters for the repair and refurbishment of wooden crates. Some of the activities needed shelter, others did not. Most required not only a work space, but also a space for storing either raw materials or finished products, or both.

Slum work-places are characterized by simple hand-tools and primitive, although by no means crude, techniques. Most of the work activities require neither water nor electricity. As a result, the work-place is often mobile, moving easily in and out of the house, and not requiring a fixed enclosure. In most cases the work-place was either directly on the street, or immediately in front of the house, in what we have called house-extensions. This calls attention to the importance of streets and walkways as not just circulation spaces, and socializing spaces, but also as work spaces. Unlike conventional housing, in which work and living are always physically separate, and distinct, low-income urban shelter requires the planner to be sensitive to a much richer mix of family, social and work activities.
Cigarettes (right, below)

This full-time activity involves a minimum of two persons working in an assembly line fashion. The raw materials which include special dry leaves, tobacco and thread for wrapping, are generally given out on a consignment basis by a distributor or retailer. The finished product is then returned to the in exchange for cash. The labor usually consists of one person cutting the leaves using the template and rolling the leaves; the second person then fills the leaves with tobacco. They then tie the ends and tie them with the string. Whether the finished product nor the raw material involves specific storage. Both are stored in baskets and the baskets are piled one on top of another. The work performed can be either inside the home or outside in the street.

Clothes (left, below)

School dresses and other uniforms sold through retailers in the market are made here, mostly by women. It is a cottage industry, since wholesalers supply material (cottons, linens, etc) in pre-cut pieces and collect the finished garments.

Combs (left, above)

All members of the household are involved in making wooden combs, each person working at a specific task in this assembly-line line. The first task involves the rough cutting of each block or wood to be carved. Second is the actual carving of the comb-teeth, and finally the finishing of the comb. These combs are sold to retailers on a contract basis. The job is usually done outside the dwelling unit and occasionally the initial wood cutting, while the rest of the process can be done inside the home. Storage of the raw material depends on the size of the contract. The finished product takes up a little space.

Brooms (right)

The production of hand-made brooms involves the use of dried palm leaves. Brooms are made in various lengths, and different types of brooms can be made using the different parts of the palm leaf. A soft broom can be made from the outer "feathery" part of the leaf. The inner "spine" makes a more rigid broom. Brooms can be fabricated by one person and the working area and storage requirements are very minimal.
CARPENTRY (left, above)
Craftsmen like carpenters, bricklayers, tinsmiths etc can be hired as temporary help. There is a central hiring location in the city (popularly called Kadiya-Makal) where they go to working. Once hired, the craftsman goes to the house or a site where the work is to be carried out. While the work is in progress they are treated almost like a family member and are offered morning tea, lunch and afternoon meals.

Depending upon the type and size of the job the carpenter selects an open space and sets up his temporary work-shop. Most of his tools are carried in a canvas bag. Public open space, especially under a tree is preferred. Sometimes the craftsman is accompanied by an apprentice helper. This carpenter was making doors and windows for an extension for which the owner had collected old window frames and some scrap pieces of wood which was to be converted into new windows.

部分翻译:

匠人（左上方）
像木匠、砖匠、锡匠等都可以聘请为临时帮手。在城市中有一个集中招聘的地方（被称为Kadiya-Makal），他们在那里工作。一旦雇佣，木匠会去到房子或建筑现场。在工作进行期间，他们会被当作家庭成员对待，并提供早茶、午餐和下午茶。

根据工作类型和大小，木匠会选择一个开阔的空间并搭建他的临时工作棚。大多数工具都是装在一个帆布袋里。公共开放空间，尤其是在树下，通常被视为首选。有时木匠会带上一个学徒。这个木匠正在为一个扩建项目制作门窗，他收集了旧的窗框和一些木头碎片，以便将它们改造成新的窗框。
AWNINGS / CRATES

The production of these canvas awnings is performed on a contract basis with at least three persons doing the work; one person doing the stitching and two persons assisting. A very large floor area is required and the work is usually done outside the dwelling unit, except of course during the rainy season when it would have to be done inside, or at least under a roofed area. A long and narrow space approximately 3x wide and 9-10' long is required.

For reasons of security, the storage of raw materials and finished awnings is always inside the dwelling unit. Since the canvas is expensive, it is purchased from the advance that is paid by the buyer.

WOODEN CRATES (right)

This activity involves recycling of old wooden boxes and crates collected around the city. For most of the boxes either the wooden parts are missing or if they are made from plywood their corners are damaged and need reinforcing. A carpenter using a Crowbar, a hammer, a saw and nails repairs these boxes. The storage of old and repaired boxes takes up a lot of space since each box is at least half a cubic meter in volume. As some of these containers can be nested, they are stacked one on top of another. An open work area is more suited for this activity, at least a 5x5 space is needed for this activity.

UTENSILS / BASKETS

Plan & Section: Finishing kitchen utensils (K.K.Bhatta)

Plan & Elevations: Making awnings (K.Todar)

Plan & Elevations: Repairing wooden crates (K.Todar)

Plan & Elevations: Basket-making (K.K.Bhatta)

This is a small workshop that produces a wide variety of utensils and baskets. The production process involves multiple steps including cutting, bending, and shaping. Various materials such as bamboo, reeds, and grasses are used to create the finished products. The finished items are then reinforced with metal strips and polished using a buffing machine. The entire process is labor-intensive and requires a team of skilled artisans. The finished utensils are stored in large wicker baskets and displayed for sale.
**Bread/Metalwork**

This activity involves the fabrication, repair and sharpening of various tools. These artisans recycle steel, implement repair tools or "whistle-you-want." The material required for this job includes steel scrap, coal and wood for the fire, a hand-operated air blower to fan the fire, and various other hand-tools. The basic fabrication job entails heating the iron in the fire (a woman or child will usually operate the blower); the iron is then passed to the next person who will hammer the metal into the desired shape and complete the tempering process by immersing the iron in the nearby basin of water. This is a specialized job at which migrants from Rajasthan are considered expert.

**Bread-Making**

Bread is thin rolled bread that is sun-dried and keeps for a long time. It is either based on an open fire or deep fried immediately before eating. It is made from either black bean or tung bean flour mixed with spices. This activity is carried out during the summer by women from within a neighborhood working as a group. On a hot summer day a large quantity of these breads are hand-rolled with the help of a rolling pin on small wooden boards, children helping to carry and spread the breads to be sun-dried. The work place is an area under a sun shade which could be the front porch of a house, or a place in the sun where beds covered with old sarees are kept. This activity does not demand any special training therefore many women do this work during the summer as an additional source of revenue. Social organizations also promote this activity, for example Gandhinagar cooperative store buy their supply of bread and other such items from marginal settlements. The storage of ready bread is in a container approximately 30cm in diameter with an air-light lid.

**Sandals/Garbage**

Old consumable tires and inner tubes are converted into components for making sandals. First the walls of old tires are cut away from the tread; since the walls are thinner than the treads they are better suited to making soles. The treads are further cut into thinner layers before being made into soles. It is possible to get three or four layers from each tread. The treads are cut using a special knife, and the layers or rubber are separated using large pliers. This activity usually involves two persons. Using a standard set of templates, holes are cut from the prepared rubber. This strips about 10mm wide are cut from inner tubes and are used to make sandal straps. The lighter work is usually done by women and older people, while the more onerous stripping of treads is done by men. Small nails, ice lumps are used to attach the inner tube strips to the soles. The storage of ready sandals is not difficult since they are stacked one on top of another in a corner of the house, before being taken to the retailer; the old treads are kept in the open and are piled five to six high.
**ROPE-MAKING**

Rope-making, like clothes-making, in a cottage industry. Cotton fibers or synthetic filaments are used. Long open spaces are required since the unit length of rope is about 30m and they are planted in their full length. Open spaces under trees and the verges of roads lined with trees are used to carry out this activity. A pair of wooden stands placed at either end are used to plant the fibers into a rope. There is usually an adult at one end and maybe a couple of children at the other. The storage of finished ropes does not require much space—generally they are hung up on a wooden support, inside the house, and turned over to retailers a number at a time.

### Table: Work Space

<table>
<thead>
<tr>
<th>Activity</th>
<th>Total Area M²</th>
<th>Work Space Shape</th>
<th>Type</th>
<th>Storage Area M²</th>
<th>Type</th>
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<th>Energy Req'd</th>
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3. Small Shops

As we discuss in Chapter 2: Work Places, informal sector housing is characterized by the integration of work and living activities in a way that is quite different from what is found in conventional modern housing, although similar to "traditional" neighborhoods in developing country towns and cities, and, incidentally, to older districts in European towns. A similar situation exists with regard to small shops, which are interspersed next to, among and within houses.

Small neighborhood shops exist in addition to formal markets or more public shopping-streets. They are usually distinguished by their extremely small size, the nature of their commerce, which is exclusively oriented to local needs, and their intimate proximity to the home.

The location of small shops follows sound commercial principles, that is, they tend to be located where there is the greatest exposure to passersby. As in so many parts of our study, this can be expressed as a hierarchy along main streets, around squares and open spaces, at street corners, and, least desirably, along smaller streets.

There are two distinct type of small shops: first, those that are adjacent to, but independent of, the living unit. These are usually larger, such as repair shops, or located on main streets. Secondly, and more commonly, are small shops which simply occupy the front room, or house extension, of the home. In many cases, "shop" area and "living" area are overlapped, the one giving way to the other, as the need arises. In such cases, the family is able to undertake commercial activity with the smallest investment on its own premises, always assuming that the house location is acceptable.

In addition to permanent small shops, there are also mobile shops--carts and movable kiosks--that are operated by hawkers and peddlers. The distinction between mobile and fixed shops can be blurred, since frequently the first stage of establishing a permanent shop is simply to park a pushcart in one location, and eventually to upgrade it into a semi-permanent structure.

Like small-scale workplaces, small shops are an important income generator in informal sector housing. They also distribute goods that are economically attuned to local resources and needs. This is especially true of repair-shops (bicycles, tin smiths), which provide a much-needed service. In the case of tea-shops, they function as neighborhood meeting places and informal social centers.

A close examination of small shops in marginal housing helps to explain why the "commercial centers" and "markets" that are planned for sites and services projects frequently stand empty and unused. Not only is the concept of centralized shopping inappropriate to the living patterns found in informal sector housing, it also fails to provide the economic and social benefits of "living-over-the-store."
Two Entrepreneurs

Two sisters have set up this street corner shop using their house extension. One sells homemade rice rolls and the other fruits; a ground cover made from old jute bags and a bamboo basket are the only items required to operate this small shop. Children from the neighborhood using the tree place opposite this shop are often customers here.

Small Vegetable Stand (Left, Above)

This vegetable stand has been set up as a part of a small extension. This stand is not open all day—it stays open only for few hours during morning and evening. Only a limited variety of vegetables is sold here. One key item are herbs like chilies, curry leaves and coriander, used as a seasoning in lentil and vegetable curries.

Small Candy Shop (Right, Below)

This is a typical small convenience-type store, that was observed throughout these settlements. It carries items such as sweets, biscuits, and other small edible items for children. It also sells essential household items such as packets of tea, sugar, match boxes, cigarettes and candies (which are often needed at short notice). These shops can be an integral part of the house or may be situated in the extension. Here it has been set up in a converted pushcart.
VEGETABLE STAND (right)

A vegetable and fruit stand at a street corner, which is part of a house extension. A canvas cover protect the merchandise from the sun. Without refrigeration it is difficult to keep fresh produce for an extended time therefore green vegetables and herbs are purchased daily. Those who cannot go to the main market every day, buy vegetables from these shops or from pushcart vendors. It is a common practice to go to the main vegetable market once a week for root vegetables like potato, onions and yams, which can be easily stored. The vendors and small stand keepers buy their supplies from the market the day before in the morning and bring the produce to the community to sell it during the day. In this particular shop, family members take turns looking after the shop.

VEGETABLE STAND (right)

This stand is located at a street corner under a large tree; a platform is being built here to make a more permanent shop. The owner uses his pushcart to transport his supplies, and at the same time uses it as a part of the stand.

GROCERIES (left)

A corner room off the front porch has been converted to a shop, and although the room size is limited a well-organized shelving system provides good storage capacity. Large and heavy items are kept at the lower level, and small and biscuits are kept in transparent glass jars at eye level to attract young customers. A weight-balance is hung on the front as a part of the sales counter. An electric ceiling fan cools the shopkeeper.

GROCERIES (left)

A typical grocery store—dry food items are sold here. Residents in this community do not have enough money to buy their annual supplies of grains and dried food (a common practice among middle class families), and they see these outlets. These stores occur at major street intersections.
BROCHERIES (left)
This extension has been converted to a small shop using wooden shelves; the remaining space is still used as a house extension. During hot summer afternoons when the flow of customers is slow the owner uses the extension to rest at the same time keeping an eye on the shop front.

BICYCLE SHOP (right)
Bicycles are the most popular vehicle used for local transportation in India. A large portion of the population own bicycles but those who cannot afford to buy, rent them on an hourly or a daily basis. Bicycle repair shops are quite frequent in K.C.Bhatta there are several. Because they service a small community group, the customers are known to the shop owners and chances of bicycle theft are few. The owners are experts at repairing bicycles and puncture can be fixed within half an hour and most repairs are done while the customer waits. At times, a bicycle shop is combined with a tea stall to serve the customers better and of course, to increase the revenue. Bicycle shops usually start as mobile shops, using a covered push cart, and slowly get converted to a more permanent form. This particular shop uses a canvas awning as a sun protection.

TEA STALL (left)
Tea is the most popular beverage in India. It is common to drink it three or four times a day, and it is a routine practice to invite friends out for a cup of tea, generally at a tea stall. Tea stalls are at major street intersections, as in this example, or near public structures like temples or markets. Stalls usually provide a few wooden benches. They also have delivery service, young children (usually under the legal working age) carry out this service.
Milk-Booth (left)

This is the only milk-booth in K.K. Bhatta. It is centrally located next to an open play field. The booth is made using a wooden frame that is enclosed with steel sheets. A company delivery truck brings the supply for further distribution and people line up in the front of the booth to buy milk. The truck needs a wider circulation space therefore the booth is located on the widest road or in this settlement. In hot climates it is difficult to preserve milk for a long time without refrigeration, and, since in India refrigerators are expensive people buy their milk supply twice a day. Generally, the milk delivery is once in the morning around five or six and another one in the after noon around four.

Laundry (left)

The front yard is being used as a work place for an ironing table, and the wall serves to stretch a canvas lean-to roof. Clothes are collected and taken to the river or a main washing place in the city once cleaned and dried in the sun, they are brought back to this shop and ironed. All the clothes are collected and delivered to the customers at home. This personalized service makes it possible to run a business of this nature without a large investment in physical plant.
LARGE TREE PLACE

A narrow passageway off a principal street leads into the public square (see above), and becomes a dead end. As a result, the square acquires a private character. A large papal tree located centrally provides the focus of the square, and is likely to have established the limits for the arrangement of the buildings around it.

The tree provides shade all year round, and also serves as a central support to which clothes lines and rope supporting ou-rropes are attached. A mud-brick stepped platform has been built around the tree. It serves as a sitting and resting place for the people who live around the square, and is also used by passers-by and humans. Internally, the villages of the community can be seen sitting on the platform, which also serves as a kind of stage during religious activities such as weddings, birthdays, festivals and other religious ceremonies. The papal tree, like the banana, is also a source of worship, and lends sanctity, as well as shade, to this place.

The houses which face edges to the space all open and extend towards the square in different ways. Some have plazas of their own, and overhang, others simply use the space as an extension for domestic activities. The activities that take place in these house extensions are of a more private nature than those in the center of the square. They include various household chores such as cooking, drying food and clothes. People sit and recline in dining and sofa couches.

A few vehicles such as bicycles and motorcycles are able to be found parked against the house walls, where they are safe and secure under their owner's eyes.

Several of the households are self-employed and have set up small manufacturing activities within their homes. These typically consist of making food products, cigarettes, clothing, and carpentry, all of which are carried out in the shade of the large papal tree.
A tree near a corner store in the middle of a community space. This Neem tree has heavy foliage, excellent shade, and good medicinal value; it requires little watering and therefore is found throughout the Indian subcontinent. The tree is skillfully located, placed out of the main circulation path that passes through the open space with a small area that is raised and paved with stones. The raised platform is in the front of the small corner store. All the house extensions face onto the open space with the tree functioning as the focal point and makes this into a pleasant outdoor living space.
A Pipal tree in front of an old well. This is an old and majestic tree, the largest tree in K.J. Shattal, with a small day-care center below. The platform under the tree is used as an outdoor class room and community meeting area. This tree place was used like a village well and gathering place before piped water was introduced; a small two outlet stand pipe now services the houses and the well is filled up, only the remains of it can be seen.
(Left) The Gul Mahur (Dalbux regia), which has a wide spread, pleasing appearance and good shade, has been planted on one edge of a public open space. The outdoor community space is used by families as an open living space to carry out daily activities such as washing clothes and utensils, cleaning shoes, combing hair of children, fixing bicycles and other objects, and so on. This tree place functions well because the area is paved with stones and the entrance to the open space within which the tree is planted is narrow enough to make the open area look almost like a private courtyard.

(Right) These two Drumstick trees are planted on marginal land which was difficult to build on because of a steep slope. The slope was filled up and the leveled area is now used as an extension to the house. It is a common practice to plant trees in areas where the construction of dwellings may be difficult. The selection of tree types is also important, most trees are fruit bearing (for example the Drumstick fruit are used for making curry). The other consideration in the selection of the trees is their maturity period—fast growing trees that can bear fruits within a year are preferred.
Fruit-bearing trees are often found alongside streets and alleys but are more common in private yards, since individuals maintain and harvest the produce. Chiku, mango, robe and Indian almond are large trees and should be planted in relatively spacious gardens. They are started as grafts and need good drainage as well as regular watering. They start bearing fruits in about three years and are excellent shade trees. The Drumstick is a medium-sized tree which is common in the settlements we visited. Its fruits and leaves are used in preparing curry and the roots are used as a substitute for horse-radish. It is planted as a large branch cutting and starts bearing fruits in a year or two. Bananas and papayas are small trees that yield fruits in 1 to 3 months; they do not have any foliage on their trunks and prefer large quantities of water. Since they tolerate some salinity they are conveniently planted within private yards, near water drains flowing out from washplaces and kitchens. Coconut palms were also observed in private yards.
<table>
<thead>
<tr>
<th>Common Name</th>
<th>Maturity Period</th>
<th>Height</th>
<th>Spread</th>
<th>Shape</th>
<th>Flowers/fruit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SHADE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BANIAN</td>
<td>20 years</td>
<td>30+</td>
<td>30+</td>
<td>Umbrella</td>
<td>Bright red figs Dec-Jan</td>
</tr>
<tr>
<td>CASURINA</td>
<td>7-8 years</td>
<td>15-35m</td>
<td>12-17m</td>
<td>Conical</td>
<td>Small brown cones</td>
</tr>
<tr>
<td>PONGEESIA</td>
<td>5-8 years</td>
<td>12-17m</td>
<td>12-17m</td>
<td>Flat dome</td>
<td>Small white sprays May-June</td>
</tr>
<tr>
<td>RAGHURAMICOLA</td>
<td>10-15 years</td>
<td>24-35m</td>
<td>3-11m</td>
<td>Irregular</td>
<td>White/yellow flowers Jul-Aug</td>
</tr>
<tr>
<td>PALMAE</td>
<td>10-20 years</td>
<td>10-20m</td>
<td>3-5m</td>
<td>Tall with crown</td>
<td>n/a</td>
</tr>
<tr>
<td>PEPAE</td>
<td>7-12 years</td>
<td>18-25m</td>
<td>12-17m</td>
<td>Irregular</td>
<td>n/a</td>
</tr>
<tr>
<td>RAIN TREE</td>
<td>0-7 years</td>
<td>20-25m</td>
<td>10-15m</td>
<td>Umbrella</td>
<td>Pink puffy flowers Mar-May &amp; Dec-Jan</td>
</tr>
<tr>
<td><strong>FLOWERING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASOKA</td>
<td>5-6 years</td>
<td>5-10m</td>
<td>5-10m</td>
<td>Conical</td>
<td>Red clusters Dec-Jan</td>
</tr>
<tr>
<td>COPPER POD</td>
<td>6-7 years</td>
<td>20-25m</td>
<td>9-12m</td>
<td>Conical</td>
<td>Yellow flowers May-June &amp; Sept-Oct</td>
</tr>
<tr>
<td>FLAME OF THE FOREST</td>
<td>10-15 years</td>
<td>10-15m</td>
<td>4-9m</td>
<td>Irregular</td>
<td>Orange clusters Jan-Dec</td>
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<tr>
<td>FRANKENSTEIN TREE</td>
<td>4-5 years</td>
<td>3-9m</td>
<td>3-9m</td>
<td>Irregular</td>
<td>White flowers May-June</td>
</tr>
<tr>
<td>SUGAR MALLOW</td>
<td>5-7 years</td>
<td>15-18m</td>
<td>15-18m</td>
<td>Umbrella</td>
<td>Reddish orange butched Feb-May</td>
</tr>
<tr>
<td>HORSERASIA</td>
<td>5-8 years</td>
<td>15-18m</td>
<td>15-18m</td>
<td>Conical/dome</td>
<td>Pink clusters May-June</td>
</tr>
<tr>
<td>INDIAN CORAL</td>
<td>6 years</td>
<td>18-25m</td>
<td>15-15m</td>
<td>Irregular</td>
<td>Large scarlet Feb-May</td>
</tr>
<tr>
<td>KELLYLINGTONIA</td>
<td>5-7 years</td>
<td>10-15m</td>
<td>10-15m</td>
<td>Dome</td>
<td>Small white flowers Apr-Nov &amp; Nov-Dec</td>
</tr>
<tr>
<td>JACARANDA</td>
<td>6-7 years</td>
<td>15-16m</td>
<td>15-16m</td>
<td>Dome</td>
<td>Purple flowers Mar-April</td>
</tr>
<tr>
<td>QUEEN OF SPAIN</td>
<td>5-6 years</td>
<td>15-16m</td>
<td>15-16m</td>
<td>Dome</td>
<td>Purple flowers May-June</td>
</tr>
<tr>
<td>RED FEATHERS</td>
<td>7-8 years</td>
<td>25-35m</td>
<td>15-15m</td>
<td>Irregular</td>
<td>Large red flowers Jan-Feb</td>
</tr>
<tr>
<td>SCHIL CRAB</td>
<td>4-7 years</td>
<td>18-21m</td>
<td>12-15m</td>
<td>Dome</td>
<td>Large orange flowers Mar-April</td>
</tr>
<tr>
<td>VARIEGATED BAHNIA</td>
<td>5-6 years</td>
<td>4-15m</td>
<td>12-15m</td>
<td>Irregular</td>
<td>Purple &amp; white flowers Feb-April</td>
</tr>
</tbody>
</table>

| FRUIT            |                 |        |        |          |                    |
| BANANA           | 1 year          | 3-5m   | 2-5m   | Tall with crown | Fruit almost all year |
| CHERRY           | 5-7 years       | 12-18m | 12-18m | Dome       | Fruit almost all year |
| COCONUT          | 7-12m           | 3-10m  | 3-10m  | Tall with crown | Fruit almost all year |
| DRUMSTICK        | 8-12m           | 15-15m | 15-15m | Irregular | Fruit at end of monsoon |
| INDIAN ALMOND    | 7-8 years       | 20-25m | 9-12m  | Leaved    | Fruit at end of season |
| MANGOSTE          | 5-10 years      | 12-18m | 12-18m | Dome       | Fruit in summer |
| PARKIA           | 1-3 years       | 3-5m   | 2-5m   | Tall with crown | Fruit in winter |

| **TABLE**        |                 |        |        |          |                    |
| GUMMANY          |                 |        |        |          |                    |
| Long needles      | Sand-clay       | Can be ground to make hedge. Tolerates salinity. Hardy tree. |
| KARAVIA          |                 |        |        |          |                    |
| Compound          | Sand-clay       | Tolerates salinity and wetness. Seeds used industrially. |
| Small             | Sand-clay       | Hardy and quick-growing shade tree. Leaves used as mosquito repellent. |
| Long, thin        | Sand-clay       | Slow-growing ornamentals; often started indoors. |
| Compound          | Sand-clay       | Hardy tree that can be propagated by planting seeds and cuttings. |
| Medium pointied   | Sand-clay       | Fast-growing, splendid shade, needs well-drained soil. Fosters growth of lac insects. |
| Compound          | Sand-clay       | Resist the spread of fire. |

| **TABLE**        |                 |        |        |          |                    |
| Leaf shape        | Soil type       | Remarks                          |
| Long drooping     | Loam or clay    | Used medicinally. Considered sacred by Hindus and Buddhists. |
| EVERGREEN        |                 |                                  |
| Compound          | Sandy loam or roty | Hardy and quick-growing; tolerates salinity. Used for furniture-making. |
| PRUNUS           |                 |                                  |
| Compound          | Sandy loam       | Hardy forest tree; slow-growing, sweet-smelling flowers. |
| Compound          | Sandy loam       | Needs little water; leaves for long periods; sweet-smelling flowers. |
| Compound          | Sandy loam       | Prickly and bleeding tree.       |
| Compound          | Sandy loam       | Cattle do not eat the brittle branches of this hardy tree. |
| Compound          | Sandy loam       | A spiky tree which is leaves before and after flowering. |
| Compound          | Loam             | A delicate ornamental tree.      |
| Compound          | Sandy loam       | A fast-growing tree. |
| Compound          | Sandy loam       | Fragrant costal shrub; grows poorly in hot climates. |
| Compound          | Loam             | Needs care and watering; flowers twice a year. |
| Compound          | Loam             | Forest tree for leaves.          |
| Compound          | Loam             | Good for avenues, needs plenty of water. |
| Compound          | Loam             | Delicate tree.                   |
| Compound          | Loam             | Cultivated through root grafts; lasts only two years. |
| Compound          | Loam             | Needs care and water; good shade tree. |
| Compound          | Loam             | Suitable for hot climates; tolerates salinity. Needs plenty of water. |
| Compound          | Loam             | Very fast-growing; fruit cooked and eaten as vegetable. |
| Compound          | Loam             | Attractive tree that tolerates some salinity; very fast-growing. |
| Compound          | Loam             | Good shade tree; many varieties exist. |
| Compound          | Loam             | Bears fruit for about three years; good for kitchen gardens. Very short life. |
5. Public Structures

This examination of public structures in informal sector housing requires some explanation. Traditional housing areas in Indian towns contain temples, sitting platforms, stairs, water fountains, bird-feeders in uniquely Indian construction, described on the following page, arcades, signs and entry gates. These public structures—as opposed to private house extensions—play an important role in establishing neighborhood identity and are important landmarks and visual reference points. They contribute to the rich texture of traditional Indian towns.

The public spaces of most planned low-income shelter projects are characterized by rows of windowed ditches, perhaps street lighting...and that is all. Infrastructure,” in this context, is largely confined to underground services. As a result, these planned housing settlements, however successful the individual houses—and these often exhibit a high degree of ingenuity and imagination—lack many of the environmental qualities that are essential for a successful housing environment. The public spaces are disorienting and lack personal definition. The planning is barrack-like, streets are simply movement spaces, nothing more.

It could be argued that in “basic” shelter, anything more would be a luxury, and would, in any case, not be required by the low-income users. Is this true? We wanted to begin to answer this question by examining the public spaces of informal sector housing for signs of public structures. What we found surprised us. While many of the traditional structures of Indian towns—gates and bird-feeders, for example—were absent, there were other signs of attempts to introduce identity into the public environment.

Those attempts are minimal, true. For one thing, beyond the neighborhood level, there is no “public” authority in these settlements. Whatever is done must be carried out by small groups of individuals, with minimal resources. But this only goes more importance to those public structures that do exist. They indicate the desire, and need, for personalizing and giving identity to the public space.

There is enough evidence, even at this preliminary stage, to convince us that there is nothing luxurious or superfluous about public structures; they are a necessary requirement for successful public spaces.
STAND-PIPE AND BATHROOM (left)

This stand-pipe is located at the widening of a street and therefore seems to function well. To take advantage of the stand-pipe location the occupants of the nearby house have extended the stone paving on the edge of their house and put up an enclosure to create a private bathroom. Note how the curvature of a wooden fence is utilized to stretch a clothes line.

SMALL TEMPLE (left)

This is a Shiva shrine located at a junction of one large and another small street. The shrine is reached from the main street, making it convenient for people to stop for a moment, pay their prayers and move along. The shrine is a part of a domestic extension but it is organized in two distinct halves, one private and other public. The family that lives behind the shrine looks after the upkeep of this structure and collects the small amount of money offered by the worshippers.

SMALL STAND-PIPE (left)

This public water stand-pipe has a small paved area around the supply tap. The paved area has a 30 cm high edge made from stone slabs for protection against vandalism. The stand-pipe is located at a T-junction of two streets. The space required for washing either clothes or utensils is not provided at this stand-pipe, and, as a result, users have placed a few large stone slabs, which also function as drain covers, in front of the tap. The stone edges around the paved area too close to the water tap so it is difficult to accommodate more than a few water containers or buckets in this space.

THREE TEMPLES (left)

This is a small complex of temples located off the street facing a stream. The land which slopes down towards the water's edge is used as a play area and is lined with three trees. Each temple has a raised platform although only two platforms at the front edge of the plot are large enough to be used as public seats. The largest platform has vertical concrete supports, which permit it to be fitted with a roof and to be used as a pavilion. This area is well used by the community and lined by children.
STREET END STAND-PIPE (left)

This stand-pipe is located at the end of a street with a circular wash place around it. The paved area is approximately 2.5m in diameter with another apron of about 50cm around it which makes this facility very comfortable to use; the large diameter of the stone paved area allows placement of lots of buckets and other utensils. The apron is also used for washing clothes and bathing children. This layout works especially well because while the washing activities are going on, users of water do not have to wait in line. The other advantage of this stand-pipe is its location close to the public toilets which means it is easy to carry water to toilets from the tap (today's use water for ablution).

COMMUNITY COMPLEX (above)

This is one of the key public facilities in K.Toda, it has three small temples, one shrine, an exercise area, open sitting areas with platforms and seats, a stand-pipe, a clump of trees and a gateway. This facility is located along a stream, and although it is polluted it does provide a good view. Raised platforms and lots of trees make this a pleasant place to relax or to carry out outdoor activities. Families from the neighborhood use this area extensively. Trees here are newly planted and once they mature this area will be greatly improved.
SHIVA TEMPLE AND PIPAL TREE (left)

This is a pleasant little square with a pipal tree that has a raised stone paved platform. The platform is high enough so that it is difficult to use it as a sexual seat. On one side of the platform is an icon of Shiva with an earthen water container hung on top of it. Worshippers climb up on the platform using a small step at the other end of the platform. The space in the front of the icon is kept open and a bell is hung from the tree. The tree gives plenty of shade on a hot afternoon, and it was observed that people took advantage of it for sleeping; one craftsman had set up a temporary watch repair shop on one corner of the platform.

RAISED STAND-PIPE (left)

This is a standard stand-pipe with two outlets and a 24 x 10 raised wash area. The stand-pipe is elevated above the road level and the surrounding area is covered with old pieces of stones to facilitate the drainage of water. The level is raised high enough to make the stand-pipe an integral part of a house extension.

STAND-PIPE IN A SQUARE (below)

An ideal location for a stand-pipe within a square in a cluster of few houses. The washing-related functions blend well with other activities of the square. Besides the stand-pipe there are two trees in the space both with raised platforms creating a village square like atmosphere. Tree trunks are also used to stretch clotheslines—the colorful clothes adding a special character to this place. Unfortunately the stand-pipe does not have proper drainage otherwise the surrounding area gets flooded—a seal drain connection to the open channel could solve this problem.
Plan: Community space (A.B. Nagar)

COMMUNITY SPACE (above)
Here is a series of extensions near the main entrance to F.B. Nagar...
6. Vehicles

Automobile traffic in slums and squatter settlements is, naturally enough, extremely limited. The urban poor do not own cars, they cannot afford taxis, nor are they served by conventional delivery vehicles or buses. Ambulances, private cars or trucks are rare. This does not mean, however, that there is no vehicular traffic. If anything, there is a greater variety of vehicles in slums than in conventional housing.

The smallest vehicles include bicycles, rickshaws, motor scooters and motorcycles. They are used for personal transportation: all the more important since the slum is usually some distance from the city. They require small clearances—less than 1 meter—and can be maneuvered almost anywhere. All of these vehicles, even bicycles, represent a large investment, and are highly valued. They are usually stored within the home.

A second type of vehicle found in slums is those that are used by the inhabitants for income generation. These include pushcarts, pullcarts, bicycle rickshaws, motorized rickshaws and motorcycle-powered three-wheelers. Motorized rickshaws, especially, are the most common type of mass transit system, and can be found in all parts of the slum. These vehicles, although highly maneuverable, require greater clearances—they are between 1.2 and 1.5 meters wide—and, except for pushcarts, they are relatively heavy.

In addition to being owned by slum dwellers, these vehicles are used to make deliveries, or for personal transportation. Pushcarts are also used by hawkers and vendors who sell various types of household items and foodstuffs in the slum.

Another, larger type of vehicle is the animal-drawn cart. These are used to move heavy materials, and to transport goods from rural areas to the city. They require similar clearances to automobiles, although they can usually be driven over rougher roads.

Parking is a makeshift affair. Only the smallest vehicles can be stored inside houses, or in porches. The rest are simply left in the street, as close to the house as possible.
Push carts are the most commonly observed vehicles used for transporting goods, materials, medium size loads in popular settlements. They are also used as mobile shops. The top surface of the cart is made of wood. It is supported on a pair of crude metal springs attached to a set of standard bicycle wheels. Push carts are used by vendors selling fruits or vegetables, scrap and junk dealers, and other hawkers who go from door to door. Push carts are also used as small shops. In such cases, they have a sheet metal enclosure added to the first floor structure; bicycle repair shops, food stalls, pan shops are such examples. When they find an appropriate street corner or a public meeting place, they shed their wheels and springings and slowly develop foundations and solid walls to transform them into permanent shops. To transport materials on this cart or to push the mobile shops around, only one person can do the job.

These vehicles are approximately 1.2m wide × 2.5m long and can be easily moved through narrow spaces.
**Bicycles**

Bicycles are the most popular mode of personal transport in India as well as in many developing countries. Since the country is not hilly and bicycles are at times used to carry more than one person as well as the household goods the model that is most popular in India has slightly fatter tires and a stronger frame compared to touring models. They cost between Rs. 400 - 800 (US$ 40-80) and are sold by retailers. It is also possible to rent them from bicycle repair shops on an hourly basis. Repair and rental shops are usually located at the intersection of major streets.

**Cycle Rickshaws**

Cycle rickshaws are manufactured locally in small shops using standard bicycle frames and other locally-available materials. They are driven by a person in the front and have a seat with a cover for protection from the sun and rain for two people at the back. Most of these rickshaws run for short distances, up to 3 km, and are hired on a trip basis. They are used for taking children to school and transporting household goods. One can tie tarpaulin near markets, shopping areas, and bus or railway stations. Different versions of bicycle rickshaws are used as mobile shops to sell items like ice-cream, textiles, and groceries or to carry light loads.

**Pull Carts**

Pull carts are used to transport heavy loads. They are pulled by either one or two animals. They are found primarily in rural areas. Depending on their size, bullock carts can be pulled by either one or two animals. They are found primarily in rural areas. Since rural roads do not have adequate clearance the carts have wooden wheels with heavy wooden spokes and a steel rim. More recently, carts with recycled automobile wheels and pneumatic tires have become popular. Carts are used to transport goods from rural to urban areas, in the urban areas they are used for moving heavy items such as building materials and large furniture.

**Bullock Cart**

Bullock carts are becoming very popular in urban areas for transporting very heavy loads. The flat bed of the cart is made of wooden planks and four recycled automobile wheels. Old wheels are not found new rails are made and old tires and tubes are put on them.

**Horse Cart**

Horse carts are usually crafted out of wood. Because of their light weight, these wooden carts can carry four passengers plus the driver with only one animal pulling. These carriages are being replaced rapidly by auto-rickshaws.
Scooters and auto-rickshaws are common in many parts of the world, especially in urban areas. They are designed to be compact and efficient, making them ideal for navigating crowded streets and narrow alleys. Scooters, or motorcycles, are often preferred for their speed and maneuverability, while auto-rickshaws offer more space and can accommodate passengers or cargo.

Auto-rickshaws use the front of a scooter as a power unit, with the rear wheel replaced by a carriage or box with two wheels. A driver sits at the front of the auto-rickshaw and the rear box accommodates up to three persons. The passenger compartment is made of steel tubes and is fabricated in small workshop. Auto-rickshaws are extremely fuel-efficient and give more than 50 miles per liter. Besides the passenger transport model, these rickshaws are available in different versions to carry other materials and supplies.

These vehicles are small enough to negotiate almost any narrow street or alleyway—their turning radius is just under 2.5m. Auto-rickshaws are the most commonly used mode of transport in large urban centers. They are equipped with meters and operate as a regular taxi service.

Scooters are another popular choice, especially among those who cannot afford a car. They are compact and easy to park, making them ideal for navigating busy streets. Scooters are also a popular choice for short-distance travel within cities.

A variety of vehicles are parked outside a shop that repairs bicycles. Pushcarts and auto-rickshaws also come here for repairs. The bicycles belong to the shop and are for hire.

The "Tattoo" is a larger, diesel-powered version of the auto-rickshaw that is capable of carrying larger and heavier cargo. With two parallel benches in the rear, it can carry up to ten passengers, with two additional riders at the front next to the driver. "Tattoos" are used like buses in the city, and run on fixed routes between railway stations, bus stops, markets, and so on. They are also used to transport goods from one part of the city to another.
7. Access Streets

Standards for the widths of streets vary considerably from place to place, but in most developing countries they are historically related to European codes. Many critics have pointed out that the standards of transplanted British garden suburbs are not appropriate in the context of Indian towns, where climate, types of vehicles and population densities are different.

The general observation is often made that streets in planned housing areas tend to be extremely wide, considering the size and frequency of wheeled vehicular traffic. In planned low-income settlements, where plot areas can be as small as 25 square meters, wide access streets can result in disproportionately large portions of the site being used for circulation, as compared to plots, with consequent higher land development costs.

We were interested to see if we would discover more realistic, indigenous street standards, in the informal sector settlements that we visited. Are circulation areas minimized? Does one find extremely narrow streets, compared to conventional norms? Or is circulation simply reduced to an absolute minimum?

Some should not imagine, however, that the widths of streets in informal sector housing settlements are simply minimized. If they were, slums would consist primarily of extremely narrow lanes; that is not the case. The largest number of the access streets (in linear terms), are not the lanes, as one might have expected, but rather the Narrow Streets. This reflects the large amount of social, work and domestic activity that takes place in the street, and the need for streets wide enough to accommodate them. However, in the newer, less-established slums, it is the wider Main Streets that predominate. This suggests that larger standards are established in the early life of the settlement, and that streets become narrower as house extensions grow larger.

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NARROW ALLEY (left)

This narrow alley has an average width between one half and one meter. It provides access to a series of one-room dwellings and is also used as a long open verandah. Since only one side of the lane has houses facing onto it, the other side consists of the backs of another row; thus this alley functions as an extension. The daily activities that occur in house extensions, such as washing, cooking, and so on, also take place here.

NARROW STREET (right)

This street has a uniform width of 1.75 m. The plaintiffs extensions in front of each dwelling form a continuous band of seats with varying heights. The street is narrow enough so that people sitting on either side can talk. This public sitting area has given the street the character of an outdoor room. Old karvars (multi-dwelling compound) resemble a large courtyard observed in Old Delhi. These have a similar character.

DEAD END STREET (above)

Dead end streets are used extensively for outdoor activities. In this case, the street width reduces towards the dead end, which is used by the last dwelling to create an extra large house extension. Traditional housing uses a similar pattern of cul-de-sacs, which are popularly known as bahollas or pods.
TYPICAL STREET WIDTHS (above)

In general, housing does not have very wide streets. Typical widths vary between 2m and 3m. The above examples, all from Kulkarni Bhatta, show three types of public right of way. Roads up to 3m wide, narrow streets up to 3m wide and main streets, which are wider than 3m. It was observed that invariably, these streets are narrower compared to streets in planned developments, but nevertheless serve to function well.

Using the nine street categories (Lanes, Narrow Street, Main Streets) five different settlements were analyzed: three from before and two from Ahmedabad. The findings are tabulated in the following pages.
<table>
<thead>
<tr>
<th>TYPE OF STREET</th>
<th>WIDTH</th>
<th>VEHICLES</th>
<th>USE</th>
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<tbody>
<tr>
<td>ALLEY</td>
<td>K300x1500</td>
<td>Pedestrian, Animals, Bicycles, Motorcycles</td>
<td>Residential</td>
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<tr>
<td>NARROW LANE</td>
<td>K1500-3000</td>
<td>Cycle rickshaws, Pull carts, Push carts, Animal carts, Auto-rickshaw, Diesel Auto-rickshaw</td>
<td>Residential, Temporary Commercial</td>
</tr>
<tr>
<td>MAIN STREET</td>
<td>K3000-over</td>
<td>Pedestrians, All vehicles</td>
<td>Residential, Permanent Commercial</td>
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</table>

**SITES AND SERVICES**

<table>
<thead>
<tr>
<th>NARROW STREET</th>
<th>K4500</th>
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<tbody>
<tr>
<td>MAIN STREET</td>
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