Spatial and structural principles for settlement-making
## TABLE OF CONTENTS

INTRODUCTION ................................................................. 1

NATURE OF THE GUIDELINES ........................................... 1

PRINCIPLES ................................................................. 1

Structural principles ..................................................... 1

Spatial principles ......................................................... 4

A SYNTHESIS OF THE PRINCIPLES .................................... 4

APPLICATION OF THE PRINCIPLES .................................. 7

Greenfield sites ........................................................... 7

Urban restructuring ....................................................... 7

Upgrading informal settlements ....................................... 8

KEY PLANNING GUIDELINES ............................................. 8

General observations ................................................... 8

The movement network and public transport ..................... 8

The open space system .................................................. 9

Public facilities .......................................................... 9

Public utilities ........................................................... 10

Cross-cutting issues .................................................... 10

Economic services ....................................................... 11

BIBLIOGRAPHY ........................................................... 13
LIST OF FIGURES

Figure 3.1 Reinforcing modes of movement .................................................1
Figure 3.2 Hierarchical concentrations along routes ....................................3
Figure 3.3 A synthesis of principles ..............................................................5
Figure 3.4 The detail of the plan .................................................................6
INTRODUCTION

This chapter focuses on settlements as systems made up of functionally interrelated elements. It builds on Chapter 2 by providing principles important to achieving well-performing settlements, and guidance on how they can be achieved. Chapter 3 can therefore be seen as providing the link between the framework presented in Chapter 2 and the practical guidelines provided in Chapter 5 and those that follow.

NATURE OF THE GUIDELINES

The guidelines are essentially concerned with principle, idea and context.

- “Principle” refers to a set of spatial “rules”, which should be applied in the settlement-making process.
- “Idea” refers to the relationships between elements of structure, which best capture the desired performance qualities in the context of a particular problem.
- “Context” has two dimensions.
  - Time: Time impacts on the technologies which can be applied to, or which have to be accommodated in, the challenge of settlement-making.
  - Place: Place refers to the specifics of the natural, socio-economic and cultural environments.

Context is the catalyst which transforms an idea into design. It makes it possible to develop a variety of different designs, based on the principles and the idea.

In these guidelines principle and idea are addressed, where necessary, by means of generic diagrams, as these are helpful in defining spatial relationships. They do not, however, represent designs. They are a-contextual. In this document the diagrams use geometric conventions, such as the grid and the pin-wheel, to clarify important relationships. It must be stressed, however, that the principles can be expressed in many different forms. It is the principle which is important, not the geometric form.

PRINCIPLES

The principles which are important in achieving well-performing settlements are of a structural and a spatial nature.

Structural principles

The principle of reinforcement

It is necessary to think structurally about all elements within the settlement. This means that each structural element should reinforce the others. This is illustrated in Figure 3.1.

The figure illustrates how interconnected modes of movement (pedestrian, bicycle, train, tax, bus, car) are brought together into a single corridor, thereby creating a range of structural opportunities. At points of major connectivity, where stopping points for all modes come together (marked 1 on the diagram) the potential exists for the creation of a major place with high-order urban activities, as these will tend to gravitate towards such points.

The integration of the elements increases the potential impact to a far greater extent than if they

LEGEND

A. Road-based public transport and private vehicles on high order limited-access routes: bus, taxi and private vehicles.
B. Heavy rail-based public transport: train.
C. Light rail-based and road-based public transport as well as private vehicles: tram, bus, taxi, private vehicles.
1. First order centre. All modes of transportation.
3. Local order centre. Local transportation: taxi, private vehicle, bicycle, walk.

Figure 3.1: Reinforcing modes of movement
were to be considered in isolation. Where two of the non-pedestrian links merge, a major place (marked 2 on the diagram) will also emerge, albeit of lesser intensity than 1. At places of local accessibility (marked 3), however, local order activities, supported mostly by local demand, will cluster.

**The principle of continuity**

**Continuities of green space**

Human society functions in a landscape that consists of the original (or primeval) natural landscape, as well as rural and urban landscapes. Access to all elements can be considered a basic need for human beings. As a result, establishing continuities of green space becomes an important element in the settlement-making process. Apart from fulfilling an important human need, this principle also promotes ecological diversity. Ecological systems are complex, with the migration of species and their exposure to different habitats forming integral components of the systems. Natural habitats should thus be continuous to allow for this to occur. At a larger settlement scale, the promotion and protection of such continuous systems become important planning principles. At a smaller scale of settlement, green spaces in new developments should contribute to emerging continuous green systems.

Two additional points can be made about green space:

- Green space within settlements should be productive space. Green space requires maintenance. If maintenance becomes too expensive or, for any other reason, breaks down, the space becomes environmentally negative. In addition, in many areas, urban agriculture has a vital role to play in the support of urban systems. In this role green space is an important supplementary source of nutrition and income for poorer people.
- Green spaces can absorb outputs from settlements. In this regard they can be used for evaporation ponds to remove partially treated wastewater; and as stormwater-retention systems.

**Continuities of movement**

The movement, or flow, of people, finance, goods and services is the energy network of settlements. Activities requiring the greatest degree of exposure will tend to gravitate towards the most accessible points and links in the energy network. The movement network exhibits its own ordering structure. At the settlement level the energy potential contained in the network is released through stopping, not through movement. Different movement modes have different patterns of stopping. Pedestrians and cars can theoretically stop anywhere along a route, bus stops may be spaced at 500 m to 800 m intervals, and train stations at intervals of 1.5 km to 2 km. Accordingly, these modes establish different rhythms of accessibility. The co-ordination of different modes enables certain points to be strongly reinforced, thus attracting and creating opportunities for the clustering of activities.

By definition, routes which do not allow stopping, such as freeways, have little positive structural impact (as defined in these guidelines) at the local level. They serve as the integrators of space at the inter-settlement level. At the local level of settlement they tend to emphasise points of exit and entry, rather than lines of accessibility. At this level they sever - rather than integrate - space.

The application of the principle of continuity consists of the creation of a complex and diverse pattern of movement and accessibility. This will enable all settlement activities, large and small, formal and informal, to find a place within the structural system. The resultant land-use pattern will be highly synergistic, with each part of the system benefiting - and being benefited by - the other parts.

**Continuity of built form**

New parcels of development should be integrated with existing development to obtain agglomeration economies. There is, however, a scale dimension to this. At places, the continuity should be consciously broken to ensure convenient access to green space as well as the natural and rural landscapes.

**Continuity of public space**

As discussed earlier, public spaces should make up a continuous network of space. Achieving a sense of enclosure and definition is important in this regard. Every building, either through the building itself, its walls, or planting, should contribute to defining the public space it abuts.

**The principle of discontinuity**

In the settlement-making context the principle of discontinuity refers to the promotion of breaks in particular components of the urban system, to achieve particular effects.

**Discontinuities of movement**

Along higher-order routes, discontinuities can be used to create special places, such as public squares.
and parks. The discontinuity principle can also be used to integrate natural and rural areas and existing features into the urban landscape.

Discontinuities of movement on lower-order routes can be used to create qualities of secrecy or privacy, particularly in that through-traffic is discouraged.

**Discontinuities of built form**

Public space, such as a square or a park, can be used as a device to interrupt built form, thereby creating visual diversity in the built environment.

**The principle of externalisation**

Social facilities and higher-order urban activities should not be “embedded” within residential precincts, but should be externalised by locating them along more continuous movement routes.

This will ensure that the future of facilities is not entirely dependent upon the fortunes and resources of particular local communities. It will also maximise the potential return on the investment in facilities, by making the facilities accessible to a wider range of people. In addition, it will reinforce the private quality of the residential areas. Lastly, it will contribute to the establishment of symbiotic relationships between different activities and facilities.

**The principle of concentration along routes**

While intensive activities and facilities should be externalised along continuous routes, it is important to recognise that development along them will not be even. The accessibility of different points along routes is not the same, as there are powerful tendencies for more intensive activities to concentrate at the most accessible points along movement routes. These tendencies are illustrated in Figure 3.2.

**The principle of accommodating sameness and diversity**

This principle relates to accommodating both homogeneity (sameness) and heterogeneity (diversity) in settlements. It is this principle that accommodates both cultural and economic diversity and expression within settlements. It recognises that in a democratic, multicultural, society all communities, individuals and cultures are to be accorded equivalent respect.

This realisation has significant implications as far as the approach to structure and space in the settlement-making process is concerned.

The connection between space and structure lies in the recognition that different activities, cultures, and lifestyles have their own requirements, which must be met in the settlement-making process. As a result, successful settlements are ones that reflect diversity in terms of areas of sameness, areas of diversity or mixed-use development, areas of cultural homogeneity and areas of cultural diversity.

At a fundamental level, the requirements of sameness and diversity relate to variations in the need for privacy and exposure. Certain institutions and public places are more “owned” by particular groups, communities, lifestyles and cultures and are thus more private, while others are more neutral or public in the sense that they serve broader, more diverse, communities. Thus, for example, commercial activities and sport stadiums, when compared to religious activities, are heterogeneous. A mosque, or church, however, is “owned”, by a smaller, more specific set of people.

In the sense that there is an order of homogeneity and heterogeneity in successful settlements, there exists a similar ordering of space, which reflects a transition from more public to more private living.

At the heart of positive settlement-making lies the creation of systems of public spaces which order activities, events and facilities according to their need for exposure or secrecy, and the integration of this system of spaces with the movement system, which, in itself, forms part of the system of public spaces.

In terms of the minimalist approach to planning and design, it is inappropriate to make centralised decisions about everything. Greater freedom, and

![Figure 3.2: Hierarchical concentrations along routes](image-url)
the more complex process of development which results from this, allow many actors to participate in and contribute to the settlement-making process. The result of this approach is settlement-making and planning in the form of a process, a process enabling and involving a diverse range of delivery agents.

**Spatial principles**

There are four spatial principles, which are central to creating positive settlements. These are **definition**, **scale**, **flexibility** and **intensity of space-use**.

**Definition**

In positive environments the public space is defined by buildings and other space-defining elements, such as walls and planting. This creates a sense of enclosure. The contrast is free-standing elements in a formless sea of space.

**Scale**

Scale refers to judgement about relationships such as size, distance and height. In settlement terms, reference is usually made to a “human scale”, which is the scale that human beings feel comfortable with. Although a quality that can be difficult to define, it is one that should be strived for in modest, as well as bold, settlement-making processes.

**Flexibility**

Positive environments reflect flexibility in their spatial structures. The principle of flexibility thus refers to the creation of spatial structures which can accommodate the unexpected demands made upon them over time.

**Intensity of space use**

Land should be used as intensively as possible as this has positive spin-offs for settlement-making. These include:

- the creation of higher levels of support for economic and social goods and services;
- the establishment of an economic climate in which economic activity can thrive;
- the creation of the preconditions for viable public transportation systems;
- the efficient use of infrastructure; and
- the achievement of better utilisation of the land, contributing to compact urban environments, reduced travelling and energy consumption, as well as a reduction in pollution.

Intensification does not imply a standardisation of living conditions, or uniform densities. In the context of the minimalist approach, a choice of living conditions, which is an important objective of settlement-making, is facilitated in a number of ways, such as:

- by encouraging the development of areas of different character throughout the settlement;
- by the presence of contrasts within the structural system, with respect to space that is private and space that is public;
- by the natural development or evolution of a range of urban densities; and
- by an evolution of configurations of plot shapes and sizes, which result in the promotion of different housing types.

**A SYNTHESIS OF THE PRINCIPLES**

A synthesis of the settlement-making principles, discussed in the preceding sections, is depicted in Figures 3.3 and 3.4. The synthesis indicates how the principles can be integrated, thereby establishing a set of locational responses.

Figure 3.3 depicts an intense, mixed-use, but primarily residential area. The area contains a wide range of uses: housing, education and other social facilities, formal and informal economic activity, small-scale manufacturing and small-scale agriculture.

Economic activity, both formal and informal, is linked with the continuous intra-settlement route. It is backed by a belt of schools. These play an integrative role, since they serve pupils from a much wider area. Pupils can access them via public transport along the main road. The library, which serves a number of schools and the community at large, is located on the main road. The informal play space is associated with the schools but also serves the broader community. In order not to disrupt the continuity of building along streets it is located on the periphery.

Opportunities for urban agriculture are created on the periphery of the site. Stormwater runoff is organised so that this area is irrigated. The agricultural area forms part of the storm-water management system.

A small-scale manufacturing hive forms the western edge of the agricultural belt. This is associated with larger scale manufacturing to the west of the site.

All space is designated as social space. A continuous hierarchical system of public spaces organises the location of educational and other public facilities, all of which are externalised.
The residential precinct is primarily organised around a 400 m by 400 m super-block module. There is no one ideal block size, as this will vary with context. The choice of the block and its internal organisation reflects an attempt to optimise efficiencies in terms of pedestrian and vehicular movement. The organising system is one of nesting blocks. At the larger scale, blocks are approximately 200 m by 200 m (although some variation in size is necessitated by the need for space-making), which is efficient in terms of vehicular use. At the smaller scale, the basic block size is 80 m by 80 m, a comfortable scale for pedestrians and one which is found in many cities of the world. The smallest blocks can also be accessed by car, but are chiefly pedestrian.

A hierarchical system of discontinuous routes create varying levels of privacy: there is a wide range of living conditions in terms of publicness and privacy.

The larger movement channels also serve as linear green spaces. They also accommodate vehicular and pedestrian movement and parking, which function as part of the green system.

The plan also shows how a variety of plot sizes and configurations, and thus house types, can be accommodated and how higher densities can be achieved.

Figure 3.4 shows areas A, B and C (indicated in Figure 3.3) in greater detail. Numbers in parenthesis refer to numbering in Figure 3.4.

- The community facilities are externalised (1). There is a pronounced dimension of order in the system, with the largest and most important facilities associated with the highest-order spaces. It is not necessary to predetermine the form of these facilities. Communities can establish their own priorities.

- The educational facilities comprise urban schools. Where possible, they should be atomised (i.e. broken up into parts), with community facilities such as sports fields, halls, libraries, computer centres and laboratories being shared between schools and between school and community (2, 3).

- Informal play spaces associated with the schools are located on the periphery, to maintain the continuity of the built form along streets (2, 3).
• The planted spaces can be used in many ways, including community events and parking (4).

• The main road is made into a space to accommodate parking (5).

• Main market sites for informal trading occur at highly accessible points (6).

• An intensive mixed-used zone, with flats above shops is promoted (7).

• There is a service zone serving the shops (8).

• There are communal gardens for agricultural activity (9).

• Refuse-sorting points are planned. Their location is determined by the main refuse-removal route (10).

• An important forecourt space is located at the end of a discontinuous route (11).

• There are manufacturing hives (12).

• In low-income, informal housing areas, corner sites may be used as communal bath-houses and laundry points (13).

• Elongated planted spaces are shown. These are social places that operate as social extensions of the houses. They are important play spaces for children (14).

Figure 3.4: The detail of the plan
• An important public space gathers to it community facilities and commercial activity. As with 14, in these spaces neither the car nor the pedestrian dominates (15).

• A fine-grained housing precinct which is effectively pedestrian dominated (16).

APPLICATION OF THE PRINCIPLES

The guidelines for settlement-making have been formulated on the basis of principles. In their application to a site, however, they can obviously be captured in many forms and need to be applied on an integrated basis. Some brief notes in this regard are provided below.

At present there are in essence three generic urban conditions prevailing in South Africa. These are greenfield or undeveloped sites, urban restructuring, and the upgrading of informal settlements. In each of these cases the form is different but the application of the principles should be the same.

Greenfield sites

The generic problem of greenfield developments is to provide a spatial ordering system to guide growth (which may occur relatively quickly) on the site, while integrating it with surrounding urban systems to the greatest degree possible.

The plan for a greenfield site should seek to create an area of settlement which is highly liveable and which has inherent qualities that will promote ongoing processes of consolidation and upgrading over time. It should be informed by the needs of the main affected parties, including existing residents, entrepreneurs and industrialists, as well as new residents. It should be recognised that each of these constituencies has different requirements of, and within, the settlement system, which need to be respected and protected. Existing communities and entrepreneurs need to be part of an environment with which they are familiar, the new settlement needs to be closely tied into broader city-wide systems but at the same time must have its own logic, identity and, over time, sense of community and belonging.

Urban restructuring

At the heart of urban restructuring is increasing investor confidence - for people to invest in the environment, from both an economic and residential point of view. To improve the urban environment over time, they must have confidence that the area is improving and that their investment will be safe. In depressed environments the application of the identified settlement-making principles can play an important role in creating a climate of confidence.

In essence, restructuring involves a number of generic actions:

• establishing a spatial structural logic or order by creating spaces and achieving the greatest possible continuities of movement at different scales - in particular, breaking down the fragmented urban pattern which is characteristic in South African urban settlements;

• improving the quality of the public spatial environment;

• creating new public spaces where they are required;

• intensification, through housing-infill programmes, in order to increase thresholds of support and thus levels of service.

Urban restructuring also requires channelling of new development into existing areas in order to improve them. This can be achieved by using new development, particularly housing, to increase densities in order to improve levels of service (for example, along existing or new transportation corridors), or to make better use of existing investments (for example, in inner city areas, around existing commercial and industrial nodes). This approach is consistent with the principle of reinforcement.

Upgrading informal settlements

A common challenge in terms of South African settlements is that of upgrading informal settlements. In terms of greenfield sites the generic problem is to provide, from the beginning, a public spatial structure to guide new development. In the case of informal settlements, the problem is one of the later provision of a public spatial structure to provide relief from overcrowding, to create public gathering places, to guide public and private investment and to improve movement systems. Whereas, in the greenfield case, housing and economic development is generated by means of infill development in the context of the spatial structure, in the case of upgrading projects the negotiated relocation of residents and economic activities may be necessary to create a spatial structure consistent with settlement-making principles.

KEY PLANNING GUIDELINES

In this section key planning guidelines are established, within the context of the minimalist approach to settlement-making. The guidelines deal specifically with those elements of the settlement-making process over which the planner has relative control.
General observations

- Different communities have different priorities in terms of social facilities. The important thing is not to predetermine the form of all facilities, but rather the positioning of social institutions valued by the community. The precise nature and form of many of these facilities can be determined over time by the community itself.

- The principle of lump-sum funding should be adopted in financing new settlement-formation. Funds should preferably not be allocated in a predetermined manner (for example Rx amount for roads, Ry for community halls) but should be allocated as a lump-sum to allow for negotiated trade-offs within the planning process.

- Community facilities are important place-making elements and they should be deliberately used, in combination with public space, to make memorable places.

- Social facilities are dependent upon public support and play an important integrating function in and between communities. They should therefore be “externalised”, by being located in places of high accessibility, and made accessible to the local and surrounding communities. In this way, they bring together people from a number of local areas and are not tied to the fortunes of any one community.

- Realities of resource scarcity demand that public spaces and buildings be used for more than one purpose. This is consistent with the principles of multifunctionality and the sharing of resources between user groups.

The movement network and public transport

- Public transport is essential in areas that are characterised by low levels of car ownership. As far as possible, new development in such areas should support public transport. Higher densities increase the viability of public transport and should be encouraged along public transport routes.

- Coordinating the stopping points and terminals of different movement modes significantly increases the attractive power of the zones in which they are found. These zones are ideal for high intensity, mixed-use development.

- Movement should not be seen as a separate element but as an activity which occurs within social space.

- The degree to which movement dominates space varies from spaces which are entirely pedestrian-dominated to spaces which are entirely vehicle-dominated. As a general principle, however, most spaces within settlements should accommodate both pedestrian and vehicular activity. However, entirely pedestrian routes, which vehicles cannot penetrate, have their place in settlements.

- Movement spaces should be flexible, to allow them to meet other demands - such as markets, meeting places and parking.

- There is a strong ordering dimension to movement. At all scales, it is necessary to maximise continuities of movement, as this promotes choice and integration. Land uses should be able to respond freely to movement patterns as this encourages diversity and a mix of activities.

- While being ordered, rigid approaches to movement hierarchies, such as inflexible stipulations regarding intersection spacing and access should be avoided, as these mitigate against spontaneous settlement-making.

- The most important social spaces are low-order, local streets and these, in particular, must accommodate pedestrian activities.

The open space system

- In the case of large city-wide green space systems, continuity is important to promote ecological diversity.

- Sports facilities form an important part of the green recreation system.

- Formal sports fields, which function as green spaces, should be located to ensure a maximum degree of sharing of space, such as sharing between sports clubs, seasonal sports, schools and communities.

- Passive recreational places where people can walk, picnic or reflect on life are important settlement facilities. Wherever possible, these should take “natural” forms, which do not require maintenance and should be associated with unique natural features such as forests or plantations, hills, rivers and streams.

Urban agriculture

- Land for urban agriculture is particularly important in settlements where people are dependent on their own produce for food and nutrition, or have to supplement their incomes.

- Urban agriculture is an environmental feature that can operate as an area of visual relief, particularly in situations where finance to maintain “public open space” is not available.
• Space for urban agriculture should generally be provided on the edge of the settlement, in order not to disrupt the continuity of the urban fabric.

Public facilities

Education

• The creation of environments which promote learning forms an integral part of the settlement-making process. Learning has both formal and informal dimensions. Schooling relates to the formal dimension of education. Informal learning stems from exposing people to experiences outside the formal learning environment, such as experiencing nature, urban activities and social events. In this respect, the informal part of the learning experience can be enhanced by integrating educational facilities with the broader settlement structure. This can be achieved by locating schools, colleges, technikons, adult-education centres and universities close to places of intensive urban activities.

• The concept of the specialised self-contained school, accommodated on a spatially discrete site and serving only its pupil population, needs a rethink. Schools should be seen as resources serving both pupils and the broader community. In this regard schools can accommodate the school population during the day and, where possible, adult education during the evenings. Similarly, halls and libraries can serve the school population during the day and the broader community during the evening, ensuring 18-hour usage of facilities.

• The need for informal school play space can be supplemented by public space adjacent to which the school is located. Formal sports fields can serve both the school and the broader community.

• In terms of their location, schools should be part of an accessible, city-wide system of education facilities. Accordingly, they should be located close to continuous public transport routes. This will make schools sustainable over a longer period, since they will draw pupils from a larger area, thus becoming less susceptible to fluctuations in the local population.

Health

• Health considerations must inform all dimensions of settlement-making and design. Particularly important is ensuring clean air, potable water, the disposal of human and toxic waste, air circulation, shelter and the prevention of overcrowding.

• Health facilities should be accessible and should be integrated with public transportation. This can be achieved by locating such facilities close to activity areas and regular places of gathering.

• The location of preventively orientated health facilities, such as clinics, in association with primary and pre-primary schools, offers advantages. Preventive functions, such as inoculation and nutritional programmes are best delivered through schools. Where a multipurpose hall serves a number of schools, a clinic may be beneficially located within or adjacent to that hall.

Meeting spaces

• Both open-air public spaces and enclosed spaces such as community halls are important parts of social infrastructure. Halls should be located in association with public spaces as this will allow for events in one to spill over into the other, or provide alternatives in case of weather changes.

• Halls should also be associated with other public facilities, such as schools and markets. Given the limited number of public facilities which can be provided in any one settlement, it makes sense to concentrate these to create a limited number of special places, which become the memorable parts of the settlement.

• The number and location of meeting places cannot simply be numerically derived. Rather, it is necessary to create “forum” places, places which over time assume a symbolic significance outstripping their purely functional role.

Religion

• Religious facilities are “public” in the sense of serving large numbers of people and being of great significance to the communities that they serve. They should, therefore, be accorded equivalent respect, regardless of their denomination.

• They should be located at equivalent, significant places within the settlement. Their symbolic importance can be emphasised by using them to define vistas and by associating them with significant natural landmarks.

Public utilities

Public utility services are engineering services, such as potable water and electricity into settlements, and sewage, refuse, stormwater and wastewater removal from settlements.
As far as possible, it is necessary to work with nature in terms of these “inputs” and “outputs”. Thus:

• Water-collection technologies (e.g. roof tanks) should form an important part of the infrastructure in water-scarce areas.

• Woodlots can form important supplementary sources of energy.

• In certain places, solar energy is a viable alternative energy form.

• Stormwater and partially treated wastewater can be used for irrigation by being channelled to playing fields and urban agricultural areas.

Engineering services can be provided through a wide variety of technologies; all these have different cost implications. The choice of appropriate technology should, however, result from an examination of social, environmental and cost issues.

Cross-cutting issues

Crime prevention

It is generally accepted that certain types of crime can be limited if the environment is designed appropriately.

• Ensure surveillance and visibility through multifunctional land uses, rather than monofunctional zoning, to ensure long hours of use; provide inviting and well-defined outdoor spaces conducive to users meeting and communicating; all paths and pedestrian routes should be in areas where there is surveillance, good lighting, controlled vegetation and high levels of activity; small open spaces should be strategically located within the neighbourhood.

• Owners/users should be encouraged to take responsibility for places by avoiding tracts of vacant land without designated users or control; design the public realm to increase people’s ability to read the built environment; networks of small neighbourhood parks are preferred to uncontrolled large open spaces.

• Limit easy access and escape routes for criminals by carefully planning the location, size and design of large open spaces; avoid ending roads on vacant/undeveloped land; clearly mark pedestrian routes.

Environmental concerns

The following ecological factors need to be considered when designing human settlements:

• Identify geological conditions and assess risks and costs associated with development on less ideal geological terrain.

• Consider hydrological concerns, especially with regard to stormwater runoff and its direct relationship with urban development (e.g. plot size, type of land use).

• Take note of atmospheric considerations in terms of orientation and layout of erven, the impact of the prevailing wind direction, plus air and noise pollution.

• Consider implications of development on biodiversity.

Emergency services

The main emergency services are ambulance, firefighting and police services.

• Fire stations and ambulance depots should be located near the intersection of major continuous urban routes to facilitate rapid access to the movement network. Similarly, police stations should be centrally located relative to the areas they serve.

• At a local scale, it is not necessary to enable access to every housing unit by emergency vehicles. However, in such cases, distances should be short enough for easy stretcher-bearing, and for buildings to be reached by fire hoses.

• The public spatial structure, which includes streets and public spaces, should be deliberately used for fire-breaks. In informal housing areas, which are not served by electricity, provision should be made, as part of the essential public infrastructure, for spaces where fires can be made, as cooking frequently occurs in these spaces.

Economic services

Economic considerations should be taken into account in all the planned elements of a settlement. Some of the related concepts and applications are discussed below.

Employment generation

In South Africa employment generation is one of the highest priorities facing society. The reality is that the majority of potentially economically active people have no option but to generate their own employment, usually in the form of “informal-sector” activity. It follows that a pressing priority in settlement-making is to create opportunities for...
people to manufacture, trade and provide services. Settlement plans should ensure that sufficient intensity is generated at points in the settlement structure to generate local markets. A plan should provide an easily readable spatial structure which unambiguously suggests major movement channels and places of gathering, allowing entrepreneurs to respond to the structure created.

As a rule, entrepreneurs will find their own place in the structure and will provide their own infrastructure where necessary. However, given problems of entry capital and urban management in many settlements, it may be necessary to establish urban markets and manufacturing infrastructure by means of deliberate public actions.

**Urban markets**

Urban markets result from the physical agglomeration of large numbers of traders in public spaces.

There are a number of advantages in promoting markets by means of public actions.

- The creation of urban markets enables small operators to gain access to viable locations.
- The physical concentration of numbers of traders increases their drawing capacity and enables them to compete with larger, formal operators.
- The agglomeration of large numbers of traders establishes the potential for other forms of mutually advantageous co-operation, such as delivery of bulk supplies from wholesalers, the sharing of vehicles, and so on.
- Markets in low-income areas can provide an important service to consumers, in that they offer variety and choice of goods and services to people who are unable to travel large distances.
- From the perspective of urban management, the creation of urban markets contributes to the resolution of problems of hygiene.

Markets should be located at points of maximum accessibility. Particularly, they should seek a close association with public transport and major pedestrian flows. Wherever possible, they should be associated with public transport terminals, such as railway stations and bus and taxi ranks.

The centrality of the market should be reinforced by associating other forms of public infrastructure, such as clinics, halls, community resource centres, pension pay-points and services pay-points, with it.

Engineering services required to maintain adequate levels of hygiene, including water, public toilets, and refuse storage facilities, should also be provided.

Markets need not always be permanent. The use of public spaces, including streets, for periodic markets, at certain times of the day, week or year is also a positive, cost-efficient option.

**Manufacturing infrastructure**

Most of the arguments associated with the provision of markets also apply to the provision of hives for small-scale manufacturing.

The critical elements of infrastructure are sheltered work spaces, electricity, water and toilet facilities. The use of metered water and electricity enables regulated usage by small-scale operators.

From a locational point of view, small-scale manufacturing needs to be associated with points of movement - in particular pedestrian activity. Because they are frequently single-person operations, it is difficult for operators to separate manufacturing and selling functions. Consequently, they should be associated with urban markets and other forms of trade agglomerations.
BIBLIOGRAPHY


