Urban Block Design
guideline / manual to best practice
METRASYS - Sustainable Mobility for Mega Cities

The project METRASYS – Sustainable Mobility for Mega Cities is one of ten projects funded by the German Federal Ministry of Education and Research as part of the scientific program “Research for Sustainable Development of the Mega Cities of Tomorrow – Energy and Climate Efficient Structures in Urban Growth Centres”. With the topic of mobility and transportation in its focus, the project deals with one of the most exigent problems of current and future mega cities and metropolitan regions.

During the development and realization phase, the Transportation Studies Group of the German Aerospace Center (DLR) is the lead partner of the METRASYS project. Among the German partners are Wuppertal Institute for Climate, Environment and Energy, AS&P - Albert Speer & Partner GmbH, Fraunhofer FIRST, LUAX Software Consultancy and Freie Universität Berlin. The Research Centre for Software Engineering Technology (ASEC), the Chinese Academy of Transportation Science (CATS) Beijing, Tongji University Shanghai, School of Architecture from the Southeast University Nanjing as well as the Chinese Academy of Science (CAS) are the Chinese project partners.

The German Federal Ministry of Education and Research (BMBF) as well as the Ministry of Science and Technology (MOST) are the funding bodies of the METRASYS project.

The main objectives of the METRASYS project are climate protection, a sustainable development of - and sustainable mobility in highly dynamic economic and urban regions.
The development of sustainable mobility concepts for already existing and future mega cities will be the main task of the project. Due to its high population growth, Hefei in the Anhui Province, China, is predicted to become one of those future mega cities. Sustainable mobility concepts will be developed for Hefei and are to be realized locally in Hefei. In close cooperation with local partners from scientific and administrative organizations, the Chinese and German project partners will develop the concepts. This procedure provides a basis for incorporating the local perception of the problems. Innovative concepts, products and services, which proof to be solid, will be transferred to other urban regions and mega cities.

Integrating the traffic management system within the overall transportation planning and transportation policy framework in Hefei is one objective of the METRASYS project. In 2009, there have been several meetings of the METRASYS team and the Hefei Institute of Planning and Design to discuss special topics of urban and transportation planning.

The METRASYS project team has been asked to develop and promote management-, transport and urban planning guidelines and manuals to best practice that accommodates Chinese urban needs and requirements and develop urban areas in Hefei accordingly.

The “Urban Design Guideline” is intended to act as a knowledge-base and toolbox. On the basis of seven basic principles it first of all shows the sustainable approaches to planning and building cities in the future. There then follows an analysis of the special problem of the size of the blocks in Chinese urban structures, which has a negative impact primarily on the development of sustainable mobility. The manual contains a number of tangible examples Europe and the United States of America as well as an urban design proposal for the PingGuo Community in Peking.

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Motivation and Targets

Urban planners and architects, economists and ecologists, artists and scientists have a duty to develop appropriate spatial, technical, and design concepts and structures for the 21st century urban world. The first priority for future urban forms will be sustainability, in the all-encompassing sense of ecological, economic, social, and aesthetic responsibility for the city as a system in the global context.

Even if there is no patent remedy for sustainable urban planning, there are seven basic principles, which are outlined in on next pages.

Following these special regards, common examples are illustrated. With regard to orientation and traffic access, the size of existing blocks is a fundamental problem in the downtown areas of Chinese cities. The redevelopment of historical city centers and the construction of new city districts that create car-friendly cities is increasingly leading to traffic problems. The six to eight-lane roads on the outskirts separate the areas on the opposite side, pedestrians and cyclists are forced to the sides, and cycle paths and sidewalks are frequently blocked by parked cars. Within the large blocks, those over-sized blocks already in existence or planned frequently have very good links for pedestrians and cyclists, but private motor traffic is unable to drive through. The few entrances and exits for vehicle traffic within the blocks lead to additional journeys and indirect routes by car.

During visits by Chinese partners in Germany it was ascertained that the size of European blocks is easier to manage, facilitates orientation and has advantages with regard to traffic. For this reason this guideline uses examples from Europe and the USA to explain fundamental access structures and illustrate block sizes. Furthermore, taking the PingGuo Community in Beijing as an example, an urban design proposal was compiled.
Future Urban Forms - The seven pillars of sustainability

The 21st century is going to be the century of the city. By 2050, more than three quarters of the world’s population will live in cities and in just 20 years we are expecting one billion new city dwellers. What form, however, are the cities that will have to provide space for and cope with this enormous influx, going to take?

For global urbanization ethics
The growing cities of the 21st century are no longer microcosms that reference themselves and their immediate surroundings, and now have to negotiate their founding treaty with the whole world, in other words with a global hinterland. This founding treaty must see aspects such as migration, environmentally-friendly development, resource and energy efficiency, education and economic participation in a trans-national context and derive its guiding principle from them. For today’s cities this means nothing more than them having to develop a new culture of global responsibility. In our century the selfish, greedy, proliferating city of the industrial age must be replaced by one that is reflexive, responsible, controlled in its growth, learns, the city of the IT and knowledge society.

The fate of the world’s climate will be decided in cities
In view of the climate change our planet is undergoing, the need for global urbanization ethics becomes particularly clear.
In the last 15 years the regions of the world that saw a particularly high increase in climate-damaging CO2 emissions were those characterized by rapidly advancing urbanization and the growth of mega-cities, in other words in the Middle East, South, South-East and East Asia.
The future of the world’s climate and of humanity will to a large extent be decided in the predominantly Asian mega-cities and in metropolitan conurbations. For this reason there is no alternative to drastically reducing greenhouse gas emissions in cities in developed countries and decoupling growing affluence from emission levels in the growing urban centers in developing countries.
Basic principles for sustainable urban planning

1. Decentralized density

“Cities” means density, and agglomeration causes a scarcity of space, natural resources and room to move. Decentralized concentration makes it possible to minimize, if not overcome, the disadvantages of mono-centric sprawling densification of mega-cities.

Metropolitan regions with several centers boasting a cooperative division of labor are stable and sustainable models of spatial development and represent an everyday alternative to the mono-centric metropolis. This is because in their network structure service and knowledge work centers can be linked up efficiently, and without any impairment to the quality of life, to industrial centers, residential areas, corridors of open space, and leisure facilities.
2. Urban Management and Strategy

In light of the increasing global competition between cities, municipal leaders are faced with the task of continually expanding and strengthening the unique selling points and the attractiveness of their own cities. This explains the worldwide renaissance of major strategic urban development concepts and master plans. If these concepts are to satisfy sustainability criteria, then they must be thematically diverse.

Energy efficiency, mobility, administration structures and public services, education and culture, business and science, open space development, and urban ecology are central themes in development planning. The main challenge herein is to implement integrated concepts in existing political and administrative structures with hierarchies and sectoral divisions. Including citizens in development processes, e.g., in the form of forums and hosted participation procedures is an essential part of modern urban management. Creating a sustainable city will only be possible in collaboration with its inhabitants.
Basic principles for sustainable urban planning

3. Density and Mixture

In the world’s mega-cities huge density levels are a feature of the scarcity of space and illustrate the obligation for high yields on land in 3D form. However, a high degree of building density is also sustainable. It enables a frugal use of space, makes expensive infrastructures and settlement technologies economically feasible, and keeps distances short.

Appropriate density is a marginal task. Though high density levels are on the one hand efficient in terms of resources, they can encroach on the urban climate and as such the quality of life. Density is ultimately culturally coded: In Asian cities it is regarded as acceptable, whereas to Europeans it is no longer considered to be so.

With regard to sustainability, the second aspect of this density is mixture, as without an intelligent mixture of facilities it is impossible to create a city with short distances. A key question in this mixture is granularity, the expanse of facilities. If it is too coarse there is a threat of monotony, exaggerated division into small units ends in atomization and the chaos of resisting user claims.

The city of the knowledge society is based on personal exchange and informal communication in small areas between those with this knowledge. This urban form has the potential to overcome the scheme of separating facilities (which had its roots in industrialization) by means of the well-balanced co-existence of living, working, and supply and leisure facilities. It goes without saying that neighborhoods such as these are not free of conflict. The flow of public space assumes the function of become a binding agent between the individual elements.
4. Mobility

Environmentally efficient mobility in metropolises and metropolitan regions is a feature of appropriate settlement structure and the personal lifestyle of its residents. Urban mobility that is fit for the future requires a radical paradigm shift that makes it more compatible with the environment, the way we live and the urban environment. The burning of fossil fuels to cover short and very short distances in cities is passé, and with regard to speed, land claims and environmental friendliness must be put to the test. Cities which cater merely for cars will be replaced by a new mobility culture, which will include attractive opportunities for low- and zero-emission mobility (electromobility, bicycle and pedestrian traffic), which is furthered by urban planning measures. This necessity grows primarily from the desirable higher density of settlement structures, which as far as mobility is concerned can only be effected through the consistent expansion of efficient, public transport systems. The future of mobility will also be determined by intelligent traffic management that networks many systems and means of transport and is capable of responding to traffic in a flexible proactive way.
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Basic principles for sustainable urban planning

5. Intelligent Urban Technology

The third industrial revolution is embracing cities and, by means of “green” technologies, is making urban infrastructures more efficient, more economical, and as such more environmentally friendly. This includes traffic and transport systems, public security systems, education and administration, just as much as energy and water supply networks. Using intelligent technologies and networks for planning purposes can dramatically increase the (environmental) efficiency of cities. The advancing integration of information and communications technology with energy, environmental, and traffic technology in major cities is a world-wide growth market, providing German businesses with huge opportunities. However, this beautiful new world of intelligent infrastructures also poses questions: legal questions regarding data protection in the case of the fully automated and sensory collection of data, questions relating to technological access hurdles on the part of individuals, financial questions in the case of the acquisition of the requisite harmonized and homogeneous IT infrastructures, and much more.

Furthermore, in emerging nations with rapid-growth cities the problems lie if anything in creating a functioning basic supply infrastructure: In Egypt even a bus route providing public transportation to a new district is a huge success. As such, it will be the big cities in developed industrialized nations that will initially serve as trial locations and guinea pigs for future urban technologies, whereas with regard to city expansion in Asia it will initially depend on designing structurally sustainable urban forms which can be technically “upgraded” at a later date.
6. Urban Landscape

Strategies and technology, density and mixture, efficient means of transport and energy-saving buildings are only part of sustainable urbanity. It is also shaped by the qualities and advantages of “perceived greenery”, the landscape and open spaces, which keep the body of the city alive and give residents the feeling that they are not entirely de-coupled from the natural basis of their existence. Open spaces and their being networked are essential for the diversity of urban ecosystems, are of fundamental importance for the urban climate, and are indispensable as potential leisure and recreation facilities for city dwellers. Even if the immediate surroundings have long since been unable to meet the basic supply needs of modern me-ga-cities alone, with regard to the production and consumption of food, regional and local circuits will become increasingly important for future cities.
Basic principles for sustainable urban planning

7. Building technology and improvements to existing structures

The biggest challenge facing energy efficient construction is bearing in mind not only technological, but also design and social aspects. Refurbishing valuable 1920s residential ensembles with thermal skins to the extent that they are unrecognizable, and surrounding expensive passive house technology with sad, ungainly perforated facades is of no use to anyone. Neither building culture, design quality nor living quality must or need be sacrificed for efficiency.

In industrialized countries the improvement of energy efficiency in residential and office buildings will be the most important task sustainable building faces. The insulation of the 24 million existing German apartments alone leads to a reduction in pollutant emissions almost equivalent to those of the country’s industry. The construction of new passive housing will be particularly interesting for the development and improvement of efficient technologies.
Impressions from China

Hefei

Shanghai

Hefei

Shanghai

Hefei

Shanghai
Urban structure - the base of sustainability

Access Structures

There are different structures that can be drawn on to develop access in a city or city district:

**Radial roads** are a concentric road infrastructure based on a center point. Expansion by extending the radial roads themselves or adding some in between is possible to a limited extent only. All traffic flow must be based on the center point.

The **grid** takes the form of a road structure that covers all areas. Unlimited expansion in all directions is theoretically possible. In the case of long distances diagonal roads can shorten routes. There is great flexibility when it comes to usage and priorities.

**Circular roads** only function in conjunction with radial roads and/or the grid. The access structure is frequently an exact copy of the stages in the growth of cities.
Radial development

Initial shape

Possibility of development

Grid

Circular development
Urban structure - the base of sustainability

Grid

A grid with a simple structure is a good way of creating efficient links. The form the grid takes can be orthogonal or irregular.

In Europe and the USA grid spacing of 80 to 100 meters provides an optimum network for motorized traffic, pedestrians, and cyclists. In central areas with large numbers of pedestrians, grid spacing of 60-80 meters is ideal. In the case of larger blocks, minor roads and footpaths through the blocks is a solution. Clear orientation for pedestrians and cyclists, as well as for motorized road users as well as a consideration of neighboring facilities should be taken into account in the selection of a suitable network structure.

The development of continuous blocks enables longer street fronts to be created. Buildings with access from the street enliven the street front. There should, however, be a strict separation of public and private areas. Public areas should face the street, private areas the interior of the block or the garden.
Mixed use neighbourhoods should contain a range of block sizes to promote variety.

- **Small blocks**
  - Single aspect / street servicing
  - 6, 3, 6
  - 6, 10, 6

- **Lager blocks**
  - 80m, 115m, 115m
  - 115m, 115m, 115m

- **Sub-division into narrower residential blocks**
  - 115m, 45m, 45m
  - 115m, 45m, 45m

- **Amalgamation into larger blocks**
  - 115m, 185m, 45m
  - 185m, 45m, 45m
Urban structure - the base of sustainability

Road Density in Downtown Cities

As opposed to Chinese cities, those in the West have a high density of relatively small streets. In Chinese cities, motorized traffic is frequently concentrated on a few very wide continuous roads. As intersections limit their capacity, the road system is far more prone to traffic jams than in Western cities. In China there are smaller roads and lanes in the blocks, which offer good links for cyclists and pedestrians, but which vehicle traffic is unable to use to drive through the blocks.
Hefei, China

Berlin, Germany

Cologne, Germany
Urban Design Proposal - the PingGuo Community in Beijing

Taking the PingGuo Community in Beijing as an example, an urban design proposal is presented over the following pages.
Urban Block Analysis

In order to develop guidelines for traffic planning the organisation of the smallest urban planning unit, the block, has to be analysed. As a first step a short reflection on the cultural reasons and roots of China’s block structure will be provided. This is followed by a profound analysis of an urban block.

As case study and reference for the analysis the PingGuo Community in Beijing (北京苹果社区) will be employed. The case analysis consists of a set of research components. In its last step the singular results will be summarised and categorised in a SWOT analysis forming the base for an alternative urban design proposal for the PingGuo community.

Finally, guidelines shall be derived from the urban design proposal demonstrating the usage of an alternative block structure. Moreover, the guidelines shall be subject to a professional discussion.
Urban Design Proposal - the PingGuo Community in Beijing

Background

The origin of the block as urban organisation unit can be traced back until the very beginning of Chinese cities itself. Ancient records describe the ideal city with an orthogonal street pattern framed by a city wall with three gates on each flank. The roads connecting the gates form the major roads. In general the ancient city pattern followed a “heavenly order” oriented towards the polar star, locating the palace in the north, the authorities in the centre and the temple of heaven in the south. These elements were aligned along the north-south facing city axis (cardo). The length of the axis was a crucial perimeter determining the city’s extension.

The gate based road system and the basic elements along the axis defined the size and constitution of the urban grid, which forms the blocks. The created block structure was organised in lockable units surrounded by walls, creating an inside and outside space.

Besides the walled residential blocks some areas within the cities were reserved for authorities or special usages. Streets were subject to limited access, too. At night time for example residential units were locked emptying the streets. Same happened if emperors or high officials took the privilege to use the street.

Reflecting the origin and constitution of the block in Chinese cities it can be said that it is the basic organisational pattern. The block’s size and usage was defined by the given elements, like the palace, the city gates etc. The walls surrounding the block defined it as a unit. The usual flank width of the blocks ranged from 300-500m.
EU: organic street pattern with hierarchy

CN: equally ranked orthogonal street pattern

EU: block with building frame

CN: block with buildings framed by wall
Urban Design Proposal - the PingGuo Community in Beijing

The block unit can be understood in structural and social means. Structurally it was shaped by the wall, which created a distinct contrast between the inside and the outside space. Socially the differentiation between the two spaces lead to a community or family associated inside space and a state associated outside space.

In contrast to the European block structure two issues are striking: first, the orthogonal and wide-mashed street pattern with rather equally ranked streets. Second, the definition of the block by walls rather than by buildings. In terms of space formation this means the European block structure can be described as space-oriented, aiming to shape a valuable open space, whether the Chinese block structure is more shape-oriented, emphasising the body of the building. This significantly correlates with related urban densities. Whereas space-orientation features compactness, shape-orientation increases the density. The comparison of the number of inhabitants per square kilometre in New York and Shanghai is a vital example.

comparison of dense and compact cities, based Mendiratta & Salzberg
CN: shape-oriented structure

EU: space-oriented structure
Urban Design Proposal - the PingGuo Community in Beijing

Analysis

For the guideline development Beijing’s PingGuo Community (北京苹果社区) will be employed. The residential compound represents a typical compound in its spatial organisation. Therefore, a structural analysis of the block can give valuable insights in order to develop an urban design proposal and derive guidelines.
Beijing by night
Urban Design Proposal - the PingGuo Community in Beijing

Urban Context Analysis

The compound is located between the 3rd and 4th ring road in the eastern inner-city of Beijing in close range to the central business district (CBD). Analysing the grid structure in the area it can be said that the macro-grid is shaped by the 3rd ring road, the Xidawang road (north-south) and the crossing east-west axis Jingsong road and Guangqumen road. The created macro-grid has a mesh width of 1.5 x 1.3km. The grid is subdivided by smaller streets, which create a micro-grid. This street grid separates the macro-block (1.5km x 1.3km) into 12 urban blocks. The shape of the resulting blocks is rather longitudinal. This might be due to the maximisation of sun-oriented south facades. Even if the sizes for the urban blocks vary an approximate value of 200x450m can be identified. The PingGuo community is located in the centre of the macro-block measuring 190x450m.
Beijing CBD

PingGuo community

streetscape neighbourhood

urban block structure
Urban Design Proposal - the PingGuo Community in Beijing

Urban Design Analysis

Even though, the grid system is rather rigid a sight on the satellite images reveals the different urban footprints and house types in the neighbourhood. Prevailing type, however, is the high-rise. To which extend the house type and the grid condition each other can be exemplified in the south-west of the neighbourhood where the rigid grid is fading out in residential mid-rise structures.

The PingGuo community is a residential high-rise compound with a wide internal green. The total land area is about 85.500m². It is covered by two north-south facing high-rise rows which frame the block.

One building consists of two attached four loaded stairwells ranging from 28 floors in the north and 22 floors in the south. The building length is standardised with a measurement of 75m. Only architectural variation is the building depth, which is increased from 12m to 15m in the south facing lower row. On the short flanks of the compound two storey buildings function as community facilities and accommodate commercial facilities such as a cafe. In terms of the urban design the row organisation has little variation. Same applies for the architectural language, which is used comprehensively on all of the eight buildings. A gross floor area (GFA) of 203.312m² and a floor area ratio (FAR) of 2.4 indicate a rather high land utilisation. In contrast, the land coverage of 14% is comparably low. The green ratio approximately equals 30% of which the largest part is formed by the vast internal green space, which is located on top of the underground parking.

Fact sheet

- Area: 85.500m²
- FAR: 2.4
- Coverage: 14%
- Green ration: 30%

- GFA: 203.312m²
  - residential: 196.200m²
  - community facilities & commercial: 7012m²

- Basement parking: 171000m²

- Building type: high-rise
- 4 loaded stairwells

- Inhabitants: ~6000
- Parking lots: ~4000

Urban Design Guideline - 32
garage
entrance
club house
70m
80m
190m
190m
450m
12m
15m

urban design structure

block measurement
Urban Design Proposal - the PingGuo Community in Beijing

Functional Analysis

The compound is mono functionally used for residential purposes. Only the short flanks fulfil a (semi-) public function. Generally, the compound has a vertical division of functions. The ground floor forms the community-oriented base with the green space and community facilities as communication space. The higher floors (2-27F) are private exclusively for living and the lower floors (-1&-2F) for parking. Levels are interconnected via elevators. The closer surrounding of the compound (the macro-block) hosts street side commercials, a hyper market, a primary school, a contemporary art museum and a metro station.
vertical functions

functions

garage

parking

PARKING

PARKING

PARKING

PARKING

neighbourhood functions

parking

taxi & drop-off

park

functions

1F parking

2F parking

school

Art Museum

Shopping

1

functions

residential

community facilities/ commercial

school

leisure & entertainment

street side commercial
Urban Design Proposal - the PingGuo Community in Beijing

Circulation

Internally the compound can be divided into four major zones. Two of them are connected to the compound’s access: the main pedestrian entrance with drop-off area (graphic blue) in the north and the access zones to the underground parking (graphic red) on the west, east and south flank. Currently only the western garage access is in use. The third and largest zone is the community green in the centre of the compound (green). The paths around the green function as access to the buildings. The fourth zone is not horizontally but vertically constituted - the residential zone.

As a result the internal circulation of the compound is concentrated on two points: the car and pedestrian entrances. Considering the large amount of inhabitants (~6000) especially the car-based entrance with direct apartment access via the elevator puts a high pressure on the feeding roads and the entrance node. Same applies for the pedestrian entrance. Moreover, the limited amount of entrances and the large block structure creates long distances for the compound’s inhabitants.

The compound is framed by four streets. The network consists of three street types, which can be allocated to two street categories. Starting with the highest category the street in the south is a four lane street with a bike path and an accompanying side road with a few parking bays. The bike path is partially separated from motorised traffic with fences. In the parts where the separation is lifted the path is adopted as parking space constricting the bike traffic. Even though, the side road offers several parking lots a general lack becomes obvious. The pressure on the stationary traffic is intensified by traffic approaching road side shops.
function zones & circulation: blue compound entrance, red garage access, green community space

community green

garage entrance

compound entrance
Urban Design Proposal - the PingGuo Community in Beijing

The second street category is the access road. Around the compound two types can be identified: one with a bike path and second without it. The bike path is organised like in the major road, but facing the same constraints. The wide mesh of the street grid causes long distances and lowers the permeability of the neighbourhood. Due to the limited street space a high pressure on the existing roads can be identified. For example at the compound entrance where waiting taxis, bike traffic and stationary traffic compete for the limited street space, which leads to constant hornblowing by frustrated driver at day and night time.

The result of this lack of street space and its organisation leads to a series of problems like the overstraining of the compound’s entrance situations (garage&main gate), the organisation of stationary traffic due to a lack of public parking lots and the organisation of different speeds, namely the balancing bike and car traffic.
access road without bike path

access road with bike path

secondary road

roads around compound

alternating: parking bays & pedestrian
Urban Design Proposal - the PingGuo Community in Beijing

Space Constitution

The interplay of the large longitudinal block (190x450m) and the disc-like 75m long high-rises create an enclosed linear space. The rather small distance space of 15-20m between the aligned 70m high buildings intensifies the wall-like appearance to the outside. Linearity is also coinining the inside (green) space, where the straight appearance is lightened by a curvy landscape design.

Besides the buildings spatial effect towards the street, the physical border of the compound is defined by a partially vegetated fence. The fence enforces the build gesture of the compound’s inside and outside. As a result the entire block is fenced except the short flanks, where the semi-public buildings relate with the streetscape. But due to their low usage, the space is converted as a parking space. Moreover, the fence leads to the establishment of an underused space between itself and the building. At the compound corners, where the orientation of the semi-public and the residential buildings create an opening, the fencing problematically demonstrates the desire to distinguish the compound inside and outside. Here the inside space fades into the outside space. In order to prevent this fading a see-through fence is installed. The result is an undefined in between space without dedicated usage.
see-through fence separating compound & public space

fence as physical border

defence line & entrances

block-street relations
Urban Design Proposal - the PingGuo Community in Beijing

Finally it can be said, that the compound lacks to establish a relation or spatial interaction with the surrounding neighbourhood. The double fencing of walls and buildings aims to separate the compound and the open space. Remarkably, the fencing faces several constraints failing to mediate the two space types. This leads to undefined spaces which are neglected or adopted as parking, storage etc. spaces.

Since the block is not interrelated with the streetscape the outside appears as a monotonous space. Spatial variations or a diversity of functions cannot be found. This leads to an abandoned and often desolate open space with a low activity level.

The inside space in contrast aims to provide a pleasant living environment. The appearance is ordered and the facilities are well-maintained. The high-qualitative internal green space is well-designed functioning as community ground. Here inhabitants meet, relax and chat.
Urban Design Proposal - the PingGuo Community in Beijing

SWOT Analysis

The analysis revealed a series of strengths and weaknesses in the current organisation of the PingGuo community. In order to facilitate the next stage, the elaboration of an alternative urban design proposal, analysis' findings shall be briefly summarised.

To categorise the findings a SWOT-analysis is employed. Moreover, the SWOT shall form the base for decision making for the guidelining process. Hence, points of necessary improvement and features to be inherited can be reviewed.

According to the analysis features to be kept concern the generous green space which embodies the concept of an enclosed community. This is mainly possible through the high density approach, with a distinct vertical distribution of the compound functions.

Identified constraints regard two interrelated issues: first, the block size of 190x450m creates a series of difficulties. At first hand, it creates long distances lowering the activity level around the block and shaping linear spaces which lack diversity. An associated issue is the definition of the compound border between the private and the open space. A rather unconsidered fencing of the compound often leads to undefined spaces. Second, rooting in the large block structure, is the lack of a diverse urban design creating interesting spaces. This matter is emphasised by the architectural monotony.

To sum up, the major constraints identified can be traced back to the block size and the enclosure of compound.
**Strengths**
- Community space
- Sufficient private parking lots
- High green ratio
- High density
- Vertical distribution of functions

**Weaknesses**
- Few compound entrances
- Compound-neighbourhood relation
- Lack of architectural diversity
- Monofunctional block usage
- Stationary traffic organisation
- Undefined spaces
- Long distances - low block permeability
- Spatial monotony

**Opportunities**

**Threats**

**SWOT analysis**
Urban Design Proposal - the PingGuo Community in Beijing

Urban Design Proposal

Aim of the proposal is to develop an urban design for the case study block which considers and reflects the results of the analysis addressing weaknesses and sustaining characteristic features.

Grid system & Traffic
The first adjustment concerns the organisation of the street network. In order to cut distances and increase the permeability of the neighbourhood the street network is redefined. Hence, the mesh width of the street grid is down scaled. The result is that block sizes are cut down to a more sustainable size. Moreover, the new network sets up a street hierarchy consisting of major, secondary, access, bicycle and pedestrian roads, as well as shared space streets. Existing semi-public roads within the neighbourhood do play a major role. They are rededicated and integrated into the overall network.

In general, the hierarchy is designed as a step-down-system. Traffic arrives from a mayor road (e.g. 3rd ring road) is then entering the neighbourhood via a secondary road from which an access road is finally leading to the destination.

One of the leitmotivs of the new network is to pick up neighbourhood internal (e.g. residence-school) and higher-ranked way connections. Therefore, it distinguishes between internal and through traffic and tries to minimise negative traffic such as parking lot search, heavy load or through traffic within the area. The new traffic system introduces two new street categories. The bike and pedestrian roads as well as the shared space. Both minor-ranked types form an important part of the new system. They are completing important connections by avoiding molesting through traffic and define the neighbourhood as one traffic zone.

As a result the redefinition of the network facilitates the traffic flows and increases the permeability. It significantly reduces distances improving the neighbourhood's performance in terms of efficiency, convenience and sustainability.
Urban Design Guideline

compound access road
bike & pedestrian street
shared space
mayor road
secondary road
access road
compound access road
bike & pedestrian street
shared space

Case study

existing traffic network

traffic network proposal

museum
school
metro
shopping
Urban Design Proposal - the PingGuo Community in Beijing

An important component of the new street system is the design of new street layouts. In first place the new street layouts address the conflict between motorised and non-motorised as well as the stationary traffic. In second place stands the combination of the different street types in order to create comprehensive routes for the motorised and the non-motorised traffic.

To solve the general dilemma of accommodating the two different speeds (car & bike) and balance it with the stationary traffic four different categories are suggested. Since fenced bike paths are often illegally adopted as parking lots (due to a high parking pressure) the physical separation is given up. With the new organisation of putting a bicycle lane next to parking bays cars are removed from the bike lane. In this way the conflict potential of the bike lane is minimised.

The bike path types reflect on the street's hierarchy. If space is limited the bike lane is offered as protective strip, which may be used by cars if specifically necessary. If hierarchy and space permit, the bike lane is separated by a division line to the car traffic. To enable this bike path system the organisation of the stationary traffic and the road side green must be flexible. The examples show space saving options, like integrating tree rows in parking bays or offering parking bays on just one side of the road.
secondary road

- street with two-sided parking bay & integrated tree row

access roads

- street with one-sided parking
- street with protective bike strip

bike and pedestrian street

shared space
Urban Design Proposal - the PingGuo Community in Beijing

A special street type represents the shared space. It is suggested in smaller streets sections (max. 500m) where car, bike and pedestrian traffic overlap. The absence of sign-posting demand the attention of all road users. Elements to separate a circulation and non-circulation area are the street furniture, trees etc. Bike and pedestrian traffic as weakest road user are prioritised.

Shared space zones can also accommodate functions like compound drop-off zones for taxis, guarantee access for fire brigades or transport lorries for tenancy changes.

Another minor-category is the bike and pedestrian road. It is exclusively for non-motorised traffic. At intersection with streets open to motorised traffic measures such as level accentuations, traffic bollards can be used to avoid the entry of cars. The character of the road can be emphasised by a special pavement.
current situation: compound road

accentuation: separating roads from bike & pedestrian roads

street level

sidewalk level

~1:10

street

bike & pedestrian street

example of continuous pavement

element of shared space
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Urban Design Structure

The next sub-chapter is zooming down to the case study focussing on the compound’s internal organisation and its urban design. As a first step the implementation of the new street network means that the compound is separated into two unequally sized blocks, measuring 140x190m and 310x190m. The new road parting the former super block is the continuation of a former compound road coming from the south. Its extension equals an upgrading into an access road which connects to a major road in the south. In order to increase the permeability of the larger plot a semi-public pedestrian thoroughfare parts the block into four sub-units.

The result is a re-sizing of the former block into two or three parts, respectively. In terms of the land selling procedure the structure with different plot sizes offers a flexible sales strategy involving two or three investors. An benefit of the structure is that the multitude of investors offer different designs enhancing the overall quality of the urban design as well as the architecture. Hence, large monotonous spaces like in the current situation can be avoided.

All in all the block is re-sized and equipped with flexible structure which contributes to the overall urban quality.
re-sizing the block
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Structurally the urban design gesture is kept acknowledging the strength of the high density and green ratio. Adjustments regard the massive building sizes of 75m creating linear and enclosed spaces and the entrance situations.

Firstly, the building types and sizes are varied. Introducing a second building type the existing building is parted into two 40m long units. As a result the block’s permeability is increased. The 75m long units can only be found in the north row increasing the sun ligh in the yard and weaken the barrier-like appearance of the buildings along the southern street. The introduction of another building type also contributes to the architectural diversity of the compound. The distribution of 22 storeys in the south and 27 storeys in the north is maintained.

Another step of tackling the monotonous appearance of the block’s outside is to emphasize the compound entrances and create a bandwidth of spaces which are relating the block with the public space. Consequently, three different types are introduced: first, the shared space which creates a valuable space for the compound as well as for the public. Secondly, the southern compound entrance which is shaped by a slight shift of the street-side buildings. Third, the normal fence border along the pavement.

Even though, the block gets more interconnected with the public the differentiation between the inside and the outside can be kept.
urban design: formation of two blocks
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In order to increase the compound's functionality internal usages are relocated and mayor functions like entrances are re-distributed. As first step to improve the accessibility the internal path system is redefined and new entrances are introduced. The new path system aims to connect all entrances and buildings on the shortest way reducing walking distances and improving the blocks permeability. The entrances are organised hierarchically, which is readable in the urban design. Major entrances are at the drop-off zone, which gives access to both plots and the southern entrance located at the neighbourhood street. These entrances are characterised by a special spatial configuration. The other four side entrances are equally distributed on both plots (two each). Consequently, different trips (shopping, school; taxi, bike) are bound to different entrances minimising the pressure on singular gates.

The same applies for the organisation of the garage accesses. Due to the separation of the plot, there are two garages. The smaller plot can be operated with one entrance working in two directions. The garage of the larger plot, in contrast, must be served by two one-directional access (fire regulations). The proposed organisation aims to de-stress the access points and streets around the two compounds.

Besides de-stressing access points a design goal is to gather synergising functions. Hence, the formerly abandoned club house is relocated in close range to the new drop-off zone in the shared space zone. It is enhanced by an activity space for Tai Chi etc. and can host leisure facilities. Moreover, it can host a public usage like a cafe as communication point. At its new location the club house synergises with the influx of arriving people, passing through pedestrians and community's activity space. Another measure is the placement of a community space at the internal hinge of the compound where all paths connecting to the entrance points are meeting.
urban design: key points

1. shared space
2. drop-off zone with compound entrances
3. taxi waiting zone
4. pedestrian compound entrances
5. club house with community space
6. community plaza
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compound entrances & fence line

pedestrian compound entrance
fence line
Garage Plot A
one two-way access

Garage Plot B
two one-way accesses

- parking bays
- garage border
- separated bike path
- bike path offered
- shared space

garage access & parking
Guideline

As a concluding remark and outcome of the analysis and the design proposal four guidelines addressing the structure, the traffic network and the urban design can be enlisted:

1. **Re-size** downsize large blocks to increase the permeability, cut distances and increase the architectural diversity.

2. **Re-distribute** introduce a street hierarchy, which regards internal and external traffic flows.

3. **Re-organise** dedicate street space exclusively for certain road users.

4. **Re-model** enhance the variety of spaces along the block to improve the spatial quality and general activity level.
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