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Case study of rapid urbanization in the greater bay area**

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**Publication date**

2021

**Document Version**

Final published version

**Published in**

Proceedings of the 13th Conference of the International Forum on Urbanism, IFoU 2020

**Citation (APA)**

Peng, Y., Bruyns, G., & Qu, L. (2021). Review of Chinese megablock urbanism: Case study of rapid urbanization in the greater bay area. In *Proceedings of the 13th Conference of the International Forum on Urbanism, IFoU 2020: Urbanism in the Mobile Internet Era* (Vol. 4, pp. 421-430)

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# REVIEW OF CHINESE MEGABLOCK URBANISM: CASE STUDY OF RAPID URBANIZATION IN THE GREATER BAY AREA

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**Abstract:** *In the past century, cities have undergone revolutionary changes from planning paradigms to urban forms. As the fastest urbanizing country in the world, China's urbanization process has also been accompanied by dramatic changes in urban planning models and has emerged substantial real estate driven compounds in the form of megablock. In December 2018, The Ministry of Housing and Urban-Rural Development (MOHURD) promulgated a new version of the "Standards for the Planning and Design of Urban Residential Areas" (GB50180-2018) and made a series of adjustments to the residential planning policies. It is worth noting that the supporting facilities of housing community will be improved, and the urban blocks will be more compact.*

*Under this background, reviewing relevant residential projects in the Greater Bay Area (GBA) during the rapid urbanization period, what are their spatial characteristics? With the latest policies and requirements of the residential area planning, what urban morphological changes will take place in the future housing planning of the Greater Bay Area?*

*This paper reviews essential context that has facilitated the Chinese Megablock Urbanism (CMU), and further takes a closer look at megablock cases in the GBA. The research methods include critical literature review of Chinese housing model, and case study expanded by configurative analysis with GIS. The outcomes of this research are expected to discuss the urban configurations, spatial distributions and other urban conditions of megablocks. It will conclude on the possible revisions of residential area planning parameters, and fully comprehend the implications of new policies to assess Chinese urban form within a more sustainable path.*

**Keywords:** *fast urbanization; housing community; urban morphology*

## 01 INTRODUCTION

One cannot deny the importance of understanding "scale" in studying Chinese cities (Miao, 2013). In either daily life or theoretical analysis, the 'mega' scale has become part and parcel of the Chinese context intuitively observed by researchers, citizens or even outsiders as a key and foundational role in all dimensions and formats of urban issues (Peng et al., 2019). If we reexamine the question of scale and reading a city from both its parts and its whole, the "mega" phenomenon remains as a key concept to our understanding of the territory. In the Chinese context, since its modernization and urbanization, this communist country where land belongs to public ownership, constantly creating collective

residential units to satisfy its urban population demand. From neighborhood-unit to work-unit to commodity housing (Lu, 2006), these compounds, averagely occupy from 1 to 2 million m<sup>2</sup>, have widely shaped Chinese major cities in “socialism with Chinese characteristics” urban fabrics, which could be termed as “megablock”.

To understand the Chinese Megablock, one should analyze within its unique context and case. In this paper, authors review the phenomenon of Chinese Megablock Urbanism (CMU), by introducing its major characteristics which include history of Chinese urban block evolution, its cultural and social roots, related policies and development strategies. The methodology section explains techniques that applied to analysis CMU and its spatial characteristics. Furthermore, a representative case in the Pearl River Delta (PRD) - Clifford Estate, is detailly studied in order to provide a clearer demonstration of CMU and conducting spatial analysis. The conclusion is drawn on the impacts of CMU and towards a discussion of future housing model in China.

## 02 FOUR ASPECTS OF CHINESE MEGABLOCK

### 2.1 History

Chinese urban block has a long history rooted in its urbanization process since ancient history. In Qin Dynasty (秦朝), one ‘li’ equaled 416 meters (Dong, 2004), but in Qing Dynasty (清朝) changed to 576 meters, until 1929 uniformed into 500 meters. ‘Li’ was originally a unit of rural residences cluster instead of length, later has been interpreted into city. It evolved into the ‘Hukou’(户口) system, as a basic administrative unit of urban population, becomes what we call neighborhood today (Ibid). ‘Lifang’ (里坊, neighborhood of Li), which means a block of one ‘Li’ length in all sides, originated from the Jingtian system (井田制, well-field system), is the basic unit of ancient cities, formed the classic Chinese urban pattern (Ibid). Chang’an (长安, now Xi’an), capital of the Tang Dynasty (618-907A.D.), which adopted this Lifang system, has profound impacts on the ancient urban planning, not only in China, but also influenced other major ancient Asian cities, for instance, Kyoto and Seoul (Sun & Liang, 2003).

If we compare with European cities of the same period Chinese city blocks have always been much larger because of the application of ‘Lifang’ model (see figure 1). To be more specific, Chang’an reached a total population of one million at around 690 A.D. (Dong, 2002, p215), while population in London is estimated to have 10,000-12,000 and Paris 20,000-30,000 at the same period (Frassetto, 2013, p444). Current Chinese blocks that easily exceed of more than 20 hectares, which is regarded as a tribute to the ancient Lifang (Liang & Sun, 2003).

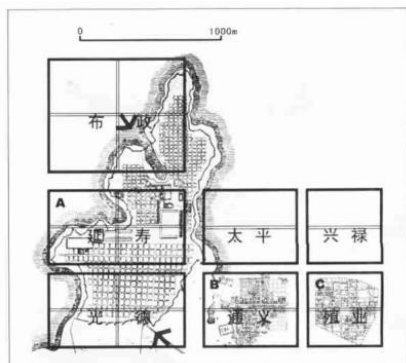


Figure 1.

Tang Dynasty Lifang compares to other ancient cities in the same scale. (A. Miletus, ancient Greek; B. Timgad, ancient Roman; C. Mirande, France middle age).

Source: Liang & Sun, 2003

As for the modern history, in Republican China (1911–49), it was employed by Japanese colonial planners in the planning of cities such as Changchun and Datong in the 1930s. During the late 1940s, Chinese planners initiated planning proposals for several major cities based on the neighbourhood unit and other modern planning concepts (Lu, 2006). Due to civil unrest and war, however, the actual realization of the neighbourhood unit idea did not take place until the founding of the People's Republic in 1949. Socialist planners experimented with several competing residential planning ideas during the 1950s. The microdistrict (xiaoqu 小区 in Chinese and mikrorayon in Russian), an idea transmitted from the Soviet Union and essentially similar to the neighbourhood unit schema, gradually gained favor (Ibid.). From those urbanization practices, work-units have changed the scale of urban block into a mega dimension with gate and wall that enclose urban parcel. Economic reforms since 1978 have created new opportunities for the implementation of the microdistrict planning principles. However, other scholars have pointed out that since the year of 1992, when the market economy has been established, the work-unit model declines due to its inflexibility to the diversification of living demands (Zhao et al., 2013), current dominate housing model of Chinese city is commodity housing driven by real-estate interests (Wu, 2005).

## 2.2. Culture and Social

Chinese vernacular architecture is regarded as a materialization of its old manners (Yu, 1998). If one looks at Chinese residential cluster, it appeals a distinctive characteristic of living collectively: no matter in historical courtyard houses or villages, or in more recently built microdistricts and work-units (Lu, 2006). Chinese habitants have a psychological identity of space with enclosure and collectivity. On the other hand, apartheid and conflicts between different social classes as in countries like South Africa, are not the main theme of Chinese social relationships. The fragmentation of megablocks does not mean a complete break between the various social groups. The significance of megablock in China is more in line with the historical continuation of the collective concept and as residents in the context of China's social transformation with higher demands for safety and public facility (Feng et al., 2011).

One of the most common forms of contemporary Chinese megablocks is gated community. Gated communities are changing the urban fabric of residential areas in China. It is not only a standard form of new large-scale residential areas in the suburbs, but also acts as an urban regenerative real-estate in the city center. From 1991 to 2000, 83% of Shanghai's residential compound were enclosed. In the same period, Guangdong Province closed up more than 540,000 communities covering more than 70% of urban and rural areas and more than 80% of its population (Miao, 2004). Due to different social and cultural backgrounds, the implications and consequences of gated communities in different places may not be exhibited in the same way. The emergence of gated communities in China is a relatively nascent urban phenomenon even though enclosed housing compounds have cultural roots in Chinese history (Feng et al., 2011). The gated-community, theme park, shopping mall and minority community are known as four typologies of 'postmodern urbanism' (Dear & Flusty, 1998). Atkinson et al. (2004), emphasized that the operation mode of gated community and combined the physical entry restriction characteristics with the legally binding contract co-management method to define the access gated community as:

“Walled and gated residential developments that restrict public access and these attributes have often sparked debate about their desirability or legitimacy in an open society.” (Atkinson and Flint, 2004)

However, although there are cultural and social reasons for the existence of megablock in Chinese context, it is not equivalent to the previous form of residential cluster. The most important difference is the organization of the community and the social structure of the residents. On one hand, the developer provides public space inside the residential area, making it has a collective property right, public resources become privatized (Pu, 2004). The management of the community implements autonomous community organization (Ibid). On the other hand, real estate “selects” the inhabitants through price levers, which is completely with different social structures from the previous work unit community (Feng et al., 2011). Moreover, regardless of the physical boundary of megablock is enclosed or not, the enormous scale and built in purpose to serve local needs only (Chen, 2017), has constantly reshaped Chinese urban social life in its megablock urbanism.

### 2.3. Policy

In order to understand the scale of Chinese urbanism, policy, technical standard, regulation is no denying that should be carefully studied. In February 2016, the State Council and the Communist Party's Central Committee—the nation's highest authorities—adopted new guidelines that call for compacter cities with denser networks of streets, more pedestrian and cycling lanes, better public transport, mixed-use zoning, and more green space. New open residential communities will be joined with public roads, and the old gated residential communities will gradually open to the public (Normile, 2016) – to promote a block system in cities. Accordingly, urban planning codes and specifications related to road and block planning, have to be renewed to satisfy the updated national guidance.

The rational of these codes indicates that megablocks would be justified at the time when they were developed. However, with the development of cities, citizens begin to realize that smaller blocks and narrower roads would be more beneficial in term of improving urban traffic and shaping a human-centered community. The codes in China adapted according to new understandings on urban issues and many urban practitioners have been engaged in the feedback iteration to facilitate more rationalized and optimized codes to guide urban planning although there no denying that adjustment to national code is a matter of procedural justice, which requires long terms of process, inevitably resulting in a delay in practice. However, many local governments have the advantages to conduct prompt adjustment to local codes in response to the dynamics

Table 1.

Technical Standards for Detailed Controlled Planning in Shanghai (Revised version 2016)

Items	Functional Region	Highways	Major Roads	Secondary Roads	Minor Roads
Designed Speed for Automobiles(km/h)	A/B/D	80	60	30 ~ 40	20 ~ 30
	C	80	60	40	30
Road Density (km/km <sup>2</sup> )	A/B1/D1	–	2 ~ 4		8 ~ 12
	B2/B3/D2/D3	–	2 ~ 4		6 ~ 10
	C	–	2 ~ 3		4 ~ 8
No. of Automobile Lanes	A/B/D	6 ~ 8	6 ~ 8	4 ~ 6	0 ~ 4
	C	6 ~ 8	6 ~ 8	4 ~ 6	2 ~ 4
Road Width	A/B/D	40 ~ 70	40 ~ 60	24 ~ 40	9 ~ 24
	C	40 ~ 70	40 ~ 60	24 ~ 40	12 ~ 24
Road Area (%)	A/B1/D1		20 ~ 30		
	B2/B3/D2/D3		15 ~ 25		
	C		15 ~ 20		

of cities compared to national code. For instance, Shanghai government issued the Technical Standards for Detailed Controlled Planning in Shanghai in 2011 which increases the density of minor roads and lowers the size of blocks, promoting new planning paradigm nationwide. The Shanghai Technical Standards provide the detailed guidelines on the basis of the national codes by sub-dividing the city into several functional areas which requires different network density, speed for automobiles. It further added new paradigm such as automobile lanes, width of roads and area of roads as requirements to regulate urban traffic networks. For instance, the network density of residential functions is increased to 2-4 km/km<sup>2</sup> for both major and sub roads, and 8-12 km/km<sup>2</sup> for minor roads, providing guidelines for more sub-divided residential blocks.

Following the Technical Standards in Shanghai, National Code of Urban Residential Areas Planning & Design (GB50180) has been revised after guiding the urban planning for China for more than 20 years. The revised code is issued by the Ministry of Housing and Urban-Rural Development of the People's Republic of China at the 10th July 2018 (GB50180-2018), adapting the new requirement in residential design when China is transferring for high speed growth into high quality growth and guiding urban development with new assumptions for better living environment and quality.

## 2.4. Development

Empirical studies in western urban planning and development process have demonstrated that the focus of urban planning corresponds to its urbanization level (Tortora et al., 2015). In 1978, accompanying with the economic reformation and opening-up, Chinese first national urban planning guideline was announced to accelerate urbanization process. In the past four decades, China has experienced the largest and fastest industrialization and urbanization process in the history of the world (see figure 2). Although during planned economic period, Chinese urbanization emerges abundant distinctive examples of socialism blocks. Scholars looked into their spatial distribution for instance Kwok (1981) and Lu (2006). But we can discover from the statistic that the rapid urbanization of China starts after the reform and opening up, to be specific, from 17.9% in 1978 to 40.5% in 2003, China has a 'Great Leap Forward of City' in 25 years (Yin, 2010). After 1992, which is the year of market economy established and replaced former planned economy, Chinese urbanization accelerated to increase 1.2% per year (3 times of world's average in the same period, Ibid). To achieve this unprecedented urbanization, 'Big Plans' that Kolson 2001 proposed is being staged all over the country. For example, a city has planned a megacity that is six times larger than Paris or 10 of London (Li & Li, 2006). Under this cover, to occupy land from surrounding villages or adjacent cities and sprawling out the administrative boundary (Yin, 2010). As consequences, mega-projects intitled with 'development districts', 'new towns', 'university towns', oversize plazas, lawns, infrastructure etc. spread out over the country (Ibid),

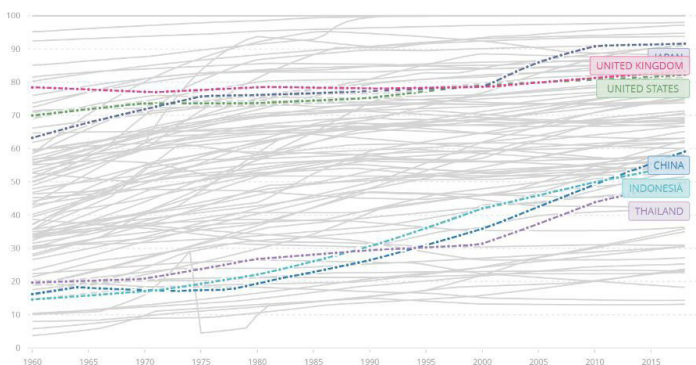


Figure 2.

The Urban Population (% of total population), China, UK, USA, Japan, Indonesia and Thailand highlighted. Source: World Bank, retrieved from: <https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?contextual=region&end=2018&locations=CN-US-JP-GB-ID-TH&start=1960-12-08-2019>.

pushing megablock urbanism becomes dominant in this urbanization heat land. With this 'Great Leap Forward' of urbanization (Chung et al., 2001; Yin, 2010), housing model accordingly shifted from the planned work-unit to market real estate driven commodity housing.

### 03 METHODOLOGY

The research methods mainly contain critical literature review and case study. Conducting comprehensive literature review of relevant and state-of-the-art literature is generally known as a way to search background information of our research. It provides constructive criticism that can improve the works and support our own. In the whole research process, potential publications were searched in different databases, mainly google scholar, Scopus and CNKI, from their inception to August 2019 using keywords as the search string. They include publications from academic and professional journals, books, doctoral theses, conferences papers, published and unpublished institutional report. Information on online media sites are also taken into consideration when necessary due to its reflection of the existing related social problems and its timeliness. In this research, critical literature review is conducted to build firm theoretical basis for this study, with the objectives to examine research background and gain knowledges of CMU phenomenon.

In the case study section, the Clifford Estate (祈福新村) in Panyu, Guangzhou is selected because of its representativeness, as it is the biggest housing compound developed in the most real-estate driven region in China, the Pearl River Delta (PRD). It begins with a background expatiation of the case, which illustrates a typical megablock urbanism model, for its statistical data, the reason and context that it is built, its conditions, facilities, stakeholders, services, and other intriguing aspects. Furthermore, spatial analysis is another focus of this case study to evaluate the CMU in a more systematic perspective. Base on geographical data that collected via multiple resources such as the local government regulatory plans, open access maps Google Earth, OpenStreetMap (OSM, [www.openstreetmap.org](http://www.openstreetmap.org)), Baidu Map ([map.baidu.com](http://map.baidu.com)), and real-estate websites data including Fang Tianxia ([fang.com](http://fang.com)), Lianjia ([lianjia.com](http://lianjia.com)), and Centaline Property ([centanet.com](http://centanet.com)), field work and proofreading of data conducted during the data collection phase.

Data analysis was conducted using the following steps:

- 1) Visualization of the case including 3D model;
- 2) Preparing base maps with GIS and OSMnx;
- 3) Analyzing basic spatial characteristics with Python;
- 4) Calculating centrality with sDNA in GIS;
- 5) Reflection of data analysis leading to the findings of the study.

### 04 CASE STUDY OF CLIFFORD ESTATE

In the 1990s of Panyu, one of the major suburbans of the Guangzhou city, many local residents had eyewitness rapid and massive development of one real estate project one next to another, and that the whole Panyu was like a messy construction site. It was from this time that Panyu's real estate entered a large-



scale development stage. During this process, the Clifford Estate has gained the reputation of "China's First Village" (Wang, 2003) was given birth by a Hong Kong developer at 1991. In around 10 years' time, the previous uncultivated land which could not be used as farmland into a mega residential community of more than 7,500 acres of land with over 50,000 household units and 200,000 residents from about 100 different countries (Ibid.). It is now regarded as a standard community for resort-style living in the suburbs of China, covering an area close to half of the Liwan District, which is a traditional county-level administration district in Guangzhou which has more than one million regular residents. Today, the Clifford Estate has become the largest low-density residential community in Guangzhou and even the whole China and is well-known as an "elite satellite city" with first-class facilities (Clifford Estate Official Website).

The Clifford estate is the first large-scale development of its kind in the city and the country. Back in 1991, the real estate market was almost blank or constructed fragmentedly without unified urban management or planning. There was no clear boundary between cities and suburbs, in this sense, the massive and successful development of Clifford Estate can be attribute to huge increase in demand for modernized housing with better living environment and community facilities from local residents, most of who used to live in self-built houses or unit welfare sub-housing in 1990s. With the rapid economic development, residents have formed increasingly demand for improvement of living conditions and developers from HK just fulfilled their need with new concept of housing with experience from Hong Kong or overseas (Ibid). On the other hand, the Clifford Estate had also attracted a large number of HK residents who was seeking for high-quality suburban living environment to let them escape from their original high dense living city. From its start, the Clifford Estate was designed to be a "Mega" living community and 1,500 acres of land was acquired at first phase.

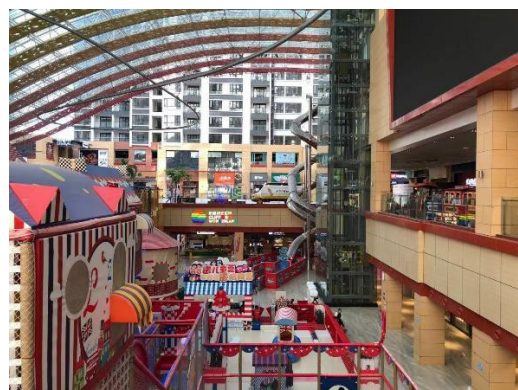
At one time, 80% of the residents in Clifford Estate are from Hong Kong. The Clifford Estate had adopted Hong Kong or foreign advanced property management methods since it was established. Combined with the natural high-quality environmental resources in Panyu, the residential community soon became a benchmark of the emerging "commercial housing" development across China (Ibid). The Clifford Estate had brought



Figure 3.

The Clifford Wonderland built in 2017

Source:author



complete fresh air to the housing market in China at that time when the country began to reform with a new economy and social development mode. The Clifford Estate took the lead in introducing the latest exotic real estate development and housing concepts into China by residential halls and villa with small gardens at the doorsteps of every household and carried out large-scale common public space. It was the time when Hong Kong people were attracted to return to the mainland to buy property because of its cost performance and spacious environment. At that time, the housing price of praying was about 1,000 yuan/square meter, which was 1/10 of the price in Hong Kong but with better living environment. For a time, Clifford Estate was the first to set off an upsurge of Hong Kong people buying property. Besides that It had also introduced many brand-new concept in real estate development in China, such as it is the first community in China that was planned to be equipped with a large number of supporting facilities, and the first to build a community as a self-sustaining, operative satellite city in the suburban area. It was also the first housing project that introduced the concept commercial marketing in China with advertisement, computerized sales system, professional salesperson demonstration units and free shuttle buses provided (Luo & Xiao, 2017). At the same time, concept of mortgage buying, clubhouse, professional property management and uniformed building exterior requirement was introduced to the country which had been closed to the outside world for tens of years. The Clifford Estate also created a series of innovative services to make the community to function like an self-operative city, such as self-support community buses, self-built community fire brigade, sewage treatment facilities up to 30,000 tons per day large-scale plant, a 600 acres of artificial lake park, a comprehensive biological chain control pests system and a hiking trail connecting with the National Forest Park.

Since its birth in 1991, the Clifford Estate had subsequently acquired the duck pond land that can accommodate 2000-3000 households and the land owned by a Hong Kong company in the surrounding area (Ibid). The combined land area of the three acquisitions totaled 7,500 acres. Up to the year 2020, there are more than 55,000 household units have been sold, with a regular resident population of more than 100,000 and more than 200,000 owners (Clifford Estate Official Website), forming a county town of considerable size. More than 200 million RMB has been spent to build internal roads and tunnels to solve the traffic problems caused by the soaring population and vehicles. The community facilities have been growing to support the large population. There are 11 international and provincial schools, an international JCI certified and national tertiary hospital, and an urban complex of approximately 2.3 million square meters, including a multiple-use retail center, international apartments for foreigners, communal plazas, luxury hotels, large-scale supermarkets, fresh food markets, banks and bus terminals, food courts. The living environment are also improved with 100 large and small leisure parks built. The green ratio of the estate is as high as 75%, and there is 600 acres reserve land as green space with more than 300,000 trees and 500,000 flowers. The Clifford Estate is recognized as a super city with the most complete community facilities in Guangzhou and a mega real estate community in China.

After 26 years of development, the population structure of Clifford Estate has changed a lot, from the original majority as Hong Kong residents to the current residents from all over the country and more than 100 countries in the world. Clifford Estate has not yet been fully developed yet, with still 800,000 square meters of construction area left for development in the future (Luo & Xiao, 2017). However, residential development will account for a relatively small proportion and about 80% of undeveloped land is for commercial development and will be After Clifford Estate, mega communities such as Beijing Tongtianyuan, Huilongguan, Guangzhou Country Garden Phoenix City have appeared in the market. However, as construction of a single developer, the scale and supporting facilities cannot surpass the Clifford Estate (Ni, 2004). As a mega residential

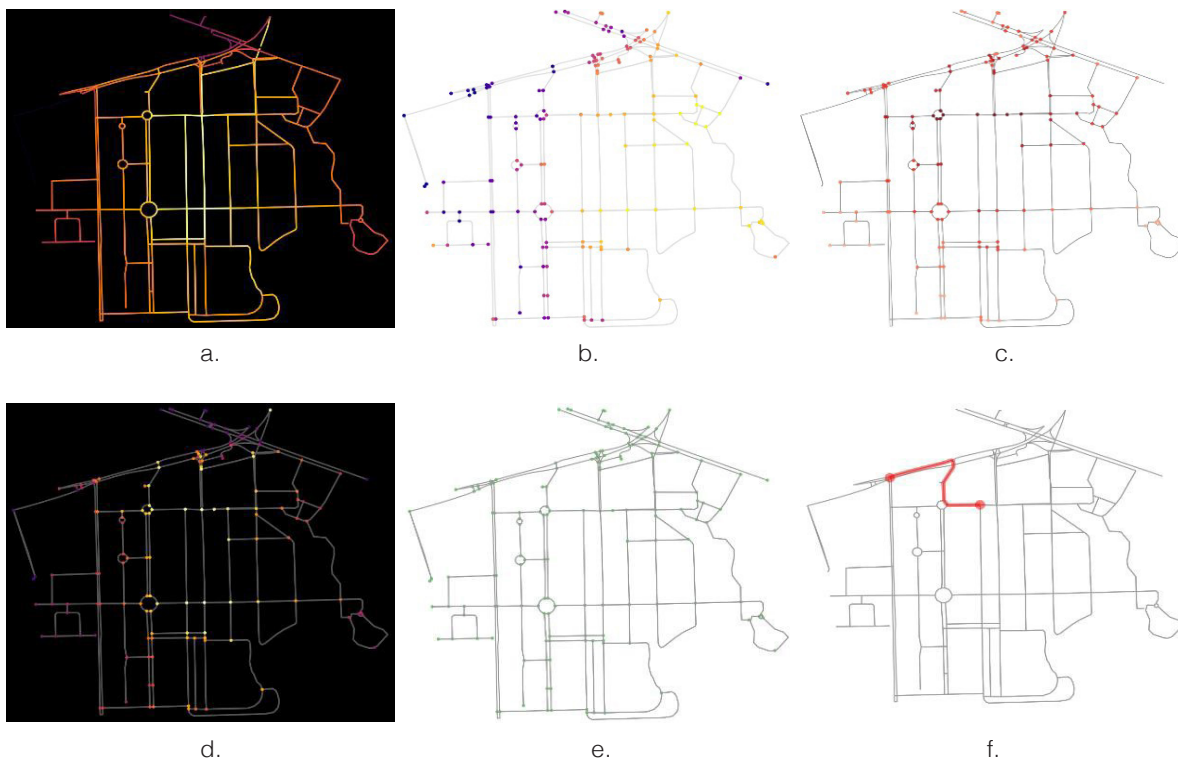
community, Clifford Estate might be the only one of its kind in China. According to the current land policy, the government has already planned many restrictions for the scale of land development. It is not feasible to supply such a large area of land as a single residential development anymore. There will no longer be pure residential communities in the future but to be combined with the commercial and industrial trends for mixed-used development.

Spatial analysis of Clifford Estate is based on geographical data that collected from various channels, furthermore, spatial characteristics of the CMU model are further tested by means of other measures. For this effect, we used the Spatial Design Network analysis (sDNA) in ArcGIS to calculate the centrality analysis of closeness (a measure of access) and betweenness (potential flow along a route) (see figure 4a). The centrality was calculated at 2 kilometers network radii, which equivalent to about 30 minutes of walking and 5 minutes of driving. Other radii were tested but due to the large size of urban blocks in the region they did not represent the local and mezzo scales well. In the results shown in Clifford Estate, the closeness within the internal area of CE is relatively high, indicating relative access internally. However, the closeness at the larger scale indicate that CE is isolated from the larger network. Similar results can be seen for betweenness, which future confirms CE isolation from the urban road network. Other test have been addressed to the network analysis of this case as well, for instance, elevation nodes; isochrones; node centrality; street network and routing (see figure 4b-f), results shows similarities as the centrality test, further indicate that this CMU development project has its distinct characteristics of high dependency of vehicle, low walkability, accessibility and connectivity.

Figure 4.

Configurative analysis of network:

a. centrality; b. elevation nodes; c. isochrones; d. node centrality; e. street network; f. routing



## 05 CONCLUSION AND DISCUSSION

The study reveals that Chinese Megablock Urbanism (CMU) has its own causes of formation, historical and cultural roots. Accompanying by the rapid development in its modernization and urbanization, has formed a unique urbanism model in the world. The Clifford Estate is a persuasive example of how CMU has grounded in Pearl River Delta, with specifications of its conditions and characteristics. Although the case study, on the other hand, spatial analysis shows distinctive shortcomings of mega community which include low accessibility and walkability, insufficient road density, over dependency on arterials and so on.

In future housing design practice, lessons learned from CMU can be divided into, firstly, advises for new neighborhood planning; secondly, how to regenerate the existing megablocks. In current circumstances, planning smaller block has reached a consensus from the perspective of planning policy, reactions from the market and residents still need to be proved. As for the built megablocks, the improvements that could be addressed are far more than simply demolish their walls and gates. The emphasis here from the configurative network analysis is on the spatial organization of the road network: both from the outside and inside of the megablock. In this sense, future housing models can be benefited from the advantages of both the rapid urbanization and a more sustainable development.

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