Using parametric modelling in form-based code design for high-dense cities

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Abstract

With the development of parametric design practices in the larger built environment, this paper proposes to merge parametric methodology with Form-Based Code in high-dense cities. Form-Based Code is a recent place-making approach which critically responds to conventional zoning. It aims to prescribe urban-rural environments and implement mixed used developments by figures instead of texts. Compare with conventional zoning, Form-Based Code is more practical and flexible for contemporary urban design processes as it emphasizes on “form” rather than rigid segregation “land-use”. Form-Based Code has been adopted in many cities successfully, but there is no adoption in high-dense cities. Due to the complicated nature of population concentration, urban planning of high-dense cities is in great need of efficient approaches like Form-Based Code. This paper presents the necessities, misconceptions, and challenges of applying Form-Based Code in high-dense cities, and then evaluates the parametric modelling methods which can support Form-Based Code generation in high-dense cities. In this respect, the paper promotes parametric modelling methodologies allow Form-Based Code to be smarter in building high-performance environment.

Keywords: Parametric modelling; form-based code; high-dense cities; built environment

1. Introduction

With the launch of New Urbanism in the 1980s, Form-Based Code was created as an alternative approach to conventional zoning and land use regulations by addressing the public realm and urban form (Ben-Joseph, 2005). It...
is a land development regulation that fosters predictable built results and a high-quality public space by using a physical form as the organizing principle for the code, which was developed by the Form-Based Codes Institute (FBCI, 2014). Compare with traditional land-use zoning focusing on building use and development capacity, Form-Based Code deals with the typology of a block, street, open space, and building façade (Kim, 2011).

Form-Based Code has been developed specifically to empower communities both to enable and to require better development patterns and individual projects (Parolek, 2008). From the Duany Plater-Zyberk & Company (DPZ) created the first contemporary Form-Based Codes for Seaside, Florida in 1981 to Miami 21, the first Form-Based Code creation for a major city in 2007, then to the latest Beaufort Development Code in South Carolina in 2015, there are hundreds of projects adopted Form-Based Code as a guidance theory. Most of these projects are for sparse American counties (a few of them are for counties of England, Romania, Canada, etc.). As Form-Based Code is a relative young and novel place-making theory, we hypothesizes it also can be applied in high-dense cities beyond America.

Hong Kong here works as a high-dense city example. Form-Based Code has the potential to be an interactive planning principle to improve the public space quality. The current planning methods of Hong Kong are primarily land use-based as conventional zoning. Form-Based Code should be a cutting-edge supplement for helping generate a more livable and multi-functional urban space. In Form-Based Code theory, Transect Matrix defines the hierarchical development scales (Kim, 2011). It assigns the built site into seven parts: T1 is the natural zone; T2 is the rural zone; T3 is the suburban zone; T4 is the general urban zone; T5 is the urban centre zone; T6 is the urban core zone; and SD is the special districts (Fig.1).

![Fig. 1. Standard transect zoning model of Form-Based Code (Parolek, 2008; Plater-Zyberk, 2009).](image)

According to the geographic limitation and population concentration, Transect Matrix of Hong Kong cannot be generalized in a common pattern. Most of the areas only have the T1-natural zone, T3-suburban zone and T6-urban core zone (Fig.2). Besides, different from the projects adopted Form-Based Code before, high-dense cities like Hong Kong have more complex coding parameters in terms of the volumetric urban environment both on the ground and
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