

*Streets and Patterns.* By Stephen Marshall. (London and New York: Spon Press, 2005). [Pp. 312.] \$ 69.95. ISBN 0415317509.

Stephen Marshall's *Streets and Patterns* covers ten years of research into the inter-relationship between transport, streets, and urban patterns, which has been the focus of multiple professions including urban planning, architecture, geography, and transport engineering. This book aims to explore how to reconcile the motor traffic with a neo-traditional system of urban design, emphasizing on streets and their patterns.

This book can be partitioned into three major parts. In the first, Chapter 1 reviews the urban revolution during the motor era, when urban streets, which historically served not only as through passage but also as public places, have been replaced by vehicular roads primarily built for the fast movement of traffic. This vast road-driven transformation, however, has proven dysfunctional, for creating new development that lacks identity and vitality. Its negative effects also include impaired transport sustainability, neighborhood amenity, and environment quality. Consequently, planners are returning to traditional street-based urban designs. The challenges, as demonstrated in Chapter 2, are to accommodate the traditional roles of streets while retaining the benefits of safety and efficiency of motor transport, and to address the confusion and inconsistency in conventional urban design caused by the lack of precision to describe desired street pattern and hierarchy.

To tackle these challenges, the second part investigates the nature of street networks, which comprises a large portion of this book. Chapters 3-5 examine three elementary aspects of the street structure: street type (hierarchy), pattern type, and route structure, respectively. In Chapter 3, Marshall claims the modern road hierarchy with its almost exclusive concern about motorized traffic imposes an artificial inverse relationship between mobility function and access function of roads, thus resulting in a dysfunctional disurban creation. He proposes a hierarchical ranking of streets incorporating non-traffic considerations in an urban context such as amenity and safety. Chapter 4 demonstrates a diverse range of existing characterizations of street pattern and develops typologies of pattern based on these properties. Chapter 5 develops a new transport network analysis based on route structure, as an alternative to the most commonly adopted graph-theoretic analysis on a network represented by nodes and links. Route structure properties are identified and quantified. The connectivity and complexity of a street network as a 'structure of routes' is analyzed in Chapter 6, where 60 example networks are evaluated and compared, and 'good' and 'bad' patterns are distinguished. Chapter 7 introduces the concept of constitution and interprets the structural issues discussed in previous chapters in a single conceptual framework of constitutional structure.

The last section focuses on the possible applications of the above investigation to planning practice. Chapter 8 discusses the design of street types. Chapter 9 proposes design guideline to create desired street patterns. Chapter 10 concludes the book and demonstrates the implications for the future practice.

Three contributions of this book need to be highlighted. This book elaborates the progressive abstraction of network structure from composition (geometry) to configuration (topology) to constitution (hierarchy), and develops a constitution-led approach for the analysis and design of street patterns (p. 225). This approach is based on the specifications of structural elements including links, routes and junctions and their relationships, without specifying any overall outcome. The author suggests such a

constitutional system of structural generation, as used by highway engineers in their standardized layout design (p.29), can provide clear guideline for urban planners, while adding more flexibility compared to the compositional and configurational designs, and thus is capable of generating desired street patterns.

This book also points out the key role of network arteriability with regard to the design of street hierarchy. Arteriability is a topological property of road networks indicating that all strategic routes connect contiguously (p.61). This book implies that arteriability not only determines the conventional urban road classification, but also makes implications for neo-traditional constitutional design, such that there is a contiguous network of the most strategic routes as the skeleton of urban streets. The author also proposes 'transit-oriented arteriability' (p.207) of streets to promote public transit.

In addition, this book presents elegant triangular diagrams as an analytic technique, which enables the quantification and comparison of network structures in a simple but effective way. This technique has been applied in this book to a diverse range of subjects from structural components such as junctions ('nodegram', p.100) and routes ('routegram', p.125), network properties such as connectivity ('netgram', p.141) and heterogeneity ('hetgram', p.148), to transport modes ('modegram', p.199).

Some supplemental comments can also be made. We like the idea of investigating network properties based on route structure, with the consideration of the movement on the network. But it is also worth noting that the route structure (such as hierarchy, continuity, and connectivity) intended by planners should not be equated with that perceived by motorists or pedestrians in their actual travel. The essence is that travelers can adjust their route choices according to the real traffic conditions, congestion, and road pricing, which are not considered by this book. This explains why planners and engineers are also examining network accessibility that incorporates travel behavior and travel demand prediction to improve their design for streets and roads.

Lastly, the author believes that large-scale patterns of streets and roads will emerge from bottom-up constitutional designs and individual acts of construction in a self-organizing urban evolution. Thus this book says little explicitly on the matter of collective network patterns. However, some typical large-scale patterns have been the focus of research for years and have been implemented successfully in practice, such as urban beltways and the hub-and-spoke for air transport. This book would have been more comprehensive by incorporating a discussion of network patterns at a collective level.

Nevertheless, this is one of the most exciting books we have read this year, which opens up the horizon to a new era of street-oriented urban and transportation planning, with a remarkable investigation into the nature of network hierarchy and pattern. This book would be of the most interest to students and researchers who are concerned with the dysfunctions brought by the automobile and its highways, as well as to practitioners who are looking for a useful guideline for better urban design.

*Feng Xie*

*David Levinson*

*Department of Civil Engineering*

*University of Minnesota*