The Art of
Vertical Green Space Development in the World

Mahdi Rahimi
Rouzbeh Kowsari

انتشارات دانشگاهی فرهمند

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In a world where cities are trapped amidst gray and lifeless structures, ***The Art of Vertical Green Space Development*** presents an innovative solution to bring life and beauty back to urban environments.

This book, focusing on green roofs, vertical gardens, and lush terraces, demonstrates how to transform barren, unused spaces into vibrant, beautiful, and sustainable environments.

Drawing on years of practical **experience** and **cutting-edge knowledge**, the authors provide practical solutions for optimizing urban spaces and designing sustainable architecture.

The Art of Vertical Green Space Development serves as a valuable guide for architects, engineers, and anyone passionate about creating greener cities and better lives. Every green roof, wall, and terrace is a step toward a more **sustainable future!**

www.greencheckco.com www.chekadbam.com www.chekadeno.com
www.chekadchoob.com

This book is the result of a collaborative effort between Mahdi Rahimi and Rouzbeh Kowsari, who, drawing on their knowledge, experience, and passion, strive to reinvent cities and create greener, more sustainable, and smarter spaces. Their goal is to provide practical solutions for architects, engineers, and environmental enthusiasts to build a better future for cities and communities.

Foreword by Dr. Yaser Shahbazi

In 2017, the book *"The Art of Vertical Green Space Development in Iran"* was published by Engineer Mahdi Rahimi, the founder and CEO of Green Check (Chakadbam Sabz Shahr). It marked a milestone in the literature on green roofs and vertical green space development in Iran. This work, introducing key concepts of green roofs and vertical green spaces, became a valuable guide for engineers, students, and enthusiasts of sustainable architecture and urban green space development. Known among Iranian architects and builders as the "Father of Green Roofs in Iran," Mr. Rahimi has played a prominent role in advancing knowledge and culture of sustainable architecture in the country through the execution of hundreds of successful projects in this field.

Now, after several years, a new version of this book is presented with a different title and expanded content. This edition not only continues the path of its predecessor but also incorporates extensive experiences and recent advancements in this domain, offering a more comprehensive and up-to-date perspective on vertical green space topics. This version examines advanced technologies, modern design principles, and practical solutions with a global approach to addressing contemporary green architecture challenges. In this book, Mr. Rahimi strives to bridge theoretical knowledge and practical experience, offering a fresh vision for the transformation of urban green spaces.

The presence of Mr. Rouzbeh Kowsari, the production and technical manager of Green Check (Chakadbam Sabz Shahr) and co-author of this book, further enriches its value. His hands-on experience in designing and implementing vertical green spaces has allowed this book to convey the practical and operational aspects of green architecture with greater depth and precision. Mr. Kowsari's expertise in managing execution projects and optimizing technical processes makes this book a tangible and practical resource for professionals.

In addition to its comprehensive scientific content, this book serves as an unparalleled practical guide for implementing vertical green space concepts in projects. Emphasizing engineering, economic, and environmental aspects, it stands as a unique and comprehensive work for all enthusiasts of creating more sustainable cities and better lives.

To all professionals, students, and enthusiasts of sustainable architecture and green space development, I recommend this book not only for reading but as a guide to action. This work can be an effective tool for addressing environmental challenges and improving urban life quality.

Dr. Yaser Shahbazi

Faculty Member, Tabriz Islamic Art University

Associate Professor of Intelligent Structures and Architectural Technology

Foreword by Dr. Mohammad Madhooshian

Faculty Member, Al-Zahra University, Tehran

The book *"The Art of Vertical Green Space Development"*, first published in 2017 by Engineer Mahdi Rahimi, founder and CEO of Green Check (Chakadbam Sabz Shahr), introduced a revolutionary perspective on green roofs and vertical green spaces in Iran. By providing fundamental and practical concepts, it became a valuable reference for architects, engineers, and enthusiasts of sustainable architecture. With over two decades of hands-on experience in this field and numerous executed projects, Mr. Rahimi is rightly recognized as the "Father of Green Roofs in Iran."

Now, after several years, a new edition of this book is released with updated content and a refreshed title. Leveraging past experiences and the latest scientific and technological achievements, this edition offers a more thorough examination of the design and implementation of vertical green spaces. By blending theoretical knowledge and practical experience, Mr. Rahimi has proposed innovative solutions to contemporary green architecture challenges.

The role of Mr. Rouzbeh Kowsari, production and technical manager of Green Check (Chakadbam Sabz Shahr) and co-author of this book, is also noteworthy. By sharing his practical and workshop experiences, he has enriched the content of the book, presenting the technical and operational dimensions of vertical green spaces with greater detail and accuracy.

This book, with a focus on technical, engineering, and environmental aspects, particularly in the intelligent use of sustainable wooden materials in designing green roofs and facades, is an invaluable resource for professionals, students, and enthusiasts of sustainable architecture. Studying and applying the recommendations of this work can take a significant step toward sustainable urban development and the reintegration of nature into urban environments.

Dr. Mohammad Madhooshian

Faculty Member, Al-Zahra University, Tehran

Specialist in Wood and Sustainable Architecture

Authors' Preface

In 2017, I published the book *"The Art of Vertical Green Space Development in Iran,"* a reflection of my knowledge and experience at the time in the fields of sustainable architecture and urban green spaces. The exceptional reception of that book highlighted society's need to revisit urban design and expand green spaces within the gray environments of cities. This response motivated me to continue this path with greater commitment and envision a brighter future for cities. Today, in a world facing environmental challenges, climate change, and rapid urbanization, utilizing modern technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), and Big Data analytics in architecture and urban design is an undeniable necessity. The new edition of this book reflects this global need, combining past experiences, advanced scientific knowledge, and emerging technologies to offer practical and intelligent solutions for creating more sustainable, beautiful, and human-centric cities. This book is not only a guide for designing and implementing vertical green spaces but also a roadmap for integrating nature and technology into urban life. From the application of AI tools in optimizing designs to exploring the impact of vertical green spaces on reducing pollution, enhancing life quality, and restoring nature to the heart of cities, this work provides a collection of practical and inspiring solutions for readers. I dedicate this book to all engineers, architects, students, and enthusiasts of sustainable architecture who strive to create a greener and smarter future. I hope this work inspires you and contributes to urban regeneration and a balanced coexistence between modern life and nature.

Mahdi Rahimi

The book *"The Art of Vertical Green Space Development in Iran,"* first published in 2017, inspired many enthusiasts of sustainable architecture and urban design. It introduced innovative concepts of smart utilization of urban spaces and laid the groundwork for new approaches in architecture and green roof development. This new edition focuses particularly on integrating green architecture with advanced technologies. Today, smart technologies such as environmental sensors, automated irrigation systems, and advanced data analysis algorithms enable us to design green spaces more efficiently and enhance their functionality. In addition to offering scientific and practical solutions, this book examines the cultural and historical use of flat roofs in Middle Eastern societies and redefines the cultural roots of this idea with a fresh perspective. I hope this work inspires a new generation of designers and engineers to create sustainable, smart, and more beautiful cities. This book, a blend of traditional knowledge, practical experiences, and technological advancements, can serve as a roadmap for urban regeneration and restoring nature to modern environments. I recommend utilizing this book not only as a study reference but also as a practical guide for your future designs and projects.

Rouzbeh Kowsari

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I extend my heartfelt gratitude to Dr. Yaser Shahbazi, esteemed Deputy of Research and Development (R&D) at Green Check, for his invaluable experience and numerous academic contributions in civil engineering and architecture, which played a pivotal role in enriching the content of this book.

I am also deeply thankful to Dr. Mohammad Madhooshian, Director of Innovation and R&D at Green Check, whose extensive expertise in wood engineering and architecture greatly contributed to the preparation of this book's content.

Special thanks to Engineer Fatemeh Keshani for her remarkable collaboration and participation in drafting the chapters related to urban planning. Her distinguished background at the University of Tehran's Faculty of Arts and nearly two decades of practical experience at Green Check have significantly enhanced the scientific and practical quality of this work.

I am grateful to Engineers Saeed Azadi and Sina Abbasmirzayi for their essential roles in the sections on roof smart systems and editing the content related to sustainability. Their expertise and knowledge were fundamental to this book's development.

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My appreciation extends to Mr. Mohammad Sharif Fereidunnia for his consistent support and tireless efforts, which were instrumental in advancing this project.

I am sincerely thankful to Engineer Sahar Nargesi, esteemed Deputy of Education at Green Check, for her valuable cooperation in drafting the research sections and theoretical foundations of green roofs, which added substantial depth to this work.

Finally, I express my utmost respect and gratitude to my esteemed colleague, Mr. Rouzbeh Kowsari, who has been a loyal and supportive partner throughout all these years. From the inception of the ideas for developing vertical green spaces to their practical realization, his dedication, extensive research into the historical and cultural roots of these spaces in the Middle East, and his contributions to research and production have been invaluable in preparing and compiling this book.

Mahdi Rahimi

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