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Radical Middle Grounds

New agendas for medium-density housing

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Sites-and-Services in Performance: Mass Housing Design beyond Efficiency and Resilience

Nelson Mota and Rohan Varma

Searching for the ideal density of households in residential areas has been a persistent pursuit of planners, designers, and policymakers since the inception of the rapid urbanization process triggered by the Industrial Revolution of the nineteenth century. One of the main challenges in this goal has been achieving the optimal trade-off between economic efficiency and quality of life, avoiding urban conditions prone to trigger social unrest and environmental degradation.

However, quantifying this trade-off has been anything but straightforward. How much is too much density? How can designers and policymakers use household density to conciliate the preservation of the natural environment while creating adequate living conditions in socially and spatially inclusive residential communities? Over the last century, this question has triggered very distinct answers.¹

While high residential densities were often associated with disease and urban squalor in industrial cities,² low density and sprawl were also a matter of contention.³ In her influential 1961 book *The Life and Death of Great American Cities*, Jane

Jacobs asks, “what are proper densities for city dwellings?”⁴ Her answer does not suggest a specific value but rather a condition: how density enables specific performances. She adverts, however, that “in-between densities” should be avoided. Those “between the point where semi-suburban character and function are lost, and the point at which lively diversity and public life can arise . . . are fit, generally, for nothing but trouble.”⁵ She points to the threshold of 100 dwellings to the acre (250 dwellings per hectare) as a reference to propel urban vitality.⁶

In the 1970s, with the increasing concern about ecological and environmental degradation caused by urbanization, there was a growing interest in the “compact city” model and in low-rise, high-density housing.⁷ Since the mid-1970s until today, the concept of density has been instrumentalized (used but also misused) to support new urban concepts, policies, and design paradigms, such as the planning agendas of New Urbanism in North America⁸ and Towards an Urban Renaissance in the United Kingdom.⁹ Notwithstanding their stress on the benefits of increased densities to stimulate

a growing sense of community in residential neighborhoods, both have been criticized for their association with the neoliberal agenda and its political economy of power.¹⁰

The latest iteration of the debate on density and the struggle to achieve an adequate trade-off between economic efficiency and sustainable development was triggered by the SARS-CoV-2 pandemic. Governments implemented a global lockdown advised by the World Health Organization all over the world to avoid the dissemination of the disease. This again opened the discussion on housing density and its consequences for public health and collective life, both in the Global North¹¹ and the Global South.¹²

This brief historical review illustrates different takes on what constitutes an *optimum* density range in housing. As Jane Jacobs asserted, the right value depends on specific circumstances. However, despite her advice to avoid “in-between densities,” this volume of CENTER explores “the medium-density range of housing as an incubator for radically new forms of cohabitation and urban morphology,” examining projects that promote typological solutions between the apartment and the suburban house. The intellectual challenge behind this editorial project is offering alternative approaches beyond New Urbanism’s “missing middle housing.”¹³ To contribute to this debate, this essay will focus on an overlooked medium-density housing strategy, the sites-and-services approach, arguably one of the most prominent attempts to explore a trade-off between economic efficiency and social resilience and between top-down initiatives and bottom-up self-initiated transformations.

Using a theoretical framework based on the principles of incremental housing,¹⁴ we will explore the sites-and-services approach from the perspective of spatial design and unpack some of the key design and managerial considerations one must consider while planning for sustainable and affordable mass housing. In particular, we analyze two case studies developed in the 1980s, one in Addis Ababa and another in Mumbai, using evidence gathered from observation during site visits, archival documentation, and design analysis of the projects. We examine the extent to which density, urban form, and typology have influenced the transformation of these settlements and created a positive trade-off between economic efficiency and social, environmental, and material resilience.

Sites-and-Services: A Short History

Before looking at the case studies, let us start with a short historical overview of the sites-and-services approach. Between World Wars I and II, the “self-help” housing approach became increasingly popular as a strategy to solve the affordable housing crisis in low-income countries. In the aftermath of WWII, the “sites-and-services” approach added an important twist. While the self-help housing schemes were mainly based on promoting grassroots initiatives, the sites-and-services approach was characterized by an interwoven relationship between the top-down design of the infrastructure—the services—and a bottom-up incremental improvement of the houses built on the plots—the sites.¹⁵

These characteristics resonate with the guidelines for action

formulated in the Vancouver Declaration, a document the United Nations prepared as a summary of its first Conference on Human Settlements (Habitat I), held in Vancouver in 1976. The Habitat I conference can be seen as the apex of a global trend toward a rehumanization of housing policies and design approaches that gained momentum in the three decades after the end of WWII.¹⁶ The Habitat I conference brought about the importance of seeking solutions for an optimal trade-off between economic and technological efficiency on the one hand and social and environmental sustainability on the other hand, focusing particularly on the “extremely serious condition of human settlements . . . which prevails in developing countries.”¹⁷

The Vancouver Declaration did not define any concrete standards for residential density. However, in line with postwar narratives of rehumanizing architecture, guideline 23 stated:

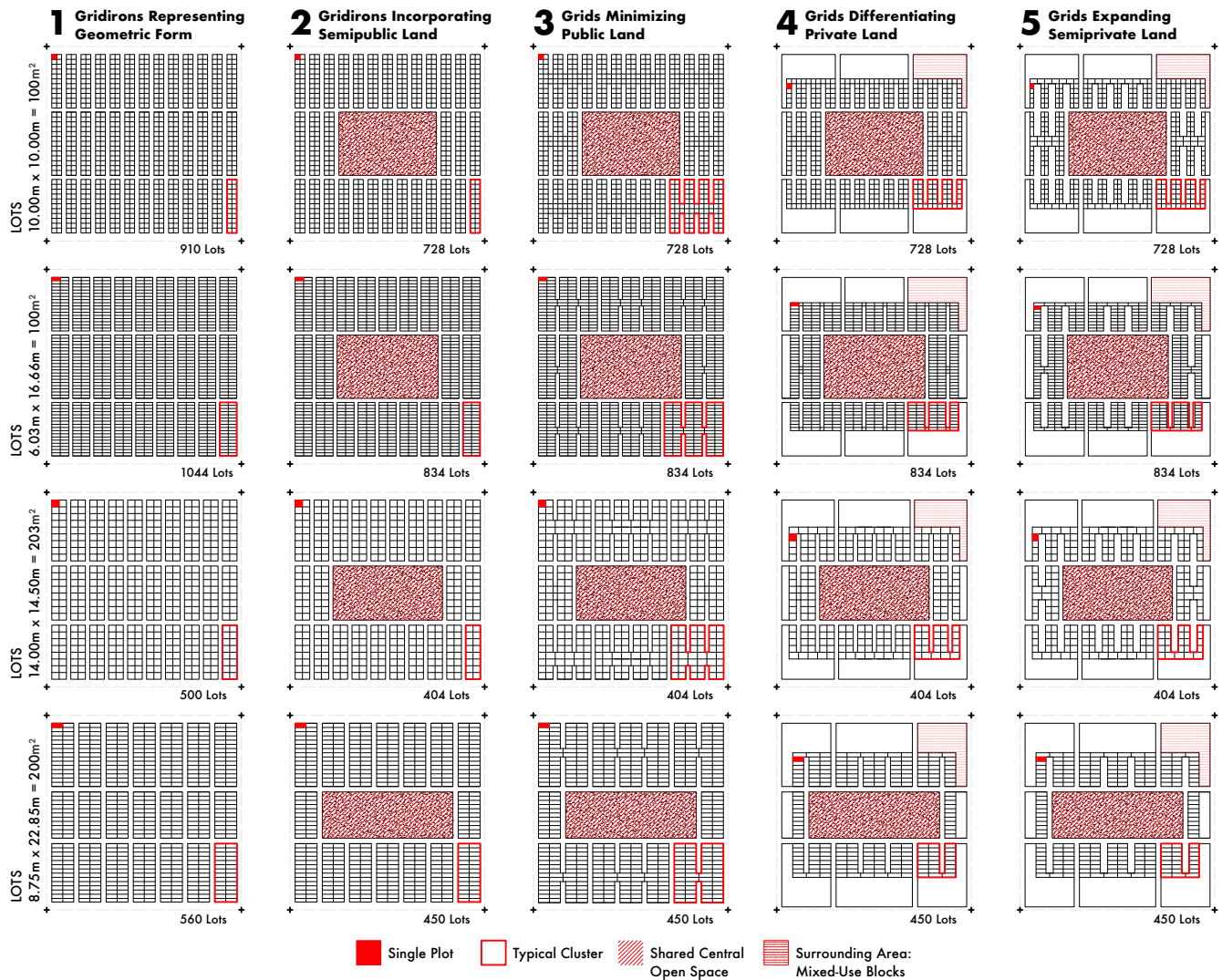
*While planning new human settlements or restructuring existing ones, a high priority should be given to the promotion of optimal and creative conditions of human coexistence. This implies the creation of a well-structured urban space on a human scale, the close interconnection of the different urban functions, the relief of urban man from intolerable psychological tensions due to overcrowding and chaos, the creation of chances of human encounters and the elimination of urban concepts leading to human isolation.*¹⁸

In their *Urbanization Primer*, published in 1978, MIT researchers Horacio Caminos and Reinhard

Goethert made a case for the sites-and-services approach as an alternative for mass housing. Their work can be seen as a concrete attempt to formalize and quantify what “optimal and creative conditions of human coexistence” could look like, especially in the context of rapid urbanization in developing countries. For these authors, the solution was either providing “complete dwellings to a few beneficiaries or to provide only basic utilities and services to a much larger sector of the population.”¹⁹

Caminos and Goethert compiled a comprehensive set of project assessments, site analyses, and design criteria to optimize the development of efficient sites-and-services schemes. In *Urbanization Primer*, they explored different design possibilities and developed an optimal layout able to accommodate incremental development (**figure 1**). The principles and strategies described and illustrated in the book were based on work developed under the auspices of the Urban Settlements Design in Developing Countries program, initiated in 1965 and carried out at MIT’s School of Architecture and Planning. It is based on contributions from several members of the program, working in the so-called Developing World, in such distinct places as Dhaka (Bangladesh), Dakar (Senegal), and Arequipa (Peru).

Despite the diversity of sources that contributed to the preparation of *Urbanization Primer*, the principles and strategies advocated in its pages disregarded the specific nature of distinct geographic, cultural, and environmental contexts. Rather, it relied on a generic construction of the Developing World as a monolithic category:



*In our urbanizing world, living conditions and dwelling environments are rapidly deteriorating for the majority of the population. The problem is aggravated in developing areas because political and economic systems are unstable, social well-being is the privilege of a minority in power, and the settlement process is largely out of control.*²⁰

Still, Caminos and Goethert defended the “pragmatism and abstraction” of their approach, arguing that their main goal “is

to identify and quantify simple urban elements that can be found in any dwelling environment under different social, economic, and political conditions.”²¹

Their “optimal layout” considered an average density of sixty to sixty-five dwellings per hectare, evolving from an initial stage of development at 200 persons per hectare to a saturated stage of development at 600 persons per hectare,²² always maintaining twelve square meters of dwelling area per person.²³

1. Optimization of residential grid based on plot size and configuration as described in *Urbanization Primer*. Image: Fynn Mengel, redrawn and adapted from Horacio Caminos and Reinhard Goethert, *Urbanization Primer* (Cambridge, MA: The MIT Press, 1978). Reproduced with permission.

Their research for the optimum layout in the sites-and-services developments would set the standards for the worldwide dissemination of this approach. Eventually, sites-and-services housing schemes, mostly due to the sponsorship of the World Bank, would be responsible for the development of several million incremental dwellings built in the 1980s.²⁴ To understand and document this approach better, let us now look in more detail at two contrasting examples of sites-and-services schemes developed by the World Bank in the 1980s, Saris Addisu in Ethiopia and Charkop in India, representing two different geopolitical contexts of the generic Developing World geography that Caminos and Goethert addressed in their *Urbanization Primer*.

Saris Addisu (Addis Ababa, Ethiopia)

The Saris Addisu sites-and-services scheme was built in Ethiopia's capital city, Addis Ababa.²⁵ This project was developed in the early 1980s in an area of 130 hectares in the Nefas Silk Lafto sub-city and was funded by the World Bank.²⁶ It aimed at developing 3,150 residential plots, 164 mixed-use plots (commercial and residential), and 186 industrial plots.

The preliminary plan for the Saris Addisu site, presented in 1982, followed some design guidelines and managerial strategies advocated for in *Urbanization Primer*. However, the efficiency of the scheme did not reach the optimum layout proposed by Caminos and Goethert. Most of the project's 130 hectares were occupied with the so-called serviced plots. Each plot had 144 square meters (8 × 18 m). Hence

the proposed plot size was bigger than the one suggested by the MIT researchers (i.e., 100 square meters). At the initial stage of development, the overall density in Saris Addisu was twenty-six dwellings per hectare, much lower than the sixty dwellings per hectare suggested in *Urbanization Primer* (**figure 2**).²⁷

Creating a typological, functional, and social mix was also an important aspect of the project. For example, there were two types of houses built on the serviced plots: plots with two-story houses, located next to the primary and secondary roads, associated in rows of four units; and plots with one-story (core-) houses located in the areas away from the primary and secondary roads, usually associated in clusters of twenty plots. The plan also included 250 dual-use or industrial plots of up to 250 square meters. According to the World Bank project appraisal report, this diversity aimed to promote "a balanced community of mixed-income families (**figure 3**)."²⁸

After the completion of the infrastructure and plot subdivision in Saris Addisu, most of the houses built on the plots expanded further. However, as the Saris Addisu plots were relatively large, the expansion usually developed horizontally, avoiding the cost and technical requirements of adding extra floors (**figure 4**).

In the main and secondary streets of the settlement, the plots with two-story houses show a different pattern of transformation through time. This created a clear variation of atmospheric qualities and perception of density. The streets are lively and active in these areas, with people constantly roaming around. However, in the parts of Saris Addisu where the single-floor (core-) dwelling units

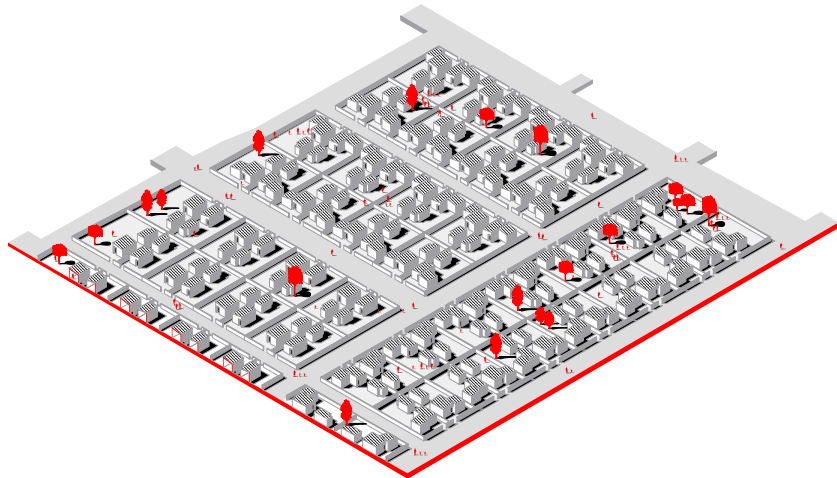
predominate, we can observe the prevalence of blind walls, plastered, or made of corrugated metal sheet, defining perimeters. Sometimes, these walls turn into a corner shop or a small social amenity. There are also cases where it is possible to observe the complete replacement of the initial core unit by a new detached or semidetached house, sometimes two floors high (**figure 5**).

Charkop (Mumbai, India)

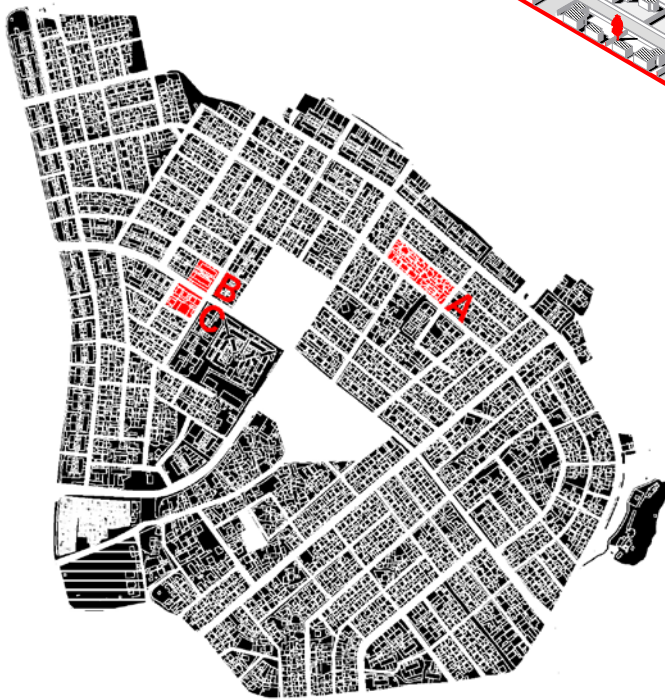
Let's turn now to India, where a very distinct example of the sites-and-services approach can be found in Charkop in Mumbai. Charkop was initiated in the mid-1980s as part of the World Bank's Bombay Urban Development Project²⁹ and followed the Bank's three principles of affordability, cost recovery, and replicability. Despite these strict considerations, Charkop contains a diverse range of housing types.³⁰ The key design feature of the plan is that of a typical residential cluster consisting of thirty-five small plots that range from twenty-five to about forty square meters. While the larger plots line the outer streets, the smaller ones are accessed through an entrance that leads to an inner, more private courtyard (**figure 6**).

The managerial and design strategy of the Charkop project has enabled a high density of roughly 170 dwellings per hectare, allowing a diverse cross-section of society to access housing options that cater to many needs and income levels.³¹ As such, this project can be seen as exceptional in its attempt to avoid the usual binary opposition of profit versus people in Mumbai's housing policies.³²

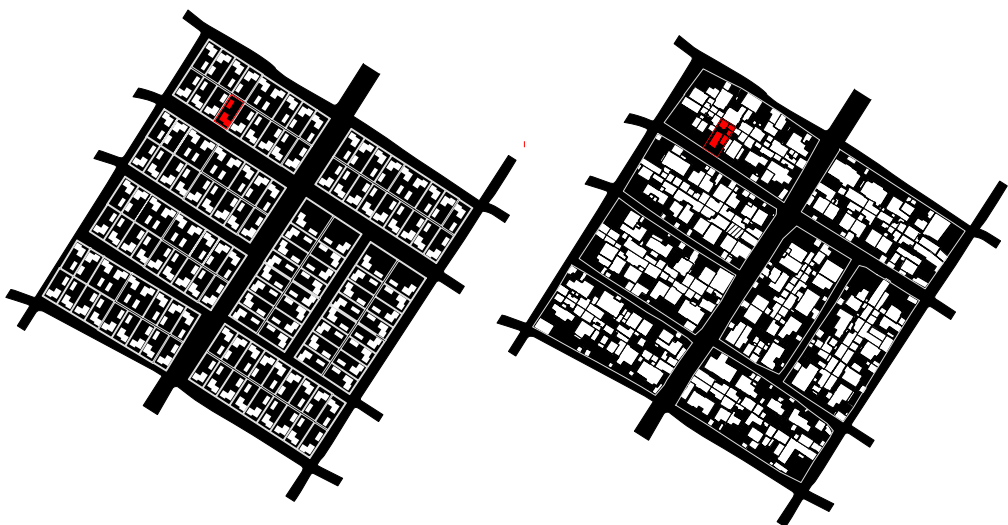
The patterns of growth and change through time in Charkop contrast



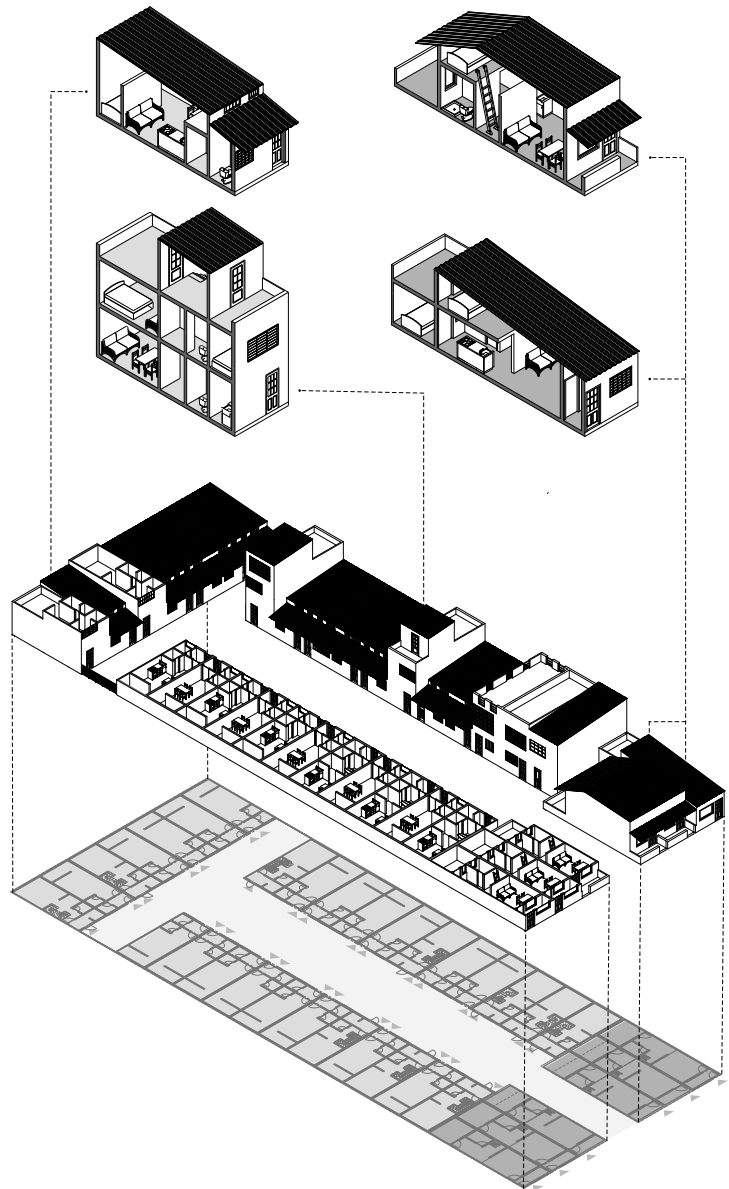
2. (above) Typical organization of a residential sector in the initial stage of Saris Addisu. Image: Fynn Mengel, redrawn and adapted from the contextual analysis developed for the course “Global Housing,” graduation studio, TU Delft, 2015–2016. Reproduced with permission.



3. (left) Situation plan of the Saris Addisu sites-and-services project: (A) urban block with 144-square-meter single-floor (core-) houses; (B) urban block with 144-square-meter double-floor houses; (C) Urban block with 250-square-meter mixed-use buildings. Image: Fynn Mengel, adapted from digital cartography of Addis Ababa. Reproduced with permission.



4. Typical organization of a residential block in the initial stage of Saris Addisu (left) and in the saturated phase (right). Image: Fynn Mengel, redrawn and adapted from the contextual analysis developed for the course “Global Housing,” graduation studio, TU Delft, 2015–2016. Reproduced with permission.



5. (left) Views of Saris Addisu. From top: View of the main street; view of a residential street with the typical 144-square-meter plot built as a double-story house; view of a residential street with the typical 144-square-meter plot built as a single-story core house; corner situation with a shop. Photos: Nelson Mota (2015).

6. (above) Axonometric perspective of a typical development of a cluster in Charkop. Image: Freya Crijns, reproduced with permission.

with those of Saris Addisu. Although nearly two-thirds of the plots in Charkop are much smaller than in the Ethiopian case discussed above, we find today that despite this, inhabitants have expanded their homes vertically, often tripling the habitable area they first received (**figure 7**).

At the larger scale, these clusters are repeated in an efficient manner and are framed by a clear hierarchical street grid and open space network that covers ninety hectares and accommodates more than 15,000 plots, including much bigger plots that range from sixty square meters for middle-income groups to about 750-square meter plots for apartment buildings built by cooperatives that each house between ten and fifteen higher-income households (**figure 8**).

This range is crucial for two reasons. Firstly, on a managerial level, it enables the project to achieve affordability through cross-subsidization. And secondly, it ensures that Charkop has a mix of income groups that have helped it develop into a dense and vibrant neighborhood full of residences of various types and sizes—from privately owned homes and rental units to small kiosks and shops on its many inner streets to substantially larger apartment buildings for higher income groups along the scheme's main peripheral roads.

Sites-and-Services in Performance

The case studies outlined above demonstrate two different progressive development and performance patterns in sites-and-services schemes. Both cases illustrate the importance of proving a sound infrastructural provision from the beginning of the development, which mitigated the peripheral location of the settlements

at the time they were built. In fact, what started as a peripheral development to benefit from the availability and lower cost of land has been progressively integrated and assimilated into the expanding fabric of the city. Moreover, this development has led to mixed-use, mixed-income neighborhoods that completely break away from the cookie-cutter, one size-fits-all approach of conventional public-housing projects.

Moreover, the level of vibrancy in the social and economic activities is directly proportional to the density of the settlement. For example, a street in Charkop, where the average density was 170 dwellings per hectare, shows a higher level of activation than a street in Saris Addisu, where the average density was twenty-six dwellings per hectare. On the other hand, a bigger plot size, as in the case of Saris Addisu (75 percent of the residential plots had an area of 144 square meters), creates possibilities for cheaper incremental growth through horizontal expansion and opens possibilities to add new areas for economic activities such as shops, workshops, or renting additional rooms.

What becomes clear from these two cases is that density plays a key role in the patterns of incremental growth of sites-and-services schemes. Both cases demonstrate a clear correlation between density and the layout of the master plan in the activation of public space, thus influencing the atmospheric qualities and perception of safety in residential areas. The higher density of Charkop enables social control through a stronger connection to the public space. In Saris Addisu, by contrast, while the two-floor dwelling units activate the main and secondary streets of the neighborhood, the

served plots of 144 square meters with single-floor (core-) houses are now mostly fenced off from the public space. As mentioned, however, the potential negative aspects of this lower density is mitigated in plots located in strategic positions (e.g., corners) by the creation of informal shops and workshops.

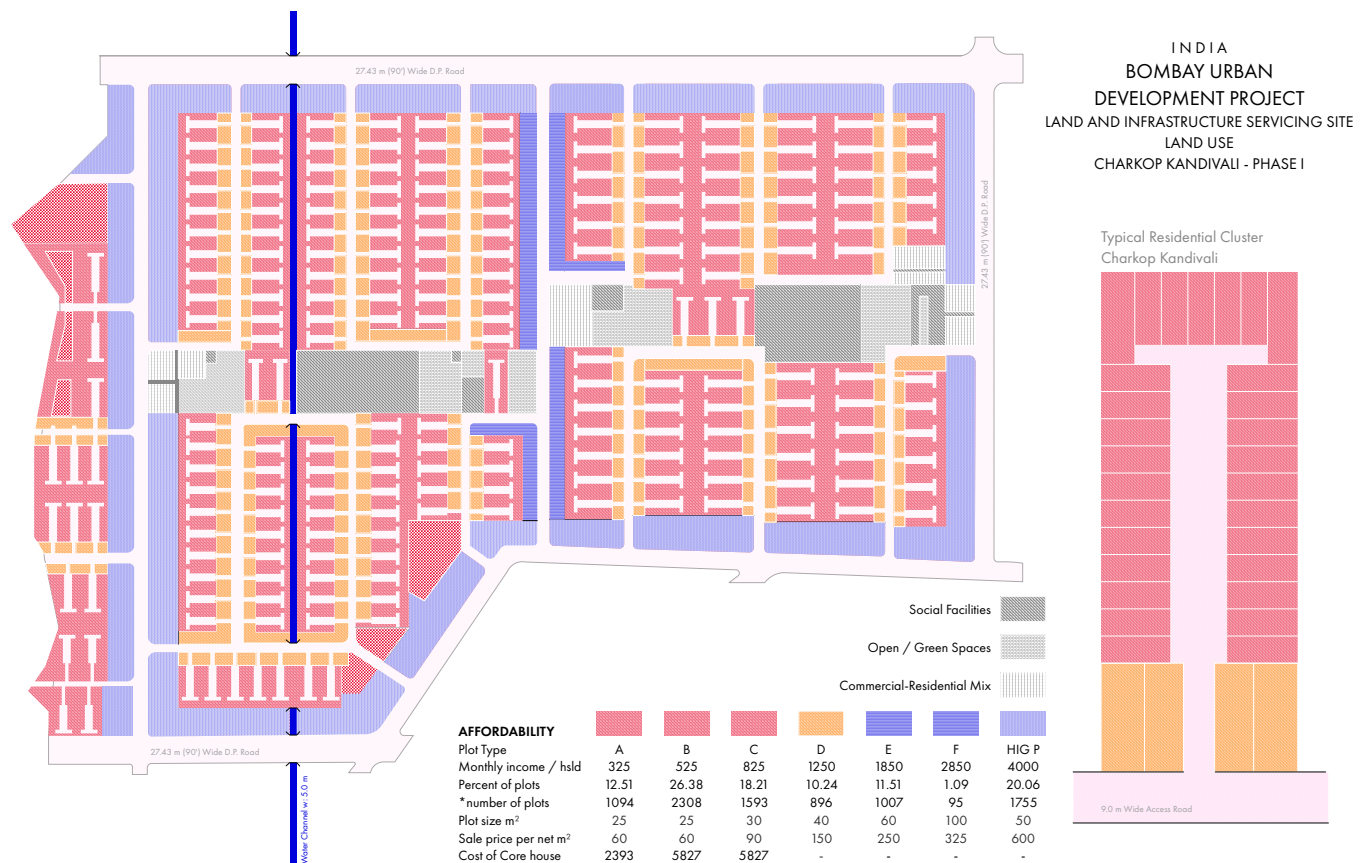
Saris Addisu and Charkop demonstrate the potential of using the sites-and-services approach to explore a wide range of densities (from 26 to 170 dwellings per hectare) that can combine permanence with reinvention. The layout of the basic infrastructure of services, the network of accessibility, and the strategy of plot subdivision provide permanent support for a constant and dynamic reinvention of each residential plot. This combination of permanence and reinvention can yield different levels of economic efficiency and enable different perceptions of quality of life. The case of Charkop and other similar sites-and-services built in India suggest that an adequate trade-off of these factors can be achieved with residential densities between 100 and 180 dwellings per hectare.³³ This suggestion is supported by recent studies indicating that sites-and-services schemes inspired by these examples can likewise play an important role in meeting sustainable housing demands.³⁴

Conclusion: Six Attributes for a Radical Middle Ground in Housing for All

The sites-and-services approach remains a situated phenomenon, developed in a specific historical period (the 1970s and 1980s) and in a specific geography (the so-called Developing World, corresponding



7. Current view of a courtyard in one of the clusters of Charkop (left) and a typical street (right).
Photos: Rohan Varma (2021).



8. Charkop Land Use Plan showing the diversity of income groups and plot layouts.
Image: Fynn Mengel, redrawn and adapted from "Staff Appraisal Report: Bombay Urban Development Project," 4794-IN, World Bank. Reproduced with permission.

today to the notion of the Global South). Its partial reliance on incremental housing through self-help and mutual-help initiatives, a key aspect in countries with limited resources, did not appeal to housing programs, policies, and design strategies developed over the last fifty years in the wealthier countries of the Global North.³⁵

We suggest a critical reappraisal of the sites-and-services approach for developing solutions to tackle the challenge of providing adequate housing to the 1.6 billion people globally who still live in inadequate housing conditions.³⁶ In light of the two cases discussed in this article, we would single out six planning and design attributes that should be considered in the development of adequate housing worldwide, in line with the guiding principles included in the UN-Habitat strategy “Housing at the Centre” of United Nations’ New Urban Agenda.³⁷

1. Coproduction: Participation of future residents in the design decision-making process stimulates a deeper understanding of vernacular social and spatial practices, collective memory, and aspirations.
2. Household density and plot optimization: Plot size and configuration affects the density of households and thus determines the possibility of achieving optimal cost recovery and replicability. A careful optimization of plot configurations and sizes can reduce infrastructure costs (streets, sewers, water lines).
3. Incrementality: Accommodating possibilities for progressive development from an initial stage of development to a saturated

stage allows for an efficient allocation of public and private financial resources and supports the customization of dwelling environments that go beyond the ubiquitous apartment and suburban home models.

4. Typology and functional mix: Allocating land for different uses and social practices and promoting a mix of residential types and tenure systems supports plot pricing and payment plans targeted to different income groups. This feature can be instrumental in accommodating different patterns of everyday life, diverse forms of income generation, and spaces for social interaction, generating residential neighborhoods that are inclusive, promote diversity, and avoid ghettoization and gentrification. Moreover, at a managerial level, this would also encourage cross-subsidization to make projects more feasible.
5. Spatial hierarchy: Introducing a hierarchical sequence of open spaces and infrastructure contributes to a variety of experiences in public spaces and to a diversity of activities and atmospheric qualities in the neighborhood.
6. Clustering: The dwelling units should be associated in layouts that promote meaningful conviviality and social interaction at a human scale.

Despite being inspired by cases in low- and middle-income countries located in non-Western geographies, we argue that these six planning and design attributes can be implemented today in a diverse range of geopolitical and socioeconomic contexts. Deliberately, these principles are not

based on a rigid set of quantifiable parameters, and they do not depend on specific socio-spatial realities or cultural backgrounds. They combine aspects associated with planning strategies and design decisions that resonate with the UN-Habitat’s “Housing for All” campaign.³⁸ As such, these principles can be implemented to achieve the desired trade-off between economic efficiency and social, environmental, and material resilience in housing projects developed in diverse contexts, ranging from informal settlement upgrading approaches in low-income countries to the development of new towns in middle-income countries to urban regeneration in high-income countries.

Lastly, we wish to highlight the importance of addressing issues of temporality and progressive development in housing design and evaluation of residential satisfaction and performance. Rather than just considering the short-term performance of housing projects, it is important to produce in-depth studies that consider their performance over time. Only making sense of the *longue durée* of a human settlement will yield adequate conclusions to evaluate its capacity to help form a radical middle ground, avoiding the pitfalls of Jane Jacobs’s “mid-densities,” achieving the ambitions of the Vancouver Declaration, and contributing to the United Nations Sustainable Development Goals.

Notes

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- 18 United Nations, 9.
- 19 Horacio Caminos and Reinhard Goethert, *Urbanization Primer* (Cambridge, MA: MIT Press, 1978), 7.
- 20 Caminos and Goethert, 6.
- 21 Caminos and Goethert, 7.
- 22 Caminos and Goethert, 28–29.
- 23 The densities proposed in *Urbanization Primer* are not calculated in terms of dwellings per hectare. Rather, they are defined in terms of persons per hectare, which is more adequate for the analysis of incremental housing schemes, where the number of dwellings remains the same, but the number of persons per dwelling increases over time. Their calculations were made considering 1,000 lots could be built in an area of sixteen hectares, which corresponds to a density of 62.5 dwellings per hectare.
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- 28 The World Bank – Eastern Africa Projects Department, "Staff Appraisal Report," 16.
- 29 The World Bank – South Asia Projects Department, "Staff Appraisal Report. Bombay Urban Development Project," January 4, 1985.
- 30 Sameep Padora, *In The Name of Housing: A Study of 11 Projects In Mumbai*. (Mumbai: Urban Design Research Institute, 2016).
- 31 According to the World Bank's Staff Appraisal Report, "a relatively high average gross residential density of about 145 households per hectare would be achieved, because of efficient site planning and the inclusion of apartment plots," 16. In the case of Charkop I, the density is even higher, as it was designed to accommodate 15,420 households in 90 hectares.
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