Atlas of Urban Expansion

The 2016 Edition Volume 2: Blocks and Roads



Shlomo Angel, Patrick Lamson-Hall, Manuel Madrid, Alejandro M. Blei, and Jason Parent, *with* Nicolás Galarza Sánchez and Kevin Thom

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NEW YORK UNIVERSITY





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Cover Image: The urban periphery of Kolkata, India (left) and Lima, Peru (right)

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FOREWARD

The *Atlas of Urban Expansion—2016 Edition* presents maps and measures of the recent, as well as the long-term, expansion of cities in an easily accessible format, providing authoritative data, information, and advice on current and emerging urbanization trends and conditions in cities the world over.

The study underlying the Atlas pushes forward the borders of the 'science of cities' using state-of-theart research, satellite imagery, and novel analytical techniques to produce one of the most critical masses of urban indicators and metrics since Habitat II. Much like medical science before it, this book adopts cities as units of analysis and studies them together to discover patterns of similarities and differences among them.

UN-Habitat, the UN agency charged with overseeing, reporting, and advising on world urbanization trends and developments, has started to monitor these trends and developments with a new UN Global Sample of Cities. This sample—composed of 200 cities that statistically represent the urban world—was created, tested, and applied in a series of studies undertaken by a tri-partite collaboration between UN-Habitat, New York University, and the Lincoln Institute of Land Policy. The *Atlas of Urban Expansion—2016 Edition* is part of a broader research programme entitled *Monitoring Global Urban Expansion* that, in different products, provides maps and metrics on the growth and expansion of cities the world over, along with information regarding the quality of that expansion, the performance of the housing sector, and the state of regulatory regimes in the expansion areas of cities, the areas built between 1990 and 2014. All these studies provide globally representative evidence to substantiate and support the implementation, follow-up, and review of the city-related Sustainable Development Goals

and the New Urban Agenda.

The results of this study are quite shocking: urban growth is mostly taking place in an unplanned and disorderly manner, informality is becoming more common over time, cities are expanding their territories faster than their populations, residential densities are decreasing dramatically, public spaces and the lands allocated to streets and arterial roads are also in decline. All these are real, empirical facts, proving that the contemporary model of urbanization is becoming highly unsustainable.

The aim of this study is to provide informed analyses to policy makers, public officials, research administrators, and scientists for use in their decision-making processes. In this sense, the *Atlas of Urban Expansion* is part of the emerging 'science of policy' that is dedicated to the production of knowledge that best serves the public interest.

Joan Clos, Under-Secretary-General, United Nations Executive Director, UN-Habitat Nairobi, Kenya www.unhabitat.org

The chronicle of global urbanization that follows offers a visually stunning example of how increasingly enhanced satellite technology might be used to guide the future growth of the world's cities. The *Atlas of Urban Expansion—The 2016 Edition* underscores a basic truth: we'll need to do a better job managing this planet of cities over the next decades than we did during the last few. The next half-century represents our last and only opportunity to get urbanization right. As we welcome hundreds of millions of people into our cities in the coming decades, we'll need our best tools to craft them into the cities we, and the planet, need. The *Atlas* is one of those tools.

Buttressed by survey research that connects actions on the ground with the view from space, the Atlas begins to articulate a more informed narrative about the relationship between land policies and urban form. Only by understanding the quality of urban growth that has occurred up to this point, and the efficacy of our efforts to manage it, can we hope to make the necessary changes in urban practice that we need to build environmentally and fiscally sustainable places.

An urban observatory based on the approach demonstrated in the Atlas will play an important role in monitoring the implementation of the New Urban Agenda following Habitat III in Quito, Ecuador in October 2016. It will produce a more scientific, evidence-based record of city-building—holding us, and UN member states, accountable for delivering on our commitments to create the better urban future embodied in the New Urban Agenda and the Sustainable Development Goals. We will see whether cities are on the right track by observing from space and on the ground if cities are getting better for all of the billions of citizens inhabiting them; and not just observing, but testing hypotheses regarding what we think will work, and finding out what does.

The Lincoln Institute of Land Policy was honored to begin this work with Shlomo "Solly" Angel and his team, establishing the original online Atlas of Urban Expansion and publishing two books, *The Atlas of Urban Expansion* and *Planet of Cities*. We celebrate this next stage of this important undertaking, in partnership with New York University and UN-Habitat: The Atlas of Urban Expansion—2016 edition.

George W. "Mac" McCarthy President and CEO, Lincoln Institute of Land Policy Cambridge, Mass. www.lincolninst.edu

The anti-sprawl agenda—decrying unplanned, low density, fragmented and non-compact urban expansion—has been guiding city planners for decades and we now find that the majority of cities have adopted land use plans that seek to contain their outward expansion in one form or another. This new finding raises a number of important questions: Has the expansion of cities—still propelled by urban population growth, by larger incomes that allow residents to consume more land, by inexpensive transport that allows them to travel to work over longer distances, and by resistance to the densification of built-up neighborhoods—slowed down, or even halted? Are average urban population densities increasing or decreasing? Where are the new urban areas, the areas developed during the past twenty-five years? Are these areas being properly laid out before development occurs? Are sufficient public works—be they local roads that organize neighborhoods or arterial roads that connect workers to the best jobs available to them—being put in place, or does the new urban periphery remain largely invisible to municipal officials, suffering from benign neglect?

In the past, these questions could only be answered, if at all, by studies that focused on one city in detail, on a few cities in one country, or on a few cities in a few countries, and concluding these studies with hints or implications for overall urban policy everywhere. Worse yet, researchers—attracted to cities with better data—often chose to study cities in more developed countries and then offer urban policy recipes for cities in less developed ones, where conditions—rapid rates of population growth, inadequate municipal or housing finance, and weak rule of law, for example—make the transfer of knowledge, policy prescriptions, and planning practices rather irrelevant. The observation that there will be eighteen or more new urban residents in less developed countries in the coming decades for each new urban

resident in more developed ones, makes such intellectual exports even less relevant.

The new Atlas of Urban Expansion—2016 Edition sheds new light on some of these questions by studying urban expansion and urban peripheries in cities the world over, be they in more developed or less developed countries, be they familiar megacities with many millions of residents or unfamiliar provincial towns with 100,000 inhabitants or more. With a new focus on a carefully chosen sample of 200 cities from the entire universe of cities—all 4,231 cities and metropolitan areas that had 100,000 people on more in 2010—it becomes possible to gather new knowledge about cities, knowledge that had thus far eluded us. The new Atlas explores a number of new data layers that pertain to this global sample of cities and that can now inform us about the universe of cities as a whole. It also offers us a new platform for studying more and more data layers in the future in a systematic manner, quickly becoming an effective tool for monitoring cities globally, a tool that will allow us to monitor the New Urban Agenda and the city-based Sustainable Development Goals in a rigorous and systematic manner in the years to come.

Shlomo Angel, Director The NYU Urban Expansion Program The Marron Institute of Urban Management and the Stern School of Business New York University, New York www.marroninstitute.nyu.edu/programs/urban-expansion

CHAPTER 1

The Dynamics of Global Urban Expansion

The *Atlas of Urban Expansion—The 2016 Edition* provides maps and estimates of the dimensions and attributes of urban expansion in a global sample of 200 cities. These maps and estimates should help us examine two sets of simple questions. First, what are the physical extents of urban areas on our planet today, what are their key attributes, and how and why are they changing over time? Second, how well configured are recently built urban peripheries, and how and why are layouts changing over time? Answers to these questions, provisional as they may be, may make us all less fearful of the rapid expansion of the urban peripheries of our cities, and hence better able to confront this expansion in a meaningful way. In large part, these are not theoretical questions but rather practical ones. Allowing cities to expand simply through the cumulative acts of their residents carries heavy costs. City residents need to engage—as responsible citizens acting together in their common interest—in ensuring that urban peripheries are laid out in a timely and pragmatic manner before they are occupied, as urban communities have done many times in the past. This is a seemingly simple task that, for one reason or another, we are failing at today—as an initial inspection of the Atlas clearly shows—with serious consequences for the productivity, inclusiveness, and sustainability of our cities in the decades to come.

Humanity is in the midst of its most ambitious project, the Urbanization Project—the gradual movement of people away from being closer to the land to being closer to each other. This project, which entails accommodating increasing numbers of people in cities, started in earnest at the beginning of the eighteenth century when less than 10% of the people lived in cities, and will be largely complete by the end of the twenty-first century when three-quarters or more of humanity will live in cities. By 1950, only 30% of the world's population resided in cities. That share increased to 54% by 2015 and is now expected to increase to 66% by 2050. The world's urban population is expected to increase from 4.0 billion in 2015 to 6.3 billion in 2050, and almost all of this growth is expected to take place in less developed countries (figure 1.1). Cities in more developed countries will add only 130 million people to their populations during this period. Cities in less developed countries will need to absorb 18 times that number, or close to 2.3 billion people, thereby increasing their total urban population of 3.0 billion in 2015 by 75% (United Nations Population Division 2014, files 2 and 3).





When cities grow in population and income, they grow outwards and upwards (figure 1.2). The amount of outward expansion is typically underestimated and the quality of urban layouts in expansion areas is largely unknown. The population of cities in less developed countries doubled between 1990 and 2015, for example—the time period covered in this Atlas—and their urban extents increased on average

by a factor of 3.5. In parallel, the population of cities in more developed countries increased by a factor of 1.2 between 1990 and 2015; their urban extents increased by a factor of 1.8. The areas of cities are growing at a faster rate than their populations, in part because economic development results in more consumption in general and more land consumption per capita. In fact, average urban densities in less developed countries—3.3 times higher than densities in more developed countries in 1990—declined at an average annual rate of 2.1% between 1990 and 2015. In more developed countries, densities declined at 1.5% during this period. Urban land consumption per capita in these regions—the reciprocal of density—increased at identical rates.

FIGURE 1.2: The outward and upward growth of Panama City, Panama, 1930 – 2009



Images via: Skyscraper City, Brian Gratwicke

These trends are likely to continue in one form or another. Between 2015 and 2050, urban extents in more developed countries can be expected to increase by a factor of 1.9 at the current rate of increase in land consumption, by a factor of 1.5 at half the current rate, and by a factor of 1.1 if land consumption per capita remains constant over time. During this period, urban extents in less developed countries will increase by a factor of 3.7 at the current rate of increase in land consumption, by a factor of 1.8 if land consumption remains constant.

By now, it should be clear that we cannot hope to slow down the urbanization process or to shift populations among cities. People are free to move within their own countries and their right to move is enshrined in the Universal Declaration of Human Rights.¹ We know that population growth in cities large and small cannot be guided by policy effectively. But the conversion of land from rural to urban use is very much guided and influenced by policy.

When cities grow in population and wealth they expand. As cities expand, they need to convert and prepare lands for urban use. Stated as a broad policy goal, cities need adequate lands to accommodate their growing populations and these lands need to be affordable, properly serviced, and accessible to jobs to be of optimum use to their inhabitants. To meet this goal, cities need concerted public action—action that secures adequate lands for public works and public open spaces in advance of development, for example—that precedes and guides the operation of the free market on the urban fringe. In the absence of concerted public action, land and housing markets, efficient as they may be in theory, will fail to perform properly in practice.

Indeed, an initial inspection of urban layouts in the global sample of cities suggests that most of the residential fabric in the expansion areas of cities (1990–2014), especially in less developed countries, is unplanned and disorderly, taking place in defiance of municipal plans or regulations. It suggests that the share of urban lands that are laid out before occupation is declining over time; it also suggests that the share of the areas of cities within walking distance of arterial roads is declining as well, failing to connect urban peripheries effectively to metropolitan labor markets, making cities less productive, less inclusive, and less sustainable. In many cities, not enough land is allocated to local streets, segregating neighborhoods, minimizing redundancy in route selection, and creating serious bottlenecks, all of which impede the integration of the urban fringe into the city. The share of the land allocated to streets in newly urbanized areas is also declining. Substantial areas on the urban fringe consist of large city blocks and a very small share of intersections that are 4-way, which creates traffic jams and compromises walking and biking. In addition, the average block size is increasing over time.

Yet, there is reluctance to engage with the prospects of urban expansion, perhaps for perfectly understandable reasons. Many people believe that cities consume enough land as it is, and that all future construction should take place within existing urban footprints. Others oppose expansion to conserve municipal budgets, reduce commuting and its subsequent traffic congestion, help decaying central cities thrive again, conserve energy, reduce air pollution, or protect precious cultivated lands at the urban

¹UN General Assembly, Universal Declaration of Human Rights, Article 13, 10 December 1948, 217 A (III), available at: <u>http://www.un.org/en/documents/udhr/</u> [accessed 13 August 2015].

fringe. This reluctance, reasonable as it may seem, keeps the reality of urban expansion in the dark and prevents us from addressing it in a clear and forthright manner.

Empirical data on actual urban expansion, its key attributes, and their change over time can provide a much-needed basis for understanding the global and historical contexts of urban expansion. Coupled with theories that could explain the underlying forces that propel and shape urban expansion, these data could provide the evidence needed to assess and address our concerns: that it would be very difficult, if not futile, to resist urban expansion in the face of rapid population growth; that ignoring it or denying it in the hope that it will not occur will simply allow expansion to take place unhindered and in a more costly and destructive way. Acquiring a better understanding of expansion will make it less formidable and more manageable. Making minimal yet effective preparations for it is the only responsible way to proceed.

The Atlas of Urban Expansion—2016 Edition focuses on the land converted to urban use in the past 25 years in a global representative sample of 200 cities. It provides maps and metric data on the spatial changes in these cities during this period with the aim of helping cities the world over make realistic plans in preparing lands for their future expansion. Increased global awareness is urgently needed to better understand and plan for this massive expansion of cities in coming decades. Local and national governments, civic institutions, international organizations, and concerned citizens will need to advocate for and implement minimum adequate preparations of lands for urban expansion. For example, it is vital that cities acquire the rights-of-way for arterial roads that can carry public transport and trunk infrastructure, and that cities protect selected open spaces on the urban periphery from encroachment in advance of the coming expansion. The sooner they act, the more effective and the less costly it will be.

It is important to note that the risks of making at least some preparations on the urban periphery for the expected expansion of cities are asymmetrical. The risk of failure to prepare adequate lands for expansion carries a high cost. It will likely result in disorderly development with a shortage of arterial roads that provide access to the job market from the urban periphery, with land supply bottlenecks that render housing unaffordable, with a shortage of public open spaces, and with damage to areas of high environmental risk. It will be next to impossible to secure lands for arterial roads or public open spaces in the expansion areas of cities after they have been occupied. The damage to the productivity, the inclusiveness, and the sustainability of these cities will have been done. In contrast, as long as investments in land preparation are kept to a minimum, the risk of preparing too much land for urban expansion and keeping it vacant or in agricultural use is rather low.

The main objective of this edition of the Atlas, like its previous 2012 edition, is to increase awareness

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and help residents, policy makers, and researchers around the world come to terms with and prepare for the expected global urban expansion in the coming decades. This call for action is timely because, as noted earlier, the Urbanization Project now underway will be largely completed by the end of the twenty-first century. By then, it will be too late to turn the tide. If the land required for public works or public open spaces is not protected from encroachment before it is developed, it will be next to impossible to ensure the orderly development of cities to make them more productive, more inclusive, and more sustainable in the decades to come.

MONITORING GLOBAL URBAN EXPANSION

The Atlas of Urban Expansion—2016 Edition is part of a long-term research project that includes a series of related publications and online resources and involves a number of partnerships and funding sources. The earlier phases of the research program, leading to the creation of this new atlas, culminated in the publication of *The Dynamics of Global Urban Expansion* (Angel et al., 2005), and *The Atlas of Urban Expansion* (Angel et al., 2012). The World Bank supported the research work for the former publication and the Lincoln Institute of Land Policy supported research for the latter, as well as its publication. Research for both publications focused on the collection and analysis of satellite imagery and population data for a global sample of 120 cities in two time periods, 1990 and 2000. Research for the *Atlas of Urban Expansion* also included collecting, geo-referencing, and digitizing the historical maps of the built-up areas of cities at 20–25 year intervals for the period from 1800 to 2000 for a representative sub-group of 30 cities from the 120-city sample. The policy implications and the general lessons drawn from these data collection and analysis efforts were summarized in a policy focus report entitled *Making Room for a Planet of Cities* (Angel et al., 2011) and elaborated upon in the book *Planet of Cities* (Angel, S., 2012).

The NYU Urban Expansion Program at the Marron Institute of Urban Management and the Stern School of Business at New York University, in partnership with the United Nations Human Settlements Programme (UN-Habitat) and the Lincoln Institute of Land Policy, initiated a multiphase research effort in 2014 to expand the monitoring of the quantitative and qualitative aspects of global urban expansion to more cities, more time periods, and more attributes. The monitoring program is now in advanced stages of completion of three interdependent phases. A number of new phases, requiring new partners and new sources of funding, are in earlier stages of development.

Phase I—the mapping and measurement of global urban expansion—focused on mapping and measuring urban extent, average built-up area density, fragmentation of the built-up area of the city by open spaces, and compactness of the geographical shapes of urban extents in the global sample of 200

cities in three time periods: circa 1990, circa 2000, and circa 2014. This phase required the classification and analysis of medium-resolution Landsat satellite imagery as well as the analysis of population data associated with the enumeration zones that contain the built-up areas of these cities. The key output of this phase is the Atlas of Urban Expansion—2016 Edition, Volume 1: Areas and Densities. This volume will be available online (www.atlasofurbanexpansion.org) as an open source of data for all interested parties worldwide, including a PDF version, spreadsheets, and GIS files, all available for download. This phase will include a number of technical reports and publications focused on findings in peer-reviewed journals and other venues.

Phase II—the mapping and measurement of urban layouts—focused on the recently-built urban peripheries (areas built between 1990 and 2014) in the global sample of 200 cities; urban areas built before 1990 compared to areas built between 1990 and 2014 in cities in the global sample; and city areas built in five different time periods (before 1900, between 1900 and 1930, between 1930 and 1960, between 1960 and 1990, and between 1990 and 2014) in a representative subgroup of 30 cities from the global sample. This phase relied on digitizing and analyzing a random sample of 10-hectare locales using high-resolution Bing and Google Earth imagery. This analysis yielded information and metrics on different attributes of urban layouts that could be observed from space: the share of residential areas that were laid out informally, formally, or not at all; the share of the land that was laid out in rectangular grids; the share of the land in streets; the average width of streets; the average size of blocks; the density of 3-way and 4-way intersections; and the share of the built-up area within walking distance of arterial roads, among others. The key output of this phase is the Atlas of Urban Expansion-2016 Edition, Volume 2: Blocks and Roads. This volume will also be available online (www.atlasofurbanexpansion.org) as an open source of data for all interested parties worldwide, including a PDF version, spreadsheets, and GIS files, all available for download. This phase will include a number of technical reports and publications focused on findings in peer-reviewed journals and other venues.

Phase III—The Land and Housing Survey in a Global Sample of Cities—included two separate survey instruments in ten languages. The first, The Survey of the Regulatory Regime Governing Land and Housing, captured land ownership patterns, land-use planning practices, and the development of new subdivisions in the expansion areas of cities. The second, The Affordability Survey, measured the prices as well as the key attributes of different types of residential plots, houses, and apartments available for sale or rent in the 200 cities in the global sample and compared them to household incomes in these cities. This phase required the engagement of city-based researchers in the 200 cities in the global sample, as well as regional coordinators based at New York University. The two surveys are now complete. This phase will also include a number of technical reports and publications focused on the findings in peer-reviewed journals and other venues, but the results of this survey are not included in the Atlas.

Selected findings from all three phases were used by the three partners—UN- Habitat, New York University, and the Lincoln Institute of Land Policy—at Habitat III: United Nations Conference on Housing and Sustainable Urban Development that took place in Quito, Ecuador, from the 17th to the 20th of October 17–20, 2016, and were also presented at Habitat III, both at selected events at Habitat III and in audiovisual displays at conference venues throughout the conference.

CHAPTER 2

The Global Sample of Cities

THE 2010 UNIVERSE OF 4,231 CITIES

The study of global urbanization trends from the perspective of countries in which national censuses differentiate between urban and rural populations yields important insights and policy prescriptions as we have seen in the previous chapter. Yet these results are limited because national urban population statistics lump all cities, large and small, together. We can advance our knowledge and understanding of global urbanization attributes and trends if we focus our attention on all the cities in the world, rather than on all countries, as units of analysis.

Identifying the universe of all cities in a given year requires a definition of what constitutes a city. Since cities have been defined along many different dimensions, any such definition involves a choice, or rather a number of choices. Cities can be distinguished from hamlets, villages, or towns by population thresholds; they can be identified by their historical centers, their municipal boundaries, the commuting patterns of their workers, or their geographical extent (Parr, 2007). They can also be identified by their local newspapers or by their local sports teams. We chose to identify cities first by a population threshold and then by their geographical extent. To ensure that the settlements we defined were indeed cities, we

chose a population threshold of 100,000, a threshold that is above the thresholds used to define what constitutes a city in all countries except China.

Identifying cities by their geographical extent follows the Roman tradition of defining a city by the edge of its built-up area, its *extrema tectorum*. That geographical extent is typically associated with a city name, the name of its largest and most prominent historical center. The built-up areas of municipalities—the governmental units associated with well-defined administrative boundaries—often merge into each other over time, as do their labor markets, as more and more people live in one municipality and commute to work in another. We define cities as agglomerations of contiguous built-up areas (and the open spaces in and around them) that may contain a large number of municipalities but, more often than not, constitute a single labor market. We consider the metropolitan region of São Paulo, Brazil, for example, to be a single city even though it contains no fewer than 39 municipalities (figure 2.1). We define São Paulo as a city by its urban edge, its *extrema tectorum*, which can be derived from freely available satellite imagery. In 2010, there were 156 free standing cities of 100,000 people or more in Brazil that had their own contiguous built-up areas made up of one or more municipalities. In contrast, there were no fewer than 5,570 municipalities in the country at that time, defined as administrative subdivisions of its national territory.

FIGURE 2.1:

The urban extent of São Paulo, Brazil (grey), showing the administrative boundaries of the 39 municipalities that constituted its metropolitan region. The urban extent of São Paulo is contained in 31 municipalities (bounded in a red line).



Using the population threshold and geographical extent definition of a city enables us to construct an entire universe of cities for the world at large. Other, possibly more precise, definitions that use information on commuting patterns or on small-area population densities cannot be used to create such a universe of cities because those data are not universally available for all cities in all countries.

Ideally, the population of a city in the universe, using our definition of population threshold and geographical extent, is the share of the population within the geographical area of the city in all the administrative (or census enumeration) zones that encompass that extent—identifiable in satellite imagery—excluding the population of villages and towns within those zones that are not part of its extent. These population estimates can, in principle, be constructed from available population data for census enumeration zones for dates roughly corresponding to 1990, 2000, and 2010. They require population data for well-defined enumeration zones, as well as rules for allocating the population of a given zone among its urban and rural built-up areas. We used this more demanding method of obtaining population estimates for the urban extent of all 200 cities in the global sample of cities described here.

For the remaining cities in the universe, we used a number of data sources that provide information on their populations, associating population with city names and coordinates without associating a specific set of enumeration zones with those names. Notably, the most useful sources on information on city populations were the United Nations Population Division (for cities of 300,000 or more) and the website <u>www.citypopulation.de</u> (Brinkhoff, 2016). Both sources had been consulted extensively to construct the 2010 universe of cities. That said, neither source could provide precise data on Chinese cities. According to the official definition of a city in China, the country had no more than 662 cities in 2010. We have identified a total of 1,029 settlements in China that had contiguous geographical extents of substantial area as well as populations of 100,000 or more in 2010. Their populations were estimated from data we obtained from the Chinese Academy of Sciences.

All the cities that were found to contain 100,000 or more people in 2010 were identified on Google Earth to determine whether they were part of larger urban agglomerations. Urban agglomerations were identified and listed in the universe by a single city name. Only cities that were not part of larger, named urban agglomerations were listed as cities in the universe.

The 2010 universe of cities is the third universe of cities constructed by the authors and their colleagues. The first universe of cities, described in *The Dynamics of Global Urban Expansion* (Angel, S. et al., 2005), identified a total of 3,943 cities with 100,000 or more residents in 2000. The second universe of cities, described in the *Atlas of Urban Expansion* (Angel, S., et al., 2012), identified a total of 3,646 cities that had 100,000 or more people in 2000. The 2010 universe of cities shown in figure 2.2 contains a total

of 4,231 free-standing cities in 172 countries or territories that had 100,000 or more people that year.

The universe of cities provides us with a new and powerful tool for analyzing urbanization patterns, attributes, and trends on a global scale. It makes it possible for us to assign individual values to cities in the universe—such as populations or population growth rates, for example—and then to study variations in these values among regions, income groups, or population sizes. However, the greatest and most promising value of having a universe of cities is in taking a stratified sample of cities from this universe and obtaining rigorous results from this sample and generalizing these results to the universe of cities as a whole. The global sample of 200 cities, drawn from the 2010 universe of cities, is the focus of this Atlas.





THE GLOBAL SAMPLE OF CITIES

Beyond the names of cities, their locations, and their estimated populations at several points in time, no quantitative information pertaining to the universe of cities is available at this time. We can learn more about these cities by studying a carefully constructed sample from this universe selected with the goal of obtaining quantitative measures that can be generalized to the entire universe. For this edition of the Atlas, we selected a global sample of 200 cities (see figure 2.1). The sample was stratified so as to be more representative of this universe—namely, to ensure that cities of all sizes, from all regions, and from large and small countries were well-represented. The sample was constructed with three strata in mind:

World Regions: Cities were selected at random from eight world regions in proportion to the urban population in each region. The eight regions were:

(1) East Asia and the Pacific;

- (2) Southeast Asia;
- (3) South and Central Asia;
- (4) Western Asia and North Africa;
- (5) Sub-Saharan Africa;
- (6) Latin America and the Caribbean;
- (7) Europe and Japan; and
- (8) Land-Rich Developed Countries.

City Population Size: An approximately equal number of cities were selected at random from four ranges of population size, each range containing one-quarter of the total population of the cities in the universe. The population ranges were:

- (1) 100,000 427,000;
- (2) 427,001 1,570,000;
- (3) 1,570,001 5,715,000; and
- (4) 5,715,001 and above.

Number of Cities in the Country: Cities were selected at random from three country groups identified by the number of cities in the country in proportion to the urban population in each group. The three groups were:

- (1) 1 9 cities;
- (2) 10 19 cities; and
- (3) 20 or more cities.

The eight world regions largely followed the divisions presented in the United Nations' *World Urbanization Prospects* (U.N. Population Division, 2014), with minor changes. The United Nations divided countries into two mega-regions: more developed countries and less developed countries. The more developed countries mega-region included North America (U.S. and Canada), Australia and New Zealand, Europe, and Japan. The less developed countries mega-region included all other countries, even though some of them, (e.g. Singapore), had higher per capita income than many more developed countries. The more developed countries mega-region was divided in two to reflect different patterns of urban expansion: (1) Europe and Japan, with lower levels of arable land per person and typically higher urban densities; and (2) land-rich developed countries (U.S., Canada, Australia, and New Zealand) with higher levels of arable land per person and typically lower urban densities. The less developed countries mega-region was divided into six regions: (1) East Asia and the Pacific, (2) Southeast Asia, (3) South and Central Asia, (4) Western Asia and North Africa, (5) Sub-Saharan Africa, and (6) Latin America and the Caribbean (see figure 2.3). To ensure that there were a minimum number of cities representing each of the eight world regions, we over-sampled cities from the smaller regions—Southeast Asia and Western Asia and North Africa—and under-sampled cities from the largest region, East Asia and the Pacific.





The assignment of cities in the universe of cities to four population-size categories entailed ranking the cities in the universe in increasing order of their populations and then dividing them into four ranges—small, medium, large, and very large cities—so that each of the four ranges contained approximately the same total population. The universe of cities had a total population of 2.49 billion in 2010. The four population-size ranges had approximately 622 million people in each range. This division into ranges resulted in a highly skewed distribution of the number of cities in each range: there were 3,150 small cities in the first range, 814 medium-sized cities in the second, 227 large cities in the third, and only 54 very large cities in the fourth. Each range contained approximately one-quarter of the number of cities in the preceding range, yet each range contained the same population total. Sampling at random from the universe as a whole would have resulted in three-quarters of the cities in the sample being small cities. Instead, we opted to under-sample small cities and to over-sample larger ones, drawing approximately the same number of cities from each city-size range. More specifically, we drew 56 small cities, 50 medium-sized ones, 54 large ones, and 40 very large ones from the universe. As a result of this decision, the 200 cities in the sample—while constituting only 4.7% of the total number of cities in the universe.

Finally, the assignment of cities to one of three groups, each pertaining to the number of cities in the country, was important to ensure that countries with fewer cities were adequately represented in the sample. Indeed, less than 7% of the population of the universe of cities was found to be in countries with 1–9 cities and less than 6% in countries with 10–19 cities. Almost 88% were in countries with 20 or more cities. Cities in the first two groups would be under-represented if the sample were drawn at random from the universe as a whole. To correct this bias, we sampled cities from countries with fewer cities in slightly higher proportion than the share of their population in the universe of cities. As a result, the sample contains cities from as many as 79 countries.

Summary values for the three strata comparing the cities in the universe and the cities in the sample are given in table 2.1. The location of cities in the sample is shown in figure 2.4.

TABLE 2.1:

A comparison of the universe of cities and the sample of cities, stratified according to world regions, city population ranges, and number-of-cities-in-the-country groups.

	Categories in the Three Strata	Universe of Cities				Sample of Cities				Sample/Universe Ratios		
Category ID Number	Categories	Number of Cities in this Category in Universe	Share of Cities in this Category in Universe	Population in this Category in Universe	Share of Population in this Category in Universe	Number of Cities in this Category in Sample	Share of Cities in this Category in Sample	Population in this Category in Sample	Share of Population in this Category in Sample	Ratio of Cities in this Catgory in Sample and Universe	Ratio of Population in this Catgory in Sample and Universe	
World Regions												
1	East Asia and the Pacific (EAP)	1,081	26%	652,310,754	26%	42	21%	174,414,516	24%	4%	27%	
2	Southeast Asia (SEA)	229	5%	143,551,770	6%	15	8%	53,516,916	7%	7%	37%	
3	South and Central Asia (SCA)	693	16%	387,180,823	16%	32	16%	115,807,394	16%	5%	30%	
4	Western Asia and North Africa (WANA)	301	7%	176,496,133	7%	15	8%	57,446,118	8%	5%	33%	
5	Sub-Saharan Africa (SSA)	329	8%	186,702,647	8%	18	9%	51,003,826	7%	5%	27%	
6	Latin America and the Caribbean (LAC)	483	11%	310,444,386	12%	26	13%	89,709,870	12%	5%	29%	
7	Europe and Japan (E&J)	781	18%	389,298,026	16%	34	17%	119,848,657	16%	4%	31%	
8	Land-Rich Developed Countries (LRDC)	334	8%	242,563,694	10%	18	9%	70,259,700	10%	5%	29%	
	Grand Total	4,231	100%	2,488,548,233	100%	200	100%	732,006,997	100%	5%	29%	
City Popu	lation Ranges											
1	100,000 - 427,000	3,143	74%	622,020,086	25%	59	30%	14,185,408	2%	2%	2%	
2	427,001 - 1,570,000	811	19%	621,981,767	25%	47	24%	38,611,298	5%	6%	6%	
3	1,570,001 - 5,715,000	225	5%	617,006,284	25%	54	27%	173,340,491	24%	24%	28%	
4	5,715,001+	52	1%	627,540,096	25%	40	20%	505,869,800	69%	77%	81%	
	Grand Total	4,231	100%	2,488,548,233	100%	200	100%	732,006,997	100%	5%	29%	
Number-o	f-Cities-in-the-Country Groups					•						
1	1-9	368	9%	183,410,690	7%	24	12%	38,599,273	5%	7%	21%	
2	10-19	306	7%	160,113,938	6%	17	9%	41,477,283	6%	6%	26%	
3	20 +	3,557	84%	2,145,023,605	86%	159	80%	651,930,441	89%	4%	30%	
	Grand Total	4,231	100%	2,488,548,233	100%	200	100%	732,006,997	100%	5%	29%	

The new global sample of 200 cities is different in some respects from the sample of 120 cities used in the two earlier publications, *The Dynamics of Global Urban Expansion* (Angel et al., 2005) and *Atlas of Urban Expansion* (Angel et al., 2012). The first two strata, eight world regions, and four city population size ranges used in the earlier sample were maintained. However, the earlier sample used countries' Gross Domestic Product (GDP) per capita as a stratum. This was abandoned because of the strong correlation between the regional affiliation of cities in the sample and their countries' GDP per capita. The number of cities in the country was introduced instead as a third stratum for the reasons explained here. Cities in the earlier sample that fit into the new sampling framework were retained in the new sample. Other cities were dropped because they were parts of larger metropolitan agglomerations, they had less than 100,000 people in 2010, or they did not represent enough similar cities in the universe. Altogether, 96 cities from the earlier sample of 120 cities are in the new sample. The earlier classifications of the satellite imagery of these cities were revisited, completed, and corrected where necessary. New metrics were derived for them as well, in line with the revised definitions of the metrics in this edition of the Atlas described in detail in the following chapter.





The simplest way to envision the stratified sampling process, given the three strata chosen in this edition of the Atlas, is to envision these strata as dimensions: world regions along the x-axis, city population size ranges along the y-axis, and the number of cities in the country groups along the z-axis. Each city in the universe (or in the sample, for that matter) could then be seen as belonging to a box in three-dimensional space, identified by a three-digit number, its world region (1-8), its city population size range (1-4), and its number of cities in the country group (1-3) (see figure 2.5). Halifax, Canada, for example, belongs to box 813. It is located in Region 8 (land-rich developed countries); it had 390,000 people in 2010, assigning it to city population size range 1; and Canada had 34 cities in the 2010 universe of cities, assigning Halifax to number of cities in the country group 3 (20+ cities in the country). Box 813 contains all 210 cities in the universe that were located in land-rich developed countries, that had less than 427,000 people in 2010, and that were in countries with 20 cities or more.

FIGURE 2.5:

The sampling framework comprising 96 boxes, each box corresponding to one of eight world regions, one of four city-population-size ranges, and one of three number-of-cities-in-the-country groups ($8 \times 4 \times 3 = 96$).



Of the 96 boxes $(8 \times 4 \times 3 = 96)$ shown in figure 2.5, only 76 had cities in the universe of cities. The rest were empty. Of these, 61 boxes had cities in the sample. The remaining 15 boxes that are not represented by cities in the sample contain 114 cities in the universe with a total population of 63.2 million, comprising 3% of the cities and 3% the population of the universe in 2010. These cities were assigned to "nearby" boxes, boxes in the same region with cities with similar population size and similar number of cities in the country assignments, to be represented by the sample as well. In this manner, all the cities in the universe were represented by cities in the sample.

The process of selecting cities in this framework consisted of picking cities at random from each box in rough proportion to the total population in each box. For example, four cities were selected at random to represent box 813: Victoria, British Columbia in Canada, and Gainesville FL, Killeen, TX, and Modesto, CA, in the United States. As there were 210 cities in the universe in this box, one city in the sample represented some 50 cities in the box 813. In parallel, as there were 44.9 million people in the cities in the universe in this box and 1.1 million people in the four sample cities in the box, every urban dweller in the cities in the sample in box 813 represented 40 urban dwellers in the universe of cities in this box.

The values 50 and 40 in this example can be thought of as city-based and population-based weights respectively. They can be used to obtain weighted averages for the universe from values obtained for the sample. If a city in a given box represents 50 cities, then any value associated with it—say, its population growth rate between 2000 and 2010—is given a city-based weight of 50, while another city in the sample representing, say, only 27 cities is given a city-based weight of 27. Similarly, if the population of a sampled city in a given box represents a population 40 times as large, then each resident in this city is given a population-based weight of 40.

The population growth rates for these cities were not used as a stratum in the creation of the sample. The universe of cities contains data on the population of each city for three time periods, 1990, 2000, and 2010. We could use this information to test whether the sample was representative of the universe. Indeed, when we compared the average population growth rates between 2000 and 2010 in all the cities in the universe with both the city-based and population-based weighted averages of the cities in the sample, we found that they were not different from each other at the 95% confidence level. This assured us that the global sample of cities was indeed representative of the universe of cities.

Using these city-based and population-based weights, we can now answer new questions about the universe of cities as a whole. For example, we determined that average densities in the universe declined significantly between 1990 and 2000, and continued to decline—albeit at a significantly lower rate—between 2000 and 2014. We also determined, for example, that the average share of area that was laid out before it was occupied in the expansion zones of cities in the universe—areas converted to urban use between 1990 and 2014—was significantly lower than it was in areas developed before 1990. In other words, the global sample of cities makes it possible, for the first time, to monitor global urban expansion in a consistent and rigorous manner. Needless to say, it can also be used to monitor other urban attributes of interest, from housing affordability to air quality, from Internet use to access to public open spaces, and from the quality of drinking water to the availability of public transport in the sample of cities to obtain valid, rigorous, comparative data—data that was never available before—on the universe of cities as a whole.

THE REPRESENTATIVE GROUP OF 30 CITIES

A representative group of 30 cities, including 27 from the global sample of 200 cities, was created to explore long-term changes in urban expansion, urban population density, and the attributes of urban layouts from circa 1800 until circa 2014. The selection of cities for this historical analysis was guided by two factors: their regional distribution and the availability of historic maps depicting their built-up areas at 20- to 25-year intervals. Three cities—Jeddah, Saudi Arabia, Nairobi, Kenya, and Kuwait City, Kuwait—were added to the 27 representative cities from the global sample to ensure a balanced subregional distribution of cities (figure 2.6).

FIGURE 2.6:

The location of the 30 cities in the representative group of cities where urban expansion was mapped and animated between 1800 and 2014.



To be included in this representative group, the relevant maps of a given city needed to depict the totality of the urban extent of the city for time periods some 20–25 years apart and have sufficiently clear landmarks to be georeferenced to Google Earth imagery. This geo-referencing process aligned the maps to a common coordinate system, thereby allowing them to be accurately compared to each other. A complete list of the map references containing the original maps used to construct the composite maps for each city is available in the earlier *Atlas of Urban Expansion* (Angel, S. et al., 2012).

The maps are digitized composite maps of the urban extent of a given city on different dates. A total of 261 maps were used to create the composite maps for the 30 cities in this representative sample, an average of 8.7 maps per city approximately 19 ± 1 years apart. The composite maps for each city with their associated populations, densities, and changes over time appear in the 2012 edition of the *Atlas of Urban Expansion*. They were subsequently animated to show the long-term expansion of these cities. These animations can be seen on the Atlas website at <u>www.atlasofurbanexpansion.org</u>.

These maps were also used in Volume 2 of the Atlas to study the changes in the attributes of urban extents over time. We divided the urban extents of the 30 cities in this representative sample to areas

that were built-up in five time periods: (1) Before ~1990, (2) between ~1900 and ~1930, (3) between ~1930 and ~1960, (3) between ~1960 and ~1990, and (5) between ~1990 and 2014. We then studied the attributes of the urban fabric and calculated the metrics associated with them in each one of these areas for each city. We used these metrics to calculate average values of each attribute—say, the share of the built-up area in streets or the average block size—in each one of the five time periods, so as to observe their changes over a century or more.

CHAPTER 3

Understanding and Measuring Urban Layouts

INTRODUCTION

Volume 1: Areas and Densities focused on the physical extents of urban areas on our planet today, their key attributes, and their change over time. Its main thrust was to alert readers—be they policy makers, public officials, academics, civic groups, or interested citizens—to the *quantity* of land converted to urban use and its relation to urban population growth, as well as to key attributes of the resulting physical extent of cities—density, fragmentation, and compactness—and their change over time. As the maps and metrics in Volume 1 clearly illustrate, the majority of cities expand outwards at a faster rate than the population they accommodate. While higher rates of land consumption per capita are largely accounted for by economic growth, by the availability of inexpensive transport, and by the plentitude of land for urban expansion, they may still be a cause for concern, calling for public intervention in urban real estate markets. Slowing down the existing rates of urban expansion would require effective strategies to facilitate the densification of existing urban extents, both by removing regulatory barriers and by addressing local community resistance to densification in its various forms. It may entail, among other things, allowing and promoting smaller dwelling units, smaller plots, higher plot coverage, taller

buildings, the transformation of more land to residential use, and the infill of vacant open spaces, both public and private. It may also entail facilitating higher-density development in the expansion areas of cities, permitting, among other things, the construction of multi-family dwellings and small-lot townhouses, and the designation of more lands for residential use.

However, regardless of whether the rapid rate of urban expansion requires public intervention to slow it down or not, there is a second and separate concern that needs to be addressed: None of the attributes described and measured in Volume 1 informs us about the physical layouts of urban areas or about their change over time. It may well be that cities are expanding in an orderly manner—ensuring that they are as productive, as inclusive, and as sustainable as can be—and if they indeed are, then we need not be unduly concerned about the quality of their expansion. But it may also be that cities are expanding in a disorderly manner that is not productive, not inclusive, and not sustainable. In this case, the *quality* of their physical expansion should be of great concern, regardless of its quantitative dimensions.

Cities become more productive when *all* workers have access to *all* jobs; they become more inclusive when they provide decent and affordable housing for all, with residential amenities and good access to these jobs; and they are more sustainable when they provide more of this access with good public transport while preserving public open spaces and areas of high environmental risk from urban development. Cities expand in an orderly manner when they plan, prepare, and secure adequate lands for arterial roads and for streets—as well as their public open spaces—to organize their urban peripheries *before development occurs* in ways that make them more productive, more inclusive, and more sustainable. Whether they do so or not, and whether they are doing it better or worse than before, raises a set of questions that, until now, could not be properly answered: How well laid out are recently built urban peripheries, how are layouts changing over time, and why?

Volume 2: Blocks and Roads begins to provide answers to these questions by the mapping and measurement of urban layouts in the global sample of 200 cities using freely available, high-resolution, *Bing* satellite imagery. More specifically, it addresses three questions:

1. How well laid out are the expansion areas (areas converted to urban use between \sim 1990 and \sim 2014) in the global sample of 200 cities?

2. How well laid out are areas converted to urban use before ~1990—the pre-1990 areas compared to expansion areas in the global sample of 200 cities? and

3. How well laid out are the areas converted to urban use in five different time periods -Period

1: before ~1900; Period 2: ~1900 - ~1930; Period 3: ~1930 - ~1960; Period 4: ~1960 - ~1990; and Period 5: ~1990 - ~2014— in a representative sub-sample of 30 cities?

THE SELECTION OF AREAS FOR ANALYSIS

The answers to the first two questions require maps identifying the pre-1990 areas and the expansion areas of all the 200 cities in the global sample. These maps can be drawn from the urban extent maps for each city in the global sample compiled in Volume 1 of this Atlas. The map of the pre-1990 area of Addis Ababa, Ethiopia, for example, is simply the map of its urban extent in ~1990. For purposes of analysis, we combined the areas converted to urban use between ~1990 and ~2000 and between ~2000 and ~2014 into one area, referring to it as the expansion area. The map of the expansion area of the city is then simply the map of its urban extent in ~2014, with its pre-1990 area excluded (see figure 3.1). That said, in the maps of the 200 cities presented in the main section of this volume of the Atlas, the two areas are shown as two distinct expansion areas.

FIGURE 3.1:

The Pre-1990 Area (ochre) and the Expansion Area (red) of Addis Ababa, Ethiopia.



Answers to the third question posed in the previous section require maps that show the history of the expansion of the 30 cities in the global representative sample of cities over the past two centuries. These maps were created and presented in the first edition of the *Atlas of Urban Expansion* (S. Angel et al. 2011, 260-319), and they are not reproduced in full in this edition of the Atlas. Instead, summary maps for all 30 cities, showing the areas converted to urban use in each of the five periods listed in the

previous section are given in the pages pertaining to these cities. An example of a summary map for Paris, France, showing the areas developed in five consecutive periods is given in figure 3.2.

FIGURE 3.2: Area converted to urban use in the five different time periods in Paris, France.



We can answer a number of important questions regarding the quality of urban layouts by patiently digitizing and analyzing high-resolution satellite imagery. *Bing* imagery, for example, is now freely available worldwide (similar *Google Earth* imagery is still proprietary) and can be analyzed using identical methods in each city in the sample, thus ensuring that results are consistent and comparable. That said, such studies are very labor intensive. In small cities, digitizing key features of urban layouts can be carried out in almost the entire urban extent of the city—including both its pre-1990 area and its expansion area. In larger cities, some layout features, like the presence of arterial roads, can be digitized and analyzed for the city as a whole, but more detailed features—like residential types, the share of the land in roads, block sizes, or plot sizes—cannot be. They can be more thoroughly investigated by sampling a limited number of 10-hectare locales at random in each of the areas of interest in the city, calculating the relevant metrics from these sampled locales, and generalizing the results for these areas of interest as a whole. In the largest cities, even the presence of arterial roads may need to be determined by sampling as well, in our case by sampling randomly selected one-kilometer squares throughout their urban extents. In broad terms, this is the procedure followed in generating the maps and metrics for this volume of the Atlas.

Most of the analysis focused on digitizing and analyzing randomly selected 10-hectare locales in the 200 cities in the global sample. All in all, a total of 20,795 locales were digitized, approximately 100 locales per city, on average. In addition, a total of 5,638 additional locales were analyzed in the sub-sample of the 30 cities used to study changes in urban layouts over a longer period: \sim 1900 - \sim 2014.

The locations of these locales in a given city were determined by combining a quasi-random series of numbers known as a Halton Sequence with the XY (latitude and longitude) origins of a bounding box that encompassed the city as a whole. This procedure generates a set of points in two-dimensional space that appear to be randomly distributed but cover the space more evenly than a set of points generated at random. A particular Halton Sequence, using the same initial XY origin to generate point coordinates, always generates the same set of points in the same order. We used one tenth of a degree of longitude and latitude as XY origins to generate points for every city in the global sample. The set of points generated for the study area of Addis Ababa, Ethiopia, is shown in figure 3.3. Subsequently, in every area of interest, say the expansion area of Addis Ababa, we initially selected 40 points for analysis in the order they were identified by the Halton sequence.

FIGURE 3.3:

Quasi-random placement of potential 10-hectare locales for the analysis of urban layouts in the study area of Addis Ababa, Ethiopia, using a Halton sequence.



As noted earlier, in each city in the sample we digitized the arterial road network in its entire urban extent in order to determine the share of the relevant area within that extent that was within walking distance of an arterial road, as well as to estimate the share of the built-up area in arterial roads. To do so in an orderly fashion, we placed a one-kilometer grid over the entire urban extent of the city and then identified and digitized arterial roads in each of the grid squares. Since arterial roads within walking distance of a built-up area may include roads outside the urban extent, we also included areas within one-kilometer of the edge of the urban extent in our analysis. The one-kilometer grid for the 2014 urban extent of Addis Ababa, Ethiopia, is shown in figure 3.4.

FIGURE 3.4:

The one-kilometer grid used to identify arterial roads in the urban extent of Addis Ababa, Ethiopia, including a one-kilometer-wide buffer around it.



In the largest cities in the global sample, identifying, digitizing, and analyzing arterial roads in their entire urban extent proved unnecessary. Instead, we selected a set of one-kilometer squares at random, using our set of Halton points described earlier. We then identified the arterial roads within each square, as well as in an area within one-kilometer of its edge, so as to be able to determine the share of the area within the square that was within walking distance of an arterial road, a road that could well be outside that square. The resulting set of randomly placed 3-by-3-kilometer areas (their rounded edges are the result of being one kilometer away from the corners of the one-kilometer squares) used to identify, digitize, and analyze arterial roads on the periphery of Tokyo, Japan, is illustrated in figure 3.5.

To summarize: Measuring the attributes of urban layouts requires a focus on high-resolution satellite imagery which, in turn, requires a more careful selection of representative areas for analysis within the urban extents of cities in the global sample. In order to study the changes over time in the attributes of urban layouts, we divided the urban extents of all cities in ~2014 into two: pre-1990 and post-1990 areas. To study changes in these attributes over a longer time period, we also differentiated the urban extents of 30 cities into five periods, spanning the twentieth century and the first fifteen years of the present century. In the absence of sampling, the study of urban layouts in the global sample of cities would be a daunting task. We rendered it doable by sampling 10-hectare locales within the urban extents of cities.
The actual locales randomly selected for digitizing and analysis of the change in urban layouts over time in Paris, France, are shown in figure 3.6. In a number of the largest cities in the global sample, we also sampled a number of one-kilometer squares throughout their urban extents to map enough of their arterial road networks to calculate the various metrics associated with them.

FIGURE 3.5:

Randomly selected 3-by-3-kilometer areas used to identify, digitize, and analyze arterial roads (in yellow) on the urban periphery of Tokyo, Japan.



FIGURE 3.6:

Actual locales selected in a quasi-random process from the total number of available locales in the study area of Paris, France, to record the changes in the attributes of urban layouts over time.



MEASURING KEY ATTRIBUTES OF URBAN LAYOUTS

Within each 10-hectare locale, manual digitization techniques were used to identify, map, and measure the physical characteristics of its urban fabric. The primary focus was on the quality and orderliness of their block and road layouts, the quality of their visible infrastructure, the size of blocks and residential plots, and the density of street intersections. Orderliness or disorderliness that can be assessed from satellite imagery largely comes down to the way in which public space is used to organize the urban fabric (through road and block layouts), the level of infrastructure that is provided in a given area (indicative of formality or informality), and the form of dwellings, both through identification of plot boundaries and through a visual assessment of building types. Much of this work falls on the image analyst. With that in mind, detailed rules were developed to assist the analyst in classifying the imagery. We summarize these rules here so that the method we used to arrive at the maps and metrics in the following Atlas pages can be better understood and easily replicated.

Blocks and Roads

Classification of satellite imagery is fundamentally an exercise in pattern recognition. As with all pattern recognition, the first task in identifying the elements of a locale involves making a primary distinction between these elements. In our case, that distinction is between block space and road space. Road space consists of all land that is currently or potentially used by either pedestrians or vehicles to travel from one place to another. We seek to identify the *right-of-way* of streets and roads, containing both the area that is currently in use and any lands that are clearly reserved for future use. All of these areas constitute road space. Block space, in turn, consists of all other uses, including open space and off-street parking areas. Road space and block space add up to the entire area of a 10-hectare locale. In other words, all space that is not road space is block space, and all block space is assigned a land use. The division of a high-resolution satellite image of a locale in Accra, Ghana, into street space and block space is illustrated in figure 3.7.

Block space is subdivided into units identified as *blocks*. Individual blocks are areas that are continuously bounded by roads or vacant open spaces (for instance, a block at the edge of a built-up area that borders on farmland). Any given block might contain several different land uses (say, apartment buildings on one end, single-family homes in the middle, and a school at the far end). Blocks and block space can be further subdivided into *plots*, individual parcels of land that would likely be identified as separate properties in a cadaster. Any given block is composed of either one large plot or a series of smaller plots. Much like the identification of rights-of-way, plot boundaries are identified through surface indicators,

pattern recognition, and comparisons with nearby areas. The concept of the plot is very important in differentiating residential categories. A suburban plot in a formal residential area might contain several structures—a house, a garage, and a toolshed, for example. We were not interested in measuring the dimensions of these structures in this Atlas. Instead, our goal was to measure the use of the underlying land so as to get a sense of the shares of land in different uses. When land uses are determined, it is the land use of the *plot* as a whole that is determined and measured, not the land occupied by a specific building. The same principle holds true when assessing patterns to determine land use in a larger area: The key is to focus on the pattern of plot boundaries and not on building footprints.

FIGURE 3.7:

The division of a high-resolution satellite image of a 10-hectare locale in Accra, Ghana, into road space (light brown) and block space (orange borders)



Land Use Categories

Each city in the global sample has specific residential and non-residential typologies, along with unique characteristics of form and layout that deserve recognition and study in their own right. However, in order to study land use on a global scale, the land use categories must be simple enough and broad enough to be identified in any city in the world, encompassing (to the maximum extent possible) the whole range of land use types found in cities. Following a review of numerous land use classifications, we narrowed our classification to seven land uses that could be reliably identified in high-resolution satellite imagery, with a focus on four types of residential land use: (1) open space; (2) non-residential areas; (3) atomistic settlements; (4) informal land subdivisions; (5) formal land subdivisions; (6) housing projects; and (7) road space.

1. *Open Space* includes open countryside, forests, cultivated lands, parks, vacant lands that have not been subdivided, cleared land, and water bodies: seas, rivers, lakes, and canals.

2. *Non-Residential Areas* include all built-up areas, both public and private, that are not in residential use.

3. Atomistic Settlements are areas with irregular layouts that were clearly not subdivided or laid out before residential construction took place. This category includes squatter settlements that grew incrementally without an overall plan, homes built on irregular parcels of land, or homes built on rural plots that were not regularly subdivided before their conversion to urban use.

4. *Informal Land Subdivisions* are areas that have been subdivided for urban use, but that lack visible evidence of conformity to land subdivision regulations such as regular plot dimensions, paved roads, streetlights, or sidewalks. That said, structures in these informal land subdivisions, although different in size and form, are typically laid out along straight or almost-straight roads, with regular intersections and standardized widths. Blocks are also regular or semi-regular in size and shape, when topography permits.

5. *Formal Land Subdivisions* are similar in layout to informal layouts, but exhibit a higher level of regularity, a higher level of provision of infrastructure, and better connections to existing roads. All roads must be paved for an area to be classified as a formal land subdivision. Sidewalks and streetlights are often visible as well.

6. *Housing Projects* range from large apartment tower projects to suburban tract housing. Housing projects share one feature: their structures must be essentially homogenous. These are projects in which all structures are built by a single developer using variations on the same plan.

7. *Road Space* includes the rights-of-way of lanes, streets and roads, both paved and unpaved, containing both the area that is currently in use and any lands that are clearly reserved for future use.

The four types of residential land use are illustrated with examples in figure 3.8. These types were chosen to reflect stages in the evolution of the housing sector, from a state of weaker planning skills and traditions, less regimented property-right and regulatory regimes, low availability of capital, and an absence of housing finance, to a state of stronger planning and regulatory regimes and a broader availability of capital. The housing sector is at its most basic in atomistic settlements, where the organization of the settlements is insufficient even to ensure consistent plot size or road width and where dwellings are located haphazardly and constructed over time. The housing sector is at its most complex when it is able to support large, planned housing projects, whether private or public, with access to capital, constructed from start to finish over a short period of time. The characterizations of these seven land use categories were used by analysts to determine the land uses within blocks in the 10-hectare locales, taking into account that a single block surrounded by roads or open spaces on all sides may contain more than one of six land uses.

FIGURE 3.8:

Four types of residential land use identified in locales, using high-resolution satellite imagery: Atomistic settlements (top left), informal land subdivisions (top right), formal land subdivisions (bottom right), and housing projects (bottom left).



Plots, Blocks, and Intersections

The dimensions of residential plots in formal and informal land subdivisions are of interest because they may tell us, for example, whether large plot sizes in formal subdivisions are leading to high rates of land consumption per capita or whether small plot sizes in informal subdivisions reflect a discrepancy between minimum official plot sizes and those offered in the informal market. It is possible to measure plot sizes in land subdivisions using high-resolution satellite imagery when plots are relatively uniform. In these cases, it is possible to identify the boundaries between plots, to count the plots, and to determine their widths and depths. To measure plot dimensions in residential subdivisions, a block that had an array of plots of uniform size was identified and two lines were drawn along two of its edges. Each line was tagged

with the number of plots along it, creating an estimate of typical plot depth and width in that area. This procedure is illustrated in figure 3.9. In this example, the length of the block (160 meters) is divided by 22 and its depth (40 meters) is divided by 2 to yield a typical plot size of 7.3-by-20 meters or 146m².

FIGURE 3.9:

Arriving at a typical plot size in an informal subdivision in Guadelajara, Mexico, by measuring overall block length and depth and dividing each dimension by the number of plots along it.



The size of city blocks or, alternatively, the density of 4-way intersections compared to 3-way ones in typical city neighborhoods is of interest because neighborhoods with small blocks and with high 4-way intersection densities facilitate walking and bicycling, reducing the reliance on private automobiles and making the urban environment healthier and more convivial. It is indeed possible to measure the size of blocks and the density of both 3-way and 4-way intersections using high-resolution satellite imagery, and we did indeed measure them in all locales.

To measure block sizes and intersection density, the analysis of locales required the digitization of road *medians* (the lines along the middle of roads). This was done for all blocks in every locale, and included the digitization of medians along the entire perimeter of all blocks within the locale, including those clipped by the circular boundary of the locale. It is important to note that using this procedure implied that the area of blocks was calculated as the entire area enclosed by road medians, including the area of roads. The procedure for identifying and mapping blocks is illustrated in figure 3.10. The density of intersections was calculated by counting the intersections within the locale and dividing their total by the built-up area of the local, excluding areas identified as open space. The procedure for identifying and counting road intersections is illustrated in figure 3.11. In this example, there are 4

4-way intersections, 33 3-way intersections, and a total area of 9.3 hectares (or 0.093 km²) in built-up areas. The 3-way intersection density in this locale is therefore 354 per km² and the 4-way intersection density is 43 per km².

FIGURE 3.10:

Identifying all the blocks in a typical locale by digitizing the road medians around them, including blocks that are clipped by the circular boundary of the locale.



FIGURE 3.11:

Identifying all the 3-way and 4-way road intersections in a typical locale by digitizing the road medians within the locale (4-way intersections are marked with a + and 3-way intersections are marked with a T).



Arterial Roads

Arterial roads in cities are of interest because they are essential for integrating urban labor markets providing access, by all transport modes, from all residences to all workplaces in the city—and the more integrated their labor markets, the more productive they are. The road network in every country typically forms a three-tier hierarchy of primary, secondary, and tertiary roads. Central or state governments usually plan, acquire land, finance, construct, and maintain the primary intercity road network that connects the country together. Municipalities typically plan, acquire land, finance, construct, and maintain the secondary or arterial road network within their jurisdictions. In many cases, private developers of residential neighborhoods or of commercial, office, and industrial projects typically plan, acquire land, finance, and construct the tertiary roads that serve buildings within their projects. In many other cases, municipalities plan and build the tertiary road network as well. The network of arterial roads is a classic public good (i.e., users cannot be effectively excluded from using it). Since it is a public good, there is no market mechanism that can ensure that arterial roads are in adequate supply in appropriate locations. In other words, a shortage of arterial roads may be a form of market failure. This means that it is up to public authorities to supply arterial roads in adequate quantities, in the right locations throughout the city, preferably before development takes place. Whether or not this happens in practice can only be determined by observation and measurement.

We identified and digitized arterial roads throughout the urban extents of all cities in the sample. As noted earlier, in the largest cities in the sample we opted to sample locations selected at random and to identify and digitize arterial roads only in these sampled locations. The information obtained from digitizing arterial roads was then used to calculate the share of the built-up area within walking distance to arterial roads, the average beeline distance to an arterial road, and the density of arterial roads. All of these measures provide some insight, for the first time, on the availability of arterial roads in cities the world over, as well as on its change over time.

All roads that fall within the urban footprint (or its surrounding one-kilometer buffer) were considered as possible arterial roads. Likely candidate roads were identified in three data sources: Java Open Street Map, Google maps, and Bing maps, where roads are available as map layers. On any of these three road map layers, roads having through-connectivity are distinguished by width and color. Analysts examined each one-kilometer grid square in the urban extent to identify arterial roads. A candidate road was identified as an arterial road when it met two criteria:

1. It connected to other arterial roads, forming part of a network that extends throughout the city; and

2. It connected to the nearby minor roads. Limited access roads (freeways or expressways) were not considered arterial roads, even though they were connected to other arterial roads.

When an analyst identified a road as *arterial*, they differentiated it further into two categories: Wide and Narrow, where wide roads were those having rights-of-way of 18-meters or more. The network of wide and narrow arterial roads in the urban extent of Addis Ababa, Ethiopia in 2014 is shown in figure 3.12. The same procedure was followed in identifying wide and narrow arterial roads in randomly selected 3-by-3-kilometer squares in the largest cities in the sample, as previously shown (figure 3.4).

FIGURE 3.12:

The network of arterial roads in the urban extent of Addis Ababa, Ethiopia in 2014, distinguishing wide arterial roads (brown) from narrow ones (blue).



Urban Layout Metrics

In each city in the global sample of 200 cities, we initially selected at random 40 locales for analysis in its pre-1990 area and 40 locales in its expansion area, a total of 80 locales per city or 16,000 locales for the global sample as a whole. Key layout features of these locales, observed in high-resolution satellite imagery, were then digitized, analyzed, and stored. The digital files associated with locales were processed in ArcGIS using a Python script that calculated the following metrics for each locale:

Land Use

- Share of land in open space (open space in locale/area of locale);
- Share of built-up area in non-residential use (non-residential land in locale excluding roads/area of locale);

- Share of the built-up area in residential use (all area in residential use in locale/built-up area of locale);
- Share of built-up area occupied by roads (area in roads/built-up area)
- Share of the residential area not laid out before development (area of atomistic settlements/residential area);
- Share of the residential area in informal land subdivisions (area in informal land subdivisions/residential area);
- Share of the residential area in formal land subdivisions (area in formal land subdivisions/ residential area);
- Share of the residential area in housing projects (area in housing projects/residential area);
- Share of the residential areas laid out before development (area in both formal and informal land subdivisions/residential area);
- Share of locale that is gridded [visual assessment of the presence of orthogonal street grids in the locale and their assignment to three categories: not gridded, partially gridded (covering 10-90% of the locale area), and gridded (covering 90% or more of the locale area)].
- Average plot size in informal land subdivisions; and
- Average plot size in formal land subdivisions.

• Roads

- Share of roads less than 4-meters-wide (length of roads less than 4-meters-wide in locale/ length of total road network in locale);
- Share of roads that are 4-to-8-meters-wide (length of roads 4-8-meters-wide in locale/ length of total road network in locale);
- Share of roads that are 8-to-12-meters-wide (length of roads 8-12-meters-wide in locale/ length of total road network in locale);
- Share of roads that are more than 16-meters-wide (length of roads more than 16-meterswide in locale/length of total road network in locale); and
- Average road width in locale.

Block Layout

- Average block size (hectares);
- The density of 3-way intersections (number per square kilometer of locale area);
- The density of 4-way intersections (number per square kilometer of locale area);
- Share of intersections that are 4-way (ratio of 4-way intersections to total number of intersections in locale);
- The Walkability Ratio (The average ratio of the beeline distance and the street travel distance for 40 pairs of sample points within the locale that are more than 200-meters apart);

In addition to calculating metrics for individual locales, a number of metrics were calculated for the arterial road network identified in each city:

Arterial Roads

- The average density of all arterial roads (linear kilometers of arterial roads/square kilometers of urban extent);
- The average density of wide (18m+) arterial roads (linear kilometers of wide arterial roads/square kilometers of urban extent);
- Average beeline distance to all arterial roads (meters);
- Average beeline distance to wide arterial roads (meters);
- Share of the urban extent within walking distance (625m) of all arterial roads; and
- Share of urban extent within walking distance (625m) of wide arterial roads.

Data for each locale is stored in four files: (1) Locale boundary file; (2) Blocks file; (3) Plot measurement file; and (4) Street medians file. Arterial roads data is stored in two additional files: (5) Arterials master file; and (6) Arterials study area file. All of the data is stored in shapefile format and can be downloaded on a city-by-city basis or in batches at <u>www.atlasofurbanexpansion.org</u>.

The Atlas pages that follow provide average values for the locales in each area of interest in each of the 200 cities in the global sample for many, but not all, of these metrics. Some metrics were chosen over others as more illustrative of the quality of urban layouts in cities at the present time. Tables summarizing these metrics in Excel format are given following the city-focused pages.

Improving the confidence in the metric averages

The metrics that we calculated exhibited a high degree of variation across locales within a city. This

intra-city variability poses a challenge for making correct inferences. More specifically, in order to detect statistically significant differences in the mean value of a metric across cities, precise estimates of the mean value of a metric within a city are needed. Although the sample average for a given metric—say, the average share of the built-up area in roads—might differ in two cities, the number of locales in each city might not be large enough to reject the null hypothesis that the two means are equal to each other. We can improve the precision of our estimates by adding locale observations to each city, but additional locales entail additional costs, in terms of both time and money.

Given the time and cost associated with extracting data from each locale, the study leading to the production of this volume of the Atlas operated with a budget allowing for the analysis of approximately 20,000 locales in the 200 cities in the global sample. All in all, some 30 analysts worked for an average of 90 days each to digitize and analyze these locales. We initially allocated 80 locales to each city in the sample, 40 in the pre-1990 area of the city and 40 in its expansion area. Then, rather than equally dividing the remaining 4,000 locales evenly among all cities, these locales were allocated using a rule to improve the overall precision of our subsequent estimates of city averages. This rule was based on the understanding that some cities are more complex than others and feature more variability in key metrics of interest. Adding locales to these cities may therefore be especially useful in improving the precision of our estimates.

We chose to focus on three principle metrics, or 'variables of interest', that are of key importance in assessing the quality of urban layouts: (1) the share of the built-up area in roads; (2) the share of residential land in atomistic settlements; and (3) the share of residential land in informal land subdivisions. Each sampled locale provides values for each one of these three metrics. For each city, given a set of sampled locales, we can calculate the sample average and sample standard deviation of each variable of interest. The method chosen to add locales to particular cities uses the information on the averages and standard deviations for these three metrics to improve the statistical power to detect differences between hypothesized means in the cities in the global sample (For a general discussion of statistical power see Casella and Berger, 2002, pp. 382-383). The procedure we followed involved the following steps:

• Initially, allocate 80 locales to each city;

• Calculate the statistical power associated with one-sided hypothesis tests for each of the variables of interest in all the cities in the sample;

• Create a power index for each city, which is the average statistical power associated with the tests for the three variables of interest;

- Sort cities on the basis of the power index from lowest to highest;
- Select the 20 cities with the lowest rankings on the power index;
- Add 10 new locales to each of these 20 cities, then calculate new metrics and new power indices;
- Rank cities again, using this new information;
- Repeat the process until all 4,000 new locales have been allocated.

It should be noted that in some cities, the expansion area is sufficiently small that it might be completely covered with locales, either before the initial 80 locales are randomly chosen or before the termination of the procedure for adding locales. As soon as it becomes impossible to add another locale that does not overlap with the existing locales, no more locales are added to a given city. As noted earlier, all in all, 20,795 locales were digitized and analyzed, a maximum of 270 locales in Cairo, Egypt and a minimum of 25 locales in Zhijin, China. Unfortunately, the addition of locales at this scale does not yet ensure that the average values reported in the Atlas pages that follow are significantly different from each other.

There are two pages in Volume 2 of the Atlas for each city in the global sample of 200 cities, arranged in alphabetical order in the following pages. They are followed by Atlas pages with maps and metrics for the 30 cities for which we have data on urban layouts that were created from 1800 onwards. These maps and metrics pages are followed by summary tables in Excel format that provide metric values for all attributes shown in the individual city tables.

Maps and Metrics for 200 Cities, 1990-2014

The following pages provide maps and metrics for the 200 cities in the global sample. The cities are arranged in alphabetical order. The Index at the end of the volume lists them by country and by world region. There are two pages for every city. The left hand pages provide six high-resolution satellite images of typical locales, three in the pre-1990 area (top row) and three in the expansion area (bottom row). Below these images there is a map showing the network of arterial roads overlaid on a map of recent urban expansion. The right pages provide a table with metric values for different attributes of urban layouts in the city and six charts showing comparisons to other cities in the region and the world.

Accra, Ghana (Sub-Saharan Africa)







Accra, Ghana (Sub-Saharan Africa)

Legend for Charts				
Accra	Other cities in region	All other cities	Global a	iverage —
Metrics			Pre- 1991	1991- 2014
	Road	ds		
Share of Built-Up A	rea Occupied by Roads	5	15%	14%
Share of Built-Up A	rea that is Gridded or P	artially Gridded	23%	10%
Average Road Widt	h (m)		9.0	6.6
Share of Roads less	s than 4m Wide		7%	26%
Share of Roads mo	re than 16m Wide		7%	3%
	Arterial	Roads		
Density of Arterial R	Roads (km/km²)		1.9	0.8
Average Beeline Di	stance to Arterial Road	s (m)	199	575
Share of Urban Exte (625m) of all Arteria	ent Within Walking Dist I Roads	ance	95%	67%
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dist ads (>16m wide)	ance	77%	49%
Block Siz	ze, Plot Size, Intersect	tion Density, and	l Walkabil	ity
Share of Intersectio	ns that are 4-way		19%	5%
Average Block Size	(ha)		6.2	3.9
3-way Intersection I	Density (number per kn	n²)	47	117
4-way Intersection [Density (number per kn	n²)	14	9
Walkabity Ratio			1.8	1.7
Average Plot Size in	n Informal Subdivisions	(m²)	22	949
Average Plot Size in	n Formal Subdivisions ((m²)	555	636
Stages in the Evolution of Residential Layouts				
Share of Built-Up A	rea in Residential Use		69%	78%
Share of Residentia	I Area Not Laid Out Be	fore Occupation	42%	47%
Share of Residentia	I Area Laid Out Before	Occupation	50%	52%
Share of Residentia	I Area in Informal Land	Subdivisions	34%	47%
Share of Residentia	I Area in Formal Land	Subdivisions	12%	4%
Share of Residentia	I Area in Housing Proje	ects	10%	0%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



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Addis Ababa, Ethiopia (Sub-Saharan Africa)









Selected Locales in Area Developed Before 1986













Urban Extent in 1986
Expansion, 1986 - 2000
Expansion, 2000 - 2010

— Arterial Roads

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Addis Ababa, Ethiopia (Sub-Saharan Africa)

Legend for Charts	Clobal		
Addis Ababa Other cities in region All other cities	Global a	average —	
Metrics	Pre- 1986	1986- 2010	
Roads			
Share of Built-Up Area Occupied by Roads	18%	21%	
Share of Built-Up Area that is Gridded or Partially Gridded	2%	30%	
Average Road Width (m)	9.0	8.1	
Share of Roads less than 4m Wide	13%	15%	
Share of Roads more than 16m Wide	12%	8%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.7	1.7	
Average Beeline Distance to Arterial Roads (m)	123	257	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	99%	89%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	93%	83%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	7%	12%	
Average Block Size (ha)	3.1	3.2	
3-way Intersection Density (number per km ²)	104	176	
4-way Intersection Density (number per km ²)	10	28	
Walkabity Ratio	1.8	1.6	
Average Plot Size in Informal Subdivisions (m ²)		244	
Average Plot Size in Formal Subdivisions (m ²)	675	187	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	56%	73%	
Share of Residential Area Not Laid Out Before Occupation	65%	41%	
Share of Residential Area Laid Out Before Occupation	34%	58%	
Share of Residential Area in Informal Land Subdivisions	15%	43%	
Share of Residential Area in Formal Land Subdivisions	18%	1%	
Share of Residential Area in Housing Projects	1%	12%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Ahmedabad, India (South and Central Asia)









Urban Extent in 1989 Expansion, 1989 - 2000 Expansion, 2000 - 2013 — Arterial Roads

Ahmedabad, India (South and Central Asia)

Legend for Charts	Global av	orago —	
	Giobai av	erage —	
Metrics	Pre- 1989	1989- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	23%	24%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	
Average Road Width (m)	7.2	8.4	
Share of Roads less than 4m Wide	37%	17%	
Share of Roads more than 16m Wide	9%	8%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.9	1.6	
Average Beeline Distance to Arterial Roads (m)	185	218	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	97%	94%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	93%	89%	
Block Size, Plot Size, Intersection Density, and	Walkabilit	У	
Share of Intersections that are 4-way	8%	17%	
Average Block Size (ha)	2.4	4.2	
3-way Intersection Density (number per km ²)	297	139	
4-way Intersection Density (number per km ²)	35	28	
Walkabity Ratio	1.8	1.6	
Average Plot Size in Informal Subdivisions (m ²)	342	100	
Average Plot Size in Formal Subdivisions (m ²)	389	120	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	71%	73%	
Share of Residential Area Not Laid Out Before Occupation	20%	14%	
Share of Residential Area Laid Out Before Occupation	79%	85%	
Share of Residential Area in Informal Land Subdivisions	30%	31%	
Share of Residential Area in Formal Land Subdivisions	35%	10%	



Share of Residential Area in Housing Projects



13%

44%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Ahvaz, Iran (South and Central Asia)

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Ahvaz, Iran (South and Central Asia)

Legend for Charts				
Ahvaz	Other cities in region	All other cities	Global a	average —
Metrics			Pre- 1991	1991- 2013
	Roa	ds		
Share of Built-Up Ar	ea Occupied by Roads	3	27%	23%
Share of Built-Up Ar	ea that is Gridded or F	Partially Gridded	15%	0%
Average Road Widt	h (m)		10.9	8.5
Share of Roads less	s than 4m Wide		11%	19%
Share of Roads more	re than 16m Wide		18%	9%
	Arterial	Roads		
Density of Arterial R	oads (km/km²)		2.0	1.6
Average Beeline Dis	stance to Arterial Road	s (m)	197	253
Share of Urban Exte (625m) of all Arteria	ent Within Walking Dist I Roads	ance	95%	90%
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dist ids (>16m wide)	ance	94%	87%
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersectio	ns that are 4-way		17%	13%
Average Block Size	(ha)		2.2	3.5
3-way Intersection	Density (number per kn	n²)	97	106
4-way Intersection [Density (number per kn	n²)	24	19
Walkabity Ratio			1.6	2.0
Average Plot Size in	n Informal Subdivisions	; (m²)	181	295
Average Plot Size in	n Formal Subdivisions	(m²)	207	217
Stages in the Evolution of Residential Layouts				
Share of Built-Up Ar	ea in Residential Use		77%	61%
Share of Residentia	I Area Not Laid Out Be	fore Occupation	0%	7%
Share of Residentia	I Area Laid Out Before	Occupation	99%	92%
Share of Residentia	Area in Informal Land	Subdivisions	15%	29%
Share of Residentia	Area in Formal Land	Subdivisions	74%	41%



Share of Residential Area in Housing Projects



8%

21%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



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Alexandria, Egypt (Western Asia and North Africa)







Alexandria, Egypt (Western Asia and North Africa)

Legend for Charts			
	Dee	4007	
Metrics	Pre- 1987	2013	
Roads			
Share of Built-Up Area Occupied by Roads	16%	23%	
Share of Built-Up Area that is Gridded or Partially Gridded	15%	0%	
Average Road Width (m)	7.5	9.1	
Share of Roads less than 4m Wide	20%	27%	
Share of Roads more than 16m Wide	7%	13%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.7	1.5	
Average Beeline Distance to Arterial Roads (m)	162	356	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	96%	80%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	82%	70%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	9%	9%	
Average Block Size (ha)	1.9	5.2	
3-way Intersection Density (number per km ²)	120	198	
4-way Intersection Density (number per km ²)	22	26	
Walkabity Ratio	1.8	2.0	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	354		
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	63%	81%	
Share of Residential Area Not Laid Out Before Occupation	5%	20%	
Share of Residential Area Laid Out Before Occupation	94%	79%	
Share of Residential Area in Informal Land Subdivisions	15%	55%	
Share of Residential Area in Formal Land Subdivisions	72%	2%	
Share of Residential Area in Housing Projects	6%	21%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Algiers, Algeria (Western Asia and North Africa)







Algiers, Algeria (Western Asia and North Africa)

Legend for Charts	Clobal a		
Algiers Other clues in region All other clues	Giobal a	verage -	
Metrics	Pre- 1987	1987- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	22%	25%	
Share of Built-Up Area that is Gridded or Partially Gridded	1%	7%	
Average Road Width (m)	9.5	6.6	
Share of Roads less than 4m Wide	12%	19%	
Share of Roads more than 16m Wide	13%	3%	
Arterial Roads			
Density of Arterial Roads (km/km²)	1.7	1.1	
Average Beeline Distance to Arterial Roads (m)	267	376	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	89%	79%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	86%	67%	
Block Size, Plot Size, Intersection Density, and	Walkabili	ity	
Share of Intersections that are 4-way	8%	6%	
Average Block Size (ha)	4.5	6.7	
3-way Intersection Density (number per km ²)	62	140	
4-way Intersection Density (number per km ²)	16	14	
Walkabity Ratio	1.9	1.8	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	356	225	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	61%	60%	
Share of Residential Area Not Laid Out Before Occupation	59%	33%	
Share of Residential Area Laid Out Before Occupation	34%	66%	
Share of Residential Area in Informal Land Subdivisions	2%	15%	
Share of Residential Area in Formal Land Subdivisions	23%	24%	
Share of Residential Area in Housing Projects	13%	26%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Anqing, Anhui, China (East Asia and the Pacific)









Selected Locales in Area Developed Before 1990



Selected Locales in Expansion Area, 1990-2013





Anging, Anhui, China (East Asia and the Pacific)

Legend for Charts			
Anging Other cities in region All other cities	Global a	iverage —	
Metrics	Pre- 1990	1990- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	23%	25%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	2%	
Average Road Width (m)	8.3	9.3	
Share of Roads less than 4m Wide	24%	34%	
Share of Roads more than 16m Wide	14%	14%	
Arterial Roads			
Density of Arterial Roads (km/km²)	1.6	1.2	
Average Beeline Distance to Arterial Roads (m)	251	336	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	91%	84%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	91%	86%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	8%	7%	
Average Block Size (ha)	3.8	4.8	
3-way Intersection Density (number per km ²)	191	121	
4-way Intersection Density (number per km ²)	24	15	
Walkabity Ratio	1.8	1.5	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)			
Stages in the Evolution of Residential La	ayouts		
Share of Built-Up Area in Residential Use	46%	59%	
Share of Residential Area Not Laid Out Before Occupation	39%	34%	
Share of Residential Area Laid Out Before Occupation	60%	65%	











Average Block Size ~1990 - ~2014 16 -14 -12 -10 -8 -6 -4 -2 -0 -1st City Rank 200th

Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



5%

22%

32%

13%

6%

44%

Antwerp, Belgium (Europe and Japan)







Selected Locales in Area Developed Before 1990







Selected Locales in Expansion Area, 1990-2013





Antwerp, Belgium (Europe and Japan)

Legend for Charts			
Antwerp Other cities in region All other	cities Global a	verage —	
Metrics	Pre-	1990-	
	1990	2013	
Roads			
Share of Built-Up Area Occupied by Roads	13%	13%	
Share of Built-Up Area that is Gridded or Partially Grid	dded	0%	
Average Road Width (m)	7.9	7.1	
Share of Roads less than 4m Wide	22%	20%	
Share of Roads more than 16m Wide	5%	1%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.6	1.4	
Average Beeline Distance to Arterial Roads (m)	228	248	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	92%	90%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	60%	48%	
Block Size, Plot Size, Intersection Densit	ty, and Walkabili	ty	
Share of Intersections that are 4-way	8%	9%	
Average Block Size (ha)	7.1	14.7	
3-way Intersection Density (number per km ²)	62	55	
4-way Intersection Density (number per km ²)	5	6	
Walkabity Ratio	1.8	1.4	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)		1448	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	64%	70%	
Share of Residential Area Not Laid Out Before Occup	ation 15%	85%	
Share of Residential Area Laid Out Before Occupation	n 84%	14%	
Share of Residential Area in Informal Land Subdivisio	ns 0%	0%	
Share of Residential Area in Formal Land Subdivision	s 80%	13%	
Share of Residential Area in Housing Projects	3%	0%	













Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Arusha, Tanzania (Sub-Saharan Africa)









Selected Locales in Area Developed Before 1988





Selected Locales in Expansion Area, 1988-2013







Urban Extent in 1988 Expansion, 1988 - 2000 Expansion, 2000 - 2013 — Arterial Roads

Arusha, Tanzania (Sub-Saharan Africa)

Legend for Charts			
Arusha Other cities in region All other cities	Global av	erage —	
Metrics	Pre- 1988	1988- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	20%	10%	
Share of Built-Up Area that is Gridded or Partially Gridded	17%	0%	
Average Road Width (m)	8.7	4.7	
Share of Roads less than 4m Wide	20%	65%	
Share of Roads more than 16m Wide	10%	5%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.9	1.0	
Average Beeline Distance to Arterial Roads (m)	104	219	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	100%	95%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	100%	84%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	14%	5%	
Average Block Size (ha)	4.8	5.0	
3-way Intersection Density (number per km ²)	111	128	
4-way Intersection Density (number per km ²)	18	11	
Walkabity Ratio	1.6	1.6	
Average Plot Size in Informal Subdivisions (m ²)	553	369	
Average Plot Size in Formal Subdivisions (m ²)	456	654	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	57%	79%	
Share of Residential Area Not Laid Out Before Occupation	35%	85%	
Share of Residential Area Laid Out Before Occupation	65%	14%	
Share of Residential Area in Informal Land Subdivisions	34%	12%	
Share of Residential Area in Formal Land Subdivisions	28%	1%	



Share of Residential Area in Housing Projects



1%

0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Astrakhan, Russia (Europe and Japan)







Selected Locales in Area Developed Before 1988





Selected Locales in Expansion Area, 1988-2014







Urban Extent in 1988 Expansion, 1988 - 2003 Expansion, 2003 - 2014 — Arterial Roads

Share of Built-up Area in Roads ~1990 - ~2014

Legend for Charts			
Astrakhan Other cities in region All other cities	Global a	verage —	
Metrics	Pre- 1988	1988- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	22%	20%	
Share of Built-Up Area that is Gridded or Partially Gridded	2%	5%	
Average Road Width (m)	7.4	5.3	
Share of Roads less than 4m Wide	7%	28%	
Share of Roads more than 16m Wide	3%	1%	
Arterial Roads			
Density of Arterial Roads (km/km²)	1.2	0.8	
Average Beeline Distance to Arterial Roads (m)	334	371	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	84%	80%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	69%	63%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	10%	12%	
Average Block Size (ha)	2.0	2.8	
3-way Intersection Density (number per km ²)	160	196	
4-way Intersection Density (number per km ²)	21	27	
Walkabity Ratio	1.8	1.6	
Average Plot Size in Informal Subdivisions (m ²)	473	991	
Average Plot Size in Formal Subdivisions (m ²)			
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	59%	72%	
Share of Residential Area Not Laid Out Before Occupation	2%	19%	
Share of Residential Area Laid Out Before Occupation	97%	80%	
Share of Residential Area in Informal Land Subdivisions	59%	80%	



80 -

60 -

40 -

20

0 -1st

City Rank



50

40



200th



Area w/n Walking Distance of Wide

0%

0%

200th





Astrakhan, Russia (Europe and Japan)

Auckland, New Zealand (Land-Rich Developed Countries)









Selected Locales in Area Developed Before 1989





Selected Locales in Expansion Area, 1989-2014




Auckland, New Zealand (Land-Rich Developed Countries)



Legend for Charts				
Auckland	Other cities in region	All other cities	Global a	verage —
Metrice			Pre-	1989-
Metrics			1989	2014
	Roads	5		
Share of Built-Up A	rea Occupied by Roads		17%	19%
Share of Built-Up A	rea that is Gridded or Pa	rtially Gridded	0%	0%
Average Road Wid	th (m)		14.2	10.3
Share of Roads les	s than 4m Wide		7%	20%
Share of Roads mo	ore than 16m Wide		43%	19%
	Arterial R	oads		
Density of Arterial F	Roads (km/km²)		1.6	1.5
Average Beeline Di	istance to Arterial Roads	(m)	233	244
Share of Urban Ext (625m) of all Arteria	tent Within Walking Distan al Roads	nce	92%	92%
Share of Urban Ext of Wide Arterial Ro	ent Within Walking Distan ads (>16m wide)	nce	92%	91%
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersection	ons that are 4-way		6%	9%
Average Block Size	e (ha)		9.3	8.1
3-way Intersection	Density (number per km ²)	33	54
4-way Intersection	Density (number per km ²)	3	6
Walkabity Ratio			1.6	1.6
Average Plot Size i	n Informal Subdivisions (m²)		
Average Plot Size i	n Formal Subdivisions (m	1²)	580	454
Stages in the Evolution of Residential Layouts				
Share of Built-Up A	rea in Residential Use		81%	79%
Share of Residentia	al Area Not Laid Out Befo	re Occupation	0%	7%
Share of Residentia	al Area Laid Out Before C	occupation	99%	92%
Share of Residentia	al Area in Informal Land S	Subdivisions	0%	0%
Share of Residentia	al Area in Formal Land Su	ubdivisions	96%	85%
Share of Residentia	al Area in Housing Projec	ts	3%	7%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Bacolod, Philippines (Southeast Asia)









Selected Locales in Area Developed Before 1992







Selected Locales in Expansion Area, 1992-2015





Urban f Z Expans Expans

Urban Extent in 1992 Expansion, 1992 - 2000 Expansion, 2000 - 2015 —— Arterial Roads

Bacolod, Philippines (Southeast Asia)

Legend for Charts			
Bacolod Other cities in region All other cities	Global av	/erage —	
Metrics	Pre-	1992-	
	1992	2015	
Roads			
Share of Built-Up Area Occupied by Roads	26%	20%	
Share of Built-Up Area that is Gridded or Partially Gridded	10%	7%	
Average Road Width (m)	8.9	5.7	
Share of Roads less than 4m Wide	23%	27%	
Share of Roads more than 16m Wide	26%	1%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.3	1.4	
Average Beeline Distance to Arterial Roads (m)	160	264	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	98%	89%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	89%	82%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	41%	10%	
Average Block Size (ha)	4.2	2.9	
3-way Intersection Density (number per km ²)	96	159	
4-way Intersection Density (number per km ²)	44	19	
Walkabity Ratio	2.1	2.2	
Average Plot Size in Informal Subdivisions (m ²)	23	383	
Average Plot Size in Formal Subdivisions (m ²)	363	409	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	97%	69%	
Share of Residential Area Not Laid Out Before Occupation	42%	33%	
Share of Residential Area Laid Out Before Occupation	78%	66%	
Share of Residential Area in Informal Land Subdivisions	5%	44%	
Share of Residential Area in Formal Land Subdivisions	64%	20%	



Share of Residential Area in Housing Projects



8%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Baghdad, Iraq (Western Asia and North Africa)

الله اکبر



 Baghdad, Iraq 1990-2013
 Urban Extent in 1990
 Arterial Roads

 km
 km
 Expansion, 1990 - 2000
 Arterial Roads

 0
 8
 16
 24
 32

الله اکبر

Baghdad, Iraq (Western Asia and North Africa)

Legend for Charts			
Baghdad Other cities in region All other cities	Global av	verage —	
Metrics	Pre- 1990	1990- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	24%	24%	
Share of Built-Up Area that is Gridded or Partially Gridded	5%	0%	
Average Road Width (m)	9.3	6.4	
Share of Roads less than 4m Wide	9%	25%	
Share of Roads more than 16m Wide	11%	3%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.7	1.5	
Average Beeline Distance to Arterial Roads (m)	313	349	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	86%	84%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	79%	74%	
Block Size, Plot Size, Intersection Density, and	Walkabili	ty	
Share of Intersections that are 4-way	11%	4%	
Average Block Size (ha)	3.1	4.1	
3-way Intersection Density (number per km ²)	130	204	
4-way Intersection Density (number per km ²)	18	17	
Walkabity Ratio	1.7	1.9	
Average Plot Size in Informal Subdivisions (m ²)	125		
Average Plot Size in Formal Subdivisions (m ²)	300		
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	79%	79%	
Share of Residential Area Not Laid Out Before Occupation	11%	54%	
Share of Residential Area Laid Out Before Occupation	88%	45%	
Share of Residential Area in Informal Land Subdivisions	30%	39%	
Share of Residential Area in Formal Land Subdivisions	52%	4%	



Share of Residential Area in Housing Projects



4%

0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Baku, Azerbaijan (Western Asia and North Africa)









C*

Baku, Azerbaijan (Western Asia and North Africa)

Legend for Charts			
Baku Other cities in region All other cities	Global av	/erage —	
Metrics	Pre- 1989	1989- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	18%	17%	
Share of Built-Up Area that is Gridded or Partially Gridded	4%	2%	
Average Road Width (m)	8.3	6.7	
Share of Roads less than 4m Wide	17%	18%	
Share of Roads more than 16m Wide	11%	4%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.8	1.4	
Average Beeline Distance to Arterial Roads (m)	251	317	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	90%	84%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	81%	68%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	9%	5%	
Average Block Size (ha)	3.1	3.9	
3-way Intersection Density (number per km ²)	107	117	
4-way Intersection Density (number per km ²)	13	7	
Walkabity Ratio	1.9	1.7	
Average Plot Size in Informal Subdivisions (m ²)		637	
Average Plot Size in Formal Subdivisions (m ²)	728		
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	57%	78%	
Share of Residential Area Not Laid Out Before Occupation	31%	44%	
Share of Residential Area Laid Out Before Occupation	68%	55%	
Share of Residential Area in Informal Land Subdivisions	23%	48%	
Share of Residential Area in Formal Land Subdivisions	26%	4%	



Share of Residential Area in Housing Projects



18%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Bamako, Mali (Sub-Saharan Africa)







Selected Locales in Area Developed Before 1990











Bamako, Mali (Sub-Saharan Africa)

	Legend for	Charts		
Bamako Other citi	es in region	All other cities	Global a	iverage —
Metrics			Pre-	1990-
Methos			1990	2013
	Road	s		
Share of Built-Up Area Occup	ied by Roads		18%	20%
Share of Built-Up Area that is	Gridded or Pa	artially Gridded	32%	17%
Average Road Width (m)			8.5	6.5
Share of Roads less than 4m	Wide		7%	19%
Share of Roads more than 16	m Wide		5%	2%
	Arterial R	loads		
Density of Arterial Roads (km	/km²)		1.9	1.0
Average Beeline Distance to	Arterial Roads	(m)	178	376
Share of Urban Extent Within (625m) of all Arterial Roads	Walking Dista	ince	98%	80%
Share of Urban Extent Within of Wide Arterial Roads (>16m	Walking Dista wide)	ince	87%	65%
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are	e 4-way		28%	20%
Average Block Size (ha)			2.2	1.6
3-way Intersection Density (n	umber per km ⁱ	2)	111	184
4-way Intersection Density (n	umber per km	2)	44	46
Walkabity Ratio			1.6	1.5
Average Plot Size in Informal	Subdivisions	(m²)	651	467
Average Plot Size in Formal S	Subdivisions (r	n²)		
Stages in th	e Evolution o	of Residential L	ayouts	
Share of Built-Up Area in Res	idential Use		66%	83%
Share of Residential Area No	t Laid Out Bef	ore Occupation	0%	21%
Share of Residential Area Lai	d Out Before (Occupation	99%	78%
Share of Residential Area in I	nformal Land	Subdivisions	99%	77%



Share of Residential Area in Formal Land Subdivisions



0%

0%

0%









Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Bangkok, Thailand (Southeast Asia)







Selected Locales in Area Developed Before 1988



Selected Locales in Expansion Area, 1988-2015







Urban Extent in 1988 Expansion, 1988 - 2002 Expansion, 2002 - 2015 Arterial Roads

Bangkok, Thailand (Southeast Asia)

Legend for Charts			
Bangkok Other cities in region All other cities	Global a	iverage —	
Metrics	Pre- 1988	1988- 2015	
Roads			
Share of Built-Up Area Occupied by Roads	18%	21%	
Share of Built-Up Area that is Gridded or Partially Gridded	4%	2%	
Average Road Width (m)	9.5	7.0	
Share of Roads less than 4m Wide	16%	23%	
Share of Roads more than 16m Wide	12%	5%	
Arterial Roads			
Density of Arterial Roads (km/km²)	1.1	0.8	
Average Beeline Distance to Arterial Roads (m)	353	520	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	83%	70%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	77%	62%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	10%	6%	
Average Block Size (ha)	5.8	5.4	
3-way Intersection Density (number per km ²)	60	91	
4-way Intersection Density (number per km ²)	10	9	
Walkabity Ratio	1.7	2.2	
Average Plot Size in Informal Subdivisions (m ²)		279	
Average Plot Size in Formal Subdivisions (m ²)	224	196	
Stages in the Evolution of Residential L	ayouts		
Share of Built-Up Area in Residential Use	55%	54%	
Share of Residential Area Not Laid Out Before Occupation	73%	40%	
Share of Residential Area Laid Out Before Occupation	22%	59%	
Share of Residential Area in Informal Land Subdivisions	1%	15%	
Share of Residential Area in Formal Land Subdivisions	19%	8%	
Share of Residential Area in Housing Projects	4%	35%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Beijing, Beijing, China (East Asia and the Pacific)











—— Arterial Roads





Beijing, Beijing, China (East Asia and the Pacific)

Legend for Charts			
Beijing Other cities in region All other cities	Global a	verage —	
Metrics	Pre- 1988	1988- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	24%	25%	
Share of Built-Up Area that is Gridded or Partially Gridded	2%	2%	
Average Road Width (m)	10.4	7.3	
Share of Roads less than 4m Wide	27%	42%	
Share of Roads more than 16m Wide	19%	11%	
Arterial Roads			
Density of Arterial Roads (km/km²)	1.6	0.7	
Average Beeline Distance to Arterial Roads (m)	271	573	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	89%	71%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	87%	57%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	10%	11%	
Average Block Size (ha)	6.2	4.5	
3-way Intersection Density (number per km ²)	106	147	
4-way Intersection Density (number per km ²)	15	35	
Walkabity Ratio	1.6	1.8	
Average Plot Size in Informal Subdivisions (m ²)	21		
Average Plot Size in Formal Subdivisions (m ²)	421		
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	51%	53%	
Share of Residential Area Not Laid Out Before Occupation	19%	10%	
Share of Residential Area Laid Out Before Occupation	64%	89%	
Share of Residential Area in Informal Land Subdivisions	8%	39%	
Share of Residential Area in Formal Land Subdivisions	12%	19%	



Share of Residential Area in Housing Projects



59%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Beira, Mozambique (Sub-Saharan Africa)







Beira, Mozambique (Sub-Saharan Africa)

Legend for Charts			
Beira Other cities in region All other cities	Global a	average —	
Metrics	Pre-	1991-	
	1991	2013	
Roads			
Share of Built-Up Area Occupied by Roads	14%	10%	
Share of Built-Up Area that is Gridded or Partially Gridded	13%	7%	
Average Road Width (m)	7.6	6.5	
Share of Roads less than 4m Wide	25%	28%	
Share of Roads more than 16m Wide	8%	4%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.1	0.6	
Average Beeline Distance to Arterial Roads (m)	336	803	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	83%	57%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	77%	55%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	15%	10%	
Average Block Size (ha)	5.2	10.4	
3-way Intersection Density (number per km ²)	58	42	
4-way Intersection Density (number per km ²)	17	8	
Walkabity Ratio	1.6	1.5	
Average Plot Size in Informal Subdivisions (m ²)	420		
Average Plot Size in Formal Subdivisions (m ²)	778		
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	78%	76%	
Share of Residential Area Not Laid Out Before Occupation	66%	83%	
Share of Residential Area Laid Out Before Occupation	33%	16%	
Share of Residential Area in Informal Land Subdivisions	16%	16%	
Share of Residential Area in Formal Land Subdivisions	10%	0%	



Share of Residential Area in Housing Projects



6%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Belgaum, India (South and Central Asia)





















Urban Extent in 1989 Expansion, 1989 - 2000 Expansion, 2000 - 2014 — Arterial Roads

Belgaum, India (South and Central Asia)

Legend for Charts			
Belgaum Other cities in region All other cities	Global av	verage —	
Metrics	Pre- 1989	1989- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	21%	23%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	2%	
Average Road Width (m)	9.2	8.0	
Share of Roads less than 4m Wide	8%	9%	
Share of Roads more than 16m Wide	12%	6%	
Arterial Roads			
Density of Arterial Roads (km/km²)	2.6	1.5	
Average Beeline Distance to Arterial Roads (m)	138	307	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	100%	87%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	97%	74%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	7%	10%	
Average Block Size (ha)	2.6	2.7	
3-way Intersection Density (number per km ²)	113	152	
4-way Intersection Density (number per km ²)	12	22	
Walkabity Ratio	1.7	1.6	
Average Plot Size in Informal Subdivisions (m ²)		177	
Average Plot Size in Formal Subdivisions (m ²)		405	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	72%	78%	
Share of Residential Area Not Laid Out Before Occupation	50%	23%	
Share of Residential Area Laid Out Before Occupation	49%	76%	
Share of Residential Area in Informal Land Subdivisions	38%	51%	
Share of Residential Area in Formal Land Subdivisions	3%	25%	



Share of Residential Area in Housing Projects



7%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Belgrade, Serbia (Europe and Japan)









Selected Locales in Area Developed Before 1988





Selected Locales in Expansion Area, 1988-2014







Urban Extent in 1988 Expansion, 1988 - 2000 Expansion, 2000 - 2014 — Arterial Roads

Belgrade, Serbia (Europe and Japan)

Legend for Charts			
Belgrade Other cities in region All other c	ities Global a	average —	
Metrics	Pre- 1988	1988- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	22%	13%	
Share of Built-Up Area that is Gridded or Partially Gridd	ded 2%	2%	
Average Road Width (m)	8.5	5.7	
Share of Roads less than 4m Wide	21%	36%	
Share of Roads more than 16m Wide	10%	3%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.0	1.6	
Average Beeline Distance to Arterial Roads (m)	182	245	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	97%	93%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	83%	77%	
Block Size, Plot Size, Intersection Density	, and Walkabil	ity	
Share of Intersections that are 4-way	11%	7%	
Average Block Size (ha)	3.1	7.1	
3-way Intersection Density (number per km ²)	120	69	
4-way Intersection Density (number per km ²)	17	7	
Walkabity Ratio	1.8	1.6	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)			
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	52%	81%	
Share of Residential Area Not Laid Out Before Occupa	tion 18%	35%	
Share of Residential Area Laid Out Before Occupation	81%	64%	













Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



0%

59%

21%

27%

33%

Belo Horizonte, Brazil (Latin America and the Caribbean)









Selected Locales in Area Developed Before 1989









— Arterial Roads

Belo Horizonte, Brazil (Latin America and the Caribbean)

Legend for Charts





Shar





Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Belo Horizonte Other cities in region All o	ther cities	Global a	average —
Metrics		Pre- 1989	1989- 2013
Roads			
Share of Built-Up Area Occupied by Roads		22%	19%
Share of Built-Up Area that is Gridded or Partially	Gridded	10%	2%
Average Road Width (m)		9.5	7.3
Share of Roads less than 4m Wide		11%	17%
Share of Roads more than 16m Wide		9%	2%
Arterial Roads			
Density of Arterial Roads (km/km ²)		2.0	1.7
Average Beeline Distance to Arterial Roads (m)		204	242
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads		95%	92%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)		83%	76%
Block Size, Plot Size, Intersection De	nsity, and	Walkabil	ity
Share of Intersections that are 4-way		20%	13%
Average Block Size (ha)		3.0	5.9
3-way Intersection Density (number per km²)		95	78
4-way Intersection Density (number per km ²)		23	9
Walkabity Ratio		1.7	1.8
Average Plot Size in Informal Subdivisions (m ²)		182	
Average Plot Size in Formal Subdivisions (m ²)		388	194
Stages in the Evolution of Res	idential La	youts	
Share of Built-Up Area in Residential Use		80%	84%
Share of Residential Area Not Laid Out Before Oc	cupation	14%	10%
Share of Residential Area Laid Out Before Occupa	ation	85%	89%
Share of Residential Area in Informal Land Subdiv	isions	9%	18%
Share of Residential Area in Formal Land Subdivis	sions	74%	69%
Share of Residential Area in Housing Projects		1%	0%





e of Built-up Area in ~1990 - ~2014	Roads

Berezniki, Russia (Europe and Japan)







Selected Locales in Area Developed Before 1989







Selected Locales in Expansion Area, 1989-2010





Berezniki, Russia (Europe and Japan)

Legend for Charts			
Berezniki Other cities in region All other cities	Global a	verage —	
Metrics	Pre-	1989-	
	1989	2010	
Roads			
Share of Built-Up Area Occupied by Roads	23%	31%	
Share of Built-Up Area that is Gridded or Partially Gridded 2%		0%	
Average Road Width (m)	7.8	6.0	
Share of Roads less than 4m Wide	17%	36%	
Share of Roads more than 16m Wide	5%	1%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	0.3	0.3	
Average Beeline Distance to Arterial Roads (m)	1129	1000	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	30%	37%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	32%	30%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	6%	5%	
Average Block Size (ha)	4.4	1.2	
3-way Intersection Density (number per km ²)	115	328	
4-way Intersection Density (number per km ²)	11	31	
Walkabity Ratio	1.9	1.7	
Average Plot Size in Informal Subdivisions (m ²)		365	
Average Plot Size in Formal Subdivisions (m ²)	1040		
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	63%	72%	
Share of Residential Area Not Laid Out Before Occupation	3%	0%	
Share of Residential Area Laid Out Before Occupation	96%	100%	
Share of Residential Area in Informal Land Subdivisions	59%	50%	
Share of Residential Area in Formal Land Subdivisions	29%	0%	



Share of Residential Area in Housing Projects



7%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Berlin, Germany (Europe and Japan)







Selected Locales in Area Developed Before 1990







Selected Locales in Expansion Area, 1990-2013





Berlin, Germany (Europe and Japan)

Legend for Charts				
Berlin	Other cities in region	All other cities	Global a	average —
Metrics			Pre- 1990	1990- 2013
	Road	ls		
Share of Built-Up A	rea Occupied by Roads		25%	17%
Share of Built-Up A	rea that is Gridded or P	artially Gridded	12%	0%
Average Road Wid	th (m)		10.7	8.8
Share of Roads less than 4m Wide			13%	16%
Share of Roads mo	ore than 16m Wide		17%	11%
	Arterial I	Roads		
Density of Arterial I	Roads (km/km²)		2.2	1.7
Average Beeline D	istance to Arterial Roads	s (m)	150	207
Share of Urban Ext (625m) of all Arteria	tent Within Walking Dista al Roads	ance	98%	95%
Share of Urban Ext of Wide Arterial Ro	tent Within Walking Dista ads (>16m wide)	ance	95%	73%
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersection	ons that are 4-way		23%	17%
Average Block Size	e (ha)		3.4	5.6
3-way Intersection	Density (number per km	²)	97	84
4-way Intersection	Density (number per km	²)	23	14
Walkabity Ratio			1.9	1.9
Average Plot Size in Informal Subdivisions (m ²)		309	278	
Average Plot Size i	in Formal Subdivisions (m²)	454	909
Stages in the Evolution of Residential Layouts				
Share of Built-Up A	rea in Residential Use		74%	76%
Share of Residentia	al Area Not Laid Out Be	ore Occupation	0%	2%
Share of Residentia	al Area Laid Out Before	Occupation	99%	97%
Share of Residentia	al Area in Informal Land	Subdivisions	7%	11%
Share of Residentia	al Area in Formal Land S	Subdivisions	71%	71%



Share of Residential Area in Housing Projects



20%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Bicheng, Chongqing, China (East Asia and the Pacific)









Bicheng, Chongqing, China (East Asia and the Pacific)

Other cities in region

Bicheng

Legend for Charts

All other cities

Global average

50

40

20

Percent 30



Metrics	1988	2013		
Roads				
Share of Built-Up Area Occupied by Roads	33%	28%		
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%		
Average Road Width (m)	8.7	10.2		
Share of Roads less than 4m Wide	20%	19%		
Share of Roads more than 16m Wide	13%	18%		
Arterial Roads				
Density of Arterial Roads (km/km²)	2.4	1.1		
Average Beeline Distance to Arterial Roads (m)	148	229		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	100%	93%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	100%	92%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	25%	7%		
Average Block Size (ha)	0.9	6.3		
3-way Intersection Density (number per km ²)	248	105		
4-way Intersection Density (number per km ²)	86	11		
Walkabity Ratio	1.4	1.9		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)				
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	92%	38%		
Share of Residential Area Not Laid Out Before Occupation	1%	26%		













Share of Residential Area Laid Out Before Occupation

Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



99%

0%

83%

16%

73%

3%

32%

Bogota, Colombia (Latin America and the Caribbean)







Selected Locales in Area Developed Before 1989





Selected Locales in Expansion Area, 1989-2010







Urban Extent in 1989 Expansion, 1989 - 2001 Expansion, 2001 - 2010 Arterial Roads

Bogota, Colombia (Latin America and the Caribbean)

Legend for Charts			
Bogota Other cities in region All othe	r cities Global a	verage —	
Metrics	Pre- 1989	1989- 2010	
Roads			
Share of Built-Up Area Occupied by Roads	25%	22%	
Share of Built-Up Area that is Gridded or Partially Gr	idded 22%	10%	
Average Road Width (m)	10.9	8.8	
Share of Roads less than 4m Wide	14%	15%	
Share of Roads more than 16m Wide	17%	11%	
Arterial Roads			
Density of Arterial Roads (km/km²)	2.7	2.4	
Average Beeline Distance to Arterial Roads (m)	145	176	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	98%	96%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	87%	84%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	18%	13%	
Average Block Size (ha)	1.9	4.2	
3-way Intersection Density (number per km ²)	167	155	
4-way Intersection Density (number per km ²)	38	40	
Walkabity Ratio	1.7	1.9	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	130		
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	63%	75%	
Share of Residential Area Not Laid Out Before Occu	pation 0%	4%	
Share of Residential Area Laid Out Before Occupation	on 99%	95%	
Share of Residential Area in Informal Land Subdivisi	ons 8%	26%	
Share of Residential Area in Formal Land Subdivisio	ns 63%	17%	
Share of Residential Area in Housing Projects	26%	51%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Budapest, Hungary (Europe and Japan)







Selected Locales in Area Developed Before 1992







Selected Locales in Expansion Area, 1992-2013







— Arterial Roads

Budapest, Hungary (Europe and Japan)

Legend for Charts				
Budapest Other cit	ies in region	All other cities	Global average —	
Metrics			Pre- 1992	1992- 2013
	Road	s		
Share of Built-Up Area Occup	ied by Roads		20%	15%
Share of Built-Up Area that is	Gridded or Pa	artially Gridded	7%	15%
Average Road Width (m)			9.1	7.7
Share of Roads less than 4m	Wide		7%	15%
Share of Roads more than 16	Sm Wide		5%	2%
	Arterial F	toads		
Density of Arterial Roads (km	/km²)		1.8	1.4
Average Beeline Distance to	Arterial Roads	(m)	205	267
Share of Urban Extent Within (625m) of all Arterial Roads	Walking Dista	ince	96%	90%
Share of Urban Extent Within of Wide Arterial Roads (>16m	Walking Distanti wide)	ince	69%	53%
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that an	e 4-way		19%	26%
Average Block Size (ha)			3.5	5.3
3-way Intersection Density (n	umber per km	²)	93	71
4-way Intersection Density (n	umber per km	2)	19	14
Walkabity Ratio			1.7	1.5
Average Plot Size in Informal	Subdivisions	(m²)		868
Average Plot Size in Formal S	Subdivisions (I	n²)	644	719
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Res	idential Use		79%	90%
Share of Residential Area No	t Laid Out Bef	ore Occupation	3%	11%
Share of Residential Area Lai	d Out Before	Occupation	96%	88%
Share of Residential Area in I	nformal Land	Subdivisions	6%	26%
Share of Residential Area in I	Formal Land S	ubdivisions	84%	62%
Share of Residential Area in I	Housing Proje	cts	6%	0%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Buenos Aires, Argentina (Latin America and the Caribbean)









Buenos Aires, Argentina (Latin America and the Caribbean)

Legend for Charts			
Buenos Aires Other cities in region All other cities	Global a	verage —	
Metrics	Pre- 1989	1989- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	25%	15%	
Share of Built-Up Area that is Gridded or Partially Gridded	87%	72%	
Average Road Width (m)	11.9	5.9	
Share of Roads less than 4m Wide	3%	13%	
Share of Roads more than 16m Wide	18%	1%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.6	2.1	
Average Beeline Distance to Arterial Roads (m)	147	194	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	98%	94%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	78%	70%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	57%	37%	
Average Block Size (ha)	2.4	3.5	
3-way Intersection Density (number per km ²)	83	68	
4-way Intersection Density (number per km ²)	29	42	
Walkabity Ratio	1.4	1.6	
Average Plot Size in Informal Subdivisions (m ²)	168	372	
Average Plot Size in Formal Subdivisions (m ²)	254	484	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	80%	82%	
Share of Residential Area Not Laid Out Before Occupation	1%	3%	
Share of Residential Area Laid Out Before Occupation	93%	96%	
Share of Residential Area in Informal Land Subdivisions	27%	87%	
Share of Residential Area in Formal Land Subdivisions	69%	4%	



Share of Residential Area in Housing Projects



1%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Bukhara, Uzbekistan (South and Central Asia)

(.....





Bukhara, Uzbekistan (South and Central Asia)

Legend for Charts			
Bukhara Other cities in region All other cities	Global a	average —	
Metrics	Pre- 1991	1991- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	18%	14%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	
Average Road Width (m)	10.3	8.6	
Share of Roads less than 4m Wide	11%	15%	
Share of Roads more than 16m Wide	15%	9%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.6	0.8	
Average Beeline Distance to Arterial Roads (m)	291	579	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	89%	69%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	86%	63%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	7%	4%	
Average Block Size (ha)	4.0	10.0	
3-way Intersection Density (number per km ²)	73	55	
4-way Intersection Density (number per km ²)	6	3	
Walkabity Ratio	1.6	1.7	
Average Plot Size in Informal Subdivisions (m ²)	1499		
Average Plot Size in Formal Subdivisions (m ²)	565	2653	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	73%	77%	
Share of Residential Area Not Laid Out Before Occupation	16%	7%	
Share of Residential Area Laid Out Before Occupation	83%	92%	
Share of Residential Area in Informal Land Subdivisions	40%	57%	
Share of Residential Area in Formal Land Subdivisions	41%	23%	
Share of Residential Area in Housing Projects	1%	12%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Busan, Korea Rep. (East Asia and the Pacific)









Selected Locales in Area Developed Before 1991



Selected Locales in Expansion Area, 1991-2013









Urban Extent in 1991
Expansion, 1991 - 2000
Expansion, 2000 - 2013

— Arterial Roads
11

Busan, Korea Rep. (East Asia and the Pacific)

Legend for Charts			
Busan Other cities in region All other cities	Global a	verage —	
Metrics	Pre- 1991	1991- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	21%	28%	
Share of Built-Up Area that is Gridded or Partially Gridded	7%	0%	
Average Road Width (m)	6.5	6.9	
Share of Roads less than 4m Wide	36%	39%	
Share of Roads more than 16m Wide	6%	8%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.9	2.1	
Average Beeline Distance to Arterial Roads (m)	213	289	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	91%	87%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	87%	82%	
Block Size, Plot Size, Intersection Density, and	l Walkabili	ity	
Share of Intersections that are 4-way	13%	10%	
Average Block Size (ha)	2.5	2.8	
3-way Intersection Density (number per km ²)	162	185	
4-way Intersection Density (number per km ²)	33	18	
Walkabity Ratio	1.7	1.7	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	166	228	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	60%	39%	
Share of Residential Area Not Laid Out Before Occupation	27%	50%	
Share of Residential Area Laid Out Before Occupation	72%	49%	
Share of Residential Area in Informal Land Subdivisions	1%	0%	
Share of Residential Area in Formal Land Subdivisions	44%	24%	



Share of Residential Area in Housing Projects



26%

24%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Cabimas, Venezuela (Latin America and the Caribbean)









Urban E Expans Expans

Urban Extent in 1989 Expansion, 1989 - 2000 Expansion, 2000 - 2014 — Arterial Roads

Cabimas, Venezuela (Latin America and the Caribbean)



Legend for Charts				
Cabimas Other cities in region All other cities Global average -				
Metrics			Pre- 1989	1989- 2014
	Roads	5		
Share of Built-Up A	rea Occupied by Roads		16%	20%
Share of Built-Up A	rea that is Gridded or Pa	rtially Gridded	2%	7%
Average Road Wid	th (m)		8.7	7.1
Share of Roads les	s than 4m Wide		4%	13%
Share of Roads mo	ore than 16m Wide		5%	4%
	Arterial R	oads		
Density of Arterial F	Roads (km/km²)		1.8	1.4
Average Beeline D	istance to Arterial Roads	(m)	179	241
Share of Urban Ext (625m) of all Arteria	tent Within Walking Dista al Roads	nce	97%	92%
Share of Urban Ext of Wide Arterial Ro	tent Within Walking Dista ads (>16m wide)	nce	82%	74%
Block Si	ze, Plot Size, Intersection	on Density, and	d Walkabil	ity
Share of Intersection	ons that are 4-way		14%	16%
Average Block Size	e (ha)		3.7	4.4
3-way Intersection	Density (number per km ²)	82	106
4-way Intersection	Density (number per km ²)	12	22
Walkabity Ratio			1.6	1.7
Average Plot Size i	n Informal Subdivisions (m²)		
Average Plot Size i	n Formal Subdivisions (n	1²)	906	456
St	ages in the Evolution o	f Residential L	ayouts	
Share of Built-Up A	rea in Residential Use		79%	82%
Share of Residentia	al Area Not Laid Out Befo	ore Occupation	0%	28%
Share of Residentia	al Area Laid Out Before C	Occupation	100%	71%
Share of Residentia	al Area in Informal Land S	Subdivisions	15%	43%
Share of Residentia	al Area in Formal Land S	ubdivisions	81%	18%
Share of Residentia	al Area in Housing Project	ts	2%	8%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Cairo, Egypt (Western Asia and North Africa)





 Cairo, Egypt
 Urban Extent in 1992
 Arterial Roads

 1992-2013
 Expansion, 1992 - 2003
 Expansion, 2003 - 2013

Cairo, Egypt (Western Asia and North Africa)

Legend for Charts			
Cairo Other cities in region All other cities	Global av	verage —	
Metrics	Pre- 1992	1992- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	25%	23%	
Share of Built-Up Area that is Gridded or Partially Gridded	13%	7%	
Average Road Width (m)	10.2	9.5	
Share of Roads less than 4m Wide	18%	25%	
Share of Roads more than 16m Wide	20%	16%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.5	1.5	
Average Beeline Distance to Arterial Roads (m)	328	406	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	83%	77%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	81%	69%	
Block Size, Plot Size, Intersection Density, and	Walkabili	ty	
Share of Intersections that are 4-way	20%	12%	
Average Block Size (ha)	2.5	4.1	
3-way Intersection Density (number per km ²)	102	144	
4-way Intersection Density (number per km ²)	32	30	
Walkabity Ratio	1.6	1.8	
Average Plot Size in Informal Subdivisions (m ²)	82	595	
Average Plot Size in Formal Subdivisions (m ²)	525	473	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	69%	75%	
Share of Residential Area Not Laid Out Before Occupation	22%	43%	
Share of Residential Area Laid Out Before Occupation	68%	56%	
Share of Residential Area in Informal Land Subdivisions	16%	17%	
Share of Residential Area in Formal Land Subdivisions	58%	13%	



Share of Residential Area in Housing Projects



2%

25%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Caracas, Venezuela (Latin America and the Caribbean)









Caracas, Venezuela (Latin America and the Caribbean)



Legend for Charts				
Caracas	Other cities in region	All other cities	Global a	iverage —
Metrics			Pre- 1991	1991- 2014
	Roads	5		
Share of Built-Up A	Area Occupied by Roads		20%	21%
Share of Built-Up A	Area that is Gridded or Pa	rtially Gridded	2%	0%
Average Road Wid	ith (m)		11.4	6.5
Share of Roads les	ss than 4m Wide		8%	24%
Share of Roads me	ore than 16m Wide		18%	3%
	Arterial R	oads		
Density of Arterial	Roads (km/km²)		2.1	1.9
Average Beeline D	istance to Arterial Roads	(m)	227	255
Share of Urban Ex (625m) of all Arteri	tent Within Walking Dista al Roads	nce	92%	90%
Share of Urban Ex of Wide Arterial Ro	tent Within Walking Dista bads (>16m wide)	nce	82%	78%
Block S	ize, Plot Size, Intersection	on Density, and	d Walkabili	ity
Share of Intersection	ons that are 4-way		12%	1%
Average Block Size	e (ha)		4.6	6.3
3-way Intersection	Density (number per km ²)	40	48
4-way Intersection	Density (number per km ²)	8	3
Walkabity Ratio			1.9	1.8
Average Plot Size	in Informal Subdivisions (m²)		
Average Plot Size	in Formal Subdivisions (n	1 ²)	550	
s	tages in the Evolution o	f Residential L	ayouts	
Share of Built-Up A	Area in Residential Use		73%	74%
Share of Residenti	al Area Not Laid Out Befo	ore Occupation	36%	51%
Share of Residenti	al Area Laid Out Before C	Occupation	63%	48%
Share of Residenti	al Area in Informal Land S	Subdivisions	6%	4%
Share of Residenti	al Area in Formal Land S	ubdivisions	51%	24%
Share of Residenti	al Area in Housing Projec	ts	5%	19%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Cebu City, Philippines (Southeast Asia)









Selected Locales in Area Developed Before 1993













Urban Extent in 1993 Expansion, 1993 - 2000 Expansion, 2000 - 2014 Arterial Roads

Cebu City, Philippines (Southeast Asia)

Legend for Charts		
Cebu City Other cities in region All other cities	Global a	iverage —
Metrics	Pre- 1993	1993- 2014
Roads		
Share of Built-Up Area Occupied by Roads	13%	14%
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%
Average Road Width (m)	9.0	5.2
Share of Roads less than 4m Wide	20%	42%
Share of Roads more than 16m Wide	8%	3%
Arterial Roads		
Density of Arterial Roads (km/km ²)	1.7	1.3
Average Beeline Distance to Arterial Roads (m)	237	295
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	91%	86%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	78%	63%
Block Size, Plot Size, Intersection Density, and	d Walkabil	ity
Share of Intersections that are 4-way	7%	0%
Average Block Size (ha)	6.5	4.4
3-way Intersection Density (number per km ²)	79	115
4-way Intersection Density (number per km ²)	7	1
Walkabity Ratio	2.1	2.2
Average Plot Size in Informal Subdivisions (m ²)		
Average Plot Size in Formal Subdivisions (m ²)	243	
Stages in the Evolution of Residential L	ayouts	
Share of Built-Up Area in Residential Use	61%	78%
Share of Residential Area Not Laid Out Before Occupation	63%	79%
Share of Residential Area Laid Out Before Occupation	36%	20%
Share of Residential Area in Informal Land Subdivisions	25%	15%
Share of Residential Area in Formal Land Subdivisions	11%	0%
Share of Residential Area in Housing Projects	0%	3%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Changzhi, Hunan, China (East Asia and the Pacific)







Selected Locales in Area Developed Before 1992







Selected Locales in Expansion Area, 1992-2014





Urban Extent in 1992
 Expansion, 1992 - 2000
 Expansion, 2000 - 2014

—— Arterial Roads

Changzhi, Hunan, China (East Asia and the Pacific)

			•*
Sh	are of Buil ~19	t-up Area 90 – ~20	a in Roads 14
50 -			
40 -			
30 -			
20 -			
10 -			
0-	lst	City Rank	200th

Percent









Legend for Charts		
Changzhi Other cities in region All other cities	Global av	verage —
Metrics	Pre- 1992	1992- 2014
Roads		
Share of Built-Up Area Occupied by Roads	24%	22%
Share of Built-Up Area that is Gridded or Partially Gridded	2%	2%
Average Road Width (m)	9.1	6.8
Share of Roads less than 4m Wide	37%	50%
Share of Roads more than 16m Wide	17%	10%
Arterial Roads		
Density of Arterial Roads (km/km²)	2.1	1.3
Average Beeline Distance to Arterial Roads (m)	178	317
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	98%	86%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	98%	74%
Block Size, Plot Size, Intersection Density, and	Walkabilit	y
Share of Intersections that are 4-way	13%	10%
Average Block Size (ha)	4.4	5.7
3-way Intersection Density (number per km ²)	153	140
4-way Intersection Density (number per km ²)	38	22
Walkabity Ratio	1.8	1.7
Average Plot Size in Informal Subdivisions (m ²)		561
Average Plot Size in Formal Subdivisions (m ²)	269	394
Stages in the Evolution of Residential La	ayouts	
Share of Built-Up Area in Residential Use	52%	45%
Share of Residential Area Not Laid Out Before Occupation	6%	0%
Share of Residential Area Laid Out Before Occupation	93%	99%
Share of Residential Area in Informal Land Subdivisions	4%	26%
Share of Residential Area in Formal Land Subdivisions	76%	59%
Share of Residential Area in Housing Projects	12%	13%





Changzhou, Jingsu, China (East Asia and the Pacific)











Selected Locales in Expansion Area, 1989-2014





Urban Extent in 1989
Expansion, 1989 - 2000
Expansion, 2000 - 2014

Arterial Roads

Changzhou, Jingsu, China (East Asia and the Pacific)

Legend for Charts









Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Changzhou	Other cities in region	All other citie	s Global	average —
Metrics			Pre- 1989	1989- 2014
	Ro	ads		
Share of Built-Up A	rea Occupied by Road	ds	22%	26%
Share of Built-Up A	rea that is Gridded or	Partially Gridde	d 0%	0%
Average Road Wid	th (m)		9.6	10.4
Share of Roads les	s than 4m Wide		32%	31%
Share of Roads mo	ore than 16m Wide		19%	18%
	Arteria	I Roads		
Density of Arterial F	Roads (km/km²)		2.2	1.4
Average Beeline Di	istance to Arterial Roa	ds (m)	154	313
Share of Urban Ext (625m) of all Arteria	ent Within Walking Dis al Roads	stance	99%	86%
Share of Urban Ext of Wide Arterial Roa	ent Within Walking Dia ads (>16m wide)	stance	99%	84%
Block Si	ze, Plot Size, Interse	ction Density, a	and Walkabi	lity
Share of Intersection	ons that are 4-way		9%	11%
Average Block Size	e (ha)		4.3	5.7
3-way Intersection	Density (number per k	(m²)	96	131
4-way Intersection	Density (number per k	(m²)	14	14
Walkabity Ratio			1.5	1.8
Average Plot Size i	n Informal Subdivision	ıs (m²)		
Average Plot Size i	n Formal Subdivisions	; (m²)		
Stages in the Evolution of Residential Layouts				
Share of Built-Up A	rea in Residential Use)	44%	42%
Share of Residentia	al Area Not Laid Out B	efore Occupatio	on 24%	68%
Share of Residential Area Laid Out Before Occupation		76%	31%	



Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions



0%

40%

35%

5%

1%

25%

Chengdu, Sichuan, China (East Asia and the Pacific)









Selected Locales in Area Developed Before 1988



Selected Locales in Expansion Area, 1988-2009



Chengdu, Sichuan, China 1988-2009 0 10 20 30 40

Urban Extent in 1988 Expansion, 1988 - 2000 Expansion, 2000 - 2009 —— Arterial Roads

Share

50

40.

20

10

0

1st

Percent 30

Chengdu, Sichuan, China (East Asia and the Pacific)

Other cities in region

Chengdu

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Legend for Charts

All other cities

Global average

	<u>^</u> #
of Built-up ~1990 -	Area in Roads ~2014

200th

Metrics	Pre-	1988-		
Beat	1966	2009		
Roads				
Share of Built-Up Area Occupied by Roads	25%	20%		
Share of Built-Up Area that is Gridded or Partially Gridded	2%	2%		
Average Road Width (m)	8.9	9.4		
Share of Roads less than 4m Wide	28%	31%		
Share of Roads more than 16m Wide	16%	17%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	2.5	0.4		
Average Beeline Distance to Arterial Roads (m)	151	3004		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	98%	31%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	98%	31%		
Block Size, Plot Size, Intersection Density, and	l Walkabil	ity		
Share of Intersections that are 4-way	12%	7%		
Average Block Size (ha)	3.4	8.0		
3-way Intersection Density (number per km ²)	174	64		
4-way Intersection Density (number per km ²)	21	11		
Walkabity Ratio	1.8	1.9		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)				
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	47%	50%		

Share of Built-Op Area in Residential Ose	41 %	50%
Share of Residential Area Not Laid Out Before Occupation	7%	39%
Share of Residential Area Laid Out Before Occupation	92%	60%
Share of Residential Area in Informal Land Subdivisions	0%	9%
Share of Residential Area in Formal Land Subdivisions	70%	23%
Share of Residential Area in Housing Projects	21%	27%







City Rank



Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Chengguan, Guizhou, China (East Asia and the Pacific)









Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2013

—— Arterial Roads

Chengguan, Guizhou, China (East Asia and the Pacific)

Legend for Charts







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Chengguan	Other cities in region	All other cities	Global a	verage —	
Metrics			Pre- 1990	1990- 2013	
	Roa	ds			
Share of Built-Up Ar	rea Occupied by Road	s	16%	11%	
Share of Built-Up Ar	rea that is Gridded or I	Partially Gridded	0%	0%	
Average Road Widt	h (m)		8.9	7.9	
Share of Roads less	s than 4m Wide		22%	27%	
Share of Roads more	re than 16m Wide		17%	3%	
	Arterial	Roads			
Density of Arterial R	loads (km/km²)		2.0	1.9	
Average Beeline Dis	stance to Arterial Road	ls (m)	114	139	
Share of Urban Exte (625m) of all Arteria	ent Within Walking Dis I Roads	tance	100%	100%	
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dis ads (>16m wide)	tance	96%	95%	
Block Siz	ze, Plot Size, Intersec	tion Density, an	id Walkabili	ty	
Share of Intersectio	ns that are 4-way		10%	3%	
Average Block Size	(ha)		5.5	15.9	
3-way Intersection	Density (number per ki	m²)	67	20	
4-way Intersection	Density (number per ki	m²)	12	3	
Walkabity Ratio			1.8	1.6	
Average Plot Size in	n Informal Subdivisions	s (m²)			
Average Plot Size in	n Formal Subdivisions	(m²)			
Sta	Stages in the Evolution of Residential Layouts				
Share of Built-Up Ar	rea in Residential Use		78%	69%	
Share of Residentia	I Area Not Laid Out Be	efore Occupation	74%	79%	
Share of Residentia	I Area Laid Out Before	e Occupation	25%	20%	

Share of Residential Area in Informal Land Subdivisions 0% Share of Residential Area in Formal Land Subdivisions 24% Share of Residential Area in Housing Projects 1% 16%





0%

3%

Cheonan, Korea Rep. (East Asia and the Pacific)







Cheonan, Korea Rep. (East Asia and the Pacific)

Other cities in region

Cheonan

Legend for Charts

All other cities

Global average



50

40

Percent

Meters

Metrics	Pre- 1991	1991- 2014
Roads		
Share of Built-Up Area Occupied by Roads	22%	26%
Share of Built-Up Area that is Gridded or Partially Gridded	17%	0%
Average Road Width (m)	7.0	6.7
Share of Roads less than 4m Wide	25%	36%
Share of Roads more than 16m Wide	7%	7%
Arterial Roads		
Density of Arterial Roads (km/km²)	3.3	0.5
Average Beeline Distance to Arterial Roads (m)	94	331
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	100%	82%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	100%	82%
Block Size, Plot Size, Intersection Density, and	l Walkabili	ty
Share of Intersections that are 4-way	22%	6%
Average Block Size (ha)	1.7	4.4
3-way Intersection Density (number per km ²)	172	149
4-way Intersection Density (number per km ²)	59	15
Walkabity Ratio	1.3	1.5
Average Plot Size in Informal Subdivisions (m ²)		
Average Plot Size in Formal Subdivisions (m ²)	170	
Stages in the Evolution of Residential La	ayouts	
Share of Built-Up Area in Residential Use	69%	51%
Share of Residential Area Not Laid Out Before Occupation	35%	56%
Share of Residential Area Laid Out Before Occupation	64%	43%
Share of Residential Area in Informal Land Subdivisions	0%	8%
Share of Residential Area in Formal Land Subdivisions	53%	10%
Share of Residential Area in Housing Projects	10%	24%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Chicago, United States (Land-Rich Developed Countries)







Selected Locales in Area Developed Before 1989



Selected Locales in Expansion Area, 1989-2014





Urban Extent in 1989 Expansion, 1989 - 2001 Expansion, 2001 - 2014 — Arterial Roads

Chicago, United States (Land-Rich Developed Countries)



Legend for Charts				
Chicago	Other cities in region	All other cities	Global average —	
Metrics			Pre- 1989	1989- 2014
	Road	S		
Share of Built-Up A	rea Occupied by Roads		27%	24%
Share of Built-Up A	rea that is Gridded or Pa	rtially Gridded	56%	0%
Average Road Wid	th (m)		11.6	10.0
Share of Roads les	s than 4m Wide		8%	26%
Share of Roads mo	ore than 16m Wide		42%	29%
	Arterial R	oads		
Density of Arterial F	Roads (km/km²)		1.4	1.4
Average Beeline Di	stance to Arterial Roads	(m)	241	258
Share of Urban Ext (625m) of all Arteria	ent Within Walking Dista al Roads	nce	92%	91%
Share of Urban Ext of Wide Arterial Roa	ent Within Walking Dista ads (>16m wide)	nce	79%	79%
Block Si	ze, Plot Size, Intersecti	on Density, and	l Walkabil	ity
Share of Intersection	ons that are 4-way		33%	8%
Average Block Size	e (ha)		7.4	3.9
3-way Intersection	Density (number per km²	?)	61	74
4-way Intersection	Density (number per km ²	²)	38	12
Walkabity Ratio			1.5	1.7
Average Plot Size i	n Informal Subdivisions ((m²)		
Average Plot Size i	n Formal Subdivisions (n	n²)	637	1795
St	ages in the Evolution o	f Residential L	ayouts	
Share of Built-Up A	rea in Residential Use		80%	82%
Share of Residentia	al Area Not Laid Out Befo	ore Occupation	1%	19%
Share of Residentia	al Area Laid Out Before C	Occupation	82%	80%
Share of Residentia	al Area in Informal Land	Subdivisions	2%	0%
Share of Residentia	al Area in Formal Land S	ubdivisions	88%	64%
Share of Residentia	al Area in Housing Project	ts	7%	16%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Cirebon, Indonesia (Southeast Asia)







Selected Locales in Area Developed Before 1989







Selected Locales in Expansion Area, 1989-2014







Urban Extent in 1989 Expansion, 1989 - 2000 Expansion, 2000 - 2014 Arterial Roads

Cirebon, Indonesia (Southeast Asia)

Legend for Charts		
Cirebon Other cities in region All other cities	Global a	iverage —
Metrics	Pre- 1989	1989- 2014
Roads		
Share of Built-Up Area Occupied by Roads	12%	14%
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%
Average Road Width (m)	5.4	5.8
Share of Roads less than 4m Wide	39%	32%
Share of Roads more than 16m Wide	1%	3%
Arterial Roads		
Density of Arterial Roads (km/km ²)	1.7	0.9
Average Beeline Distance to Arterial Roads (m)	229	435
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	97%	77%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	95%	66%
Block Size, Plot Size, Intersection Density, and	Walkabil	ity
Share of Intersections that are 4-way	11%	4%
Average Block Size (ha)	2.0	6.7
3-way Intersection Density (number per km ²)	179	123
4-way Intersection Density (number per km ²)	29	11
Walkabity Ratio	1.7	1.8
Average Plot Size in Informal Subdivisions (m ²)		
Average Plot Size in Formal Subdivisions (m ²)		270
Stages in the Evolution of Residential La	ayouts	
Share of Built-Up Area in Residential Use	74%	81%
Share of Residential Area Not Laid Out Before Occupation	47%	61%
Share of Residential Area Laid Out Before Occupation	52%	38%
Share of Residential Area in Informal Land Subdivisions	0%	16%
Share of Residential Area in Formal Land Subdivisions	50%	22%
Share of Residential Area in Housing Projects	1%	0%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 – ~2014



Cleveland, United States (Land-Rich Developed Countries)









Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2013

—— Arterial Roads

Cleveland, United States (Land-Rich Developed Countries)

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	•		

Legend for Charts			
Cleveland Other cities in region All of	her cities Global a	iverage —	
Metrics	Pre-	1990-	
	1990	2013	
Roads			
Share of Built-Up Area Occupied by Roads	19%	15%	
Share of Built-Up Area that is Gridded or Partially	Gridded 5%	0%	
Average Road Width (m)	10.8	21.8	
Share of Roads less than 4m Wide	18%	12%	
Share of Roads more than 16m Wide	26%	26%	
Arterial Roads			
Density of Arterial Roads (km/km²)	1.6	1.2	
Average Beeline Distance to Arterial Roads (m)	225	258	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	95%	91%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	90%	51%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	10%	9%	
Average Block Size (ha)	5.3	7.7	
3-way Intersection Density (number per km ²)	82	99	
4-way Intersection Density (number per km ²)	11	11	
Walkabity Ratio	1.7	1.7	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	840	1381	
Stages in the Evolution of Resi	dential Layouts		
Share of Built-Up Area in Residential Use	67%	77%	
Share of Residential Area Not Laid Out Before Oct	cupation 7%	15%	
Share of Residential Area Laid Out Before Occupa	ation 92%	84%	
Share of Residential Area in Informal Land Subdiv	isions 0%	3%	
Share of Residential Area in Formal Land Subdivis	ions 85%	75%	
Share of Residential Area in Housing Projects	6%	6%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 – ~2014



Cochabamba, Bolivia (Latin America and the Caribbean)

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Cochabamba, Bolivia
1990-2013Urban Extent in 1990Arterial Roads0481216

Cochabamba, Bolivia (Latin America and the Caribbean)

Legend for Charts		
Cochabamba Other cities in region All other cities	Global av	erage —
Metrics	Pre-	1990-
	1990	2013
Roads		
Share of Built-Up Area Occupied by Roads	24%	19%
Share of Built-Up Area that is Gridded or Partially Gridded	17%	0%
Average Road Width (m)	10.4	8.5
Share of Roads less than 4m Wide	7%	24%
Share of Roads more than 16m Wide	16%	2%
Arterial Roads		
Density of Arterial Roads (km/km ²)	2.4	1.2
Average Beeline Distance to Arterial Roads (m)	164	378
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	97%	81%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	95%	72%
Block Size, Plot Size, Intersection Density, and	Walkability	y
Share of Intersections that are 4-way	18%	17%
Average Block Size (ha)	2.1	5.6
3-way Intersection Density (number per km ²)	126	133
4-way Intersection Density (number per km ²)	27	26
Walkabity Ratio	1.7	1.6
Average Plot Size in Informal Subdivisions (m ²)		319
Average Plot Size in Formal Subdivisions (m ²)	356	347
Stages in the Evolution of Residential La	iyouts	
Share of Built-Up Area in Residential Use	67%	62%
Share of Residential Area Not Laid Out Before Occupation	0%	30%
Share of Residential Area Laid Out Before Occupation	99%	69%
Share of Residential Area in Informal Land Subdivisions	33%	55%
Share of Residential Area in Formal Land Subdivisions	65%	13%



Share of Residential Area in Housing Projects



0%

0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



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Coimbatore, India (South and Central Asia)





Selected Locales in Area Developed Before 1992





Selected Locales in Expansion Area, 1992-2014







Urban Extent in 1992 Expansion, 1992 - 2000 Expansion, 2000 - 2014

Arterial Roads

Coimbatore, India (South and Central Asia)

Legend for Charts	Global a	
	Ciobara	verage
Metrics	Pre- 1992	1992- 2014
Roads		
Share of Built-Up Area Occupied by Roads	18%	23%
Share of Built-Up Area that is Gridded or Partially Gridded	2%	0%
Average Road Width (m)	8.1	6.5
Share of Roads less than 4m Wide	10%	17%
Share of Roads more than 16m Wide	8%	6%
Arterial Roads		
Density of Arterial Roads (km/km²)	1.8	1.4
Average Beeline Distance to Arterial Roads (m)	196	238
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	96%	93%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	78%	65%
Block Size, Plot Size, Intersection Density, and	l Walkabili	ty
Share of Intersections that are 4-way	9%	7%
Average Block Size (ha)	4.5	3.9
3-way Intersection Density (number per km ²)	130	182
4-way Intersection Density (number per km ²)	13	19
Walkabity Ratio	2.0	1.9
Average Plot Size in Informal Subdivisions (m ²)	209	174
Average Plot Size in Formal Subdivisions (m ²)	315	220
Stages in the Evolution of Residential La	ayouts	
Share of Built-Up Area in Residential Use	59%	57%
Share of Residential Area Not Laid Out Before Occupation	20%	23%
Share of Residential Area Laid Out Before Occupation	79%	76%
Share of Residential Area in Informal Land Subdivisions	44%	69%
Share of Residential Area in Formal Land Subdivisions	31%	1%



Share of Residential Area in Housing Projects



2%

4%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Cordoba, Argentina (Latin America and the Caribbean)







Cordoba, Argentina (Latin America and the Caribbean)

Legend for Charts		
Cordoba Other cities in region All other cities	Global a	verage —
Metrics	Pre- 1991	1991- 2014
Roads		
Share of Built-Up Area Occupied by Roads	22%	20%
Share of Built-Up Area that is Gridded or Partially Gridded	47%	15%
Average Road Width (m)	10.2	7.5
Share of Roads less than 4m Wide	5%	15%
Share of Roads more than 16m Wide	8%	4%
Arterial Roads		
Density of Arterial Roads (km/km ²)	2.3	1.8
Average Beeline Distance to Arterial Roads (m)	190	235
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	95%	92%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	86%	82%
Block Size, Plot Size, Intersection Density, and	l Walkabili	ty
Share of Intersections that are 4-way	42%	20%
Average Block Size (ha)	2.3	5.7
3-way Intersection Density (number per km ²)	70	80
4-way Intersection Density (number per km ²)	55	25
Walkabity Ratio	1.4	1.7
Average Plot Size in Informal Subdivisions (m ²)	344	789
Average Plot Size in Formal Subdivisions (m ²)	326	768
Stages in the Evolution of Residential La	ayouts	
Share of Built-Up Area in Residential Use	79%	75%
Share of Residential Area Not Laid Out Before Occupation	3%	9%
Share of Residential Area Laid Out Before Occupation	96%	90%
Share of Residential Area in Informal Land Subdivisions	15%	53%
Share of Residential Area in Formal Land Subdivisions	80%	23%



Share of Residential Area in Housing Projects



1%

12%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Culiacan, Mexico (Latin America and the Caribbean)









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Culiacan, Mexico (Latin America and the Caribbean)

Legend for Charts		
Culiacan Other cities in region All other cities	Global av	verage —
Metrics	Pre- 1990	1990- 2014
Roads		
Share of Built-Up Area Occupied by Roads	23%	28%
Share of Built-Up Area that is Gridded or Partially Gridded	35%	7%
Average Road Width (m)	10.1	7.0
Share of Roads less than 4m Wide	9%	25%
Share of Roads more than 16m Wide	12%	5%
Arterial Roads		
Density of Arterial Roads (km/km ²)	2.2	1.5
Average Beeline Distance to Arterial Roads (m)	159	297
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	97%	85%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	88%	79%
Block Size, Plot Size, Intersection Density, and	Walkabili	ty
Share of Intersections that are 4-way	37%	14%
Average Block Size (ha)	2.8	2.8
3-way Intersection Density (number per km ²)	77	183
4-way Intersection Density (number per km ²)	51	35
Walkabity Ratio	1.8	2.0
Average Plot Size in Informal Subdivisions (m ²)	265	152
Average Plot Size in Formal Subdivisions (m ²)	161	132
Stages in the Evolution of Residential La	ayouts	
Share of Built-Up Area in Residential Use	66%	65%
Share of Residential Area Not Laid Out Before Occupation	2%	3%
Share of Residential Area Laid Out Before Occupation	97%	96%
Share of Residential Area in Informal Land Subdivisions	35%	23%



Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



61%

0%

67%

5%



Percent

10 -0 -1st City Rank 200th





Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Curitiba, Brazil (Latin America and the Caribbean)









Selected Locales in Area Developed Before 1990





— Arterial Roads

Selected Locales in Expansion Area, 1990-2014







Urban Extent in 1990 Expansion, 1990 - 2000

Expansion, 2000 - 2014

Curitiba, Brazil (Latin America and the Caribbean)

Legend for Charts			
Curitiba Other cities in region All other cities	Global ave	erage —	
Metrics	Pre- 1990	1990- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	26%	15%	
Share of Built-Up Area that is Gridded or Partially Gridded	45%	17%	
Average Road Width (m)	12.5	6.6	
Share of Roads less than 4m Wide	7%	16%	
Share of Roads more than 16m Wide	26%	1%	
Arterial Roads			
Density of Arterial Roads (km/km²)	2.2	1.6	
Average Beeline Distance to Arterial Roads (m)	173	262	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	98%	90%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	96%	81%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	37%	18%	
Average Block Size (ha)	4.1	5.3	
3-way Intersection Density (number per km ²)	57	70	
4-way Intersection Density (number per km ²)	26	20	
Walkabity Ratio	1.5	1.7	
Average Plot Size in Informal Subdivisions (m ²)		370	
Average Plot Size in Formal Subdivisions (m ²)	325	376	
Stages in the Evolution of Residential La	ayouts		
Share of Built-Up Area in Residential Use	69%	71%	
Share of Residential Area Not Laid Out Before Occupation	1%	18%	
Share of Residential Area Laid Out Before Occupation	98%	81%	
Share of Residential Area in Informal Land Subdivisions	0%	29%	



Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



96%

1%

47%

4%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Dhaka, Bangladesh (South and Central Asia)






Dhaka, Bangladesh (South and Central Asia)

Legend for Charts		
Dhaka Other cities in region All other cities	Global a	verage —
Metrics	Pre- 1989	1989- 2014
Roads		
Share of Built-Up Area Occupied by Roads	15%	11%
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%
Average Road Width (m)	6.8	4.3
Share of Roads less than 4m Wide	39%	55%
Share of Roads more than 16m Wide	9%	1%
Arterial Roads		
Density of Arterial Roads (km/km ²)	2.3	1.5
Average Beeline Distance to Arterial Roads (m)	162	261
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	97%	90%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	88%	68%
Block Size, Plot Size, Intersection Density, and	Walkabili	ty
Share of Intersections that are 4-way	9%	5%
Average Block Size (ha)	3.3	5.8
3-way Intersection Density (number per km ²)	131	149
4-way Intersection Density (number per km ²)	15	8
Walkabity Ratio	1.6	1.5
Average Plot Size in Informal Subdivisions (m ²)	270	349
Average Plot Size in Formal Subdivisions (m ²)	379	
Stages in the Evolution of Residential La	ayouts	
Share of Built-Up Area in Residential Use	74%	70%
Share of Residential Area Not Laid Out Before Occupation	68%	91%
Share of Residential Area Laid Out Before Occupation	30%	8%
Share of Residential Area in Informal Land Subdivisions	17%	5%
Share of Residential Area in Formal Land Subdivisions	7%	0%
Share of Residential Area in Housing Projects	6%	3%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Dzerzhinsk, Russia (Europe and Japan)







Selected Locales in Area Developed Before 1989





Selected Locales in Expansion Area, 1989-2010





Dzerzhinsk, Russia (Europe and Japan)

Legend for Charts		
Dzerzhinsk Other cities in region All other cities	Global av	erage —
Metrics	Pre- 1989	1989- 2010
Roads		
Share of Built-Up Area Occupied by Roads	21%	17%
Share of Built-Up Area that is Gridded or Partially Gridded		0%
Average Road Width (m)	6.5	5.2
Share of Roads less than 4m Wide	27%	30%
Share of Roads more than 16m Wide	6%	1%
Arterial Roads		
Density of Arterial Roads (km/km ²)	1.5	1.3
Average Beeline Distance to Arterial Roads (m)	471	494
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	75%	73%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	83%	82%
Block Size, Plot Size, Intersection Density, and	Walkabilit	у
Share of Intersections that are 4-way	8%	8%
Average Block Size (ha)	4.0	8.7
3-way Intersection Density (number per km ²)	155	83
4-way Intersection Density (number per km ²)	20	9
Walkabity Ratio	2.0	2.1
Average Plot Size in Informal Subdivisions (m ²)	683	
Average Plot Size in Formal Subdivisions (m ²)		
Stages in the Evolution of Residential La	ayouts	
Share of Built-Up Area in Residential Use	49%	93%
Share of Residential Area Not Laid Out Before Occupation	4%	1%
Share of Residential Area Laid Out Before Occupation	95%	98%
Share of Residential Area in Informal Land Subdivisions	60%	94%



Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



28%

6%

4%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Florianopolis, Brazil (Latin America and the Caribbean)









Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2014







Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2014 — Arterial Roads

Florianopolis, Brazil (Latin America and the Caribbean)

Legend for Charts











Florianopolis Other cities in region All other cities	Global a	average —
Metrics	Pre- 1990	1990- 2014
Roads		
Share of Built-Up Area Occupied by Roads	23%	18%
Share of Built-Up Area that is Gridded or Partially Gridded	7%	0%
Average Road Width (m)	9.3	6.3
Share of Roads less than 4m Wide	5%	17%
Share of Roads more than 16m Wide	6%	0%
Arterial Roads		
Density of Arterial Roads (km/km²)	2.0	1.4
Average Beeline Distance to Arterial Roads (m)	206	344
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	96%	85%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	73%	61%
Block Size, Plot Size, Intersection Density, and	d Walkabil	ity
Share of Intersections that are 4-way	18%	10%
Average Block Size (ha)	3.6	5.7
3-way Intersection Density (number per km ²)	73	54
4-way Intersection Density (number per km ²)	18	12
Walkabity Ratio	1.8	1.9
Average Plot Size in Informal Subdivisions (m ²)	345	233
Average Plot Size in Formal Subdivisions (m ²)	326	241
Stages in the Evolution of Residential L	ayouts.	
Share of Built-Up Area in Residential Use	61%	88%
Share of Residential Area Not Laid Out Before Occupation	3%	14%
Share of Residential Area Laid Out Before Occupation	96%	85%
Share of Residential Area in Informal Land Subdivisions	5%	22%
Share of Residential Area in Formal Land Subdivisions	82%	60%
Share of Residential Area in Housing Projects	8%	2%





Fukuoka, Japan (Europe and Japan)











Arterial Roads

Fukuoka, Japan (Europe and Japan)

Legend for Charts				
Fukuoka	Other cities in region	All other cities	Global a	average —
Metrics			Pre- 1993	1993- 2014
	Roa	ads		
Share of Built-Up A	rea Occupied by Road	s	24%	28%
Share of Built-Up A	rea that is Gridded or	Partially Gridded	0%	0%
Average Road Widt	th (m)		5.4	5.1
Share of Roads les	s than 4m Wide		48%	45%
Share of Roads mo	re than 16m Wide		4%	1%
	Arterial	Roads		
Density of Arterial F	Roads (km/km²)		2.3	2.1
Average Beeline Di	stance to Arterial Road	ds (m)	174	185
Share of Urban Ext (625m) of all Arteria	ent Within Walking Dis al Roads	stance	97%	97%
Share of Urban Ext of Wide Arterial Roa	ent Within Walking Dis ads (>16m wide)	stance	76%	70%
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersection	ons that are 4-way		17%	15%
Average Block Size	e (ha)		1.6	1.9
3-way Intersection I	Density (number per k	m²)	254	288
4-way Intersection I	Density (number per k	m²)	57	55
Walkabity Ratio			1.5	1.5
Average Plot Size in	n Informal Subdivision	s (m²)	230	229
Average Plot Size in	n Formal Subdivisions	(m²)	248	257
St	ages in the Evolution	of Residential L	ayouts	
Share of Built-Up A	rea in Residential Use		64%	58%
Share of Residentia	al Area Not Laid Out B	efore Occupation	18%	31%
Share of Residentia	al Area Laid Out Before	e Occupation	81%	68%
Share of Residentia	al Area in Informal Lan	d Subdivisions	4%	9%
Share of Residentia	al Area in Formal Land	Subdivisions	76%	58%



Share of Residential Area in Housing Projects



0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Gainesville, FL, United States (Land-Rich Developed Countries)









Selected Locales in Area Developed Before 1990



Selected Locales in Expansion Area, 1990-2013









Urban Extent in 1990 — Arterial Roads Expansion, 1990 - 2000 Expansion, 2000 - 2013

Gainesville, FL, United States (Land-Rich Developed Countries)

Legend for Charts			
Gainesville Other cities in region All other cities	Global a	iverage —	
Metrics	Pre- 1990	1990- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	18%	18%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	
Average Road Width (m)	8.5	9.9	
Share of Roads less than 4m Wide	17%	12%	
Share of Roads more than 16m Wide	13%	13%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.7	1.4	
Average Beeline Distance to Arterial Roads (m)	197	233	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	96%	93%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	96%	92%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	13%	6%	
Average Block Size (ha)	3.8	7.6	
3-way Intersection Density (number per km ²)	92	69	
4-way Intersection Density (number per km ²)	17	5	
Walkabity Ratio	1.8	2.4	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	1037	1009	
Stages in the Evolution of Residential La	ayouts		
Share of Built-Up Area in Residential Use	71%	74%	
Share of Residential Area Not Laid Out Before Occupation	3%	10%	
Share of Residential Area Laid Out Before Occupation	96%	89%	
Share of Residential Area in Informal Land Subdivisions	0%	0%	
Share of Residential Area in Formal Land Subdivisions	89%	74%	



Share of Residential Area in Housing Projects



6%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 – ~2014



Gaoyou, Jiangsu, China (East Asia and the Pacific)





Selected Locales in Expansion Area, 1990-2016







Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2016 Arterial Roads

Gaoyou, Jiangsu, China (East Asia and the Pacific)



Share of Built-up Area in Roads ~1990 - ~2014











Share of Residential Area in Housing Projects



23%

Gombe, Nigeria (Sub-Saharan Africa)







Selected Locales in Area Developed Before 1990



Selected Locales in Expansion Area, 1990-2013





Gombe, Nigeria (Sub-Saharan Africa)

Legend for Charts		
Gombe Other cities in region All other cities	Global av	/erage —
Metrics	Pre-	1990-
	1990	2013
Roads		
Share of Built-Up Area Occupied by Roads	20%	20%
Share of Built-Up Area that is Gridded or Partially Gridded	7%	0%
Average Road Width (m)	7.5	8.2
Share of Roads less than 4m Wide	16%	23%
Share of Roads more than 16m Wide	6%	6%
Arterial Roads		
Density of Arterial Roads (km/km ²)	2.2	1.2
Average Beeline Distance to Arterial Roads (m)	170	336
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	96%	81%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	89%	67%
Block Size, Plot Size, Intersection Density, and	Walkabilit	ty
Share of Intersections that are 4-way	21%	9%
Average Block Size (ha)	1.6	2.5
3-way Intersection Density (number per km ²)	193	248
4-way Intersection Density (number per km ²)	55	37
Walkabity Ratio	1.5	1.7
Average Plot Size in Informal Subdivisions (m ²)		599
Average Plot Size in Formal Subdivisions (m ²)		806
Stages in the Evolution of Residential La	ayouts	
Share of Built-Up Area in Residential Use	76%	73%
Share of Residential Area Not Laid Out Before Occupation	9%	41%
Share of Residential Area Laid Out Before Occupation	90%	58%
Share of Residential Area in Informal Land Subdivisions	85%	52%
Share of Residential Area in Formal Land Subdivisions	5%	3%









Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014





Share of Residential Area in Housing Projects



0%

Gomel, Belarus (Europe and Japan)



X







Selected Locales in Area Developed Before 1990



Selected Locales in Expansion Area, 1990-2013





X

Gomel, Belarus (Europe and Japan)

Legend for Charts				
Gomel	Gomel Other cities in region All other cities Global average —			
Metrics			Pre- 1990	1990- 2013
	Road	s		
Share of Built-Up Ar	rea Occupied by Roads		19%	15%
Share of Built-Up Ar	rea that is Gridded or Pa	artially Gridded	0%	0%
Average Road Widt	h (m)		6.9	6.5
Share of Roads less	s than 4m Wide		22%	25%
Share of Roads more	re than 16m Wide		7%	5%
	Arterial F	Roads		
Density of Arterial R	loads (km/km²)		0.8	0.7
Average Beeline Dis	stance to Arterial Roads	; (m)	448	475
Share of Urban Exte (625m) of all Arteria	ent Within Walking Dista I Roads	ance	72%	70%
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dista ads (>16m wide)	ance	71%	70%
Block Siz	Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersectio	ns that are 4-way		14%	13%
Average Block Size	(ha)		3.4	5.1
3-way Intersection	Density (number per km	²)	164	79
4-way Intersection [Density (number per km	2)	20	17
Walkabity Ratio			2.0	1.8
Average Plot Size in	n Informal Subdivisions	(m²)		847
Average Plot Size in	n Formal Subdivisions (m²)	731	806
Sta	ages in the Evolution	of Residential L	ayouts	
Share of Built-Up Ar	rea in Residential Use		58%	77%
Share of Residentia	I Area Not Laid Out Bef	ore Occupation	0%	5%
Share of Residentia	I Area Laid Out Before	Occupation	99%	94%
Share of Residentia	l Area in Informal Land	Subdivisions	37%	81%
Share of Residentia	I Area in Formal Land S	Subdivisions	41%	7%



Share of Residential Area in Housing Projects



20%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Gorgan, Iran (South and Central Asia)

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Selected Locales in Area Developed Before 1991









Selected Locales in Expansion Area, 1991-2014





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Gorgan, Iran (South and Central Asia)

Legend for Charts			
Gorgan Other cities in region All other cities	Global a	verage —	
Metrics	Pre- 1991	1991- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	22%	24%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	
Average Road Width (m)	8.6	8.6	
Share of Roads less than 4m Wide	14%	20%	
Share of Roads more than 16m Wide	10%	9%	
Arterial Roads			
Density of Arterial Roads (km/km²)	1.9	1.5	
Average Beeline Distance to Arterial Roads (m)	169	236	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	99%	92%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	98%	90%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	7%	7%	
Average Block Size (ha)	2.1	7.0	
3-way Intersection Density (number per km ²)	171	109	
4-way Intersection Density (number per km ²)	16	15	
Walkabity Ratio	1.8	1.7	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	259		
Stages in the Evolution of Residential La	ayouts		
Share of Built-Up Area in Residential Use	65%	68%	
Share of Residential Area Not Laid Out Before Occupation	11%	6%	
Share of Residential Area Laid Out Before Occupation	88%	93%	
Share of Residential Area in Informal Land Subdivisions	7%	75%	
Share of Residential Area in Formal Land Subdivisions	78%	14%	



Share of Residential Area in Housing Projects



2%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Guadalajara, Mexico (Latin America and the Caribbean)





Guadalajara, Mexico 1990-2014 km 0 5 10 15 20

Urban Extent in 1990 Expansion, 1990 - 1999 Expansion, 1999 - 2014

—— Arterial Roads

Guadalajara, Mexico (Latin America and the Caribbean)

Legend for Charts		
Guadalajara Other cities in region All other cities	Global a	average —
Metrics	Pre- 1990	1990- 2014
Roads		
Share of Built-Up Area Occupied by Roads	26%	27%
Share of Built-Up Area that is Gridded or Partially Gridded	27%	7%
Average Road Width (m)	12.4	9.3
Share of Roads less than 4m Wide	5%	9%
Share of Roads more than 16m Wide	18%	10%
Arterial Roads		
Density of Arterial Roads (km/km ²)	2.3	1.6
Average Beeline Distance to Arterial Roads (m)	165	298
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	97%	86%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	92%	78%
Block Size, Plot Size, Intersection Density, and	d Walkabil	ity
Share of Intersections that are 4-way	28%	10%
Average Block Size (ha)	3.0	3.2
3-way Intersection Density (number per km ²)	100	142
4-way Intersection Density (number per km ²)	44	19
Walkabity Ratio	1.7	1.8
Average Plot Size in Informal Subdivisions (m ²)		
Average Plot Size in Formal Subdivisions (m ²)		
Stages in the Evolution of Residential L	ayouts	
Share of Built-Up Area in Residential Use	60%	76%
Share of Residential Area Not Laid Out Before Occupation	0%	2%
Share of Residential Area Laid Out Before Occupation	100%	97%

Share of Built-up Area in Roads ~1990 - ~2014 50 -

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Roads Less Than 4m Wide ~1990 - ~2014

Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014





Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



15%

79%

5%

40%

45%

Guangzhou, Guangdong, China (East Asia and the Pacific)









Selected Locales in Area Developed Before 1991



Selected Locales in Expansion Area, 1991-2014





Urban Extent in 1991 Expansion, 1991 - 2000 Expansion, 2000 - 2014

—— Arterial Roads

Guangzhou, Guangdong, China (East Asia and the Pacific)

Legend for Charts











Guangzhou	Other cities in region	All other cities	Global a	average —	
Metrics			Pre- 1991	1991- 2014	
	Ro	ads			
Share of Built-Up	Area Occupied by Roa	ds	18%	19%	
Share of Built-Up	Area that is Gridded or	Partially Gridded		0%	
Average Road W	idth (m)		8.6	7.9	
Share of Roads le	ess than 4m Wide		27%	33%	
Share of Roads n	nore than 16m Wide		12%	12%	
	Arteria	I Roads			
Density of Arteria	l Roads (km/km²)		2.2	0.6	
Average Beeline	Distance to Arterial Roa	ids (m)	175	912	
Share of Urban E (625m) of all Arte	xtent Within Walking Di rial Roads	stance	97%	70%	
Share of Urban E of Wide Arterial R	xtent Within Walking Di loads (>16m wide)	stance	97%	69%	
Block	Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersec	tions that are 4-way		6%	5%	
Average Block Si	ze (ha)		3.6	5.2	
3-way Intersection	n Density (number per l	(m²)	123	124	
4-way Intersection	n Density (number per l	km²)	10	10	
Walkabity Ratio			1.8	1.8	
Average Plot Size	e in Informal Subdivisior	ns (m²)		168	
Average Plot Size	e in Formal Subdivisions	s (m²)			
	Stages in the Evolutio	n of Residential L	ayouts.		
Share of Built-Up	Area in Residential Use	e	51%	49%	
Share of Residen	tial Area Not Laid Out E	Before Occupation	46%	49%	
Share of Residen	tial Area Laid Out Befor	e Occupation	53%	50%	
Share of Residen	tial Area in Informal Lar	nd Subdivisions	0%	26%	

Average Block Size ~1990 - ~2014 16 -14 -12 -5 10 -8 -6 -4 -2 -0 -1st City Rank 200th

Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



37%

15%

10%

Guatemala City, Guatemala (Latin America and the Caribbean)







Selected Locales in Area Developed Before 1990







Selected Locales in Expansion Area, 1990-2013





Urban Extent in 1990 Expansion, 1990 - 2001 Expansion, 2001 - 2013 —— Arterial Roads

Guatemala City, Guatemala (Latin America and the Caribbean)

Legend for Charts			
Guatemala City Other cities in region All other cities	Global a	verage —	
Metrics	Pre- 1990	1990- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	20%	19%	
Share of Built-Up Area that is Gridded or Partially Gridded	49%	2%	
Average Road Width (m)	8.3	6.9	
Share of Roads less than 4m Wide	12%	12%	
Share of Roads more than 16m Wide	9%	3%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.0	1.5	
Average Beeline Distance to Arterial Roads (m)	187	250	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	95%	90%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	81%	67%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	30%	9%	
Average Block Size (ha)	2.1	2.0	
3-way Intersection Density (number per km ²)	89	97	
4-way Intersection Density (number per km ²)	42	21	
Walkabity Ratio	1.6	1.8	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	392	187	
Stages in the Evolution of Residential La	ayouts		
Share of Built-Up Area in Residential Use	72%	72%	
Share of Residential Area Not Laid Out Before Occupation	25%	15%	
Share of Residential Area Laid Out Before Occupation	67%	84%	
Share of Residential Area in Informal Land Subdivisions	7%	36%	
Share of Residential Area in Formal Land Subdivisions	63%	40%	
Share of Residential Area in Housing Projects	3%	7%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Guixi, Chongqing, China (East Asia and the Pacific)









Guixi, Chongqing, China (East Asia and the Pacific)

Legend for Charts			
Guixi Other cities in region All other cities	Global a	iverage —	
Metrics	Pre- 1988	1988- 2016	
Roads			Ħ
Share of Built-Up Area Occupied by Roads	17%	18%	Iccel
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	Pe
Average Road Width (m)	10.2	9.5	
Share of Roads less than 4m Wide	17%	38%	
Share of Roads more than 16m Wide	18%	17%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.0	1.0	
Average Beeline Distance to Arterial Roads (m)	214	264	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	100%	88%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	100%	96%	ters
Block Size, Plot Size, Intersection Density, and	Walkabili	ity	Met
Share of Intersections that are 4-way	27%	5%	
Average Block Size (ha)	4.1	7.9	
3-way Intersection Density (number per km ²)	69	47	
4-way Intersection Density (number per km ²)	17	6	
Walkabity Ratio	1.4	1.7	
Average Plot Size in Informal Subdivisions (m ²)			-
Average Plot Size in Formal Subdivisions (m ²)			
Stages in the Evolution of Residential La	ayouts		
Share of Built-Up Area in Residential Use	66%	61%	ent
Share of Residential Area Not Laid Out Before Occupation	54%	63%	erce

Share of Built-up Area in Roads ~1990 - ~2014 50 40 30 20 10 0 1st City Rank 200th





Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014





Share of Residential Area Laid Out Before Occupation

Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



45%

0%

44%

1%

36%

3%

7%

Gwangju, Korea Rep. (East Asia and the Pacific)









Selected Locales in Area Developed Before 1989













11

Gwangju, Korea Rep. (East Asia and the Pacific)

Other cities in region

Gwangju

L

Legend for Charts

All other cities Global average







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Metrics	Pre-	1989- 2015		
Roads		2010		
Share of Built-Up Area Occupied by Roads	23%	24%		
Share of Built-Up Area that is Gridded or Partially Gridded	2%	0%		
Average Road Width (m)	7.6	6.7		
Share of Roads less than 4m Wide	30%	42%		
Share of Roads more than 16m Wide	10%	7%		
Arterial Roads				
Density of Arterial Roads (km/km²)	4.6	2.8		
Average Beeline Distance to Arterial Roads (m)	69	199		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	99%	91%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	99%	89%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	17%	10%		
Average Block Size (ha)	2.3	4.3		
3-way Intersection Density (number per km ²)	150	189		
4-way Intersection Density (number per km ²)	38	19		
Walkabity Ratio	1.5	1.7		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)	189	236		
Stages in the Evolution of Residential La	ayouts			
Share of Built-Up Area in Residential Use	61%	30%		
Share of Residential Area Not Laid Out Before Occupation	25%	37%		
Share of Residential Area Laid Out Before Occupation	74%	62%		
Share of Residential Area in Informal Land Subdivisions	0%	3%		
Share of Residential Area in Formal Land Subdivisions	41%	33%		
Share of Residential Area in Housing Projects	33%	24%		





Haikou, Hainan, China (East Asia and the Pacific)









Selected Locales in Area Developed Before 1991



Selected Locales in Expansion Area, 1991-2013





Haikou, Hainan, China (East Asia and the Pacific)

Legend for Charts

	Sha	are of Bu ~1	iilt-up A 990 – ~2	rea in R 2014	oads
	40 -				
ercent	30 -				
۵.	20 - 10 -				
	0-	st	City Ran	ık	200th









Global av	verage —			
Pre- 1991	1991- 2013			
22%	21%			
0%	0%			
11.7	7.9			
18%	23%			
21%	8%			
2.0	1.6			
192	249			
95%	91%			
95%	91%			
Block Size, Plot Size, Intersection Density, and Walkability				
10%	4%			
3.7	4.6			
99	136			
7	7			
1.8	1.7			
Stages in the Evolution of Residential Layouts				
54%	59%			
25%	40%			
74%	59%			
	Global av Pre-1991 1991 22% 0% 11.7 18% 21% 2.0 192 95% 95% 95% 0% 10% 3.7 99 7 1.8 4000 54% 25% 74%			

Share of Residential Area Not Laid Out Before Occupation25%40%Share of Residential Area Laid Out Before Occupation74%59%Share of Residential Area in Informal Land Subdivisions2%10%Share of Residential Area in Formal Land Subdivisions50%16%Share of Residential Area in Housing Projects21%32%





Halle, Germany (Europe and Japan)







Selected Locales in Area Developed Before 1990

10.00











Halle, Germany (Europe and Japan)

Legend for Charts				
Halle	Other cities in region	All other cities	Global a	iverage —
Metrics			Pre- 1990	1990- 2010
	Roa	ds		
Share of Built-Up Ar	ea Occupied by Roads	S	18%	14%
Share of Built-Up Ar	ea that is Gridded or F	Partially Gridded	0%	0%
Average Road Width	h (m)		6.4	5.0
Share of Roads less	than 4m Wide		37%	39%
Share of Roads mor	re than 16m Wide		6%	0%
	Arterial	Roads		
Density of Arterial R	oads (km/km²)		2.2	1.9
Average Beeline Dis	stance to Arterial Road	s (m)	155	187
Share of Urban Exte (625m) of all Arteria	ent Within Walking Dist I Roads	tance	98%	96%
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dist ids (>16m wide)	tance	90%	76%
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersection	ns that are 4-way		9%	3%
Average Block Size	(ha)		2.5	4.3
3-way Intersection E	Density (number per kr	n²)	214	155
4-way Intersection E	Density (number per kr	n²)	27	11
Walkabity Ratio			1.7	1.6
Average Plot Size in	Informal Subdivisions	s (m²)		325
Average Plot Size in	Formal Subdivisions	(m²)	405	674
Stages in the Evolution of Residential Layouts				
Share of Built-Up Ar	ea in Residential Use		57%	69%
Share of Residentia	I Area Not Laid Out Be	fore Occupation	4%	23%
Share of Residentia	I Area Laid Out Before	Occupation	95%	76%
Share of Residentia	Area in Informal Land	Subdivisions	1%	13%
Share of Residentia	Area in Formal Land	Subdivisions	66%	62%
Share of Residentia	Area in Housing Proje	ects	27%	1%













Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Hangzhou, Zhejiang, China (East Asia and the Pacific)









Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2013





Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2013

— Arterial Roads

Hangzhou, Zhejiang, China (East Asia and the Pacific)

Other cities in region

Hangzhou

Legend for Charts

All other cities

Global average

50

40

20

10

Percent 30



Metrics	1990	2013		
Roads				
Share of Built-Up Area Occupied by Roads	31%	26%		
Share of Built-Up Area that is Gridded or Partially Gridded	2%	2%		
Average Road Width (m)	9.9	8.1		
Share of Roads less than 4m Wide	25%	38%		
Share of Roads more than 16m Wide	16%	13%		
Arterial Roads				
Density of Arterial Roads (km/km²)	3.0	0.7		
Average Beeline Distance to Arterial Roads (m)	129	1556		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	99%	66%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	99%	63%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	13%	12%		
Average Block Size (ha)	2.4	3.6		
3-way Intersection Density (number per km ²)	259	154		
4-way Intersection Density (number per km ²)	42	24		
Walkabity Ratio	1.7	1.7		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)	162	592		
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	46%	55%		
Share of Residential Area Not Laid Out Before Occupation	24%	21%		
Share of Residential Area Laid Out Before Occupation	75%	78%		
Share of Residential Area in Informal Land Subdivisions	0%	38%		
Share of Residential Area in Formal Land Subdivisions	23%	17%		
Share of Residential Area in Housing Projects	51%	22%		









Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Hindupur, India (South and Central Asia)











Hindupur, India (South and Central Asia)

Legend for Charts			
Hindupur Other cities in region All other citie	Global average —		
Metrics	Pre- 1989- 1989 2014		
Roads			
Share of Built-Up Area Occupied by Roads 18%			
Share of Built-Up Area that is Gridded or Partially Gridded 0% 0%			
Average Road Width (m)6.55.1			
Share of Roads less than 4m Wide	26% 39%		
Share of Roads more than 16m Wide	3% 1%		
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.3 1.3		
Average Beeline Distance to Arterial Roads (m)	115 219		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	100% 94%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	91% 95%		
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	13% 16%		
Average Block Size (ha)	1.7 2.5		
3-way Intersection Density (number per km ²)	193 279		
4-way Intersection Density (number per km ²)	25 56		
Walkabity Ratio	1.5 1.7		
Average Plot Size in Informal Subdivisions (m ²)	155 141		
Average Plot Size in Formal Subdivisions (m ²)			
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	77% 74%		
Share of Residential Area Not Laid Out Before Occupation	on 1% 24%		
Share of Residential Area Laid Out Before Occupation	98% 75%		













Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



98%

0%

0%

73%

0%

Ho Chi Minh City, Vietnam (Southeast Asia)









Selected Locales in Area Developed Before 1989



Selected Locales in Expansion Area, 1989-2015





Urban Extent in 1989 Expansion, 1989 - 1999 Expansion, 1999 - 2015 —— Arterial Roads
Ho Chi Minh City, Vietnam (Southeast Asia)

Legend for Charts	1 12200000		
Ho Chi Minh City Other cities in region All other cities	Global a	average —	
Metrics	Pre-	1989-	
	1989	2015	
Roads			
Share of Built-Up Area Occupied by Roads	17%	15%	
Share of Built-Up Area that is Gridded or Partially Gridded	7%	2%	
Average Road Width (m)	9.0	7.2	
Share of Roads less than 4m Wide	23%	34%	
Share of Roads more than 16m Wide	13%	6%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.6	1.2	
Average Beeline Distance to Arterial Roads (m)	146	362	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	97%	82%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	94%	64%	
Block Size, Plot Size, Intersection Density, and	l Walkabil	ity	
Share of Intersections that are 4-way	14%	5%	
Average Block Size (ha)	3.0	5.3	
3-way Intersection Density (number per km ²)	118	88	
4-way Intersection Density (number per km ²)	22	7	
Walkabity Ratio	1.7	1.8	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)		193	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	66%	67%	
Share of Residential Area Not Laid Out Before Occupation	49%	56%	
Share of Residential Area Laid Out Before Occupation	50%	43%	
Share of Residential Area in Informal Land Subdivisions	0%	22%	
Share of Residential Area in Formal Land Subdivisions	50%	19%	



Share of Residential Area in Housing Projects



0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Holguin, Cuba (Latin America and the Caribbean)







Holguin, Cuba (Latin America and the Caribbean)

Legend for Charts			
Holguin Other cities in region All other cities	Global av	erage —	
Metrics	Pre- 1987	1987- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	15%	20%	
Share of Built-Up Area that is Gridded or Partially Gridded	12%	0%	
Average Road Width (m)	6.2	7.0	
Share of Roads less than 4m Wide	17%	19%	
Share of Roads more than 16m Wide	3%	8%	
Arterial Roads			
Density of Arterial Roads (km/km²)	1.7	1.5	
Average Beeline Distance to Arterial Roads (m)	235	250	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	92%	92%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	68%	67%	
Block Size, Plot Size, Intersection Density, and	Walkabilit	у	
Share of Intersections that are 4-way	20%	6%	
Average Block Size (ha)	4.2	8.5	
3-way Intersection Density (number per km ²)	96	117	
4-way Intersection Density (number per km ²)	32	14	
Walkabity Ratio	1.5	1.8	
Average Plot Size in Informal Subdivisions (m ²)	134		
Average Plot Size in Formal Subdivisions (m ²)	241		
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	72%	68%	
Share of Residential Area Not Laid Out Before Occupation	32%	56%	
Share of Residential Area Laid Out Before Occupation	67%	43%	
Share of Residential Area in Informal Land Subdivisions	43%	42%	



Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



15%

8%

0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Hong Kong, Hong Kong, China (East Asia and the Pacific)









Selected Locales in Area Developed Before 1989



Selected Locales in Expansion Area, 1989-2013





Urban Extent in 1989 Expansion, 1989 - 2000 Expansion, 2000 - 2013

—— Arterial Roads

Hong Kong, Hong Kong, China (East Asia and the Pacific)



Legend for Ch	arts		
Hong Kong Other cities in region	All other cities	Global a	verage —
Metrics		Pre- 1989	1989- 2013
Roads			
Share of Built-Up Area Occupied by Roads		25%	20%
Share of Built-Up Area that is Gridded or Partia	ally Gridded	0%	2%
Average Road Width (m)		11.3	9.4
Share of Roads less than 4m Wide		14%	25%
Share of Roads more than 16m Wide		23%	16%
Arterial Roa	ids		
Density of Arterial Roads (km/km ²)		3.9	3.2
Average Beeline Distance to Arterial Roads (m	ו)	105	132
Share of Urban Extent Within Walking Distanc (625m) of all Arterial Roads	e	99%	97%
Share of Urban Extent Within Walking Distanc of Wide Arterial Roads (>16m wide)	e	98%	94%
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way		11%	17%
Average Block Size (ha)		4.6	3.7
3-way Intersection Density (number per km ²)		55	27
4-way Intersection Density (number per km ²)		12	8
Walkabity Ratio		1.9	1.7
Average Plot Size in Informal Subdivisions (m ²	2)		
Average Plot Size in Formal Subdivisions (m ²)		1098	
Stages in the Evolution of F	Residential La	youts	
Share of Built-Up Area in Residential Use		50%	44%
Share of Residential Area Not Laid Out Before	Occupation	16%	31%
Share of Residential Area Laid Out Before Occ	cupation	83%	68%
Share of Residential Area in Informal Land Su	bdivisions	0%	0%
Share of Residential Area in Formal Land Sub	divisions	31%	8%
Share of Residential Area in Housing Projects		52%	60%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Houston, United States (Land-Rich Developed Countries)







Selected Locales in Area Developed Before 1990













Houston, United States (Land-Rich Developed Countries)



Legend for Charts				
Houston Other cities in region All other cities Global average —				verage —
Metrics			Pre- 1990	1990- 2014
	Road	s		
Share of Built-Up Ar	ea Occupied by Roads		20%	19%
Share of Built-Up Ar	ea that is Gridded or Pa	artially Gridded	5%	0%
Average Road Width	n (m)		10.6	10.0
Share of Roads less	than 4m Wide		11%	12%
Share of Roads mor	e than 16m Wide		20%	14%
	Arterial R	toads		
Density of Arterial R	oads (km/km²)		2.0	0.8
Average Beeline Dis	stance to Arterial Roads	(m)	181	396
Share of Urban Exte (625m) of all Arterial	ent Within Walking Dista Roads	ince	97%	80%
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dista ds (>16m wide)	ince	95%	73%
Block Siz	e, Plot Size, Intersecti	on Density, and	d Walkabili	ty
Share of Intersection	ns that are 4-way		13%	11%
Average Block Size	(ha)		5.9	6.7
3-way Intersection E	ensity (number per km ²	2)	81	53
4-way Intersection E	ensity (number per km ²	2)	13	9
Walkabity Ratio			1.8	1.9
Average Plot Size in	Informal Subdivisions	(m²)		
Average Plot Size in	Formal Subdivisions (r	m²)	800	852
Sta	iges in the Evolution o	of Residential L	ayouts	
Share of Built-Up Ar	ea in Residential Use		64%	83%
Share of Residentia	Area Not Laid Out Befo	ore Occupation	4%	13%
Share of Residentia	Area Laid Out Before	Occupation	95%	86%
Share of Residentia	Area in Informal Land	Subdivisions	0%	0%
Share of Residentia	Area in Formal Land S	ubdivisions	85%	73%
Share of Residentia	Area in Housing Project	cts	9%	13%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 – ~2014



Hyderabad, India (South and Central Asia)











Selected Locales in Expansion Area, 1990-2014





Hyderabad, India (South and Central Asia)

Legend for Charts			
Hyderabad Other cities in region All other cities	Global a	verage —	
Metrics	Pre- 1990	1990- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	18%	20%	
Share of Built-Up Area that is Gridded or Partially Gridded	2%	0%	
Average Road Width (m)	6.8	6.2	
Share of Roads less than 4m Wide	18%	23%	
Share of Roads more than 16m Wide	3%	2%	
Arterial Roads			
Density of Arterial Roads (km/km²)	1.9	1.3	
Average Beeline Distance to Arterial Roads (m)	184	279	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	98%	90%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	77%	63%	
Block Size, Plot Size, Intersection Density, and	l Walkabili	ty	
Share of Intersections that are 4-way	9%	15%	
Average Block Size (ha)	2.2	3.0	
3-way Intersection Density (number per km ²)	189	204	
4-way Intersection Density (number per km ²)	25	43	
Walkabity Ratio	1.7	1.5	
Average Plot Size in Informal Subdivisions (m ²)	95	159	
Average Plot Size in Formal Subdivisions (m ²)	213	190	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	68%	66%	
Share of Residential Area Not Laid Out Before Occupation	10%	14%	
Share of Residential Area Laid Out Before Occupation	89%	85%	
Share of Residential Area in Informal Land Subdivisions	3%	64%	
Share of Residential Area in Formal Land Subdivisions	83%	19%	





2%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Ibadan, Nigeria (Sub-Saharan Africa)







Selected Locales in Area Developed Before 1984







Selected Locales in Expansion Area, 1984-2013







Urban Extent in 1984 Expansion, 1984 - 2000 Expansion, 2000 - 2013 — Arterial Roads

Ibadan, Nigeria (Sub-Saharan Africa)

Legend for Charts			
Ibadan Other cities in region All other cities	Global a	verage —	
Metrics	Pre- 1984	1984- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	11%	12%	
Share of Built-Up Area that is Gridded or Partially Gridded	5%	0%	
Average Road Width (m)	6.0	3.2	
Share of Roads less than 4m Wide	21%	68%	
Share of Roads more than 16m Wide	1%	0%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.0	0.7	
Average Beeline Distance to Arterial Roads (m)	353	596	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	81%	65%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	49%	33%	
Block Size, Plot Size, Intersection Density, a	nd Walkabili	ty	
Share of Intersections that are 4-way	4%	7%	
Average Block Size (ha)	5.7	4.2	
3-way Intersection Density (number per km ²)	70	196	
4-way Intersection Density (number per km ²)	5	14	
Walkabity Ratio	1.8	1.7	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	677		
Stages in the Evolution of Residential	Layouts		
Share of Built-Up Area in Residential Use	70%	75%	
Share of Residential Area Not Laid Out Before Occupation	n 35%	75%	
Share of Residential Area Laid Out Before Occupation	64%	24%	
Share of Residential Area in Informal Land Subdivisions	56%	24%	
Share of Residential Area in Formal Land Subdivisions	6%	0%	
Share of Residential Area in Housing Projects	1%	0%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Ilheus, Brazil (Latin America and the Caribbean)







Ilheus, Brazil (Latin America and the Caribbean)

Legend for Charts	01.1.1		
Ilheus Other cities in region All other cities	Global a	verage —	
Metrics	Pre- 1993	1993- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	22%	21%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	10%	
Average Road Width (m)	9.0	8.7	
Share of Roads less than 4m Wide	13%	6%	
Share of Roads more than 16m Wide	9%	5%	
Arterial Roads			
Density of Arterial Roads (km/km²)	2.3	1.7	
Average Beeline Distance to Arterial Roads (m)	156	264	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	97%	88%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	94%	78%	
Block Size, Plot Size, Intersection Density, and	l Walkabili	ity	
Share of Intersections that are 4-way	13%	14%	
Average Block Size (ha)	3.3	3.3	
3-way Intersection Density (number per km ²)	107	79	
4-way Intersection Density (number per km ²)	17	18	
Walkabity Ratio	1.6	1.7	
Average Plot Size in Informal Subdivisions (m ²)		500	
Average Plot Size in Formal Subdivisions (m ²)		253	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	74%	78%	
Share of Residential Area Not Laid Out Before Occupation	3%	6%	
Share of Residential Area Laid Out Before Occupation	96%	93%	
Share of Residential Area in Informal Land Subdivisions	28%	50%	



Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



67%

1%

42%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Ipoh, Malaysia (Southeast Asia)









Selected Locales in Expansion Area, 1990-2015





Ipoh, Malaysia (Southeast Asia)

Legend for Charts				
Ipoh	Other cities in region	All other cities	Global a	average —
Metrics			Pre- 1990	1990- 2015
	Road	ls		
Share of Built-Up Ar	ea Occupied by Roads	•	31%	29%
Share of Built-Up Ar	ea that is Gridded or P	artially Gridded	2%	2%
Average Road Width	n (m)		10.8	8.6
Share of Roads less	than 4m Wide		5%	8%
Share of Roads mor	e than 16m Wide		14%	6%
	Arterial I	Roads		
Density of Arterial R	oads (km/km²)		1.1	0.8
Average Beeline Dis	stance to Arterial Roads	s (m)	387	479
Share of Urban Exte (625m) of all Arterial	ent Within Walking Dist Roads	ance	79%	71%
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dist ds (>16m wide)	ance	68%	57%
Block Siz	e, Plot Size, Intersect	tion Density, and	l Walkabil	ity
Share of Intersection	ns that are 4-way		7%	3%
Average Block Size	(ha)		2.7	3.2
3-way Intersection D	ensity (number per km	1 ²)	151	146
4-way Intersection E	ensity (number per km	1 ²)	16	8
Walkabity Ratio			2.0	1.6
Average Plot Size in	Informal Subdivisions	(m²)		
Average Plot Size in	Formal Subdivisions ((m²)	358	336
Stages in the Evolution of Residential Layouts				
Share of Built-Up Ar	ea in Residential Use		69%	82%
Share of Residentia	Area Not Laid Out Be	fore Occupation	0%	10%
Share of Residentia	Area Laid Out Before	Occupation	99%	89%
Share of Residentia	Area in Informal Land	Subdivisions	4%	4%
Share of Residentia	Area in Formal Land	Subdivisions	68%	28%



Share of Residential Area in Housing Projects



26%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Istanbul, Turkey (Western Asia and North Africa)









Istanbul, Turkey (Western Asia and North Africa)

Legend for Charts	Olahala	10-11-11-11-11-11-11-11-11-11-11-11-11-1	
Istanbul Other cities in region All other cities	Global a	average —	
Metrics	Pre- 1990	1990- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	26%	28%	
Share of Built-Up Area that is Gridded or Partially Gridded	10%	5%	
Average Road Width (m)	9.2	7.8	
Share of Roads less than 4m Wide	9%	14%	
Share of Roads more than 16m Wide	9%	5%	
Arterial Roads			
Density of Arterial Roads (km/km²)	3.3	2.3	
Average Beeline Distance to Arterial Roads (m)	115	202	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	98%	93%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	93%	81%	
Block Size, Plot Size, Intersection Density, and	l Walkabil	ity	
Share of Intersections that are 4-way	17%	6%	
Average Block Size (ha)	2.0	4.3	
3-way Intersection Density (number per km ²)	143	160	
4-way Intersection Density (number per km ²)	30	15	
Walkabity Ratio	1.7	2.0	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	355	318	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	73%	68%	
Share of Residential Area Not Laid Out Before Occupation	41%	24%	
Share of Residential Area Laid Out Before Occupation	52%	75%	
Share of Residential Area in Informal Land Subdivisions	0%	12%	
Share of Residential Area in Formal Land Subdivisions	50%	34%	
Share of Residential Area in Housing Projects	7%	28%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Jaipur, India (South and Central Asia)







Selected Locales in Expansion Area, 1989-2014





Jaipur, India (South and Central Asia)

Legend for Charts			
Jaipur Other cities in region All other cities	Global av	verage —	
Metrics	Pre- 1989	1989- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	21%	27%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	
Average Road Width (m)	8.0	7.4	
Share of Roads less than 4m Wide	19%	18%	
Share of Roads more than 16m Wide	9%	7%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.9	1.4	
Average Beeline Distance to Arterial Roads (m)	185	272	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	96%	90%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	94%	88%	
Block Size, Plot Size, Intersection Density, and	Walkabili	ty	
Share of Intersections that are 4-way	11%	6%	
Average Block Size (ha)	2.4	2.2	
3-way Intersection Density (number per km ²)	197	242	
4-way Intersection Density (number per km ²)	19	17	
Walkabity Ratio	1.7	1.7	
Average Plot Size in Informal Subdivisions (m ²)	246	195	
Average Plot Size in Formal Subdivisions (m ²)	233	212	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	69%	75%	
Share of Residential Area Not Laid Out Before Occupation	13%	15%	
Share of Residential Area Laid Out Before Occupation	86%	84%	
Share of Residential Area in Informal Land Subdivisions	40%	67%	
Share of Residential Area in Formal Land Subdivisions	41%	11%	



Share of Residential Area in Housing Projects



4%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Jalna, India (South and Central Asia)









Selected Locales in Area Developed Before 1989





Selected Locales in Expansion Area, 1989-2014





Jalna, India (South and Central Asia)

Legend for Charts				
Jalna Other cities in region All other cities Global average —				
Metrics			Pre- 1989	1989- 2014
	Roa	ds		
Share of Built-Up A	rea Occupied by Road	s	19%	18%
Share of Built-Up A	rea that is Gridded or I	Partially Gridded	0%	0%
Average Road Wid	th (m)		6.3	7.2
Share of Roads les	s than 4m Wide		20%	28%
Share of Roads mo	ore than 16m Wide		1%	6%
	Arterial	Roads		
Density of Arterial F	Roads (km/km²)		1.6	1.5
Average Beeline Di	stance to Arterial Road	ds (m)	190	241
Share of Urban Ext (625m) of all Arteria	ent Within Walking Dis al Roads	tance	96%	93%
Share of Urban Ext of Wide Arterial Roa	ent Within Walking Dis ads (>16m wide)	tance	63%	66%
Block Si	ze, Plot Size, Intersec	ction Density, and	d Walkabil	ity
Share of Intersection	ons that are 4-way		8%	10%
Average Block Size	e (ha)		3.0	5.3
3-way Intersection	Density (number per ki	m²)	162	179
4-way Intersection	Density (number per ki	m²)	15	28
Walkabity Ratio			1.6	1.6
Average Plot Size i	n Informal Subdivision	s (m²)	145	
Average Plot Size i	n Formal Subdivisions	(m²)	141	
St	ages in the Evolution	of Residential L	ayouts	
Share of Built-Up A	rea in Residential Use		54%	55%
Share of Residentia	al Area Not Laid Out Be	efore Occupation	49%	30%
Share of Residentia	al Area Laid Out Before	e Occupation	50%	69%
Share of Residentia	al Area in Informal Land	d Subdivisions	31%	62%
Share of Residentia	al Area in Formal Land	Subdivisions	17%	7%



Share of Residential Area in Housing Projects



1%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Jequie, Brazil (Latin America and the Caribbean)







Jequie, Brazil (Latin America and the Caribbean)

Legend for Charts		
Jequie Other cities in region All other cities	Global ave	erage —
Metrics	Pre- 1992	1992- 2014
Roads		
Share of Built-Up Area Occupied by Roads	24%	26%
Share of Built-Up Area that is Gridded or Partially Gridded	10%	11%
Average Road Width (m)	7.6	5.6
Share of Roads less than 4m Wide	20%	28%
Share of Roads more than 16m Wide	4%	1%
Arterial Roads		
Density of Arterial Roads (km/km ²)	1.2	1.0
Average Beeline Distance to Arterial Roads (m)	332	383
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	83%	79%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	68%	65%
Block Size, Plot Size, Intersection Density, and	Walkability	1
Share of Intersections that are 4-way	19%	17%
Average Block Size (ha)	2.3	3.1
3-way Intersection Density (number per km ²)	181	254
4-way Intersection Density (number per km ²)	38	47
Walkabity Ratio	1.9	1.6
Average Plot Size in Informal Subdivisions (m ²)	202	173
Average Plot Size in Formal Subdivisions (m ²)	132	274
Stages in the Evolution of Residential La	ayouts	
Share of Built-Up Area in Residential Use	68%	69%
Share of Residential Area Not Laid Out Before Occupation	0%	15%
Share of Residential Area Laid Out Before Occupation	99%	84%
Share of Residential Area in Informal Land Subdivisions	59%	58%



Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



36%

4%

15%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Jinan, Shandong, China (East Asia and the Pacific)









Selected Locales in Area Developed Before 1991







Selected Locales in Expansion Area, 1991-2013





Urban Extent in 1991
 Expansion, 1991 - 2000
 Expansion, 2000 - 2013

—— Arterial Roads

Jinan, Shandong, China (East Asia and the Pacific)

Legend for Charts



City Rank

200th

Percent

0 -1st





Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Jinan	Other cities in region	All other cities	Global	average —
Metrics			Pre- 1991	1991- 2013
	Road	s		
Share of Built-Up Ar	ea Occupied by Roads		25%	22%
Share of Built-Up Area that is Gridded or Partially Gridded		0%	0%	
Average Road Width (m)			9.5	9.5
Share of Roads less than 4m Wide		35%	41%	
Share of Roads mor	e than 16m Wide		15%	16%
	Arterial R	loads		
Density of Arterial R	oads (km/km²)		1.4	1.2
Average Beeline Distance to Arterial Roads (m)		332	500	
Share of Urban Exte (625m) of all Arterial	ent Within Walking Dista I Roads	nce	86%	75%
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dista ds (>16m wide)	nce	86%	75%
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersection	ns that are 4-way		5%	14%
Average Block Size	(ha)		3.7	7.2
3-way Intersection D	Density (number per km ²	2)	158	111
4-way Intersection E	Density (number per km ²	2)	13	14
Walkabity Ratio			2.0	1.6
Average Plot Size in	Informal Subdivisions	(m²)		
Average Plot Size in	r Formal Subdivisions (r	n²)		
Stages in the Evolution of Residential Layouts				
Share of Built-Up Ar	ea in Residential Use		38%	48%
Share of Residential Area Not Laid Out Before Occupation		7%	13%	
Share of Residential Area Laid Out Before Occupation		92%	86%	

Share of Residential Area Not Laid Out Before Occupation7%13%Share of Residential Area Laid Out Before Occupation92%86%Share of Residential Area in Informal Land Subdivisions21%29%Share of Residential Area in Formal Land Subdivisions45%12%Share of Residential Area in Housing Projects25%45%





Jinju, Korea Rep. (East Asia and the Pacific)









Selected Locales in Area Developed Before 1988





Selected Locales in Expansion Area, 1988-2014





1%

Jinju, Korea Rep. (East Asia and the Pacific)

Legend for Charts					
Jinju Other cities in region All other cities	Global av	erage —			
Metrics	Pre- 1988	1988- 2014			
Roads	Roads				
Share of Built-Up Area Occupied by Roads	24%	17%			
Share of Built-Up Area that is Gridded or Partially Gridded	17%	0%			
Average Road Width (m)	7.5	4.8			
Share of Roads less than 4m Wide	30%	53%			
Share of Roads more than 16m Wide	9%	1%			
Arterial Roads					
Density of Arterial Roads (km/km ²)	2.4	1.3			
Average Beeline Distance to Arterial Roads (m)	172	404			
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	97%	80%			
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	94%	51%			
Block Size, Plot Size, Intersection Density, and Walkability					
Share of Intersections that are 4-way	20%	14%			
Average Block Size (ha)	2.4	5.5			
3-way Intersection Density (number per km ²)	159	108			
4-way Intersection Density (number per km ²)	41	21			
Walkabity Ratio	1.4	1.6			
Average Plot Size in Informal Subdivisions (m ²)					
Average Plot Size in Formal Subdivisions (m ²)					
Stages in the Evolution of Residential Layouts					
Share of Built-Up Area in Residential Use	58%	30%			

Share of Built-Up Area in Residential Use58%30%Share of Residential Area Not Laid Out Before Occupation19%76%Share of Residential Area Laid Out Before Occupation80%23%Share of Residential Area in Informal Land Subdivisions0%0%Share of Residential Area in Formal Land Subdivisions55%3%Share of Residential Area in Housing Projects24%19%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Johannesburg, South Africa (Sub-Saharan Africa)









Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2013





Urban Extent in 1990 Expansion, 1990 - 1998 Expansion, 1998 - 2013

— Arterial Roads

Johannesburg, South Africa (Sub-Saharan Africa)

Legend for Charts				
Johannesburg Other cities in region All other cities	Global a	iverage —		
Metrics	Pre- 1990	1990- 2013		
Roads				
Share of Built-Up Area Occupied by Roads	24%	17%		
Share of Built-Up Area that is Gridded or Partially Gridded		2%		
Average Road Width (m)		7.4		
Share of Roads less than 4m Wide		21%		
Share of Roads more than 16m Wide		7%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	1.5	0.5		
Average Beeline Distance to Arterial Roads (m)		835		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	93%	49%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)		46%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	23%	10%		
Average Block Size (ha)		5.3		
3-way Intersection Density (number per km ²)		109		
4-way Intersection Density (number per km ²)		14		
Walkabity Ratio		2.2		
Average Plot Size in Informal Subdivisions (m ²)		290		
Average Plot Size in Formal Subdivisions (m ²)	965	509		
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	84%	82%		
Share of Residential Area Not Laid Out Before Occupation		13%		
Share of Residential Area Laid Out Before Occupation		86%		
Share of Residential Area in Informal Land Subdivisions		45%		



Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



87%

7%

38%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Kabul, Afghanistan (South and Central Asia)





Selected Locales in Expansion Area, 1987-2014





Kabul, Afghanistan (South and Central Asia)

Legend for Charts				
Kabul Other cities in region All other cities	Global a	verage —		
Metrics	Pre- 1987	1987- 2014		
Roads				
Share of Built-Up Area Occupied by Roads	17%	19%		
Share of Built-Up Area that is Gridded or Partially Gridded		5%		
Average Road Width (m)	8.2	6.3		
Share of Roads less than 4m Wide		29%		
Share of Roads more than 16m Wide		3%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	1.6	1.2		
Average Beeline Distance to Arterial Roads (m)		346		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	85%	82%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)		63%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	10%	9%		
Average Block Size (ha)		2.5		
3-way Intersection Density (number per km ²)		172		
4-way Intersection Density (number per km ²)		18		
Walkabity Ratio		1.9		
Average Plot Size in Informal Subdivisions (m ²)	548	339		
Average Plot Size in Formal Subdivisions (m ²)	366			
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	73%	75%		
Share of Residential Area Not Laid Out Before Occupation		17%		
Share of Residential Area Laid Out Before Occupation		82%		
Share of Residential Area in Informal Land Subdivisions		82%		



Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



11%

3%

0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Kaiping, Guangdong, China (East Asia and the Pacific)









Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2014 —— Arterial Roads

Kaiping, Guangdong, China (East Asia and the Pacific)

Legend for Charts



50

40

Percent 30











Kaiping	Other cities in region	All other cities	Global a	verage —
Metrics			Pre- 1990	1990- 2014
	Roads			
Share of Built-Up Area Occupied by Roads			18%	24%
Share of Built-Up Area that is Gridded or Partially Gridded		0%	0%	
Average Road Width (m)		5.1	8.4	
Share of Roads less than 4m Wide		52%	33%	
Share of Roads more	re than 16m Wide		5%	12%
	Arterial R	bads		
Density of Arterial R	oads (km/km²)		2.0	1.4
Average Beeline Dis	stance to Arterial Roads	(m)	161	235
Share of Urban Exte (625m) of all Arteria	ent Within Walking Distar I Roads	nce	100%	92%
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Distar ids (>16m wide)	nce	100%	89%
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersection	ns that are 4-way		16%	8%
Average Block Size	(ha)		1.0	2.5
3-way Intersection	Density (number per km ²))	311	267
4-way Intersection E	Density (number per km ²))	84	49
Walkabity Ratio			1.5	1.6
Average Plot Size in	n Informal Subdivisions (m²)		
Average Plot Size in	n Formal Subdivisions (m	l ²)		
Stages in the Evolution of Residential Layouts				
Share of Built-Up Ar	ea in Residential Use		82%	48%
Share of Residential Area Not Laid Out Before Occupation		6%	9%	
Share of Residential Area Laid Out Before Occupation		93%	90%	

Share of Residential Area Laid Out Before Occupation 93% Share of Residential Area in Informal Land Subdivisions 31% Share of Residential Area in Formal Land Subdivisions 49% 12% Share of Residential Area in Housing Projects





56%

10%

Kairouan, Tunisia (Western Asia and North Africa)

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 Kairouan, Tunisia
 Urban Extent in 1992

 1992-2010
 Expansion, 1992 - 2000

 km
 Expansion, 2000 - 2010

Arterial Roads

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Kairouan, Tunisia (Western Asia and North Africa)





Share of Residential Area in Housing Projects



3%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 – ~2014



Kampala, Uganda (Sub-Saharan Africa)









Selected Locales in Area Developed Before 1988



Selected Locales in Expansion Area, 1988-2015











Urban Extent in 1988 Expansion, 1988 - 2003 Expansion, 2003 - 2015 — Arterial Roads
Kampala, Uganda (Sub-Saharan Africa)

Legend for Charts		
Kampala Other cities in region All other cities	Global av	erage —
Metrics	Pre- 1988	1988- 2015
Roads		
Share of Built-Up Area Occupied by Roads	12%	11%
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%
Average Road Width (m)	6.7	4.5
Share of Roads less than 4m Wide	20%	41%
Share of Roads more than 16m Wide	3%	0%
Arterial Roads		
Density of Arterial Roads (km/km ²)	2.1	1.1
Average Beeline Distance to Arterial Roads (m)	157	346
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	98%	83%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	58%	37%
Block Size, Plot Size, Intersection Density, and	l Walkabilit	у
Share of Intersections that are 4-way	6%	3%
Average Block Size (ha)	6.0	7.5
3-way Intersection Density (number per km ²)	74	105
4-way Intersection Density (number per km ²)	6	5
Walkabity Ratio	1.8	1.6
Average Plot Size in Informal Subdivisions (m ²)		
Average Plot Size in Formal Subdivisions (m ²)		
Stages in the Evolution of Residential La	ayouts	
Share of Built-Up Area in Residential Use	71%	68%
Share of Residential Area Not Laid Out Before Occupation	48%	67%
Share of Residential Area Laid Out Before Occupation	51%	32%













Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



47%

1%

2%

32%

0%

Kanpur, India (South and Central Asia)









Selected Locales in Area Developed Before 1991





Selected Locales in Expansion Area, 1991-2014





Kanpur, India (South and Central Asia)

	Legend for	Charts		
Kanpur Oth	ner cities in region	All other cities	Global a	average —
Metrics			Pre- 1991	1991- 2014
	Road	s		
Share of Built-Up Area C	ccupied by Roads		19%	22%
Share of Built-Up Area th	nat is Gridded or Pa	artially Gridded	0%	2%
Average Road Width (m))		6.8	5.7
Share of Roads less that	n 4m Wide		23%	37%
Share of Roads more that	an 16m Wide		5%	4%
	Arterial F	Roads		
Density of Arterial Roads	s (km/km²)		1.8	1.5
Average Beeline Distance	e to Arterial Roads	(m)	187	261
Share of Urban Extent W (625m) of all Arterial Roa	vithin Walking Dista ads	ance	97%	91%
Share of Urban Extent W of Wide Arterial Roads (>	√ithin Walking Dista >16m wide)	ance	94%	84%
Block Size, P	lot Size, Intersect	ion Density, and	l Walkabil	ity
Share of Intersections th	at are 4-way		8%	8%
Average Block Size (ha)			3.3	3.4
3-way Intersection Dens	ity (number per km	2)	206	289
4-way Intersection Densi	ity (number per km	2)	22	33
Walkabity Ratio			1.6	1.6
Average Plot Size in Info	rmal Subdivisions	(m²)	158	
Average Plot Size in For	mal Subdivisions (m²)	262	169
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in	Residential Use		73%	73%
Share of Residential Are	a Not Laid Out Bef	ore Occupation	19%	47%
Share of Residential Are	a Laid Out Before	Occupation	80%	52%
Share of Residential Are	a in Informal Land	Subdivisions	48%	46%
Share of Residential Are	a in Formal Land S	ubdivisions	21%	3%



Share of Residential Area in Housing Projects



10%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Karachi, Pakistan (South and Central Asia)









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Karachi, Pakistan (South and Central Asia)

Legend for Charts	Clobal a		
Karachi Other cities in region All other cities	Global av	verage —	
Metrics	Pre- 1991	1991- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	21%	22%	
Share of Built-Up Area that is Gridded or Partially Gridded	5%	12%	
Average Road Width (m)	8.3	7.4	
Share of Roads less than 4m Wide	29%	30%	
Share of Roads more than 16m Wide	12%	8%	
Arterial Roads			
Density of Arterial Roads (km/km²)	3.1	2.6	
Average Beeline Distance to Arterial Roads (m)	130	158	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	99%	98%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	94%	89%	
Block Size, Plot Size, Intersection Density, and	Walkabili	ty	
Share of Intersections that are 4-way	12%	21%	
Average Block Size (ha)	3.2	2.4	
3-way Intersection Density (number per km ²)	220	226	
4-way Intersection Density (number per km ²)	50	74	
Walkabity Ratio	1.7	1.7	
Average Plot Size in Informal Subdivisions (m ²)	83		
Average Plot Size in Formal Subdivisions (m ²)	464	343	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	71%	70%	
Share of Residential Area Not Laid Out Before Occupation	24%	27%	
Share of Residential Area Laid Out Before Occupation	75%	72%	
Share of Residential Area in Informal Land Subdivisions	26%	60%	
Share of Residential Area in Formal Land Subdivisions	46%	6%	



Share of Residential Area in Housing Projects



2%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Kaunas, Lithuania (Europe and Japan)







Selected Locales in Area Developed Before 1990













Kaunas, Lithuania (Europe and Japan)

	Lonord	or Charte		
Legend for Charts				
Raunas		All other cities	Global a	iverage —
Metrics			Pre-	1990-
			1990	2014
	Roa	ads		
Share of Built-Up Ar	rea Occupied by Road	ls	17%	12%
Share of Built-Up Ar	rea that is Gridded or	Partially Gridded	0%	0%
Average Road Widt	h (m)		7.9	5.4
Share of Roads less	s than 4m Wide		26%	31%
Share of Roads more	re than 16m Wide		10%	1%
	Arterial	Roads		
Density of Arterial R	loads (km/km²)		1.3	1.2
Average Beeline Dis	stance to Arterial Road	ds (m)	275	281
Share of Urban Exte (625m) of all Arteria	ent Within Walking Dis I Roads	stance	90%	89%
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dis ads (>16m wide)	stance	80%	77%
Block Siz	ze, Plot Size, Intersed	ction Density, and	d Walkabili	ity
Share of Intersectio	ns that are 4-way		13%	8%
Average Block Size	(ha)		4.9	5.5
3-way Intersection	Density (number per k	m²)	90	80
4-way Intersection [Density (number per k	m²)	17	7
Walkabity Ratio			2.0	1.5
Average Plot Size in	n Informal Subdivision	s (m²)	1567	990
Average Plot Size in	n Formal Subdivisions	(m²)	741	784
Sta	ages in the Evolution	n of Residential L	ayouts	
Share of Built-Up Ar	rea in Residential Use	£	61%	73%
Share of Residentia	I Area Not Laid Out B	efore Occupation	25%	24%
Share of Residentia	I Area Laid Out Before	e Occupation	74%	75%
Share of Residentia	l Area in Informal Lan	d Subdivisions	17%	27%
Share of Residentia	l Area in Formal Land	Subdivisions	40%	38%
Share of Residentia	I Area in Housing Pro	jects	16%	9%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Kayseri, Turkey (Western Asia and North Africa)









Selected Locales in Area Developed Before 1987



Selected Locales in Expansion Area, 1987-2013





Kayseri, Turkey (Western Asia and North Africa)

Legend for Charts		
Kayseri Other cities in region All other cities	Global a	verage —
Metrics	Pre- 1987	1987- 2013
Roads		
Share of Built-Up Area Occupied by Roads	31%	27%
Share of Built-Up Area that is Gridded or Partially Gridded	5%	0%
Average Road Width (m)	9.4	9.1
Share of Roads less than 4m Wide	16%	27%
Share of Roads more than 16m Wide	12%	17%
Arterial Roads		
Density of Arterial Roads (km/km ²)	2.9	1.8
Average Beeline Distance to Arterial Roads (m)	125	218
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	99%	92%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	99%	89%
Block Size, Plot Size, Intersection Density, and	l Walkabili	ty
Share of Intersections that are 4-way	14%	12%
Average Block Size (ha)	1.7	3.3
3-way Intersection Density (number per km ²)	205	201
4-way Intersection Density (number per km ²)	26	37
Walkabity Ratio	1.6	1.6
Average Plot Size in Informal Subdivisions (m ²)		
Average Plot Size in Formal Subdivisions (m ²)	561	275
Stages in the Evolution of Residential L	ayouts	
Share of Built-Up Area in Residential Use	48%	68%
Share of Residential Area Not Laid Out Before Occupation	9%	23%
Share of Residential Area Laid Out Before Occupation	90%	76%
Share of Residential Area in Informal Land Subdivisions	10%	18%
Share of Residential Area in Formal Land Subdivisions	76%	27%



Share of Residential Area in Housing Projects



3%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Khartoum, Sudan (Western Asia and North Africa)











—— Arterial Roads

Share of Built-up Area in Roads ~1990 - ~2014

Khartoum, Sudan (Western Asia and North Africa)

Legend for Charts		
Khartoum Other cities in region All other cities	Global a	average —
Metrics	Pre- 1988	1988- 2014
Roads		
Share of Built-Up Area Occupied by Roads	23%	22%
Share of Built-Up Area that is Gridded or Partially Gridded		7%
Average Road Width (m)	9.3	7.3
Share of Roads less than 4m Wide	4%	20%
Share of Roads more than 16m Wide	8%	6%
Arterial Roads		
Density of Arterial Roads (km/km ²)	1.8	1.2
Average Beeline Distance to Arterial Roads (m)	281	516
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	89%	74%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	88%	72%
Block Size, Plot Size, Intersection Density, an	d Walkabil	ity
Share of Intersections that are 4-way	20%	18%
Average Block Size (ha)	1.4	1.7
3-way Intersection Density (number per km ²)	168	226
4-way Intersection Density (number per km ²)	51	60
Walkabity Ratio	1.5	1.5
Average Plot Size in Informal Subdivisions (m ²)	534	345
Average Plot Size in Formal Subdivisions (m ²)		
Stages in the Evolution of Residential L	ayouts.	
Share of Built-Up Area in Residential Use	74%	86%
Share of Residential Area Not Laid Out Before Occupation	3%	5%
Share of Residential Area Laid Out Before Occupation	96%	94%



50



200th









Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



87%

5%

4%

94%

0%

Kigali, Rwanda (Sub-Saharan Africa)







Selected Locales in Area Developed Before 1987





Selected Locales in Expansion Area, 1987-2014





Kigali, Rwanda (Sub-Saharan Africa)

Legend for Charts			
Kigali Other cities in region All other cities	Global av	erage —	
Metrics	Pre- 1987	1987- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	17%	14%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	
Average Road Width (m)	7.9	5.5	
Share of Roads less than 4m Wide	18%	32%	
Share of Roads more than 16m Wide	7%	1%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.2	1.2	
Average Beeline Distance to Arterial Roads (m)	179	318	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	95%	86%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	72%	57%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	6%	3%	
Average Block Size (ha)	5.7	4.6	
3-way Intersection Density (number per km ²)	65	99	
4-way Intersection Density (number per km ²)	7	5	
Walkabity Ratio	2.3	1.7	
Average Plot Size in Informal Subdivisions (m ²)		444	
Average Plot Size in Formal Subdivisions (m ²)			
Stages in the Evolution of Residential La	ayouts		
Share of Built-Up Area in Residential Use	58%	78%	
Share of Residential Area Not Laid Out Before Occupation	43%	69%	
Share of Residential Area Laid Out Before Occupation	56%	30%	
Share of Residential Area in Informal Land Subdivisions	34%	29%	













Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



22%

0%

0%

Killeen, United States (Land-Rich Developed Countries)









Killeen, United States (Land-Rich Developed Countries)



Legend for Charts				
Killeen Other cities in region All other cities Global average —				
Metrics			Pre- 1990	1990- 2013
	Road	s		
Share of Built-Up A	Area Occupied by Roads		24%	22%
Share of Built-Up A	area that is Gridded or Pa	artially Gridded	0%	2%
Average Road Wid	th (m)		10.6	18.8
Share of Roads les	ss than 4m Wide		11%	12%
Share of Roads mo	ore than 16m Wide		23%	30%
	Arterial R	loads		
Density of Arterial I	Roads (km/km²)		1.1	0.9
Average Beeline D	istance to Arterial Roads	(m)	470	472
Share of Urban Ex (625m) of all Arteria	tent Within Walking Dista al Roads	ince	76%	74%
Share of Urban Ex of Wide Arterial Ro	tent Within Walking Dista ads (>16m wide)	ince	74%	72%
Block Si	ize, Plot Size, Intersecti	on Density, and	d Walkabili	ty
Share of Intersection	ons that are 4-way		18%	8%
Average Block Size	e (ha)		2.9	5.4
3-way Intersection	Density (number per km	2)	109	52
4-way Intersection	Density (number per km	2)	20	7
Walkabity Ratio			1.8	1.7
Average Plot Size	in Informal Subdivisions	(m²)		
Average Plot Size	in Formal Subdivisions (r	m²)	742	770
Si	tages in the Evolution o	of Residential L	ayouts	
Share of Built-Up A	rea in Residential Use		73%	93%
Share of Residenti	al Area Not Laid Out Bef	ore Occupation	0%	9%
Share of Residenti	al Area Laid Out Before	Occupation	99%	90%
Share of Residenti	al Area in Informal Land	Subdivisions	0%	0%
Share of Residenti	al Area in Formal Land S	ubdivisions	67%	85%
Share of Residenti	al Area in Housing Project	cts	32%	5%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 – ~2014



Kinshasa, Congo Dem. Rep. (Sub-Saharan Africa)









Kinshasa, Congo Dem. Rep. (Sub-Saharan Africa)



-			
Share of Built-Up Area in Residential Use	84%	85%	ent
Share of Residential Area Not Laid Out Before Occupation	18%	36%	erc
Share of Residential Area Laid Out Before Occupation	81%	63%	۵.
Share of Residential Area in Informal Land Subdivisions	72%	58%	
Share of Residential Area in Formal Land Subdivisions	8%	1%	
Share of Residential Area in Housing Projects	0%	2%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Kolkata, India (South and Central Asia)









Kolkata, India (South and Central Asia)

Legend for Charts			
Kolkata Other cities in region All other cities	Global a	verage —	
Metrics	Pre-	1990-	
	1990	2014	
Roads			
Share of Built-Up Area Occupied by Roads	12%	9%	
Share of Built-Up Area that is Gridded or Partially Gridded	1%	2%	
Average Road Width (m)	5.8	4.0	
Share of Roads less than 4m Wide	38%	59%	
Share of Roads more than 16m Wide	4%	1%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.6	1.1	
Average Beeline Distance to Arterial Roads (m)	245	335	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	91%	84%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	62%	54%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	8%	3%	
Average Block Size (ha)	5.2	4.8	
3-way Intersection Density (number per km ²)	85	108	
4-way Intersection Density (number per km ²)	9	6	
Walkabity Ratio	1.6	1.6	
Average Plot Size in Informal Subdivisions (m ²)		217	
Average Plot Size in Formal Subdivisions (m ²)	271		
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	76%	84%	
Share of Residential Area Not Laid Out Before Occupation	83%	73%	
Share of Residential Area Laid Out Before Occupation	15%	26%	
Share of Residential Area in Informal Land Subdivisions	6%	15%	
Share of Residential Area in Formal Land Subdivisions	6%	2%	



Share of Residential Area in Housing Projects



2%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Kozhikode, India (South and Central Asia)









Selected Locales in Area Developed Before 1991





Selected Locales in Expansion Area, 1991-2014







—— Arterial Roads

Kozhikode, India (South and Central Asia)

Legend for Charts			
Kozhikode Other cities in region All other cities	Global av	verage —	
Metrics	Pre- 1991	1991- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	14%	8%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	
Average Road Width (m)	6.3	4.8	
Share of Roads less than 4m Wide	26%	44%	
Share of Roads more than 16m Wide	3%	3%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.2	0.7	
Average Beeline Distance to Arterial Roads (m)	189	314	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	98%	88%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	100%	67%	
Block Size, Plot Size, Intersection Density, and	d Walkabilit	ty	
Share of Intersections that are 4-way	4%	5%	
Average Block Size (ha)	1.7	7.5	
3-way Intersection Density (number per km ²)	176	111	
4-way Intersection Density (number per km ²)	9	10	
Walkabity Ratio	1.4	1.6	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)			
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	44%	87%	
Share of Residential Area Not Laid Out Before Occupation	100%	54%	

Share of Built-Up Area in Residential Use44%87%Share of Residential Area Not Laid Out Before Occupation100%54%Share of Residential Area Laid Out Before Occupation0%45%Share of Residential Area in Informal Land Subdivisions0%44%Share of Residential Area in Formal Land Subdivisions0%0%Share of Residential Area in Housing Projects0%0%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Lagos, Nigeria (Sub-Saharan Africa)







Selected Locales in Area Developed Before 1984





Selected Locales in Expansion Area, 1984-2013





Lagos, Nigeria (Sub-Saharan Africa)

Legend for Charts		
Lagos Other cities in region All other cities	Global a	iverage —
Metrics	Pre- 1984	1984- 2013
Roads		
Share of Built-Up Area Occupied by Roads	16%	15%
Share of Built-Up Area that is Gridded or Partially Gridded	13%	0%
Average Road Width (m)	10.1	7.1
Share of Roads less than 4m Wide	5%	19%
Share of Roads more than 16m Wide	9%	3%
Arterial Roads		
Density of Arterial Roads (km/km²)	1.2	0.8
Average Beeline Distance to Arterial Roads (m)	336	543
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	85%	70%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	73%	50%
Block Size, Plot Size, Intersection Density, and	Walkabili	ity
Share of Intersections that are 4-way	10%	4%
Average Block Size (ha)	5.8	4.8
3-way Intersection Density (number per km ²)	61	83
4-way Intersection Density (number per km ²)	12	4
Walkabity Ratio	1.7	1.7
Average Plot Size in Informal Subdivisions (m ²)	28	669
Average Plot Size in Formal Subdivisions (m ²)	538	679
Stages in the Evolution of Residential La	ayouts	
Share of Built-Up Area in Residential Use	69%	76%
Share of Residential Area Not Laid Out Before Occupation	47%	38%
Share of Residential Area Laid Out Before Occupation	50%	61%
Share of Residential Area in Informal Land Subdivisions	28%	53%
Share of Residential Area in Formal Land Subdivisions	19%	3%
Share of Residential Area in Housing Projects	4%	4%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Lahore, Pakistan (South and Central Asia)









Selected Locales in Area Developed Before 1991





Selected Locales in Expansion Area, 1991-2013





Lahore, Pakistan (South and Central Asia)

Legend for Charts			
Lahore Other cities in region All other cities	Global a	verage —	
Metrics	Pre- 1991	1991- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	19%	23%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	
Average Road Width (m)	7.3	6.4	
Share of Roads less than 4m Wide	31%	31%	
Share of Roads more than 16m Wide	8%	6%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	3.2	2.5	
Average Beeline Distance to Arterial Roads (m)	119	167	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	99%	97%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	93%	87%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	11%	10%	
Average Block Size (ha)	2.3	1.9	
3-way Intersection Density (number per km ²)	208	209	
4-way Intersection Density (number per km ²)	31	23	
Walkabity Ratio	1.5	1.9	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	394	440	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	81%	70%	
Share of Residential Area Not Laid Out Before Occupation	35%	11%	
Share of Residential Area Laid Out Before Occupation	64%	88%	
Share of Residential Area in Informal Land Subdivisions	20%	31%	
Share of Residential Area in Formal Land Subdivisions	42%	54%	
Share of Residential Area in Housing Projects	0%	2%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Lausanne, Switzerland (Europe and Japan)









Selected Locales in Area Developed Before 1987







Selected Locales in Expansion Area, 1987-2015





Lausanne, Switzerland (Europe and Japan)

Legend for Charts			
Lausanne Other cities in region All other cities	Global a	verage —	
Metrics	Pre- 1987	1987- 2015	
Roads			
Share of Built-Up Area Occupied by Roads	20%	23%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	
Average Road Width (m)	erage Road Width (m) 18.3		
Share of Roads less than 4m Wide	17%	21%	
Share of Roads more than 16m Wide	13%	1%	
Arterial Roads			
Density of Arterial Roads (km/km²)	3.1	2.6	
Average Beeline Distance to Arterial Roads (m)	95	125	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	100%	99%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	73%	60%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	13%	4%	
Average Block Size (ha)	4.1	6.6	
3-way Intersection Density (number per km ²)	120	107	
4-way Intersection Density (number per km ²)	14	7	
Walkabity Ratio	1.9	1.6	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)		1231	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	64%	77%	
Share of Residential Area Not Laid Out Before Occupation	7%	27%	
Share of Residential Area Laid Out Before Occupation	92%	72%	
Share of Residential Area in Informal Land Subdivisions	0%	0%	
Share of Residential Area in Formal Land Subdivisions	78%	68%	



Share of Residential Area in Housing Projects



14%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Le Mans, France (Europe and Japan)







Selected Locales in Area Developed Before 1992













Le Mans, France (Europe and Japan)

Legend for Charts			
Le Mans Other cities in region All other citie	es Global a	verage —	
Metrics	Pre- 1992	1992- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	20%	20%	
Share of Built-Up Area that is Gridded or Partially Gridde	ed 0%	0%	
Average Road Width (m)	6.7	5.5	
Share of Roads less than 4m Wide	24%	33%	
Share of Roads more than 16m Wide	3%	2%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.9	2.8	
Average Beeline Distance to Arterial Roads (m)	117	122	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	99%	99%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	84%	83%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	8%	7%	
Average Block Size (ha)	2.7	6.3	
3-way Intersection Density (number per km ²)	184	138	
4-way Intersection Density (number per km ²)	22	14	
Walkabity Ratio	2.0	1.7	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	647	720	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	61%	54%	
Share of Residential Area Not Laid Out Before Occupation	on 13%	44%	
Share of Residential Area Laid Out Before Occupation	86%	55%	
Share of Residential Area in Informal Land Subdivisions	0%	0%	
Share of Residential Area in Formal Land Subdivisions	71%	53%	
Share of Residential Area in Housing Projects	14%	2%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Leon, Nicaragua (Latin America and the Caribbean)







Leon, Nicaragua (Latin America and the Caribbean)

Legend for Charts			
Leon Other cities in region All other cities	Global a	average —	
Metrics	Pre-	1993-	
	1993	2010	
Roads			
Share of Built-Up Area Occupied by Roads	18%	18%	
Share of Built-Up Area that is Gridded or Partially Gridded	22%	12%	
Average Road Width (m)	7.8	5.5	
Share of Roads less than 4m Wide	8%	18%	
Share of Roads more than 16m Wide	2%	0%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	3.0	2.0	
Average Beeline Distance to Arterial Roads (m)	119	188	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	99%	96%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	66%	66%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	36%	19%	
Average Block Size (ha)	2.7	5.8	
3-way Intersection Density (number per km ²)	79	155	
4-way Intersection Density (number per km ²)	34	57	
Walkabity Ratio	1.6	1.6	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	143	355	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	74%	81%	
Share of Residential Area Not Laid Out Before Occupation	6%	10%	
Share of Residential Area Laid Out Before Occupation	93%	89%	
Share of Residential Area in Informal Land Subdivisions	15%	62%	
Share of Residential Area in Formal Land Subdivisions	78%	24%	
Share of Residential Area in Housing Projects	0%	1%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 – ~2014



Leshan, Sichuan, China (East Asia and the Pacific)









Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2014





Urban Extent in 1990 Expansion, 1990 - 2001 Expansion, 2001 - 2014

— Arterial Roads

Leshan, Sichuan, China (East Asia and the Pacific)

Legend for Charts			
Leshan Other cities in region All other cities	Global	average —	
Metrics	Pre- 1990	1990- 2014	
Roads			Ħ
Share of Built-Up Area Occupied by Roads	26%	18%	Icel
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	Pe
Average Road Width (m)	10.8	7.6	
Share of Roads less than 4m Wide	10%	26%	
Share of Roads more than 16m Wide	18%	7%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.4	0.8	
Average Beeline Distance to Arterial Roads (m)	166	747	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	97%	61%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	85%	55%	ters
Block Size, Plot Size, Intersection Density, and Walkability			Me
Share of Intersections that are 4-way	15%	2%	
Average Block Size (ha)	3.3	4.9	
3-way Intersection Density (number per km ²)	99	78	
4-way Intersection Density (number per km ²)	17	6	
Walkabity Ratio	1.7	1.4	
Average Plot Size in Informal Subdivisions (m ²)			1
Average Plot Size in Formal Subdivisions (m ²)			
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	66%	52%	ant
Share of Residential Area Not Laid Out Before Occupation	40%	75%	erce

Share of Built-up Area in Roads ~1990 - ~2014 50 40 30. 20 10 0 1st City Rank 200th





Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014





Share of Residential Area Laid Out Before Occupation

Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions



59%

4%

30%

24%

24%

7%

10%



London, United Kingdom (Europe and Japan)











Selected Locales in Expansion Area, 1989-2013



London, United Kingdom 1989-2013





Urban Extent in 1989 Expansion, 1989 - 2000 Expansion, 2000 - 2013

—— Arterial Roads

London, United Kingdom (Europe and Japan)

Legend for Charts			
London Other cities in region All other cities	Global a	verage —	
Metrics	Pre- 1989	1989- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	19%	9%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	
Average Road Width (m)	9.5	7.5	
Share of Roads less than 4m Wide	9%	18%	
Share of Roads more than 16m Wide	9%	4%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.2	1.4	
Average Beeline Distance to Arterial Roads (m)	163	439	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	98%	78%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	75%	37%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	12%	4%	
Average Block Size (ha)	8.4	8.2	
3-way Intersection Density (number per km ²)	51	61	
4-way Intersection Density (number per km ²)	10	10	
Walkabity Ratio	1.7	1.7	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	550	612	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	73%	72%	
Share of Residential Area Not Laid Out Before Occupation	2%	13%	
Share of Residential Area Laid Out Before Occupation	95%	86%	
Share of Residential Area in Informal Land Subdivisions	0%	0%	
Share of Residential Area in Formal Land Subdivisions	45%	86%	



Share of Residential Area in Housing Projects



52%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Los Angeles, United States (Land-Rich Developed Countries)







Los Angeles, United States 1990-2014

0 10 20 30 40 50 60

Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2014

— Arterial Roads
Los Angeles, United States (Land-Rich Developed Countries)

Legend for Charts			
Los Angeles Other cities in region All other cities	Global av	erage —	
Metrics	Pre- 1990	1990- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	24%	25%	
Share of Built-Up Area that is Gridded or Partially Gridded	28%	0%	1
Average Road Width (m)	15.1	15.8	
Share of Roads less than 4m Wide	6%	18%	
Share of Roads more than 16m Wide	46%	20%	
Arterial Roads			
Density of Arterial Roads (km/km²)	2.1	0.3	
Average Beeline Distance to Arterial Roads (m)	187	2340	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	95%	20%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	95%	20%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	26%	5%	
Average Block Size (ha)	6.5	6.5	
3-way Intersection Density (number per km ²)	47	74	
4-way Intersection Density (number per km ²)	19	8	
Walkabity Ratio	1.6	2.0	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	752	789	
Stages in the Evolution of Residential La	youts		
Share of Built-Up Area in Residential Use	85%	86%	
Share of Residential Area Not Laid Out Before Occupation	2%	19%	
Share of Residential Area Laid Out Before Occupation	91%	80%	1
Share of Residential Area in Informal Land Subdivisions	0%	3%	
Share of Residential Area in Formal Land Subdivisions	90%	62%	



Share of Residential Area in Housing Projects



7%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 – ~2014



Luanda, Angola (Sub-Saharan Africa)







Selected Locales in Area Developed Before 1991





Selected Locales in Expansion Area, 1991-2014





Luanda, Angola (Sub-Saharan Africa)

Legend for Charts			
Luanda Other cities in region All other cities	Global a	iverage —	
Metrics	Pre- 1991	1991- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	15%	17%	
Share of Built-Up Area that is Gridded or Partially Gridded	10%	0%	
Average Road Width (m)	7.9	6.4	
Share of Roads less than 4m Wide	16%	30%	
Share of Roads more than 16m Wide	6%	5%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.1	0.6	
Average Beeline Distance to Arterial Roads (m)	412	698	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	78%	58%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	66%	52%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	15%	14%	
Average Block Size (ha)	3.2	2.4	
3-way Intersection Density (number per km ²)	96	139	
4-way Intersection Density (number per km ²)	17	29	
Walkabity Ratio	1.7	1.7	
Average Plot Size in Informal Subdivisions (m ²)	255	387	
Average Plot Size in Formal Subdivisions (m ²)	291		
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	69%	75%	
Share of Residential Area Not Laid Out Before Occupation	58%	52%	
Share of Residential Area Laid Out Before Occupation	41%	47%	
Share of Residential Area in Informal Land Subdivisions	32%	37%	
Share of Residential Area in Formal Land Subdivisions	9%	2%	



Share of Residential Area in Housing Projects



0%

7%



Percent





Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Lubumbashi, Congo Dem. Rep. (Sub-Saharan Africa)







Lubumbashi, Congo Dem. Rep. (Sub-Saharan Africa)















Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



87%

4%

0%

67%

1%

Madrid, Spain (Europe and Japan)

1









Urban Extent in 1991 Expansion, 1991 - 2002 Expansion, 2002 - 2010

—— Arterial Roads

pla,

Madrid, Spain (Europe and Japan)

Legend for Charts				
Madrid Other cities in region All other cities Global average -				
Metrics	Pre- 1991	1991- 2010		
Roads				
Share of Built-Up Area Occupied by Roads	28%	29%		
Share of Built-Up Area that is Gridded or Partially Grid	dded 7%	5%		
Average Road Width (m)	13.2	11.3		
Share of Roads less than 4m Wide	11%	22%		
Share of Roads more than 16m Wide	25%	27%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	1.8	1.4		
Average Beeline Distance to Arterial Roads (m)	204	266		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	96%	90%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	94%	80%		
Block Size, Plot Size, Intersection Densi	ty, and Walkabili	ty		
Share of Intersections that are 4-way	18%	21%		
Average Block Size (ha)	3.8	5.5		
3-way Intersection Density (number per km ²)	108	80		
4-way Intersection Density (number per km ²)	34	26		
Walkabity Ratio	1.6	1.8		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)	565	546		
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	67%	70%		
Share of Residential Area Not Laid Out Before Occup	ation 4%	13%		
Share of Residential Area Laid Out Before Occupation	n 95%	86%		
Share of Residential Area in Informal Land Subdivision	ons 0%	0%		
Share of Residential Area in Formal Land Subdivision	ns 79%	67%		
Share of Residential Area in Housing Projects	16%	19%		











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Malatya, Turkey (Western Asia and North Africa)







Malatya, Turkey (Western Asia and North Africa)

Legend for Charts				
Malatya Other cities in region All other cities	Global a	average —		
Metrics	Pre- 1990	1990- 2014		
Roads				
Share of Built-Up Area Occupied by Roads	27%	27%		
Share of Built-Up Area that is Gridded or Partially Gridded	2%	0%		
Average Road Width (m)	9.2	9.3		
Share of Roads less than 4m Wide	10%	19%		
Share of Roads more than 16m Wide	11%	14%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	1.9	1.3		
Average Beeline Distance to Arterial Roads (m)	228	354		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	90%	79%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	86%	73%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	14%	8%		
Average Block Size (ha)	1.4	5.9		
3-way Intersection Density (number per km ²)	204	121		
4-way Intersection Density (number per km ²)	35	14		
Walkabity Ratio	1.5	1.8		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)				
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	72%	79%		
Share of Residential Area Not Laid Out Before Occupation	3%	27%		
Share of Residential Area Laid Out Before Occupation	96%	72%		

Share of Built-up Area in Roads ~1990 - ~2014 50 40 -40 -30 -20 -10 -10 -1st City Rank 200th











Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



10%

76%

9%

12%

31%

Malegaon, India (South and Central Asia)









Selected Locales in Area Developed Before 1991





Selected Locales in Expansion Area, 1991-2014





Malegaon, India (South and Central Asia)

Legend for Charts			
Malegaon Other cities in region All other cities	Global a	verage —	
Metrics	Pre- 1991	1991- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	19%	26%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	
Average Road Width (m)	5.3	4.6	
Share of Roads less than 4m Wide	36%	39%	
Share of Roads more than 16m Wide	2%	1%	
Arterial Roads			
Density of Arterial Roads (km/km²)	1.1	0.8	
Average Beeline Distance to Arterial Roads (m)	343	391	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	81%	78%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	72%	69%	
Block Size, Plot Size, Intersection Density, and	Walkabili	ty	
Share of Intersections that are 4-way	12%	10%	
Average Block Size (ha)	1.2	1.7	
3-way Intersection Density (number per km ²)	292	422	
4-way Intersection Density (number per km ²)	52	55	
Walkabity Ratio	1.5	1.5	
Average Plot Size in Informal Subdivisions (m ²)	170	130	
Average Plot Size in Formal Subdivisions (m ²)			
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	65%	68%	
Share of Residential Area Not Laid Out Before Occupation	35%	48%	
Share of Residential Area Laid Out Before Occupation	64%	51%	

Share of Built-Up Area in Residential Use65%68%Share of Residential Area Not Laid Out Before Occupation35%48%Share of Residential Area Laid Out Before Occupation64%51%Share of Residential Area in Informal Land Subdivisions38%48%Share of Residential Area in Formal Land Subdivisions25%0%Share of Residential Area in Housing Projects0%2%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Manchester, United Kingdom (Europe and Japan)









Selected Locales in Area Developed Before 1989



Selected Locales in Expansion Area, 1989-2010





Urban Extent in 1989 Expansion, 1989 - 2002 Expansion, 2002 - 2010

- Arterial Roads

Manchester, United Kingdom (Europe and Japan)





Share of Residential Area in Housing Projects



0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 – ~2014



Manila, Philippines (Southeast Asia)









Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2014



Manila, Philippines 1990-2014 0 5 10 15 20



Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2014 ----- Arterial Roads

Manila, Philippines (Southeast Asia)

Legend for Charts			
Manila Other cities in region All other cities	Global average —		
Metrics	Pre- 1990	1990- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	19%	22%	
Share of Built-Up Area that is Gridded or Partially Gridded	12%	0%	
Average Road Width (m)	9.2	5.8	
Share of Roads less than 4m Wide	11%	23%	
Share of Roads more than 16m Wide	10%	0%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.9	1.5	
Average Beeline Distance to Arterial Roads (m)	202	265	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	95%	90%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	72%	61%	
Block Size, Plot Size, Intersection Density, and	Walkabili	ity	
Share of Intersections that are 4-way	19%	10%	
Average Block Size (ha)	3.1	2.7	
3-way Intersection Density (number per km ²)	82	189	
4-way Intersection Density (number per km ²)	28	26	
Walkabity Ratio	1.6	1.8	
Average Plot Size in Informal Subdivisions (m ²)		94	
Average Plot Size in Formal Subdivisions (m ²)	329	312	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	69%	76%	
Share of Residential Area Not Laid Out Before Occupation	44%	32%	
Share of Residential Area Laid Out Before Occupation	50%	67%	
Share of Residential Area in Informal Land Subdivisions	1%	27%	
Share of Residential Area in Formal Land Subdivisions	52%	33%	



Share of Residential Area in Housing Projects



0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Marrakesh, Morocco (Western Asia and North Africa)







Marrakesh, Morocco (Western Asia and North Africa)

Legend for Charts			
Marrakesh Other cities in region All other cities	Global av	erage —	
Metrics	Pre- 1988	1988- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	21%	25%	
Share of Built-Up Area that is Gridded or Partially Gridded	2%	0%	
Average Road Width (m)	8.5	8.7	
Share of Roads less than 4m Wide	27%	19%	
Share of Roads more than 16m Wide	13%	12%	
Arterial Roads			
Density of Arterial Roads (km/km²)	2.3	1.4	
Average Beeline Distance to Arterial Roads (m)	176	360	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	97%	85%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	92%	80%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	12%	13%	
Average Block Size (ha)	2.7	4.8	
3-way Intersection Density (number per km ²)	159	172	
4-way Intersection Density (number per km ²)	21	27	
Walkabity Ratio	1.7	1.5	
Average Plot Size in Informal Subdivisions (m ²)	136	1226	
Average Plot Size in Formal Subdivisions (m ²)	194	478	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	62%	75%	
Share of Residential Area Not Laid Out Before Occupation	20%	22%	
Share of Residential Area Laid Out Before Occupation	79%	77%	
Share of Residential Area in Informal Land Subdivisions	3%	12%	



Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



61%

14%

33%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Medan, Indonesia (Southeast Asia)







Selected Locales in Area Developed Before 1989





Selected Locales in Expansion Area, 1989-2013





Medan, Indonesia (Southeast Asia)

Legend for Charts				
Medan	Other cities in region All other cities Global average —			
Metrics			Pre- 1989	1989- 2013
	Roa	ads		
Share of Built-Up A	rea Occupied by Road	s	12%	11%
Share of Built-Up Ar	rea that is Gridded or I	Partially Gridded	0%	0%
Average Road Widt	h (m)		6.5	5.1
Share of Roads less	s than 4m Wide		24%	37%
Share of Roads mo	re than 16m Wide		4%	0%
	Arterial	Roads		
Density of Arterial R	Roads (km/km²)		1.3	0.7
Average Beeline Dis	stance to Arterial Road	ds (m)	284	645
Share of Urban Exte (625m) of all Arteria	ent Within Walking Dis I Roads	stance	88%	68%
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dis ads (>16m wide)	stance	70%	42%
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersectio	ns that are 4-way		9%	5%
Average Block Size	(ha)		5.2	7.6
3-way Intersection [Density (number per k	m²)	76	55
4-way Intersection [Density (number per k	m²)	10	4
Walkabity Ratio			1.7	1.5
Average Plot Size in	n Informal Subdivision	s (m²)		
Average Plot Size in	n Formal Subdivisions	(m²)	483	
Stages in the Evolution of Residential Layouts				
Share of Built-Up Ar	rea in Residential Use		69%	75%
Share of Residentia	I Area Not Laid Out Be	efore Occupation	10%	69%
Share of Residentia	I Area Laid Out Before	e Occupation	89%	30%
Share of Residentia	I Area in Informal Lan	d Subdivisions	38%	25%
Share of Residentia	l Area in Formal Land	Subdivisions	50%	4%
Share of Residentia	I Area in Housing Proj	ects	0%	0%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Mexico City, Mexico (Latin America and the Caribbean)









Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2014

Arterial Roads

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Mexico City, Mexico (Latin America and the Caribbean)

Legend for Charts			
Mexico City Other cities in region All other cities	Global av	verage —	
Metrics	Pre- 1990	1990- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	25%	23%	
Share of Built-Up Area that is Gridded or Partially Gridded	53%	7%	
Average Road Width (m)	12.5	8.0	
Share of Roads less than 4m Wide	5%	14%	
Share of Roads more than 16m Wide	19%	4%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.4	0.8	
Average Beeline Distance to Arterial Roads (m)	162	418	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	98%	77%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	97%	55%	
Block Size, Plot Size, Intersection Density, and	l Walkabili	ty	
Share of Intersections that are 4-way	38%	14%	
Average Block Size (ha)	2.7	3.5	
3-way Intersection Density (number per km ²)	68	149	
4-way Intersection Density (number per km ²)	37	25	
Walkabity Ratio	1.6	1.7	
Average Plot Size in Informal Subdivisions (m ²)		132	
Average Plot Size in Formal Subdivisions (m ²)	211	181	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	65%	64%	
Share of Residential Area Not Laid Out Before Occupation	4%	25%	
Share of Residential Area Laid Out Before Occupation	90%	74%	
Share of Residential Area in Informal Land Subdivisions	3%	27%	
Share of Residential Area in Formal Land Subdivisions	89%	42%	



Share of Residential Area in Housing Projects



1%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Milan, Italy (Europe and Japan)







Selected Locales in Area Developed Before 1988







Selected Locales in Expansion Area, 1988-2013





Milan, Italy (Europe and Japan)

Legend for Charts			
Milan Other cities in region All other cities	Global average —		
Metrics	Pre- 1988	1988- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	21%	18%	
Share of Built-Up Area that is Gridded or Partially Gridded	2%	0%	
Average Road Width (m)	8.4	5.0	
Share of Roads less than 4m Wide	17%	40%	
Share of Roads more than 16m Wide	10%	0%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.5	1.5	
Average Beeline Distance to Arterial Roads (m)	234	244	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	93%	92%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	52%	31%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	10%	9%	
Average Block Size (ha)	3.9	7.1	
3-way Intersection Density (number per km ²)	93	101	
4-way Intersection Density (number per km ²)	13	14	
Walkabity Ratio	2.1	2.0	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)			
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	58%	66%	
Share of Residential Area Not Laid Out Before Occupation	4%	39%	
Share of Residential Area Laid Out Before Occupation	95%	60%	



10

0 1st





Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014





Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



0%

84%

11%

0%

44%

Minneapolis, United States (Land-Rich Developed Countries)





Minneapolis, United States 1990-2014 0 10 20 30 40 50



Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2014 — Arterial Roads

Minneapolis, United States (Land-Rich Developed Countries)

Legend for Charts

	Share	of Built-up Area ~1990 – ~2014	in Roads ¹
	40 -		
ercent	30 -		
Pe	20 -		
	0 - 1st	City Rank	200th









Minneapolis Other cities in region All other cities	Global average -			
Metrics	Pre- 1990	1990- 2014		
Roads				
Share of Built-Up Area Occupied by Roads	22%	20%		
Share of Built-Up Area that is Gridded or Partially Gridded	15%	0%		
Average Road Width (m)	9.5	8.8		
Share of Roads less than 4m Wide	15%	15%		
Share of Roads more than 16m Wide	14%	6%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	1.8	1.5		
Average Beeline Distance to Arterial Roads (m)	213	250		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	95%	92%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	92%	88%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	17%	5%		
Average Block Size (ha)	3.8	10.5		
3-way Intersection Density (number per km ²)	102	52		
4-way Intersection Density (number per km ²)	17	5		
Walkabity Ratio	1.8	1.6		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)	925	1091		
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	72%	84%		
Share of Residential Area Not Laid Out Before Occupation	6%	28%		
Share of Residential Area Laid Out Before Occupation	93%	71%		
Share of Residential Area in Informal Land Subdivisions	0%	0%		
Share of Residential Area in Formal Land Subdivisions	80%	61%		
Share of Residential Area in Housing Projects	13%	9%		





Modesto, United States (Land-Rich Developed Countries)









Selected Locales in Area Developed Before 1992



Selected Locales in Expansion Area, 1992-2014







Modesto, United States 1992-2014 0 5 10 15 20

Urban Extent in 1992
Expansion, 1992 - 2000
Expansion, 2000 - 2014

— Arterial Roads

Modesto, United States (Land-Rich Developed Countries)



Legend for Charts					
Modesto	Other cities in region	All other cities	Global a	Global average —	
Metrics			Pre- 1992	1992- 2014	
	Roads	5			
Share of Built-Up Area Occupied by Roads		24%	28%		
Share of Built-Up Area that is Gridded or Partially Gridded		2%	0%		
Average Road Width (m)			10.6	10.2	
Share of Roads less than 4m Wide			17%	21%	
Share of Roads more	re than 16m Wide		17%	18%	
Arterial Roads					
Density of Arterial R	oads (km/km²)		1.9	1.5	
Average Beeline Distance to Arterial Roads (m)		196	242		
Share of Urban Exte (625m) of all Arteria	ent Within Walking Dista I Roads	nce	96%	92%	
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dista ids (>16m wide)	nce	90%	82%	
Block Size, Plot Size, Intersection Density, and Walkability					
Share of Intersection	ns that are 4-way		13%	13%	
Average Block Size	(ha)		2.5	5.1	
3-way Intersection E	Density (number per km ²	;)	128	139	
4-way Intersection E	Density (number per km ²	[:])	16	27	
Walkabity Ratio			1.9	2.1	
Average Plot Size in	n Informal Subdivisions (m²)			
Average Plot Size in	n Formal Subdivisions (n	n²)	620	581	
Stages in the Evolution of Residential Layouts					
Share of Built-Up Ar	ea in Residential Use		70%	66%	
Share of Residentia	Area Not Laid Out Befo	ore Occupation	5%	3%	
Share of Residentia	I Area Laid Out Before C	Occupation	94%	96%	
Share of Residentia	Area in Informal Land	Subdivisions	1%	0%	
Share of Residentia	Area in Formal Land S	ubdivisions	87%	89%	
Share of Residential Area in Housing Projects		5%	6%		











Area w/n Walking Distance of Wide Arterial Roads, ~1990 – ~2014



Montreal, Canada (Land-Rich Developed Countries)





Selected Locales in Expansion Area, 1990-2013



Montreal, Canada 1990-2013 0 5 10 15 20 25



Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2013 Arterial Roads

Montreal, Canada (Land-Rich Developed Countries)

Legend for Charts



200th

50

40

20

10

0 - 1st

Percent 30

Montreal	Other cities in region	All other cities	Global a	Global average —	
Metrics			Pre- 1990	1990- 2013	
Roads					
Share of Built-Up Area Occupied by Roads			20%	19%	
Share of Built-Up Area that is Gridded or Partially Gridded		0%	0%		
Average Road Width (m)		9.4	16.1		
Share of Roads less than 4m Wide		10%	11%		
Share of Roads more than 16m Wide		8%	11%		
Arterial Roads					
Density of Arteria	l Roads (km/km²)		2.3	2.1	
Average Beeline	Distance to Arterial Roa	ds (m)	165	187	
Share of Urban E (625m) of all Arte	xtent Within Walking Di rial Roads	stance	97%	96%	
Share of Urban E of Wide Arterial R	xtent Within Walking Di coads (>16m wide)	stance	82%	77%	
Block Size, Plot Size, Intersection Density, and Walkability					
Share of Intersec	tions that are 4-way		10%	5%	
Average Block Si	ze (ha)		4.1	5.0	
3-way Intersection	n Density (number per k	(m²)	84	67	
4-way Intersection	n Density (number per k	(m²)	9	7	
Walkabity Ratio			2.5	2.2	
Average Plot Size	e in Informal Subdivision	ns (m²)			
Average Plot Size	e in Formal Subdivisions	s (m²)	556	593	
Stages in the Evolution of Residential Layouts					
Share of Built-Up	Area in Residential Use)	74%	79%	
Share of Residential Area Not Laid Out Before Occupation		0%	7%		
Share of Residential Area Laid Out Before Occupation		99%	92%		
Share of Residential Area in Informal Land Subdivisions		0%	0%		
Share of Residential Area in Formal Land Subdivisions		92%	73%		
Share of Residential Area in Housing Projects		6%	18%		







City Rank



Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Moscow, Russia (Europe and Japan)







Selected Locales in Area Developed Before 1991



Selected Locales in Expansion Area, 1991-2014





Moscow, Russia (Europe and Japan)

Lawrend For Objects				
Legend for Charts				
	Giobal a	verage —		
Metrics	Pre-	1991-		
	1991	2014		
Roads				
Share of Built-Up Area Occupied by Roads		14%		
Share of Built-Up Area that is Gridded or Partially Gridded		2%		
Average Road Width (m)	9.7	5.6		
Share of Roads less than 4m Wide		31%		
Share of Roads more than 16m Wide	25%	2%		
Arterial Roads				
Density of Arterial Roads (km/km²)	1.1	0.3		
Average Beeline Distance to Arterial Roads (m)	385	1191		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	79%	35%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	75%	28%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	14%	10%		
Average Block Size (ha)	6.1	4.8		
3-way Intersection Density (number per km ²)	43	102		
4-way Intersection Density (number per km ²)	8	22		
Walkabity Ratio	1.6	2.1		
Average Plot Size in Informal Subdivisions (m ²)		1099		
Average Plot Size in Formal Subdivisions (m ²)		962		
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	74%	84%		
Share of Residential Area Not Laid Out Before Occupation	5%	0%		
Share of Residential Area Laid Out Before Occupation	78%	99%		
Share of Residential Area in Informal Land Subdivisions	8%	74%		



Share of Residential Area in Formal Land Subdivisions



54%

31%

10%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Mumbai, India (South and Central Asia)





Selected Locales in Expansion Area, 1991-2014



Mumbai, India 1991-2014





Urban Extent in 1991 Expansion, 1991 - 2001 Expansion, 2001 - 2014

Arterial Roads

Mumbai, India (South and Central Asia)

Legend for Charts				
Mumbai Other cities in region All other cities	Global av	erage —		
Metrics	Pre- 1991	1991- 2014		
Roads				
Share of Built-Up Area Occupied by Roads	17%	19%		
Share of Built-Up Area that is Gridded or Partially Gridded	0%	2%		
Average Road Width (m)	11.6	8.6		
Share of Roads less than 4m Wide	10%	24%		
Share of Roads more than 16m Wide	18%	11%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	1.6	1.3		
Average Beeline Distance to Arterial Roads (m)	272	347		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	90%	84%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	87%	79%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	11%	9%		
Average Block Size (ha)	5.8	4.9		
3-way Intersection Density (number per km ²)	62	89		
4-way Intersection Density (number per km ²)	12	13		
Walkabity Ratio	1.6	1.7		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)	655			
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	66%	70%		
Share of Residential Area Not Laid Out Before Occupation	60%	62%		
Share of Residential Area Laid Out Before Occupation	35%	37%		
Share of Residential Area in Informal Land Subdivisions	1%	0%		
Share of Residential Area in Formal Land Subdivisions	24%	15%		



Share of Residential Area in Housing Projects



13%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Myeik, Myanmar (Southeast Asia)







Selected Locales in Area Developed Before 1991









Selected Locales in Expansion Area, 1991-2014





Myeik, Myanmar (Southeast Asia)

Legend for Charts				
Myeik Other cities in region All other cities	Global av	verage —		
Metrics	Pre- 1991	1991- 2014		
Roads				
Share of Built-Up Area Occupied by Roads	14%	12%		
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%		
Average Road Width (m)	5.1	5.3		
Share of Roads less than 4m Wide	32%	36%		
Share of Roads more than 16m Wide	0%	2%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	0.3	0.4		
Average Beeline Distance to Arterial Roads (m)	422	599		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	69%	63%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	0%	0%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	25%	11%		
Average Block Size (ha)	1.7	6.5		
3-way Intersection Density (number per km ²)	161	90		
4-way Intersection Density (number per km ²)	57	20		
Walkabity Ratio	1.5	1.7		
Average Plot Size in Informal Subdivisions (m ²)	165	182		
Average Plot Size in Formal Subdivisions (m ²)	298			
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	78%	61%		
Share of Residential Area Not Laid Out Before Occupation	23%	66%		
Share of Residential Area Laid Out Before Occupation	76%	33%		
Share of Residential Area in Informal Land Subdivisions	69%	33%		
Share of Residential Area in Formal Land Subdivisions	7%	0%		



Share of Residential Area in Housing Projects



0%

0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Nakuru, Kenya (Sub-Saharan Africa)









Selected Locales in Area Developed Before 1989







Selected Locales in Expansion Area, 1989-2014




Nakuru, Kenya (Sub-Saharan Africa)

Legend for Charts			
Nakuru Other cities in region All other cities	Global av	/erage —	
Metrics	Pre- 1989	1989- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	23%	21%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	
Average Road Width (m)	10.8	5.5	
Share of Roads less than 4m Wide	13%	31%	
Share of Roads more than 16m Wide	19%	1%	
Arterial Roads			
Density of Arterial Roads (km/km²)	1.0	0.6	
Average Beeline Distance to Arterial Roads (m)	546	916	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	65%	60%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	64%	59%	
Block Size, Plot Size, Intersection Density, and	Walkabilit	t y	
Share of Intersections that are 4-way	16%	9%	
Average Block Size (ha)	4.4	5.8	
3-way Intersection Density (number per km ²)	103	165	
4-way Intersection Density (number per km ²)	18	17	
Walkabity Ratio	1.6	1.7	
Average Plot Size in Informal Subdivisions (m ²)	302	626	
Average Plot Size in Formal Subdivisions (m ²)	2240		
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	54%	75%	
Share of Residential Area Not Laid Out Before Occupation	0%	16%	
Share of Residential Area Laid Out Before Occupation	99%	83%	
Share of Residential Area in Informal Land Subdivisions	81%	79%	



Share of Residential Area in Formal Land Subdivisions



2%

15%

2%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Ndola, Zambia (Sub-Saharan Africa)







Selected Locales in Expansion Area, 1989-2014





Ndola, Zambia (Sub-Saharan Africa)

Legend for Charts				
Ndola Other cities in region All other cities	Global a	verage —		
Metrics	Pre-	1989-		
	1989	2014		
Roads				
Share of Built-Up Area Occupied by Roads	16%	13%		
Share of Built-Up Area that is Gridded or Partially Gridded		0%		
Average Road Width (m)	8.9	4.9		
Share of Roads less than 4m Wide	16%	43%		
Share of Roads more than 16m Wide	13%	2%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	1.2	1.0		
Average Beeline Distance to Arterial Roads (m)	332	392		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	85%	79%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	85%	79%		
Block Size, Plot Size, Intersection Density, and	l Walkabili	ty		
Share of Intersections that are 4-way	10%	11%		
Average Block Size (ha)	5.1	3.0		
3-way Intersection Density (number per km ²)	102	148		
4-way Intersection Density (number per km ²)	13	22		
Walkabity Ratio	1.9	1.7		
Average Plot Size in Informal Subdivisions (m ²)	742	373		
Average Plot Size in Formal Subdivisions (m ²)	1810	424		
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	83%	72%		
Share of Residential Area Not Laid Out Before Occupation	5%	18%		
Share of Residential Area Laid Out Before Occupation	94%	81%		
Share of Residential Area in Informal Land Subdivisions	70%	80%		
Share of Residential Area in Formal Land Subdivisions	22%	0%		



Share of Residential Area in Housing Projects



1%









Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



New York, United States (Land-Rich Developed Countries)







Selected Locales in Expansion Area, 1991-2011





New York, United States (Land-Rich Developed Countries)



Legend for Charts				
New York	Other cities in region	es in region All other cities Global average —		
Metrics			Pre-	1991-
Method			1991	2011
	Roads	5		
Share of Built-Up A	rea Occupied by Roads		20%	12%
Share of Built-Up A	rea that is Gridded or Pa	rtially Gridded		0%
Average Road Wid	th (m)		10.8	8.9
Share of Roads les	s than 4m Wide		7%	14%
Share of Roads mo	ore than 16m Wide		12%	7%
	Arterial R	oads		
Density of Arterial F	Roads (km/km²)		1.8	0.7
Average Beeline Di	stance to Arterial Roads	(m)	226	393
Share of Urban Ext (625m) of all Arteria	ent Within Walking Dista al Roads	nce	93%	78%
Share of Urban Ext of Wide Arterial Roa	ent Within Walking Dista ads (>16m wide)	nce	62%	41%
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersection	ons that are 4-way		21%	0%
Average Block Size	e (ha)		5.1	6.7
3-way Intersection	Density (number per km ²)	45	47
4-way Intersection	Density (number per km ²)	14	2
Walkabity Ratio			1.6	1.8
Average Plot Size i	n Informal Subdivisions (m²)		
Average Plot Size i	n Formal Subdivisions (n	1²)	712	400
Stages in the Evolution of Residential Layouts				
Share of Built-Up A	rea in Residential Use		82%	82%
Share of Residentia	al Area Not Laid Out Befo	ore Occupation	3%	11%
Share of Residentia	al Area Laid Out Before C	Occupation	96%	88%
Share of Residentia	al Area in Informal Land S	Subdivisions	0%	0%
Share of Residentia	al Area in Formal Land S	ubdivisions	93%	86%
Share of Residentia	al Area in Housing Projec	ts	3%	1%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 – ~2014



Nikolaev, Ukraine (Europe and Japan)







Selected Locales in Area Developed Before 1989



Selected Locales in Expansion Area, 1989-2013









Nikolaev, Ukraine (Europe and Japan)

Legend for Charts				
Nikolaev Other cities in region All c	other cities Gl	obal average —		
Metrics	Pre 198	- 1989- 9 2013		
Roads				
Share of Built-Up Area Occupied by Roads	18%	% 14%		
Share of Built-Up Area that is Gridded or Partially	Gridded 5%	0%		
Average Road Width (m)	8.6	5.6		
Share of Roads less than 4m Wide	10%	6 25%		
Share of Roads more than 16m Wide	7%	0%		
Arterial Roads				
Density of Arterial Roads (km/km²)	0.9	0.8		
Average Beeline Distance to Arterial Roads (m)	481	531		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	72%	67%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	719	65%		
Block Size, Plot Size, Intersection De	ensity, and Walk	ability		
Share of Intersections that are 4-way	12%	6 13%		
Average Block Size (ha)	3.7	5.3		
3-way Intersection Density (number per km ²)	101	129		
4-way Intersection Density (number per km ²)	13	16		
Walkabity Ratio	1.9	1.5		
Average Plot Size in Informal Subdivisions (m ²)	501			
Average Plot Size in Formal Subdivisions (m ²)	484			
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	73%	% 85%		
Share of Residential Area Not Laid Out Before Oc	ccupation 12%	6 8%		
Share of Residential Area Laid Out Before Occup	ation 87%	6 91%		
Share of Residential Area in Informal Land Subdiv	visions 50%	62%		
Share of Residential Area in Formal Land Subdivi	isions 25%	6 25%		
Share of Residential Area in Housing Projects	119	6 3%		











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Okayama, Japan (Europe and Japan)









Selected Locales in Area Developed Before 1990



Selected Locales in Expansion Area, 1990-2014







Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2014 — Arterial Roads

Okayama, Japan (Europe and Japan)

Legend for Charts				
Okayama Other cities in region All other cities	Global a	verage —		
Metrics	Pre- 1990	1990- 2014		
Roads				
Share of Built-Up Area Occupied by Roads	25%	23%		
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%		
Average Road Width (m)	5.7	4.4		
Share of Roads less than 4m Wide	50%	60%		
Share of Roads more than 16m Wide	5%	2%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	1.6	1.6		
Average Beeline Distance to Arterial Roads (m)	314	320		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	89%	89%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	53%	50%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	16%	10%		
Average Block Size (ha)	1.6	2.3		
3-way Intersection Density (number per km ²)	278	270		
4-way Intersection Density (number per km ²)	59	38		
Walkabity Ratio	1.5	1.7		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)	189	283		
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	57%	54%		
Share of Residential Area Not Laid Out Before Occupation	25%	32%		
Share of Residential Area Laid Out Before Occupation	74%	67%		
Share of Residential Area in Informal Land Subdivisions	2%	10%		
Share of Residential Area in Formal Land Subdivisions	71%	56%		
Share of Residential Area in Housing Projects	0%	0%		











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Oldenburg, Germany (Europe and Japan)







Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2013



Oldenburg, Germany 1990-2013 0 2 4 6

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Urban Extent in 1990 Expansion, 1990 - 1999 Expansion, 1999 - 2013

—— Arterial Roads

Oldenburg, Germany (Europe and Japan)

Legend for Charts			
Oldenburg Other cities in region All other cities	Global	average —	
Metrics	Pre- 1990	1990- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	18%	18%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	
Average Road Width (m)	7.6	6.6	
Share of Roads less than 4m Wide	17%	23%	
Share of Roads more than 16m Wide	4%	3%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.4	1.4	
Average Beeline Distance to Arterial Roads (m)	239	252	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	92%	92%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	87%	80%	
Block Size, Plot Size, Intersection Density, and	d Walkabil	ity	
Share of Intersections that are 4-way	7%	8%	
Average Block Size (ha)	3.4	4.9	
3-way Intersection Density (number per km ²)	99	110	
4-way Intersection Density (number per km ²)	9	10	
Walkabity Ratio	1.8	1.7	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)		536	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	71%	82%	
Share of Residential Area Not Laid Out Before Occupation	0%	6%	
Share of Residential Area Laid Out Before Occupation	100%	93%	
Share of Residential Area in Informal Land Subdivisions	3%	0%	
Share of Residential Area in Formal Land Subdivisions	86%	87%	



Share of Residential Area in Housing Projects



10%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Osaka, Japan (Europe and Japan)









Selected Locales in Area Developed Before 1989



Selected Locales in Expansion Area, 1989-2014







Urban Extent in 1989 Expansion, 1989 - 2001 Expansion, 2001 - 2014 —— Arterial Roads

Osaka, Japan (Europe and Japan)

Legend for Charts				
Osaka	Osaka Other cities in region All other cities Global average —			
Metrics			Pre- 1989	1989- 2014
	Roa	ds		
Share of Built-Up Ar	ea Occupied by Road	s	20%	25%
Share of Built-Up Ar	ea that is Gridded or F	Partially Gridded	15%	0%
Average Road Width	h (m)		5.7	5.5
Share of Roads less	than 4m Wide		46%	40%
Share of Roads mor	e than 16m Wide		5%	3%
	Arterial	Roads		
Density of Arterial R	oads (km/km²)		1.8	1.1
Average Beeline Dis	stance to Arterial Road	ls (m)	220	550
Share of Urban Exte (625m) of all Arterial	ent Within Walking Dis I Roads	tance	95%	69%
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dis ds (>16m wide)	tance	75%	46%
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersection	ns that are 4-way		21%	18%
Average Block Size	(ha)		1.7	2.4
3-way Intersection E	Density (number per kr	m²)	201	196
4-way Intersection E	Density (number per kr	m²)	55	38
Walkabity Ratio			1.4	1.6
Average Plot Size in	Informal Subdivisions	s (m²)		
Average Plot Size in	Formal Subdivisions	(m²)	143	227
Stages in the Evolution of Residential Layouts				
Share of Built-Up Ar	ea in Residential Use		51%	60%
Share of Residentia	Area Not Laid Out Be	efore Occupation	30%	41%
Share of Residentia	Area Laid Out Before	Occupation	69%	58%
Share of Residentia	Area in Informal Land	d Subdivisions	0%	4%
Share of Residentia	Area in Formal Land	Subdivisions	67%	52%
Share of Residentia	Area in Housing Proj	ects	1%	1%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Oyo, Nigeria (Sub-Saharan Africa)







Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2014





Oyo, Nigeria (Sub-Saharan Africa)

Legend for Charts				
Oyo Other cities in region All other cities	Global a	verage —		
Metrics	Pre- 1990	1990- 2014		
Roads				
Share of Built-Up Area Occupied by Roads	12%	15%		
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%		
Average Road Width (m)	7.6	6.7		
Share of Roads less than 4m Wide	12%	23%		
Share of Roads more than 16m Wide	3%	3%		
Arterial Roads				
Density of Arterial Roads (km/km²)	1.1	0.8		
Average Beeline Distance to Arterial Roads (m)	269	428		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	94%	78%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	49%	52%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	10%	9%		
Average Block Size (ha)	5.6	5.4		
3-way Intersection Density (number per km ²)	54	77		
4-way Intersection Density (number per km ²)	5	6		
Walkabity Ratio	1.7	1.6		
Average Plot Size in Informal Subdivisions (m ²)	558	393		
Average Plot Size in Formal Subdivisions (m ²)				
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	89%	83%		
Share of Residential Area Not Laid Out Before Occupation	72%	31%		
Share of Residential Area Laid Out Before Occupation	27%	68%		
Share of Residential Area in Informal Land Subdivisions	26%	65%		



Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



0%

0%

0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Palembang, Indonesia (Southeast Asia)



A Low Arts





Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2013





Palembang, Indonesia (Southeast Asia)

Legend for Charts				
Palembang Other cities in region All other cities	Global av	verage —		
Metrics	Pre- 1990	1990- 2013		
Roads				
Share of Built-Up Area Occupied by Roads	12%	13%		
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%		
Average Road Width (m)	5.8	4.4		
Share of Roads less than 4m Wide	34%	50%		
Share of Roads more than 16m Wide	5%	1%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	0.9	0.5		
Average Beeline Distance to Arterial Roads (m)	400	783		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	80%	57%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	64%	44%		
Block Size, Plot Size, Intersection Density, and	Walkabili	ty		
Share of Intersections that are 4-way	8%	2%		
Average Block Size (ha)	4.1	6.1		
3-way Intersection Density (number per km ²)	104	71		
4-way Intersection Density (number per km ²)	16	7		
Walkabity Ratio	1.6	1.5		
Average Plot Size in Informal Subdivisions (m ²)	189			
Average Plot Size in Formal Subdivisions (m ²)	185	244		
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	73%	56%		
Share of Residential Area Not Laid Out Before Occupation	32%	78%		
Share of Residential Area Laid Out Before Occupation	67%	21%		
Share of Residential Area in Informal Land Subdivisions	26%	12%		
Share of Residential Area in Formal Land Subdivisions	37%	3%		
Share of Residential Area in Housing Projects	2%	6%		











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Palermo, Italy (Europe and Japan)







Selected Locales in Area Developed Before 1987







Selected Locales in Expansion Area, 1987-2013





Palermo, Italy (Europe and Japan)

Legend for Charts				
Palermo Other cities in region All other cities	Palermo Other cities in region All other cities Global average —			
Metrics	Pre- 1987	1987- 2013		
Roads				
Share of Built-Up Area Occupied by Roads	20%	19%		
Share of Built-Up Area that is Gridded or Partially Gridded	5%	0%		
Average Road Width (m)	7.2	5.4		
Share of Roads less than 4m Wide	29%	39%		
Share of Roads more than 16m Wide	8%	0%		
Arterial Roads				
Density of Arterial Roads (km/km²)	2.3	1.9		
Average Beeline Distance to Arterial Roads (m)	165	197		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	97%	95%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	85%	64%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	7%	7%		
Average Block Size (ha)	3.1	6.3		
3-way Intersection Density (number per km ²)	156	105		
4-way Intersection Density (number per km ²)	20	10		
Walkabity Ratio	1.7	2.0		
Average Plot Size in Informal Subdivisions (m ²)		867		
Average Plot Size in Formal Subdivisions (m ²)	1119	444		
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	56%	58%		
Share of Residential Area Not Laid Out Before Occupation	15%	36%		
Share of Residential Area Laid Out Before Occupation	84%	63%		
Share of Residential Area in Informal Land Subdivisions	1%	21%		
Share of Residential Area in Formal Land Subdivisions	80%	41%		
Share of Residential Area in Housing Projects	2%	0%		













Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Palmas, Brazil (Latin America and the Caribbean)









Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2013





Palmas, Brazil (Latin America and the Caribbean)

Logond for Charte				
Palmas Other cities in region All other cities	Global a	average —		
Metrics	Pre- 1990	1990- 2013		
Roads				
Share of Built-Up Area Occupied by Roads	30%	36%		
Share of Built-Up Area that is Gridded or Partially Gridded	22%	0%		
Average Road Width (m)	9.6	8.3		
Share of Roads less than 4m Wide	27%	18%		
Share of Roads more than 16m Wide	16%	9%		
Arterial Roads				
Density of Arterial Roads (km/km²)	2.2	1.1		
Average Beeline Distance to Arterial Roads (m)	189	590		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	96%	68%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	96%	84%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	26%	20%		
Average Block Size (ha)	3.4	2.9		
3-way Intersection Density (number per km ²)	89	174		
4-way Intersection Density (number per km ²)	23	43		
Walkabity Ratio	1.5	1.6		
Average Plot Size in Informal Subdivisions (m ²)	395	350		
Average Plot Size in Formal Subdivisions (m ²)	342	306		
Stages in the Evolution of Residential L	ayouts			
Share of Built-Up Area in Residential Use	64%	85%		
Share of Residential Area Not Laid Out Before Occupation	0%	3%		
Share of Residential Area Laid Out Before Occupation	100%	96%		













Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



8%

2%

89%

41%

54%

Parbhani, India (South and Central Asia)







Parbhani, India (South and Central Asia)

Legend for Charts				
Parbhani Other cities in region All other cities	Global a	average —		
Metrics	Pre-	1991-		
	1991	2014		
Roads				
Share of Built-Up Area Occupied by Roads	23%	27%		
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%		
Average Road Width (m)	6.5	3.8		
Share of Roads less than 4m Wide	15%	46%		
Share of Roads more than 16m Wide	2%	0%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	1.1	0.9		
Average Beeline Distance to Arterial Roads (m)	332	376		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	85%	80%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	64%	60%		
Block Size, Plot Size, Intersection Density, and	l Walkabil	ity		
Share of Intersections that are 4-way	9%	17%		
Average Block Size (ha)	1.5	1.2		
3-way Intersection Density (number per km ²)	242	500		
4-way Intersection Density (number per km ²)	24	104		
Walkabity Ratio	1.8	1.7		
Average Plot Size in Informal Subdivisions (m ²)	216			
Average Plot Size in Formal Subdivisions (m ²)	411			
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	79%	84%		
Share of Residential Area Not Laid Out Before Occupation	2%	26%		
Share of Residential Area Laid Out Before Occupation	97%	73%		
Share of Residential Area in Informal Land Subdivisions	80%	73%		
Share of Residential Area in Formal Land Subdivisions	16%	0%		



Share of Residential Area in Housing Projects



0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Parepare, Indonesia (Southeast Asia)







Selected Locales in Area Developed Before 1994



Selected Locales in Expansion Area, 1994-2014





Parepare, Indonesia (Southeast Asia)

Legend for Charts				
Parepare	Other cities in region	All other cities	Global average —	
Metrics			Pre- 1994	1994- 2014
	Roa	ds		
Share of Built-Up A	rea Occupied by Roads	6	12%	10%
Share of Built-Up A	rea that is Gridded or F	Partially Gridded	0%	0%
Average Road Widt	h (m)		7.6	6.3
Share of Roads less	s than 4m Wide		10%	14%
Share of Roads mo	re than 16m Wide		0%	0%
	Arterial	Roads		
Density of Arterial F	Roads (km/km²)		2.4	1.7
Average Beeline Di	stance to Arterial Road	s (m)	142	179
Share of Urban Exte (625m) of all Arteria	ent Within Walking Dist Il Roads	ance	99%	98%
Share of Urban Extension of Wide Arterial Roa	ent Within Walking Dist ads (>16m wide)	ance	40%	30%
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersectio	ons that are 4-way		8%	10%
Average Block Size	(ha)		4.9	8.5
3-way Intersection I	Density (number per kn	n²)	65	75
4-way Intersection I	Density (number per kn	n²)	10	20
Walkabity Ratio			1.7	1.6
Average Plot Size in	n Informal Subdivisions	; (m²)		
Average Plot Size in	n Formal Subdivisions	(m²)		
Stages in the Evolution of Residential Layouts				
Share of Built-Up A	rea in Residential Use		75%	85%
Share of Residentia	al Area Not Laid Out Be	fore Occupation	60%	60%
Share of Residentia	al Area Laid Out Before	Occupation	39%	39%
Share of Residentia	al Area in Informal Land	Subdivisions	1%	13%
Share of Residential Area in Formal Land Subdivisions			37%	25%



Share of Residential Area in Housing Projects



0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Paris, France (Europe and Japan)







Selected Locales in Area Developed Before 1987







Selected Locales in Expansion Area, 1987-2014





Paris, France (Europe and Japan)

Legend for Charts					
Paris	Other cities in region	All other cities	Global average —		
Metrics			Pre- 1987	1987- 2014	
	Roa	lds			
Share of Built-Up Ar	rea Occupied by Road	s	20%	15%	
Share of Built-Up Ar	rea that is Gridded or I	Partially Gridded	6%	0%	
Average Road Widt	h (m)		9.2	6.2	
Share of Roads less	s than 4m Wide		9%	27%	
Share of Roads more	re than 16m Wide		11%	5%	
	Arterial	Roads			
Density of Arterial R	loads (km/km²)		3.3	0.9	
Average Beeline Dis	stance to Arterial Road	is (m)	110	973	
Share of Urban Exte (625m) of all Arteria	ent Within Walking Dis I Roads	tance	99%	46%	
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dis ads (>16m wide)	tance	79%	24%	
Block Siz	ze, Plot Size, Intersec	tion Density, and	d Walkabil	ity	
Share of Intersectio	ns that are 4-way		20%	10%	
Average Block Size	(ha)		4.5	6.7	
3-way Intersection	Density (number per ki	m²)	72	78	
4-way Intersection [Density (number per ki	m²)	21	10	
Walkabity Ratio			1.6	1.6	
Average Plot Size in	n Informal Subdivisions	s (m²)			
Average Plot Size in	n Formal Subdivisions	(m²)	447	545	
Stages in the Evolution of Residential Layouts					
Share of Built-Up Ar	rea in Residential Use		76%	72%	
Share of Residentia	I Area Not Laid Out Be	efore Occupation	22%	29%	
Share of Residentia	I Area Laid Out Before	e Occupation	69%	70%	
Share of Residentia	I Area in Informal Land	d Subdivisions	0%	1%	
Share of Residentia	l Area in Formal Land	Subdivisions	63%	67%	
Share of Residentia	I Area in Housing Proj	ects	14%	1%	













Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Pematangsiantar, Indonesia (Southeast Asia)





Pematangsiantar, Indonesia 1994-2014 km 0 3 2

Urban Extent in 1994 Expansion, 1994 - 2001 Expansion, 2001 - 2014

—— Arterial Roads

Pematangsiantar, Indonesia (Southeast Asia)

Legend for Charts				
Pematangsiantar Other cities in region All other cities	Global a	verage —		
Metrics	Pre-	1994-		
	1994	2014		
Roads				
Share of Built-Up Area Occupied by Roads	11%	13%		
Share of Built-Up Area that is Gridded or Partially Gridded	10%	0%		
Average Road Width (m)	6.1	5.0		
Share of Roads less than 4m Wide	25%	36%		
Share of Roads more than 16m Wide	1%	0%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	0.7	0.6		
Average Beeline Distance to Arterial Roads (m)	529	544		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	64%	64%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	75%	77%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	14%	4%		
Average Block Size (ha)	5.6	7.7		
3-way Intersection Density (number per km ²)	74	108		
4-way Intersection Density (number per km ²)	17	7		
Walkabity Ratio	1.6	1.8		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)				
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	74%	62%		
Share of Residential Area Not Laid Out Before Occupation	40%	21%		
Share of Residential Area Laid Out Before Occupation	59%	78%		
Share of Residential Area in Informal Land Subdivisions	11%	58%		
Share of Residential Area in Formal Land Subdivisions	47%	19%		



Share of Residential Area in Housing Projects



0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Philadelphia, United States (Land-Rich Developed Countries)









Selected Locales in Area Developed Before 1990



Selected Locales in Expansion Area, 1990-2014







Philadelphia, United States 1990-2014





Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2014 —— Arterial Roads

Philadelphia, United States (Land-Rich Developed Countries)

Legend for Charts				
Philadelphia Other cities in region All other cities	Global av	verage —		
Metrics	Pre- 1990	1990- 2014		
Roads				
Share of Built-Up Area Occupied by Roads	21%	15%		
Share of Built-Up Area that is Gridded or Partially Gridded	7%	0%		
Average Road Width (m)	17.8	8.1		
Share of Roads less than 4m Wide	15%	14%		
Share of Roads more than 16m Wide	10%	6%		
Arterial Roads				
Density of Arterial Roads (km/km²)	1.8	0.9		
Average Beeline Distance to Arterial Roads (m)	223	394		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	93%	79%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	70%	36%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	14%	8%		
Average Block Size (ha)	3.6	9.9		
3-way Intersection Density (number per km ²)	110	28		
4-way Intersection Density (number per km ²)	17	5		
Walkabity Ratio	1.8	1.6		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)	709	986		
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	75%	85%		
Share of Residential Area Not Laid Out Before Occupation	7%	9%		
Share of Residential Area Laid Out Before Occupation	92%	90%		
Share of Residential Area in Informal Land Subdivisions	0%	0%		
Share of Residential Area in Formal Land Subdivisions	84%	85%		



Share of Residential Area in Housing Projects



7%











Pingxiang, Jiangxi, China (East Asia and the Pacific)





Selected Locales in Expansion Area, 1989-2013





Pingxiang, Jiangxi, China (East Asia and the Pacific)

Other cities in region

Share of Built-Up Area that is Gridded or Partially Gridded

Share of Built-Up Area Occupied by Roads

Pingxiang

Average Road Width (m)

Share of Roads less than 4m Wide Share of Roads more than 16m Wide

Density of Arterial Roads (km/km²)

(625m) of all Arterial Roads

Average Beeline Distance to Arterial Roads (m) Share of Urban Extent Within Walking Distance

Metrics

Legend for Charts

Roads

Arterial Roads

All other cities

Global av Pre- 1989 14% 0% 6.5 38%	verage — 1989- 2013 11% 0% 4.0 63%	Percent	Sha 50 - 40 - 30 - 20 - 10 -	are of Bu ~1	µilt-up Are 1990 – ∼20	a in Roads 14
7%	1%		0-	st	City Rank	200th
1.1	0.7			Avera ~1	age Road 1990 – ~20	Width 14
66%	63%		20 - 16 -			
46%	53%	eters	12 -			

Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	46%	53%	12 -	
Block Size, Plot Size, Intersection Der	nsity, and Walkability		9 8-	
Share of Intersections that are 4-way	8%	8%	4 -	
Average Block Size (ha)	6.5	6.6		
3-way Intersection Density (number per km ²)	54	102	0-1	st C
4-way Intersection Density (number per km ²)	12	27		
Walkabity Ratio	1.5	1.3		Roads Less
Average Plot Size in Informal Subdivisions (m ²)			100 -	1000
Average Plot Size in Formal Subdivisions (m ²)	170			

Stages in the Evolution of Residential Layouts Share of Built-Lin Area in Residential Lise 660/

Share of Built-Up Area in Residential Use	66%	83%
Share of Residential Area Not Laid Out Before Occupation	80%	93%
Share of Residential Area Laid Out Before Occupation	19%	6%
Share of Residential Area in Informal Land Subdivisions	5%	3%
Share of Residential Area in Formal Land Subdivisions	7%	0%
Share of Residential Area in Housing Projects	7%	2%







200th







Pokhara, Nepal (South and Central Asia)









Selected Locales in Area Developed Before 1989



Selected Locales in Expansion Area, 1989-2013











Urban Extent in 1989 Expansion, 1989 - 2000 Expansion, 2000 - 2013 — Arterial Roads

Pokhara, Nepal (South and Central Asia)

Legend for Charts					
Pokhara Other cities in region All other cities	Global av	erage —			
Metrics	Pre- 1989	1989- 2013			
Roads					
Share of Built-Up Area Occupied by Roads	16%	17%			
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%			
Average Road Width (m)	6.0	4.8			
Share of Roads less than 4m Wide	29%	42%			
Share of Roads more than 16m Wide	2%	0%			
Arterial Roads					
Density of Arterial Roads (km/km²)	2.0	1.4			
Average Beeline Distance to Arterial Roads (m)	190	253			
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	94%	89%			
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	77%	76%			
Block Size, Plot Size, Intersection Density, and Walkability					
Share of Intersections that are 4-way	10%	4%			
Average Block Size (ha)	3.5	5.4			
3-way Intersection Density (number per km ²)	100	115			
4-way Intersection Density (number per km ²)	10	7			
Walkabity Ratio	1.7	1.7			
Average Plot Size in Informal Subdivisions (m ²)					
Average Plot Size in Formal Subdivisions (m ²)					
Stages in the Evolution of Residential Layouts					
Share of Built-Up Area in Residential Use	59%	66%			
Share of Residential Area Not Laid Out Before Occupation	82%	65%			

Share of Built-Up Area in Residential Use59%66%Share of Residential Area Not Laid Out Before Occupation82%65%Share of Residential Area Laid Out Before Occupation17%34%Share of Residential Area in Informal Land Subdivisions14%28%Share of Residential Area in Formal Land Subdivisions1%0%Share of Residential Area in Housing Projects1%5%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Port Elizabeth, South Africa (Sub-Saharan Africa)









Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2013





—— Arterial Roads
Port Elizabeth, South Africa (Sub-Saharan Africa)

Legend for Charts				
Port Elizabeth Other cities in region All other cities	Global a	iverage —		
Metrics	Pre-	1990-		
Produ	1990	2013		
Roads				
Share of Built-Up Area Occupied by Roads	22%	17%		
Share of Built-Up Area that is Gridded or Partially Gridded	2%	0%		
Average Road Width (m)	10.3	7.0		
Share of Roads less than 4m Wide	10%	19%		
Share of Roads more than 16m Wide	14%	2%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	1.1	0.9		
Average Beeline Distance to Arterial Roads (m)	370	601		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	81%	71%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	78%	72%		
Block Size, Plot Size, Intersection Density, and	l Walkabili	ity		
Share of Intersections that are 4-way	8%	13%		
Average Block Size (ha)	4.8	3.3		
3-way Intersection Density (number per km ²)	90	93		
4-way Intersection Density (number per km ²)	11	17		
Walkabity Ratio	1.8	1.8		
Average Plot Size in Informal Subdivisions (m ²)	297	290		
Average Plot Size in Formal Subdivisions (m ²)	646	755		
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	72%	83%		
Share of Residential Area Not Laid Out Before Occupation	1%	7%		
Share of Residential Area Laid Out Before Occupation	98%	92%		
Share of Residential Area in Informal Land Subdivisions	5%	20%		
Share of Residential Area in Formal Land Subdivisions	83%	69%		



Share of Residential Area in Housing Projects



10%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Portland, OR, United States (Land-Rich Developed Countries)











Selected Locales in Expansion Area, 1990-2014





Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2014

— Arterial Roads

Portland, OR, United States (Land-Rich Developed Countries)

Legend for Charts		
Portland Other cities in region All other cities	Global a	verage —
Metrics	Pre- 1990	1990- 2014
Roads		
Share of Built-Up Area Occupied by Roads	23%	20%
Share of Built-Up Area that is Gridded or Partially Gridded	12%	0%
Average Road Width (m)	10.1	10.0
Share of Roads less than 4m Wide	18%	10%
Share of Roads more than 16m Wide	14%	7%
Arterial Roads		
Density of Arterial Roads (km/km²)	2.0	1.7
Average Beeline Distance to Arterial Roads (m)	189	218
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	96%	95%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	92%	87%
Block Size, Plot Size, Intersection Density, and	Walkabili	ty
Share of Intersections that are 4-way	17%	3%
Average Block Size (ha)	4.3	4.9
3-way Intersection Density (number per km ²)	98	60
4-way Intersection Density (number per km ²)	21	4
Walkabity Ratio	1.6	1.8
Average Plot Size in Informal Subdivisions (m ²)		
Average Plot Size in Formal Subdivisions (m ²)	640	842
Stages in the Evolution of Residential La	ayouts	
Share of Built-Up Area in Residential Use	73%	90%
Share of Residential Area Not Laid Out Before Occupation	2%	27%
Share of Residential Area Laid Out Before Occupation	97%	72%
Share of Residential Area in Informal Land Subdivisions	0%	0%
Share of Residential Area in Formal Land Subdivisions	87%	64%



Share of Residential Area in Housing Projects



9%











Pune, India (South and Central Asia)







Pune, India (South and Central Asia)

Legend for Charts				
Pune	Other cities in region	All other cities	Global a	iverage —
Metrics			Pre- 1991	1991- 2011
	Roa	ds		
Share of Built-Up Are	ea Occupied by Roads	6	20%	21%
Share of Built-Up Are	ea that is Gridded or F	artially Gridded	0%	0%
Average Road Width	(m)		9.9	7.8
Share of Roads less	than 4m Wide		6%	12%
Share of Roads more	e than 16m Wide		12%	6%
	Arterial	Roads		
Density of Arterial Ro	oads (km/km²)		2.1	1.4
Average Beeline Dist	tance to Arterial Road	s (m)	167	264
Share of Urban Exter (625m) of all Arterial	nt Within Walking Dist Roads	ance	98%	91%
Share of Urban Externation of Wide Arterial Road	nt Within Walking Dist ds (>16m wide)	ance	90%	73%
Block Size	e, Plot Size, Intersec	tion Density, and	l Walkabil	ity
Share of Intersection	s that are 4-way		10%	3%
Average Block Size ((ha)		3.1	5.1
3-way Intersection D	ensity (number per kn	n²)	114	96
4-way Intersection D	ensity (number per kn	n²)	14	5
Walkabity Ratio			1.6	2.0
Average Plot Size in	Informal Subdivisions	(m²)		
Average Plot Size in	Formal Subdivisions	(m²)	316	270
Sta	ges in the Evolution	of Residential L	ayouts	
Share of Built-Up Are	ea in Residential Use		71%	55%
Share of Residential	Area Not Laid Out Be	fore Occupation	22%	27%
Share of Residential	Area Laid Out Before	Occupation	77%	72%
Share of Residential	Area in Informal Land	Subdivisions	0%	23%
Share of Residential	Area in Formal Land	Subdivisions	73%	30%
Share of Residential	Area in Housing Proje	ects	3%	18%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Pyongyang, Korea Dem. Rep. (East Asia and the Pacific)









Selected Locales in Area Developed Before 1990



Selected Locales in Expansion Area, 1990-2014





—— Arterial Roads





Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2014

Pyongyang, Korea Dem. Rep. (East Asia and the Pacific)



Legend for Charts				
Pyongyang	Other cities in region	All other cities	Global a	iverage —
Metrics			Pre- 1990	1990- 2014
	Road	s		
Share of Built-Up A	rea Occupied by Roads		22%	17%
Share of Built-Up A	rea that is Gridded or Pa	artially Gridded	0%	0%
Average Road Wid	th (m)		7.1	4.5
Share of Roads les	s than 4m Wide		30%	55%
Share of Roads mo	ore than 16m Wide		6%	2%
	Arterial R	oads		
Density of Arterial I	Roads (km/km²)		2.1	1.9
Average Beeline D	istance to Arterial Roads	(m)	172	195
Share of Urban Ext (625m) of all Arteria	tent Within Walking Dista al Roads	nce	97%	95%
Share of Urban Ext of Wide Arterial Ro	tent Within Walking Dista ads (>16m wide)	nce	86%	80%
Block Si	ze, Plot Size, Intersecti	on Density, and	l Walkabil	ity
Share of Intersection	ons that are 4-way		5%	2%
Average Block Size	e (ha)		4.2	6.7
3-way Intersection	Density (number per km ²	2)	131	92
4-way Intersection	Density (number per km ²	2)	9	4
Walkabity Ratio			1.8	2.2
Average Plot Size i	in Informal Subdivisions ((m²)		289
Average Plot Size i	in Formal Subdivisions (r	n²)		
St	ages in the Evolution o	of Residential L	ayouts	
Share of Built-Up A	rea in Residential Use		46%	29%
Share of Residentia	al Area Not Laid Out Befo	ore Occupation	46%	52%
Share of Residentia	al Area Laid Out Before 0	Occupation	53%	47%
Share of Residentia	al Area in Informal Land	Subdivisions	8%	45%
Share of Residentia	al Area in Formal Land S	ubdivisions	32%	0%



Share of Residential Area in Housing Projects



12%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Qingdao, Shandong, China (East Asia and the Pacific)









Selected Locales in Area Developed Before 1990











Urban Extent in 1990
Expansion, 1990 - 2000
Expansion, 2000 - 2013

—— Arterial Roads

Qingdao, Shandong, China (East Asia and the Pacific)

Other cities in region

Qingdao

Legend for Charts

All other cities

Global average

50

40

20

10

0

1st

Percent 30



200th

Roads		2010		
Share of Built-Up Area Occupied by Roads	26%	24%		
Share of Built-Up Area that is Gridded or Partially Gridde	d 0%	0%		
Average Road Width (m)	10.1	8.3		
Share of Roads less than 4m Wide	21%	23%		
Share of Roads more than 16m Wide	18%	9%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	2.1	1.2		
Average Beeline Distance to Arterial Roads (m)	168	380		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	98%	83%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	97%	80%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	16%	13%		
Average Block Size (ha)	3.5	4.7		
3-way Intersection Density (number per km ²)	160	168		
4-way Intersection Density (number per km ²)	33	51		
Walkabity Ratio	1.5	1.5		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)				
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	50%	56%		

Share of Residential Area Not Laid Out Before Occupation	5%	0%
Share of Residential Area Laid Out Before Occupation	94%	99%
Share of Residential Area in Informal Land Subdivisions	11%	23%
Share of Residential Area in Formal Land Subdivisions	20%	11%
Share of Residential Area in Housing Projects	63%	64%







City Rank



Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Qom, Iran (South and Central Asia)

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Selected Locales in Area Developed Before 1990



Selected Locales in Expansion Area, 1990-2010









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Qom, Iran (South and Central Asia)

Legend for Charts				
Qom	Other cities in region	All other cities	Global a	verage —
Metrics			Pre- 1990	1990- 2010
	Road	ls		
Share of Built-Up Ar	ea Occupied by Roads		26%	28%
Share of Built-Up Ar	ea that is Gridded or Pa	artially Gridded	0%	0%
Average Road Width	h (m)		9.3	10.5
Share of Roads less	than 4m Wide		13%	11%
Share of Roads mor	e than 16m Wide		14%	16%
	Arterial F	Roads		
Density of Arterial R	oads (km/km²)		2.8	2.0
Average Beeline Dis	stance to Arterial Roads	s (m)	127	218
Share of Urban Exte (625m) of all Arterial	ent Within Walking Dista I Roads	ance	100%	94%
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dista ds (>16m wide)	ance	100%	96%
Block Siz	e, Plot Size, Intersect	ion Density, and	l Walkabili	ty
Share of Intersection	ns that are 4-way		14%	11%
Average Block Size	(ha)		1.8	4.2
3-way Intersection D	Density (number per km	²)	164	139
4-way Intersection E	Density (number per km	²)	26	15
Walkabity Ratio			1.6	1.7
Average Plot Size in	Informal Subdivisions	(m²)		
Average Plot Size in	Formal Subdivisions (m²)		166
Stages in the Evolution of Residential Layouts				
Share of Built-Up Ar	ea in Residential Use		74%	77%
Share of Residentia	Area Not Laid Out Bef	ore Occupation	9%	1%
Share of Residentia	Area Laid Out Before	Occupation	90%	98%
Share of Residentia	Area in Informal Land	Subdivisions	2%	14%
Share of Residentia	Area in Formal Land S	Subdivisions	83%	58%



Share of Residential Area in Housing Projects



3%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Quito, Ecuador (Latin America and the Caribbean)









Quito, Ecuador (Latin America and the Caribbean)



Legend for Charts			
Quito Other cities in region All other c	ities Global average ·	_	
Metrics	Pre- 198 1988 201	8- 3	
Roads			
Share of Built-Up Area Occupied by Roads	23% 21	%	
Share of Built-Up Area that is Gridded or Partially Grid	ded 7% 2%	6	
Average Road Width (m)	12.0 7.8	3	
Share of Roads less than 4m Wide	5% 11	%	
Share of Roads more than 16m Wide	19% 4%	6	
Arterial Roads			
Density of Arterial Roads (km/km²)	3.1 1.6	ô	
Average Beeline Distance to Arterial Roads (m)	101 36	7	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	100% 83	%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	94% 68	%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	19% 13	%	
Average Block Size (ha)	2.8 3.5	5	
3-way Intersection Density (number per km ²)	93 12	0	
4-way Intersection Density (number per km ²)	25 20		
Walkabity Ratio	1.6 1.8	8	
Average Plot Size in Informal Subdivisions (m ²)	54	3	
Average Plot Size in Formal Subdivisions (m ²)	336 37	4	
Stages in the Evolution of Resident	tial Layouts		
Share of Built-Up Area in Residential Use	56% 75	%	
Share of Residential Area Not Laid Out Before Occupa	ition 1% 13	%	
Share of Residential Area Laid Out Before Occupation	98% 86	%	
Share of Residential Area in Informal Land Subdivision	is 0% 17	%	
Share of Residential Area in Formal Land Subdivisions	89% 67	%	
Share of Residential Area in Housing Projects	8% 1	%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Rajshahi, Bangladesh (South and Central Asia)







Rajshahi, Bangladesh (South and Central Asia)

Legend for Charts			
Rajshahi Other cities in region All other cities	Global av	verage —	
Metrics	Pre- 1990	1990- 2010	
Roads			
Share of Built-Up Area Occupied by Roads	9%	12%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	
Average Road Width (m)	4.8	4.9	
Share of Roads less than 4m Wide	47%	43%	
Share of Roads more than 16m Wide	3%	2%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	4.2	1.6	
Average Beeline Distance to Arterial Roads (m)	59	204	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	100%	94%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	100%	72%	
Block Size, Plot Size, Intersection Density, and	d Walkabilit	y	
Share of Intersections that are 4-way	12%	6%	
Average Block Size (ha)	3.3	11.0	
3-way Intersection Density (number per km ²)	93	49	
4-way Intersection Density (number per km ²)	17	4	
Walkabity Ratio	1.5	1.6	
Average Plot Size in Informal Subdivisions (m ²)		360	
Average Plot Size in Formal Subdivisions (m ²)			
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	84%	83%	
Share of Residential Area Not Laid Out Before Occupation	100%	85%	
Share of Residential Area Laid Out Before Occupation	0%	14%	
Share of Residential Area in Informal Land Subdivisions	0%	14%	



Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



0%

0%

0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Raleigh, United States (Land-Rich Developed Countries)







Raleigh, United States (Land-Rich Developed Countries)



Legend for Charts			
Raleigh Other cities in region All other cities Global average —			
Metrics	Pre- 1990	1990- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	20%	18%	
Share of Built-Up Area that is Gridded or Partially Gridded	2%	0%	
Average Road Width (m)	9.1	9.5	
Share of Roads less than 4m Wide	7%	13%	
Share of Roads more than 16m Wide	9%	8%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.8	1.2	
Average Beeline Distance to Arterial Roads (m)	182	338	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	97%	85%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	90%	59%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	10%	6%	
Average Block Size (ha)	4.9	9.2	
3-way Intersection Density (number per km ²)	82	56	
4-way Intersection Density (number per km ²)	11	6	
Walkabity Ratio	2.0	1.8	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	1166	521	
Stages in the Evolution of Residential La	ayouts		
Share of Built-Up Area in Residential Use	83%	88%	
Share of Residential Area Not Laid Out Before Occupation	6%	4%	
Share of Residential Area Laid Out Before Occupation	93%	95%	
Share of Residential Area in Informal Land Subdivisions	0%	0%	
Share of Residential Area in Formal Land Subdivisions	78%	78%	
Share of Residential Area in Housing Projects	15%	17%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014













Selected Locales in Area Developed Before 1989















----- Arterial Roads

Rawang, Malaysia (Southeast Asia)

Legend for Charts				
Rawang Other cities in region All other cities	Global a	average —		
Metrics	Pre-	1989-		
	1989	2014		
Roads				
Share of Built-Up Area Occupied by Roads	24%	28%		
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%		
Average Road Width (m)	7.8	9.2		
Share of Roads less than 4m Wide	13%	13%		
Share of Roads more than 16m Wide	5%	14%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	1.1	0.7		
Average Beeline Distance to Arterial Roads (m)	341	558		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	82%	65%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	66%	55%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	6%	5%		
Average Block Size (ha)	2.3	3.5		
3-way Intersection Density (number per km ²)	163	141		
4-way Intersection Density (number per km ²)	17	14		
Walkabity Ratio	2.9	2.1		
Average Plot Size in Informal Subdivisions (m ²)	376			
Average Plot Size in Formal Subdivisions (m ²)	319	1175		
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	62%	53%		
Share of Residential Area Not Laid Out Before Occupation	3%	4%		
Share of Residential Area Laid Out Before Occupation	97%	95%		
Share of Residential Area in Informal Land Subdivisions	14%	14%		
Share of Residential Area in Formal Land Subdivisions	66%	35%		



Share of Residential Area in Housing Projects



16%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Reynosa, Mexico (Latin America and the Caribbean)

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Reynosa, Mexico (Latin America and the Caribbean)

Legend for Charts			
Reynosa Other cities in region All other cities	Global a	iverage —	
Metrics	Pre- 1991	1991- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	26%	29%	
Share of Built-Up Area that is Gridded or Partially Gridded	30%	5%	
Average Road Width (m)	9.8	8.7	
Share of Roads less than 4m Wide	10%	15%	
Share of Roads more than 16m Wide	10%	5%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.1	0.9	
Average Beeline Distance to Arterial Roads (m)	384	478	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	78%	70%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	77%	68%	
Block Size, Plot Size, Intersection Density, and	l Walkabil	ity	
Share of Intersections that are 4-way	29%	26%	
Average Block Size (ha)	2.7	2.2	
3-way Intersection Density (number per km ²)	114	141	
4-way Intersection Density (number per km ²)	43	51	
Walkabity Ratio	1.9	1.9	
Average Plot Size in Informal Subdivisions (m ²)	377	178	
Average Plot Size in Formal Subdivisions (m ²)	260	157	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	67%	79%	
Share of Residential Area Not Laid Out Before Occupation	6%	3%	
Share of Residential Area Laid Out Before Occupation	93%	96%	
Share of Residential Area in Informal Land Subdivisions	31%	30%	
Share of Residential Area in Formal Land Subdivisions	55%	14%	



Share of Residential Area in Housing Projects



6%

50%



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Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Ribeirao Preto, Brazil (Latin America and the Caribbean)









Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2014





Ribeirao Preto, Brazil (Latin America and the Caribbean)

Metrics





City Rank

200th











Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions



0%

90%

6%

16%

70%

Riyadh, Saudi Arabia (Western Asia and North Africa)

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Selected Locales in Expansion Area, 1990-2013





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Riyadh, Saudi Arabia (Western Asia and North Africa)

Legend for Charts			
Riyadh Other cities in region All other cities	Global a	Global average —	
Metrics	Pre- 1990	1990- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	35%	34%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	
Average Road Width (m)	16.3	15.5	
Share of Roads less than 4m Wide	4%	5%	
Share of Roads more than 16m Wide	36%	38%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.2	1.6	
Average Beeline Distance to Arterial Roads (m)	178	304	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	96%	87%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	96%	87%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	8%	3%	
Average Block Size (ha)	3.3	5.8	
3-way Intersection Density (number per km ²)	150	111	
4-way Intersection Density (number per km ²)	16	5	
Walkabity Ratio	1.6	1.8	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	448	432	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	75%	53%	
Share of Residential Area Not Laid Out Before Occupation	2%	4%	
Share of Residential Area Laid Out Before Occupation	97%	95%	
Share of Residential Area in Informal Land Subdivisions	3%	5%	
Share of Residential Area in Formal Land Subdivisions	87%	77%	



Share of Residential Area in Housing Projects



6%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Rovno, Ukraine (Europe and Japan)







Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2014





—— Arterial Roads

Rovno, Ukraine (Europe and Japan)

Legend for Charte				
Royno I	Other cities in region	All other cities	Global average	
		Another offices	Ciobare	itolago –
Metrics			Pre-	1990-
			1990	2014
	Roa	ads		
Share of Built-Up Ar	ea Occupied by Road	ls	20%	15%
Share of Built-Up Ar	ea that is Gridded or	Partially Gridded	0%	0%
Average Road Widt	h (m)		7.6	5.8
Share of Roads less	s than 4m Wide		28%	34%
Share of Roads more	re than 16m Wide		8%	3%
	Arteria	Roads		
Density of Arterial R	oads (km/km²)		2.0	1.4
Average Beeline Dis	stance to Arterial Roa	ds (m)	179	313
Share of Urban Exte (625m) of all Arteria	ent Within Walking Dis I Roads	stance	97%	86%
Share of Urban Exte	ent Within Walking Dis	stance	000/	750/
of Wide Arterial Roa	ids (>16m wide)		00 70	75%
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersection	ns that are 4-way		7%	9%
Average Block Size	(ha)		3.9	6.5
3-way Intersection E	Density (number per k	m²)	132	86
4-way Intersection E	Density (number per k	m²)	14	12
Walkabity Ratio			1.7	1.6
Average Plot Size in	n Informal Subdivision	s (m²)		1326
Average Plot Size in	n Formal Subdivisions	(m²)	776	1071
Stages in the Evolution of Residential Layouts				
Share of Built-Up Ar	ea in Residential Use		53%	74%
Share of Residentia	I Area Not Laid Out B	efore Occupation	21%	48%
Share of Residentia	I Area Laid Out Before	e Occupation	78%	51%
Share of Residentia	I Area in Informal Lan	d Subdivisions	0%	34%
Share of Residentia	I Area in Formal Land	Subdivisions	48%	16%
Share of Residentia	Area in Housing Pro	jects	29%	1%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Saidpur, Bangladesh (South and Central Asia)









Saidpur, Bangladesh (South and Central Asia)

Legend for Charts			
Saidpur Other cities in region All other cities	Global a	verage —	
Metrics	Pre-	1990-	
	1990	2014	
Roads			
Share of Built-Up Area Occupied by Roads	9%	14%	
Share of Built-Up Area that is Gridded or Partially Gridded			
Average Road Width (m)	3.6	4.7	
Share of Roads less than 4m Wide	65%	45%	
Share of Roads more than 16m Wide	0%	0%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.8	1.9	
Average Beeline Distance to Arterial Roads (m)	98	173	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	100%	96%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	15%	43%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	8%	5%	
Average Block Size (ha)	2.8	9.7	
3-way Intersection Density (number per km ²)	103	77	
4-way Intersection Density (number per km ²)	17	6	
Walkabity Ratio	1.4	1.5	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)			
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	82%	70%	
Share of Residential Area Not Laid Out Before Occupation	89%	85%	
Share of Residential Area Laid Out Before Occupation	10%	14%	
Share of Residential Area in Informal Land Subdivisions	10%	3%	
Share of Residential Area in Formal Land Subdivisions	0%	0%	



Share of Residential Area in Housing Projects



0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Saint Petersburg, Russia (Europe and Japan)







Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2014



Saint Petersburg, Russia 1990-2014 km 0 10 20 30



Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2014

—— Arterial Roads

Saint Petersburg, Russia (Europe and Japan)

Legend for Charts			
Saint Petersburg Other cities in region All other cities	Global average —		
Metrics	Pre- 1990	1990- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	26%	20%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	5%	
Average Road Width (m)	9.3	8.1	
Share of Roads less than 4m Wide	13%	19%	
Share of Roads more than 16m Wide	13%	9%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.2	0.9	
Average Beeline Distance to Arterial Roads (m)	433	523	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	78%	70%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	76%	61%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	11%	6%	
Average Block Size (ha)	3.3	5.3	
3-way Intersection Density (number per km ²)	133	77	
4-way Intersection Density (number per km ²)	20	6	
Walkabity Ratio	1.7	1.8	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)		736	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	66%	82%	
Share of Residential Area Not Laid Out Before Occupation	12%	30%	
Share of Residential Area Laid Out Before Occupation	87%	69%	
Share of Residential Area in Informal Land Subdivisions	18%	34%	
Share of Residential Area in Formal Land Subdivisions	43%	24%	



Share of Residential Area in Housing Projects



25%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



San Salvador, El Salvador (Latin America and the Caribbean)

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Selected Locales in Area Developed Before 1991





Selected Locales in Expansion Area, 1991-2014





Urban Extent in 1991 Expansion, 1991 - 1999 Expansion, 1999 - 2014

—— Arterial Roads

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San Salvador, El Salvador (Latin America and the Caribbean)

Legend for Charts			
San Salvador Other cities in region All other cities	Global average —		
Metrics	Pre- 1991	1991- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	24%	22%	
Share of Built-Up Area that is Gridded or Partially Gridded	5%	0%	
Average Road Width (m)	10.4	8.1	
Share of Roads less than 4m Wide	7%	20%	
Share of Roads more than 16m Wide	13%	8%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.8	2.0	
Average Beeline Distance to Arterial Roads (m)	155	212	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	96%	93%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	82%	74%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	17%	12%	
Average Block Size (ha)	2.1	4.8	
3-way Intersection Density (number per km ²)	94	104	
4-way Intersection Density (number per km ²)	22	28	
Walkabity Ratio	1.6	1.8	
Average Plot Size in Informal Subdivisions (m ²)		77	
Average Plot Size in Formal Subdivisions (m ²)	91	157	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	68%	78%	
Share of Residential Area Not Laid Out Before Occupation	18%	26%	
Share of Residential Area Laid Out Before Occupation	81%	73%	
Share of Residential Area in Informal Land Subdivisions	17%	24%	
Share of Residential Area in Formal Land Subdivisions	61%	40%	



Share of Residential Area in Housing Projects



2%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Sana, Yemen (Western Asia and North Africa)



Selected Locales in Expansion Area, 1989-2014





Sana, Yemen (Western Asia and North Africa)

Legend for Charts			
Sana Other cities in region All other cities	Global average —		
Metrics	Pre- 1989	1989- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	29%	28%	
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	
Average Road Width (m)	10.7	7.8	
Share of Roads less than 4m Wide	15%	33%	
Share of Roads more than 16m Wide	15%	10%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	2.2	1.0	
Average Beeline Distance to Arterial Roads (m)	219	767	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	92%	70%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	90%	69%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	12%	5%	
Average Block Size (ha)	2.3	3.5	
3-way Intersection Density (number per km ²)	172	218	
4-way Intersection Density (number per km ²)	26	15	
Walkabity Ratio	1.7	1.7	
Average Plot Size in Informal Subdivisions (m ²)		221	
Average Plot Size in Formal Subdivisions (m ²)	193	407	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	62%	67%	
Share of Residential Area Not Laid Out Before Occupation	30%	56%	
Share of Residential Area Laid Out Before Occupation	69%	43%	
Share of Residential Area in Informal Land Subdivisions	17%	35%	
Share of Residential Area in Formal Land Subdivisions	49%	8%	
Share of Residential Area in Housing Projects	3%	0%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Santiago, Chile (Latin America and the Caribbean)

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Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2014 —— Arterial Roads
Santiago, Chile (Latin America and the Caribbean)

Legend for Charts		
Santiago Other cities in region All other cities	Global a	iverage —
Metrics	Pre- 1990	1990- 2014
Roads		
Share of Built-Up Area Occupied by Roads	25%	18%
Share of Built-Up Area that is Gridded or Partially Gridded	37%	5%
Average Road Width (m)	12.6	7.9
Share of Roads less than 4m Wide	4%	15%
Share of Roads more than 16m Wide	26%	10%
Arterial Roads		
Density of Arterial Roads (km/km ²)	3.0	2.4
Average Beeline Distance to Arterial Roads (m)	126	199
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	99%	94%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	99%	90%
Block Size, Plot Size, Intersection Density, and	l Walkabil	ity
Share of Intersections that are 4-way	33%	13%
Average Block Size (ha)	3.5	6.5
3-way Intersection Density (number per km ²)	61	117
4-way Intersection Density (number per km ²)	26	20
Walkabity Ratio	1.6	2.0
Average Plot Size in Informal Subdivisions (m ²)		
Average Plot Size in Formal Subdivisions (m ²)	493	282
Stages in the Evolution of Residential L	ayouts	
Share of Built-Up Area in Residential Use	64%	77%
Share of Residential Area Not Laid Out Before Occupation	2%	16%
Share of Residential Area Laid Out Before Occupation	93%	83%
Share of Residential Area in Informal Land Subdivisions	0%	5%
Share of Residential Area in Formal Land Subdivisions	89%	63%



Share of Residential Area in Housing Projects



8%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Sao Paulo, Brazil (Latin America and the Caribbean)









Selected Locales in Area Developed Before 1988





Selected Locales in Expansion Area, 1988-2014





Sao Paulo, Brazil (Latin America and the Caribbean)

Sao Paulo

Average Road Width (m)

(625m) of all Arterial Roads

Average Block Size (ha)

Walkabity Ratio

Metrics



Average Plot Size in Formal Subdivisions (m²) 286 Stages in the Evolution of Residential Layouts Share of Built-Up Area in Residential Use 72% 71% Share of Residential Area Not Laid Out Before Occupation 1% 22% Share of Residential Area Laid Out Before Occupation 92% 77% Share of Residential Area in Informal Land Subdivisions 3% 23% Share of Residential Area in Formal Land Subdivisions 91% 49%



Share of Residential Area in Housing Projects



3%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Seoul, Korea Rep. (East Asia and the Pacific)









Selected Locales in Area Developed Before 1991



Selected Locales in Expansion Area, 1991-2014











— Arterial Roads

11

Seoul, Korea Rep. (East Asia and the Pacific)

Legend for Charts		
Seoul Other cities in region All other cities	Global a	verage —
Metrics	Pre- 1991	1991- 2014
Roads		
Share of Built-Up Area Occupied by Roads	21%	19%
Share of Built-Up Area that is Gridded or Partially Gridded	5%	0%
Average Road Width (m)	7.6	5.6
Share of Roads less than 4m Wide	32%	44%
Share of Roads more than 16m Wide	10%	4%
Arterial Roads		
Density of Arterial Roads (km/km ²)	2.5	0.8
Average Beeline Distance to Arterial Roads (m)	177	478
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	95%	71%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	93%	47%
Block Size, Plot Size, Intersection Density, and	l Walkabili	ty
Share of Intersections that are 4-way	15%	9%
Average Block Size (ha)	2.4	6.3
3-way Intersection Density (number per km ²)	132	96
4-way Intersection Density (number per km ²)	29	15
Walkabity Ratio	1.8	1.5
Average Plot Size in Informal Subdivisions (m ²)		
Average Plot Size in Formal Subdivisions (m ²)	242	
Stages in the Evolution of Residential L	ayouts	
Share of Built-Up Area in Residential Use	55%	42%
Share of Residential Area Not Laid Out Before Occupation	7%	65%
Share of Residential Area Laid Out Before Occupation	92%	34%
Share of Residential Area in Informal Land Subdivisions	2%	6%
Share of Residential Area in Formal Land Subdivisions	54%	7%



Share of Residential Area in Housing Projects



35%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Shanghai, Shanghai, China (East Asia and the Pacific)









Selected Locales in Area Developed Before 1991





Selected Locales in Expansion Area, 1991-2015



Shanghai, Shanghai, China 1991-2015 km 0 10 20 30



Urban Extent in 1991 — Arterial Roads Expansion, 1991 - 2000 Expansion, 2000 - 2015

Shanghai, Shanghai, China (East Asia and the Pacific)

Legend for Charts



50

40

Percent 30











Shangha	Other cities in region	All other cities	Global a	average —
Metrics			Pre- 1991	1991- 2015
	Ro	ads		
Share of Built-Up	Area Occupied by Roa	ds	27%	21%
Share of Built-Up	Area that is Gridded or	Partially Gridded	2%	7%
Average Road Wi	dth (m)		9.7	8.2
Share of Roads le	ess than 4m Wide		16%	40%
Share of Roads m	nore than 16m Wide		24%	14%
	Arteria	I Roads		
Density of Arterial	Roads (km/km²)		1.7	0.7
Average Beeline I	Distance to Arterial Roa	ids (m)	229	1286
Share of Urban E (625m) of all Arter	xtent Within Walking Di rial Roads	stance	93%	63%
Share of Urban E of Wide Arterial R	xtent Within Walking Di oads (>16m wide)	stance	93%	60%
Block	Size, Plot Size, Interse	ction Density, and	d Walkabil	ity
Share of Intersect	tions that are 4-way		20%	13%
Average Block Siz	ze (ha)		6.1	6.8
3-way Intersection	n Density (number per k	km²)	67	81
4-way Intersection	n Density (number per k	km²)	18	10
Walkabity Ratio			1.6	1.7
Average Plot Size	in Informal Subdivision	ns (m²)		
Average Plot Size	e in Formal Subdivisions	s (m²)	302	
5	Stages in the Evolutio	n of Residential L	ayouts	
Share of Built-Up	Area in Residential Use	e	51%	46%
Share of Resident	tial Area Not Laid Out B	Sefore Occupation	11%	45%
Share of Residen	tial Area Laid Out Befor	e Occupation	82%	54%
Share of Resident	tial Area in Informal Lar	nd Subdivisions	6%	16%
Share of Residen	tial Area in Formal Land	d Subdivisions	38%	10%
Share of Resident	tial Area in Housing Pro	ojects	43%	27%





Sheffield, United Kingdom (Europe and Japan)





Sheffield, United Kingdom 1992-2013 km 0 5 10 15 20

Urban Extent in 1992 Expansion, 1992 - 2002 Expansion, 2002 - 2013 —— Arterial Roads

Sheffield, United Kingdom (Europe and Japan)

Legend for Charts		
Sheffield Other cities in region All other cities	Global a	verage —
Metrics	Pre- 1992	1992- 2013
Roads		
Share of Built-Up Area Occupied by Roads	18%	16%
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%
Average Road Width (m)	8.0	7.5
Share of Roads less than 4m Wide	24%	23%
Share of Roads more than 16m Wide	6%	4%
Arterial Roads		
Density of Arterial Roads (km/km²)	1.6	1.5
Average Beeline Distance to Arterial Roads (m)	220	234
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	94%	93%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	46%	44%
Block Size, Plot Size, Intersection Density, and	Walkabili	ty
Share of Intersections that are 4-way	7%	6%
Average Block Size (ha)	3.4	6.2
3-way Intersection Density (number per km ²)	98	63
4-way Intersection Density (number per km ²)	10	6
Walkabity Ratio	1.6	1.5
Average Plot Size in Informal Subdivisions (m ²)		
Average Plot Size in Formal Subdivisions (m ²)	525	144
Stages in the Evolution of Residential La	ayouts	
Share of Built-Up Area in Residential Use	68%	73%
Share of Residential Area Not Laid Out Before Occupation	2%	5%
Share of Residential Area Laid Out Before Occupation	97%	94%
Share of Residential Area in Informal Land Subdivisions	0%	3%
Share of Residential Area in Formal Land Subdivisions	90%	77%



Share of Residential Area in Housing Projects



6%

13%





50





Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Shenzhen, Guangdong, China (East Asia and the Pacific)









Selected Locales in Area Developed Before 1987



Selected Locales in Expansion Area, 1987-2013



Shenzhen, Guangdong, China 1987-2013 N 6 5 10 15 20 25



Urban Extent in 1987 Expansion, 1987 - 2000 Expansion, 2000 - 2013 Arterial Roads

Shenzhen, Guangdong, China (East Asia and the Pacific)



Legend for Ch	arts		
Shenzhen Other cities in region	All other cities	Global a	average —
Metrics		Pre- 1987	1987- 2013
Roads			
Share of Built-Up Area Occupied by Roads		26%	24%
Share of Built-Up Area that is Gridded or Partia	ally Gridded	0%	0%
Average Road Width (m)		10.7	8.4
Share of Roads less than 4m Wide		20%	33%
Share of Roads more than 16m Wide		17%	14%
Arterial Roa	ids		
Density of Arterial Roads (km/km ²)		2.8	1.0
Average Beeline Distance to Arterial Roads (m	ו)	148	444
Share of Urban Extent Within Walking Distanc (625m) of all Arterial Roads	e	97%	80%
Share of Urban Extent Within Walking Distanc of Wide Arterial Roads (>16m wide)	e	97%	80%
Block Size, Plot Size, Intersection	Density, and	Walkabil	ity
Share of Intersections that are 4-way		6%	18%
Average Block Size (ha)		3.0	3.3
3-way Intersection Density (number per km ²)		132	251
4-way Intersection Density (number per km ²)		12	82
Walkabity Ratio		1.8	1.7
Average Plot Size in Informal Subdivisions (m ²	2)		158
Average Plot Size in Formal Subdivisions (m ²)		302	214
Stages in the Evolution of F	Residential La	youts	
Share of Built-Up Area in Residential Use		44%	46%
Share of Residential Area Not Laid Out Before	Occupation	8%	38%
Share of Residential Area Laid Out Before Oct	cupation	91%	61%
Share of Residential Area in Informal Land Su	bdivisions	0%	4%
Share of Residential Area in Formal Land Sub	divisions	51%	39%
Share of Residential Area in Housing Projects		40%	17%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Shymkent, Kazakhstan (South and Central Asia)









Shymkent, Kazakhstan (South and Central Asia)

Legend for Charts		
Shymkent Other cities in region All other cities	Global av	erage —
Metrics	Pre- 1993	1993- 2013
Roads		
Share of Built-Up Area Occupied by Roads	14%	16%
Share of Built-Up Area that is Gridded or Partially Gridded	7%	0%
Average Road Width (m)	8.5	7.7
Share of Roads less than 4m Wide	13%	17%
Share of Roads more than 16m Wide	8%	7%
Arterial Roads		
Density of Arterial Roads (km/km²)	1.2	0.9
Average Beeline Distance to Arterial Roads (m)	461	469
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	75%	74%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	65%	57%
Block Size, Plot Size, Intersection Density, and	Walkabilit	у
Share of Intersections that are 4-way	14%	14%
Average Block Size (ha)	6.4	5.6
3-way Intersection Density (number per km ²)	44	65
4-way Intersection Density (number per km ²)	8	13
Walkabity Ratio	1.7	1.8
Average Plot Size in Informal Subdivisions (m ²)	1144	959
Average Plot Size in Formal Subdivisions (m ²)	729	879
Stages in the Evolution of Residential La	ayouts	
Share of Built-Up Area in Residential Use	71%	86%
Share of Residential Area Not Laid Out Before Occupation	19%	13%
Share of Residential Area Laid Out Before Occupation	80%	86%
Share of Residential Area in Informal Land Subdivisions	23%	62%

40 -10 -10 -10 -1st City Rank 200th Average Road Width ~1990 - ~2014

50









Average Block Size ~1990 - ~2014 16 -14 -12 -10 -8 -8 -6 -4 -2 -0 -1st City Rank 200th

Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



45%

11%

21%

3%

Share of Built-up Area in Roads ~1990 - ~2014

Sialkot, Pakistan (South and Central Asia)









Sialkot, Pakistan (South and Central Asia)

Legend for Charts	Olahal	
Sialkot Other cities in region All other cities	Global a	average —
Metrics	Pre- 1992	1992- 2014
Roads		
Share of Built-Up Area Occupied by Roads	16%	17%
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%
Average Road Width (m)	7.1	5.1
Share of Roads less than 4m Wide	46%	45%
Share of Roads more than 16m Wide	12%	4%
Arterial Roads		
Density of Arterial Roads (km/km ²)	1.8	1.0
Average Beeline Distance to Arterial Roads (m)	181	379
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	99%	81%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	88%	70%
Block Size, Plot Size, Intersection Density, and	l Walkabil	ity
Share of Intersections that are 4-way	8%	6%
Average Block Size (ha)	2.4	5.1
3-way Intersection Density (number per km ²)	150	154
4-way Intersection Density (number per km ²)	16	19
Walkabity Ratio	1.6	1.8
Average Plot Size in Informal Subdivisions (m ²)		
Average Plot Size in Formal Subdivisions (m ²)	332	234
Stages in the Evolution of Residential L	ayouts	
Share of Built-Up Area in Residential Use	75%	72%
Share of Residential Area Not Laid Out Before Occupation	57%	69%
Share of Residential Area Laid Out Before Occupation	42%	30%
Share of Residential Area in Informal Land Subdivisions	18%	16%
Share of Residential Area in Formal Land Subdivisions	23%	7%
Share of Residential Area in Housing Projects	0%	7%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Singapore, Singapore (Southeast Asia)









Selected Locales in Area Developed Before 1990



Selected Locales in Expansion Area, 1990-2013









(*** ***

Singapore, Singapore (Southeast Asia)

Legend for Charts		
Singapore Other cities in region All other cities	Global a	iverage —
Metrics	Pre- 1990	1990- 2013
Roads		
Share of Built-Up Area Occupied by Roads	23%	25%
Share of Built-Up Area that is Gridded or Partially Gridded	0%	10%
Average Road Width (m)	11.7	9.1
Share of Roads less than 4m Wide	7%	21%
Share of Roads more than 16m Wide	23%	15%
Arterial Roads		
Density of Arterial Roads (km/km ²)	1.7	1.4
Average Beeline Distance to Arterial Roads (m)	243	513
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	92%	82%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	92%	82%
Block Size, Plot Size, Intersection Density, and	l Walkabil	ity
Share of Intersections that are 4-way	4%	15%
Average Block Size (ha)	4.5	3.9
3-way Intersection Density (number per km ²)	78	100
4-way Intersection Density (number per km ²)	5	16
Walkabity Ratio	2.2	2.0
Average Plot Size in Informal Subdivisions (m ²)		
Average Plot Size in Formal Subdivisions (m ²)		520
Stages in the Evolution of Residential L	ayouts	
Share of Built-Up Area in Residential Use	54%	55%
Share of Residential Area Not Laid Out Before Occupation	3%	14%
Share of Residential Area Laid Out Before Occupation	96%	85%
Share of Residential Area in Informal Land Subdivisions	0%	0%
Share of Residential Area in Formal Land Subdivisions	38%	13%



Share of Residential Area in Housing Projects



58%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Singrauli, India (South and Central Asia)









Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2010





Singrauli, India (South and Central Asia)

Legend for Charts		
Singrauli Other cities in region All other cities	Global av	verage —
Metrics	Pre-	1990-
	1990	2010
Roads		
Share of Built-Up Area Occupied by Roads	28%	18%
Share of Built-Up Area that is Gridded or Partially Gridded		0%
Average Road Width (m)	8.5	6.2
Share of Roads less than 4m Wide	7%	28%
Share of Roads more than 16m Wide	7%	4%
Arterial Roads		
Density of Arterial Roads (km/km ²)	0.0	0.6
Average Beeline Distance to Arterial Roads (m)	1182	678
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	21%	54%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	21%	57%
Block Size, Plot Size, Intersection Density, and	l Walkabili	ty
Share of Intersections that are 4-way	8%	5%
Average Block Size (ha)	3.4	6.0
3-way Intersection Density (number per km ²)	180	137
4-way Intersection Density (number per km ²)	20	12
Walkabity Ratio	1.5	1.7
Average Plot Size in Informal Subdivisions (m ²)		236
Average Plot Size in Formal Subdivisions (m ²)	226	
Stages in the Evolution of Residential L	ayouts	
Share of Built-Up Area in Residential Use	60%	74%
Share of Residential Area Not Laid Out Before Occupation	1%	33%
Share of Residential Area Laid Out Before Occupation	98%	66%
Share of Residential Area in Informal Land Subdivisions	0%	33%
Share of Residential Area in Formal Land Subdivisions	21%	3%



Share of Residential Area in Housing Projects



76%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Sitapur, India (South and Central Asia)





 Sitapur, India 1989-2014
 N
 Urban Extent in 1989
 Arterial Roads

 0
 1
 2
 3
 4

Sitapur, India (South and Central Asia)

Legend for Charts		
Sitapur Other cities in region All other cities	Global a	verage —
Metrics	Pre- 1989	1989- 2014
Roads		
Share of Built-Up Area Occupied by Roads	17%	25%
Share of Built-Up Area that is Gridded or Partially Gridded	10%	0%
Average Road Width (m)	5.5	5.0
Share of Roads less than 4m Wide	45%	42%
Share of Roads more than 16m Wide	4%	0%
Arterial Roads		
Density of Arterial Roads (km/km ²)	1.9	1.7
Average Beeline Distance to Arterial Roads (m)	175	251
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	96%	90%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	78%	75%
Block Size, Plot Size, Intersection Density, and	l Walkabili	ity
Share of Intersections that are 4-way	10%	5%
Average Block Size (ha)	2.6	4.8
3-way Intersection Density (number per km ²)	203	132
4-way Intersection Density (number per km ²)	26	7
Walkabity Ratio	1.8	1.3
Average Plot Size in Informal Subdivisions (m ²)	108	93
Average Plot Size in Formal Subdivisions (m ²)	149	
Stages in the Evolution of Residential L	ayouts	
Share of Built-Up Area in Residential Use	69%	51%
Share of Residential Area Not Laid Out Before Occupation	26%	1%
Share of Residential Area Laid Out Before Occupation	73%	98%
Share of Residential Area in Informal Land Subdivisions	70%	78%
Share of Residential Area in Formal Land Subdivisions	3%	0%



Share of Residential Area in Housing Projects



0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Springfield, MA, United States (Land-Rich Developed Countries)









Arterial Roads

Springfield, MA, United States (Land-Rich Developed Countries)

Legend for Charts		
Springfield Other cities in region All other cities	Global a	average —
Metrics	Pre- 1991	1991- 2014
Roads		
Share of Built-Up Area Occupied by Roads	18%	15%
Share of Built-Up Area that is Gridded or Partially Gridded	2%	0%
Average Road Width (m)	8.1	7.9
Share of Roads less than 4m Wide	18%	13%
Share of Roads more than 16m Wide	8%	2%
Arterial Roads		
Density of Arterial Roads (km/km²)	1.9	1.4
Average Beeline Distance to Arterial Roads (m)	246	275
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	92%	89%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	75%	48%
Block Size, Plot Size, Intersection Density, and	Walkabil	ity
Share of Intersections that are 4-way	8%	5%
Average Block Size (ha)	3.8	7.2
3-way Intersection Density (number per km ²)	97	45
4-way Intersection Density (number per km ²)	9	8
Walkabity Ratio	1.6	1.6
Average Plot Size in Informal Subdivisions (m ²)		
Average Plot Size in Formal Subdivisions (m ²)	950	1508
Stages in the Evolution of Residential La	ayouts	
Share of Built-Up Area in Residential Use	73%	75%
Share of Residential Area Not Laid Out Before Occupation	9%	32%
Share of Residential Area Laid Out Before Occupation	90%	67%
Share of Residential Area in Informal Land Subdivisions	0%	0%
Share of Residential Area in Formal Land Subdivisions	85%	66%
Share of Residential Area in Housing Projects	4%	1%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 – ~2014



Suining, Sichuan, China (East Asia and the Pacific)







Suining, Sichuan, China (East Asia and the Pacific)

Legend for Charts

*
Share of Built-up Area in Roads ~1990 - ~2014
0 -
0 -
0-
0 -
0-

200th

City Rank

Percent

0 -1st









Suining	Other cities in region	All other cities	Global average —		
Metrics			Pre- 1988	1988- 2013	
	Road	5			
Share of Built-Up Area Occupied by Roads 27%				27%	
Share of Built-Up Area that is Gridded or Partially Gridded		0%	0%		
Average Road Width (m)		10.8	11.0		
Share of Roads less	s than 4m Wide		6%	9%	
Share of Roads mo	re than 16m Wide		19%	18%	
Arterial Roads					
Density of Arterial R	Roads (km/km²)		2.6	1.8	
Average Beeline Dis	stance to Arterial Roads	(m)	117	190	
Share of Urban Exte (625m) of all Arteria	ent Within Walking Dista Il Roads	nce	100%	96%	
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dista ads (>16m wide)	nce	100%	94%	
Block Size, Plot Size, Intersection Density, and Walkability					
Share of Intersectio	ns that are 4-way		7%	6%	
Average Block Size	(ha)		2.2	5.6	
3-way Intersection Density (number per km ²)		209	140		
4-way Intersection Density (number per km ²)		18	15		
Walkabity Ratio		1.4	1.9		
Average Plot Size in	n Informal Subdivisions (m²)			
Average Plot Size in	n Formal Subdivisions (r	1²)			
Stages in the Evolution of Residential Layouts					
Share of Built-Up A	rea in Residential Use		69%	60%	
Share of Residentia	I Area Not Laid Out Befo	ore Occupation	2%	26%	
Share of Residential Area Laid Out Before Occupation		97%	73%		
Share of Residential Area in Informal Land Subdivisions			0%	13%	



Share of Residential Area in Formal Land Subdivisions



97%

0%

29%

Suva, Fiji (East Asia and the Pacific)









Selected Locales in Area Developed Before 1991





Selected Locales in Expansion Area, 1991-2014





Suva, Fiji (East Asia and the Pacific)

Legend for Charts				
Suva Other cities in region All other cities	Global av	erage —		
Metrics	Pre- 1991	1991- 2014		
Roads				
Share of Built-Up Area Occupied by Roads	24%	12%		
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%		
Average Road Width (m)	10.9	8.4		
Share of Roads less than 4m Wide	7%	19%		
Share of Roads more than 16m Wide	16%	8%		
Arterial Roads				
Density of Arterial Roads (km/km²)	2.9	1.4		
Average Beeline Distance to Arterial Roads (m)	83	253		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	100%	90%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	100%	90%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	1%	2%		
Average Block Size (ha)	5.2	8.4		
3-way Intersection Density (number per km ²)	142	32		
4-way Intersection Density (number per km ²)	5	1		
Walkabity Ratio	1.5	1.6		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)				
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	48%	84%		
Share of Residential Area Not Laid Out Before Occupation	29%	39%		
Share of Residential Area Laid Out Before Occupation	70%	60%		







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014





Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions



0%

1%

69%

14%

41%

Sydney, Australia (Land-Rich Developed Countries)







Selected Locales in Area Developed Before 1991









Selected Locales in Expansion Area, 1991-2014







— Arterial Roads

Sydney, Australia (Land-Rich Developed Countries)



Legend for Charts					
Sydney	Other cities in region	All other cities	Global a	Global average —	
Metrics			Pre-	1991-	
Methos			1991	2014	
	Roads	5			
Share of Built-Up A	rea Occupied by Roads		26%	19%	
Share of Built-Up A	rea that is Gridded or Pa	rtially Gridded	8%	2%	
Average Road Widt	th (m)		15.7	9.9	
Share of Roads les	s than 4m Wide		5%	7%	
Share of Roads mo	ore than 16m Wide		50%	15%	
	Arterial R	oads			
Density of Arterial F	Roads (km/km²)		2.3	1.3	
Average Beeline Di	stance to Arterial Roads	(m)	163	357	
Share of Urban Ext (625m) of all Arteria	ent Within Walking Dista al Roads	nce	97%	82%	
Share of Urban Ext of Wide Arterial Roa	ent Within Walking Dista ads (>16m wide)	nce	97%	76%	
Block Size, Plot Size, Intersection Density, and Walkability					
Share of Intersection	ons that are 4-way		17%	4%	
Average Block Size	e (ha)		5.8	6.2	
3-way Intersection	Density (number per km ²)	61	36	
4-way Intersection	Density (number per km ²)	17	3	
Walkabity Ratio			1.7	1.8	
Average Plot Size i	n Informal Subdivisions (m²)			
Average Plot Size i	n Formal Subdivisions (n	n²)	575	707	
Stages in the Evolution of Residential Layouts					
Share of Built-Up A	rea in Residential Use		82%	78%	
Share of Residentia	al Area Not Laid Out Befo	ore Occupation	0%	13%	
Share of Residentia	al Area Laid Out Before C	Occupation	95%	86%	
Share of Residentia	al Area in Informal Land S	Subdivisions	0%	0%	
Share of Residentia	al Area in Formal Land S	ubdivisions	92%	80%	
Share of Residentia	al Area in Housing Projec	ts	7%	6%	











Area w/n Walking Distance of Wide Arterial Roads, ~1990 – ~2014



Taipei, Taiwan, China (East Asia and the Pacific)









Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2014





Taipei, Taiwan, China (East Asia and the Pacific)

Legend for Charts			
Taipei Other cities in region All other cities	Global average —		
Metrics	Pre- 1990	1990- 2014	
Roads			Ħ
Share of Built-Up Area Occupied by Roads	21%	17%	Iccel
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	Pe
Average Road Width (m)	8.5	5.3	
Share of Roads less than 4m Wide	22%	44%	
Share of Roads more than 16m Wide	11%	3%	
Arterial Roads			
Density of Arterial Roads (km/km²)	4.6	3.1	
Average Beeline Distance to Arterial Roads (m)	83	134	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	99%	97%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	95%	81%	ters
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	13%	3%	
Average Block Size (ha)	2.9	7.7	
3-way Intersection Density (number per km ²)	135	96	
4-way Intersection Density (number per km ²)	24	8	
Walkabity Ratio	1.6	1.9	
Average Plot Size in Informal Subdivisions (m ²)			
Average Plot Size in Formal Subdivisions (m ²)	209		
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	47%	40%	ant
Share of Residential Area Not Laid Out Before Occupation	22%	55%	erce
Share of Residential Area Laid Out Before Occupation	77%	44%	٩.
Share of Residential Area in Informal Land Subdivisions	0%	0%	







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014





Share of Residential Area in Formal Land Subdivisions



70%

6%

35%

Tangshan, Hebei, China (East Asia and the Pacific)





Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2013





Tangshan, Hebei, China (East Asia and the Pacific)

Legend for Charts			
Tangshan Other cities in region All other cities Global average —		/erage —	
Metrics	Pre- 1990	1990- 2013	4
Roads			ŧ
Share of Built-Up Area Occupied by Roads	19%	17%	rcer
Share of Built-Up Area that is Gridded or Partially Gridded	2%	0%	Pe
Average Road Width (m)	6.7	5.7	
Share of Roads less than 4m Wide	33%	42%	
Share of Roads more than 16m Wide	6%	4%	
Arterial Roads			
Density of Arterial Roads (km/km²)	14	0.8	
Average Beeline Distance to Arterial Boads (m)	318	840	
Share of Lirbon Extent Within Wolking Distance	010	040	
(625m) of all Arterial Roads	86%	62%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	84%	59%	ters
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	9%	8%	
Average Block Size (ha)	3.0	5.5	
3-way Intersection Density (number per km ²)	204	151	
4-way Intersection Density (number per km ²)	31	20	
Walkabity Ratio	1.6	1.6	
Average Plot Size in Informal Subdivisions (m ²)		308	1(
Average Plot Size in Formal Subdivisions (m ²)		374	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	51%	57%	, int
Share of Residential Area Not Laid Out Before Occupation	0%	11%	erce
Share of Residential Area Laid Out Before Occupation	99%	88%	<u>د</u> ۲
Share of Residential Area in Informal Land Subdivisions	42%	67%	2



Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



44%

12%

13%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Tashkent, Uzbekistan (South and Central Asia)

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Tashkent, Uzbekistan (South and Central Asia)

Legend for Charts				
Tashkent Other cities in region All other cities	Global av	/erage —		
Metrics	Pre- 1990	1990- 2013		
Roads				
Share of Built-Up Area Occupied by Roads	16%	11%		
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%		
Average Road Width (m)	8.8	5.6		
Share of Roads less than 4m Wide	12%	30%		
Share of Roads more than 16m Wide	10%	1%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	1.0	0.9		
Average Beeline Distance to Arterial Roads (m)	412	445		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	79%	76%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	77%	72%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	7%	11%		
Average Block Size (ha)	5.7	5.9		
3-way Intersection Density (number per km ²)	61	46		
4-way Intersection Density (number per km ²)	8	7		
Walkabity Ratio	1.8	1.7		
Average Plot Size in Informal Subdivisions (m ²)	962	1104		
Average Plot Size in Formal Subdivisions (m ²)				
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	72%	80%		
Share of Residential Area Not Laid Out Before Occupation	16%	8%		
Share of Residential Area Laid Out Before Occupation	83%	91%		
Share of Residential Area in Informal Land Subdivisions	37%	88%		



Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



37%

9%

0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Tebessa, Algeria (Western Asia and North Africa)









Selected Locales in Area Developed Before 1988







Selected Locales in Expansion Area, 1988-2014




Tebessa, Algeria (Western Asia and North Africa)

Legend for Charts			
Tebessa Other cities in region All other cities	Global a	average —	
Metrics	Pre- 1988	1988- 2014	
Roads			
Share of Built-Up Area Occupied by Roads	23%	23%	
Share of Built-Up Area that is Gridded or Partially Gridded	2%	0%	
Average Road Width (m)	7.8	6.2	
Share of Roads less than 4m Wide	28%	32%	
Share of Roads more than 16m Wide	10%	7%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.7	1.2	
Average Beeline Distance to Arterial Roads (m)	205	305	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	95%	85%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	86%	81%	
Block Size, Plot Size, Intersection Density, and	l Walkabil	ity	
Share of Intersections that are 4-way	12%	13%	
Average Block Size (ha)	1.4	2.5	
3-way Intersection Density (number per km ²)	250	283	
4-way Intersection Density (number per km ²)	44	57	
Walkabity Ratio	1.7	1.6	
Average Plot Size in Informal Subdivisions (m ²)	251	178	
Average Plot Size in Formal Subdivisions (m ²)	330	240	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	61%	61%	
Share of Residential Area Not Laid Out Before Occupation	7%	19%	
Share of Residential Area Laid Out Before Occupation	92%	80%	
Share of Residential Area in Informal Land Subdivisions	44%	52%	



Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



32%

15%

1%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Tehran, Iran (South and Central Asia)

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Tehran, Iran (South and Central Asia)

	Legend for	Charts		
Tehran Other cit	es in region	All other cities	Global a	iverage —
Metrics			Pre- 1991	1991- 2010
	Road	s		
Share of Built-Up Area Occup	ied by Roads		22%	27%
Share of Built-Up Area that is	Gridded or Pa	artially Gridded	12%	0%
Average Road Width (m)			11.2	9.5
Share of Roads less than 4m	Wide		15%	19%
Share of Roads more than 16	m Wide		19%	14%
	Arterial R	loads		
Density of Arterial Roads (km	/km²)		2.4	1.9
Average Beeline Distance to	Arterial Roads	(m)	176	255
Share of Urban Extent Within (625m) of all Arterial Roads	Walking Dista	ince	96%	91%
Share of Urban Extent Within of Wide Arterial Roads (>16m	Walking Dista wide)	ince	96%	90%
Block Size, Plot S	ize, Intersecti	on Density, and	l Walkabil	ity
Share of Intersections that are	e 4-way		16%	13%
Average Block Size (ha)			4.1	4.2
3-way Intersection Density (n	umber per km	2)	81	162
4-way Intersection Density (n	umber per km	2)	28	24
Walkabity Ratio			1.5	2.1
Average Plot Size in Informal	Subdivisions	(m²)		
Average Plot Size in Formal S	Subdivisions (r	m²)	258	
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Res	idential Use		70%	63%
Share of Residential Area No	t Laid Out Bef	ore Occupation	19%	24%
Share of Residential Area Lai	d Out Before	Occupation	65%	75%
Share of Residential Area in I	nformal Land	Subdivisions	0%	18%
Share of Residential Area in F	Formal Land S	ubdivisions	73%	40%



Share of Residential Area in Housing Projects



6%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Tel Aviv, Israel (Western Asia and North Africa)









Selected Locales in Area Developed Before 1987





Selected Locales in Expansion Area, 1987-2014







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Urban Extent in 1987 Expansion, 1987 - 2000 Expansion, 2000 - 2014 —— Arterial Roads

Tel Aviv, Israel (Western Asia and North Africa)

Legend for Charts		
Tel Aviv Other cities in region All other cities	Global a	average —
Metrics	Pre- 1987	1987- 2014
Roads		
Share of Built-Up Area Occupied by Roads	23%	21%
Share of Built-Up Area that is Gridded or Partially Gridded	1%	0%
Average Road Width (m)	11.8	9.4
Share of Roads less than 4m Wide	6%	19%
Share of Roads more than 16m Wide	18%	13%
Arterial Roads		
Density of Arterial Roads (km/km ²)	2.0	1.1
Average Beeline Distance to Arterial Roads (m)	178	376
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	96%	80%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	96%	78%
Block Size, Plot Size, Intersection Density, and	l Walkabil	ity
Share of Intersections that are 4-way	21%	9%
Average Block Size (ha)	4.0	5.7
3-way Intersection Density (number per km ²)	76	65
4-way Intersection Density (number per km ²)	110	8
Walkabity Ratio	1.6	2.1
Average Plot Size in Informal Subdivisions (m ²)		554
Average Plot Size in Formal Subdivisions (m ²)	487	772
Stages in the Evolution of Residential L	ayouts	
Share of Built-Up Area in Residential Use	70%	71%
Share of Residential Area Not Laid Out Before Occupation	14%	17%
Share of Residential Area Laid Out Before Occupation	71%	82%
Share of Residential Area in Informal Land Subdivisions	1%	16%
Share of Residential Area in Formal Land Subdivisions	72%	59%



Share of Residential Area in Housing Projects



11%

6%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Thessaloniki, Greece (Europe and Japan)









Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2011





Thessaloniki, Greece (Europe and Japan)

Legend for Charts				
Thessaloniki Other cities in region All other cities	Global a	average —		
Metrics	Pre- 1990	1990- 2011		
Roads				
Share of Built-Up Area Occupied by Roads	22%	20%		
Share of Built-Up Area that is Gridded or Partially Gridded	7%	0%		
Average Road Width (m)	8.5	7.0		
Share of Roads less than 4m Wide	21%	22%		
Share of Roads more than 16m Wide	9%	8%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	2.9	2.1		
Average Beeline Distance to Arterial Roads (m)	138	198		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	98%	94%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	89%	78%		
Block Size, Plot Size, Intersection Density, and	d Walkabil	ity		
Share of Intersections that are 4-way	22%	9%		
Average Block Size (ha)	5.1	9.1		
3-way Intersection Density (number per km ²)	159	84		
4-way Intersection Density (number per km ²)	46	9		
Walkabity Ratio	1.7	2.3		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)				
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	60%	57%		
Share of Residential Area Not Laid Out Before Occupation	5%	9%		













Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Tianjin, Tianjin, China (East Asia and the Pacific)





Tianjin, Tianjin, China
1990-2013Urban Extent in 1990Arterial Roadskm
02040Expansion, 1990 - 2000Arterial Roads

Tianjin, Tianjin, China (East Asia and the Pacific)



Share of Built-Up Area in Residential Use	42%	45%
Share of Residential Area Not Laid Out Before Occupation	3%	4%
Share of Residential Area Laid Out Before Occupation	96%	95%
Share of Residential Area in Informal Land Subdivisions	8%	25%
Share of Residential Area in Formal Land Subdivisions	16%	19%
Share of Residential Area in Housing Projects	71%	50%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 – ~2014



Tijuana, Mexico (Latin America and the Caribbean)

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Urban Extent in 1989 Expansion, 1989 - 2000 Expansion, 2000 - 2014 — Arterial Roads

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Tijuana, Mexico (Latin America and the Caribbean)

Legend for Charts	Olahal			
Tijuana Other cities in region All other cities	Global a	average —		
Metrics	Pre- 1989	1989- 2014		
Roads				
Share of Built-Up Area Occupied by Roads	23%	26%		
Share of Built-Up Area that is Gridded or Partially Gridded	15%	12%		
Average Road Width (m)	11.3	9.3		
Share of Roads less than 4m Wide	7%	8%		
Share of Roads more than 16m Wide	17%	7%		
Arterial Roads				
Density of Arterial Roads (km/km²)	1.9	1.6		
Average Beeline Distance to Arterial Roads (m)	172	233		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	98%	93%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	81%	73%		
Block Size, Plot Size, Intersection Density, and	Walkabil	ity		
Share of Intersections that are 4-way	17%	21%		
Average Block Size (ha)	3.5	3.0		
3-way Intersection Density (number per km ²)	83	111		
4-way Intersection Density (number per km ²)	17	28		
Walkabity Ratio	1.7	1.8		
Average Plot Size in Informal Subdivisions (m ²)	315			
Average Plot Size in Formal Subdivisions (m ²)	259	155		
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	70%	77%		
Share of Residential Area Not Laid Out Before Occupation	5%	6%		
Share of Residential Area Laid Out Before Occupation	94%	93%		
Share of Residential Area in Informal Land Subdivisions	9%	49%		
Share of Residential Area in Formal Land Subdivisions	84%	27%		
Share of Residential Area in Housing Projects	0%	15%		











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Tokyo, Japan (Europe and Japan)









Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2014







Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2014

—— Arterial Roads

Tokyo, Japan (Europe and Japan)

	Legend for	Charts		
Tokyo	Other cities in region	All other cities	Global a	average —
Metrics			Pre- 1990	1990- 2014
	Road	s		
Share of Built-Up Ar	rea Occupied by Roads		37%	24%
Share of Built-Up Ar	rea that is Gridded or Pa	artially Gridded	15%	2%
Average Road Widt	h (m)		5.4	5.0
Share of Roads less	s than 4m Wide		45%	51%
Share of Roads more	re than 16m Wide		2%	2%
	Arterial F	Roads		
Density of Arterial R	loads (km/km²)		2.8	1.7
Average Beeline Dis	stance to Arterial Roads	; (m)	129	198
Share of Urban Exte (625m) of all Arteria	ent Within Walking Dista I Roads	ance	99%	93%
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dista ads (>16m wide)	ance	84%	57%
Block Siz	ze, Plot Size, Intersect	ion Density, and	l Walkabil	ity
Share of Intersectio	ns that are 4-way		18%	15%
Average Block Size	(ha)		1.6	2.5
3-way Intersection	Density (number per km	²)	169	194
4-way Intersection [Density (number per km	2)	41	47
Walkabity Ratio			1.5	1.4
Average Plot Size in	n Informal Subdivisions	(m²)	350	
Average Plot Size in	n Formal Subdivisions (m²)	200	230
Sta	ages in the Evolution	of Residential L	ayouts	
Share of Built-Up Ar	rea in Residential Use		62%	55%
Share of Residentia	I Area Not Laid Out Bef	ore Occupation	47%	46%
Share of Residentia	I Area Laid Out Before	Occupation	48%	53%
Share of Residentia	l Area in Informal Land	Subdivisions	0%	1%
Share of Residentia	I Area in Formal Land S	Subdivisions	49%	49%



Share of Residential Area in Housing Projects



3%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Toledo, United States (Land-Rich Developed Countries)





Selected Locales in Expansion Area, 1990-2014





Toledo, United States (Land-Rich Developed Countries)



Legend for Charts	Legend for Charts			
Toledo Other cities in region All other cities	Global a	iverage —		
Metrics	Pre- 1990	1990- 2014		
Roads				
Share of Built-Up Area Occupied by Roads	20%	18%		
Share of Built-Up Area that is Gridded or Partially Gridded	2%	0%		
Average Road Width (m)	8.6	9.3		
Share of Roads less than 4m Wide	24%	14%		
Share of Roads more than 16m Wide	17%	21%		
Arterial Roads				
Density of Arterial Roads (km/km²)	1.4	1.2		
Average Beeline Distance to Arterial Roads (m)	258	340		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	91%	84%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	74%	56%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	17%	4%		
Average Block Size (ha)	2.4	6.9		
3-way Intersection Density (number per km ²)	126	75		
4-way Intersection Density (number per km ²)	25	3		
Walkabity Ratio	1.7	1.6		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)	625	1238		
Stages in the Evolution of Residential L	ayouts			
Share of Built-Up Area in Residential Use	71%	79%		
Share of Residential Area Not Laid Out Before Occupation	1%	33%		
Share of Residential Area Laid Out Before Occupation	98%	66%		
Share of Residential Area in Informal Land Subdivisions	0%	0%		
Share of Residential Area in Formal Land Subdivisions	88%	58%		
Share of Residential Area in Housing Projects	9%	8%		











Area w/n Walking Distance of Wide Arterial Roads, ~1990 – ~2014



Tyumen, Russia (Europe and Japan)







Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2011





Tyumen, Russia (Europe and Japan)

	Legend for	Charts		
Tyumen Other cities	in region	All other cities	Global	average —
Metrics			Pre- 1990	1990- 2011
	Road	s		
Share of Built-Up Area Occupie	d by Roads		20%	18%
Share of Built-Up Area that is G	ridded or Pa	artially Gridded	10%	2%
Average Road Width (m)			7.7	6.7
Share of Roads less than 4m V	Vide		17%	19%
Share of Roads more than 16m	wide		7%	5%
	Arterial R	toads		
Density of Arterial Roads (km/k	m²)		1.3	1.1
Average Beeline Distance to Ar	terial Roads	(m)	312	392
Share of Urban Extent Within V (625m) of all Arterial Roads	Valking Dista	ince	85%	79%
Share of Urban Extent Within V of Wide Arterial Roads (>16m v	Valking Dista vide)	ince	84%	75%
Block Size, Plot Size	e, Intersecti	on Density, ar	nd Walkabi	lity
Share of Intersections that are	4-way		9%	16%
Average Block Size (ha)			5.2	3.8
3-way Intersection Density (nur	nber per km	²)	109	126
4-way Intersection Density (nur	nber per km	2)	13	18
Walkabity Ratio			1.8	1.7
Average Plot Size in Informal S	ubdivisions	(m²)	471	900
Average Plot Size in Formal Su	bdivisions (r	n²)	1104	1185
Stages in the	Evolution of	of Residential	Layouts	
Share of Built-Up Area in Resid	ential Use		47%	84%
Share of Residential Area Not L	aid Out Bef	ore Occupation	14%	0%
Share of Residential Area Laid	Out Before	Occupation	85%	99%
Share of Residential Area in Inf	ormal Land	Subdivisions	38%	85%
Share of Residential Area in Fo	rmal Land S	ubdivisions	19%	10%



Share of Residential Area in Housing Projects



26%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Ulaanbaatar, Mongolia (East Asia and the Pacific)









Ulaanbaatar, Mongolia (East Asia and the Pacific)

Legend for Charts

	Į		
Built-u ~1990 -	o Area - ~2014	in Ro 4	ads



Share of









Ulaanbaatar	Other cities in region	All other cities	Global a	average —
Metrics			Pre- 1990	1990- 2014
	Roa	ads		
Share of Built-Up	Area Occupied by Road	ls	15%	11%
Share of Built-Up	0%	0%		
Average Road Wi	dth (m)		7.1	4.2
Share of Roads le	ess than 4m Wide		24%	51%
Share of Roads m	ore than 16m Wide		7%	0%
	Arteria	Roads		
Density of Arterial	Roads (km/km²)		1.6	1.2
Average Beeline	Distance to Arterial Roa	ds (m)	272	394
Share of Urban Ex (625m) of all Arter	xtent Within Walking Dis ial Roads	stance	89%	78%
Share of Urban Ex of Wide Arterial Re	xtent Within Walking Dis oads (>16m wide)	stance	81%	67%
Block S	Size, Plot Size, Interse	ction Density, an	d Walkabil	ity
Share of Intersect	ions that are 4-way		2%	7%
Average Block Siz	ze (ha)		5.6	4.4
3-way Intersection	n Density (number per k	.m²)	85	91
4-way Intersection	n Density (number per k	m²)	4	10
Walkabity Ratio			1.8	1.7
Average Plot Size	in Informal Subdivision	s (m²)	643	629
Average Plot Size	in Formal Subdivisions	; (m²)		
S	Stages in the Evolution	n of Residential L	ayouts.	
Share of Built-Up	Area in Residential Use		66%	85%
Share of Resident	tial Area Not Laid Out B	efore Occupation	23%	25%
Share of Resident	tial Area Laid Out Before	e Occupation	76%	74%
Share of Residential Area in Informal Land Subdivisions		64%	71%	

Average Block Size ~1990 - ~2014

Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



5%

6%

0%

Valledupar, Colombia (Latin America and the Caribbean)









Selected Locales in Expansion Area, 1989-2011





Urban Extent in 1989 Expansion, 1989 - 2001 Expansion, 2001 - 2011

----- Arterial Roads

Valledupar, Colombia (Latin America and the Caribbean)

Legend for Charts				
Valledupar Other cities in region All other cities	Global a	verage —		
Metrics	Pre- 1989	1989- 2011		
Roads				
Share of Built-Up Area Occupied by Roads	21%	26%		
Share of Built-Up Area that is Gridded or Partially Gridded	67%	30%		
Average Road Width (m)	8.9	6.9		
Share of Roads less than 4m Wide	7%	14%		
Share of Roads more than 16m Wide	9%	1%		
Arterial Roads				
Density of Arterial Roads (km/km²)	3.3	2.4		
Average Beeline Distance to Arterial Roads (m)	107	209		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	99%	90%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	97%	86%		
Block Size, Plot Size, Intersection Density, and	Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	38%	33%		
Average Block Size (ha)	1.3	2.2		
3-way Intersection Density (number per km ²)	119	183		
4-way Intersection Density (number per km ²)	68	91		
Walkabity Ratio	1.4	1.7		
Average Plot Size in Informal Subdivisions (m ²)		90		
Average Plot Size in Formal Subdivisions (m ²)				
Stages in the Evolution of Residential La	ayouts			
Share of Built-Up Area in Residential Use	73%	89%		
Share of Residential Area Not Laid Out Before Occupation	0%	4%		
Share of Residential Area Laid Out Before Occupation	99%	95%		
Share of Residential Area in Informal Land Subdivisions	23%	55%		



Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



76%

0%

1%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Victoria, Canada (Land-Rich Developed Countries)









Selected Locales in Area Developed Before 1990



Selected Locales in Expansion Area, 1990-2013





Victoria, Canada (Land-Rich Developed Countries)





Share of Residential Area in Housing Projects



7%









Area w/n Walking Distance of Wide Arterial Roads, ~1990 – ~2014



Vienna, Austria (Europe and Japan)







Selected Locales in Area Developed Before 1991





Selected Locales in Expansion Area, 1991-2013



Vienna, Austria 1991-2013 0 5 10 15 20



Urban Extent in 1991 Expansion, 1991 - 2000 Expansion, 2000 - 2013

—— Arterial Roads

Vienna, Austria (Europe and Japan)

Legend for Charts				
Vienna	Other cities in region	All other cities	Global average —	
Metrics			Pre- 1991	1991- 2013
	Roa	lds		
Share of Built-Up Area Occupied by Roads		22%	18%	
Share of Built-Up Ar	rea that is Gridded or I	Partially Gridded	5%	0%
Average Road Widt	h (m)		7.8	6.6
Share of Roads less	s than 4m Wide		23%	21%
Share of Roads mo	re than 16m Wide		8%	0%
	Arterial	Roads		
Density of Arterial R	Roads (km/km²)		2.0	1.8
Average Beeline Dis	stance to Arterial Road	is (m)	169	207
Share of Urban Exte (625m) of all Arteria	ent Within Walking Dis I Roads	tance	97%	95%
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dis ads (>16m wide)	tance	84%	70%
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersectio	ns that are 4-way		18%	9%
Average Block Size	(ha)		2.8	4.9
3-way Intersection Density (number per km ²)		198	103	
4-way Intersection Density (number per km ²)		40	17	
Walkabity Ratio		1.7	2.1	
Average Plot Size in	n Informal Subdivisions	s (m²)		
Average Plot Size in	n Formal Subdivisions	(m²)	575	587
Stages in the Evolution of Residential Layouts				
Share of Built-Up Ar	rea in Residential Use		68%	78%
Share of Residentia	I Area Not Laid Out Be	efore Occupation	0%	12%
Share of Residential Area Laid Out Before Occupation		e Occupation	99%	87%
Share of Residential Area in Informal Land Subdivisions		d Subdivisions	1%	0%
Share of Residential Area in Formal Land Subdivisions		82%	80%	
Share of Residential Area in Housing Projects			15%	6%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Vijayawada, India (South and Central Asia)











Selected Locales in Expansion Area, 1991-2014





Vijayawada, India (South and Central Asia)

Legend for Charts			
Vijayawada Other cities in region All other cities	Global ave	erage —	
Metrics	Pre-	1991-	
	1991	2014	
Roads			
Share of Built-Up Area Occupied by Roads 19% 18%			
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	
Average Road Width (m)	7.0	5.8	
Share of Roads less than 4m Wide	20%	31%	
Share of Roads more than 16m Wide	7%	3%	
Arterial Roads			
Density of Arterial Roads (km/km²)	2.0	1.6	
Average Beeline Distance to Arterial Roads (m)	161	221	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	99%	94%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	92%	87%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	15%	5%	
Average Block Size (ha)	1.8	6.8	
3-way Intersection Density (number per km ²)	158	130	
4-way Intersection Density (number per km ²)	34	17	
Walkabity Ratio	1.7	1.8	
Average Plot Size in Informal Subdivisions (m ²)	281	195	
Average Plot Size in Formal Subdivisions (m ²)	233	69	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	73%	70%	
Share of Residential Area Not Laid Out Before Occupation	20%	35%	
Share of Residential Area Laid Out Before Occupation	79%	64%	
Share of Residential Area in Informal Land Subdivisions	26%	59%	
Share of Residential Area in Formal Land Subdivisions	52%	4%	



Share of Residential Area in Housing Projects



1%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Vinh Long, Vietnam (Southeast Asia)







Vinh Long, Vietnam
1989-2014Urban Extent in 1989Arterial Roadskm
0km
2Expansion, 1989 - 2000Expansion, 2000 - 2014

Vinh Long, Vietnam (Southeast Asia)

Legend for Charts				
Vinh Long Other cities in region All other cities	Global a	verage —		
Metrics	Pre- 1989	1989- 2014		
Roads				
Share of Built-Up Area Occupied by Roads	16%	9%		
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%		
Average Road Width (m)	7.7	6.1		
Share of Roads less than 4m Wide	18%	46%		
Share of Roads more than 16m Wide	3%	8%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	3.6	1.0		
Average Beeline Distance to Arterial Roads (m)	74	321		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	100%	83%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	89%	66%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	22%	2%		
Average Block Size (ha)	1.9	14.4		
3-way Intersection Density (number per km ²)	92	33		
4-way Intersection Density (number per km ²)	23	6		
Walkabity Ratio	1.4	1.3		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)				
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	66%	66%		
Share of Residential Area Not Laid Out Before Occupation	46%	98%		
Share of Residential Area Laid Out Before Occupation	53%	1%		
Share of Residential Area in Informal Land Subdivisions	0%	1%		



Share of Residential Area in Formal Land Subdivisions



53%

0%

0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014





Warsaw, Poland (Europe and Japan)







Selected Locales in Area Developed Before 1992







Selected Locales in Expansion Area, 1992-2013





—— Arterial Roads

Warsaw, Poland (Europe and Japan)

Legend for Charts			
Warsaw Other cities in region All other cities	Global a	Global average —	
Metrics	Pre- 1992	1992- 2013	
Roads			
Share of Built-Up Area Occupied by Roads	21%	15%	
Share of Built-Up Area that is Gridded or Partially Gridded	4%	5%	
Average Road Width (m)	9.3	6.3	
Share of Roads less than 4m Wide	7%	24%	
Share of Roads more than 16m Wide	12%	1%	
Arterial Roads			
Density of Arterial Roads (km/km ²)	1.9	1.6	
Average Beeline Distance to Arterial Roads (m)	185	214	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	96%	94%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	78%	64%	
Block Size, Plot Size, Intersection Density, and Walkability			
Share of Intersections that are 4-way	20%	13%	
Average Block Size (ha)	6.0	6.9	
3-way Intersection Density (number per km ²)	29	79	
4-way Intersection Density (number per km ²)	19	17	
Walkabity Ratio	1.6	1.6	
Average Plot Size in Informal Subdivisions (m ²)	22	1401	
Average Plot Size in Formal Subdivisions (m ²)	772	751	
Stages in the Evolution of Residential Layouts			
Share of Built-Up Area in Residential Use	68%	76%	
Share of Residential Area Not Laid Out Before Occupation	5%	14%	
Share of Residential Area Laid Out Before Occupation	89%	85%	
Share of Residential Area in Informal Land Subdivisions	7%	36%	
Share of Residential Area in Formal Land Subdivisions	66%	41%	



Share of Residential Area in Housing Projects



20%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Wuhan, Hubei, China (East Asia and the Pacific)









Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2013



Wuhan, Hubei, China 1990-2013 0 8 16 24 32



Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2013 —— Arterial Roads

Wuhan, Hubei, China (East Asia and the Pacific)

Legend for Charts				
Wunan Other cities in region All other cities	Global	average —		
Metrics	Pre- 1990	1990- 2013		
Roads				
Share of Built-Up Area Occupied by Roads	16%	16%		
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%		
Average Road Width (m)	9.8	7.4		
Share of Roads less than 4m Wide	18%	28%		
Share of Roads more than 16m Wide	19%	8%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	1.6	0.8		
Average Beeline Distance to Arterial Roads (m)	193	453		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	98%	75%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	98%	76%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	12%	16%		
Average Block Size (ha)	5.5	6.9		
3-way Intersection Density (number per km ²)	63	80		
4-way Intersection Density (number per km ²)	7	15		
Walkabity Ratio	1.5	1.7		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)				
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	53%	64%		
Share of Residential Area Not Laid Out Before Occupation	7%	6%		













Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Xingping, Shaanxi, China (East Asia and the Pacific)





Selected Locales in Area Developed Before 1992





Selected Locales in Expansion Area, 1992-2013





Xingping, Shaanxi, China (East Asia and the Pacific)

Legend for Charts

Share of E	Built-up Area ir ~1990 – ~2014	Roads
40 -		
30 -		
20 -		
0 - 1st	City Rank	200th

Percent





Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Xingping	Other cities in region	All other cities	Global a	verage —
Metrics			Pre- 1992	1992- 2013
	Ro	ads		
Share of Built-Up Area Occupied by Roads			20%	24%
Share of Built-Up Area that is Gridded or Partially Gridded		0%	0%	
Average Road Width (m)		8.5	9.2	
Share of Roads le	ess than 4m Wide		21%	34%
Share of Roads m	ore than 16m Wide		22%	18%
	Arteria	l Roads		
Density of Arterial	Roads (km/km²)		1.8	1.3
Average Beeline I	Distance to Arterial Roa	ds (m)	136	259
Share of Urban E (625m) of all Arter	xtent Within Walking Di rial Roads	stance	100%	92%
Share of Urban E of Wide Arterial R	xtent Within Walking Di oads (>16m wide)	stance	100%	91%
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersect	tions that are 4-way		10%	8%
Average Block Siz	ze (ha)		3.7	7.4
3-way Intersection Density (number per km ²)		53	106	
4-way Intersection Density (number per km ²)			10	13
Walkabity Ratio			1.4	1.6
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size	in Formal Subdivisions	s (m²)		
Stages in the Evolution of Residential Layouts				
Share of Built-Up	Area in Residential Use	•	67%	56%
Share of Resident	tial Area Not Laid Out B	efore Occupation	89%	44%
Share of Residential Area Laid Out Before Occupation		10%	55%	
Share of Residential Area in Informal Land Subdivisions		0%	38%	



Share of Residential Area in Formal Land Subdivisions

Share of Residential Area in Housing Projects



0%

10%

1%

Xucheng, Jiangsu, China (East Asia and the Pacific)









Selected Locales in Area Developed Before 1990



Selected Locales in Expansion Area, 1990-2013









Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2013

— Arterial Roads
Xucheng, Jiangsu, China (East Asia and the Pacific)

Legend for Charts

	· •
Share of Built-up ~1990 -	o Area in Roads - ∼2014
50 -	
40 -	
30 -	
20 -	
10 -	

City Rank

200th

Percent





Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Xucheng	Other cities in region	All other cities	Global a	average —	
Metrics			Pre- 1990	1990- 2013	
	Roa	ıds			
Share of Built-Up Ar	rea Occupied by Road	s	27%	28%	
Share of Built-Up Ar	rea that is Gridded or I	Partially Gridded	0%	0%	
Average Road Widt	h (m)		5.5	5.8	
Share of Roads less	s than 4m Wide		47%	45%	
Share of Roads more	re than 16m Wide		3%	4%	
	Arterial	Roads			
Density of Arterial R	loads (km/km²)		1.6	1.5	
Average Beeline Dis	stance to Arterial Road	ds (m)	243	241	
Share of Urban Exte (625m) of all Arteria	ent Within Walking Dis I Roads	tance	90%	91%	
Share of Urban Exte of Wide Arterial Roa	ent Within Walking Dis ads (>16m wide)	tance	79%	70%	
Block Size, Plot Size, Intersection Density, and Walkability					
Share of Intersectio	ns that are 4-way		10%	12%	
Average Block Size	(ha)		2.8	2.4	
3-way Intersection	Density (number per k	m²)	204	282	
4-way Intersection [Density (number per k	m²)	31	42	
Walkabity Ratio			1.6	1.5	
Average Plot Size in	n Informal Subdivision	s (m²)			
Average Plot Size ir	1 Formal Subdivisions	(m²)	293	292	
Sta	Stages in the Evolution of Residential Layouts				
Share of Built-Up Ar	rea in Residential Use		56%	61%	
Share of Residentia	I Area Not Laid Out Be	efore Occupation	69%	45%	
Share of Residentia	Area Laid Out Before	 Occupation 	30%	54%	
Share of Residentia	Area in Informal Lan	d Subdivisions	0%	24%	
Share of Residentia	l Area in Formal Land	Subdivisions	30%	29%	
Share of Residentia	I Area in Housing Proj	ects	0%	0%	





Yamaguchi, Japan (Europe and Japan)







Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2014







Urban Extent in 1990 Expansion, 1990 - 1999 Expansion, 1999 - 2014 — Arterial Roads

Yamaguchi, Japan (Europe and Japan)

Logand for Charts				
Yamaguchi Other cities in region All other cities	Global a	verage —		
Metrics	Pre- 1990	1990- 2014		
Roads				
Share of Built-Up Area Occupied by Roads	23%	15%		
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%		
Average Road Width (m)	8.6	3.3		
Share of Roads less than 4m Wide	31%	75%		
Share of Roads more than 16m Wide	16%	2%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	0.9	0.6		
Average Beeline Distance to Arterial Roads (m)	451	836		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	69%	59%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	69%	57%		
Block Size, Plot Size, Intersection Density, and	l Walkabili	ty		
Share of Intersections that are 4-way	10%	16%		
Average Block Size (ha)	3.0	3.8		
3-way Intersection Density (number per km ²)	147	178		
4-way Intersection Density (number per km ²)	21	32		
Walkabity Ratio	1.7	1.5		
Average Plot Size in Informal Subdivisions (m ²)	440	474		
Average Plot Size in Formal Subdivisions (m ²)	331			
Stages in the Evolution of Residential Layouts				
Share of Built-Up Area in Residential Use	70%	71%		
Share of Residential Area Not Laid Out Before Occupation	0%	0%		
Share of Residential Area Laid Out Before Occupation	99%	99%		
Share of Residential Area in Informal Land Subdivisions	51%	97%		



Share of Residential Area in Formal Land Subdivisions



25%

23%

0%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Yanggu, Shandong, China (East Asia and the Pacific)









Selected Locales in Area Developed Before 1990









Yanggu, Shandong, China 1990-2014 0 2 4 6 8

Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2014

— Arterial Roads

Yanggu, Shandong, China (East Asia and the Pacific)

Legend for Charts













Yanggu Other cities in region All other cities	Global a	average —
Metrics	Pre- 1990	1990- 2014
Roads		
Share of Built-Up Area Occupied by Roads	16%	15%
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%
Average Road Width (m)	10.7	6.8
Share of Roads less than 4m Wide	17%	48%
Share of Roads more than 16m Wide	18%	10%
Arterial Roads		
Density of Arterial Roads (km/km²)	1.6	0.8
Average Beeline Distance to Arterial Roads (m)	263	481
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	91%	77%
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	91%	71%
Block Size, Plot Size, Intersection Density, and	d Walkabil	ity
Share of Intersections that are 4-way	10%	5%
Average Block Size (ha)	10.4	13.1
3-way Intersection Density (number per km ²)	40	63
4-way Intersection Density (number per km ²)	5	5
Walkabity Ratio	1.7	1.3
Average Plot Size in Informal Subdivisions (m ²)		
Average Plot Size in Formal Subdivisions (m ²)		
Stages in the Evolution of Residential L	ayouts	
Share of Built-Up Area in Residential Use	63%	78%
Share of Residential Area Not Laid Out Before Occupation	62%	70%
Share of Residential Area Laid Out Before Occupation	37%	29%
Share of Residential Area in Informal Land Subdivisions	6%	24%

 Share of Residential Area Laid Out Before Occupation
 37%

 Share of Residential Area in Informal Land Subdivisions
 6%

 Share of Residential Area in Formal Land Subdivisions
 24%

 Share of Residential Area in Housing Projects
 6%

 Average Block Size
 4-way Intersection I

 ~1990 - ~2014
 ~1990 - ~201





3%

Yiyang, Hunan, China (East Asia and the Pacific)







Yiyang, Hunan, China (East Asia and the Pacific)

Legend for Charts				
Yiyang Other cities in region All other cities	Global av	erage —		
Metrics	Pre-	1994-		
	1994	2013		
Roads				
Share of Built-Up Area Occupied by Roads	19%	20%		
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%		
Average Road Width (m)	6.7	6.0		
Share of Roads less than 4m Wide	43%	48%		
Share of Roads more than 16m Wide	10%	6%		
Arterial Roads				
Density of Arterial Roads (km/km²)	1.8	1.0		
Average Beeline Distance to Arterial Roads (m)	324	591		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	83%	71%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	96%	60%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	8%	7%		
Average Block Size (ha)	2.7	5.8		
3-way Intersection Density (number per km ²)	187	156		
4-way Intersection Density (number per km ²)	24	18		
Walkabity Ratio	1.6	1.5		
Average Plot Size in Informal Subdivisions (m ²)				
Average Plot Size in Formal Subdivisions (m ²)	433			
Stages in the Evolution of Residential La	youts			
Share of Built-Up Area in Residential Use	51%	56%		
Share of Residential Area Not Laid Out Before Occupation	57%	72%		
Share of Residential Area Laid Out Before Occupation	42%	27%		
Share of Residential Area in Informal Land Subdivisions	1%	11%		
Share of Residential Area in Formal Land Subdivisions	26%	8%		



Share of Residential Area in Housing Projects



14%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Yucheng, Zhejiang, China (East Asia and the Pacific)









Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2014





Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2014

—— Arterial Roads

Yucheng, Zhejiang, China (East Asia and the Pacific)

Legend for Charts

	*
Share of Built-up ~1990 -	Area in Roads - ~2014
0 - 0 -	
0 -	
0 -	

City Rank

200th

5

2

0

1st

Percent 3





Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Yucheng	Other cities in region	All other cities	Global a	average —
Metrics			Pre- 1990	1990- 2014
	Ro	ads		
Share of Built-Up	Area Occupied by Road	ds	16%	15%
Share of Built-Up	Area that is Gridded or	Partially Gridded	0%	0%
Average Road W	idth (m)		8.6	6.9
Share of Roads le	ess than 4m Wide		30%	45%
Share of Roads n	nore than 16m Wide		15%	9%
	Arteria	l Roads		
Density of Arteria	l Roads (km/km²)		1.8	1.0
Average Beeline	Distance to Arterial Roa	ds (m)	208	616
Share of Urban E (625m) of all Arte	xtent Within Walking Dis rial Roads	stance	97%	72%
Share of Urban E of Wide Arterial R	xtent Within Walking Di loads (>16m wide)	stance	97%	66%
Block	Size, Plot Size, Interse	ction Density, and	d Walkabil	ity
Share of Intersect	tions that are 4-way		9%	5%
Average Block Siz	ze (ha)		4.5	5.1
3-way Intersection	n Density (number per k	km²)	73	91
4-way Intersection	n Density (number per k	(m²)	9	6
Walkabity Ratio			1.8	1.7
Average Plot Size	e in Informal Subdivisior	ns (m²)		187
Average Plot Size	e in Formal Subdivisions	s (m²)	305	141
:	Stages in the Evolution	n of Residential L	ayouts	
Share of Built-Up	Area in Residential Use	9	59%	69%
Share of Residen	tial Area Not Laid Out B	efore Occupation	51%	70%
Share of Residen	tial Area Laid Out Befor	e Occupation	48%	29%
Share of Residen	tial Area in Informal Lar	d Subdivisions	12%	10%
Share of Residen	tial Area in Formal Land	Subdivisions	31%	10%
Share of Residen	tial Area in Housing Pro	jects	5%	8%





Yulin, Guangxi, China (East Asia and the Pacific)





Yulin, Guangxi, China 1991-2009 Urban Extent in 1991 Expansion, 1991 - 2000 Expansion, 2000 - 2009

Yulin, Guangxi, China (East Asia and the Pacific)

Walkabity Ratio

Legend for Charts			Share of Ruilt up Area in Roada
Yulin Other cities in region All other c	ities Global a	verage —	~1990 – ~2014
Metrics	Pre- 1991	1991- 2009	50 - 40 -
Roads			E 20-
Share of Built-Up Area Occupied by Roads	22%	20%	30-
Share of Built-Up Area that is Gridded or Partially Grid	ded 0%	0%	۹ 20 -
Average Road Width (m)	8.1	8.5	10-
Share of Roads less than 4m Wide	32%	31%	10
Share of Roads more than 16m Wide	16%	13%	0 - 1st City Rank 200th
Arterial Roads			
Density of Arterial Roads (km/km²)	2.0	0.8	Average Road Width ~1990 – ~2014
Average Beeline Distance to Arterial Roads (m)	181	527	20 -
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	98%	80%	16 -
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	98%	76%	12 -
Block Size, Plot Size, Intersection Density	, and Walkabili	ty	8 -
Share of Intersections that are 4-way	10%	7%	4 -



Stages in the Evolution of Residential Layouts

Share of Built-Up Area in Residential Use	48%	53%
Share of Residential Area Not Laid Out Before Occupation	13%	28%
Share of Residential Area Laid Out Before Occupation	86%	71%
Share of Residential Area in Informal Land Subdivisions	0%	45%
Share of Residential Area in Formal Land Subdivisions	50%	1%
Share of Residential Area in Housing Projects	35%	24%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014









Zhengzhou, Henan, China (East Asia and the Pacific)





Selected Locales in Area Developed Before 1992





Selected Locales in Expansion Area, 1992-2015



Zhengzhou, Henan, China 1992-2015 0 10 20 30

Urban Extent in 1992 Expansion, 1992 - 2000 Expansion, 2000 - 2015 —— Arterial Roads

Zhengzhou, Henan, China (East Asia and the Pacific)

Zhengzhou

Walkabity Ratio

Metrics

Legend for Charts



City Rank

200th

200th





City Rank







Share of Built-Up Area in Residential Use

Share of Residential Area Not Laid Out Before Occupation

Share of Residential Area Laid Out Before Occupation

Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions



73%

70%

29%

10%

10%

8%

68%

58%

41%

12%

12%

Zhuji, Zhejiang, China (East Asia and the Pacific)









Selected Locales in Area Developed Before 1990





Selected Locales in Expansion Area, 1990-2013



Zhuji, Zhejiang, China 1990-2013 0 5 10 15 20



Urban Extent in 1990 Expansion, 1990 - 2000 Expansion, 2000 - 2013

Arterial Roads

Zhuji, Zhejiang, China (East Asia and the Pacific)



Share of Built-Up Area in Residential Use	51%	50%
Share of Residential Area Not Laid Out Before Occupation	28%	54%
Share of Residential Area Laid Out Before Occupation	71%	45%
Share of Residential Area in Informal Land Subdivisions	2%	12%
Share of Residential Area in Formal Land Subdivisions	39%	10%
Share of Residential Area in Housing Projects	29%	23%











Area w/n Walking Distance of Wide Arterial Roads, ~1990 – ~2014



Zunyi, Guizhou, China (East Asia and the Pacific)









Zunyi, Guizhou, China (East Asia and the Pacific)

Legend for Charts			
Zunyi Other cities in region All other cities	Global	average —	
Metrics	Pre-	1988-	
	1988	2013	
Roads			ŧ
Share of Built-Up Area Occupied by Roads	22%	26%	erce
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%	Å
Average Road Width (m)	4.7	6.6	
Share of Roads less than 4m Wide	49%	34%	
Share of Roads more than 16m Wide	3%	7%	
Arterial Roads			
Density of Arterial Roads (km/km²)	1.7	1.5	
Average Beeline Distance to Arterial Roads (m)	214	242	
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	95%	93%	
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	92%	90%	ters
Block Size, Plot Size, Intersection Density, and	d Walkabi	lity	Me
Share of Intersections that are 4-way	10%	15%	
Average Block Size (ha)	1.9	4.1	
3-way Intersection Density (number per km ²)	329	207	
4-way Intersection Density (number per km ²)	43	47	
Walkabity Ratio	1.8	1.8	
Average Plot Size in Informal Subdivisions (m ²)			1
Average Plot Size in Formal Subdivisions (m ²)	646	1219	
Stages in the Evolution of Residential L	ayouts		
Share of Built-Up Area in Residential Use	63%	64%	t
Share of Residential Area Not Laid Out Before Occupation	8%	19%	erce
Share of Residential Area Laid Out Before Occupation	91%	80%	đ
Share of Residential Area in Informal Land Subdivisions	0%	3%	
Share of Residential Area in Formal Land Subdivisions 30% 46%			



Share of Residential Area in Housing Projects



60%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Zwolle, Netherlands (Europe and Japan)







Selected Locales in Area Developed Before 1990













Urban Extent in 1990
 Expansion, 1990 - 2000
 Expansion, 2000 - 2014

— Arterial Roads

Zwolle, Netherlands (Europe and Japan)

Legend for Charts				
Zwolle Other cities in region All other cities	Global a	verage —		
Metrics	Pre- 1990	1990- 2014		
Roads				
Share of Built-Up Area Occupied by Roads	16%	26%		
Share of Built-Up Area that is Gridded or Partially Gridded	0%	0%		
Average Road Width (m)	8.8	6.6		
Share of Roads less than 4m Wide	12%	34%		
Share of Roads more than 16m Wide	10%	7%		
Arterial Roads				
Density of Arterial Roads (km/km ²)	1.7	1.5		
Average Beeline Distance to Arterial Roads (m)	214	242		
Share of Urban Extent Within Walking Distance (625m) of all Arterial Roads	95%	93%		
Share of Urban Extent Within Walking Distance of Wide Arterial Roads (>16m wide)	92%	90%		
Block Size, Plot Size, Intersection Density, and Walkability				
Share of Intersections that are 4-way	7%	15%		
Average Block Size (ha)	5.7	4.1		
3-way Intersection Density (number per km ²)	61	207		
4-way Intersection Density (number per km ²)	8	47		
Walkabity Ratio	1.8	1.8		
Average Plot Size in Informal Subdivisions (m ²)	962			
Average Plot Size in Formal Subdivisions (m ²)		1219		
Stages in the Evolution of Residential La	ayouts			
Share of Built-Up Area in Residential Use	72%	64%		
Share of Residential Area Not Laid Out Before Occupation	22%	53%		
Share of Residential Area Laid Out Before Occupation	77%	46%		
Share of Residential Area in Informal Land Subdivisions	37%	3%		
Share of Residential Area in Formal Land Subdivisions	37%	46%		



Share of Residential Area in Housing Projects



9%







Area w/n Walking Distance of Wide Arterial Roads, ~1990 - ~2014



Maps and Metrics for 30 Cities, 1900-2014

The following pages provide maps and metrics for a representative group of 30 cities, 27 of which are in the global sample of 200 cities. The cities are arranged in alphabetical order. The Index at the end of the volume lists them by country and by world region. There are two pages for every city. The left hand pages provide six high-resolution satellite images of typical locales developed at five approximate time periods: pre-1900, 1900-1930, 1930-1960, 1960-1990, and 1990-2014. Below these images, there is a map showing the network of arterial roads overlaid on a map of the city's historical expansion, ~1900 to ~2014. The right hand pages provide a table with metric values for each of five periods, as well as three charts with metric values associated with the different attributes of urban layouts in the city at different time periods and their comparison to the average of the 30 cities in the group.

Accra, Ghana (Sub-Saharan Africa 1903 – 2014)





Accra, Ghana (Sub-Saharan Africa 1903 – 2014)



Urban Layout Metrics	Pre- 1903	1903 - 1929	1929 - 1966	1966- 1991	1991 - 2014			
Roads								
Share of Built-up Area Occupied by Roads		17%	15%	15%	17%			
Share of Built-up Area That Is Gridded		40%	24%	15%	11%			
Share of Roads Less Than 4 Meters Wide		6%	9%	11%	27%			
Share of Roads More Than 16 Meters Wide		10%	5%	7%	2%			
Arterial Roads								
Total Area of Zone (km ²)		3	37	156	682			
Total Length of Arterial Roads (km ²)		2	37	141	60			
Density of All Arterial Roads (km/km ²)		0.81	1.01	0.92	0.09			
Average Beeline Distance to All Arterial Roads (meters)		254	364	471	2,915			
Share of Area within Walking Distance of All Arterial Roads		95%	82%	71%	14%			
Block Size, Plot Size, Intersection Density, and Walkability								
Share of Intersections that are 4-Way		40%	25%	10%	8%			
Average Block Size (ha)		4.0	5.7	7.0	3.5			
4-Way Intersection Density (number per km ²)		29	15	9	12			
Walkability Ratio		1.6	1.8	1.6	1.7			
Average Plot Size in Informal Land Subdivisions		417	688	757				
Average Plot Size in Formal Land Subdivisions		583	528					
Stages in the Evolution of Residen	tial Layo	uts						
Share of Built-up Area That Is Residential		43%	59%	70%	82%			
Share of Residential Areas Not Laid Out Before Development		42%	40%	65%	47%			
Share of Residential Areas Laid Out Before Development		58%	60%	55%	53%			
Share of Residential Area in Informal Land Subdivisions		24%	27%	31%	45%			
Share of Residential Area in Formal Land Subdivisions		18%	16%	4%	7%			
Share of Residential Area in Housing Projects		16%	17%	1%	0%			

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)



Share of Roads Less Than 4-meters Wide



Algiers, Algeria (Northern Africa 1903 – 2014)

16 km





Arterial Roads

No data

Algiers, Algeria (Northern Africa 1903 – 2014)



Urban Layout Metrics	Pre- 1903	1903 - 1929	1929 - 1972	1972 - 1987	1987- 2014			
Roads								
Share of Built-up Area Occupied by Roads	28%	26%	22%	23%	13%			
Share of Built-up Area That Is Gridded	6%	0%	0%	3%	5%			
Share of Roads Less Than 4 Meters Wide	14%	10%	8%	13%	16%			
Share of Roads More Than 16 Meters Wide	12%	23%	13%	15%	9%			
Arterial Roads								
Total Area of Zone (km ²)	3	5	12	302	427			
Total Length of Arterial Roads (km ²)	6	8	13	373	489			
Density of All Arterial Roads (km/km ²)	1.76	1.63	1.11	1.24	0.88			
Average Beeline Distance to All Arterial Roads (meters)	249	288	278	510	431			
Share of Area within Walking Distance of All Arterial Roads	94%	87%	93%	76%	75%			
Block Size, Plot Size, Intersection Density, and Walkability								
Share of Intersections that are 4-Way	18%	12%	10%	10%	15%			
Average Block Size (ha)	1.1	3.1	4.3	6.8	6.3			
4-Way Intersection Density (number per km ²)	49	32	14	13	33			
Walkability Ratio	1.5	1.6	2.0	1.7	0.7			
Average Plot Size in Informal Land Subdivisions								
Average Plot Size in Formal Land Subdivisions	469		353	267	68			
Stages in the Evolution of Resident	ial Layou	uts						
Share of Built-up Area That Is Residential	48%	31%	42%	40%	36%			
Share of Residential Areas Not Laid Out Before Development	41%	40%	88%	64%	45%			
Share of Residential Areas Laid Out Before Development	59%	60%	12%	36%	55%			
Share of Residential Area in Informal Land Subdivisions	0%	0%	0%	1%	28%			
Share of Residential Area in Formal Land Subdivisions	58%	53%	6%	14%	38%			
Share of Residential Area in Housing Projects	2%	7%	6%	20%	39%			

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)



Share of Roads Less Than 4-meters Wide



Bangkok, Thailand (Southeast Asia 1900 – 2015)



Bangkok, Thailand (Southeast Asia 1900 - 2015)

Urban Layout Metrics	Pre- 1900	1900 - 1922	1922 - 1953	1953 - 1988	1988 - 2015			
Roads								
Share of Built-up Area Occupied by Roads	18%	15%	18%	21%	11%			
Share of Built-up Area That Is Gridded	8%	0%	3%	8%	3%			
Share of Roads Less Than 4 Meters Wide	19%	23%	14%	17%	27%			
Share of Roads More Than 16 Meters Wide	17%	12%	15%	10%	9%			
Arterial Roads								
Total Area of Zone (km ²)	35	13	57	1538	2966			
Total Length of Arterial Roads (km ²)	89	28	82	1390	1667			
Density of All Arterial Roads (km/km ²)	2.55	2.16	1.42	0.90	0.47			
Average Beeline Distance to All Arterial Roads (meters)	138	221	240	549	921			
Share of Area within Walking Distance of All Arterial Roads	99%	94%	95%	69%	49%			
Block Size, Plot Size, Intersection Density, and Walkability								
Share of Intersections that are 4-Way	14%	7%	10%	9%	12%			
Average Block Size (ha)	4.1	6.4	6.3	9.0	5.5			
4-Way Intersection Density (number per km ²)	13	4	5	5	7			
Walkability Ratio	1.6	1.6	1.7	1.5	1.0			
Average Plot Size in Informal Land Subdivisions								
Average Plot Size in Formal Land Subdivisions			295	216				
Stages in the Evolution of Resident	ial Layou	uts						
Share of Built-up Area That Is Residential	43%	50%	47%	51%	30%			
Share of Residential Areas Not Laid Out Before Development	87%	94%	93%	61%	35%			
Share of Residential Areas Laid Out Before Development	13%	6%	7%	39%	65%			
Share of Residential Area in Informal Land Subdivisions	0%	0%	0%	0%	31%			
Share of Residential Area in Formal Land Subdivisions	13%	6%	5%	27%	25%			
Share of Residential Area in Housing Projects	0%	1%	2%	11%	46%			

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)







Pre1900 1900-1922 1922-1953 1953-1988 1988-2015

30

60 km

Beijing, China (Eastern Asia & the Pacific 1900 – 2013)





Arterial Roads

No data

Beijing, China (Eastern Asia & the Pacific 1900 – 2013)

Urban Layout Metrics	Pre- 1900	1900 - 1929	1929- 1959	1959 - 1988	1988 2013
Roads					
Share of Built-up Area Occupied by Roads	23%	32%	24%	24%	12%
Share of Built-up Area That Is Gridded	3%	4%	3%	3%	3%
Share of Roads Less Than 4 Meters Wide	27%	21%	18%	41%	22%
Share of Roads More Than 16 Meters Wide	19%	29%	25%	16%	15%
Arterial Roads					
Total Area of Zone (km ²)	55	6	107	2628	1301
Total Length of Arterial Roads (km ²)	204	22	351	3525	1821
Density of All Arterial Roads (km/km ²)	3.69	3.89	3.26	1.34	0.67
Average Beeline Distance to All Arterial Roads (meters)	103	102	123	791	573
Share of Area within Walking Distance of All Arterial Roads	100%	100%	99%	67%	71%
Block Size, Plot Size, Intersection De	ensity, and Wa	lkability			
Share of Intersections that are 4-Way	13%	15%	9%	7%	18%
Average Block Size (ha)	4.7	3.7	8.4	9.4	2.6
4-Way Intersection Density (number per km ²)	10	14	6	12	36
Walkability Ratio	1.5	1.4	1.6	1.7	0.8
Average Plot Size in Informal Land Subdivisions				377	
Average Plot Size in Formal Land Subdivisions				421	
Stages in the Evolution of Resi	dential Layou	its			
Share of Built-up Area That Is Residential	44%	30%	29%	32%	20%
Share of Residential Areas Not Laid Out Before Development	35%	26%	5%	61%	11%
Share of Residential Areas Laid Out Before Development	65%	74%	95%	39%	89%
Share of Residential Area in Informal Land Subdivisions	0%	0%	0%	33%	48%

Average Block Size (hectares)

Share of Residential Area in Housing Projects

Share of Residential Area in Formal Land Subdivisions



Share of Area Within Walking Distance of Arterial Road (625m)

21%

44%

6%

68%

23%

72%



Share of Roads Less Than 4-meters Wide

4%

43%

38%



Buenos Aires, Argentina (Latin America & the Caribbean 1887-2014)





Buenos Aires, Argentina (Latin America & the Caribbean 1887-2014)

Urban Layout Metrics	Pre- 1887	1887- 1918	1918 - 1964	1964 - 1989	1989 - 2014			
Roads								
Share of Built-up Area Occupied by Roads	27%	26%	26%	25%	6%			
Share of Built-up Area That Is Gridded	100%	90%	90%	70%	73%			
Share of Roads Less Than 4 Meters Wide	2%	3%	3%	4%	12%			
Share of Roads More Than 16 Meters Wide	29%	19%	13%	10%	3%			
Arterial Roads								
Total Area of Zone (km ²)	20	491	496	827	1941			
Total Length of Arterial Roads (km ²)	59	655	467	462	4164			
Density of All Arterial Roads (km/km ²)	2.69	1.33	0.94	0.56	1.22			
Average Beeline Distance to All Arterial Roads (meters)	104	352	468	809	349			
Share of Area within Walking Distance of All Arterial Roads	100%	82%	73%	52%	82%			
Block Size, Plot Size, Intersection Density, and Walkability								
Share of Intersections that are 4-Way	86%	50%	54%	41%	25%			
Average Block Size (ha)	1.8	2.8	1.8	3.5	3.6			
4-Way Intersection Density (number per km ²)	58	46	54	37	42			
Walkability Ratio	1.3	1.4	1.4	1.5	0.5			
Average Plot Size in Informal Land Subdivisions		332	277		103			
Average Plot Size in Formal Land Subdivisions	168	197	311	324				
Stages in the Evolution of Resident	tial Layou	its						
Share of Built-up Area That Is Residential	43%	52%	62%	52%	67%			
Share of Residential Areas Not Laid Out Before Development	0%	4%	2%	0%	13%			
Share of Residential Areas Laid Out Before Development	100%	96%	98%	100%	87%			
Share of Residential Area in Informal Land Subdivisions	0%	6%	45%	65%	28%			
Share of Residential Area in Formal Land Subdivisions	100%	89%	51%	34%	17%			
Share of Residential Area in Housing Projects	0%	1%	2%	1%	18%			

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)



Share of Roads Less Than 4-meters Wide



Cairo, Egypt (Western Asia and North Africa 1897–2013)

X



Cairo, Egypt (Western Asia and North Africa 1897-2013)

Market
144
Chail St.

Urban Layout Metrics	Pre- 1987	1897- 1927	1927 - 1960	1960 - 1992	1992 - 2013			
Roads								
Share of Built-up Area Occupied by Roads	23%	27%	29%	21%	12%			
Share of Built-up Area That Is Gridded	15%	13%	17%	5%	8%			
Share of Roads Less Than 4 Meters Wide	38%	14%	14%	14%	26%			
Share of Roads More Than 16 Meters Wide	13%	24%	26%	18%	19%			
Arterial Roads								
Total Area of Zone (km ²)	16	20	29	550	1368			
Total Length of Arterial Roads (km ²)	45	82	122	1294	1560			
Density of All Arterial Roads (km/km ²)	2.85	4.14	4.25	2.35	1.13			
Average Beeline Distance to All Arterial Roads (meters)	137	101	97	488	584			
Share of Area within Walking Distance of All Arterial Roads	100%	100%	100%	81%	68%			
Block Size, Plot Size, Intersection Density, and Walkability								
Share of Intersections that are 4-Way	14%	25%	26%	14%	16%			
Average Block Size (ha)	1.1	1.9	2.6	5.0	4.5			
4-Way Intersection Density (number per km ²)	44	46	49	20	36			
Walkability Ratio	1.5	1.6	1.6	1.6	0.6			
Average Plot Size in Informal Land Subdivisions	128	148	87	77	190			
Average Plot Size in Formal Land Subdivisions	332	665	618	486	217			
Stages in the Evolution of Residen	tial Layoເ	its						
Share of Built-up Area That Is Residential	59%	44%	46%	39%	42%			
Share of Residential Areas Not Laid Out Before Development	58%	7%	4%	35%	41%			
Share of Residential Areas Laid Out Before Development	42%	93%	96%	65%	59%			
Share of Residential Area in Informal Land Subdivisions	5%	14%	22%	35%	37%			
Share of Residential Area in Formal Land Subdivisions	36%	78%	70%	25%	28%			
Share of Residential Area in Housing Projects	2%	1%	4%	6%	42%			

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)



Share of Roads Less Than 4-meters Wide



Chicago, United States (Land-Rich Developed Countries 1893 – 2014)







Chicago, United States (Land-Rich Developed Countries 1893 – 2014)



Urban Layout Metrics	Pre- 1893	1893- 1945	1945- 1967	1967- 1989	1989- 2014			
Roads								
Share of Built-up Area Occupied by Roads	34%	28%	23%	19%	14%			
Share of Built-up Area That Is Gridded	83%	80%	30%	8%	0%			
Share of Roads Less Than 4 Meters Wide	8%	8%	8%	11%	29%			
Share of Roads More Than 16 Meters Wide	49%	44%	40%	31%	32%			
Arterial Roads								
Total Area of Zone (km ²)	302	101	2099	84	618			
Total Length of Arterial Roads (km ²)	2990	913	9043	234	681			
Density of All Arterial Roads (km/km ²)	9.89	9.07	4.31	2.78	0.79			
Average Beeline Distance to All Arterial Roads (meters)	49	67	241	410	358			
Share of Area within Walking Distance of All Arterial Roads	100%	100%	90%	77%	81%			
Block Size, Plot Size, Intersection Density, and Walkability								
Share of Intersections that are 4-Way	45%	43%	18%	15%	14%			
Average Block Size (ha)	3.2	2.5	0.1	20.8	3.2			
4-Way Intersection Density (number per km ²)	64	51	15	7	12			
Walkability Ratio	1.5	1.5	1.6	1.4	0.5			
Average Plot Size in Informal Land Subdivisions								
Average Plot Size in Formal Land Subdivisions	374	463	812	1348	1622			
Stages in the Evolution of Resident	tial Layou	Its						
Share of Built-up Area That Is Residential	39%	46%	45%	54%	58%			
Share of Residential Areas Not Laid Out Before Development	0%	0%	7%	2%	19%			
Share of Residential Areas Laid Out Before Development	100%	100%	93%	98%	81%			
Share of Residential Area in Informal Land Subdivisions	0%	0%	3%	8%	0%			
Share of Residential Area in Formal Land Subdivisions	94%	98%	78%	72%	44%			
Share of Residential Area in Housing Projects	6%	2%	11%	18%	36%			

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)







Pre1893 1893-1945 1945-1967 1967-1989 1989-2014

Guatemala City, Guatemala (Latin America & the Caribbean 1900 - 2013)

 $\langle \rangle$


Guatemala City, Guatemala (Latin America & the Caribbean 1900 - 2013)

Urban Layout Metrics	Pre- 1900	1900 - 1936	1936- 1976	1976- 1990	1990 - 2013
Roads					
Share of Built-up Area Occupied by Roads	24%	26%	18%	18%	19%
Share of Built-up Area That Is Gridded	84%	78%	58%	14%	3%
Share of Roads Less Than 4 Meters Wide	8%	7%	12%	15%	13%
Share of Roads More Than 16 Meters Wide	12%	22%	4%	8%	4%
Arterial Roads					
Total Area of Zone (km ²)	11	6	7	198	376
Total Length of Arterial Roads (km ²)	22	18	11	150	579
Density of All Arterial Roads (km/km ²)	1.89	3.16	1.53	0.76	0.88
Average Beeline Distance to All Arterial Roads (meters)	323	182	352	504	390
Share of Area within Walking Distance of All Arterial Roads	82%	94%	80%	69%	78%
Block Size, Plot Size, Intersection Density	, and Wa	alkability			
Share of Intersections that are 4-Way	49%	46%	31%	16%	8%
Average Block Size (ha)	1.6	1.9	1.5	2.9	2.3
4-Way Intersection Density (number per km ²)	62	70	48	22	14
Walkability Ratio	1.5	1.4	1.6	1.7	1.9
Average Plot Size in Informal Land Subdivisions					
Average Plot Size in Formal Land Subdivisions				748	143
Stages in the Evolution of Residenti	al Layoı	uts			
Share of Built-up Area That Is Residential	28%	26%	47%	57%	58%
Share of Residential Areas Not Laid Out Before Development	11%	24%	46%	28%	16%
Share of Residential Areas Laid Out Before Development	89%	76%	54%	72%	84%
Share of Residential Area in Informal Land Subdivisions	1%	29%	3%	14%	46%
Share of Residential Area in Formal Land Subdivisions	86%	48%	52%	53%	30%
Share of Residential Area in Housing Projects	1%	0%	0%	6%	9%



Share of Area Within Walking Distance of Arterial Road (625m)







Istanbul, Turkey (Western Asia 1899 – 2013)









1899

1934





2013

Water

No data

1990

2002



1960

20 km

2013

Arterial Roads

Istanbul, Turkey (Western Asia 1899 – 2013)



Urban Layout Metrics	Pre- 1899	1899- 1934	1934 - 1960	1960 - 1990	1990 - 2013					
Roads										
Share of Built-up Area Occupied by Roads	24%	27%	29%	25%	30%					
Share of Built-up Area That Is Gridded	13%	15%	3%	10%	5%					
Share of Roads Less Than 4 Meters Wide	15%	6%	10%	7%	15%					
Share of Roads More Than 16 Meters Wide	6%	13%	13%	6%	7%					
Arterial Roads										
Total Area of Zone (km ²)	32	58	86	426	1319					
Total Length of Arterial Roads (km ²)	50	87	114	538	2989					
Density of All Arterial Roads (km/km ²)	1.59	1.50	1.32	1.26	1.69					
Average Beeline Distance to All Arterial Roads (meters)	256	309	308	592	263					
Share of Area within Walking Distance of All Arterial Roads	93%	88%	88%	80%	90%					
Block Size, Plot Size, Intersection Density, and Walkability										
Share of Intersections that are 4-Way	21%	17%	16%	17%	6%					
Average Block Size (ha)	1.2	2.5	2.6	2.1	4.8					
4-Way Intersection Density (number per km ²)	57	26	24	36	15					
Walkability Ratio	1.6	1.8	1.8	1.7	2.0					
Average Plot Size in Informal Land Subdivisions										
Average Plot Size in Formal Land Subdivisions		473	446	235	318					
Stages in the Evolution of Resident	ial Layou	ıts								
Share of Built-up Area That Is Residential	48%	50%	46%	48%	36%					
Share of Residential Areas Not Laid Out Before Development	59%	42%	28%	39%	25%					
Share of Residential Areas Laid Out Before Development	41%	58%	72%	61%	75%					
Share of Residential Area in Informal Land Subdivisions	0%	0%	0%	0%	16%					
Share of Residential Area in Formal Land Subdivisions	40%	55%	59%	50%	31%					
Share of Residential Area in Housing Projects	2%	3%	13%	10%	29%					



Share of Area Within Walking Distance of Arterial Road (625m)



Share of Roads Less Than 4-meters Wide



Jeddah, Saudi Arabia (Western Asia and North Africa 1900 – 2013)

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Jeddah, Saudi Arabia (Western Asia and North Africa 1900 – 2013)

Urban Layout Metrics	Pre- 1900	1900 - 1925	1925 - 1964	1964 - 1990	1990 - 2013
Roads					
Share of Built-up Area Occupied by Roads	19%		31%	30%	28%
Share of Built-up Area That Is Gridded	0%		16%	5%	3%
Share of Roads Less Than 4 Meters Wide	14%		8%	5%	14%
Share of Roads More Than 16 Meters Wide	24%		21%	41%	15%
Arterial Roads					
Total Area of Zone (km ²)	0.4		35	249	798
Total Length of Arterial Roads (km ²)	1		108	1107	804
Density of All Arterial Roads (km/km ²)	3.67		3.08	4.44	1.18
Average Beeline Distance to All Arterial Roads (meters)	70		127	124	505
Share of Area within Walking Distance of All Arterial Roads	100%		100%	98%	77%
Block Size, Plot Size, Intersection Density	, and Wal	kability			
Share of Intersections that are 4-Way	6%		24%	13%	12%
Average Block Size (ha)	3.2		2.6	3.9	4.0
4-Way Intersection Density (number per km ²)	3		51	21	22
Walkability Ratio	1.9		1.5	1.6	1.7
Average Plot Size in Informal Land Subdivisions					
Average Plot Size in Formal Land Subdivisions			496	583	
Stages in the Evolution of Resident	tial Layout	ts			
Share of Built-up Area That Is Residential	36%		38%	33%	27%
Share of Residential Areas Not Laid Out Before Development	67%		44%	8%	11%
Share of Residential Areas Laid Out Before Development	33%		56%	92%	89%
Share of Residential Area in Informal Land Subdivisions	0%		0%	4%	18%
Share of Residential Area in Formal Land Subdivisions	33%		53%	39%	67%
Share of Residential Area in Housing Projects	0%		3%	16%	4%

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)







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Johannesburg, South Africa (Sub-Saharan Africa 1900 – 2013)





Johannesburg, South Africa (Sub-Saharan Africa 1900 – 2013)



Urban Layout Metrics	Pre- 1900	1900 - 1938	1938 - 1957	1957 - 1990	1990 - 2013				
Roads									
Share of Built-up Area Occupied by Roads	29%	23%	24%	24%	17%				
Share of Built-up Area That Is Gridded	52%	30%	10%	3%	3%				
Share of Roads Less Than 4 Meters Wide	6%	5%	5%	10%	24%				
Share of Roads More Than 16 Meters Wide	38%	31%	37%	25%	4%				
Arterial Roads									
Total Area of Zone (km ²)	23	372	198	1424	2880				
Total Length of Arterial Roads (km ²)	91	1075	525	2807	1827				
Density of All Arterial Roads (km/km ²)	3.95	2.89	2.65	1.97	0.53				
Average Beeline Distance to All Arterial Roads (meters)	107	187	166	287	582				
Share of Area within Walking Distance of All Arterial Roads	100%	95%	98%	89%	64%				
Block Size, Plot Size, Intersection Density, and Walkability									
Share of Intersections that are 4-Way	38%	30%	20%	6%	10%				
Average Block Size (ha)	4.9	7.4	9.0	10.4	4.9				
4-Way Intersection Density (number per km ²)	42	18	9	6	16				
Walkability Ratio	1.5	1.7	1.6	1.7	2.3				
Average Plot Size in Informal Land Subdivisions				230	205				
Average Plot Size in Formal Land Subdivisions	560	1034	1136	960	493				
Stages in the Evolution of Resident	tial Layou	uts							
Share of Built-up Area That Is Residential	26%	52%	47%	57%	64%				
Share of Residential Areas Not Laid Out Before Development	2%	0%	0%	1%	18%				
Share of Residential Areas Laid Out Before Development	98%	100%	100%	99%	82%				
Share of Residential Area in Informal Land Subdivisions		6%		11%	41%				
Share of Residential Area in Formal Land Subdivisions	98%	88%	89%	74%	38%				
Share of Residential Area in Housing Projects	0%	6%	11%	14%	3%				





Share of Area Within Walking Distance of Arterial Road (625m)



Share of Roads Less Than 4-meters Wide



Kolkata, India (South and Central Asia 1883 – 2014)

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Kolkata, India (South and Central Asia 1883 – 2014)

Urban Layout Metrics	Pre- 1883	1883- 1931	1931 - 1961	1961 - 1990	1990 - 2014
Roads					
Share of Built-up Area Occupied by Roads	19%	13%	11%	9%	10%
Share of Built-up Area That Is Gridded	0%	3%	0%	3%	3%
Share of Roads Less Than 4 Meters Wide	29%	31%	46%	58%	60%
Share of Roads More Than 16 Meters Wide	12%	5%	3%	1%	2%
Arterial Roads					
Total Area of Zone (km ²)	28	13	211	398	989
Total Length of Arterial Roads (km ²)	72	15	124	190	794
Density of All Arterial Roads (km/km²)	2.57	1.13	0.59	0.48	0.57
Average Beeline Distance to All Arterial Roads (meters)	179	466	1151	1595	650
Share of Area within Walking Distance of All Arterial Roads	96%	73%	49%	36%	62%
Block Size, Plot Size, Intersection Densit	y, and Wa	lkability			
Share of Intersections that are 4-Way	19%	8%	7%	4%	4%
Average Block Size (ha)	2.8	3.9	5.0	9.8	4.8
4-Way Intersection Density (number per km ²)	24	8	8	4	6
Walkability Ratio	1.4	1.7	1.8	1.6	1.6
Average Plot Size in Informal Land Subdivisions					217
Average Plot Size in Formal Land Subdivisions	141	263	318	351	
Stages in the Evolution of Resident	tial Layou	ıts			
Share of Built-up Area That Is Residential	62%	64%	61%	73%	67%
Share of Residential Areas Not Laid Out Before Development	91%	91%	90%	96%	73%
Share of Residential Areas Laid Out Before Development	9%	9%	10%	4%	27%
Share of Residential Area in Informal Land Subdivisions	0%	0%	0%	0%	16%
Share of Residential Area in Formal Land Subdivisions	9%	4%	5%	3%	3%
Share of Residential Area in Housing Projects	1%	5%	5%	1%	8%

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)



Share of Roads Less Than 4-meters Wide



Pre1883 1883-1931 1931-1961 1961-1990 1990-2014



Kuwait City, Kuwait (Western Asia and North Africa1900 - 2013)





Kuwait City, Kuwait (Western Asia and North Africa1900 - 2013)



Urban Layout Metrics	Pre- 1900	1900 - 1922	1922 - 1963	1963 - 1990	1990 - 2013					
Roads										
Share of Built-up Area Occupied by Roads	22%	30%	30%	21%	27%					
Share of Built-up Area That Is Gridded	0%	5%	0%	0%	0%					
Share of Roads Less Than 4 Meters Wide	7%	17%	8%	6%	7%					
Share of Roads More Than 16 Meters Wide	35%	46%	31%	16%	11%					
Arterial Roads										
Total Area of Zone (km ²)	3	1	37	508	565					
Total Length of Arterial Roads (km ²)	8	2	103	945	1175					
Density of All Arterial Roads (km/km ²)	2.77	2.13	2.78	1.86	2.08					
Average Beeline Distance to All Arterial Roads (meters)	113	101	117	542	248					
Share of Area within Walking Distance of All Arterial Roads	100%	100%	100%	83%	91%					
Block Size, Plot Size, Intersection Density, and Walkability										
Share of Intersections that are 4-Way	26%	38%	14%	5%	7%					
Average Block Size (ha)	8.0	9.8	6.3	9.1	3.6					
4-Way Intersection Density (number per km ²)	8	5	6	2	13					
Walkability Ratio	1.6	2.1	1.8	2.0	2.1					
Average Plot Size in Informal Land Subdivisions										
Average Plot Size in Formal Land Subdivisions			615	639						
Stages in the Evolution of Resident	tial Layou	its								
Share of Built-up Area That Is Residential	9%	13%	30%	33%	28%					
Share of Residential Areas Not Laid Out Before Development	0%	0%	0%	0%	4%					
Share of Residential Areas Laid Out Before Development	100%	100%	100%	100%	96%					
Share of Residential Area in Informal Land Subdivisions	0%	0%	0%	4%	19%					
Share of Residential Area in Formal Land Subdivisions	28%	100%	97%	94%	73%					
Share of Residential Area in Housing Projects	24%	0%	18%	7%	4%					

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)



Share of Roads Less Than 4-meters Wide



Lagos, Nigeria (West Africa 1900 – 2013)















Lagos, Nigeria (West Africa 1900 – 2013)

Urban Layout Metrics	Pre- 1900	1900 - 1920	1920 - 1962	1962 - 1984	1984 - 2013					
Roads										
Share of Built-up Area Occupied by Roads	23%	17%	16%	17%	17%					
Share of Built-up Area That Is Gridded	0%	43%	20%	5%	0%					
Share of Roads Less Than 4 Meters Wide	17%	5%	5%	6%	25%					
Share of Roads More Than 16 Meters Wide	10%	12%	10%	9%	3%					
Arterial Roads										
Total Area of Zone (km ²)	4	5	66	250	830					
Total Length of Arterial Roads (km ²)	2	9	57	242	509					
Density of All Arterial Roads (km/km ²)	0.52	1.66	0.87	0.97	0.42					
Average Beeline Distance to All Arterial Roads (meters)	476	247	472	1750	787					
Share of Area within Walking Distance of All Arterial Roads	68%	93%	72%	59%	52%					
Block Size, Plot Size, Intersection Density, and Walkability										
Share of Intersections that are 4-Way	28%	32%	9%	7%	2%					
Average Block Size (ha)	1.9	6.5	7.0	5.6	4.7					
4-Way Intersection Density (number per km ²)	49	10	7	5	3					
Walkability Ratio	1.4	1.6	1.6	1.8	1.8					
Average Plot Size in Informal Land Subdivisions				648						
Average Plot Size in Formal Land Subdivisions			399	610						
Stages in the Evolution of Residenti	ial Layou	ts								
Share of Built-up Area That Is Residential	45%	28%	43%	62%	60%					
Share of Residential Areas Not Laid Out Before Development	84%	20%	58%	58%	52%					
Share of Residential Areas Laid Out Before Development	16%	80%	42%	42%	48%					
Share of Residential Area in Informal Land Subdivisions	3%	16%	9%	23%	41%					
Share of Residential Area in Formal Land Subdivisions	13%	43%	29%	13%	0%					
Share of Residential Area in Housing Projects	0%	21%	4%	6%	6%					



Share of Area Within Walking Distance of Arterial Road (625m)







Pre1900 1900-1920 1920-1962 1962-1984 1984-2013

London, United Kingdom (Europe & Japan 1880– 2013)





London, United Kingdom (Europe & Japan 1880- 2013)



Urban Layout Metrics	Pre- 1880	1880 - 1929	1929 - 1955	1955 - 1989	1989 - 2013					
Roads										
Share of Built-up Area Occupied by Roads	21%	18%	18%	20%	10%					
Share of Built-up Area That Is Gridded	0%	0%	0%	0%	0%					
Share of Roads Less Than 4 Meters Wide	5%	8%	9%	12%	18%					
Share of Roads More Than 16 Meters Wide	10%	9%	12%	7%	4%					
Arterial Roads										
Total Area of Zone (km ²)	376	307	455	1719	838					
Total Length of Arterial Roads (km ²)	558	323	399	626	1527					
Density of All Arterial Roads (km/km ²)	1.48	1.05	0.88	0.36	1.62					
Average Beeline Distance to All Arterial Roads (meters)	281	366	554	1477	207					
Share of Area within Walking Distance of All Arterial Roads	90%	83%	71%	40%	95%					
Block Size, Plot Size, Intersection Density, and Walkability										
Share of Intersections that are 4-Way	15%	17%	16%	2%	4%					
Average Block Size (ha)	3.3	5.6	8.6	17.2	8.2					
4-Way Intersection Density (number per km ²)	15	10	6	2	10					
Walkability Ratio	1.6	1.9	1.6	1.7	1.7					
Average Plot Size in Informal Land Subdivisions										
Average Plot Size in Formal Land Subdivisions	404	491	528	698	612					
Stages in the Evolution of Resident	ial Layou	ıts								
Share of Built-up Area That Is Residential	57%	65%	60%	52%	43%					
Share of Residential Areas Not Laid Out Before Development	0%	0%	0%	9%	13%					
Share of Residential Areas Laid Out Before Development	100%	100%	100%	91%	87%					
Share of Residential Area in Informal Land Subdivisions	0%	0%	0%	0%	0%					
Share of Residential Area in Formal Land Subdivisions	24%	46%	67%	42%	87%					
Share of Residential Area in Housing Projects	76%	54%	33%	49%	0%					



Share of Area Within Walking Distance of Arterial Road (625m)



Share of Roads Less Than 4-meters Wide



Los Angeles, United States (Land-Rich Developed Countries 1907 – 2014)







Los Angeles, United States (Land-Rich Developed Countries 1907 – 2014)



Urban Layout Metrics	Pre- 1907	1907 - 1937	1930 - 1970	1970 - 1990	1990 - 2014					
Roads										
Share of Built-up Area Occupied by Roads	27%	24%	23%	22%	26%					
Share of Built-up Area That Is Gridded	33%	53%	28%	0%	0%					
Share of Roads Less Than 4 Meters Wide	7%	5%	7%	6%	18%					
Share of Roads More Than 16 Meters Wide	50%	48%	41%	44%	21%					
Arterial Roads										
Total Area of Zone (km ²)	89	900	948	84	1298					
Total Length of Arterial Roads (km ²)	706	5167	3774	321	1665					
Density of All Arterial Roads (km/km ²)	7.90	5.74	3.98	3.82	1.04					
Average Beeline Distance to All Arterial Roads (meters)	72	122	177	120	461					
Share of Area within Walking Distance of All Arterial Roads	99%	97%	94%	100%	78%					
Block Size, Plot Size, Intersection Density, and Walkability										
Share of Intersections that are 4-Way	33%	45%	19%	10%	6%					
Average Block Size (ha)	4.5	3.8	9.2	10.6	6.5					
4-Way Intersection Density (number per km ²)	23	29	16	5	8					
Walkability Ratio	1.7	1.4	1.7	1.8	2.0					
Average Plot Size in Informal Land Subdivisions										
Average Plot Size in Formal Land Subdivisions	665	689	780	921	789					
Stages in the Evolution of Resident	ial Layou	uts								
Share of Built-up Area That Is Residential	38%	59%	53%	59%	48%					
Share of Residential Areas Not Laid Out Before Development	7%	0%	0%	2%	20%					
Share of Residential Areas Laid Out Before Development	93%	100%	100%	98%	80%					
Share of Residential Area in Informal Land Subdivisions	0%	0%	0%	1%	3%					
Share of Residential Area in Formal Land Subdivisions	89%	95%	92%	88%	62%					
Share of Residential Area in Housing Projects	4%	5%	8%	9%	15%					

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)



Share of Roads Less Than 4-meters Wide



Manila, Philippines (Southeast Asia 1898 – 2014)





Manila, Philippines (Southeast Asia 1898 - 2014)



Urban Layout Metrics	Pre- 1898	1898 - 1945	1945 - 1971	1971 - 1990	1990 - 2014					
Roads										
Share of Built-up Area Occupied by Roads	25%	23%	19%	15%	23%					
Share of Built-up Area That Is Gridded	35%	20%	8%	0%	0%					
Share of Roads Less Than 4 Meters Wide	10%	9%	10%	17%	26%					
Share of Roads More Than 16 Meters Wide	14%	18%	13%	1%	1%					
Arterial Roads										
Total Area of Zone (km ²)	6	69	67	752	1112					
Total Length of Arterial Roads (km ²)	7	131	139	476	1681					
Density of All Arterial Roads (km/km ²)	1.28	1.89	2.08	0.63	1.05					
Average Beeline Distance to All Arterial Roads (meters)	169	219	186	1014	372					
Share of Area within Walking Distance of All Arterial Roads	100%	96%	98%	52%	81%					
Block Size, Plot Size, Intersection Density, and Walkability										
Share of Intersections that are 4-Way	25%	31%	20%	10%	10%					
Average Block Size (ha)	2.0	2.3	4.5	3.5	2.8					
4-Way Intersection Density (number per km ²)	51	34	19	11	29					
Walkability Ratio	1.4	1.5	1.7	1.6	1.7					
Average Plot Size in Informal Land Subdivisions					94					
Average Plot Size in Formal Land Subdivisions	308	260	471	247	97					
Stages in the Evolution of Resident	tial Layou	uts								
Share of Built-up Area That Is Residential	45%	45%	47%	62%	55%					
Share of Residential Areas Not Laid Out Before Development	39%	46%	40%	58%	36%					
Share of Residential Areas Laid Out Before Development	61%	54%	60%	42%	64%					
Share of Residential Area in Informal Land Subdivisions	2%	0%	0%	0%	33%					
Share of Residential Area in Formal Land Subdivisions	59%	54%	57%	42%	25%					
Share of Residential Area in Housing Projects	0%	0%	3%	0%	6%					



Share of Area Within Walking Distance of Arterial Road (625m)



Share of Roads Less Than 4-meters Wide



Mexico City, Mexico (Latin America & the Caribbean 1886 - 2014)

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Mexico City, Mexico (Latin America & the Caribbean 1886 - 2014)



Urban Layout Metrics	Pre- 1886	1886 - 1929	1929 - 1970	1970 - 1990	1990 - 2014					
Roads										
Share of Built-up Area Occupied by Roads	20%	31%	27%	23%	23%					
Share of Built-up Area That Is Gridded	63%	75%	50%	28%	8%					
Share of Roads Less Than 4 Meters Wide	7%	4%	5%	6%	18%					
Share of Roads More Than 16 Meters Wide	14%	32%	25%	14%	4%					
Arterial Roads										
Total Area of Zone (km ²)	12	35	88	1205	572					
Total Length of Arterial Roads (km ²)	32	141	299	1826	876					
Density of All Arterial Roads (km/km ²)	2.64	4.01	3.41	1.52	0.77					
Average Beeline Distance to All Arterial Roads (meters)	155	97	123	480	418					
Share of Area within Walking Distance of All Arterial Roads	99%	100%	99%	77%	77%					
Block Size, Plot Size, Intersection Density, and Walkability										
Share of Intersections that are 4-Way	45%	53%	43%	27%	13%					
Average Block Size (ha)	1.9	2.6	2.2	4.8	3.1					
4-Way Intersection Density (number per km ²)	45	50	52	29	26					
Walkability Ratio	1.4	1.4	1.5	1.7	1.7					
Average Plot Size in Informal Land Subdivisions					132					
Average Plot Size in Formal Land Subdivisions	109	199	172	247	196					
Stages in the Evolution of Resident	ial Layou	uts								
Share of Built-up Area That Is Residential	35%	45%	47%	52%	48%					
Share of Residential Areas Not Laid Out Before Development	2%	3%	2%	9%	27%					
Share of Residential Areas Laid Out Before Development	98%	97%	98%	91%	73%					
Share of Residential Area in Informal Land Subdivisions	0%	0%	0%	8%	34%					
Share of Residential Area in Formal Land Subdivisions	98%	97%	97%	78%	34%					
Share of Residential Area in Housing Projects	0%	1%	1%	5%	4%					



Share of Area Within Walking Distance of Arterial Road (625m)



Share of Roads Less Than 4-meters Wide



Moscow, The Russian Federation (Europe & Japan 1893 – 2014)



Moscow, The Russian Federation (Europe & Japan 1893 – 2014)

Urban Layout Metrics	Pre- 1893	1893 - 1939	1939 - 1957	1957 - 1991	1991 - 2014					
Roads										
Share of Built-up Area Occupied by Roads	22%	20%	20%	18%	15%					
Share of Built-up Area That Is Gridded	0%	5%	0%	8%	3%					
Share of Roads Less Than 4 Meters Wide	3%	8%	10%	9%	32%					
Share of Roads More Than 16 Meters Wide	31%	30%	34%	15%	3%					
Arterial Roads										
Total Area of Zone (km ²)	68	100	193	1253	2109					
Total Length of Arterial Roads (km ²)	294	272	486	1519	1202					
Density of All Arterial Roads (km/km ²)	4.35	2.73	2.52	1.21	0.48					
Average Beeline Distance to All Arterial Roads (meters)	87	144	152	761	981					
Share of Area within Walking Distance of All Arterial Roads	100%	98%	99%	68%	48%					
Block Size, Plot Size, Intersection Density, and Walkability										
Share of Intersections that are 4-Way	21%	18%	16%	8%	11%					
Average Block Size (ha)	5.0	9.4	6.2	4.5	4.8					
4-Way Intersection Density (number per km ²)	10	6	13	7	22					
Walkability Ratio	1.7	1.6	1.6	1.6	2.1					
Average Plot Size in Informal Land Subdivisions					1099					
Average Plot Size in Formal Land Subdivisions					962					
Stages in the Evolution of Resident	ial Layou	ıts								
Share of Built-up Area That Is Residential	31%	41%	34%	38%	73%					
Share of Residential Areas Not Laid Out Before Development	0%	0%	0%	15%	0%					
Share of Residential Areas Laid Out Before Development	100%	100%	100%	85%	100%					
Share of Residential Area in Informal Land Subdivisions	0%	6%	0%	21%	75%					
Share of Residential Area in Formal Land Subdivisions	89%	56%	48%	28%	11%					
Share of Residential Area in Housing Projects	11%	38%	52%	36%	14%					

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)



Share of Roads Less Than 4-meters Wide



Mumbai, India (South and Central Asia 1909 – 2014)

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Mumbai, India (South and Central Asia 1909 – 2014)

Urban Layout Metrics	Pre- 1909	1909 - 1931	1931 - 1968	1968 - 1991	1991 - 2014			
Roads								
Share of Built-up Area Occupied by Roads	18%	14%	13%	15%	21%			
Share of Built-up Area That Is Gridded	0%	0%	0%	3%	3%			
Share of Roads Less Than 4 Meters Wide	9%	8%	19%	14%	24%			
Share of Roads More Than 16 Meters Wide	16%	20%	16%	21%	11%			
Arterial Roads								
Total Area of Zone (km ²)	15	29	23	382	713			
Total Length of Arterial Roads (km ²)	40	75	48	567	897			
Density of All Arterial Roads (km/km ²)	2.58	2.62	2.16	1.48	0.90			
Average Beeline Distance to All Arterial Roads (meters)	153	155	225	398	447			
Share of Area within Walking Distance of All Arterial Roads	99%	99%	92%	83%	75%			
Block Size, Plot Size, Intersection Density, and Walkability								
Share of Intersections that are 4-Way	15%	20%	6%	11%	8%			
Average Block Size (ha)	3.0	6.0	7.9	7.2	4.4			
4-Way Intersection Density (number per km ²)	17	9	4	4	12			
Walkability Ratio	1.5	1.6	1.5	1.6	1.8			
Average Plot Size in Informal Land Subdivisions								
Average Plot Size in Formal Land Subdivisions		535	496	779				
Stages in the Evolution of Residential Layouts								
Share of Built-up Area That Is Residential	45%	47%	41%	60%	42%			
Share of Residential Areas Not Laid Out Before Development	69%	65%	68%	66%	61%			
Share of Residential Areas Laid Out Before Development	31%	35%	32%	34%	39%			
Share of Residential Area in Informal Land Subdivisions	0%	0%	0%	0%	0%			
Share of Residential Area in Formal Land Subdivisions	29%	18%	16%	17%	14%			
Share of Residential Area in Housing Projects	2%	17%	16%	17%	25%			

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)







Pre1909 1909-1931 1931-1968 1968-1991 1991-2014



Nairobi, Kenya (East Africa 1906 - 2010)





Nairobi, Kenya (East Africa 1906 – 2010)



Urban Layout Metrics	Pre- 1906	1906 - 1926	1926 - 1964	1964 - 1988	1988 - 2010			
Roads								
Share of Built-up Area Occupied by Roads	27%	19%	17%	17%	19%			
Share of Built-up Area That Is Gridded	0%	3%	3%	0%	0%			
Share of Roads Less Than 4 Meters Wide	5%	5%	4%	13%	34%			
Share of Roads More Than 16 Meters Wide	25%	23%	28%	4%	3%			
Arterial Roads								
Total Area of Zone (km ²)	2	22	69	563	788			
Total Length of Arterial Roads (km ²)	9	80	118	426	638			
Density of All Arterial Roads (km/km ²)	5.29	3.62	1.71	0.76	0.81			
Average Beeline Distance to All Arterial Roads (meters)	65	109	271	646	521			
Share of Area within Walking Distance of All Arterial Roads	100%	100%	90%	63%	72%			
Block Size, Plot Size, Intersection Density, and Walkability								
Share of Intersections that are 4-Way	28%	10%	6%	4%	6%			
Average Block Size (ha)	5.0	7.3	17.5	16.8	9.5			
4-Way Intersection Density (number per km ²)	23	6	3	3	10			
Walkability Ratio	2.0	1.6	1.5	1.5	1.6			
Average Plot Size in Informal Land Subdivisions				2053				
Average Plot Size in Formal Land Subdivisions	357	402	2600	1005				
Stages in the Evolution of Residential Layouts								
Share of Built-up Area That Is Residential	24%	37%	59%	51%	54%			
Share of Residential Areas Not Laid Out Before Development	0%	3%	5%	32%	19%			
Share of Residential Areas Laid Out Before Development	100%	97%	95%	68%	81%			
Share of Residential Area in Informal Land Subdivisions	15%	16%	25%	57%	68%			
Share of Residential Area in Formal Land Subdivisions	70%	57%	32%	8%	10%			
Share of Residential Area in Housing Projects	14%	19%	18%	3%	3%			

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)







Paris, France (Europe & Japan 1900 – 2014)













Paris, France (Europe & Japan 1900 – 2014)

Urban Layout Metrics	Pre- 1900	1900 - 1928	1928 - 1955	1955 - 1987	1987 - 2014			
Roads								
Share of Built-up Area Occupied by Roads	26%	19%	18%	19%	15%			
Share of Built-up Area That Is Gridded	5%	10%	8%	3%	0%			
Share of Roads Less Than 4 Meters Wide	7%	12%	8%	12%	28%			
Share of Roads More Than 16 Meters Wide	21%	11%	6%	5%	5%			
Arterial Roads								
Total Area of Zone (km ²)	231	92	359	28	1130			
Total Length of Arterial Roads (km ²)	514	95	204	19	2538			
Density of All Arterial Roads (km/km ²)	2.23	1.03	0.57	0.66	1.89			
Average Beeline Distance to All Arterial Roads (meters)	276	618	883	1476	206			
Share of Area within Walking Distance of All Arterial Roads	87%	68%	55%	44%	93%			
Block Size, Plot Size, Intersection Density, and Walkability								
Share of Intersections that are 4-Way	27%	32%	17%	7%	10%			
Average Block Size (ha)	2.7	3.8	4.7	7.9	6.7			
4-Way Intersection Density (number per km ²)	24	22	14	7	10			
Walkability Ratio	1.5	1.6	1.6	1.8	1.6			
Average Plot Size in Informal Land Subdivisions								
Average Plot Size in Formal Land Subdivisions	333	469	450	565	545			
Stages in the Evolution of Residential Layouts								
Share of Built-up Area That Is Residential	57%	60%	61%	51%	49%			
Share of Residential Areas Not Laid Out Before Development	12%	37%	10%	32%	29%			
Share of Residential Areas Laid Out Before Development	88%	63%	90%	68%	61%			
Share of Residential Area in Informal Land Subdivisions	0%	0%	0%	0%	2%			
Share of Residential Area in Formal Land Subdivisions	76%	43%	79%	53%	667%			
Share of Residential Area in Housing Projects	12%	21%	16%	15%	1%			



Share of Area Within Walking Distance of Arterial Road (625m)







Santiago, Chile (Latin America & the Caribbean 1900 – 2014)

*



Santiago, Chile (Latin America & the Caribbean 1900 – 2014)

Urban Layout Metrics	Pre- 1900	1900 - 1930	1930 - 1970	1970 - 1990	1990 - 2014			
Roads								
Share of Built-up Area Occupied by Roads	26%	25%	25%	23%	18%			
Share of Built-up Area That Is Gridded	60%	35%	25%	30%	5%			
Share of Roads Less Than 4 Meters Wide	4%	3%	3%	6%	16%			
Share of Roads More Than 16 Meters Wide	27%	36%	31%	18%	10%			
Arterial Roads								
Total Area of Zone (km ²)	161	48	42	448	761			
Total Length of Arterial Roads (km ²)	54	272	183	1282	1346			
Density of All Arterial Roads (km/km ²)	3.36	5.66	4.39	2.86	1.04			
Average Beeline Distance to All Arterial Roads (meters)	108	69	86	195	474			
Share of Area within Walking Distance of All Arterial Roads	100%	100%	100%	95%	79%			
Block Size, Plot Size, Intersection Density, and Walkability								
Share of Intersections that are 4-Way	54%	32%	35%	21%	14%			
Average Block Size (ha)	2.4	3.2	3.2	5.7	6.5			
4-Way Intersection Density (number per km ²)	39	26	29	25	20			
Walkability Ratio	1.4	1.5	1.5	1.7	2.0			
Average Plot Size in Informal Land Subdivisions								
Average Plot Size in Formal Land Subdivisions		273	385	713	282			
Stages in the Evolution of Residential Layouts								
Share of Built-up Area That Is Residential	34%	45%	47%	46%	50%			
Share of Residential Areas Not Laid Out Before Development	1%	0%	0%	2%	16%			
Share of Residential Areas Laid Out Before Development	99%	100%	100%	98%	84%			
Share of Residential Area in Informal Land Subdivisions	0%	0%	0%	0%	5%			
Share of Residential Area in Formal Land Subdivisions	93%	92%	96%	74%	63%			
Share of Residential Area in Housing Projects	6%	8%	4%	18%	15%			

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)







Pre1900 1900-1930 1930-1970 1970-1990 1990-2014

*

São Paulo, Brazil (Latin America & the Caribbean 1905 - 2014)





Sao Paulo, Brazil 1905 1905-2014 1929 1974 40 km



CBD

Water

No data

Study area

São Paulo, Brazil (Latin America & the Caribbean 1905 – 2014)



Urban Layout Metrics	Pre- 1905	1905 - 1929	1929 - 1974	1974 - 1988	1988 - 2014			
Roads								
Share of Built-up Area Occupied by Roads	25%	24%	26%	23%	23%			
Share of Built-up Area That Is Gridded	33%	25%	23%	8%	3%			
Share of Roads Less Than 4 Meters Wide	3%	4%	5%	4%	10%			
Share of Roads More Than 16 Meters Wide	29%	30%	18%	11%	2%			
Arterial Roads								
Total Area of Zone (km ²)	24	80	168	1655	843			
Total Length of Arterial Roads (km ²)	34	87	168	1037	1133			
Density of All Arterial Roads (km/km ²)	1.44	1.10	1.01	0.63	0.84			
Average Beeline Distance to All Arterial Roads (meters)	248	310	393	969	539			
Share of Area within Walking Distance of All Arterial Roads	95%	88%	80%	54%	68%			
Block Size, Plot Size, Intersection Density, and Walkability								
Share of Intersections that are 4-Way	37%	40%	22%	18%	7%			
Average Block Size (ha)	2.7	3.0	2.7	4.3	6.2			
4-Way Intersection Density (number per km ²)	25	27	20	18	6			
Walkability Ratio	1.5	1.6	1.7	1.7	1.7			
Average Plot Size in Informal Land Subdivisions								
Average Plot Size in Formal Land Subdivisions	223	213	399	279				
Stages in the Evolution of Residential Layouts								
Share of Built-up Area That Is Residential	38%	50%	53%	47%	53%			
Share of Residential Areas Not Laid Out Before Development	0%	0%	1%	3%	21%			
Share of Residential Areas Laid Out Before Development	100%	100%	99%	97%	79%			
Share of Residential Area in Informal Land Subdivisions	0%	0%	0%	7%	24%			
Share of Residential Area in Formal Land Subdivisions	97%	96%	96%	88%	49%			
Share of Residential Area in Housing Projects	3%	4%	3%	2%	6%			



Share of Area Within Walking Distance of Arterial Road (625m)



Share of Roads Less Than 4-meters Wide



Shanghai, China (Eastern Asia & the Pacific 1902 – 2015)

















Shanghai, China (Eastern Asia & the Pacific 1902 - 2015)

Urban Layout Metrics	Pre- 1902	1902 - 1944	1944 - 1973	1973 - 1991	1991 2015
Roads					
Share of Built-up Area Occupied by Roads	28%	29%	25%	26%	20%
Share of Built-up Area That Is Gridded	5%	0%	8%	0%	8%
Share of Roads Less Than 4 Meters Wide	13%	7%	12%	13%	40%
Share of Roads More Than 16 Meters Wide	27%	38%	22%	23%	18%
Arterial Roads					
Total Area of Zone (km ²)	19	51	32	1278	600
Total Length of Arterial Roads (km ²)	65	144	105	3356	700
Density of All Arterial Roads (km/km ²)	3.47	2.85	3.27	2.63	0.65
Average Beeline Distance to All Arterial Roads (meters)	95	142	131	206	1286
Share of Area within Walking Distance of All Arterial Roads	100%	98%	98%	93%	63%
Block Size, Plot Size, Intersection De	nsity, and Wa	lkability			
Share of Intersections that are 4-Way	32%	27%	17%	15%	15%
Average Block Size (ha)	3.1	6.5	5.7	7.5	6.4
4-Way Intersection Density (number per km ²)	24	22	22	15	8
Walkability Ratio	1.4	1.5	1.4	1.8	1.7
Average Plot Size in Informal Land Subdivisions					
Average Plot Size in Formal Land Subdivisions			379	319	
Stages in the Evolution of Resid	dential Layou	ıts			
Share of Built-up Area That Is Residential	44%	48%	43%	30%	28%
Share of Residential Areas Not Laid Out Before Development	0%	4%	8%	25%	34%
Share of Residential Areas Laid Out Before Development	100%	96%	92%	75%	66%

Average Block Size (hectares)

Share of Residential Area in Housing Projects

Share of Residential Area in Informal Land Subdivisions

Share of Residential Area in Formal Land Subdivisions



Share of Area Within Walking Distance of Arterial Road (625m)

0%

71%

29%

0%

51%

44%

0%

36%

56%





0%

18%

57%

25%

9%

31%



Sydney, Australia (Land-Rich Developed Countries 1895 – 2014)





20

1975

2014 Arterial Roads

No data
Sydney, Australia (Land-Rich Developed Countries 1895 – 2014)



Urban Layout Metrics	Pre- 1895	1895 - 1945	1945 - 1975	1975 - 1991	1991 - 2014
Roads					
Share of Built-up Area Occupied by Roads	31%	27%	23%	24%	20%
Share of Built-up Area That Is Gridded	20%	10%	3%	3%	3%
Share of Roads Less Than 4 Meters Wide	5%	3%	4%	8%	8%
Share of Roads More Than 16 Meters Wide	37%	54%	59%	54%	16%
Arterial Roads					
Total Area of Zone (km ²)	10	201	314	676	1645
Total Length of Arterial Roads (km ²)	26	1107	1601	2251	2114
Density of All Arterial Roads (km/km ²)	2.66	5.50	5.09	3.33	0.91
Average Beeline Distance to All Arterial Roads (meters)	203	102	110	155	400
Share of Area within Walking Distance of All Arterial Roads	92%	98%	98%	98%	79%
Block Size, Plot Size, Intersection Density	y, and Wa	alkability			
Share of Intersections that are 4-Way	30%	19%	17%	8%	4%
Average Block Size (ha)	2.2	4.4	6.4	9.6	6.2
4-Way Intersection Density (number per km ²)	34	13	6	3	3
Walkability Ratio	1.5	1.7	1.8	1.7	1.8
Average Plot Size in Informal Land Subdivisions					
Average Plot Size in Formal Land Subdivisions	331	479	688	694	707
Stages in the Evolution of Resident	ial Layou	uts			
Share of Built-up Area That Is Residential	39%	52%	60%	62%	61%
Share of Residential Areas Not Laid Out Before Development	0%	0%	0%	0%	13%
Share of Residential Areas Laid Out Before Development	100%	100%	100%	100%	87%
Share of Residential Area in Informal Land Subdivisions	0%	0%	0%	0%	0%
Share of Residential Area in Formal Land Subdivisions	81%	96%	98%	95%	80%
Share of Residential Area in Housing Projects	19%	4%	2%	5%	7%

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)







Tehran, Iran (Western Asia and North Africa 1899 – 2010)

 (Ψ)



Tehran, Iran (Western Asia and North Africa 1899 – 2010)

Urban Layout Metrics	Pre- 1899	1899- 1925	1925 - 1956	1956 - 1991
Roads				
Share of Built-up Area Occupied by Roads	13%	20%	22%	28%
Share of Built-up Area That Is Gridded	0%	5%	20%	18%
Share of Roads Less Than 4 Meters Wide	42%	17%	15%	6%
Share of Roads More Than 16 Meters Wide	22%	18%	20%	22%
Arterial Roads				
Total Area of Zone (km ²)	5	23	27	535
Total Length of Arterial Roads (km ²)	14	61	60	1141
Density of All Arterial Roads (km/km ²)	2.98	2.63	2.17	2.13
Average Beeline Distance to All Arterial Roads (meters)	126	125	199	221
Share of Area within Walking Distance of All Arterial Roads	100%	100%	96%	94%

Block Size, Plot Size, Intersection Density, and Walkability											
Share of Intersections that are 4-Way	8%	18%	25%	22%	11%						
Average Block Size (ha)	3.2	2.2	2.6	7.0	4.6						
4-Way Intersection Density (number per km ²)	8	24	32	23	16						
Walkability Ratio	1.6	1.5	1.5	1.5	1.9						
Average Plot Size in Informal Land Subdivisions											
Average Plot Size in Formal Land Subdivisions			306	222	270						
Stages in the Evolution of Resident	ial Layou	ıts									
Share of Built-up Area That Is Residential	70%	59%	57%	40%	33%						
Share of Residential Areas Not Laid Out Before Development	92%	12%	7%	10%	11%						
Share of Residential Areas Laid Out Before Development	8%	88%	93%	90%	89%						
Share of Residential Area in Informal Land Subdivisions	0%	0%	0%	0%	16%						
Share of Residential Area in Formal Land Subdivisions	8%	88%	90%	75%	46%						
Share of Residential Area in Housing Projects	0%	0%	3%	15%	26%						

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)







 (\mathbf{I})

1991 -

2010

25%

0%

24%

14%

784

1488

1.90

255

91%

Tel Aviv, Israel (Western Asia and North Africa 1917 – 2014)





Tel Aviv, Israel (Western Asia and North Africa 1917 - 2014)



Urban Layout Metrics	Pre- 1917	1917 - 1929	1929 - 1956	1956 - 1987	1987 - 2014
Roads					
Share of Built-up Area Occupied by Roads	23%	27%	25%	21%	19%
Share of Built-up Area That Is Gridded	0%	0%	0%	3%	0%
Share of Roads Less Than 4 Meters Wide	8%	4%	3%	5%	16%
Share of Roads More Than 16 Meters Wide	9%	8%	23%	16%	15%
Arterial Roads					
Total Area of Zone (km ²)	1	2	33	316	602
Total Length of Arterial Roads (km ²)	1	4	58	611	692
Density of All Arterial Roads (km/km ²)	0.69	1.8	1.77	1.93	0.95
Average Beeline Distance to All Arterial Roads (meters)	389	160	135	381	435
Share of Area within Walking Distance of All Arterial Roads	72%	99%	100%	82%	76%
Block Size, Plot Size, Intersection Density	y, and Wa	alkability			
Share of Intersections that are 4-Way	34%	46%	18%	25%	10%
Average Block Size (ha)	2.6	0.9	3.6	4.0	6.1
4-Way Intersection Density (number per km ²)	63	87	22	16	8
Walkability Ratio	1.4	1.4	1.5	1.6	2.0
Average Plot Size in Informal Land Subdivisions					554
Average Plot Size in Formal Land Subdivisions	438	413	482	461	844
Stages in the Evolution of Resident	ial Layou	uts			
Share of Built-up Area That Is Residential	62%	59%	59%	50%	45%
Share of Residential Areas Not Laid Out Before Development	60%	14%	7%	24%	15%
Share of Residential Areas Laid Out Before Development	40%	86%	93%	74%	85%
Share of Residential Area in Informal Land Subdivisions	0%	0%	0%	0%	20%
Share of Residential Area in Formal Land Subdivisions	37%	86%	87%	55%	57%
Share of Residential Area in Housing Projects	3%	0%	6%	21%	7%

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)







Pre1917 1917-1929 1929-1956 1956-1987 1987-2014

Tokyo, Japan (Europe & Japan 1892 – 2014)





Tokyo, Japan (Europe & Japan 1892 – 2014)



Urban Layout Metrics	Pre- 1892	1892 - 1929	1929 - 1954	1954 - 1990	1990 - 2014
Roads					
Share of Built-up Area Occupied by Roads	32%	21%	21%	22%	25%
Share of Built-up Area That Is Gridded	26%	6%	14%	10%	3%
Share of Roads Less Than 4 Meters Wide	26%	48%	35%	44%	51%
Share of Roads More Than 16 Meters Wide	18%	5%	10%	4%	3%
Arterial Roads					
Total Area of Zone (km ²)	68	314	201	133	632
Total Length of Arterial Roads (km ²)	296	5690	313	140	1415
Density of All Arterial Roads (km/km ²)	4.34	1.82	1.56	1.06	1.73
Average Beeline Distance to All Arterial Roads (meters)	91	284	394	543	198
Share of Area within Walking Distance of All Arterial Roads	100%	91%	80%	70%	93%
Block Size, Plot Size, Intersection Density	y, and Wa	alkability			
Share of Intersections that are 4-Way	27%	25%	25%	20%	16%
Average Block Size (ha)	1.8	1.5	3.0	2.7	2.5
4-Way Intersection Density (number per km ²)	71	70	56	41	47
Walkability Ratio	1.4	1.4	1.5	1.6	1.4
Average Plot Size in Informal Land Subdivisions					
Average Plot Size in Formal Land Subdivisions	289	166	150	224	230
Stages in the Evolution of Resident	ial Layou	uts			
Share of Built-up Area That Is Residential	34%	53%	48%	53%	35%
Share of Residential Areas Not Laid Out Before Development	24%	63%	56%	52%	47%
Share of Residential Areas Laid Out Before Development	76%	37%	44%	48%	53%
Share of Residential Area in Informal Land Subdivisions	0%	0%	0%	0%	2%
Share of Residential Area in Formal Land Subdivisions	75%	34%	39%	40%	49%
Share of Residential Area in Housing Projects	1%	3%	5%	9%	2%

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)



Share of Roads Less Than 4-meters Wide



Pre1892 1892-1929 1929-1954 1954-1990 1990-2014

Warsaw, Poland (Europe & Japan 1888 - 2013)







1888

1936





 2013

1992

Esri? HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community 5 Warsaw, Poland ☆ CBD 1888 1992 1888-2013 Study area 1936 2000 1958 2013 Water 20 km Arterial Roads No data

Warsaw, Poland (Europe & Japan 1888 - 2013)

Urban Layout Metrics	Pre- 1888	1888 - 1936	1936 - 1958	1958 - 1992	1992 - 2013
Roads					
Share of Built-up Area Occupied by Roads	28%	25%	19%	16%	15%
Share of Built-up Area That Is Gridded	3%	3%	0%	13%	5%
Share of Roads Less Than 4 Meters Wide	4%	6%	7%	11%	28%
Share of Roads More Than 16 Meters Wide	42%	38%	19%	8%	1%
Arterial Roads					
Total Area of Zone (km ²)	13	24	96	417	746
Total Length of Arterial Roads (km ²)	46	71	140	361	866
Density of All Arterial Roads (km/km ²)	3.52	2.91	1.46	0.86	0.86
Average Beeline Distance to All Arterial Roads (meters)	89	125	344	1004	347
Share of Area within Walking Distance of All Arterial Roads	100%	99%	86%	57%	83%
Block Size, Plot Size, Intersection Density	y, and Wa	alkability			
Share of Intersections that are 4-Way	25%	21%	17%	18%	13%
Average Block Size (ha)	5.7	5.6	6.9	7.1	6.4
4-Way Intersection Density (number per km ²)	13	10	10	10	8
Walkability Ratio	1.6	1.6	1.6	1.5	1.6
Average Plot Size in Informal Land Subdivisions				798	1401
Average Plot Size in Formal Land Subdivisions			764	774	751
Stages in the Evolution of Resident	tial Layou	uts			
Share of Built-up Area That Is Residential	31%	42%	45%	52%	62%
Share of Residential Areas Not Laid Out Before Development	5%	2%	0%	14%	18%
Share of Residential Areas Laid Out Before Development	95%	98%	100%	86%	82%
Share of Residential Area in Informal Land Subdivisions	0%	0%	11%	25%	39%
Share of Residential Area in Formal Land Subdivisions	63%	79%	67%	51%	35%
Share of Residential Area in Housing Projects	31%	19%	22%	10%	7%

Average Block Size (hectares)



Share of Area Within Walking Distance of Arterial Road (625m)







Tables

The tables in this section provide a consolidated report of all the metrics listed in the previous pages for individual cities. Table 1 reports on blocks and roads metrics for 200 cities: pre-1990 and 1990-2014. Table 2: reports on blocks and roads metrics for 30 cities for five periods: from the pre-1900 period to the 1990-2014 period. Cities are listed in alphabetical order in rows and their values for various metrics are listed in columns.

TABLE 1: Blocks and Roads metrics for 200 cities: Pre-1990 and 1990-2014

City Name	City Name Country Region		CBD Lo	ocation	Land Cover Dates			
			Latitude	Longitude	T1	T2	тз	
Accra	Ghana	Sub-Saharan Africa	5.615	-0.159	1/1/91	2/1/00	3/1/14	
Addis Ababa	Ethiopia	Sub-Saharan Africa	9.001	38.756	1/1/86	12/1/00	12/1/10	
Ahmedabad	India	South and Central Asia	23.037	72.589	12/1/89	10/1/00	10/1/13	
Ahvaz	Iran	South and Central Asia	31.320	48.665	11/1/91	9/1/00	9/1/13	
Alexandria	Egypt	Western Asia and North Africa	31.152	29.884	10/1/87	4/1/99	7/1/13	
Algiers	Algeria	Western Asia and North Africa	36.732	3.140	8/1/87	6/1/00	7/1/14	
Anqing, Anhui	China	East Asia and the Pacific	30.536	117.050	9/1/90	4/1/00	10/1/13	
Antwerp	Belgium	Europe and Japan	51.220	4.403	7/1/90	8/1/00	9/1/13	
Arusha	Tanzania	Sub-Saharan Africa	-3.373	36.679	10/1/88	9/1/00	10/1/13	
Astrakhan	Russia	Europe and Japan	46.340	48.020	7/1/88	9/1/03	3/1/14	
Auckland	New Zealand	Land-Rich Developed Countries	-36.915	174.786	6/1/89	9/1/01	4/1/14	
Bacolod	Philippines	Southeast Asia	10.664	122.961	12/1/92	9/1/00	3/1/15	
Baghdad	Iraq	Western Asia and North Africa	33.320	44.379	8/1/90	8/1/00	8/1/13	
Baku	Azerbaijan	Western Asia and North Africa	40.400	49.881	7/1/89	1/1/00	8/1/14	
Bamako	, Mali	Sub-Saharan Africa	12.650	-8.000	1/1/90	10/1/00	11/1/13	
Bangkok	Thailand	Southeast Asia	13,778	100.538	3/1/88	1/1/02	1/1/15	
Beiiina. Beiiina	China	East Asia and the Pacific	39.920	116.370	12/1/88	7/1/99	10/1/13	
Beira	Mozambique	Sub-Saharan Africa	-19.831	34,860	3/1/91	5/1/01	7/1/13	
Belgaum	India	South and Central Asia	15 850	74 506	11/1/89	11/1/00	4/1/14	
Belgrade	Serbia		44 798	20 447	8/1/88	7/1/00	3/1/14	
Belo Horizonte	Brazil	Latin America and the Caribbean	-19 904	-44 005	6/1/89	6/1/00	5/1/13	
Berezniki	Russia	Europe and Japan	59 415	56 795	7/1/89	5/1/00	7/1/10	
Berlin	Germany		52 502	13 453	8/1/90	8/1/00	12/1/13	
Bichena Chongging	China	East Asia and the Pacific	29 595	106 231	9/1/88	7/1/00	6/1/13	
Bogota	Colombia	Latin America and the Caribbean	4 644	-74 120	12/1/80	1/1/01	1/1/10	
Budanest	Hungany	Europe and Japan	4.044	10 000	7/1/02	6/1/02	7/1/13	
Buonos Airos	Argonting	Latin America and the Caribbean	34 652	58 547	5/1/20	12/1/01	2/1/1/	
Bukhara	Lizbokiston	South and Control Asia	-04.002	-30.347	J/1/03	7/1/00	9/1/13	
Bucon	Koroa Pon	Fast Asia and the Basific	35.167	120.026	2/1/01	10/1/00	0/1/13	
Cohimon	Norea Nep.	Last Asia and the Caribbeen	10 204	71 270	10/1/00	1/1/00	3/1/13	
Cabinas	Faunt	Mostern Asia and North Africa	20.024	-11.370	9/1/09	1/1/00	5/1/12	
Caraoso	Egypt Vonozuolo	Letin America and the Caribbean	10.470	S1.202	6/1/9Z	4/1/03	3/1/13	
	Dhilippingo		10.479	-00.097	0/1/91	3/1/01	2/1/14	
	China	Southeast Asia	10.322	142.907	0/1/93	0/1/00	2/1/14	
	China	East Asia and the Pacific	30.192	113.110	10/1/92	0/1/00	0/1/14	
Changzhou, Jingsu	China	East Asia and the Pacific	31.775	119.970	10/1/89	3/1/00	3/1/14	
Chengou, Sichuan	China	East Asia and the Pacific	30.667	104.051	5/1/88	5/1/00	3/1/09	
Chengguan, Guiznou	China Kasa Das	East Asia and the Pacific	26.680	105.769	8/1/90	11/1/00	6/1/13	
Cheonan	Korea Rep.	East Asia and the Pacific	36.826	127.144	2/1/91	8/1/00	9/1/14	
Chicago	United States	Land-Rich Developed Countries	41.860	-87.864	6/1/89	9/1/01	9/1/14	
Cirebon	Indonesia	Southeast Asia	-6.702	108.497	10/1/89	10/1/00	6/1/14	
	United States	Land-Rich Developed Countries	41.470	-81.636	4/1/90	3/1/00	6/1/13	
	Bolivia	Latin America and the Caribbean	-17.391	-66.170	7/1/90	6/1/00	7/1/13	
Combatore	India	South and Central Asia	11.015	76.973	1/1/92	10/1/00	2/1/14	
Cordoba	Argentina	Latin America and the Caribbean	-31.381	-64.216	12/1/91	11/1/01	//1/14	
Culiacan	Mexico	Latin America and the Caribbean	24.798	-107.402	1/1/90	1/1/00	3/1/14	
Curitiba	Brazil	Latin America and the Caribbean	-25.463	-49.254	9/1/90	7/1/00	1/1/14	
Dhaka	Bangladesh	South and Central Asia	23.766	90.418	11/1/89	10/1/99	3/1/14	
Dzerzhinsk	Russia	Europe and Japan	56.241	43.455	8/1/89	4/1/00	7/1/10	
Florianopolis	Brazil	Latin America and the Caribbean	-27.595	-48.613	5/1/90	5/1/00	1/1/14	
Fukuoka	Japan	Europe and Japan	33.598	130.437	5/1/93	5/1/01	4/1/14	

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City Name	Share of Buil Occupied b	t-up Area y Roads	Average Ro (mete	ad Width ers)	Share of Road 4 Meters	s Less Than s Wide	Share of Roads More Than 16 Meters Wide		
	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	
Accra	16%	14%	9.0	6.6	8%	26%	8%	3%	
Addis Ababa	18%	22%	9.0	8.1	13%	15%	13%	8%	
Ahmedabad	23%	24%	7.2	8.4	37%	18%	9%	9%	
Ahvaz	27%	23%	10.9	8.5	12%	20%	18%	10%	
Alexandria	16%	23%	7.5	9.1	21%	27%	8%	14%	
Algiers	23%	25%	9.5	6.6	13%	19%	14%	3%	
Anqing, Anhui	24%	25%	8.3	9.3	24%	35%	14%	14%	
Antwerp	14%	13%	7.9	7.1	22%	21%	6%	2%	
Arusha	21%	10%	8.7	4.7	21%	65%	11%	5%	
Astrakhan	23%	20%	7.4	5.3	8%	29%	4%	1%	
Auckland	18%	19%	14.2	10.3	8%	20%	43%	19%	
Bacolod	26%	21%	8.9	5.7	23%	28%	27%	1%	
Baghdad	24%	24%	9.3	6.4	10%	26%	11%	3%	
Baku	19%	18%	8.3	6.7	17%	18%	12%	5%	
Bamako	19%	20%	8.5	6.5	8%	19%	5%	3%	
Bangkok	18%	22%	9.5	7.0	16%	23%	13%	5%	
Beijing, Beijing	25%	26%	10.4	7.3	27%	43%	20%	11%	
Beira	14%	11%	7.6	6.5	26%	29%	9%	5%	
Belgaum	22%	23%	9.2	8.0	8%	9%	13%	6%	
Belgrade	23%	14%	8.5	5.7	22%	37%	10%	4%	
Belo Horizonte	23%	20%	9.5	7.3	11%	17%	9%	3%	
Berezniki	23%	32%	7.8	6.0	17%	36%	5%	2%	
Berlin	25%	18%	10.7	8.8	13%	17%	17%	11%	
Bicheng, Chongqing	33%	28%	8.7	10.2	21%	20%	13%	18%	
Bogota	25%	23%	10.9	8.8	14%	16%	17%	11%	
Budapest	20%	16%	9.1	7.7	7%	15%	6%	3%	
Buenos Aires	26%	15%	11.9	5.9	3%	13%	18%	1%	
Bukhara	19%	15%	10.3	8.6	11%	15%	15%	10%	
Busan	22%	29%	6.5	6.9	37%	39%	7%	9%	
Cabimas	16%	21%	8.7	7.1	4%	14%	5%	5%	
Cairo	26%	24%	10.2	9.5	19%	25%	21%	16%	
Caracas	20%	21%	11.4	6.5	9%	25%	19%	3%	
Cebu City	13%	14%	9.0	5.2	21%	43%	9%	3%	
Changzhi, Hunan	24%	23%	9.1	6.8	38%	51%	17%	10%	
Changzhou, Jingsu	22%	27%	9.6	10.4	32%	32%	20%	18%	
Chengdu, Sichuan	25%	21%	8.9	9.4	29%	31%	16%	17%	
Chengguan, Guizhou	16%	12%	8.9	7.9	22%	28%	17%	4%	
Cheonan	23%	26%	7.0	6.7	25%	37%	7%	8%	
Chicago	27%	25%	11.6	10.0	8%	27%	42%	30%	
Cirebon	13%	14%	5.4	5.8	40%	32%	2%	4%	
Cleveland	19%	16%	10.8	21.8	18%	13%	26%	26%	
Cochabamba	24%	19%	10.4	8.5	7%	25%	17%	2%	
Coimbatore	18%	24%	8.1	6.5	11%	17%	9%	6%	
Cordoba	23%	21%	10.2	7.5	5%	15%	8%	5%	
Culiacan	23%	29%	10.1	7.0	10%	26%	12%	6%	
Curitiba	26%	16%	12.5	6.6	7%	17%	27%	2%	
Dhaka	15%	12%	6.8	4.3	40%	56%	10%	2%	
Dzerzhinsk	21%	17%	6.5	5.2	27%	31%	6%	2%	
Florianopolis	23%	19%	9.3	6.3	6%	18%	6%	0%	
Fukuoka	25%	29%	5.4	5.1	48%	46%	4%	2%	

	Density of A Roads (kr	ll Arterial n∕ km²)	Average Beeli to All Arter	ine Distance ial Roads	Share of Are Walking Dist	ea within ance of All Roads	Share of Area within Walking Distance of Wide Arterial Roads		
City Name	Pre-1990	1990 -	Pre-1990	1990 -	Pre-1990	1990 -	Pre-1990	1990 -	
•	4.00	2014	400	2014	0.00%	2014	770/	2014	
Accra	1.90	0.82	199	575	96%	68%	77%	49%	
Addis Ababa	2.68	1.65	123	257	99%	90%	94%	84%	
Ahmedabad	1.86	1.61	185	218	97%	95%	93%	90%	
Ahvaz	2.03	1.64	197	253	96%	91%	95%	87%	
Alexandria	2.71	1.45	162	356	97%	81%	83%	70%	
Algiers	1.68	1.09	267	376	89%	80%	87%	68%	
Anqing, Annui	1.57	1.23	251	336	92%	85%	91%	86%	
Antwerp	1.65	1.40	228	248	93%	91%	61%	49%	
Arusna Astrolyhan	2.80	0.99	104	219	100%	95%	100%	84%	
Astraknan	1.16	0.84	334	371	84%	80%	69%	63% 04%	
Auckland	1.62	1.52	233	244	93%	92%	92%	91%	
Bacolod	2.35	1.30	160	204	98%	90%	89%	83%	
Bagnoad	1.69	1.49	313	349	86%	84%	79%	74%	
Baku	1.80	1.37	251	317	90%	84%	81%	68% 05%	
Bamako	1.87	1.02	178	376	98%	80%	87%	60% 00%	
Bangkok Deiling Deiling	1.07	0.78	353	520	83%	70%	11%	62%	
Beljing, Beljing	1.63	0.67	271	573	89%	71%	87%	58%	
Beira	1.15	0.62	336	803	83%	58%	11%	55%	
Belgaum	2.62	1.50	138	307	100%	87%	97%	74%	
Belgrade	2.02	1.64	182	245	97%	93%	83%	77%	
Belo Horizonte	2.00	1.74	204	242	95%	92%	83%	76%	
Berezniki	0.25	0.30	1,129	1,000	30%	37%	32%	30%	
Berlin	2.21	1.72	150	207	98%	95%	95%	73%	
Bicheng, Chongqing	2.38	1.15	148	229	100%	93%	100%	92%	
Bogota	2.69	2.37	145	1/6	98%	96%	87%	84%	
Budapest	1.80	1.38	205	267	96%	90%	69%	53%	
Buenos Aires	2.57	2.14	147	194	98%	95%	/8%	71%	
Buknara	1.58	0.84	291	579	89%	69%	87%	64%	
Busan	2.91	2.07	213	289	91%	87%	87%	82%	
Cabimas	1.80	1.43	179	241	97%	92%	83%	75%	
Cairo	1.53	1.51	328	406	83%	78%	81%	70%	
Caracas	2.12	1.87	227	255	92%	90%	82%	78%	
Cebu City	1.71	1.34	237	295	91%	86%	78%	63%	
Changzhi, Hunan	2.11	1.34	178	317	98%	86%	98%	74%	
Changzhou, Jingsu	2.24	1.41	154	313	99%	86%	99%	84%	
Chengdu, Sichuan	2.46	0.44	151	3,004	98%	31%	98%	31%	
Chengguan, Guiznou	1.98	1.85	114	139	100%	100%	96%	95%	
Cheonan	3.29	0.50	94	331	100%	82%	100%	82%	
Chicago	1.41	1.41	241	258	93%	92%	80%	79%	
Cirebon	1.72	0.91	229	435	97%	11%	95%	00%	
Cleveland	1.63	1.21	225	258	95%	91%	90%	51%	
	2.42	1.24	164	378	97%	82%	96%	12%	
Compatore	1.77	1.42	196	238	96%	93%	79%	00%	
Culiacon	2.30	1.81	190	235	95%	92%	80%	82%	
Cullacan	2.20	1.54	159	297	98%	86%	88% 00%	79%	
Dhaka	2.22	1.59	1/3	262	98%	90%	96%	81%	
	2.27	1.50	162	261	97%	90%	80%	00%	
	1.40	1.30	4/1	494	75%	13%	83% 700/	82%	
Fionanopolis	1.99	1.40	200	344	90%	85%	13%	700/	
гикиока	2.31	2.09	174	185	97%	97%	76%	70%	

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City Name	Average Block Size (ha)		3-Way Intersection Density (number per km ²)		4-Way Intersection Density (number per km ²)		Share of Intersections that are 4-Way		Walkability Ratio	
	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014
Accra	6.2	3.9	47.3	117.3	14.3	8.9	19%	5%	1.8	1.7
Addis Ababa	3.1	3.2	104.4	176.3	10.1	28.2	8%	13%	1.8	1.6
Ahmedabad	2.4	4.2	297.5	139.4	35.1	27.9	9%	17%	1.8	1.6
Ahvaz	2.2	3.5	96.8	106.4	23.6	19.1	17%	14%	1.6	2.0
Alexandria	1.9	5.2	120.4	198.5	22.3	26.4	10%	9%	1.8	2.0
Algiers	4.5	6.7	61.8	140.0	16.2	14.1	9%	6%	1.9	1.8
Anqing, Anhui	3.8	4.8	191.0	121.2	23.8	14.6	9%	8%	1.8	1.5
Antwerp	7.1	14.7	62.3	55.2	5.1	6.4	8%	9%	1.8	1.4
Arusha	4.8	5.0	111.4	127.6	17.8	11.4	14%	5%	1.6	1.6
Astrakhan	2.0	2.8	159.7	195.8	21.3	27.1	11%	13%	1.8	1.6
Auckland	9.3	8.1	32.9	54.2	3.1	5.8	7%	9%	1.6	1.6
Bacolod	4.2	2.9	96.2	158.6	43.9	19.4	42%	11%	2.1	2.2
Baghdad	3.1	4.1	129.8	203.9	17.6	17.3	11%	4%	1.7	1.9
Baku	3.1	3.9	107.3	117.3	13.4	6.7	10%	5%	1.9	1.7
Bamako	2.2	1.6	111.5	184.3	43.8	45.6	28%	20%	1.6	1.5
Bangkok	5.8	5.4	60.3	91.1	10.3	9.5	11%	6%	1.7	2.2
Beijing, Beijing	6.2	4.5	105.9	147.0	15.3	34.6	10%	11%	1.6	1.8
Beira	5.2	10.4	57.6	42.0	17.4	7.6	15%	11%	1.6	1.5
Belgaum	2.6	2.7	112.7	152.1	11.9	21.9	8%	10%	1.7	1.6
Belgrade	3.1	7.1	120.0	69.2	17.3	6.9	12%	7%	1.8	1.6
Belo Horizonte	3.0	5.9	94.5	77.8	23.5	8.7	21%	14%	1.7	1.8
Berezniki	4.4	1.2	114.9	327.6	10.5	30.8	6%	6%	1.9	1.7
Berlin	3.4	5.6	97.3	83.8	23.5	14.4	23%	17%	1.9	1.9
Bicheng, Chongqing	0.9	6.3	248.0	105.3	86.0	11.1	26%	7%	1.4	1.9
Bogota	1.9	4.2	167.1	154.6	38.4	39.8	18%	13%	1.7	1.9
Budapest	3.5	5.3	92.8	71.1	19.1	14.3	20%	26%	1.7	1.5
Buenos Aires	2.4	3.5	83.1	68.1	29.2	41.5	58%	38%	1.4	1.6
Bukhara	4.0	10.0	72.9	55.4	6.2	3.2	8%	5%	1.6	1.7
Busan	2.5	2.8	161.8	185.4	32.8	18.3	14%	10%	1.7	1.7
Cabimas	3.7	4.4	81.5	105.6	12.5	22.3	15%	17%	1.6	1.7
Cairo	2.5	4.1	101.7	144.4	31.6	30.5	20%	12%	1.6	1.8
Caracas	4.6	6.3	39.8	47.7	8.3	2.8	13%	2%	1.9	1.8
Cebu City	6.5	4.4	79.4	114.9	7.4	1.0	8%	1%	2.1	2.2
Changzhi, Hunan	4.4	5.7	153.0	139.5	38.1	22.1	14%	11%	1.8	1.7
Changzhou, Jingsu	4.3	5.7	96.4	131.3	14.4	14.4	9%	11%	1.5	1.8
Chengdu, Sichuan	3.4	8.0	173.6	64.1	21.2	10.7	12%	8%	1.8	1.9
Chengguan, Guizhou	5.5	15.9	67.2	20.3	12.3	2.7	11%	4%	1.8	1.6
Cheonan	1.7	4.4	172.1	149.4	59.1	15.2	22%	6%	1.3	1.5
Chicago	7.4	3.9	61.2	73.9	37.6	11.8	33%	9%	1.5	1.7
Cirebon	2.0	6.7	178.6	122.6	29.0	11.4	12%	5%	1.7	1.8
Cleveland	5.3	7.7	82.0	99.3	10.5	10.9	11%	9%	1.7	1.7
Cochabamba	2.1	5.6	125.8	133.2	26.5	26.4	19%	17%	1.7	1.6
Coimbatore	4.5	3.9	130.1	182.4	12.6	19.1	9%	8%	2.0	1.9
Cordoba	2.3	5.7	70.5	80.0	55.3	25.2	42%	21%	1.4	1.7
Culiacan	2.8	2.8	77.3	183.1	51.0	35.4	37%	15%	1.8	2.0
Curitiba	4.1	5.3	57.3	70.2	26.1	19.6	37%	18%	1.5	1.7
Dhaka	3.3	5.8	131.0	149.4	15.3	7.6	10%	6%	1.6	1.5
Dzerzhinsk	4.0	8.7	155.5	83.1	20.2	9.5	9%	9%	2.0	2.1
Florianopolis	3.6	5.7	73.5	54.2	18.0	11.7	19%	11%	1.8	1.9
Fukuoka	1.6	1.9	254.5	288.2	56.8	54.9	17%	15%	1.5	1.5

City Name	Share of Bui That Is Res	lt-up Area iidential	Share of Re Areas Laid O Develop	sidential out Before ment	Share of Re Areas Not Laic Develop	sidential I Out Before oment	Share of Built-up Area That Is Gridded	
	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014
Accra	70%	79%	51%	52%	43%	48%	24%	10%
Addis Ababa	56%	73%	35%	58%	65%	42%	3%	30%
Ahmedabad	72%	74%	80%	86%	20%	14%	0%	0%
Ahvaz	78%	61%	100%	92%	0%	8%	15%	0%
Alexandria	64%	82%	95%	80%	5%	20%	15%	0%
Algiers	62%	60%	35%	67%	60%	33%	2%	8%
Anqing, Anhui	47%	60%	61%	65%	39%	35%	0%	3%
Antwerp	65%	71%	84%	14%	16%	86%		0%
Arusha	58%	79%	65%	15%	35%	85%	18%	0%
Astrakhan	60%	73%	98%	80%	2%	20%	3%	5%
Auckland	82%	79%	100%	93%	0%	7%	0%	0%
Bacolod	98%	70%	78%	67%	43%	33%	10%	8%
Baghdad	79%	80%	88%	45%	12%	55%	5%	0%
Baku	57%	78%	68%	56%	32%	44%	4%	3%
Bamako	66%	84%	100%	78%	0%	22%	33%	18%
Bangkok	56%	54%	23%	60%	73%	40%	4%	3%
Beijing, Beijing	51%	54%	65%	89%	19%	11%	3%	3%
Beira	78%	76%	33%	17%	67%	83%	14%	8%
Belgaum	72%	79%	49%	77%	51%	23%	0%	3%
Belgrade	52%	82%	81%	64%	19%	36%	3%	3%
Belo Horizonte	81%	85%	85%	89%	15%	11%	10%	3%
Berezniki	64%	72%	97%	100%	3%	0%	3%	0%
Berlin	74%	77%	100%	97%	0%	3%	13%	0%
Bicheng, Chongging	93%	38%	99%	74%	1%	26%	0%	0%
Bogota	64%	76%	99%	95%	1%	5%	23%	10%
Budapest	80%	90%	97%	89%	3%	11%	8%	15%
Buenos Aires	81%	83%	93%	97%	2%	3%	88%	73%
Bukhara	73%	78%	83%	93%	17%	7%	0%	0%
Busan	60%	40%	73%	49%	27%	51%	8%	0%
Cabimas	79%	83%	100%	72%	0%	28%	3%	8%
Cairo	70%	75%	69%	57%	22%	43%	13%	8%
Caracas	73%	74%	64%	48%	36%	52%	3%	0%
Cebu City	62%	78%	37%	20%	63%	80%	0%	0%
Changzhi, Hunan	52%	46%	94%	100%	6%	0%	3%	3%
Changzhou, Jingsu	45%	43%	76%	32%	24%	68%	0%	0%
Chengdu, Sichuan	47%	51%	93%	60%	7%	40%	3%	3%
Chengguan, Guizhou	78%	70%	26%	21%	75%	79%	0%	0%
Cheonan	69%	51%	64%	44%	36%	56%	18%	0%
Chicago	80%	83%	82%	81%	2%	19%	57%	0%
Cirebon	75%	82%	52%	39%	48%	61%	0%	0%
Cleveland	67%	78%	92%	85%	8%	15%	5%	0%
Cochabamba	67%	63%	99%	70%	1%	30%	18%	0%
Coimbatore	59%	58%	80%	76%	20%	24%	3%	0%
Cordoba	79%	76%	97%	90%	3%	10%	48%	15%
Culiacan	66%	66%	97%	96%	3%	4%	35%	8%
Curitiba	70%	72%	99%	82%	1%	18%	45%	18%
Dhaka	75%	71%	30%	9%	68%	91%	0%	0%
Dzerzhinsk	49%	94%	96%	99%	4%	1%		0%
Florianopolis	61%	88%	96%	85%	4%	15%	8%	0%
Fukuoka	64%	59%	81%	69%	19%	31%	0%	0%

Accra - Fukuoka

City Name	Share of Residential Area in Informal Land Subdivisions		Share of R Area in For Subdiv	Share of Residential Area in Formal Land Subdivisions		Share of Residential Area in Housing Projects		Average Plot Size in Informal Land Subdivisions		lot Size in Land isions
	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014
Accra	34%	47%	13%	5%	10%	0%	22	949	555	636
Addis Ababa	15%	44%	18%	2%	1%	13%		244	675	187
Ahmedabad	31%	31%	36%	10%	14%	44%	342	100	389	120
Ahvaz	16%	29%	75%	42%	9%	21%	181	295	207	217
Alexandria	15%	55%	73%	3%	7%	22%			354	
Algiers	3%	16%	23%	25%	14%	26%			356	225
Anqing, Anhui	5%	14%	23%	7%	33%	45%				
Antwerp	0%	0%	81%	14%	3%	0%				1,448
Arusha	35%	12%	29%	2%	2%	1%	553	369	456	654
Astrakhan	59%	80%	19%	0%	19%	0%	473	991		
Auckland	0%	0%	96%	85%	4%	7%			580	454
Bacolod	6%	44%	64%	20%	8%	2%	23	383	363	409
Baghdad	31%	39%	53%	5%	5%	1%	125		300	
Baku	23%	48%	27%	5%	18%	3%		637	728	
Bamako	99%	78%	0%	0%	0%	1%	651	467		
Bangkok	2%	15%	20%	9%	5%	36%		279	224	196
Beijing, Beijing	9%	40%	13%	20%	59%	30%	21		421	
Beira	16%	17%	10%	0%	7%	0%	420		778	
Belgaum	38%	51%	4%	26%	7%	0%		177		405
Belgrade	0%	27%	60%	33%	21%	4%				
Belo Horizonte	9%	18%	74%	70%	2%	1%	182		388	194
Berezniki	60%	50%	29%	0%	8%	50%	796	365	1,040	
Berlin	7%	11%	72%	71%	21%	14%	309	278	454	909
Bicheng, Chongqing	0%	3%	83%	33%	16%	38%				
Bogota	9%	26%	63%	18%	27%	51%			130	
Budapest	6%	26%	84%	62%	6%	0%		868	644	719
Buenos Aires	28%	87%	69%	4%	1%	5%	168	372	254	484
Bukhara	40%	57%	41%	23%	2%	12%	1,499		565	2,653
Busan	1%	0%	45%	24%	27%	25%			166	228
Cabimas	16%	44%	82%	19%	3%	9%			906	456
Cairo	17%	18%	58%	13%	3%	26%	82	595	525	473
Caracas	6%	4%	52%	24%	6%	20%			550	
Cebu City	25%	16%	11%	0%	0%	4%			243	
Changzhi, Hunan	5%	27%	77%	59%	13%	13%		561	269	394
Changzhou, Jingsu	1%	5%	40%	1%	35%	25%				
Chengdu, Sichuan	0%	9%	71%	23%	22%	28%				
Chengguan, Guizhou	0%	1%	24%	4%	1%	17%				
Cheonan	0%	8%	54%	11%	10%	25%			170	
Chicago	2%	0%	89%	64%	8%	17%			637	1,795
Cirebon	0%	16%	51%	22%	2%	0%				270
Cleveland	0%	3%	85%	75%	7%	6%			840	1,381
Cochabamba	33%	55%	66%	14%	1%	1%		319	356	347
Coimbatore	45%	70%	32%	2%	3%	5%	209	174	315	220
Cordoba	16%	54%	80%	24%	1%	13%	344	789	326	768
Culiacan	36%	24%	62%	67%	0%	5%	265	152	161	132
Curitiba	0%	30%	97%	48%	2%	4%		370	325	376
Dhaka	18%	5%	8%	0%	6%	3%	270	349	379	
Dzerzhinsk	61%	94%	28%	4%	7%	0%	683			
Florianopolis	5%	23%	82%	60%	9%	2%	345	233	326	241
Fukuoka	4%	9%	76%	59%	1%	1%	230	229	248	257

City Name	Country	Region	CBD Lo	ocation	Lanc	l Cover Da	tes
			Latitude	Longitude	T1	Т2	тз
Gainesville, FL	United States	Land-Rich Developed Countries	29.661	-82.377	7/1/90	10/1/00	10/1/13
Gaoyou, Jiangsu	China	East Asia and the Pacific	32.792	119.430	10/1/90	1/1/00	4/1/16
Gombe	Nigeria	Sub-Saharan Africa	10.290	11.167	12/1/90	4/1/00	5/1/13
Gomel	Belarus	Europe and Japan	52.432	30.972	5/1/90	9/1/00	5/1/13
Gorgan	Iran	South and Central Asia	36.843	54.436	6/1/91	10/1/00	9/1/14
Guadalajara	Mexico	Latin America and the Caribbean	20.660	-103.357	3/1/90	11/1/99	4/1/14
Guangzhou, Guangdong	China	East Asia and the Pacific	22.936	113.608	2/1/91	9/1/00	10/1/14
Guatemala City	Guatemala	Latin America and the Caribbean	14.605	-90.542	1/1/90	1/1/01	11/1/13
Guixi, Chongqing	China	East Asia and the Pacific	30.332	107.348	6/1/88	7/1/01	6/1/16
Gwangju	Korea Rep.	East Asia and the Pacific	35.146	126.919	10/1/89	3/1/00	5/1/15
Haikou, Hainan	China	East Asia and the Pacific	20.028	110.329	10/1/91	7/1/01	12/1/13
Halle	Germany	Europe and Japan	51.487	11.970	8/1/90	9/1/99	7/1/10
Hangzhou, Zhejiang	China	East Asia and the Pacific	30.305	120.168	10/1/90	5/1/00	4/1/13
Hindupur	India	South and Central Asia	13.838	77.488	2/1/89	3/1/00	3/1/14
Ho Chi Minh City	Vietnam	Southeast Asia	10.830	106.713	1/1/89	12/1/99	1/1/15
Holguin	Cuba	Latin America and the Caribbean	20.883	-76.263	7/1/87	5/1/01	1/1/14
Hong Kong, Hong Kong	China	East Asia and the Pacific	22.346	114.183	11/1/89	1/1/00	10/1/13
Houston	United States	Land-Rich Developed Countries	29.780	-95.386	11/1/90	9/1/00	5/1/14
Hyderabad	India	South and Central Asia	17.422	78.484	3/1/90	7/1/99	5/1/14
Ibadan	Nigeria	Sub-Saharan Africa	7.388	3.896	12/1/84	2/1/00	12/1/13
Ilheus	Brazil	Latin America and the Caribbean	-14.803	-39.045	7/1/93	5/1/01	12/1/13
Ipoh	Malaysia	Southeast Asia	4.590	101.077	12/1/90	3/1/03	2/1/15
Istanbul	Turkey	Western Asia and North Africa	40.981	29.065	11/1/90	6/1/02	7/1/13
Jaipur	India	South and Central Asia	26.911	75.787	10/1/89	10/1/00	9/1/14
Jalna	India	South and Central Asia	19.851	75.878	10/1/89	10/1/00	10/1/14
Jequie	Brazil	Latin America and the Caribbean	-13.862	-40.085	8/1/92	4/1/01	4/1/14
Jinan, Shandong	China	East Asia and the Pacific	36.682	117.020	9/1/91	9/1/00	7/1/13
Jinju	Korea Rep.	East Asia and the Pacific	35.187	128.107	4/1/88	4/1/00	5/1/14
Johannesburg	South Africa	Sub-Saharan Africa	6.842	3.634	3/1/90	7/1/98	6/1/13
Kabul	Afghanistan	South and Central Asia	34.529	69.172	11/1/87	8/1/00	9/1/14
Kaiping, Guangdong	China	East Asia and the Pacific	22.380	112.688	4/1/90	9/1/00	11/1/14
Kairouan	Tunisia	Western Asia and North Africa	35.673	10.096	5/1/92	5/1/00	6/1/10
Kampala	Uganda	Sub-Saharan Africa	0.315	32.585	3/1/88	2/1/03	2/1/15
Kanpur	India	South and Central Asia	26.457	80.310	12/1/91	2/1/99	9/1/14
Karachi	Pakistan	South and Central Asia	24.900	67.075	2/1/91	10/1/00	10/1/13
Kaunas	Lithuania	Europe and Japan	54.903	23.925	8/1/90	9/1/00	3/1/14
Kayseri	Turkey	Western Asia and North Africa	38.724	35.480	10/1/87	6/1/00	8/1/13
Khartoum	Sudan	Western Asia and North Africa	15.552	32.532	12/1/88	4/1/00	3/1/14
Kigali	Rwanda	Sub-Saharan Africa	9.927	8.880	2/1/87	7/1/99	10/1/14
Killeen	United States	Land-Rich Developed Countries	31.112	-97.732	8/1/90	5/1/00	8/1/13
Kinshasa	Congo Dem. Rep.	Sub-Saharan Africa	-4.374	15.320	8/1/94	9/1/00	7/1/13
Kolkata	India	South and Central Asia	22.533	88.356	11/1/90	11/1/03	4/1/14
Kozhikode	India	South and Central Asia	11.254	75.803	2/1/91	3/1/01	2/1/14
Lagos	Nigeria	Sub-Saharan Africa	6.210	7.063	12/1/84	2/1/00	12/1/13
Lahore	Pakistan	South and Central Asia	31.514	74.314	11/1/91	10/1/00	10/1/13
Lausanne	Switzerland	Europe and Japan	46.516	6.633	4/1/87	3/1/01	8/1/15
Le Mans	France	Europe and Japan	47.989	0.199	5/1/92	8/1/99	7/1/13
Leon	Nicaragua	Latin America and the Caribbean	12.438	-86.878	7/1/93	4/1/00	1/1/10
Leshan, Sichuan	China	East Asia and the Pacific	29.591	103.754	7/1/90	7/1/01	8/1/14
London	United Kingdom	Europe and Japan	51.506	-0.139	5/1/89	6/1/00	7/1/13

Gainsville - London

City Name	Share of Buil Occupied b	t-up Area y Roads	Average Str (mete	eet Width ers)	Share of Roads Less Tha 4m. Wide		an Share of Roads More Than 16m. Wide		
	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	
Gainesville, FL	19%	18%	8.5	9.9	18%	13%	14%	14%	
Gaoyou, Jiangsu	13%	23%	7.0	8.6	33%	25%	9%	16%	
Gombe	21%	21%	7.5	8.2	17%	23%	7%	6%	
Gomel	20%	16%	6.9	6.5	23%	26%	8%	5%	
Gorgan	23%	24%	8.6	8.6	15%	20%	10%	9%	
Guadalajara	27%	27%	12.4	9.3	6%	10%	18%	10%	
Guangzhou, Guangdong	19%	19%	8.6	7.9	27%	34%	12%	12%	
Guatemala City	20%	20%	8.3	6.9	12%	12%	10%	3%	
Guixi, Chongqing	18%	18%	10.2	9.5	17%	38%	19%	18%	
Gwangju	23%	25%	7.6	6.7	30%	43%	11%	7%	
Haikou, Hainan	23%	21%	11.7	7.9	19%	24%	22%	9%	
Halle	18%	15%	6.4	5.0	37%	40%	6%	0%	
Hangzhou, Zhejiang	32%	27%	9.9	8.1	25%	38%	16%	13%	
Hindupur	18%	20%	6.5	5.1	26%	39%	3%	2%	
Ho Chi Minh City	18%	15%	9.0	7.2	23%	34%	13%	7%	
Holguin	16%	21%	6.2	7.0	18%	19%	3%	9%	
Hong Kong, Hong Kong	25%	20%	11.3	9.4	14%	25%	23%	16%	
Houston	21%	20%	10.6	10.0	11%	12%	20%	14%	
Hyderabad	19%	21% 100/	6.8	0.2	19%	23%	4%	3%	
Ibadan	12%	IZ% 010/	6.0	3.Z 0.7	22%	09% 70/	∠% 10%	U%	
Ineus	23%	21%	9.0	0.7	13%	7 %	10%	5% 6%	
lstanbul	27%	28%	0.0	7.8	9%	970 14%	10%	0 % 6%	
lainur	27%	20%	9.2 8.0	7.0	9 <i>%</i>	14 %	10%	8%	
Jalpa	19%	18%	6.3	7.4	13 % 21%	29%	10%	6%	
Jequie	24%	26%	7.6	5.6	21%	29%	4%	1%	
Jinan Shandong	25%	20%	9.5	9.5	35%	42%	15%	17%	
Jiniu	24%	17%	7.5	4.8	31%	54%	10%	2%	
Johannesburg	25%	18%	13.2	7.4	6%	22%	32%	2 /₀ 7%	
Kabul	17%	20%	8.2	6.3	35%	30%	10%	3%	
Kaiping, Guangdong	18%	24%	5.1	8.4	52%	33%	6%	13%	
Kairouan	26%	25%	7.7	5.8	14%	35%	8%	3%	
Kampala	13%	12%	6.7	4.5	20%	42%	4%	1%	
Kanpur	20%	23%	6.8	5.7	24%	38%	5%	4%	
Karachi	22%	23%	8.3	7.4	30%	30%	12%	9%	
Kaunas	17%	12%	7.9	5.4	26%	31%	10%	1%	
Kayseri	31%	27%	9.4	9.1	17%	28%	13%	17%	
Khartoum	24%	23%	9.3	7.3	5%	21%	9%	6%	
Kigali	17%	14%	7.9	5.5	18%	32%	7%	1%	
Killeen	24%	23%	10.6	18.8	12%	13%	24%	31%	
Kinshasa	14%	13%	9.5	5.2	28%	37%	4%	3%	
Kolkata	13%	10%	5.8	4.0	38%	60%	5%	2%	
Kozhikode	15%	8%	6.3	4.8	26%	44%	3%	3%	
Lagos	17%	16%	10.1	7.1	6%	20%	10%	3%	
Lahore	20%	24%	7.3	6.4	32%	32%	9%	6%	
Lausanne	21%	24%	18.3	6.2	17%	21%	14%	1%	
Le Mans	21%	21%	6.7	5.5	25%	34%	4%	2%	
Leon	18%	19%	7.8	5.5	9%	19%	2%	1%	
Leshan, Sichuan	27%	18%	10.8	7.6	10%	27%	18%	8%	
London	19%	10%	9.5	7.5	9%	18%	9%	4%	

City Name	Density of A Roads (ki	l l Arterial n∕km²)	Average Beeli to All Arter (met	ine Distance ial Roads ers)	Share of Are Walking Dist Arterial	ea within ance of All Roads	Share of Are Walking Dista Arterial	ea within nce of Wide Roads
	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014
Gainesville, FL	1.71	1.45	197	233	97%	93%	96%	93%
Gaoyou, Jiangsu	1.47	1.47	334	310	83%	91%	83%	91%
Gombe	2.19	1.22	170	336	97%	81%	89%	67%
Gomel	0.77	0.72	448	475	72%	71%	72%	70%
Gorgan	1.90	1.50	169	236	99%	93%	98%	90%
Guadalajara	2.28	1.59	165	298	97%	86%	93%	78%
Guangzhou, Guangdong	2.19	0.59	175	912	97%	70%	97%	69%
Guatemala City	2.03	1.53	187	250	95%	90%	81%	68%
Guixi, Chongqing	0.95	1.05	214	264	100%	89%	100%	96%
Gwangju	4.63	2.77	69	199	100%	92%	100%	90%
Haikou, Hainan	2.04	1.60	192	249	96%	92%	96%	92%
Halle	2.17	1.87	155	187	98%	96%	90%	76%
Hangzhou, Zhejiang	2.97	0.74	129	1,556	99%	66%	99%	63%
Hindupur	2.35	1.28	115	219	100%	95%	92%	95%
Ho Chi Minh City	2.57	1.17	146	362	97%	82%	95%	64%
Holguin	1.65	1.50	235	250	92%	92%	69%	67%
Hong Kong, Hong Kong	3.88	3.22	105	132	99%	97%	98%	94%
Houston	1.99	0.83	181	396	97%	80%	95%	73%
Hyderabad	1.92	1.31	184	279	98%	90%	77%	63%
Ibadan 	1.04	0.71	353	596	82%	65%	49%	34%
Ilheus	2.34	1.71	156	264	98%	88%	95%	78%
Ipoh	1.05	0.81	387	479	79%	/1%	68%	58%
Istanbul	3.30	2.25	115	202	99%	94%	93%	82%
Jalpur	1.95	1.38	185	272	96%	90%	94%	88%
Jaina	1.65	1.50	190	241	96%	93%	63%	66% 05%
Jequie	1.20	1.02	332	383	83%	79%	68%	05% 76%
Jinan, Shandong	1.45	1.15	332	500	00%	70%	00%	70%
Jiliju Johannoshura	2.55	0.52	228	404 835	97%	00%	94%	01% 46%
Kabul	1.51	1.25	301	346	93 <i>%</i>	4370	68%	40 % 63%
Kaining Guangdong	1.00	1.25	161	235	100%	02 /0	100%	80%
Kairouan	2 25	1.00	156	196	99%	96%	99%	96%
Kampala	2.20	1.00	157	346	98%	84%	58%	37%
Kanpur	1.81	1.47	187	261	97%	91%	94%	84%
Karachi	3.11	2.59	130	158	99%	98%	94%	89%
Kaunas	1.28	1.21	275	281	90%	90%	81%	78%
Kayseri	2.93	1.81	125	218	99%	93%	99%	89%
Khartoum	1.76	1.18	281	516	89%	74%	88%	72%
Kigali	2.22	1.17	179	318	95%	86%	72%	58%
Killeen	1.11	0.95	470	472	76%	75%	75%	73%
Kinshasa	1.26	0.84	327	709	84%	65%	41%	35%
Kolkata	1.63	1.11	245	335	92%	84%	62%	54%
Kozhikode	2.16	0.74	189	314	98%	88%	100%	67%
Lagos	1.25	0.76	336	543	85%	70%	73%	50%
Lahore	3.21	2.46	119	167	99%	97%	94%	88%
Lausanne	3.10	2.58	95	125	100%	99%	73%	60%
Le Mans	2.87	2.78	117	122	100%	99%	85%	84%
Leon	3.02	2.01	119	188	99%	96%	66%	66%
Leshan, Sichuan	2.44	0.79	166	747	97%	61%	85%	55%
London	2.21	1.39	163	439	98%	78%	75%	37%

Gainsville - London

City Name	Average B (ha	lock Size a)	3-Way Inte Density (nu km	ersection Imber per I ²)	4-Way Inte Density (nu km	ersection mber per 2)	Share Intersection 4-W	e of is that are ay	e Walkability Ratio	
	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014
Gainesville, FL	3.8	7.6	91.6	69.3	17.0	4.9	13%	6%	1.8	2.4
Gaoyou, Jiangsu	5.3	8.0	79.9	58.9	11.5	14.5	10%	15%	1.5	1.5
Gombe	1.6	2.5	193.1	248.1	55.2	36.5	22%	10%	1.5	1.7
Gomel	3.4	5.1	163.9	79.4	19.6	16.7	14%	14%	2.0	1.8
Gorgan	2.1	7.0	170.8	109.4	15.8	15.2	8%	7%	1.8	1.7
Guadalajara	3.0	3.2	100.0	142.0	43.6	19.2	28%	11%	1.7	1.8
Guangzhou, Guangdong	3.6	5.2	123.2	123.6	10.3	9.7	6%	6%	1.8	1.8
Guatemala City	2.1	2.0	89.5	97.5	42.0	21.1	31%	10%	1.6	1.8
Guixi, Chongqing	4.1	7.9	68.8	47.4	17.1	5.8	28%	6%	1.4	1.7
Gwangju	2.3	4.3	149.6	188.7	38.0	18.9	18%	11%	1.5	1.7
Haikou, Hainan	3.7	4.6	99.3	136.0	7.4	6.8	11%	5%	1.8	1.7
Halle	2.5	4.3	214.1	154.7	26.8	11.0	9%	3%	1.7	1.6
Hangzhou, Zhejiang	2.4	3.6	258.8	153.9	42.2	23.9	13%	13%	1.7	1.7
Hindupur	1.7	2.5	193.2	279.2	24.8	56.0	13%	16%	1.5	1.7
Ho Chi Minh City	3.0	5.3	117.6	87.5	22.4	6.8	14%	6%	1.7	1.8
Holguin	4.2	8.5	96.3	116.6	32.4	13.6	21%	7%	1.5	1.8
Hong Kong, Hong Kong	4.6	3.7	55.0	26.7	12.3	7.9	11%	18%	1.9	1.7
Houston	5.9	6.7	81.1	53.3	12.7	8.9	14%	12%	1.8	1.9
Hyderabad	2.2	3.0	188.7	204.2	25.0	43.3	10%	15%	1.7	1.5
Ibadan 	5.7	4.2	69.8	196.2	5.3	14.0	4%	8%	1.8	1.7
Ilheus	3.3	3.3	107.4	78.6	17.0	17.5	13%	14%	1.6	1.7
lpoh	2.7	3.2	150.5	146.4	15.6	8.1	8%	3%	2.0	1.6
Istanbul	2.0	4.3	143.4	160.4	30.5	14.8	1/%	7%	1.7	2.0
Jaipur	2.4	2.2	197.1	242.1	18.7	17.2	11%	7%	1.7	1.7
Jaina	3.0	5.3	161.7	178.5	15.4	28.2	9%	11%	1.6	1.6
Jequie	2.3	3.1	180.8	254.5	38.3	46.8	19%	18%	1.9	1.6
Jinan, Snandong	3.7	1.Z	157.9	110.5	13.5	14.5	5% 20%	14%	2.0	1.0
Jiriju Johannoohurg	2.4	5.5	159.5	100.5	40.0	20.0	20%	10%	1.4	1.0
Kabul	7.0	0.0 2.5	47.7	171.0	10.4	14.2	23%	10%	1.0	2.2
Kabul Kaining Guangdong	J.1 1 0	2.5	311.1	266.8	84.3	17.0	16%	8%	1.7	1.9
Kairouan	1.0	2.0	305.1	200.0	04.5 43.9	49.0 52.3	10%	9%	1.5	1.0
Kampala	6.0	Z.5	74.0	105.1	40.0 6.0	5.3	6%	0 % 4%	1.0	1.7
Kanpur	3.3	3.4	206.3	289.2	22.4	33.5	9%	9%	1.0	1.6
Karachi	3.2	2.4	220.3	226.1	50.2	74.0	13%	21%	1.7	1.7
Kaunas	4.9	5.5	90.3	79.6	17.0	7.2	14%	9%	2.0	1.5
Kavseri	1.7	3.3	205.0	201.5	26.4	37.2	14%	13%	1.6	1.6
Khartoum	1.4	1.7	167.8	225.6	50.8	60.3	21%	18%	1.5	1.5
Kigali	5.7	4.6	64.9	99.4	7.1	4.7	6%	3%	2.3	1.7
Killeen	2.9	5.4	109.0	51.7	19.8	6.9	19%	9%	1.8	1.7
Kinshasa	2.1	2.7	122.6	115.7	36.1	25.4	22%	12%	1.7	1.7
Kolkata	5.2	4.8	85.5	107.8	9.5	5.7	8%	4%	1.6	1.6
Kozhikode	1.7	7.5	176.0	110.9	8.6	10.0	4%	5%	1.4	1.6
Lagos	5.8	4.8	61.4	82.8	12.0	4.4	10%	4%	1.7	1.7
Lahore	2.3	1.9	207.9	209.2	31.1	23.0	11%	11%	1.5	1.9
Lausanne	4.1	6.6	119.6	106.6	13.7	6.7	14%	5%	1.9	1.6
Le Mans	2.7	6.3	184.4	137.9	22.2	13.9	8%	8%	2.0	1.7
Leon	2.7	5.8	78.8	155.3	34.5	57.0	36%	20%	1.6	1.6
Leshan, Sichuan	3.3	4.9	98.8	78.2	17.1	6.0	16%	3%	1.7	1.4
London	8.4	8.2	50.9	60.8	10.0	10.4	13%	4%	1.7	1.7

Pre-199 1990- 2014 1990- 2014 1990- 2014 1990- 2014 1990- 2014 1990- 2014 Gainewsville, FL 71% 74% 96% 80% 4% 11% 0% 0% Garoya, Jangsu 70% 51% 96% 66% 40% 44% 44% 0% Gombe 55% 78% 99% 94% 15% 66% 65%	City Name	Share of Bui That Is Res	lt-up Area sidential	Share of Re Areas Laid O Develop	sidential ut Before ment	Share of Re Areas Not Laio Develop	sidential I Out Before oment	Share of Built- Is Grid	up Are That ded
Gaineswille, FL 71% 74% 98% 68% 40% 11% 0% 0% Gaoyou, Jiangau 70% 51% 60% 66% 40% 44% 0% 0% Gomel 59% 78% 99% 94% 19% 6% 0% <td< th=""><th></th><th>Pre-1990</th><th>1990 - 2014</th><th>Pre-1990</th><th>1990 - 2014</th><th>Pre-1990</th><th>1990 - 2014</th><th>Pre-1990</th><th>1990 - 2014</th></td<>		Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014
Gacyou, Jiangsu 70% 51% 60% 60% 40% 44% Gombe 77% 74% 91% 93% 93% 42% 8% 0% Gorgan 66% 66% 88% 93% 12% 7% 0%	Gainesville, FL	71%	74%	96%	89%	4%	11%	0%	0%
Gombe 77% 74% 91% 89% 94% </td <td>Gaoyou, Jiangsu</td> <td>70%</td> <td>51%</td> <td>60%</td> <td>56%</td> <td>40%</td> <td>44%</td> <td></td> <td></td>	Gaoyou, Jiangsu	70%	51%	60%	56%	40%	44%		
Gomel 59% 79% 99% 94% 11% 6% 0% 0% 0% Guadalajara 66% 69% 100% 98% 01% 2% 28% 8% Guanghou, Guangdoug 51% 50% 64% 67% 46% 50% 46% 30% 0%	Gombe	77%	74%	91%	58%	9%	42%	8%	0%
Gorgan 66% 60% 88% 93% 12% 7% 0% 0% Guadalajara 61% 70% 100% 93% 0% 28% 88% Guagzhou, Guangdong 51% 50% 54% 50% 44% 63% 0% 0% Guagzhou, Guangdong 62% 43% 37% 54% 63% 0% 0% Gwangdou, Janian 55% 60% 77% 59% 25% 41% 0% 0% Halkou, Hainan 55% 60% 77% 78% 22% 3% 0% 0% Haldpur 77% 78% 99% 78% 24% 23% 0% 0% Hodguin 67% 68% 50% 44% 63% 3% 0% 44% 13% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%	Gomel	59%	78%	99%	94%	1%	6%	0%	0%
Guadalajran 61% 76% 100% 98% 0.% 2.% 2.8% 8% Guangzhou, Guangdong 51% 55% 66% 84% 20% 16% 49% 37% 62% 49% 37% 62% 38% 3% 0%	Gorgan	66%	69%	88%	93%	12%	7%	0%	0%
Guangzhou, Guangdong 61% 50% 64% 60% 0% Guatemala City 73% 72% 668% 84% 22% 18% 44% 3% Guix, Chongqing 67% 62% 42% 18% 44% 3% 0% 0% Halkou, Hainan 55% 60% 77% 62% 42% 23% 0% 0% Halkou, Hainan 57% 69% 96% 77% 4% 23% 0% 0% Halgbou, Zhejjang 46% 66% 77% 78% 50% 57% 8% 0% 0% Hodgkin 77% 78% 96% 14% 25% 0% 0% Hordgkin 77% 78% 96% 14% 13% 0% 0% 3% Hordgkin 77% 78% 86% 10% 14% 3% 0% 16% 13% 10% 10% 16% 10% 15% 10% 10%	Guadalajara	61%	76%	100%	98%	0%	2%	28%	8%
Guatemala City 73% 72% 66% 94% 22% 16% 93% Guixi, Chongqing 67% 62% 31% 75% 62% 25% 38% 3% 0% Haikou, Lhainan 55% 60% 75% 59% 22% 41% 0% 0% Haikou, Zhejjang 46% 56% 76% 78% 24% 22% 3% 3% Hindupur 77% 77% 99% 77% 1% 25% 0% 0% Holguin 73% 66% 66% 44% 32% 56% 3% 0% Houston 66% 66% 80% 66% 10% 14% 3% 0% 0% Ibeuston 71% 76% 64% 55% 10% 10% 10% 3% 3% 0% 0% 0% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10%	Guangzhou, Guangdong	51%	50%	54%	50%	46%	50%		0%
Gaixi, Chongqing 67% 62% 37% 54% 63% 0% 0% Gawangju 62% 31% 75% 62% 25% 38% 0% 0% Halkou, Hainan 55% 60% 77% 55% 25% 41% 0% 0% Halg 57% 69% 66% 77% 24% 22% 3% 3% 0% Hangzhou, Zhejiang 47% 66% 50% 47% 62% 0%	Guatemala City	73%	72%	68%	84%	26%	16%	49%	3%
Gwangju 62% 31% 75% 62% 25% 31% 0% Haikou, Hainan 55% 60% 75% 59% 25% 41% 0% 0% Hangzhou, Zhejjang 46% 56% 77% 47% 22% 3% 3% Hindupur 77% 75% 99% 75% 24% 22% 3% 3% Holguin 77% 75% 99% 75% 1% 25% 0% 0% Houston 65% 65% 66% 10% 11% 14% 3% 0% Houston 66% 66% 90% 86% 10% 14% 3% 0% Ibeaan 71% 76% 64% 25% 36% 75% 0% 0% Jataa 75% 79% 97% 94% 4% 6% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%	Guixi, Chongqing	67%	62%	46%	37%	54%	63%	0%	0%
Hakou, Hainan 55% 60% 77% 59% 25% 41% 0% 0% Halle 57% 69% 96% 77% 4% 23% 0% 0% Hangzhou, Zhejjang 46% 56% 77% 78% 24% 22% 3% 3% Hindyur 77% 68% 68% 44% 32% 56% 13% 0% 3% Hong Kong, Hong Kong 51% 44% 68% 44% 13% 0% 3% Houston 65% 63% 90% 87% 4% 13% 0% 3% Ibeuston 65% 63% 90% 86% 10% 14% 3% 0% Ibroh 70% 64% 53% 76% 42% 26% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% <	Gwangju	62%	31%	75%	62%	25%	38%	3%	0%
Halle 57% 69% 96% 77% 44% 22% 9% 0% Hangzhou, Zhejiang 46% 56% 76% 78% 24% 22% 3% 3% Hindupur 77% 75% 99% 75% 14% 25% 9% 0% Hoguin 73% 69% 66% 43% 50% 57% 8% 3% Houston 66% 83% 96% 87% 4% 13% 0% Ibadan 77% 76% 64% 25% 36% 75% 0% Ibadan 76% 76% 64% 25% 36% 76% 13% 0% 0% Ibadan 75% 79% 97% 94% 4% 6% 00% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% <t< td=""><td>Haikou, Hainan</td><td>55%</td><td>60%</td><td>75%</td><td>59%</td><td>25%</td><td>41%</td><td>0%</td><td>0%</td></t<>	Haikou, Hainan	55%	60%	75%	59%	25%	41%	0%	0%
Hangzhou, Zhejiang 46% 56% 76% 77% 72% 99% 75% 11% 22% 33% 33% Hindupur 77% 75% 99% 75% 11% 25% 0% 0% 0% Holguin 73% 69% 68% 44% 69% 16% 31% 0% 3% Holguin 73% 69% 66% 90% 86% 10% 14% 3% 0% Houston 66% 66% 90% 86% 10% 14% 3% 0% Ibeadan 71% 76% 64% 25% 36% 75% 5% 0% Ipoh 70% 82% 100% 90% 0% 10% 3%	Halle	57%	69%	96%	77%	4%	23%	0%	0%
Hindupur 77% 75% 99% 75% 11% 22% 0.% 0.% Ho Chi Minh City 67% 68% 50% 43% 50% 57% 8% 3% Holgukong, Hong Kong 51% 44% 68% 66% 13% 0% 3% Houston 65% 83% 96% 87% 4% 13% 5% 0% Hyderabad 66% 66% 00% 86% 16% 14% 3% 0% Ibadan 71% 76% 64% 25% 36% 75% 0% 0% 11% 11% 10% 11% 11% 10% 11% 14% 25% 3% 3% 10% 10% 10% 10% 10%	Hangzhou, Zhejiang	46%	56%	76%	78%	24%	22%	3%	3%
Ho Chi Minh City 67% 68% 50% 43% 50% 57% 8% 33% Holg kong, Hong Kong 51% 44% 68% 66% 90% 87% 44% 13% 0% 0% 33% 0% Houston 65% 83% 96% 87% 44% 13% 5% 0% Hyderabad 68% 66% 90% 86% 75% 5% 0% Ibadan 71% 76% 64% 25% 36% 75% 0% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 33% </td <td>Hindupur</td> <td>77%</td> <td>75%</td> <td>99%</td> <td>75%</td> <td>1%</td> <td>25%</td> <td>0%</td> <td>0%</td>	Hindupur	77%	75%	99%	75%	1%	25%	0%	0%
Holguin 73% 69% 68% 44% 32% 56% 13% 0% Hong Kong, Hong Kong 51% 44% 84% 69% 16% 31% 0% 3% Houston 65% 83% 96% 87% 44% 13% 0% 3% Hyderabad 68% 66% 90% 86% 10% 14% 3% 0% Ibadan 71% 76% 64% 25% 36% 75% 5% 0% Iboh 70% 79% 97% 94% 4% 6% 0% 10% 3% 3% Japa 70% 78% 100% 90% 0% 10% 5% 30% <	Ho Chi Minh City	67%	68%	50%	43%	50%	57%	8%	3%
Hong Kong, Hong Kong 51% 44% 84% 69% 16% 31% 0% 33% Houston 65% 83% 96% 87% 44% 13% 5% 0% Houston 66% 66% 90% 86% 11% 14% 3% 0% Ibadan 71% 76% 64% 25% 36% 75% 5% 0% Ibadan 77% 97% 94% 4% 6% 0% 10% 3% Ibadan 76% 87% 85% 13% 15% 0%	Holguin	73%	69%	68%	44%	32%	56%	13%	0%
Houston 66% 68% 66% 87% 44% 13% 5% 0% Hyderabad 66% 90% 86% 10% 14% 3% 0% Ibadan 71% 76% 64% 25% 36% 75% 5% 0% Ilheus 75% 79% 97% 94% 4% 6% 0% 10% Japur 70% 82% 100% 90% 0% 10% 5% 3% 3% 3% Jaipur 70% 76% 87% 65% 13% 15% 0% <td>Hong Kong, Hong Kong</td> <td>51%</td> <td>44%</td> <td>84%</td> <td>69%</td> <td>16%</td> <td>31%</td> <td>0%</td> <td>3%</td>	Hong Kong, Hong Kong	51%	44%	84%	69%	16%	31%	0%	3%
Hyderabad 66% 69% 86% 10% 14% 3% 0% Ibadan 71% 76% 64% 25% 36% 75% 0% Ilpoh 70% 82% 100% 90% 44% 6% 0% 10% Jaipar 70% 82% 100% 90% 42% 24% 10% 5% Jaipar 75% 55% 50% 70% 42% 24% 10% 5% Jaipar 65% 55% 50% 70% 50% 30% 0% 0% Jalan 55% 55% 50% 70% 15% 10% 11% Jana 58% 31% 80% 23% 20% 77% 18% 0% Johanneshurg 58% 63% 93% 86% 11% 14% 25% 3% Kaipuan 74% 75% 68% 83% 32% 17% 0% 0%	Houston	65%	83%	96%	87%	4%	13%	5%	0%
Ibadan 71% 76% 64% 25% 36% 75% 5% 0% Ilheus 75% 79% 97% 94% 4% 6% 0% 10% Istanbul 76% 82% 100% 90% 0% 10% 3% Jaipur 70% 76% 87% 85% 13% 15% 0% 0% Jaipur 70% 76% 87% 85% 13% 15% 0% 0% Jaquie 69% 70% 100% 85% 0% 11% 11% 0% 0% 0% 0% 0% 11% 11% 0% 0% 0% 11% 14% 25% 38 0% 33% 16% 11% 0% 0% 0% 0% 6% 36% 13% 48% 93% 90% 7% 10% 0% 0% 6% 36% 13% 48% 93% 90% 7% 10% 25% <td>Hyderabad</td> <td>68%</td> <td>66%</td> <td>90%</td> <td>86%</td> <td>10%</td> <td>14%</td> <td>3%</td> <td>0%</td>	Hyderabad	68%	66%	90%	86%	10%	14%	3%	0%
lineus 75% 79% 97% 94% 4% 6% 0% 10% lpoh 70% 82% 100% 90% 00% 10% 3% 3% Istanbul 74% 68% 53% 76% 42% 24% 10% 5% Jaipur 70% 76% 87% 85% 13% 15% 0% 0% 0% Jaipur 70% 76% 87% 55% 50% 70% 13% 0% 0% 0% Jaina 55% 55% 50% 70% 13% 0% <td>Ibadan</td> <td>71%</td> <td>76%</td> <td>64%</td> <td>25%</td> <td>36%</td> <td>75%</td> <td>5%</td> <td>0%</td>	Ibadan	71%	76%	64%	25%	36%	75%	5%	0%
Ipoh 70% 82% 100% 90% 0% 10% 3% 3% Istanbul 74% 68% 53% 76% 42% 24% 10% 5% Jaipur 70% 76% 87% 68% 13% 15% 0% 0% 0% Jaina 55% 55% 50% 70% 50% 30% 0% 0% Jequie 69% 70% 100% 85% 0% 15% 10% 11% Jinan, Shandong 38% 48% 93% 86% 1% 14% 25% 3% Johannesburg 85% 83% 93% 86% 1% 14% 25% 3% Kabul 74% 75% 68% 83% 32% 17% 86% 5% Kaiping, Guangdong 83% 48% 93% 66% 17% 10% 0% 3% Karapala 72% 69% 51% 33%<	Ilheus	75%	79%	97%	94%	4%	6%	0%	10%
Istanbul 74% 66% 53% 76% 42% 24% 10% 55% Jaipar 70% 76% 87% 85% 13% 15% 0% 0% Jaina 55% 55% 50% 70% 50% 30% 0% 0% Jaua 69% 70% 100% 85% 0% 15% 10% 11% Janan, Shandong 38% 48% 93% 87% 7% 13% 0% 0% Jinju 58% 31% 80% 23% 20% 77% 18% 0% Johannesburg 85% 83% 93% 86% 1% 14% 25% 3% Kabul 74% 75% 68% 83% 32% 17% 8% 5% Kaiping, Guangdong 83% 48% 93% 90% 77% 10% 0% 0% Kaipota 72% 69% 51% 33% 49% 67% 0% 0% Kaipota 71% 71% 75%	lpoh	70%	82%	100%	90%	0%	10%	3%	3%
Jaipur 70% 76% 87% 85% 13% 15% 0% 0% Jaina 55% 55% 50% 70% 50% 30% 0% 0% Jana, Shandong 38% 44% 93% 87% 77% 13% 0% 0% Jinju 58% 31% 80% 23% 20% 77% 18% 0% Johannesburg 85% 83% 93% 86% 1% 14% 25% 3% Kabul 74% 75% 68% 83% 32% 17% 8% 5% Kairouan 79% 62% 94% 83% 6% 17% 0% 0% Karouan 72% 69% 51% 33% 49% 67% 0% 0% Karachi 71% 71% 75% 72% 25% 28% 5% 13% Kaunas 61% 73% 75% 75% 25% 25% 0% 0% Kustau 75% 75% 75% 25%	Istanbul	74%	68%	53%	76%	42%	24%	10%	5%
Jalna 55% 55% 50% 70% 50% 30% 0% 0% Jequie 69% 70% 100% 85% 0% 15% 10% 11% Jinan, Shandong 38% 48% 93% 87% 7% 13% 0% 0% 0% Jinju 58% 31% 80% 23% 20% 77% 18% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 14% 25% 3% 68% 13% 14% 25% 3% Kapu 7% 10% 0%	Jaipur	70%	76%	87%	85%	13%	15%	0%	0%
Jequie 69% 70% 100% 85% 0% 15% 10% 11% Jinan, Shandong 38% 48% 93% 87% 7% 13% 0% 0% Johannesburg 58% 31% 80% 23% 20% 77% 18% 0% Johannesburg 85% 83% 93% 86% 1% 14% 25% 3% Kabul 74% 75% 688% 83% 32% 17% 8% 5% Kaiping, Guangdong 83% 48% 93% 90% 7% 10% 0% 0% Kairouan 79% 62% 94% 83% 6% 17% 0% 0% Kanpur 73% 74% 81% 52% 19% 48% 0% 3% Kanpur 73% 75% 75% 25% 26% 0% 0% Kanpai 61% 73% 75% 75% 25% <td< td=""><td>Jalna</td><td>55%</td><td>55%</td><td>50%</td><td>70%</td><td>50%</td><td>30%</td><td>0%</td><td>0%</td></td<>	Jalna	55%	55%	50%	70%	50%	30%	0%	0%
Jinan, Shandong 38% 48% 93% 87% 7% 13% 0% 0% Jinju 58% 31% 80% 23% 20% 77% 18% 0% Johannesburg 85% 83% 93% 86% 1% 14% 25% 3% Kabul 74% 75% 68% 83% 32% 17% 8% 5% Kaiping, Guangdong 83% 48% 93% 90% 7% 10% 0% 0% Kairouan 79% 62% 94% 83% 6% 17% 0% 0% Kampala 72% 69% 51% 33% 49% 67% 0% 0% Kanpur 73% 74% 81% 52% 19% 48% 0% 3% Kaunas 61% 73% 75% 75% 25% 25% 0% 0% Kayseri 49% 68% 90% 77% 10% 23% 5% 0% 6% 13% 144% 69% 0% 0%<	Jequie	69%	70%	100%	85%	0%	15%	10%	11%
Jinju 58% 31% 80% 23% 20% 77% 18% 0% Johannesburg 85% 83% 93% 86% 11% 14% 25% 3% Kabul 74% 75% 68% 83% 32% 17% 8% 5% Kaiping, Guangdong 83% 48% 93% 90% 7% 10% 0% 0% Kairouan 79% 62% 94% 83% 6% 17% 0% 0% Kampala 72% 69% 51% 33% 49% 67% 0% 0% Kanpur 73% 74% 81% 52% 19% 48% 0% 3% Kaunas 61% 73% 75% 75% 25% 25% 0% 0% Kaunas 61% 73% 75% 75% 25% 25% 0% 0% Kaunas 61% 73% 75% 75% 25% 25% 0% 0% Kaunas 61% 73% 75% 75% <td>Jinan, Shandong</td> <td>38%</td> <td>48%</td> <td>93%</td> <td>87%</td> <td>7%</td> <td>13%</td> <td>0%</td> <td>0%</td>	Jinan, Shandong	38%	48%	93%	87%	7%	13%	0%	0%
Johannesburg 85% 83% 93% 86% 1% 14% 25% 3% Kabul 74% 75% 68% 83% 32% 17% 8% 5% Kaiping, Guangdong 83% 48% 93% 90% 7% 10% 0% 0% Kairouan 79% 62% 94% 83% 6% 17% 0% 0% Kampala 72% 69% 51% 33% 49% 67% 0% 0% Kanpur 73% 74% 81% 52% 19% 48% 0% 3% Kaunas 61% 73% 75% 75% 25% 28% 5% 13% Kaunas 61% 73% 75% 75% 25% 25% 0% 0% Kayseri 49% 68% 90% 77% 10% 23% 5% 0% Kileen 74% 93% 100% 91% 0%	Jinju	58%	31%	80%	23%	20%	77%	18%	0%
Kabul 74% 75% 68% 83% 32% 17% 8% 5% Kaiping, Guangdong 83% 48% 93% 90% 7% 10% 0% 0% Kairouan 79% 62% 94% 83% 6% 17% 0% 0% Kampala 72% 69% 51% 33% 49% 67% 0% 0% Kanpur 73% 74% 81% 52% 19% 48% 0% 3% Karachi 71% 71% 75% 72% 25% 28% 5% 13% Kaunas 61% 73% 75% 75% 25% 25% 0% 0% Kayseri 49% 68% 90% 77% 10% 23% 5% 0% Kigali 58% 79% 56% 31% 44% 69% 0% 9% Kigali 58% 79% 56% 31% 63% 19% 37% 10% 5% Kotata 76% 84% 15%	Johannesburg	85%	83%	93%	86%	1%	14%	25%	3%
Kaiping, Guangdong 83% 48% 93% 90% 7% 10% 0% 0% Kairouan 79% 62% 94% 83% 6% 17% 0% 0% Kampala 72% 69% 51% 33% 49% 67% 0% 0% Kanpur 73% 74% 81% 52% 19% 48% 0% 3% Karachi 71% 71% 75% 72% 25% 28% 5% 13% Kaunas 61% 73% 75% 75% 25% 25% 0% 0% Kayseri 49% 68% 90% 77% 10% 23% 5% 0% Kigali 58% 79% 56% 31% 44% 69% 0% 9% 0% 3% Kigali 58% 79% 56% 31% 44% 69% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%	Kabul	74%	75%	68%	83%	32%	17%	8%	5%
Kairouan79%62%94%83%6%17%0%0%Kampala72%69%51%33%49%67%0%0%Kanpur73%74%81%52%19%48%0%3%Karachi71%71%75%72%25%28%5%13%Kaunas61%73%75%75%25%25%0%0%Kayseri49%68%90%77%10%23%5%0%Khartoum75%87%97%94%3%6%8%Kigali58%79%56%31%44%69%0%0%Killeen74%93%100%91%0%9%3%Kokata76%84%15%27%84%73%10%5%Kolkata76%84%15%27%84%73%1%3%Kozhikode44%87%0%45%100%55%0%0%0%Lagos70%77%51%61%47%39%13%0%0%0%Lausanne65%77%92%73%8%27%0%0%0%0%Leon76%82%93%89%71%11%23%13%0%Leshan, Sichuan66%52%59%24%41%76%0%0%0%	Kaiping, Guangdong	83%	48%	93%	90%	7%	10%	0%	0%
Kampala72%69%51%33%44%67%0%0%Kanpur73%74%81%52%19%48%0%3%Karachi71%71%75%72%25%28%5%13%Kaunas61%73%75%75%25%25%0%0%0%Kaunas61%73%75%75%25%25%0%0%0%Kayseri49%68%90%77%10%23%5%0%0%Khartoum75%87%97%94%3%6%8%8%Kigali58%79%56%31%44%69%0%0%3%Killeen74%93%100%91%0%9%0%3%Kokata76%84%15%27%84%73%10%5%Kozhikode44%87%0%45%100%55%0%0%0%Lagos70%77%51%61%47%39%13%0%0%Lausanne65%77%92%73%8%27%0%0%0%Leon74%82%93%89%7%11%23%13%Leshan, Sichuan66%52%59%24%41%76%0%0%	Kairouan	79%	62%	94%	83%	6%	17%	0%	0%
Kanpur 73% 74% 81% 52% 19% 48% 0% 3% Karachi 71% 71% 75% 72% 25% 28% 5% 13% Kaunas 61% 73% 75% 75% 25% 28% 5% 13% Kaunas 61% 73% 75% 75% 25% 26% 0% 0% Kayseri 49% 68% 90% 77% 10% 23% 5% 0% 0% Khartoum 75% 87% 97% 94% 3% 6% 8% Kigali 58% 79% 56% 31% 44% 69% 0% 0% Killeen 74% 93% 100% 91% 0% 9% 3% 10% 5% Kolkata 76% 84% 15% 27% 84% 73% 1% 3% Kozhikode 44% 87% 0% 45% 100% </td <td>Kampala</td> <td>72%</td> <td>69%</td> <td>51%</td> <td>33%</td> <td>49%</td> <td>67%</td> <td>0%</td> <td>0%</td>	Kampala	72%	69%	51%	33%	49%	67%	0%	0%
Karachi 71% 71% 75% 72% 25% 28% 5% 13% Kaunas 61% 73% 75% 75% 25% 25% 0% 0% Kayseri 49% 68% 90% 77% 10% 23% 5% 0% Khartoum 75% 87% 97% 94% 3% 6% 8% Kigali 58% 79% 56% 31% 44% 69% 0% 0% Killeen 74% 93% 100% 91% 0% 9% 3% Kokata 76% 84% 15% 27% 84% 73% 10% 5% Kokata 76% 84% 15% 27% 84% 73% 1% 3% Kozhikode 44% 87% 0% 45% 100% 55% 0% 0% Lagos 70% 77% 51% 61% 47% 39% 13% 0% Lausanne 65% 77% 92% 73% 8% 27% <	Kanpur	73%	74%	81%	52%	19%	48%	0%	3%
Kaunas61%73%75%75%25%25%0%0%Kayseri49%68%90%77%10%23%5%0%Khartoum75%87%97%94%3%6%8%Kigali58%79%56%31%44%69%0%0%Killeen74%93%100%91%0%9%0%3%Kinshasa85%85%81%63%19%37%10%5%Kolkata76%84%15%27%84%73%1%3%Kozhikode44%87%0%45%100%55%0%0%Lagos70%77%51%61%47%39%13%0%Lausanne65%77%92%73%8%27%0%0%Leon74%82%93%89%7%11%23%13%Leshan, Sichuan66%52%59%24%41%76%0%0%	Karachi	71%	71%	75%	72%	25%	28%	5%	13%
Kayseri49%68%90%77%10%23%5%0%Khartoum75%87%97%94%3%6%8%Kigali58%79%56%31%44%69%0%0%Killeen74%93%100%91%0%9%0%3%Kinshasa85%85%81%63%19%37%10%5%Kolkata76%84%15%27%84%73%1%3%Kozhikode44%87%0%45%100%55%0%0%Lagos70%77%51%61%47%39%13%0%Lausanne65%77%92%73%8%27%0%0%Le Mans62%55%86%56%14%44%0%0%Leshan, Sichuan66%52%59%24%41%76%0%0%	Kaunas	61%	73%	75%	75%	25%	25%	0%	0%
Khartoum 75% 87% 97% 94% 3% 6% 8% Kigali 58% 79% 56% 31% 44% 69% 0% 0% Killeen 74% 93% 100% 91% 0% 9% 0% 3% Kinshasa 85% 85% 81% 63% 19% 37% 10% 5% Kolkata 76% 84% 15% 27% 84% 73% 1% 3% Kozhikode 44% 87% 0% 45% 100% 55% 0% 0% Lagos 70% 77% 51% 61% 47% 39% 13% 0% Lahore 82% 70% 64% 89% 36% 11% 0% 0% Le Mans 65% 77% 92% 73% 8% 27% 0% 0% Leon 74% 82% 93% 86% 56% 14% 44% 0% 0% Leshan, Sichuan 66% 52% 59% 24%	Kayseri	49%	68%	90%	//%	10%	23%	5%	0%
Kigali58%79%56%31%44%69%0%0%Killeen74%93%100%91%0%9%0%3%Kinshasa85%85%81%63%19%37%10%5%Kolkata76%84%15%27%84%73%1%3%Kozhikode44%87%0%45%100%55%0%0%Lagos70%77%51%61%47%39%13%0%Lahore82%70%64%89%36%11%0%0%Lausanne65%77%92%73%8%27%0%0%Leon74%82%93%89%7%11%23%13%Leshan, Sichuan66%52%59%24%41%76%0%0%	Khartoum	75%	87%	97%	94%	3%	6%	0.94	8%
Killeen 74% 93% 100% 91% 0% 9% 0% 3% Kinshasa 85% 85% 81% 63% 19% 37% 10% 5% Kolkata 76% 84% 15% 27% 84% 73% 1% 3% Kolkata 76% 84% 15% 27% 84% 73% 1% 3% Kozhikode 44% 87% 0% 45% 100% 55% 0% 0% Lagos 70% 77% 51% 61% 47% 39% 13% 0% Lahore 82% 70% 64% 89% 36% 11% 0% 0% Lausanne 65% 77% 92% 73% 8% 27% 0% 0% Lee Mans 62% 55% 86% 56% 14% 44% 0% 0% 0% Leon 74% 82% 93% 89% 7% <td>Kigali</td> <td>58%</td> <td>79%</td> <td>56%</td> <td>31%</td> <td>44%</td> <td>69%</td> <td>0%</td> <td>0%</td>	Kigali	58%	79%	56%	31%	44%	69%	0%	0%
Kinshasa 85% 85% 81% 63% 19% 37% 10% 5% Kolkata 76% 84% 15% 27% 84% 73% 1% 3% Kozhikode 44% 87% 0% 45% 100% 55% 0% 0% Lagos 70% 77% 51% 61% 47% 39% 13% 0% Lahore 82% 70% 64% 89% 36% 11% 0% 0% Lausanne 65% 77% 92% 73% 8% 27% 0% 0% Le Mans 62% 55% 86% 56% 14% 44% 0% 0% Leon 74% 82% 93% 89% 7% 11% 23% 13% Leshan, Sichuan 66% 52% 59% 24% 41% 76% 0% 0%	Killeen	74%	93%	100%	91%	0%	9%	0%	3%
Kolkata 76% 84% 15% 27% 84% 73% 1% 3% Kozhikode 44% 87% 0% 45% 100% 55% 0% 0% Lagos 70% 77% 51% 61% 47% 39% 13% 0% Lahore 82% 70% 64% 89% 36% 11% 0% 0% Lausanne 65% 77% 92% 73% 8% 27% 0% 0% Le Mans 62% 55% 86% 56% 14% 44% 0% 0% Leon 74% 82% 93% 89% 7% 11% 23% 13% Leshan, Sichuan 66% 52% 59% 24% 41% 0% 0%	Kinshasa	85%	85%	81%	63%	19%	37%	10%	5%
Koznikode 44% 87% 0% 45% 100% 55% 0% 0% Lagos 70% 77% 51% 61% 47% 39% 13% 0% Lahore 82% 70% 64% 89% 36% 11% 0% 0% Lausanne 65% 77% 92% 73% 8% 27% 0% 0% Le Mans 62% 55% 86% 56% 14% 44% 0% 0% Leon 74% 82% 93% 89% 7% 11% 23% 13% Leshan, Sichuan 66% 52% 59% 24% 41% 76% 0% 0%	Kolkata	76%	84%	15%	27%	84%	73%	1%	3%
Lagos 70% 77% 51% 61% 47% 39% 13% 0% Lahore 82% 70% 64% 89% 36% 11% 0% 0% Lausanne 65% 77% 92% 73% 8% 27% 0% 0% Le Mans 62% 55% 86% 56% 14% 44% 0% 0% Leon 74% 82% 93% 89% 7% 11% 23% 13% Leshan, Sichuan 66% 52% 59% 24% 41% 76% 0% 0%	Koznikode	44%	87%	0%	45%	100%	55%	0%	0%
Lanore 82% 70% 64% 89% 36% 11% 0% 0% Lausanne 65% 77% 92% 73% 8% 27% 0% 0% Le Mans 62% 55% 86% 56% 14% 44% 0% 0% Leon 74% 82% 93% 89% 7% 11% 23% 13% Leshan, Sichuan 66% 52% 59% 24% 41% 76% 0% 0%	Lagos	70%	77%	51%	61%	47%	39%	13%	0%
Lausanne 05% 77% 92% 73% 8% 27% 0% 0% Le Mans 62% 55% 86% 56% 14% 44% 0% 0% Leon 74% 82% 93% 89% 7% 11% 23% 13% Leshan, Sichuan 66% 52% 59% 24% 41% 76% 0% 0%		82%	70%	64%	89%	36%	11%	0%	0%
Le iviaits 62% 55% 86% 56% 14% 44% 0% 0% Leon 74% 82% 93% 89% 7% 11% 23% 13% Leshan, Sichuan 66% 52% 59% 24% 41% 76% 0% 0%		05% 60%	11%	92%	13%	۵% ۸ ۸ ۵ /	21%	0%	0%
Leshan, Sichuan 66% 52% 59% 24% 41% 76% 0% 0%		02%	55%	۵۵% ۵۵۵/	56%	14%	44%	0%	0%
Leshan, Sichuan 00% 32% 33% 24% 41% 70% 0% 0%	Leon Sichur	74%	82%	93%	89%	1%	760/	23%	13%
London 73% 72% 95% 87% 2% 13% 0% 0%	London	73%	52% 72%	95%	24%	41% 2%	13%	0%	0%

Gainsville - London

City Name	Share of R Areas in I Land Sub	esidential Informal divisions	Share of Residential Areas in Formal Land Subdivisions		Share of R Areas in Proje	esidential Housing ects	Average P Informa Subdiv	lot Size in al Land isions	Average Plot Size in Formal Land Subdivisions	
	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014
Gainesville, FL	0%	0%	90%	74%	7%	15%			1,037	1,009
Gaoyou, Jiangsu	1%	0%	35%	39%	23%	17%				674
Gombe	85%	52%	5%	4%	0%	2%		599		806
Gomel	38%	81%	41%	8%	20%	5%		847	731	806
Gorgan	7%	75%	78%	15%	2%	3%			259	
Guadalajara	15%	40%	79%	45%	6%	13%				
Guangzhou, Guangdong	0%	26%	38%	11%	16%	13%		168		
Guatemala City	7%	36%	63%	41%	4%	7%			392	187
Guixi, Chongqing	0%	4%	44%	8%	2%	25%				
Gwangju	0%	4%	41%	33%	33%	25%			189	236
Haikou, Hainan	2%	11%	51%	16%	21%	32%				
Halle	1%	13%	67%	62%	28%	1%		325	405	674
Hangzhou, Zhejiang	1%	38%	23%	18%	52%	22%			162	592
Hindupur	99%	74%	0%	0%	0%	1%	155	141		
Ho Chi Minh City	0%	23%	50%	20%	0%	1%				193
Holguin	44%	42%	15%	0%	9%	2%	134		241	
Hong Kong, Hong Kong	0%	0%	32%	9%	52%	60%			1,098	
Houston	0%	0%	86%	73%	10%	14%			800	852
Hyderabad	3%	65%	83%	20%	3%	2%	95	159	213	190
Ibadan	56%	25%	6%	0%	2%	0%			677	
Ilheus	28%	51%	67%	42%	1%	1%		500		253
Ipoh	5%	5%	68%	29%	27%	56%			358	336
Istanbul	0%	13%	51%	35%	7%	28%			355	318
Jaipur	40%	68%	42%	11%	5%	6%	246	195	233	212
Jalna	32%	62%	17%	7%	1%	0%	145		141	
Jequie	59%	58%	36%	16%	4%	11%	202	173	132	274
Jinan, Shandong	22%	29%	45%	13%	26%	45%				
Jinju	0%	0%	56%	4%	25%	19%				
Johannesburg	4%	46%	87%	38%	8%	2%	230	290	965	509
Kabul	53%	83%	12%	0%	4%	0%	548	339	366	
Kaiping, Guangdong	31%	57%	50%	11%	12%	23%				
Kairouan	21%	36%	69%	47%	3%	0%			422	168
Kampala	47%	32%	2%	0%	2%	0%				
Kanpur	49%	46%	22%	4%	10%	2%	158		262	169
Karachi	26%	61%	46%	7%	3%	5%	83		464	343
Kaunas	18%	27%	41%	39%	16%	9%	1,567	990	741	784
Kayseri	10%	19%	77%	28%	3%	31%			561	275
Khartoum	88%	94%	5%	0%	4%	0%	534	345		
Kigali	34%	30%	22%	0%	0%	1%		444		
Killeen	0%	0%	68%	85%	32%	6%			742	770
Kinshasa	73%	59%	9%	2%	0%	3%	444	124		
Kolkata	7%	16%	7%	3%	3%	8%		217	271	
Kozhikode	0%	45%	0%	0%	0%	1%				
Lagos	28%	53%	20%	4%	5%	4%	28	669	538	679
Lahore	21%	31%	42%	54%	1%	3%			394	440
Lausanne	0%	0%	78%	68%	14%	5%				1,231
Le Mans	0%	0%	72%	54%	14%	2%			647	720
Leon	15%	63%	78%	24%	0%	2%			143	355
Leshan, Sichuan	4%	7%	30%	11%	24%	7%				
London	0%	0%	45%	87%	53%	0%			550	612

City Name	Country	Region	CBD Lo	ocation	Land Cover Dates		
			Latitude	Longitude	T1	т2	тз
Los Angeles	United States	Land-Rich Developed Countries	33.971	-117.969	5/1/90	5/1/00	10/1/14
Luanda	Angola	Sub-Saharan Africa	-8.825	13.260	6/1/91	6/1/00	5/1/14
Lubumbashi	Congo Dem. Rep.	Sub-Saharan Africa	-11.677	27.480	7/1/90	9/1/98	8/1/13
Madrid	Spain	Europe and Japan	40.413	-3.707	5/1/91	6/1/02	5/1/10
Malatya	Turkey	Western Asia and North Africa	38.350	38.270	8/1/90	7/1/00	3/1/14
Malegaon	India	South and Central Asia	20.562	74.520	2/1/91	3/1/00	10/1/14
Manchester	United Kingdom	Europe and Japan	53.470	-2.474	5/1/89	9/1/02	10/1/10
Manila	Philippines	Southeast Asia	14.579	121.028	12/1/90	4/1/00	2/1/14
Marrakesh	Morocco	Western Asia and North Africa	31.636	-8.021	3/1/88	6/1/02	8/1/14
Medan	Indonesia	Southeast Asia	3.596	98.651	6/1/89	6/1/01	6/1/13
Mexico City	Mexico	Latin America and the Caribbean	19.446	-99.123	3/1/90	2/1/00	4/1/14
Milan	Italy	Europe and Japan	45.608	9.222	9/1/88	8/1/03	8/1/13
Minneapolis	United States	Land-Rich Developed Countries	44.959	-93.256	5/1/90	4/1/00	10/1/14
Modesto	United States	Land-Rich Developed Countries	37.649	-120.993	7/1/92	7/1/00	8/1/14
Montreal	Canada	Land-Rich Developed Countries	45.534	-73.658	8/1/90	9/1/00	8/1/13
Moscow	Russia	Europe and Japan	55.743	37.645	5/1/91	5/1/01	9/1/14
Mumbai	India	South and Central Asia	19.115	72.913	12/1/91	12/1/01	10/1/14
Myeik	Myanmar	Southeast Asia	12.448	98.618	2/1/91	12/1/03	1/1/14
Nakuru	Kenya	Sub-Saharan Africa	-0.294	36.058	3/1/89	2/1/00	2/1/14
Ndola	Zambia	Sub-Saharan Africa	-12.981	28.634	6/1/89	5/1/02	6/1/14
New York	United States	Land-Rich Developed Countries	40.842	-73.798	5/1/91	10/1/00	5/1/11
Nikolaev	Ukraine	Europe and Japan	46.974	32.029	5/1/89	9/1/00	8/1/13
Okavama	Japan	Europe and Japan	34.657	133.949	5/1/90	5/1/00	5/1/14
Oldenburg	Germany	Europe and Japan	53,148	8.207	8/1/90	8/1/99	10/1/13
Osaka	Japan	Europe and Japan	34.718	135.389	5/1/89	10/1/01	3/1/14
Ovo	Nigeria	Sub-Saharan Africa	6.818	3.916	12/1/90	2/1/00	2/1/14
Palembang	Indonesia	Southeast Asia	-2.958	104.736	4/1/90	7/1/01	6/1/13
Palermo	Italy	Europe and Japan	38,135	13.330	7/1/87	5/1/00	7/1/13
Palmas	Brazil	Latin America and the Caribbean	-10.189	-48.330	4/1/90	6/1/00	8/1/13
Parbhani	India	South and Central Asia	19.280	76,765	3/1/91	10/1/02	12/1/14
Parepare	Indonesia	Southeast Asia	-7.772	112,195	8/1/94	8/1/00	7/1/14
Paris	France	Europe and Japan	48.863	2.315	5/1/87	8/1/00	5/1/14
Pematangtiantar	Indonesia	Southeast Asia	2,962	99.074	7/1/94	7/1/01	2/1/14
Philadelphia	United States	Land-Rich Developed Countries	40.015	-75.168	6/1/90	5/1/00	4/1/14
Pingxiang, Jiangxi	China	East Asia and the Pacific	27.643	113.851	2/1/89	12/1/99	9/1/13
Pokhara	Nepal	South and Central Asia	28.220	83.980	4/1/89	1/1/00	5/1/13
Port Elizabeth	South Africa	Sub-Saharan Africa	13.052	5.230	6/1/90	7/1/01	7/1/13
Portland, OR	United States	Land-Rich Developed Countries	45.520	-122.666	9/1/90	9/1/00	8/1/14
Pune	India	South and Central Asia	18.524	73.864	2/1/91	4/1/01	1/1/11
Pvongvang	Korea Dem, Rep.	East Asia and the Pacific	39.045	125.767	3/1/90	5/1/00	3/1/14
Qingdao, Shandong	China	East Asia and the Pacific	36.220	120.403	5/1/90	1/1/00	8/1/13
Qom	Iran	South and Central Asia	34.640	50.876	1/1/90	7/1/01	5/1/10
Quito	Ecuador	Latin America and the Caribbean	-0.135	-78.443	6/1/88	12/1/00	6/1/13
Raishahi	Bangladesh	South and Central Asia	24.367	88,600	5/1/90	11/1/00	1/1/10
Raleigh	United States	Land-Rich Developed Countries	35 807	-78 675	10/1/90	11/1/00	5/1/13
Rawang	Malavsia	Southeast Asia	3,330	101.577	6/1/89	9/1/01	3/1/14
Revnosa	Mexico	Latin America and the Caribbean	26.063	-98.302	7/1/91	6/1/00	7/1/13
Ribeirao Preto	Brazil	Latin America and the Caribbean	-21 172	-47 798	12/1/90	3/1/01	3/1/14
Rivadh	Saudi Arabia	Western Asia and North Africa	24 686	46 742	8/1/90	8/1/00	8/1/13
Rovno	Ukraine	Europe and Japan	50.624	26.248	5/1/90	5/1/00	5/1/14

Los Angeles - Rovno

Pre-199 1990/ 2014 1990/ 2014 1990/ 2014 1990/ 2014 1990/ 2014 1990/ 2014 Los Angeles 25% 25% 15.1 15.8 6% 13% 37% 6% Luanda 15% 17% 7.9 6.4 17% 31% 27% 5% Madrid 28% 298 11.3 11% 22% 22% 28% Malaya 28% 292 9.3 11% 22% 11% 33% 11% 34% Manhasen 20% 17% 6.5 11% 23% 11% 11% 34%	City Name	Share of Bui Occupied b	lt-up Area y Roads	Average Str (met	eet Width ers)	Share of Road 4m. V	ls Less Than Vide	Share of Ro Than 16n	ads More 1. Wide
Los Angeles 25% 15.1 15.1 15.1 15.1 15.1 15.8 17% 7.9 6.4 17% 31% 7% 5% Luanda 15% 17% 7.9 6.4 17% 31% 27% 55 Madrd 28% 285 9.2 9.3 11% 22% 25% 25% Malegaon 20% 27% 5.3 4.6 37% 40% 42% 1% Manchester 20% 22% 9.2 5.8 11% 23% 11% 1%		Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014
Landa 15% 17% 7.9 6.4 17% 31% 7% 5% Lubumbashi 16% 16% 9.1 5.6 9% 33% 10% 2% Malaya 28% 28% 9.2 9.3 11% 20% 12% 15% Malaya 28% 28% 9.2 5.8 11% 20% 14% 15% Manchester 20% 22% 9.2 5.8 11% 23% 14% 11% Marrakesh 22% 20% 8.5 6.7 27% 20% 14% 12% Marrakesh 22% 22% 8.0 6.6 6.7 27% 20% 4% Marrakesh 22% 12% 10% 14% 12% 4% 16% 4% 16% 16% 16% 16% 16% 16% 16% 16% 16% 16% 16% 16% 16% 16% 16% 16% 16%	Los Angeles	25%	26%	15.1	15.8	6%	18%	46%	21%
Lubumbashi 16% 16% 9.1 5.6 9% 3.3% 10% 2% Madrid 28% 29% 13.2 11.3 12% 22% 28% Maleya 28% 28% 9.2 9.3 111% 12% 12% 15% Markestor 20% 12% 5.3 4.6 37% 4.4% 3% Marnakesh 22% 22% 9.2 5.8 11% 2.3% 14% 13% Marrakesh 22% 22% 9.2 5.8 11% 2.3% 14% 13% Marrakesh 22% 22% 9.2 5.8 6.7 2.7% 3% 6% 6% Marrakesh 22% 23% 21% 15% 12% 4% 16% 15% 13% Minneapolis 23% 21% 9.5 16% 11% 16% 11% 16% 11% Morteal 25% 27% 16.8	Luanda	15%	17%	7.9	6.4	17%	31%	7%	5%
Madid 28% 29% 11.2 11.3 12% 22% 28% 28% Malatya 28% 28% 9.2 9.3 11% 20% 12% 15% Manchester 20% 19% 7.4 6.3 25% 35% 4% 3% Manila 20% 22% 9.2 5.8 11% 23% 11% 1% Marakesh 22% 26% 8.5 8.7 27% 20% 14% 12% Medan 12% 11% 6.5 5.1 25% 37% 4% MancoCity 22% 26% 12% 16% 15% 20% 4% Mineapolis 23% 21% 9.4 61.1 11% 12% 18% 11% Modesto 20% 15% 9.7 6.6 10% 24% 11% 3% Manuba 17% 20% 11.6 8.6 11% 24% 14% </td <td>Lubumbashi</td> <td>16%</td> <td>16%</td> <td>9.1</td> <td>5.6</td> <td>9%</td> <td>33%</td> <td>10%</td> <td>2%</td>	Lubumbashi	16%	16%	9.1	5.6	9%	33%	10%	2%
Malayan 28% 28% 9.2 9.3 11% 20% 12% 11% Malegaon 20% 27% 5.3 4.4 37% 40% 12% 11% Manchester 20% 27% 6.3 25% 35% 44% 35% Marakesh 22% 22% 8.6 8.7 27% 20% 114% 12% Marakesh 22% 22% 2.6 8.7 27% 20% 144 12% Medan 12% 11% 6.5 5.1 25% 37% 5% 0.0% Mina 21% 11% 6.5 11% 12% 4% 13% Modesto 20% 15% 9.7 5.5 13% 25% 13% 3% 13% Modesto 15% 1.6 6.5 11% 13% 3% 3% Mola 15% 1.6 5.5 14% 3% 3% 3% <	Madrid	28%	29%	13.2	11.3	12%	22%	25%	28%
Malegoon 20% 27% 5.3 4.6 37% 40% 2% 1% Manchester 20% 19% 7.4 6.3 25% 35% 4% 3% Manla 20% 22% 9.2 5.8 11% 23% 11% 1% Marakesh 22% 22% 12.5 8.0 6% 15% 20% 4% Minanapolis 23% 21% 9.5 8.8 18% 15% 7% Monteal 20% 19% 9.4 16.1 11% 12% 11% Moscow 20% 15% 15.3 32% 36% 11% Moscow 20% 15% 15.3 32% 36% 11% Markuru 24% 21% 10.8 5.5 14% 13% 20% 2% Noka 17% 13% 8.8 4.9 14% 13% 20% 2% 3% Nodia	Malatya	28%	28%	9.2	9.3	11%	20%	12%	15%
Manchester 20% 10% 7.4 6.3 22% 35% 11% 33% Mania 20% 22% 9.2 5.8 11% 23% 11% 11% 11% Marakesh 22% 22% 22% 5.8 5.7 22% 20% 14% 0% Mexico City 22% 23% 12.5 8.0 18% 40% 10% 1% Minan 21% 14% 8.4 5.0 18% 40% 10% 1% Modesto 22% 25% 29% 10.6 10.2 18% 18% 11% Modesto 20% 19% 9.4 16.1 11% 22% 11% 19% 11% 14% 11% 12% 8% 11% 11% 13% 11% 13% 11% 13% 11% 13% 11% 13% 11% 13% 11% 13% 11% 13% 11% 13% 11% 13% 13% 13% 13% 13% 13% 13% 13% 13% <td>Malegaon</td> <td>20%</td> <td>27%</td> <td>5.3</td> <td>4.6</td> <td>37%</td> <td>40%</td> <td>2%</td> <td>1%</td>	Malegaon	20%	27%	5.3	4.6	37%	40%	2%	1%
Manila 20% 22% 9.2 5.8 11% 23% 11% 1% Marrakesh 22% 26% 8.5 8.7 27% 20% 14% 12% Marrakesh 22% 23% 12.5 8.0 6.6% 15% 20% 4% Minneapolis 23% 21% 9.5 8.8 16% 15% 7% Montreal 20% 19% 9.4 6.1 11% 12% 8% 11% Montreal 20% 15% 9.7 5.6 10% 32% 25% 3% Montreal 17% 20% 11.6 8.5 11% 44% 18% 11% Moreal 17% 13% 8.9 4.9 16% 44% 13% 2% Neavork 20% 15% 8.6 5.6 10% 28% 3% 3% Odenburg 18% 18% 7.6 6.7 13% 2	Manchester	20%	19%	7.4	6.3	25%	35%	4%	3%
Marrakesh 22% 26% 8.5 6.7 27% 20% 14% 12% Mexico City 12% 11% 6.5 5.1 25% 37% 5% 0% Mian 21% 18% 8.4 5.0 18% 40% 10% 1% Mineapolis 23% 21% 9.5 8.8 16% 16% 15% 7% Moscow 25% 29% 10.6 10.2 18% 22% 18% 11% Moscow 20% 15% 9.7 5.6 10% 32% 25% 3% Mumbai 17% 20% 11.6 8.6 11% 11% 13% 3% 3% 11% 3% 3% 11% 3% 11% 3% 11% 3% 3% 3% 11% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3%	Manila	20%	22%	9.2	5.8	11%	23%	11%	1%
Medan 12% 11% 6.5 5.1 25% 37% 5% 0% Mexico City 26% 23% 12.5 8.0 6% 15% 20% 4% Minan 21% 18% 8.4 5.0 18% 40% 10% 1% Minneapolis 23% 21% 9.5 8.8 16% 16% 15% 7% Montreal 20% 19% 9.4 16.1 11% 12% 8% 11% Moscow 20% 15% 9.7 5.6 10% 32% 25% 3% Murbai 17% 13% 8.9 4.9 11% 14% 13% 20% 2% Ndola 17% 13% 8.9 4.9 16% 44% 13% 20% 2% 3% Ndola 17% 13% 8.6 5.6 10% 26% 3% 1% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3%	Marrakesh	22%	26%	8.5	8.7	27%	20%	14%	12%
Mexico City 28% 23% 12.5 8.0 6% 15% 20% 4% Minane 21% 88 8.4 5.0 18% 40% 10% 1% Minneapolis 23% 22% 9.5 8.8 16% 16% 16% 16% 17% 7% Modesto 22% 29% 10.6 10.2 18% 22% 18% 19% Montreal 20% 19% 9.4 16.1 11% 12% 8% 11% Muscu 20% 13% 5.1 5.3 32% 36% 11% 24% 11% 33% 20% 25% 33% Nakuru 24% 21% 10.8 5.5 14% 31% 20% 25% 34% 13% 23% 26% 35% 34% 34% 36% 35% 36% 35% 35% 34% 36% 35% 35% 36% 35% 35% 36%	Medan	12%	11%	6.5	5.1	25%	37%	5%	0%
Milan 21% 18% 8.4 5.0 18% 40% 10% 1% Minneapolis 23% 21% 9.5 8.8 16% 15% 7% Modesto 25% 29% 10.6 10.2 18% 22% 18% 19% Montreal 20% 19% 9.4 16.1 11% 12% 8% 11% Mumbai 17% 20% 11.6 8.6 11% 24% 18% 11% Myeik 15% 13% 5.1 5.3 32% 36% 11% 3% Nakuru 24% 21% 10.8 8.9 14% 13% 20% 2% 2% 2% 2% 2% 2% 12% 8% 11% 12% 8% 16% 16% 16% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3%	Mexico City	26%	23%	12.5	8.0	6%	15%	20%	4%
Minneapolis 23% 21% 9.5 8.8 16% 16% 15% 7% Modesto 25% 29% 10.6 10.2 18% 12% 18% 19% Montreal 20% 15% 9.7 5.6 10% 32% 25% 3% Mumbai 17% 20% 11.6 8.6 11% 32% 25% 3% Makuru 24% 21% 10.8 5.1 5.3 32% 3% 3% Nakuru 24% 21% 10.8 8.9 4.9 16% 44% 13% 2% 8% New York 20% 13% 8.8 6.6 10% 26% 8% 11% Okayama 26% 23% 5.7 4.4 61% 64% 3% 3% Oldenburg 18% 18% 7.6 6.7 13% 23% 3% 3% Oldenburg 13% 14% 5.8 <td>Milan</td> <td>21%</td> <td>18%</td> <td>8.4</td> <td>5.0</td> <td>18%</td> <td>40%</td> <td>10%</td> <td>1%</td>	Milan	21%	18%	8.4	5.0	18%	40%	10%	1%
Modesto 25% 29% 10.6 10.2 18% 22% 18% 19% Montreal 20% 19% 9.4 16.1 11% 12% 8% 11% Moscow 20% 15% 9.7 5.6 10% 32% 25% 3% Mumbai 17% 20% 11.6 8.6 11% 24% 18% 11% 3% Nakuru 24% 21% 10.8 5.5 14% 31% 20% 2% Ndola 17% 13% 8.9 4.9 16% 44% 13% 2% 8% 1% Okayama 26% 23% 5.7 4.4 51% 66% 3%<	Minneapolis	23%	21%	9.5	8.8	16%	16%	15%	7%
Montreal 20% 19% 9.4 16.1 11% 12% 8% 11% Moscow 20% 15% 9.7 5.6 10% 32% 25% 33% Mumbai 17% 20% 11.6 8.6 11% 24% 33% 36% 11% 33% 36% 11% 33% 36% 11% 33% 36% 11% 33% 36% 11% 33% 36% 11% 33% 36% 11% 20% 2% Nkolae 11% 12% 8% 14% 13% 2% Nkolaev 19% 15% 8.6 5.6 10% 26% 3% 1% 0% 3% 1% 0% 3% 1% 0% 3% 1% 0% 3% 1% 16% 1% 3% 1% 0% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% <td>Modesto</td> <td>25%</td> <td>29%</td> <td>10.6</td> <td>10.2</td> <td>18%</td> <td>22%</td> <td>18%</td> <td>19%</td>	Modesto	25%	29%	10.6	10.2	18%	22%	18%	19%
Moscow 20% 15% 9.7 5.6 10% 32% 25% 3% Mumbai 17% 20% 11.6 8.6 11% 24% 18% 11% Myeik 15% 13% 5.1 5.3 32% 36% 1% 3% Nakuru 24% 21% 10.8 8.5 14% 31% 20% 2% Noda 17% 13% 8.9 4.9 16% 44% 13% 2% New York 20% 13% 10.8 8.9 8% 14% 12% 8% 1% Okayama 26% 23% 5.7 4.4 51% 61% 6% 3% Okaa 21% 26% 5.7 5.5 47% 40% 6% 3% 3% Palemo 21% 19% 7.2 5.4 29% 3% 3% 9% 2% 2% 2% 2% 2% 2%	Montreal	20%	19%	9.4	16.1	11%	12%	8%	11%
Mumbai 17% 20% 11.6 8.6 11% 24% 11% Myeik 15% 13% 5.1 5.3 32% 36% 1% 33% Nakuru 24% 21% 10.8 5.5 14% 31% 20% 2% Nodal 17% 13% 8.9 4.9 16% 44% 13% 2% Nikolaev 19% 15% 8.6 5.6 10% 6% 3% Okayama 26% 23% 5.7 4.4 61% 6% 3% Oldenburg 18% 18% 7.6 6.7 13% 23% 3% 3% Oyo 12% 15% 7.6 6.7 13% 23% 3% 3% Palembang 13% 14% 5.8 4.4 34% 50% 5% 2% Palembang 13% 14% 5.8 4.4 34% 50% 5% 2% 1	Moscow	20%	15%	9.7	5.6	10%	32%	25%	3%
Myeik 15% 13% 5.1 5.3 32% 36% 1% 3% Nakuru 24% 21% 10.8 5.5 14% 31% 20% 2% Ndola 17% 13% 8.9 4.9 16% 44% 13% 2% Nikolaev 19% 15% 8.6 5.6 10% 26% 8% 1% Okayama 26% 23% 5.7 4.4 51% 61% 6% 3% Oldenburg 18% 18% 7.6 6.6 14% 4% 3% Oyo 12% 15% 7.6 6.7 13% 23% 3% 3% Palermo 21% 15% 7.6 6.7 13% 23% 3% 3% Palermo 21% 19% 7.2 5.4 29% 3% 0% Pairas 30% 37% 9.6 8.3 27% 19% 17%	Mumbai	17%	20%	11.6	8.6	11%	24%	18%	11%
Nakuru 24% 21% 10.8 5.5 14% 31% 20% 2% Ndola 17% 13% 8.9 4.9 16% 44% 13% 2% New York 20% 13% 10.8 8.9 8% 14% 12% 8% Nikolaev 19% 15% 8.6 5.6 10% 26% 8% 1% Okayama 26% 23% 5.7 4.4 51% 64% 3% Oldenburg 18% 18% 7.6 6.6 17% 24% 4% 3% Oyo 12% 15% 7.5 47% 40% 6% 3% Palembang 13% 14% 5.8 4.4 34% 50% 2% Palembang 13% 14% 5.8 4.4 34% 5% 2% Parbani 23% 27% 6.5 3.8 16% 17% 9% 2% 16% <t< td=""><td>Mveik</td><td>15%</td><td>13%</td><td>5.1</td><td>5.3</td><td>32%</td><td>36%</td><td>1%</td><td>3%</td></t<>	Mveik	15%	13%	5.1	5.3	32%	36%	1%	3%
Ndola 17% 13% 8.9 4.9 16% 44% 13% 2% New York 20% 13% 10.8 8.9 8% 14% 12% 8% Nikolaev 19% 15% 8.6 5.6 10% 26% 8% 1% Okayama 26% 23% 5.7 4.4 61% 66% 3% Oldenburg 18% 18% 7.6 6.6 17% 24% 4% 3% Osaka 21% 26% 5.7 5.5 47% 40% 6% 3% Palembang 13% 14% 5.8 4.4 34% 50% 5% Palerman 21% 19% 7.2 5.4 29% 39% 8% 1% Palerman 23% 27% 6.5 3.8 16% 47% 3% 0% Parbars 30% 37% 9.6 8.3 27% 17% 9%	Nakuru	24%	21%	10.8	5.5	14%	31%	20%	2%
New York 20% 13% 10.8 8.9 8% 14% 12% 8% Nikolaev 19% 15% 8.6 5.6 10% 26% 8% 1% Okayama 26% 23% 5.7 4.4 51% 61% 6% 3% Oldenburg 18% 18% 7.6 6.6 17% 24% 4% 3% Osaka 21% 26% 5.7 5.5 47% 40% 6% 3% Oyo 12% 15% 7.6 6.7 13% 23% 3% 3% Palemas 30% 37% 9.6 8.3 27% 19% 17% 9% Parbani 23% 27% 6.5 3.8 16% 47% 3% 0% Parbani 23% 27% 6.5 3.8 16% 47% 3% 0% Parbani 23% 17% 6.5 4.0 3% 2% </td <td>Ndola</td> <td>17%</td> <td>13%</td> <td>8.9</td> <td>4.9</td> <td>16%</td> <td>44%</td> <td>13%</td> <td>2%</td>	Ndola	17%	13%	8.9	4.9	16%	44%	13%	2%
Nikolaev 19% 15% 8.6 5.6 10% 26% 3% 1% Okayama 26% 23% 5.7 4.4 51% 61% 6% 3% Oldenburg 18% 18% 7.6 6.6 17% 24% 4% 3% Osaka 21% 26% 5.7 5.5 47% 40% 6% 3% Oyo 12% 15% 7.6 6.7 13% 23% 3% 3% Palembang 13% 14% 5.8 4.4 34% 50% 5% 2% Palemas 30% 37% 9.6 8.3 27% 19% 17% 9% Parbani 23% 27% 6.5 3.8 16% 47% 3% 0% Parbani 23% 27% 6.5 3.8 11% 15% 0% 0% 0% Parbani 21% 15% 9.2 6.2 10%<	New York	20%	13%	10.8	8.9	8%	14%	12%	8%
Okayama 26% 23% 5.7 4.4 51% 61% 66% 3% Oldenburg 18% 18% 7.6 6.6 17% 24% 4% 3% Osaka 21% 26% 5.7 5.5 47% 40% 6% 3% Oyo 12% 15% 7.6 6.7 13% 23% 3% 3% Palembang 13% 14% 5.8 4.4 34% 50% 5% 2% Palembang 21% 19% 7.2 5.4 29% 39% 8% 1% Palemas 30% 37% 9.6 8.3 27% 19% 17% 9% Parbhani 23% 27% 6.5 3.8 10% 17% 9% 9% 9% 1% 9% 9% 1% 9% 9% 1% 9% 1% 1% 1% 9% 1% 1% 1% 9% 1% <td< td=""><td>Nikolaev</td><td>19%</td><td>15%</td><td>8.6</td><td>5.6</td><td>10%</td><td>26%</td><td>8%</td><td>1%</td></td<>	Nikolaev	19%	15%	8.6	5.6	10%	26%	8%	1%
Oldenburg 18% 18% 7.6 6.6 17% 24% 4% 3% Osaka 21% 26% 5.7 5.5 47% 40% 6% 3% Oyo 12% 15% 7.6 6.7 13% 23% 3% 3% Palembang 13% 14% 5.8 4.4 34% 50% 5% 2% Palemas 30% 37% 9.6 8.3 27% 19% 17% 9% Parbani 23% 27% 6.5 3.8 16% 47% 3% 0% Parepare 13% 11% 7.6 6.3 10% 15% 0% 0% Paris 21% 15% 9.2 6.2 10% 28% 11% 5% Pematangtiantar 11% 14% 6.1 5.0 29% 42% 0% 0% Pingxiang, Jiangxi 14% 12% 6.5 4.0 39% 64% 8% 2% 0% Port Elizabeth 22% 17%	Okavama	26%	23%	5.7	4.4	51%	61%	6%	3%
Osaka 21% 26% 57 55 47% 40% 6% 3% Oyo 12% 15% 7.6 6.7 13% 23% 3% 3% Palembang 13% 14% 5.8 4.4 34% 50% 5% 2% Palermo 21% 19% 7.2 5.4 29% 39% 8% 1% Palmas 30% 37% 9.6 8.3 27% 19% 17% 9% Parbhani 23% 27% 6.5 3.8 16% 47% 3% 0% Parepare 13% 11% 7.6 6.3 10% 15% 0% 0% Pingatangtiantar 11% 14% 6.1 5.0 26% 37% 11% 7% Pingxiang, Jiangxi 14% 12% 6.5 4.0 39% 64% 8% 2% Pokhara 16% 17% 6.0 4.8 29% <td>Oldenburg</td> <td>18%</td> <td>18%</td> <td>7.6</td> <td>6.6</td> <td>17%</td> <td>24%</td> <td>4%</td> <td>3%</td>	Oldenburg	18%	18%	7.6	6.6	17%	24%	4%	3%
Oyo 12% 15% 7.6 6.7 13% 23% 3% 3% Palembang 13% 14% 5.8 4.4 34% 50% 5% 2% Palermo 21% 19% 7.2 5.4 29% 39% 8% 1% Palmas 30% 37% 9.6 8.3 27% 19% 17% 9% Parbhani 23% 27% 6.5 3.8 16% 47% 3% 0% Parbpare 13% 11% 7.6 6.3 10% 15% 0% 0% Paris 21% 15% 9.2 6.2 10% 28% 11% 5% Pematangtiantar 11% 14% 6.1 5.0 26% 37% 1% 0% Pingxiang, Jiangxi 14% 12% 6.5 4.0 39% 64% 8% 2% 0% Port Elizabeth 22% 17% 10.3 <td< td=""><td>Osaka</td><td>21%</td><td>26%</td><td>5.7</td><td>5.5</td><td>47%</td><td>40%</td><td>6%</td><td>3%</td></td<>	Osaka	21%	26%	5.7	5.5	47%	40%	6%	3%
Palembang 13% 14% 18 19	Ονο	12%	15%	7.6	6.7	13%	23%	3%	3%
Palermo21%10%7.25.429%39%8%1%Palmas30%37%9.68.327%19%17%9%Parbhani23%27%6.53.816%47%3%0%Parepare13%11%7.66.310%15%0%0%Paris21%15%9.26.210%28%11%5%Pematangtiantar11%14%6.15.026%37%1%0%Philadelphia22%15%17.88.115%11%7%Pingxiang, Jiangxi14%12%6.50.39%64%8%2%Pokhara16%17%6.04.829%42%2%0%Port Elizabeth22%17%10.37.011%20%14%3%Portand, OR23%20%10.110.018%10%15%8%Pune21%21%9.97.86%13%13%6%Qindo, Shandong27%24%10.18.321%23%29%44%3%2%Quito23%29%12.07.86%11%20%4%8%2%Quito23%20%19.19.57%13%10%8%8%Rajshahi9%12%4.84.948%44%3%2%Rajeigh20%19%7.8<	Palembang	13%	14%	5.8	4.4	34%	_0%	5%	2%
Palmas30%37%9.68.327%19%17%9%Parbhani23%27%6.53.816%47%3%0%Parepare13%11%7.66.310%15%0%0%Paris21%15%9.26.210%28%11%5%Pematangtiantar11%14%6.15.026%37%1%0%Philadelphia22%15%17.88.115%15%11%7%Pingxiang, Jiangxi14%12%6.54.039%64%8%2%Pokhara16%17%6.04.829%42%2%0%Portland, OR23%20%10.110.018%10%15%8%Pune21%21%9.97.86%13%13%6%Qingdao, Shandong27%24%10.18.321%23%19%10%Quito23%22%12.07.86%11%20%4%Quito23%22%12.07.86%11%20%4%Raishahi9%12%4.84.948%44%3%2%Raieigh20%19%7.89.213%13%6%14%Ribiano28%27%11.38.07%13%16%5%Rivadh35%35%16.315.54%6% <td>Palermo</td> <td>21%</td> <td>19%</td> <td>7.2</td> <td>5.4</td> <td>29%</td> <td>39%</td> <td>8%</td> <td>1%</td>	Palermo	21%	19%	7.2	5.4	29%	39%	8%	1%
Parbani23%27%6.53.816%47%3%0%Parepare13%11%7.66.310%15%0%0%Paris21%15%9.26.210%28%11%5%Pematangtiantar11%14%6.15.026%37%1%0%Philadelphia22%15%17.88.115%15%11%7%Pingxiang, Jiangxi14%12%6.54.039%64%8%2%Pokhara16%17%6.04.829%42%2%0%Portland, OR23%20%10.110.018%10%15%8%Pune21%21%9.97.86%13%13%6%Qingdao, Shandong27%24%10.18.321%23%29%4%Quito23%22%12.07.86%11%20%4%Rajshahi9%12%4.84.948%44%3%2%Rakang24%29%7.89.213%13%6%14%Reynosa27%30%9.88.710%16%10%6%Ribarhi35%35%16.315.54%6%37%37%Ribarhi20%19%9.88.710%16%10%6%Rawang24%29%7.89.213%13% </td <td>Palmas</td> <td>30%</td> <td>37%</td> <td>9.6</td> <td>8.3</td> <td>27%</td> <td>19%</td> <td>17%</td> <td>9%</td>	Palmas	30%	37%	9.6	8.3	27%	19%	17%	9%
Parepare13%1%7.66.310%15%0%0%Paris21%15%9.26.210%28%11%5%Pematangtiantar11%14%6.15.026%37%1%0%Philadelphia22%15%17.88.115%15%11%7%Pingxiang, Jiangxi14%12%6.54.039%64%8%2%Pokhara16%17%6.04.829%42%2%0%Port Elizabeth22%17%10.37.011%20%14%3%Portland, OR23%20%10.110.018%10%15%8%Pune21%21%9.97.86%13%13%6%Pyongyang22%18%7.14.530%55%7%2%Qingdao, Shandong27%24%10.18.321%23%19%10%Quito23%22%12.07.86%11%20%4%Rajshahi9%12%4.84.948%44%3%2%Raleigh20%19%9.19.57%13%10%8%Raiegh20%19%7.89.213%13%6%14%Reynosa27%30%9.88.710%16%10%6%Ribeirao Preto28%27%11.38.0	Parbhani	23%	27%	6.5	3.8	16%	47%	3%	0%
Paris21%1%1%1%1%1%1%1%1%1%Peris21%15%9.26.210%28%11%5%Pematangtiantar11%14%6.15.026%37%1%0%Philadelphia22%15%17.88.115%15%11%7%Pingxiang, Jiangxi14%12%6.54.039%64%8%2%Pokhara16%17%6.04.829%42%2%0%Port Elizabeth22%17%10.37.011%20%14%3%Portland, OR23%20%10.110.018%10%15%8%Pune21%21%9.97.86%13%13%6%Pyongyang22%18%7.14.530%55%7%2%Qingdao, Shandong27%24%10.18.321%23%19%10%Quito23%22%12.07.86%11%20%4%Rajshahi9%12%4.84.948%44%3%2%Raleigh20%19%9.19.57%13%10%8%Rawang24%29%7.89.213%13%6%14%Ribeirao Preto28%27%11.38.07%13%16%5%Riyadh35%35%16.3 <t< td=""><td>Parepare</td><td>13%</td><td>11%</td><td>7.6</td><td>6.3</td><td>10%</td><td>15%</td><td>0%</td><td>0%</td></t<>	Parepare	13%	11%	7.6	6.3	10%	15%	0%	0%
Pematangtiantar11%10	Paris	21%	15%	9.2	6.2	10%	28%	11%	5%
Philadelphia22%15%17.88.115%17%7%Pingxiang, Jiangxi14%12%6.54.039%64%8%2%Pokhara16%17%6.04.829%42%2%0%Port Elizabeth22%17%10.37.011%20%14%3%Portland, OR23%20%10.110.018%10%15%8%Pune21%21%9.97.86%13%13%6%Pyongyang22%18%7.14.530%55%7%2%Qingdao, Shandong27%24%10.18.321%23%19%10%Qom26%29%9.310.514%12%14%16%Quito23%22%12.07.86%11%20%4%Rajshahi9%12%4.84.948%44%3%2%Rakeigh20%19%9.19.57%13%10%8%Rawang24%29%7.89.213%13%6%14%Reynosa27%30%9.88.710%16%10%6%Ribeirao Preto28%27%11.38.07%13%16%5%Riyadh35%35%16.315.54%6%37%38%	Pematangtiantar	11%	14%	6.1	5.0	26%	37%	1%	0%
Pingxiang, Jiangxi14%12%6.54.039%64%8%2%Pokhara16%17%6.04.829%42%2%0%Port Elizabeth22%17%10.37.011%20%14%3%Portland, OR23%20%10.110.018%10%15%8%Pune21%21%9.97.86%13%13%6%Pyongyang22%18%7.14.530%55%7%2%Qingdao, Shandong27%24%10.18.321%23%19%10%Qom26%29%9.310.514%12%14%16%Quito23%22%12.07.86%11%20%4%Rajshahi9%12%4.84.948%44%3%2%Rakeigh20%19%9.19.57%13%10%8%Rawang24%29%7.89.213%13%6%14%Reynosa27%30%9.88.710%16%10%6%Ribeirao Preto28%27%11.38.07%13%16%5%Riyadh35%35%16.315.54%6%37%38%	Philadelphia	22%	15%	17.8	8.1	15%	15%	11%	7%
Pixeling burger110120100100100100100Pokhara16%17%6.04.829%42%2%0%Port Elizabeth22%17%10.37.011%20%14%3%Portland, OR23%20%10.110.018%10%15%8%Pune21%21%9.97.86%13%13%6%Pyongyang22%18%7.14.530%55%7%2%Qingdao, Shandong27%24%10.18.321%23%19%10%Qom26%29%9.310.514%12%14%16%Quito23%22%12.07.86%11%20%4%Rajshahi9%12%4.84.948%44%3%2%Raleigh20%19%9.19.57%13%10%8%Rawang24%29%7.89.213%13%6%14%Reynosa27%30%9.88.710%16%10%6%Ribeirao Preto28%27%11.38.07%13%16%5%Riyadh35%35%16.315.54%6%37%38%	Pingxiang, Jiangxi	14%	12%	6.5	4.0	39%	64%	8%	2%
Port Elizabeth 22% 17% 10.3 7.0 11% 20% 14% 3% Portland, OR 23% 20% 10.1 10.0 18% 10% 15% 8% Pune 21% 21% 9.9 7.8 6% 13% 13% 6% Pyongyang 22% 18% 7.1 4.5 30% 55% 7% 2% Qingdao, Shandong 27% 24% 10.1 8.3 21% 23% 19% 10% Qom 26% 29% 9.3 10.5 14% 12% 14% 16% Quito 23% 22% 12.0 7.8 6% 11% 20% 4% Rajshahi 9% 12% 4.8 4.9 48% 44% 3% 2% Raleigh 20% 19% 9.1 9.5 7% 13% 10% 8% Reynosa 27% 30% 9.8 8.7 10% 16% 14% Reynosa 27% 30% 9.8 8.7 </td <td>Pokhara</td> <td>16%</td> <td>17%</td> <td>6.0</td> <td>4.8</td> <td>29%</td> <td>42%</td> <td>2%</td> <td>0%</td>	Pokhara	16%	17%	6.0	4.8	29%	42%	2%	0%
Portland, OR 23% 20% 10.1 10.0 18% 10% 15% 8% Pune 21% 21% 9.9 7.8 6% 13% 13% 6% Pyongyang 22% 18% 7.1 4.5 30% 55% 7% 2% Qingdao, Shandong 27% 24% 10.1 8.3 21% 23% 19% 10% Qom 26% 29% 9.3 10.5 14% 12% 14% 16% Quito 23% 22% 12.0 7.8 6% 11% 20% 4% Raishahi 9% 12% 4.8 4.9 48% 44% 3% 2% Rakeigh 20% 19% 9.1 9.5 7% 13% 10% 8% Rawang 24% 29% 7.8 9.2 13% 13% 6% 14% Reynosa 27% 30% 9.8 8.7 10% 16% 10% 6% Ribeirao Preto 28% 27% 11.3 <td>Port Elizabeth</td> <td>22%</td> <td>17%</td> <td>10.3</td> <td>7.0</td> <td>11%</td> <td>20%</td> <td>14%</td> <td>3%</td>	Port Elizabeth	22%	17%	10.3	7.0	11%	20%	14%	3%
Pune 21% 21% 9.9 7.8 6% 13% 13% 6% Pyongyang 22% 18% 7.1 4.5 30% 55% 7% 2% Qingdao, Shandong 27% 24% 10.1 8.3 21% 23% 19% 10% Qom 26% 29% 9.3 10.5 14% 12% 14% 16% Quito 23% 22% 12.0 7.8 6% 11% 20% 4% Rajshahi 9% 12% 4.8 4.9 48% 44% 3% 2% Raleigh 20% 19% 9.1 9.5 7% 13% 10% 8% Rawang 24% 29% 7.8 9.2 13% 13% 6% 14% Reynosa 27% 30% 9.8 8.7 10% 16% 10% 6% Ribeirao Preto 28% 27% 11.3 8.0 7% 13% 16% 5% Riyadh 35% 35% 16.3	Portland OR	23%	20%	10.0	10.0	18%	10%	15%	8%
Pyongyang22%18%7.14.530%55%7%2%Qingdao, Shandong27%24%10.18.321%23%19%10%Qom26%29%9.310.514%12%14%16%Quito23%22%12.07.86%11%20%4%Rajshahi9%12%4.84.948%44%3%2%Raleigh20%19%9.19.57%13%10%8%Rawang24%29%7.89.213%13%6%14%Reynosa27%30%9.88.710%16%5%6%Ribeirao Preto28%27%11.38.07%13%16%5%Riyadh35%35%16.315.54%6%37%38%	Pune	21%	21%	9.9	7.8	6%	13%	13%	6%
Appendix of the second secon	Pyongyang	22%	18%	7 1	4.5	30%	55%	7%	2%
Qom 26% 29% 9.3 10.5 14% 12% 14% 16% Quito 23% 22% 12.0 7.8 6% 11% 20% 4% Rajshahi 9% 12% 4.8 4.9 48% 44% 3% 2% Raleigh 20% 19% 9.1 9.5 7% 13% 10% 8% Rawang 24% 29% 7.8 9.2 13% 13% 6% 14% Reynosa 27% 30% 9.8 8.7 10% 16% 5% Riyadh 35% 35% 16.3 15.5 4% 6% 37% 38%	Qingdao Shandong	27%	24%	10.1	8.3	21%	23%	19%	10%
Quito 23% 22% 12.0 7.8 6% 11% 20% 4% Rajshahi 9% 12% 4.8 4.9 48% 44% 3% 2% Raleigh 20% 19% 9.1 9.5 7% 13% 10% 8% Rawang 24% 29% 7.8 9.2 13% 13% 6% 14% Reynosa 27% 30% 9.8 8.7 10% 16% 5% Ribeirao Preto 28% 27% 11.3 8.0 7% 13% 16% 5% Riyadh 35% 35% 16.3 15.5 4% 6% 37% 38%	Oom	26%	29%	9.3	10.5	14%	12%	14%	16%
Raisbahi 9% 12% 4.8 4.9 48% 44% 3% 2% Raleigh 20% 19% 9.1 9.5 7% 13% 10% 8% Rawang 24% 29% 7.8 9.2 13% 13% 6% 14% Reynosa 27% 30% 9.8 8.7 10% 16% 10% 6% Ribeirao Preto 28% 27% 11.3 8.0 7% 13% 16% 5% Riyadh 35% 35% 16.3 15.5 4% 6% 37% 38%	Quito	23%	20%	12.0	7.8	6%	12%	20%	4%
Raightin 20% 12% 4.6 4.6 4.6 44% 6% 2% Raleigh 20% 19% 9.1 9.5 7% 13% 10% 8% Rawang 24% 29% 7.8 9.2 13% 13% 6% 14% Reynosa 27% 30% 9.8 8.7 10% 16% 10% 6% Ribeirao Preto 28% 27% 11.3 8.0 7% 13% 16% 5% Riyadh 35% 35% 16.3 15.5 4% 6% 37% 38%	Raishahi	9%	12%	4.8	4.9	48%	44%	3%	2%
Rawang 24% 29% 7.8 9.2 13% 16% 16% 14% Reynosa 27% 30% 9.8 8.7 10% 16% 10% 6% Ribeirao Preto 28% 27% 11.3 8.0 7% 13% 16% 5% Riyadh 35% 35% 16.3 15.5 4% 6% 37% 38%	Raleigh	20%	12 %	4.0 9.1	9.5	7%	13%	10%	2 /0
Reynosa 27% 30% 9.8 8.7 10% 16% 10% 6% Ribeirao Preto 28% 27% 11.3 8.0 7% 13% 16% 5% Riyadh 35% 35% 16.3 15.5 4% 6% 37% 38% Royno 20% 15% 7.6 5.8 28% 34% 0% 3%	Rawang	2070	20%	7.8	9.J Q 2	13%	13%	6%	14%
Ribeirao Preto 28% 27% 11.3 8.0 7% 13% 16% 5% Riyadh 35% 35% 16.3 15.5 4% 6% 37% 38% Royno 20% 15% 7.6 5.8 28% 34% 9% 3%	Revnosa	24 /0 070/	29 /0	7.0 Q Q	9.Z Q 7	10%	16%	10%	6º/
Riyadh 35% 35% 16.3 15.5 4% 6% 37% 38% Royno 20% 15% 7.6 5.8 28% 34% 0% 3%	Ribeirao Preto	21 /0	070/	9.0	0.7	70/	120/	16%	50%
Rovno 20% 15% 7.6 5.8 28% 34% 0% 37% 30%	Rivadh	20%	21 %	11.3	0.U 15 F	/ 70 / 0/	13% 60/	270/	20%
	Royno	20%	15%	7.6	5.8	- 7/0 28%	34%	9%	3%

City Name	Density of A Roads (kr	ll Arterial n∕ km²)	Average Beeli to All Arter (met	ne Distance ial Roads ers)	Share of Are Walking Dista Arterial I	ea within ance of All Roads	Share of Are Walking Dista Arterial	ea within nce of Wide Roads
	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014
Los Angeles	2.05	0.28	187	2,340	96%	21%	96%	20%
Luanda	1.05	0.63	412	698	78%	58%	67%	52%
Lubumbashi	1.64	0.99	259	428	90%	74%	65%	46%
Madrid	1.80	1.36	204	266	96%	90%	94%	80%
Malatya	1.94	1.34	228	354	90%	79%	86%	73%
Malegaon	1.06	0.84	343	391	82%	78%	72%	70%
Manchester	1.80	1.73	187	194	97%	97%	59%	56%
Manila	1.92	1.51	202	265	95%	90%	72%	61%
Marrakesh	2.28	1.44	176	360	97%	85%	92%	80%
Medan	1.33	0.71	284	645	88%	68%	70%	42%
Mexico City	2.37	0.77	162	418	98%	77%	97%	55%
Milan	1.52	1.47	234	244	94%	92%	53%	31%
Minneapolis	1.75	1.48	213	250	95%	92%	92%	88%
Modesto	1.91	1.54	196	242	96%	92%	90%	82%
Montreal	2.30	2.10	165	187	97%	96%	82%	77%
Moscow	1.13	0.33	385	1,191	79%	35%	75%	28%
Mumbai	1.59	1.25	272	347	91%	84%	88%	79%
Myeik	0.35	0.41	422	599	69%	63%	0%	0%
Nakuru	0.96	0.62	546	916	65%	60%	64%	59%
Ndola	1.19	0.97	332	392	85%	79%	85%	79%
New York	1.75	0.74	226	393	93%	78%	62%	41%
Nikolaev	0.90	0.80	481	531	72%	67%	71%	65%
Okayama	1.63	1.57	314	320	89%	89%	53%	50%
Oldenburg	1.45	1.36	239	252	92%	92%	87%	80%
Osaka	1.76	1.07	220	550	95%	69%	75%	46%
Оуо	1.11	0.81	269	428	94%	78%	49%	52%
Palembang	0.90	0.45	400	783	80%	58%	64%	44%
Palermo	2.32	1.86	165	197	97%	95%	85%	64%
Palmas	2.18	1.14	189	590	96%	68%	96%	84%
Parbhani	1.13	0.93	332	376	85%	80%	64%	60%
Parepare	2.44	1.69	142	179	99%	98%	40%	30%
Paris	3.34	0.89	110	973	99%	46%	79%	24%
Pematangtiantar	0.70	0.59	529	544	64%	64%	75%	77%
Philadelphia	1.79	0.86	223	394	93%	79%	70%	36%
Pingxiang, Jiangxi	1.09	0.67	510	771	66%	63%	46%	54%
Pokhara	1.99	1.43	190	253	94%	89%	77%	76%
Port Elizabeth	1.06	0.89	370	601	81%	71%	78%	72%
Portland, OR	1.96	1.70	189	218	96%	95%	92%	87%
Pune	2.07	1.36	167	264	98%	91%	90%	73%
Pvongvang	2.15	1.91	172	195	97%	95%	86%	80%
Qingdao, Shandong	2.14	1.18	168	380	98%	83%	97%	80%
Qom	2.79	1.97	127	218	100%	94%	100%	96%
Quito	3.14	1.57	101	367	100%	83%	94%	68%
Raishahi	4.22	1.60	59	204	100%	94%	100%	72%
Raleigh	1.81	1.19	182	338	97%	85%	90%	59%
Rawang	1.15	0.72	341	558	82%	65%	66%	55%
Revnosa	1.15	0.91	384	478	78%	70%	77%	68%
Ribeirao Preto	2.24	1.80	171	200	99%	96%	93%	90%
Rivadh	2.24	1.57	178	304	96%	87%	96%	87%
Rovno	2.05	1.42	179	313	97%	86%	88%	75%

Los Angeles - Rovno

City Name	Average B (ha	lock Size ı)	3-Way Inte Density (nu km	ersection µmber per າ ²)	4-Way Inte Density (nu km	ersection Imber per 2)	Share Intersection 4-W	e of is that are 'ay	Walkabili	ty Ratio
	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014
Los Angeles	6.5	6.5	46.8	74.0	19.2	8.2	27%	6%	1.6	2.0
Luanda	3.2	2.4	96.1	139.1	17.3	29.3	15%	15%	1.7	1.7
Lubumbashi	5.7	3.3	60.9	170.4	25.6	30.3	30%	18%	1.6	1.6
Madrid	3.8	5.5	108.2	80.3	34.0	25.9	19%	21%	1.6	1.8
Malatya	1.4	5.9	203.8	120.8	35.3	14.2	15%	8%	1.5	1.8
Malegaon	1.2	1.7	292.2	422.4	52.1	54.9	12%	10%	1.5	1.5
Manchester	5.3	11.1	150.0	75.7	21.7	8.3	10%	6%	2.0	1.8
Manila	3.1	2.7	82.5	189.4	28.5	26.5	20%	10%	1.6	1.8
Marrakesh	2.7	4.8	158.8	171.8	21.0	26.9	12%	14%	1.7	1.5
Medan	5.2	7.6	75.8	54.9	10.3	4.1	9%	5%	1.7	1.5
Mexico City	2.7	3.5	68.3	149.4	37.2	24.8	39%	14%	1.6	1.7
Milan	3.9	7.1	93.4	101.2	12.7	14.0	11%	9%	2.1	2.0
Minneapolis	3.8	10.5	101.8	52.3	17.3	5.4	18%	6%	1.8	1.6
Modesto	2.5	5.1	128.0	139.1	15.6	26.5	13%	14%	1.9	2.1
Montreal	4.1	5.0	84.3	67.0	8.7	6.6	11%	5%	2.5	2.2
Moscow	6.1	4.8	42.9	102.4	8.3	22.0	14%	11%	1.6	2.1
Mumbai	5.8	4.9	61.5	88.9	11.8	13.0	12%	10%	1.6	1.7
Myeik	1.7	6.5	160.8	89.8	57.1	19.8	26%	11%	1.5	1.7
Nakuru	4.4	5.8	102.5	165.5	17.9	16.8	16%	10%	1.6	1.7
Ndola	5.1	3.0	101.8	148.2	13.0	22.3	10%	11%	1.9	1.7
New York	5.1	6.7	45.2	46.8	14.4	1.8	22%	1%	1.6	1.8
Nikolaev	3.7	5.3	101.1	128.5	13.1	15.8	13%	14%	1.9	1.5
Okayama	1.6	2.3	278.3	270.4	58.6	38.2	16%	10%	1.5	1.7
Oldenburg	3.4	4.9	99.0	109.5	8.7	9.9	7%	8%	1.8	1.7
Osaka	1.7	2.4	200.5	195.7	55.1	38.0	22%	18%	1.4	1.6
Оуо	5.6	5.4	53.8	77.4	5.2	5.7	10%	9%	1.7	1.6
Palembang	4.1	6.1	104.1	71.2	16.1	6.9	9%	3%	1.6	1.5
Palermo	3.1	6.3	155.9	105.4	19.5	10.2	7%	7%	1.7	2.0
Palmas	3.4	2.9	89.2	173.9	22.9	43.0	27%	20%	1.5	1.6
Parbhani	1.5	1.2	241.8	500.2	24.4	104.4	9%	17%	1.8	1.7
Parepare	4.9	8.5	65.3	75.0	9.5	19.8	9%	10%	1.7	1.6
Paris	4.5	6.7	71.8	77.7	21.2	9.9	21%	10%	1.6	1.6
Pematangtiantar	5.6	7.7	74.2	108.4	16.5	6.8	14%	4%	1.6	1.8
Philadelphia	3.6	9.9	109.7	27.6	16.5	5.2	14%	8%	1.8	1.6
Pingxiang, Jiangxi	6.5	6.6	53.6	101.7	11.5	26.5	9%	9%	1.5	1.3
Pokhara	3.5	5.4	99.7	114.9	9.9	6.9	10%	5%	1.7	1.7
Port Elizabeth	4.8	3.3	89.5	93.4	11.1	16.5	8%	13%	1.8	1.8
Portland, OR	4.3	4.9	97.8	60.3	20.8	4.4	17%	4%	1.6	1.8
Pune	3.1	5.1	113.7	96.2	13.8	4.5	11%	3%	1.6	2.0
Pyongyang	4.2	6.7	130.6	92.0	8.6	3.6	5%	2%	1.8	2.2
Qingdao, Shandong	3.5	4.7	159.6	168.0	32.7	51.0	17%	14%	1.5	1.5
Qom	1.8	4.2	164.4	139.1	26.4	14.5	14%	12%	1.6	1.7
Quito	2.8	3.5	93.5	119.8	24.5	19.8	19%	14%	1.6	1.8
Rajshahi	3.3	11.0	93.0	49.4	16.8	4.0	12%	7%	1.5	1.6
Raleigh	4.9	9.2	82.0	55.9	11.0	5.7	11%	7%	2.0	1.8
Rawang	2.3	3.5	162.5	140.8	16.7	13.8	7%	5%	2.9	2.1
Reynosa	2.7	2.2	113.7	141.2	42.5	50.7	29%	26%	1.9	1.9
Ribeirao Preto	3.7	6.9	94.8	90.7	46.1	16.1	33%	12%	1.8	1.8
Riyadh	3.3	5.8	149.9	111.0	16.3	4.9	9%	4%	1.6	1.8
Rovno	3.9	6.5	132.3	86.2	14.5	11.8	7%	10%	1.7	1.6

City Name	Share of Bui That Is Res	lt-up Area sidential	Share of Re Areas Laid O Develop	sidential ut Before ment	Share of Residential Areas Not Laid Out Befor Development		e Share of Built-up Are That Is Gridded		
	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	
Los Angeles	86%	87%	92%	80%	3%	20%	29%	0%	
Luanda	70%	75%	42%	47%	58%	53%	10%	0%	
Lubumbashi	84%	84%	92%	70%	8%	30%	23%	0%	
Madrid	67%	71%	96%	87%	4%	13%	8%	5%	
Malatya	73%	80%	97%	72%	3%	28%	3%	0%	
Malegaon	65%	68%	64%	51%	36%	49%	0%	0%	
Manchester	64%	59%	98%	79%	2%	21%	0%	0%	
Manila	70%	77%	50%	68%	45%	32%	13%	0%	
Marrakesh	63%	76%	80%	77%	20%	23%	3%	0%	
Medan	70%	76%	90%	30%	10%	70%	0%	0%	
Mexico City	66%	64%	91%	74%	5%	26%	54%	8%	
Milan	58%	66%	96%	61%	4%	39%	3%	0%	
Minneapolis	72%	84%	94%	71%	6%	29%	15%	0%	
Modesto	71%	66%	94%	97%	6%	3%	3%	0%	
Montreal	75%	79%	99%	93%	1%	7%	0%	0%	
Moscow	74%	85%	78%	100%	6%	0%	3%	3%	
Mumbai	66%	70%	36%	37%	60%	63%	1%	3%	
Myeik	78%	62%	77%	34%	23%	66%	0%	0%	
Nakuru	55%	76%	99%	83%	1%	17%	0%	0%	
Ndola	84%	73%	95%	81%	5%	19%		0%	
New York	82%	83%	97%	88%	3%	12%		0%	
Nikolaev	73%	85%	87%	91%	13%	9%	5%	0%	
Okayama	58%	54%	74%	68%	26%	32%	0%	0%	
Oldenburg	72%	83%	100%	94%	0%	6%	0%	0%	
Osaka	52%	61%	70%	59%	30%	41%	15%	0%	
Оуо	90%	84%	28%	69%	72%	31%	0%	0%	
Palembang	73%	57%	67%	22%	33%	78%	0%	0%	
Palermo	56%	59%	84%	63%	16%	37%	5%	0%	
Palmas	64%	86%	100%	96%	0%	4%	23%	0%	
Parbhani	79%	85%	97%	73%	3%	27%	0%	0%	
Parepare	76%	86%	39%	39%	61%	61%	0%	0%	
Paris	76%	73%	70%	71%	22%	29%	6%	0%	
Pematangtiantar	75%	62%	59%	78%	41%	22%	10%	0%	
Philadelphia	75%	85%	92%	90%	8%	10%	8%	0%	
Pingxiang, Jiangxi	67%	84%	20%	6%	80%	94%	0%	0%	
Pokhara	60%	67%	18%	34%	82%	66%	0%	0%	
Port Elizabeth	73%	84%	99%	92%	1%	8%	3%	0%	
Portland, OR	73%	90%	97%	72%	3%	28%	13%	0%	
Pune	71%	56%	77%	72%	23%	28%	0%	0%	
Pyongyang	47%	30%	54%	48%	46%	52%	0%	0%	
Qingdao, Shandong	50%	57%	95%	100%	5%	0%	0%	0%	
Qom	75%	78%	91%	98%	9%	2%	0%	0%	
Quito	56%	76%	98%	87%	2%	13%	8%	3%	
Rajshahi	85%	84%	0%	15%	100%	85%	0%	0%	
Raleigh	83%	89%	93%	96%	7%	4%	3%	0%	
Rawang	62%	54%	97%	96%	3%	4%	0%	0%	
Reynosa	68%	80%	94%	96%	6%	4%	30%	5%	
Ribeirao Preto	77%	82%	97%	92%	3%	8%	43%	5%	
Riyadh	76%	54%	98%	95%	2%	5%	0%	0%	
Rovno	54%	74%	79%	52%	21%	48%	0%	0%	

Los Angeles - Rovno

City Name	Share of Re Areas in I Land Sub	esidential nformal divisions	Share of Residential Areas in Formal Land Subdivisions		Share of Re Areas in Proje	esidential Housing ects	Average P Informa Subdiv	lot Size in Il Land isions	n Average Plot Size Formal Land Subdivisions	
	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014
Los Angeles	0%	3%	90%	62%	7%	15%			752	789
Luanda	33%	37%	9%	3%	0%	7%	255	387	291	
Lubumbashi	88%	67%	5%	2%	0%	2%	611	839	1,452	
Madrid	0%	0%	80%	68%	16%	19%			565	546
Malatya	10%	12%	77%	31%	10%	29%				
Malegaon	38%	48%	25%	1%	1%	2%	170	130		
Manchester	0%	0%	98%	79%	0%	0%			489	321
Manila	2%	27%	53%	34%	1%	7%		94	329	312
Marrakesh	3%	13%	62%	33%	15%	31%	136	1,226	194	478
Medan	38%	25%	51%	5%	1%	0%			483	
Mexico City	4%	27%	90%	42%	2%	5%		132	211	181
Milan	0%	0%	84%	44%	11%	17%				
Minneapolis	0%	0%	80%	61%	14%	10%			925	1,091
Modesto	1%	1%	88%	90%	6%	7%			620	581
Montreal	0%	0%	92%	74%	7%	19%			556	593
Moscow	9%	75%	54%	11%	31%	14%		1,099		962
Mumbai	1%	0%	25%	15%	14%	22%			655	
Myeik	69%	34%	8%	0%	0%	0%	165	182	298	
Nakuru	81%	80%	2%	2%	15%	1%	302	626	2,240	
Ndola	71%	80%	22%	0%	2%	1%	742	373	1,810	424
New York	0%	0%	93%	87%	4%	2%			712	400
Nikolaev	50%	62%	25%	26%	12%	3%	501		484	
Okayama	3%	11%	72%	57%	0%	0%			189	283
Oldenburg	4%	0%	86%	87%	10%	6%				536
Osaka	0%	5%	68%	52%	2%	2%			143	227
Оуо	27%	66%	1%	0%	0%	3%	558	393		
Palembang	27%	12%	37%	3%	3%	6%	189		185	244
Palermo	1%	21%	81%	42%	2%	0%		867	1,119	444
Palmas	8%	41%	89%	55%	2%	0%	395	350	342	306
Parbhani	81%	73%	16%	0%	0%	0%	216		411	
Parepare	2%	13%	37%	25%	0%	1%				
Paris	0%	2%	63%	67%	15%	1%			447	545
Pematangtiantar	12%	58%	47%	20%	0%	0%				
Philadelphia	0%	0%	85%	85%	8%	5%			709	986
Pingxiang, Jiangxi	5%	4%	8%	0%	7%	3%			170	
Pokhara	15%	29%	1%	0%	1%	6%				
Port Elizabeth	6%	20%	83%	70%	10%	2%	297	290	646	755
Portland, OR	0%	0%	88%	64%	9%	8%			640	842
Pune	0%	23%	73%	31%	4%	18%			316	270
Pyongyang	9%	45%	32%	0%	13%	2%		289		
Qingdao, Shandong	11%	24%	21%	12%	63%	64%				
Qom	3%	14%	84%	58%	4%	26%				166
Quito	0%	17%	90%	68%	9%	1%		543	336	374
Rajshahi	0%	14%	0%	0%	0%	0%		360		
Raleigh	0%	0%	78%	78%	15%	18%			1,166	521
Rawang	14%	14%	66%	35%	17%	46%	376		319	1.175
Revnosa	31%	31%	56%	14%	7%	51%	377	178	260	157
Ribeirao Preto	0%	17%	90%	71%	6%	5%		3.208	303	513
Rivadh	4%	5%	87%	78%	7%	12%		-,200	448	432
Rovno	0%	34%	49%	17%	30%	1%		1,326	776	1,071

Saidpur Bangladesh South and Central Asia 25.802 88.81 11/190 11/100 41/10 Sain Petersburg Russia Europe and Japan 59.911 30.348 70.902 31.81 10.1099 11/14 San Salvador El Salvador Lain America and the Caribbean 33.491 70.707 11.99 11/14 San Ealvador Brazil Lain America and the Caribbean 23.334 46.615 91.48 41.00 71.19 71.00 71.19 11.00 41.14 San Janus Yemen Western Asia and the Pacific 23.341 47.615 91.48 41.00 71.19 11.00 71.11 73.95 72.693 81.91 61.00 71.19 11.00 10.113 Sintesh 50.418 41.418 41.010 71.11 10.110 71.11 73.95 72.693 81.99 10.010 11.113 Sintesh 50.418 41.312 11.113 11.110 11.111 11.110 11.111 11.110 11.1113 11.1110 11.1110	City Name	Country	Region	CBD Lo	ocation	Land Cover Dates		
Sardpur Bangladesh. South and Central Asia 25.802 88.881 11/1/10 11/1/10 41/1/13 Sain Salvador Ei Salvador Lain America and the Caribbean 15.303 42.003 71/130 51/100 51/114 San Salvador Chine Lain America and the Caribbean 23.341 70.070 11/190 11/1/10 41/14 San Gavador Brazil Lain America and the Caribbean 23.344 46.615 91/180 71/100 <td< th=""><th></th><th></th><th></th><th>Latitude</th><th>Longitude</th><th>T1</th><th>Т2</th><th>тз</th></td<>				Latitude	Longitude	T1	Т2	тз
Saint Petersburg Russia Europe and Japan 99.911 30.348 7/100 5/1/10 5/1/10 5/1/10 5/1/10 5/1/10 5/1/10 5/1/10 1/1/14 San Salvador El Salvador Latin America and the Caribbean -33.349 -70.670 1/1/19 6/1/10 4/1/14 San Balvador Chile Latin America and the Caribbean -33.491 -70.670 1/1/19 6/1/10 4/1/14 San Balvador Koree Rep. East Asia and the Pacific 37.495 121.440 1/1/19 8/1/10 8/1/15 Shenzhen, Guangdong China East Asia and the Pacific 24.316 16.80 8/1/33 9/1/00 10/1/13 Singapore Singapore South and Central Asia 22.508 8/4.224 11/190 0/1/10 10/1/13 10/100 11/190 0/1/10 11/190 0/1/10 11/110 11/110 11/110 11/110 11/110 11/110 11/110 11/110 11/111 11/110 11/110 11/111 11/110 11/111 11	Saidpur	Bangladesh	South and Central Asia	25.802	88.881	11/1/90	11/1/01	4/1/14
San Salvador El Salvador Lain America and the Caribbean 13.700 -99.201 91/11 10/11/90 11/114 Saniago Chile Latin America and the Caribbean -33.491 -70.670 11/190 11/100 11/114 San Jaugo Brazil Latin America and the Caribbean -33.491 -70.670 11/180 11/100 51/14 San Jaugo China East Asia and the Pacific 31.250 12.440 11/181 00 51/14 Sheffield United Kingdom Europe and Jagan 63.45 1-1.86 51/142 11/173 01/170 11/173 Sheffield United Kingdom Europe and Jagan 63.45 1-1.86 51/142 11/173 01/170 01/170 Singapore Singapore Singapore Singapore Singapore Singapore Singapore 31.250 71.42 11/132 01/100 01/101 01/14 Syningfield, MA United States Land-Alch Developed Countries 33.54 15.09 81/183 01/191 01/10	Saint Petersburg	Russia	Europe and Japan	59.911	30.348	7/1/90	5/1/00	5/1/14
Sana Yemen Western Asia and North Africa 15.833 44 208 91/189 61/100 11/11/14 Santago Dila Latin America and the Caribbean -33.491 -70.670 11/100 11/100 41/1100 11/1100	San Salvador	El Salvador	Latin America and the Caribbean	13.700	-89.201	3/1/91	10/1/99	1/1/14
Santlago Chile Latin America and the Carbbean -70.670 11/190 11/190 41/140 Sao Paulo Korea Rep. East Asia and the Pacific 37.495 126.933 8/191 5/1100 5/11/43 Shanghai China East Asia and the Pacific 37.495 121.440 11/191 8/170 5/11/192 11/102	Sana	Yemen	Western Asia and North Africa	15.363	44.208	9/1/89	5/1/00	11/1/14
Sac Paulo Brazil Latin Amenca and the Carbbean -23.34 -46.615 91/88 41/100 71/14 Shoul Korea Rep. East Asia and the Pacific 37.495 126.933 81/191 81/100 81/191 81/100 81/191 81/100 81/191 81/100 81/191 81/100 81/191 81/100 81/191 81/100 81/191 81/100 81/191 81/100 81/191 81/100 81/191 81/100 81/191 81/100 81/110 81/110 81/110 81/110 81/110 81/110 81/110 11/110	Santiago	Chile	Latin America and the Caribbean	-33.491	-70.670	1/1/90	1/1/00	4/1/14
Seoul Korea Rep. East Asia and the Pacific 37.495 126.393 8/1/91 5/1/00 5/1/14 Shanghai, Shanghai China East Asia and the Pacific 31.250 121.440 1/1/91 8/1/00 8/1/15 Shenthen, Guangdong China East Asia and the Pacific 24.316 161.12 10/1/87 1/1/101 10/1/13 Shenthen, Guangdong China East Asia and the Pacific 24.316 163.12 10/1/35 91/102 1/1/1/3 Shignauli India South and Central Asia 22.508 74.524 1/1/102 2/1/10 2/1/10 Singrauli India South and Central Asia 22.668 80.692 2/1/89 4/1/10 3/1/10	Sao Paulo	Brazil	Latin America and the Caribbean	-23.534	-46.615	9/1/88	4/1/00	7/1/14
Shanghai, Shanghai China East Asia and the Pacific 31.250 121.40 1//191 8/1/00 8/1/153 Sheffeld United Kingdom East Asia and the Pacific 24.316 16.112 10/1/33 11/100 10/1/33 Shymkent Kazakhstan South and Central Asia 24.316 19.630 8/1/93 9/1/00 10/1/13 Singapore Singapore South and Central Asia 22.508 74.524 11/1/92 10/1/02 4/1/1/30 Singapore South and Central Asia 22.568 80.652 2/1/84 4/1/90 2/1/1/13 3/1/14 Synapur India South and Central Asia 27.568 80.652 2/1/84 4/1/91 2/1/100 3/1/14 Synapur India East Asia and the Pacific 30.524 105.564 1/1/84 4/1/91 10/1/08 7/1/14 Synapur Australia Land-Rich Developed Countries 33.854 150.984 4/1/91 2/1/100 6/1/14 Synapur Australia Land-Rich Developed Countries	Seoul	Korea Rep.	East Asia and the Pacific	37.495	126.939	8/1/91	5/1/00	5/1/14
Sheffield United Kingdom Europe and Japan 53.454 17.132 97/102 97/173 Shenzhen, Guangdom China East Asia and the Pacific 24.316 116.112 107/187 117/100 107/173 Shmkent Kazakhstan South and Central Asia 42.315 69.630 87/182 117/192 107/100 107/1173 Singapore Singapore South and Central Asia 12.90 103.850 47/100 21/100	Shanghai, Shanghai	China	East Asia and the Pacific	31.250	121.440	1/1/91	8/1/00	8/1/15
Shenzhen, Guangdong China East Asia and the Pacific 24.316 116.112 10//187 11//100 10//173 Shymkent Kazakhstan South and Central Asia 32.508 74.524 11//192 10//160 10//173 Singapore Singapore South and Central Asia 32.508 74.524 11//190 10//102 4//100 2/1/100 2/1/100 2/1/100 2/1/100 2/1/100 2/1/100 2/1/100 2/1/100 2/1/100 2/1/100 2/1/100 2/1/100 2/1/100 2/1/100 3/1/14 South and Central Asia 2.57.68 60.692 2/1/89 4/1/100 3/1/14 South and Central Asia 2.57.68 60.692 2/1/89 4/1/100 3/1/14 South and Central Asia 2.57.68 60.692 2/1/89 4/1/100 3/1/14 South and Central Asia 2.57.68 60.692 2/1/89 4/1/100 3/1/14 South and Central Asia 1.59.64 9/1/80 6/1/14 1/1/14 1/1/14 1/1/14 1/1/14 1/1/14 1/1/14 1/1/14 1/1/14 <t< td=""><td>Sheffield</td><td>United Kingdom</td><td>Europe and Japan</td><td>53.454</td><td>-1.356</td><td>5/1/92</td><td>9/1/02</td><td>11/1/13</td></t<>	Sheffield	United Kingdom	Europe and Japan	53.454	-1.356	5/1/92	9/1/02	11/1/13
Shymkent Kazakhstam South and Central Asia 42.315 6.630 8/1/93 9/1/00 10/1/13 Sinakot Pakistam South and Central Asia 32.508 74.52 11/1/92 10/1/00 10/1/14 Singapore Singapore South and Central Asia 82.671 24.000 11/190 21/100 21/110 21/100 21/110 21/100 21/111 21/100 21/111 21/100 21/111 21/100 21/111 21/100 21/111 21/100 21/111 21/100 21/111 21/100 21/111 21/100 21/111 21/111 21/111 21/111 21/100	Shenzhen, Guangdong	China	East Asia and the Pacific	24.316	116.112	10/1/87	1/1/00	10/1/13
Sialkot Pakistan South and Central Asia 32.508 74.824 11/192 10/100 10/102 4/1/13 Singrapore South and Central Asia 82.671 24.200 11/192 21/100 21/110 21/100 21/110 21/100 21/110 21/100 21/110 21/100 21/110 21/100 21/110 21/100 21/110 21/100 21/110 21/100 21/110 21/100 21/111 21/100 21/110 21/100 21/110 21/100 21/111 21/100 21/110 21/100 21/111 21/100 21/111 21/100 21/110 <	Shymkent	Kazakhstan	South and Central Asia	42.315	69.630	8/1/93	9/1/00	10/1/13
Singapore Singapore Southaard Sain 1.280 103.850 4/1/30 10/1/02 4/1/130 Singrauli India South and Central Asia 28.671 12.400 1/1/90 2/1/10 3/1/10 Sinpur India South and Central Asia 27.568 80.692 2/1/89 4/1/100 3/1/10 Synpur China East Asia and the Pacific 30.524 105.564 9/1/88 7/1/00 8/1/13 Syna Fiji East Asia and the Pacific 23.854 150.998 4/1/91 2/1/00 8/1/14 Syna China East Asia and the Pacific 23.854 150.998 4/1/91 2/1/00 8/1/10 Tangshan, Hebei China East Asia and horth Africa 39.648 118.100 0/1/99 9/1/13 Tangshan, Hebei Uzbekistan South and Central Asia 35.705 51.384 6/1/10 8/1/10 8/1/10 8/1/10 8/1/10 8/1/10 8/1/10 8/1/10 8/1/10 8/1/10 8/1/10 8/1/10 8/	Sialkot	Pakistan	South and Central Asia	32.508	74.524	11/1/92	10/1/00	10/1/14
Singrauli India South and Central Asia 62.671 24.200 11/100 21/100 21/100 Sitapur India South and Central Asia 27.568 80.692 2/1/89 4/1/100 3/1/14 Springfield, MA United States Land-Rich Developed Countries 30.524 105.564 9/188 7/1/00 8/1/13 Suva Fiji East Asia and the Pacific -81.142 178.441 8/191 0/1/199 5/1/14 Sydney Australia Land-Rich Developed Countries -33.854 150.998 4/1/91 2/1/100 8/1/14 Tappei, Taiwan China East Asia and the Pacific 25.047 121.546 7/1/90 7/1/100 8/1/14 Tappei, Taiwan Uzbekistan South and Central Asia 41.297 69.233 8/1/90 10/1/19 9/1/10 6/1/10 8/1/14 Tehesa Kiraa South and Central Asia 35.705 51.384 6/1/91 7/1/00 6/1/10 8/1/14 Thessatoniki Greece Europe and Japan<	Singapore	Singapore	Southeast Asia	1.290	103.850	4/1/90	10/1/02	4/1/13
Sitapur India South and Central Asia 27.568 80.692 2/1/89 4/1/00 3/1/14 Springfield, MA United States Land-Rich Developed Countries 37.190 39.293 9/1/19 19/1/00 8/1/10 8/1/	Singrauli	India	South and Central Asia	82.671	24.200	1/1/90	2/1/00	2/1/10
Springfield, MA United States Land-Rich Developed Countries 37.190 -93.293 9/1/91 9/1/00 10/1/14 Suring, Sichuan China East Asia and the Pacific -18.142 178.441 8/1/91 0/1/00 8/1/13 Sydney Australia Land-Rich Developed Countries -33.854 150.998 4/1/91 2/1/00 8/1/14 Taipei, Taiwan China East Asia and the Pacific 23.044 8/190 0/1/19 9/1/13 Tashkent Uzbekistan South and Central Asia 41.297 69.233 8/1/90 0/1/19 9/1/13 Tebessa Algeria Western Asia and North Africa 35.416 8.108 5/1/88 6/1/10 8/1/14 Tehran Iran South and Central Asia 35.705 51.384 6/1/91 7/1/00 8/1/14 Tisral Western Asia and North Africa 33.167 5/1/100 8/1/14 7/1/00 6/1/14 Telakvin Israel Western Asia and the Pacific 39.149 9/1/100 5/1/14	Sitapur	India	South and Central Asia	27.568	80.692	2/1/89	4/1/00	3/1/14
Suining, Sichuan China East Asia and the Pacific 30.524 105.564 9/1/88 7/1/00 8/1/13 Suva Fiji East Asia and the Pacific -18.142 178.441 8/1/91 10/1/99 5/1/14 Sydney Australia Land-Rich Developed Countries 2-33.854 150.998 4/1/19 2/1/00 8/1/14 Tapjei, Taiwan China East Asia and the Pacific 39.648 118.190 9/1/90 7/1/10 8/1/10 7/1/10	Springfield, MA	United States	Land-Rich Developed Countries	37.190	-93.293	9/1/91	9/1/00	10/1/14
Suva Fiji East Asia and the Pacific -18.142 178.441 8/1/91 10/1/99 5/1/14 Sydney Australia Land-Rich Developed Countries -33.854 150.998 4/1/91 2/1/00 8/1/14 Tanjeni, Taiwan China East Asia and the Pacific 39.648 118.190 9/1/90 7/1/00 7/1/13 Tanshent Uzbekistan South and Central Asia 41.297 69.233 8/1/90 10/1/99 9/1/13 Tebessa Algeria Western Asia and North Africa 35.416 8.108 5/1/88 6/1/10 8/1/14 Tela Ariv Israel Western Asia and North Africa 32.077 34.839 8/1/87 5/1/00 8/1/14 Tial Ariv Israel Western Asia and the Pacific 33.142 117.189 10/1/90 6/1/10 9/1/11 Tianjan China East Asia and the Pacific 33.142 117.189 10/1/90 6/1/14 Tokyo Japan Europe and Japan 35.682 139.649 12/1/19 6/1/10 <td>Suining, Sichuan</td> <td>China</td> <td>East Asia and the Pacific</td> <td>30.524</td> <td>105.564</td> <td>9/1/88</td> <td>7/1/00</td> <td>8/1/13</td>	Suining, Sichuan	China	East Asia and the Pacific	30.524	105.564	9/1/88	7/1/00	8/1/13
Sydney Australia Land-Rich Developed Countries -33.854 150.998 4/1/91 2/1/00 8/1/14 Taipei, Taiwan China East Asia and the Pacific 25.047 121.546 7/1/190 3/1/01 1/1/14 Tangshan, Hebei China East Asia and the Pacific 39.648 118.190 9/1/90 7/1/100 <t< td=""><td>Suva</td><td>Fiji</td><td>East Asia and the Pacific</td><td>-18.142</td><td>178.441</td><td>8/1/91</td><td>10/1/99</td><td>5/1/14</td></t<>	Suva	Fiji	East Asia and the Pacific	-18.142	178.441	8/1/91	10/1/99	5/1/14
Taipei, Taiwan China East Asia and the Pacific 25.047 121.546 7/1/90 3/1/01 1/1/14 Tanghan, Hebei China East Asia and the Pacific 39.648 118.190 9/1/90 7/1/00 7/1/100	Sydney	Australia	Land-Rich Developed Countries	-33.854	150.998	4/1/91	2/1/00	8/1/14
Tangshan, Hebei China East Asia and the Pacific 39.648 118.190 9/1/90 7/1/00 7/1/13 Tanskent Uzbekistan South and Central Asia 41.297 69.233 8/1/90 10/1/99 9/1/13 Tebessa Algeria Western Asia and North Africa 35.705 51.884 6/1/10 8/1/10 9/1/10 5/1/11 117.189 10/1/90 6/1/10 5/1/14 Tokyo Japan Europe and Japan 35.682 139.649 121/190 9/1/10 5	Taipei, Taiwan	China	East Asia and the Pacific	25.047	121.546	7/1/90	3/1/01	1/1/14
Taskkent Uzbekistan South and Central Asia 41.297 69.233 8/1/90 10/1/99 9/1/13 Tebessa Algeria Western Asia and North Africa 35.416 8.108 6/1/10 8/1/14 Tehran Iran South and Central Asia 35.705 51.384 6/1/10 8/1/10 5/1/10 8/1/10 5/1/10 8/1/10 5/1/10 8/1/10 5/1/10 8/1/10 5/1/10 5/1/10 5/1/10 5/1/10 5/1/10 5/1/10 5/1/10 5/1/10 5/1/10 5/1/10 5/1/10 5/1/	Tangshan, Hebei	China	East Asia and the Pacific	39.648	118.190	9/1/90	7/1/00	7/1/13
Tebessa Algeria Western Asia and North Africa 35.416 8.108 5/1/88 6/1/01 8/1/14 Tehran Iran South and Central Asia 35.705 51.384 6/1/91 7/1/00 6/1/10 Tel Aviv Israel Western Asia and North Africa 32.077 34.839 8/1/87 5/1/00 8/1/14 Thessaloniki Greece Europe and Japan 40.650 22.916 8/1/90 3/1/00 9/1/13 Tijuana Mexico Latin America and the Pacific 39.142 117.189 10/1/90 6/1/00 9/1/10 5/1/14 Tokyo Japan Europe and Japan 35.682 139.649 12/1/90 9/1/00 6/1/14 Tymen Russia Europe and Japan 57.160 65.551 4/1/90 8/1/90 9/1/10 6/1/14 Valledupar Colombia Latin America and the Caribbean 10.464 -73.261 12/1/89 10/1/10 2/1/10 Vilaoud Colombia Latin America and the Caribbean 10.2650 157.	Tashkent	Uzbekistan	South and Central Asia	41.297	69.233	8/1/90	10/1/99	9/1/13
Tehran Iran South and Central Asia 35.705 51.384 6/1/91 7/1/00 6/1/91 Tel Aviv Israel Western Asia and North Africa 32.077 34.839 8/1/87 5/1/00 8/1/14 Thessaloniki Greece Europe and Japan 40.650 22.916 8/1/90 3/1/00 9/1/13 Tijuana Mexico Laita America and the Caribbean 32.499 -116.870 4/1/189 4/1/100 5/1/14 Tokyo Japan Europe and Japan 35.682 139.649 12/1/90 9/1/00 5/1/14 Tokyo Japan Europe and Japan 35.682 139.649 12/1/90 9/1/00 6/1/14 Tymen Russia Europe and Japan 10.464 -73.261 12/1/89 10/1/10 1/1/14 Valledupar Colombia Lain America and the Caribbean 10.464 -73.261 12/1/189 10/1/10 1/1/13 Vialedupar Colombia Lain America and the Caribbean 10.464 -73.261 12/1/18 10/1/10<	Tebessa	Algeria	Western Asia and North Africa	35.416	8.108	5/1/88	6/1/01	8/1/14
Tel Aviv Israel Western Asia and North Africa 32.077 34.839 8/1/87 5/1/00 8/1/14 Thessaloniki Greece Europe and Japan 40.650 22.916 8/1/90 3/1/00 9/1/11 Tianjin, Tianjin China East Asia and the Pacific 39.142 117.189 10/190 6/1/00 9/1/13 Tijuana Mexico Latin America and the Caribbean 32.499 -116.970 4/1/89 4/1/00 5/1/14 Tokyo Japan Europe and Japan 35.682 139.649 12/1/90 9/1/10 6/1/14 Tokoo United States Land-Rich Developed Countries 41.655 +8.802 8/1/90 9/1/10 6/1/14 Vamen Russia Europe and Japan 57.160 65.551 4/1/90 8/1/99 9/1/11 Ulaanbaatar Mongolia East Asia and the Pacific 47.930 106.889 9/1/90 8/1/101 6/1/14 Valenpa Clombia Latin America and the Caribbean 10.464 -73.261 12/1/89	Tehran	Iran	South and Central Asia	35.705	51.384	6/1/91	7/1/00	6/1/10
Thessaloniki Greece Europe and Japan 40.650 22.916 8/1/90 3/1/00 9/1/11 Tianjin, Tianjin China East Asia and the Pacific 39.142 117.189 10/1/90 6/1/00 9/1/13 Tijuana Mexico Latin America and the Caribbean 32.499 -116.970 4/1/89 4/1/00 5/1/14 Tokyo Japan Europe and Japan 35.682 139.649 12/1/90 9/1/10 5/1/14 Toledo United States Land-Rich Developed Countries 41.655 -83.602 8/1/90 9/1/10 6/1/14 Ulaanbaatar Mongolia East Asia and the Pacific 47.930 106.889 9/1/00 6/1/14 Valledupar Colombia Latin America and the Caribbean 10.464 -73.261 12/1/89 10/1/10 2/1/130 Vienna Austria Europe and Japan 48.154 16.346 6/1/91 9/1/00 8/1/13 Vienna Colombia Latin America and the Caribbean 10.250 105.967 4/1/89 <td< td=""><td>Tel Aviv</td><td>Israel</td><td>Western Asia and North Africa</td><td>32.077</td><td>34.839</td><td>8/1/87</td><td>5/1/00</td><td>8/1/14</td></td<>	Tel Aviv	Israel	Western Asia and North Africa	32.077	34.839	8/1/87	5/1/00	8/1/14
Tianjin, Tianjin China East Asia and the Pacific 39.142 117.189 10/1/90 6/1/00 9/1/13 Tijuana Mexico Latin America and the Caribbean 32.499 -116.970 4/1/89 4/1/00 5/1/14 Tokyo Japan Europe and Japan 35.682 139.649 12/1/90 9/1/00 5/1/14 Toledo United States Land-Rich Developed Countries 41.655 -83.602 8/1/90 9/1/00 6/1/14 Tyumen Russia Europe and Japan 57.160 65.551 4/1/90 8/1/99 9/1/10 6/1/14 Valledupar Colombia Latin America and the Caribbean 10.464 -73.261 12/1/89 10/1/10 2/1/11 Victoria Canada Land-Rich Developed Countries 48.456 -123.401 8/1/90 7/1/00 9/1/13 Vilayawada India South and Central Asia 16.515 80.641 11/1/91 10/1/00 6/1/14 Vinha South and Central Asia 10.250 105.967 4/1/89 </td <td>Thessaloniki</td> <td>Greece</td> <td>Europe and Japan</td> <td>40.650</td> <td>22.916</td> <td>8/1/90</td> <td>3/1/00</td> <td>9/1/11</td>	Thessaloniki	Greece	Europe and Japan	40.650	22.916	8/1/90	3/1/00	9/1/11
Tijuana Mexico Latin America and the Caribbean 32.499 -116.970 4/1/89 4/1/00 5/1/14 Tokyo Japan Europe and Japan 35.682 139.649 12/1/90 9/1/00 5/1/14 Toledo United States Land-Rich Developed Countries 41.655 -83.602 8/1/90 9/1/00 6/1/14 Tyumen Russia Europe and Japan 57.160 65.551 4/1/90 8/1/99 9/1/10 6/1/14 Ulanbabatar Mongolia East Asia and the Pacific 47.930 106.889 9/1/90 8/1/01 6/1/14 Victoria Canada Land-Rich Developed Countries 48.456 -123.401 8/1/90 9/1/00 8/1/13 Vijayawada India South and Central Asia 16.515 80.641 11/1/191 10/1/00 6/1/14 Warsaw Poland Europe and Japan 52.234 21.024 5/1/92 8/1/00 9/1/100 1/1/14 Warsaw Poland Europe and Japan 52.234 21.024	Tianiin. Tianiin	China	East Asia and the Pacific	39.142	117.189	10/1/90	6/1/00	9/1/13
TokyoJapanEurope and Japan35.682139.64912/1/909/1/005/1/14ToledoUnited StatesLand-Rich Developed Countries41.655-83.6028/1/909/1/006/1/14TyumenRussiaEurope and Japan57.16065.5514/1/908/1/909/1/106/1/14UlanbaatarMongoliaEast Asia and the Pacific47.930106.8899/1/908/1/016/1/14ValleduparColombiaLatin America and the Caribbean10.464-73.26112/1/8910/1/012/1/11VictoriaCanadaLand-Rich Developed Countries48.456-123.4018/1/907/1/009/1/30ViennaAustriaEurope and Japan48.12416.3466/1/919/1/008/1/13VijayawadaIndiaSouth and Central Asia10.250105.9674/1/8911/1/106/1/14WarsawPolandEurope and Japan52.23421.0245/1/928/1/009/1/30Wuhan, HubeiChinaEast Asia and the Pacific33.064118.50710/1/909/1/008/1/13Xucheng, JiangsuChinaEast Asia and the Pacific33.004118.50710/1/909/1/908/1/14Yushangu, HunanChinaEast Asia and the Pacific36.116115.7869/1/909/1/108/1/14Yugang, HunanChinaEast Asia and the Pacific28.587112.3567/1/949/1/901/1/14Yugang, HunanChinaEast Asia an	Tiiuana	Mexico	Latin America and the Caribbean	32,499	-116.970	4/1/89	4/1/00	5/1/14
Toledo United States Land-Rich Developed Countries 41.655 -83.602 8/1/90 9/1/10 6/1/14 Tyumen Russia Europe and Japan 57.160 65.551 4/1/90 8/1/99 9/1/11 Ulaanbaatar Mongolia East Asia and the Pacific 47.930 106.889 9/1/90 8/1/10 6/1/14 Valledupar Colombia Latin America and the Caribbean 10.464 -73.261 12/1/89 10/1/01 2/1/11 Victoria Canada Land-Rich Developed Countries 48.456 -123.401 8/1/90 7/1/00 9/1/13 Vienna Austria Europe and Japan 48.124 16.346 6/1/91 9/1/00 8/1/14 Vienna South and Central Asia 10.250 105.967 4/1/89 11/1/10 1/1/14 Warsaw Poland Europe and Japan 52.234 21.024 5/1/92 8/1/00 9/1/30 Xingping, Shaanxi China East Asia and the Pacific 34.308 108.463 7/1/92 6/1/10	Tokvo	Japan	Europe and Japan	35.682	139.649	12/1/90	9/1/00	5/1/14
Tyumen Russia Europe and Japan 57.160 65.551 4/1/90 8/1/99 9/1/11 Ulaanbaatar Mongolia East Asia and the Pacific 47.930 106.889 9/1/90 8/1/01 6/1/14 Valledupar Colombia Latin America and the Caribbean 10.464 -73.261 12/1/89 10/1/01 2/1/11 Victoria Canada Land-Rich Developed Countries 48.456 -123.401 8/1/90 7/1/00 9/1/13 Vienna Austria Europe and Japan 48.124 16.346 6/1/91 9/1/00 8/1/14 Vipayawada India South and Central Asia 16.515 80.641 11/1/91 10/1/00 6/1/14 Vinh Long Vietnam Southeast Asia 10.250 105.967 4/1/89 11/1/00 1/1/14 Warsaw Poland Europe and Japan 52.234 21.024 5/1/92 8/1/00 9/1/13 Xingping, Shaanxi China East Asia and the Pacific 30.04 118.507 10/1/90 9/1/00<	Toledo	United States	Land-Rich Developed Countries	41.655	-83.602	8/1/90	9/1/00	6/1/14
Juanbatar Mongolia East Asia and the Pacific 47.930 106.889 9/1/90 8/1/01 6/1/14 Valledupar Colombia Latin America and the Caribbean 10.464 -73.261 12/1/89 10/1/01 2/1/11 Victoria Canada Land-Rich Developed Countries 48.456 -123.401 8/1/90 7/1/00 9/1/10 8/1/11 Vietnam Austria Europe and Japan 48.124 16.346 6/1/91 9/1/90 8/1/10 6/1/14 Vienna Austria Europe and Japan 48.124 16.346 6/1/91 9/1/90 8/1/10 6/1/14 Vienna South and Central Asia 16.515 80.641 11/1/91 10/1/00 6/1/14 Vinh Long Vietnam Southeast Asia 10.250 105.967 4/1/89 11/1/00 1/1/14 Warsaw Poland Europe and Japan 52.234 21.024 5/1/92 8/1/00 9/1/10 9/1/10 9/1/10 9/1/10 9/1/10 9/1/10 9/1/10 9/1/10	Tvumen	Russia	Europe and Japan	57,160	65.551	4/1/90	8/1/99	9/1/11
Valledupar Colombia Latin America and the Caribbean 10.464 -73.261 12/1/89 10/1/1 Victoria Canada Land-Rich Developed Countries 48.456 -123.401 8/1/90 7/1/00 9/1/13 Vienna Austria Europe and Japan 48.124 16.346 6/1/91 9/1/00 8/1/13 Vijayawada India South and Central Asia 16.515 80.641 11/1/91 10/1/00 6/1/14 Vinh Long Vietnam Southeast Asia 10.250 105.967 4/1/89 11/1/00 1/1/14 Warsaw Poland Europe and Japan 52.234 21.024 5/1/92 8/1/00 9/1/13 Wuhan, Hubei China East Asia and the Pacific 30.576 114.295 9/1/90 9/1/00 8/1/13 Xucheng, Jiangsu China East Asia and the Pacific 33.004 118.507 10/1/90 9/1/00 8/1/13 Yamaguchi Japan Europe and Japan 34.155 131.458 9/1/90 3/1/99 5/1/14<	Ulaanbaatar	Mongolia	East Asia and the Pacific	47.930	106.889	9/1/90	8/1/01	6/1/14
VictoriaCanadaLand-Rich Developed Countries48.456-123.4018/1/907/1/009/1/13ViennaAustriaEurope and Japan48.12416.3466/1/919/1/008/1/13VijayawadaIndiaSouth and Central Asia16.51580.64111/1/9110/1/006/1/14Vinh LongVietnamSoutheast Asia10.250105.9674/1/8911/1/001/1/14WarsawPolandEurope and Japan52.23421.0245/1/928/1/009/1/13Wuhan, HubeiChinaEast Asia and the Pacific30.576114.2959/1/909/1/006/1/13Xingping, ShaanxiChinaEast Asia and the Pacific33.004118.50710/1/909/1/008/1/13YamaguchiJapanEurope and Japan34.155131.4589/1/903/1/995/1/14Yanggu, ShandongChinaEast Asia and the Pacific36.116115.7869/1/909/1/104/1/14Yiyang, HunanChinaEast Asia and the Pacific28.587112.3567/1/949/1/9910/1/13Yucheng, ZhejiangChinaEast Asia and the Pacific28.125121.24712/1/901/1/10012/1/14Yulin, GuangxiChinaEast Asia and the Pacific28.125121.24712/1/901/1/10012/1/14Yulin, GuangxiChinaEast Asia and the Pacific29.725120.2376/1/905/1/004/1/15Zhuji, ZhejiangChinaEast Asia and the	Valledupar	Colombia	Latin America and the Caribbean	10.464	-73.261	12/1/89	10/1/01	2/1/11
NinnaAustriaEurope and Japan48.12416.34661/19191/1008/1/13VijayawadaIndiaSouth and Central Asia16.51580.64111/1/9110/1/006/1/14Vinh LongVietnamSoutheast Asia10.250105.9674/1/8911/1/001/1/14WarsawPolandEurope and Japan52.23421.0245/1/928/1/009/1/13Wuhan, HubeiChinaEast Asia and the Pacific30.576114.2959/1/909/1/009/1/13Xingping, ShaanxiChinaEast Asia and the Pacific34.308108.4637/1/926/1/006/1/13Xucheng, JiangsuChinaEast Asia and the Pacific33.004118.50710/1/909/1/008/1/13YamaguchiJapanEurope and Japan34.155131.4589/1/903/1/995/1/14Yanggu, ShandongChinaEast Asia and the Pacific36.116115.7869/1/909/1/004/1/14Yiyang, HunanChinaEast Asia and the Pacific28.587112.3567/1/949/1/9910/1/13Yucheng, ZhejiangChinaEast Asia and the Pacific28.125121.24712/1/901/1/1001/1/10Yulin, GuangxiChinaEast Asia and the Pacific22.611110.13910/1/9110/1/001/1/10Zhengzhou, HenanChinaEast Asia and the Pacific22.611110.13910/1/919/1/1001/1/10ZhengzhouChinaEast Asia and the Pa	Victoria	Canada	I and-Rich Developed Countries	48,456	-123,401	8/1/90	7/1/00	9/1/13
VijayawadaIndiaSouth and Central Asia16.51580.64111/1/9110/1/006/1/14VijayawadaVietnamSouth and Central Asia16.51580.64111/1/9110/1/006/1/14Vinh LongVietnamSoutheast Asia10.250105.9674/1/8911/1/001/1/14WarsawPolandEurope and Japan52.23421.0245/1/928/1/009/1/13Wuhan, HubeiChinaEast Asia and the Pacific30.576114.2959/1/909/1/009/1/13Xingping, ShaanxiChinaEast Asia and the Pacific34.308108.4637/1/926/1/006/1/13Xucheng, JiangsuChinaEast Asia and the Pacific33.004118.50710/1/909/1/008/1/13YamaguchiJapanEurope and Japan34.155131.4589/1/903/1/995/1/14Yanggu, ShandongChinaEast Asia and the Pacific36.116115.7869/1/909/1/004/1/14Yiyang, HunanChinaEast Asia and the Pacific28.587112.3567/1/949/1/9910/1/13Yucheng, ZhejiangChinaEast Asia and the Pacific22.611110.13910/1/9110/1/001/1/09Yulin, GuangxiChinaEast Asia and the Pacific22.611110.13910/1/928/1/009/1/15Zhengzhou, HenanChinaEast Asia and the Pacific29.725120.2376/1/905/1/004/1/13Zunyi, GuizhouChinaEast	Vienna	Austria	Europe and Japan	48,124	16.346	6/1/91	9/1/00	8/1/13
VinctionVietnamSoutheast Asia10.250105.9674/1/8911/1/001/1/14WarsawPolandEurope and Japan52.23421.0245/1/928/1/009/1/13Wuhan, HubeiChinaEast Asia and the Pacific30.576114.2959/1/909/1/009/1/13Xingping, ShaanxiChinaEast Asia and the Pacific34.308108.4637/1/926/1/006/1/13Xucheng, JiangsuChinaEast Asia and the Pacific33.004118.50710/1/909/1/008/1/13YamaguchiJapanEurope and Japan34.155131.4589/1/903/1/995/1/14Yanggu, ShandongChinaEast Asia and the Pacific36.116115.7869/1/909/1/004/1/14Yiyang, HunanChinaEast Asia and the Pacific28.587112.3567/1/949/1/9910/1/13Yucheng, ZhejiangChinaEast Asia and the Pacific28.125121.24712/1/901/1/0012/1/14Yulin, GuangxiChinaEast Asia and the Pacific22.611110.13910/1/9110/1/001/1/09Zhengzhou, HenanChinaEast Asia and the Pacific34.756113.63710/1/928/1/009/1/15Zhuji, ZhejiangChinaEast Asia and the Pacific29.725120.2376/1/905/1/004/1/13Zunyi, GuizhouChinaEast Asia and the Pacific29.725120.2376/1/905/1/004/1/13	Vijavawada	India	South and Central Asia	16.515	80.641	11/1/91	10/1/00	6/1/14
Warsaw Poland Europe and Japan 52.234 21.024 5/1/92 8/1/00 9/1/13 Wuhan, Hubei China East Asia and the Pacific 30.576 114.295 9/1/90 9/1/00 9/1/13 Xingping, Shaanxi China East Asia and the Pacific 34.308 108.463 7/1/92 6/1/00 6/1/13 Xucheng, Jiangsu China East Asia and the Pacific 33.004 118.507 10/1/90 9/1/00 8/1/14 Yamaguchi Japan Europe and Japan 34.155 131.458 9/1/90 3/1/99 5/1/14 Yanggu, Shandong China East Asia and the Pacific 36.116 115.786 9/1/90 9/1/90 4/1/14 Yiyang, Hunan China East Asia and the Pacific 28.587 112.356 7/1/94 9/1/99 10/1/13 Yucheng, Zhejiang China East Asia and the Pacific 28.125 121.247 12/1/90 1/1/00 1/1/10 Yulin, Guangxi China East Asia and the Pacific 22.611 110.139	Vinh Long	Vietnam	Southeast Asia	10.250	105 967	4/1/89	11/1/00	1/1/14
Wuhan, Hubei China East Asia and the Pacific 30.576 114.295 9/1/90 9/1/00 9/1/3 Xingping, Shaanxi China East Asia and the Pacific 34.308 108.463 7/1/92 6/1/00 6/1/13 Xucheng, Jiangsu China East Asia and the Pacific 33.004 118.507 10/1/90 9/1/00 8/1/13 Yamaguchi Japan Europe and Japan 34.155 131.458 9/1/90 3/1/99 5/1/14 Yanggu, Shandong China East Asia and the Pacific 36.116 115.786 9/1/90 9/1/00 4/1/14 Yiyang, Hunan China East Asia and the Pacific 28.587 112.356 7/1/94 9/1/99 10/1/13 Yucheng, Zhejiang China East Asia and the Pacific 28.125 121.247 12/1/90 1/1/100 12/1/14 Yulin, Guangxi China East Asia and the Pacific 22.611 110.139 10/1/91 10/1/01 1/1/109 Zhengzhou, Henan China East Asia and the Pacific 24.756 113.637 10/1/92 8/1/00 9/1/15 Zhuji, Zhejian	Warsaw	Poland		52 234	21 024	5/1/92	8/1/00	9/1/13
Xingping, Shaanxi China East Asia and the Pacific 34.308 108.463 7/1/92 6/1/00 6/1/13 Xucheng, Jiangsu China East Asia and the Pacific 33.004 118.507 10/1/90 9/1/00 8/1/13 Yamaguchi Japan Europe and Japan 34.155 131.458 9/1/90 3/1/99 5/1/14 Yanggu, Shandong China East Asia and the Pacific 36.116 115.786 9/1/90 9/1/90 4/1/14 Yanggu, Shandong China East Asia and the Pacific 36.116 115.786 9/1/90 9/1/90 4/1/14 Yiyang, Hunan China East Asia and the Pacific 28.587 112.356 7/1/94 9/1/99 10/1/13 Yucheng, Zhejiang China East Asia and the Pacific 28.125 121.247 12/1/90 1/1/00 12/1/14 Yulin, Guangxi China East Asia and the Pacific 22.611 110.139 10/1/91 10/1/00 1/1/09 Zhengzhou, Henan China East Asia and the Pacific 34.756 113.637 10/1/92 8/1/00 9/1/15 Zhuji, Zhej	Wuhan Hubei	China	East Asia and the Pacific	30.576	114 295	9/1/90	9/1/00	9/1/13
Xucheng, Jiangsu China East Asia and the Pacific 33.004 118.507 10/1/90 9/1/00 8/1/13 Yamaguchi Japan Europe and Japan 34.155 131.458 9/1/90 3/1/99 5/1/14 Yanggu, Shandong China East Asia and the Pacific 36.116 115.786 9/1/90 3/1/99 5/1/14 Yanggu, Shandong China East Asia and the Pacific 36.116 115.786 9/1/90 9/1/90 4/1/14 Yiyang, Hunan China East Asia and the Pacific 28.587 112.356 7/1/94 9/1/99 10/1/13 Yucheng, Zhejiang China East Asia and the Pacific 28.125 121.247 12/1/90 1/1/00 12/1/14 Yulin, Guangxi China East Asia and the Pacific 22.611 110.139 10/1/91 10/1/00 1/1/09 Zhengzhou, Henan China East Asia and the Pacific 34.756 113.637 10/1/92 8/1/00 9/1/15 Zhuji, Zhejiang China East Asia and the Pacific 29.725	Xingping Shaanxi	China	East Asia and the Pacific	34 308	108 463	7/1/92	6/1/00	6/1/13
YamaguchiJapanEurope and Japan34.155131.4589/1/903/1/995/1/14Yanggu, ShandongChinaEast Asia and the Pacific36.116115.7869/1/909/1/004/1/14Yiyang, HunanChinaEast Asia and the Pacific28.587112.3567/1/949/1/9910/1/13Yucheng, ZhejiangChinaEast Asia and the Pacific28.125121.24712/1/901/1/0012/1/14Yulin, GuangxiChinaEast Asia and the Pacific22.611110.13910/1/9110/1/001/1/09Zhengzhou, HenanChinaEast Asia and the Pacific34.756113.63710/1/928/1/009/1/15Zhuji, ZhejiangChinaEast Asia and the Pacific29.725120.2376/1/905/1/004/1/13Zunyi, GuizhouChinaEast Asia and the Pacific27.696106.9256/1/884/1/0112/1/13	Xucheng Jiangsu	China	East Asia and the Pacific	33 004	118 507	10/1/90	9/1/00	8/1/13
Yanggu, Shandong China East Asia and the Pacific 36.116 115.786 9/1/90 9/1/90 4/1/14 Yiyang, Hunan China East Asia and the Pacific 28.587 112.356 7/1/94 9/1/90 10/1/13 Yucheng, Zhejiang China East Asia and the Pacific 28.125 121.247 12/1/90 1/1/00 12/1/14 Yulin, Guangxi China East Asia and the Pacific 22.611 110.139 10/1/91 10/1/00 1/1/09 Zhengzhou, Henan China East Asia and the Pacific 34.756 113.637 10/1/92 8/1/00 9/1/15 Zhuji, Zhejiang China East Asia and the Pacific 29.725 120.237 6/1/90 5/1/00 4/1/13 Zunyi, Guizhou China East Asia and the Pacific 27.696 106.925 6/1/88 4/1/01 12/1/13	Yamaquchi	Janan		34 155	131 458	9/1/90	3/1/99	5/1/14
Yiyang, Hunan China East Asia and the Pacific 28.587 112.356 7/1/94 9/1/99 10/1/13 Yucheng, Zhejiang China East Asia and the Pacific 28.125 121.247 12/1/90 1/1/00 12/1/14 Yulin, Guangxi China East Asia and the Pacific 22.611 110.139 10/1/91 10/1/00 1/1/09 Zhengzhou, Henan China East Asia and the Pacific 34.756 113.637 10/1/92 8/1/00 9/1/15 Zhuji, Zhejiang China East Asia and the Pacific 29.725 120.237 6/1/90 5/1/00 4/1/13 Zunyi, Guizhou China East Asia and the Pacific 27.696 106.925 6/1/88 4/1/01 12/1/13	Yanggu Shandong	China	East Asia and the Pacific	36 116	115 786	9/1/90	9/1/00	4/1/14
Yucheng, Zhejiang China East Asia and the Pacific 28.125 121.247 12/1/90 1/1/00 12/1/14 Yulin, Guangxi China East Asia and the Pacific 22.611 110.139 10/1/91 10/1/90 1/1/00 1/1/09 Zhengzhou, Henan China East Asia and the Pacific 34.756 113.637 10/1/92 8/1/00 9/1/15 Zhuji, Zhejiang China East Asia and the Pacific 29.725 120.237 6/1/90 5/1/00 4/1/13 Zunyi, Guizhou China East Asia and the Pacific 27.696 106.925 6/1/88 4/1/01 12/1/13	Yiyang Hunan	China	East Asia and the Pacific	28 587	112 356	7/1/94	9/1/99	10/1/13
Yulin, Guangxi China East Asia and the Pacific 22.611 110.139 10/1/91 10/1/90 1/1/00 Zhengzhou, Henan China East Asia and the Pacific 34.756 113.637 10/1/92 8/1/00 9/1/15 Zhuji, Zhejiang China East Asia and the Pacific 29.725 120.237 6/1/90 5/1/00 4/1/13 Zunyi, Guizhou China East Asia and the Pacific 27.696 106.925 6/1/88 4/1/01 12/1/13	Yucheng Zheijang	China	East Asia and the Pacific	28 125	121 247	12/1/90	1/1/00	12/1/14
Zhengzhou, Henan China East Asia and the Pacific 34.756 113.637 10/1/92 8/1/00 9/1/15 Zhuji, Zhejiang China East Asia and the Pacific 29.725 120.237 6/1/90 5/1/00 4/1/13 Zunyi, Guizhou China East Asia and the Pacific 27.696 106.925 6/1/88 4/1/01 12/1/13	Yulin Guangyi	China	East Asia and the Pacific	20.120	110 130	10/1/01	10/1/00	1/1/00
Zhuji, Zhejiang China East Asia and the Pacific 29.725 120.237 6/1/90 5/1/00 9/1/13 Zunyi, Guizhou China East Asia and the Pacific 29.725 120.237 6/1/90 5/1/00 4/1/13	Zhengzhou Henan	China	East Asia and the Pacific	34 756	113 637	10/1/02	8/1/00	9/1/15
Zunyi, Zughang China Last Asia and the Pacific 25.723 120.237 0/1/30 3/1/00 4/1/13 Zunyi, Guizhou China East Asia and the Pacific 27.696 106.925 6/1/88 4/1/01 12/1/13	Zhuji Zheijang	China	East Asia and the Pacific	20 725	120 237	6/1/00	5/1/00	4/1/12
	Zunyi, Zuojiany Zunyi, Guizbou	China	East Asia and the Pacific	23.125	106 025	6/1/88	<u>4/1/01</u>	12/1/12
Zwolle Netherlands Europe and Japan 52 513 6 0901 4/1/90 5/1/00 3/1/14	Zwolle	Netherlands	Europe and Japan	52,513	6.090	4/1/90	5/1/00	3/1/14

Saidpur - Zwolle

City Name	Share of Built-up Area Occupied by Roads		Average Stro (mete	eet Width ers)	Share of Road 4m. V	ls Less Than /ide	Share of Roads More Than 16m. Wide		
	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	
Saidpur	9%	15%	3.6	4.7	65%	46%	0%	0%	
Saint Petersburg	26%	21%	9.3	8.1	14%	20%	14%	9%	
San Salvador	25%	23%	10.4	8.1	7%	21%	14%	9%	
Sana	29%	28%	10.7	7.8	15%	33%	16%	10%	
Santiago	25%	18%	12.6	7.9	5%	16%	27%	10%	
Sao Paulo	24%	22%	9.9	7.2	5%	11%	19%	1%	
Seoul	22%	20%	7.6	5.6	33%	45%	10%	4%	
Shanghai, Shanghai	27%	22%	9.7	8.2	16%	41%	25%	14%	
Sheffield	19%	17%	8.0	7.5	24%	24%	6%	5%	
Shenzhen, Guangdong	27%	25%	10.7	8.4	21%	33%	17%	15%	
Shymkent	14%	17%	8.5	7.7	14%	18%	8%	7%	
Sialkot	17%	17%	7.1	5.1	46%	45%	12%	4%	
Singapore	24%	26%	11.7	9.1	7%	22%	24%	15%	
Singrauli	28%	19%	8.5	6.2	7%	28%	7%	5%	
Sitapur	17%	25%	5.5	5.0	46%	42%	5%	0%	
Springfield, MA	18%	16%	8.1	7.9	19%	13%	9%	3%	
Suining, Sichuan	28%	28%	10.8	11.0	7%	9%	20%	19%	
Suva	24%	13%	10.9	8.4	7%	19%	17%	9%	
Sydney	26%	20%	15.7	9.9	5%	8%	51%	16%	
Taipei, Taiwan	22%	18%	8.5	5.3	22%	44%	12%	3% 50/	
Tangshan, Hebei	20%	17%	6.7	5.7	33%	43%	7%	5%	
	16%	12%	8.8	5.6	13%	30%	11%	2%	
Tebessa	24%	23%	7.8	0.2	29%	32%	10%	1%	
Tenran Tel Aviv	22%	20%	11.2	9.5	70/	19%	19%	10%	
Thossaloniki	23%	22 %	11.0	9.4	770	19%	19%	14 %	
	23%	21/0	0.0	8.4	21%	20%	10%	970 13%	
Tidijin, Hanjin Tijuana	2270	25%	3. <u>2</u> 11 3	0.4	7%	30 %	12 /0	8%	
Tokyo	37%	20%	5.4	5.0	46%	51%	3%	3%	
Toledo	21%	18%	8.6	9.3	25%	14%	17%	22%	
Tvumen	20%	19%	77	6.7	18%	20%	7%	6%	
Ulaanbaatar	15%	12%	7.1	4.2	25%	51%	8%	0%	
Valledupar	21%	26%	8.9	6.9	8%	15%	9%	2%	
Victoria	19%	17%	9.8	7.3	9%	22%	12%	4%	
Vienna	22%	18%	7.8	6.6	24%	22%	9%	1%	
Vijayawada	20%	18%	7.0	5.8	20%	32%	8%	4%	
Vinh Long	16%	10%	7.7	6.1	19%	46%	4%	8%	
Warsaw	22%	15%	9.3	6.3	8%	24%	12%	1%	
Wuhan, Hubei	21%	23%	10.1	7.3	27%	41%	17%	11%	
Xingping, Shaanxi	16%	17%	9.8	7.4	18%	29%	20%	8%	
Xucheng, Jiangsu	20%	24%	8.5	9.2	21%	35%	22%	18%	
Yamaguchi	27%	29%	5.5	5.8	48%	45%	4%	4%	
Yanggu, Shandong	23%	15%	8.6	3.3	32%	75%	17%	3%	
Yiyang, Hunan	17%	16%	10.7	6.8	17%	48%	19%	10%	
Yucheng, Zhejiang	19%	20%	6.7	6.0	43%	49%	11%	7%	
Yulin, Guangxi	17%	15%	8.6	6.9	31%	46%	16%	9%	
Zhengzhou, Henan	22%	20%	8.1	8.5	33%	31%	16%	14%	
Zhuji, Zhejiang	23%	23%	6.1	6.8	39%	34%	5%	8%	
Zunyi, Guizhou	20%	17%	7.6	7.2	28%	32%	11%	10%	
Zwolle	22%	26%	4.7	6.6	49%	34%	4%	8%	

City Name	Density of All Arterial Roads (km/km ²)		Average Beeli to All Arteri (mete	ne Distance ial Roads ers)	Share of Are Walking Dista Arterial F	ea within ance of All Roads	Share of Area within Walking Distance of Wide Arterial Roads		
	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	
Saidpur	2.81	1.90	98	173	100%	96%	15%	43%	
Saint Petersburg	1.19	0.90	433	523	78%	70%	76%	61%	
San Salvador	2.84	2.02	155	212	96%	93%	82%	74%	
Sana	2.25	0.96	219	767	92%	70%	90%	69%	
Santiago	3.01	2.37	126	199	99%	94%	99%	90%	
Sao Paulo	2.36	0.53	162	1,268	99%	39%	78%	23%	
Seoul	2.51	0.79	177	478	95%	71%	93%	47%	
Shanghai, Shanghai	1.72	0.65	229	1,286	93%	63%	93%	60%	
Sheffield	1.65	1.54	220	234	94%	93%	46%	44%	
Shenzhen, Guangdong	2.75	0.97	148	444	97%	80%	97%	80%	
Shymkent	1.18	0.92	461	469	75%	74%	65%	58%	
Sialkot	1.76	1.03	181	379	99%	81%	88%	70%	
Singapore	1.74	1.42	243	513	93%	83%	92%	83%	
Singrauli	0.02	0.62	1,182	678	21%	54%	21%	58%	
Sitapur	1.95	1.69	175	251	96%	90%	78%	75%	
Springfield, MA	1.94	1.36	246	275	92%	89%	75%	48%	
Suining, Sichuan	2.64	1.77	117	190	100%	96%	100%	94%	
Suva	2.90	1.39	83	253	100%	90%	100%	90%	
Sydney	2.30	1.28	163	357	97%	82%	97%	76%	
Taipei, Taiwan	4.62	3.06	83	134	99%	98%	96%	82%	
Tangshan, Hebei	1.37	0.76	318	840	86%	63%	84%	59%	
Tashkent	1.03	0.90	412	445	79%	76%	77%	72%	
Tebessa	1.74	1.24	205	305	95%	85%	86%	81%	
Tehran	2.36	1.90	176	255	96%	91%	96%	90%	
Tel Aviv	2.03	1.13	178	376	97%	81%	96%	78%	
Thessaloniki	2.91	2.09	138	198	98%	94%	89%	78%	
Tianjin, Tianjin	2.32	0.77	173	522	97%	69%	96%	61%	
Tijuana	1.94	1.55	172	233	98%	93%	81%	73%	
Tokyo	2.75	1.73	129	198	99%	93%	84%	58%	
Toledo	1.42	1.17	258	340	91%	84%	74%	57%	
Tyumen	1.32	1.07	312	392	86%	79%	85%	76%	
Ulaanbaatar	1.60	1.18	272	394	89%	78%	81%	67%	
Valledupar	3.30	2.36	107	209	99%	90%	97%	86%	
Victoria	1.99	1.56	185	260	96%	89%	88%	75%	
Vienna	2.01	1./5	169	207	98%	95%	84%	/1%	
Vijayawada	2.05	1.65	161	221	99%	94%	92%	87%	
Vinh Long	3.63	1.03	74	321	100%	84%	90%	67%	
Warsaw	1.92	1.58	185	214	96%	94%	79%	65%	
Vvunan, Hubel	1.77	0.40	246	994	91%	67% 75%	90%	66%	
Xingping, Shaanxi	1.63	0.82	193	453	99%	75%	99%	11%	
Xucheng, Jiangsu	1.82	1.31	136	259	100%	92%	100%	91%	
Yanagu Shandana	1.65	1.52	243	241	90%	92%	79%	71%	
Yanggu, Shahuong Vivong, Hunon	0.92	0.02	401	030	01%	39% 770/	01%	00% 710/	
Tiyang, Fundh Vuchong, Zheijong	1.04	0.03	203	401	91%	710/	91%	11%	
Yulin, Cuongyi	1./0	0.97	3Z4 200	591	03%	71%	90%	00%	
Zhengzhou, Honon	1.77	0.90	200	507	91 % 0 Q 0/	1 Z %	91 %	760/	
Zhenyzhou, nenan Zhuji Zhejiana	0.69	0.77	662	976	90%	60%	90% 50%	/0%	
Zunyi, Zuejiany Zunyi, Guizbou	0.00	1 11	163	224	100%	07%	100%	47 % 77%	
Zwolle	1.66	1.50	214	242	95%	93%	92%	90%	

Saidpur - Zwolle

City Name	Average Block Size (ha)		3-Way Intersection Density (number per km ²)		4-Way Intersection Density (number per km ²)		Share of Intersections that are 4-Way		Walkability Ratio	
	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014
Saidpur	2.8	9.7	103.0	77.0	17.3	6.1	8%	6%	1.4	1.5
Saint Petersburg	3.3	5.3	133.0	77.1	19.9	6.1	12%	6%	1.7	1.8
San Salvador	2.1	4.8	93.8	104.0	21.8	28.1	18%	12%	1.6	1.8
Sana	2.3	3.5	171.7	217.5	25.9	15.4	13%	5%	1.7	1.7
Santiago	3.5	6.5	60.7	116.5	26.5	19.9	34%	14%	1.6	2.0
Sao Paulo	3.5	6.7	66.6	82.6	17.8	5.4	26%	6%	1.8	1.7
Seoul	2.4	6.3	131.8	95.6	29.2	14.9	16%	9%	1.8	1.5
Shanghai, Shanghai	6.1	6.8	67.3	80.9	17.8	10.2	20%	13%	1.6	1.7
Sheffield	3.4	6.2	97.6	62.6	10.3	6.4	7%	6%	1.6	1.5
Shenzhen, Guangdong	3.0	3.3	132.3	251.2	11.8	82.4	7%	18%	1.8	1.7
Shymkent	6.4	5.6	43.9	65.2	8.0	13.3	14%	15%	1.7	1.8
Sialkot	2.4	5.1	149.7	153.9	15.6	19.4	9%	6%	1.6	1.8
Singapore	4.5	3.9	78.2	100.3	4.7	16.2	5%	15%	2.2	2.0
Singrauli	3.4	6.0	180.4	137.0	19.8	12.0	8%	5%	1.5	1.7
Sitapur	2.6	4.8	202.8	132.3	26.4	6.8	10%	6%	1.8	1.3
Springfield, MA	3.8	7.2	96.7	45.1	8.5	8.5	8%	5%	1.6	1.6
Suining, Sichuan	2.2	5.6	209.3	139.5	17.9	15.2	7%	6%	1.4	1.9
Suva	5.2	8.4	141.9	31.9	5.0	1.3	1%	2%	1.5	1.6
Sydney	5.8	6.2	61.2	35.9	17.4	3.1	17%	4%	1.7	1.8
Taipei, Taiwan	2.9	7.7	134.9	96.0	24.1	7.9	13%	3%	1.6	1.9
Tangshan, Hebei	3.0	5.5	203.8	151.3	30.7	19.5	10%	9%	1.6	1.6
Tashkent	5.7	5.9	61.2	46.4	7.8	7.3	8%	12%	1.8	1.7
Tebessa	1.4	2.5	249.5	283.2	44.2	57.2	12%	13%	1.7	1.6
Tehran	4.1	4.2	80.5	162.0	27.8	23.5	16%	14%	1.5	2.1
Tel Aviv	4.0	5.7	76.2	64.8	109.8	7.7	21%	10%	1.6	2.1
Thessaloniki	5.1	9.1	159.4	83.9	46.2	9.5	23%	10%	1.7	2.3
Tianjin, Tianjin	3.0	5.7	119.0	99.6	18.3	15.9	12%	14%	1.9	1.9
Tijuana	3.5	3.0	82.7	110.7	17.2	27.9	17%	21%	1.7	1.8
Tokyo	1.6	2.5	169.0	194.1	40.9	47.2	18%	16%	1.5	1.4
Toledo	2.4	6.9	126.3	75.1	25.3	3.3	18%	4%	1.7	1.6
Tyumen	5.2	3.8	109.2	126.4	12.5	18.5	10%	16%	1.8	1.7
Ulaanbaatar	5.6	4.4	84.9	91.4	4.2	9.6	3%	8%	1.8	1.7
Valledupar	1.3	2.2	119.2	182.7	68.4	90.9	38%	33%	1.4	1.7
Victoria	7.5	13.5	68.1	22.2	11.5	3.5	19%	3%	1.8	1.3
Vienna	2.8	4.9	198.2	102.7	40.1	16.5	19%	10%	1.7	2.1
Vijayawada	1.8	6.8	157.7	130.3	34.4	17.2	15%	6%	1.7	1.8
Vinh Long	1.9	14.4	92.4	32.9	23.4	6.3	22%	2%	1.4	1.3
Warsaw	6.0	6.9	29.4	79.2	19.4	17.4	20%	14%	1.6	1.6
Wuhan, Hubei	5.7	5.3	91.9	172.7	8.5	23.6	6%	7%	1.7	1.7
Xingping, Shaanxi	5.5	6.9	63.0	80.3	7.5	15.0	12%	16%	1.5	1.7
Xucheng, Jiangsu	3.7	7.4	52.5	105.5	10.0	12.6	10%	8%	1.4	1.6
Yamaguchi	2.8	2.4	203.8	282.3	30.9	42.0	10%	12%	1.6	1.5
Yanggu, Shandong	3.0	3.8	146.6	177.9	20.9	31.9	10%	17%	1.7	1.5
Yiyang, Hunan	10.4	13.1	40.2	62.8	5.4	5.1	11%	6%	1.7	1.3
Yucheng, Zhejiang	2.7	5.8	187.0	155.6	24.0	18.5	9%	7%	1.6	1.5
Yulin, Guangxi	4.5	5.1	72.8	91.1	9.2	6.3	10%	6%	1.8	1.7
Zhengzhou, Henan	4.1	5.7	141.8	110.6	14.2	16.3	10%	8%	1.9	1.6
Zhuji, Zhejiang	5.3	5.8	144.5	110.3	20.9	17.7	7%	8%	1.5	1.8
Zunyi, Guizhou	7.3	7.2	117.3	67.8	9.0	6.6	5%	5%	2.5	1.9
Zwolle	1.9	4.1	328.9	207.2	42.8	47.0	11%	16%	1.8	1.8

	Share of Residential		Share of Residential		Share of Residential		Average Plot Size in		Average Plot Size in	
	Land Subdivisions		Subdivisions		Areas in Housing Projects		Subdivisions		Formai Lano Subdivisions	
City Name	Lanu Sub	1000	Subuly	1000	Proje	1000	Subuly	1000	Subuly	1000
	Pre-1990	2014	Pre-1990	2014	Pre-1990	2014	Pre-1990	2014	Pre-1990	2014
Saidpur	10%	3%	0%	0%	0%	12%				
Saint Petersburg	19%	34%	43%	25%	26%	11%				736
San Salvador	17%	25%	62%	40%	2%	8%		77	91	157
Sana	17%	36%	49%	8%	3%	0%		221	193	407
Santiago	0%	5%	90%	63%	8%	15%			493	282
Sao Paulo	4%	24%	92%	50%	4%	5%			286	
Seoul	2%	6%	54%	7%	36%	21%			242	
Shanghai, Shanghai	6%	17%	39%	10%	44%	28%			302	
Sheffield	0%	3%	90%	78%	7%	13%			525	144
Shenzhen, Guangdong	0%	4%	51%	40%	40%	17%		158	302	214
Shymkent	23%	62%	46%	21%	12%	3%	1,144	959	729	879
Sialkot	18%	16%	24%	7%	1%	7%			332	234
Singapore	0%	0%	38%	14%	58%	72%				520
Singrauli	0%	33%	22%	4%	77%	30%		236	226	
Sitapur	70%	79%	3%	0%	0%	20%	108	93	149	
Springfield, MA	0%	0%	86%	66%	4%	2%			950	1,508
Suining, Sichuan	0%	14%	98%	30%	0%	30%				
Suva	0%	15%	69%	42%	2%	3%				
Sydney	0%	0%	93%	80%	7%	7%			575	707
Taipei, Taiwan	0%	1%	70%	36%	7%	8%			209	
Tangshan, Hebei	42%	68%	45%	13%	13%	7%		308		374
Tashkent	37%	89%	37%	0%	10%	3%	962	1,104		
Tebessa	45%	52%	33%	2%	15%	26%	251	178	330	240
Tehran	0%	19%	74%	41%	6%	16%			258	
Tel Aviv	1%	17%	73%	59%	12%	7%		554	487	772
Thessaloniki	1%	31%	91%	54%	3%	6%				
Tianjin, Tianjin	9%	25%	16%	19%	71%	51%				
Tijuana	10%	50%	85%	28%	1%	16%	315		259	155
Tokyo	0%	2%	49%	49%	4%	2%	350		200	230
Toledo	0%	0%	89%	59%	9%	8%			625	1,238
Tyumen	38%	86%	20%	11%	27%	3%	471	900	1,104	1,185
Ulaanbaatar	65%	71%	5%	0%	6%	3%	643	629		
Valledupar	23%	56%	76%	1%	0%	39%		90		
Victoria	0%	6%	84%	57%	8%	3%			778	725
Vienna	1%	0%	83%	81%	15%	7%			575	587
Vijayawada	26%	60%	52%	5%	1%	0%	281	195	233	69
Vinh Long	0%	2%	54%	0%	0%	0%	00	4 404	770	754
Warsaw	8%	37%	67%	41%	20%	7%	22	1,401	112	751
Wuhan, Hubei	1%	12%	18%	0%	41%	48%				
Xingping, Snaanxi	8%	76%	84%	2%	1%	16%				
Xucheng, Jiangsu	0%	38%	0%	1%	11%	16%			000	000
	0%	25%	30%	30%	1%	0%	440	474	293	292
Yanggu, Shandong	51%	98%	20%	0%	23%	2%	440	474	331	
Yiyang, Hunan Yushang, Zhaijang	1%	24%	24%	3%	0% 150/	2% ۵0/			400	
Tucheng, ∠nejlang	1.00/	11%	21%	۵% 140/	15%	ð%		107	433	1.1.1
	IZ% ∩0/	11%	51%	11% 00/	250/	0% 240/		10/	305	141
Zhenyzhou, nenan Zhuji Zhejiana	10%	40%	110/	∠ 70 1 20/	00/	24 %		206	275	275
Znuji, Znejiany Zupvi, Guizbou	20/	1∠% 100/	300/	1∠% 110/	3/0	17% 220/		200	215	213
	0%	1∠ ⁻ /0	310/	11%	61%	20%			646	1 210
2110110	0 /0	4 /0	51/0	40 /0	01/0	50 /0			040	1,219

Saidpur - Zwolle

City Name	Share of Residential Areas in Informal Land Subdivisions		Share of Residential Areas in Formal Land Subdivisions		Share of Residential Areas in Housing Proiects		Average Plot Size in Informal Land Subdivisions		Average Plot Size in Formal Land Subdivisions	
	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014	Pre-1990	1990 - 2014
Saidpur	10%	3%	0%	0%	0%	12%				
Saint Petersburg	19%	34%	43%	25%	26%	11%				736
San Salvador	17%	25%	62%	40%	2%	8%		77	91	157
Sana	17%	36%	49%	8%	3%	0%		221	193	407
Santiago	0%	5%	90%	63%	8%	15%			493	282
Sao Paulo	4%	24%	92%	50%	4%	5%			286	
Seoul	2%	6%	54%	7%	36%	21%			242	
Shanghai, Shanghai	6%	17%	39%	10%	44%	28%			302	
Sheffield	0%	3%	90%	78%	7%	13%			525	144
Shenzhen, Guangdong	0%	4%	51%	40%	40%	17%		158	302	214
Shymkent	23%	62%	46%	21%	12%	3%	1,144	959	729	879
Sialkot	18%	16%	24%	7%	1%	7%			332	234
Singapore	0%	0%	38%	14%	58%	72%				520
Singrauli	0%	33%	22%	4%	77%	30%		236	226	
Sitapur	70%	79%	3%	0%	0%	20%	108	93	149	
Springfield, MA	0%	0%	86%	66%	4%	2%			950	1,508
Suining, Sichuan	0%	14%	98%	30%	0%	30%				
Suva	0%	15%	69%	42%	2%	3%				
Sydney	0%	0%	93%	80%	7%	7%			575	707
Taipei, Taiwan	0%	1%	70%	36%	7%	8%			209	
Tangshan, Hebei	42%	68%	45%	13%	13%	7%		308		374
Tashkent	37%	89%	37%	0%	10%	3%	962	1,104		
Tebessa	45%	52%	33%	2%	15%	26%	251	178	330	240
Tehran	0%	19%	74%	41%	6%	16%			258	
Tel Aviv	1%	17%	73%	59%	12%	7%		554	487	772
Thessaloniki	1%	31%	91%	54%	3%	6%				
Tianjin, Tianjin	9%	25%	16%	19%	71%	51%				
Tijuana	10%	50%	85%	28%	1%	16%	315		259	155
Tokyo	0%	2%	49%	49%	4%	2%	350		200	230
Toledo	0%	0%	89%	59%	9%	8%			625	1,238
Tyumen	38%	86%	20%	11%	27%	3%	471	900	1,104	1,185
Ulaanbaatar	65%	71%	5%	0%	6%	3%	643	629		
Valledupar	23%	56%	76%	1%	0%	39%		90		
Victoria	0%	6%	84%	57%	8%	3%			778	725
Vienna	1%	0%	83%	81%	15%	7%			575	587
Vijayawada	26%	60%	52%	5%	1%	0%	281	195	233	69
Vinh Long	0%	2%	54%	0%	0%	0%				
Warsaw	8%	37%	67%	41%	20%	7%	22	1,401	772	751
Wuhan, Hubei	1%	12%	18%	0%	41%	48%				
Xingping, Shaanxi	8%	76%	84%	2%	1%	16%				
Xucheng, Jiangsu	0%	38%	0%	1%	11%	16%				
Yamaguchi	0%	25%	30%	30%	1%	0%			293	292
Yanggu, Shandong	51%	98%	26%	0%	23%	2%	440	474	331	
Yiyang, Hunan	7%	24%	24%	3%	6%	2%				
Yucheng, Zhejiang	1%	11%	27%	8%	15%	8%			433	
Yulin, Guangxi	12%	11%	31%	11%	6%	8%		187	305	141
Zhengzhou, Henan	0%	45%	51%	2%	35%	24%		333		357
Zhuji, Zhejiang	10%	12%	11%	12%	9%	17%		206	275	275
Zunyi, Guizhou	3%	12%	39%	11%	30%	23%				
Zwolle	0%	4%	31%	46%	61%	30%			646	1,219

TABLE 2:

Blocks and Roads metrics for 30 cities for five periods: From the pre-1900 period to the 1990-2014 period

City Name	Country	Pegion	CBD Location			
	Country	подюл	Latitude	Longitude		
Accra	Ghana	Sub-Saharan Africa	5.615	-0.159		
Algiers	Algeria	Western Asia and North Africa	36.732	3.140		
Bangkok	Thailand	Southeast Asia	13.778	100.538		
Beijing, Beijing	China	East Asia and the Pacific	39.920	116.370		
Buenos Aires	Argentina	Latin America and the Caribbean	-34.652	-58.547		
Cairo	Egypt	Western Asia and North Africa	30.034	31.282		
Chicago	United States	Land-Rich Developed Countries	41.860	-87.864		
Guatemala City	Guatemala	Latin America and the Caribbean	14.605	-90.542		
Istanbul	Turkey	Western Asia and North Africa	40.981	29.065		
Jeddah	Saudi Arabia	Western Asia and North Africa	21.543	39.173		
Johannesburg	South Africa	Sub-Saharan Africa	6.842	3.634		
Kolkata	India	South and Central Asia	22.533	88.356		
Kuwait City	Kuwait	Western Asia and North Africa	29.382	47.977		
Lagos	Nigeria	Sub-Saharan Africa	6.210	7.063		
London	United Kingdom	Europe and Japan	51.506	-0.139		
Los Angeles	United States	Land-Rich Developed Countries	33.971	-117.969		
Manila	Philippines	Southeast Asia	14.579	121.028		
Mexico City	Mexico	Latin America and the Caribbean	19.446	-99.123		
Moscow	Russia	Europe and Japan	55.743	37.645		
Mumbai	India	South and Central Asia	19.115	72.913		
Nairobi	Kenya	Sub-Saharan Africa	-1.230	36.738		
Paris	France	Europe and Japan	48.863	2.315		
Santiago	Chile	Latin America and the Caribbean	-33.491	-70.670		
Sao Paulo	Brazil	Latin America and the Caribbean	-23.534	-46.615		
Shanghai, Shanghai	China	East Asia and the Pacific	31.250	121.440		
Sydney	Australia	Land-Rich Developed Countries	-33.854	150.998		
Tehran	Iran	South and Central Asia	35.705	51.384		
Tel Aviv	Israel	Western Asia and North Africa	32.077	34.839		
Tokyo	Japan	Europe and Japan	35.682	139.649		
Warsaw	Poland	Europe and Japan	52.234	21.024		
City Name			Map Periods			
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	Period 1	Period 2	Period 3	Period 4	Period 5	
Accra	Pre-1903	1903-1929	1929-1966	1966-1991	1991-2014	
Algiers	Pre-1903	1903-1929	1929-1972	1972-1987	1987-2014	
Bangkok	Pre-1900	1900-1922	1922-1953	1953-1988	1988-2015	
Beijing, Beijing	Pre-1900	1900-1929	1929-1959	1959-1988	1988-2013	
Buenos Aires	Pre-1887	1887-1918	1918-1964	1964-1989	1989-2014	
Cairo	Pre-1897	1897-1927	1927-1960	1960-1992	1992-2013	
Chicago	Pre-1893	1893-1945	1945-1967	1967-1989	1989-2014	
Guatemala City	Pre-1900	1900-1936	1936-1976	1976-1990	1990-2013	
Istanbul	Pre-1899	1899-1934	1934-1960	1960-1990	1990-2013	
Jeddah	Pre-1900	1900-1925	1925-1964	1964-1990	1990-2013	
Johannesburg	Pre-1900	1900-1938	1938-1957	1957-1990	1990-2013	
Kolkata	Pre-1883	1883-1931	1931-1961	1961-1990	1990-2014	
Kuwait City	Pre-1900	1900-1922	1922-1963	1963-1990	1990-2013	
Lagos	Pre-1900	1900-1920	1920-1962	1962-1984	1984-2013	
London	Pre-1880	1880-1929	1929-1955	1955-1989	1989-2013	
Los Angeles	Pre-1907	1907-1937	1937-1970	1970-1990	1990-2014	
Manila	Pre-1898	1898-1945	1945-1971	1971-1990	1990-2014	
Mexico City	Pre-1886	1886-1929	1929-1970	1970-1990	1990-2014	
Moscow	Pre-1893	1893-1939	1939-1957	1957-1991	1991-2014	
Mumbai	Pre-1909	1909-1931	1931-1968	1968-1991	1991-2014	
Nairobi	Pre-1906	1906-1926	1926-1964	1964-1988	1988-2010	
Paris	Pre-1900	1900-1928	1928-1955	1955-1987	1987-2014	
Santiago	Pre-1900	1900-1930	1930-1970	1970-1990	1990-2014	
Sao Paulo	Pre-1905	1905-1929	1929-1974	1974-1988	1988-2014	
Shanghai, Shanghai	Pre-1902	1902-1944	1944-1973	1973-1991	1991-2015	
Sydney	Pre-1895	1895-1945	1945-1975	1975-1991	1991-2014	
Tehran	Pre-1899	1899-1925	1925-1956	1956-1991	1991-2010	
Tel Aviv	Pre-1917	1917-1929	1929-1956	1956-1987	1987-2014	
Tokyo	Pre-1892	1892-1929	1929-1954	1954-1990	1990-2014	
Warsaw	Pre-1888	1888-1936	1936-1958	1958-1992	1992-2013	

City Name	Dens	ity of All /	Arterial Ro	oads (km/	km²)	Average Beeline Distance to All Arterial Roads (meters)				
	Period 1	Period 2	Period 3	Period 4	Period 5	Period 1	Period 2	Period 3	Period 4	Period 5
Accra		0.8	1.0	0.9	0.6		254	364	471	673
Algiers	1.8	1.6	1.1	1.2	0.9	249	288	278	509	431
Bangkok	2.5	2.2	1.4	0.9	0.5	138	221	240	549	921
Beijing, Beijing	3.7	3.9	3.3	1.3	0.7	103	102	123	791	573
Buenos Aires	3.0	1.3	0.9	0.6	1.2	104	352	468	809	349
Cairo	2.9	4.1	4.2	2.4	1.1	137	100	97	488	584
Chicago	9.9	9.1	4.3	2.8	0.8	49	67	241	410	358
Guatemala City	1.9	3.2	1.5	0.8	0.9	323	181	352	504	390
Istanbul	1.6	1.5	1.3	1.3	1.7	256	309	308	592	263
Jeddah	3.7		3.1	4.4	1.2	70		127	124	505
Johannesburg	3.9	2.9	2.6	2.0	0.5	107	187	166	287	582
Kolkata	2.6	1.1	0.6	0.5	0.6	179	466	1,151	1,595	650
Kuwait City	2.8	2.1	2.8	1.9	2.1	113	101	116	542	248
Lagos	0.5	1.7	0.9	1.0	0.4	476	247	472	1,750	787
London	1.5	1.1	0.9	0.4	1.6	281	366	554	1,477	207
Los Angeles	7.9	5.7	4.0	3.8	1.0	72	122	177	120	461
Manila	1.3	1.9	2.1	0.6	1.1	169	219	186	1,014	372
Mexico City	2.6	4.0	3.4	1.5	0.8	155	97	123	480	418
Moscow	4.3	2.7	2.5	1.2	0.5	87	144	152	760	981
Mumbai	2.6	2.6	2.2	1.5	0.9	153	155	225	398	447
Nairobi	5.3	3.6	1.7	0.8	0.8	65	109	271	646	521
Paris	2.2	1.0	0.6	0.7	1.9	276	618	883	1,476	206
Santiago	3.4	5.7	4.4	2.9	1.0	108	69	86	195	474
Sao Paulo	1.4	1.1	1.0	0.6	0.8	248	310	393	968	539
Shanghai, Shanghai	3.5	2.9	3.3	2.6	0.7	95	142	131	206	1,286
Sydney	2.7	5.5	5.1	3.3	0.9	203	102	110	155	400
Tehran	3.0	2.6	2.2	2.1	1.9	126	125	199	221	255
Tel Aviv	0.7	1.8	1.8	1.9	1.0	389	160	135	381	435
Tokyo	4.3	1.8	1.6	1.1	1.7	91	284	394	543	198
Warsaw	3.5	2.9	1.5	0.9	0.9	89	124	344	1,004	347

City Name	Share o	f Area wit Ai	ihin Walkii rterial Roa	ng Distan Ids	ce of All		Average Block Size (ha)				
	Period 1	Period 2	Period 3	Period 4	Period 5	Period 1	Period 2	Period 3	Period 4	Period 5	
Accra		95%	82%	71%	60%		4.0	5.7	7.0	3.5	
Algiers	94%	87%	93%	76%	75%	1.1	3.1	4.3	6.8	6.7	
Bangkok	99%	94%	95%	69%	49%	4.1	6.4	6.3	9.0	5.8	
Beijing, Beijing	100%	100%	99%	67%	71%	4.7	3.7	8.4	9.4	4.3	
Buenos Aires	100%	82%	73%	52%	82%	1.8	2.8	1.8	3.5	3.5	
Cairo	100%	100%	100%	81%	68%	1.1	1.9	2.6	5.0	4.3	
Chicago	100%	100%	90%	77%	81%	3.2	2.5	8.6	20.8	3.9	
Guatemala City	82%	94%	80%	69%	78%	1.6	1.9	1.5	2.9	2.3	
Istanbul	93%	88%	88%	80%	90%	1.2	2.5	2.6	2.1	4.8	
Jeddah	100%		100%	98%	77%	3.2		2.6	3.9	4.0	
Johannesburg	100%	95%	98%	89%	64%	4.9	7.4	9.0	10.3	4.9	
Kolkata	96%	73%	49%	36%	62%	2.8	3.9	5.0	9.8	4.8	
Kuwait City	100%	100%	100%	83%	91%	8.0	9.8	6.3	9.1	3.6	
Lagos	68%	93%	72%	59%	52%	1.9	6.5	7.0	5.6	4.7	
London	90%	83%	71%	40%	95%	3.3	5.6	8.6	17.2	8.2	
Los Angeles	99%	97%	94%	100%	78%	4.4	3.8	9.2	10.6	6.5	
Manila	100%	96%	98%	52%	81%	2.0	2.3	4.5	3.5	2.8	
Mexico City	99%	100%	99%	77%	77%	1.9	2.6	2.2	4.8	3.1	
Moscow	100%	98%	99%	68%	48%	5.0	9.4	6.2	4.5	4.8	
Mumbai	99%	99%	92%	83%	75%	3.0	6.0	7.9	7.2	4.4	
Nairobi	100%	100%	90%	63%	72%	5.0	7.3	17.4	16.8	9.5	
Paris	87%	68%	55%	44%	93%	2.7	3.8	4.7	7.9	6.7	
Santiago	100%	100%	100%	95%	79%	2.4	3.2	3.2	5.7	6.5	
Sao Paulo	95%	88%	80%	54%	68%	2.7	3.0	2.7	4.3	6.2	
Shanghai, Shanghai	100%	98%	98%	93%	63%	3.1	6.5	5.7	7.5	6.4	
Sydney	92%	98%	98%	98%	79%	2.2	4.4	6.4	9.6	6.2	
Tehran	100%	100%	96%	94%	91%	3.2	2.2	2.6	7.0	4.6	
Tel Aviv	72%	99%	100%	82%	76%	2.6	0.9	3.6	4.0	6.1	
Tokyo	100%	91%	80%	70%	93%	1.8	1.5	3.0	2.7	2.5	
Warsaw	100%	99%	86%	57%	83%	5.7	5.6	6.9	7.1	6.4	

City Name	3-Way Ir	ntersection	n Density	(number p	ber km2)	4-Way Intersection Density (number per km2)					
	Period 1	Period 2	Period 3	Period 4	Period 5	Period 1	Period 2	Period 3	Period 4	Period 5	
Accra		40	39	63	142		29	15	9	13	
Algiers	203	139	74	84	146	49	32	14	13	16	
Bangkok	69	59	42	58	70	13	4	5	5	7	
Beijing, Beijing	79	110	81	117	148	10	14	6	12	36	
Buenos Aires	11	45	51	55	68	58	46	54	37	42	
Cairo	248	129	139	96	131	44	46	49	20	36	
Chicago	85	68	50	40	74	64	51	15	7	12	
Guatemala City	63	73	55	79	90	62	70	48	22	14	
Istanbul	199	123	132	170	163	57	26	24	36	15	
Jeddah	51		186	104		3		51	21	22	
Johannesburg	52	45	40	64	118	42	18	9	6	16	
Kolkata	104	80	102	93	108	24	8	8	4	6	
Kuwait City	38	8	72	54	151	8	5	6	2	13	
Lagos	118	35	62	54	102	49	10	7	5	2	
London	86	51	32	62	61	15	10	6	2	10	
Los Angeles	37	34	45	25	74	23	29	16	5	8	
Manila	124	70	60	98	204	51	34	19	11	29	
Mexico City	57	53	59	77	169	45	50	52	29	26	
Moscow	41	34	44	69	102	10	6	13	7	22	
Mumbai	74	35	45	38	88	17	9	4	4	12	
Nairobi	58	46	37	74	118	23	6	3	3	10	
Paris	68	53	60	70	78	24	22	14	7	10	
Santiago	39	59	54	83	117	39	26	29	25	20	
Sao Paulo	49	48	74	72		25	27	20	18	6	
Shanghai, Shanghai	71	59	108	83		24	22	22	15	8	
Sydney	74	57	29	44	36	34	12	6	3	3	
Tehran	76	105	105	90	124	8	24	32	23	16	
Tel Aviv	129	104	86	43	62	63	87	22	16	8	
Tokyo	156	209	147	152	194	71	70	56	41	47	
Warsaw	43	44	47	45	85	13	10	10	10	8	

City Name	Sha	re of Inter	sections t	hat are 4-	Way		Walkability Ratio				
	Period 1	Period 2	Period 3	Period 4	Period 5	Period 1	Period 2	Period 3	Period 4	Period 5	
Accra		40%	25%	10%	8%		1.6	1.8	1.5	1.7	
Algiers	18%	12%	10%	10%	7%	1.4	1.6	1.9	1.7	1.7	
Bangkok	14%	7%	10%	9%	5%	1.5	1.6	1.7	1.5	2.0	
Beijing, Beijing	13%	15%	9%	7%	12%	1.5	1.4	1.6	1.7	1.8	
Buenos Aires	86%	50%	54%	41%	38%	1.3	1.4	1.4	1.5	1.6	
Cairo	14%	25%	26%	14%	13%	1.5	1.6	1.6	1.6	1.7	
Chicago	45%	43%	18%	15%	9%	1.5	1.5	1.6	1.4	1.7	
Guatemala City	49%	46%	31%	16%	8%	1.5	1.4	1.6	1.7	1.9	
Istanbul	21%	17%	16%	17%	6%	1.6	1.8	1.8	1.7	2.0	
Jeddah	6%	,	24%	13%	12%	1.9		1.5	1.6	1.7	
Johannesburg	38%	30%	20%	6%	10%	1.5	1.7	1.6	1.7	2.3	
Kolkata	19%	8%	. 7%	4%	4%	1.4	1.7	1.8	1.6	1.6	
Kuwait City	26%	38%	14%	5%	7%	1.6	2.1	1.8	2.0	2.1	
Lagos	28%	32%	9%	7%	2%	1.4	1.6	1.6	1.8	1.8	
London	15%	17%	16%	2%	4%	1.6	1.9	1.6	1.7	1.7	
Los Angeles	33%	45%	19%	10%	6%	1.7	1.4	1.7	1.8	2.0	
Manila	25%	31%	20%	10%	10%	1.4	1.5	1.7	1.6	1.7	
Mexico City	45%	53%	43%	27%	13%	1.4	1.4	1.5	1.7	1.7	
Moscow	21%	18%	16%	8%	11%	1.7	1.6	1.6	1.6	2.1	
Mumbai	15%	20%	6%	11%	8%	1.5	1.6	1.5	1.5	1.8	
Nairobi	28%	10%	6%	4%	6%	2.0	1.6	1.5	1.5	1.6	
Paris	27%	32%	17%	7%	10%	1.5	1.6	1.6	1.8	1.6	
Santiago	54%	32%	35%	21%	14%	1.4	1.5	1.5	1.7	2.0	
Sao Paulo	37%	40%	22%	18%	7%	1.5	1.6	1.7	1.7	1.7	
Shanghai, Shanghai	32%	27%	17%	15%	15%	1.4	1.5	1.4	1.8	1.7	
Sydney	30%	19%	17%	8%	4%	1.5	1.7	1.8	1.7	1.8	
Tehran	8%	18%	25%	22%	11%	1.5	1.4	1.5	1.5	1.9	
Tel Aviv	34%	46%	18%	25%	10%	1.4	1.4	1.5	1.6	2.0	
Tokyo	27%	25%	25%	20%	16%	1.4	1.4	1.5	1.6	1.4	
Warsaw	25%	21%	17%	18%	13%	1.6	1.6	1.6	1.5	1.6	

City Name	Share	of Built-u	p Area Th	at Is Resid	lential	Share of Residential Areas Not Laid Out Before Development				
	Period 1	Period 2	Period 3	Period 4	Period 5	Period 1	Period 2	Period 3	Period 4	Period 5
Accra		43%	59%	71%	80%		42%	40%	65%	45%
Algiers	68%	40%	51%	52%	49%	41%	40%	88%	64%	31%
Bangkok	49%	55%	55%	58%	42%	87%	94%	93%	61%	35%
Beijing, Beijing	55%	35%	39%	37%	27%	35%	26%	5%	20%	11%
Buenos Aires	58%	68%	83%	67%	78%	0%	4%	2%	0%	3%
Cairo	75%	59%	64%	50%	58%	58%	7%	4%	35%	41%
Chicago	57%	66%	57%	70%	78%	0%	0%	7%	2%	19%
Guatemala City	50%	36%	57%	71%	68%	11%	24%	46%	28%	16%
Istanbul	62%	62%	61%	64%	47%	59%	42%	28%	39%	25%
Jeddah	35%		53%	50%	27%	67%		44%	8%	11%
Johannesburg	40%	66%	63%	72%	68%	2%	0%	0%	1%	18%
Kolkata	72%	70%	68%	81%	74%	91%	91%	90%	96%	73%
Kuwait City	12%	18%	45%	43%	36%	0%	0%	0%	0%	4%
Lagos	57%	29%	50%	71%	71%	84%	20%	58%	58%	52%
London	72%	79%	73%	64%	49%	0%	. 0%	0%	9%	13%
Los Angeles	51%	77%	71%	76%	72%	7%	0%	0%	2%	20%
Manila	53%	57%	60%	75%	73%	39%	46%	40%	58%	36%
Mexico City	44%	66%	66%	67%	59%	2%	3%	2%	9%	27%
Moscow	38%	52%	42%	51%	83%	0%	0%	0%	15%	0%
Mumbai	54%	56%	45%	70%	51%	69%	65%	68%	66%	61%
Nairobi	34%	45%	69%	55%	70%	0%	, 7%	5%	32%	19%
Paris	74%	74%	75%	58%	58%	12%	37%	10%	32%	29%
Santiago	45%	60%	62%	59%	57%	1%	0%	0%	8%	16%
Sao Paulo	51%	66%	69%	60%	53%	0%	0%	1%	3%	21%
Shanghai, Shanghai	58%	65%	54%	40%	28%	0%	4%	8%	25%	34%
Sydney	55%	71%	79%	79%	74%	0%	0%	0%	0%	13%
Tehran	79%	74%	74%	54%	42%	92%	12%	7%	10%	11%
Tel Aviv	70%	85%	80%	59%	50%	60%	14%	7%	24%	15%
Токуо	47%	67%	60%	64%	49%	24%	63%	56%	52%	47%
Warsaw	42%	54%	56%	62%	72%	5%	2%	0%	14%	18%

City Name	Sha	re of Built	-up Area T	That Is Grie	dded	Share of Residential Area in Informal Land Subdivisions				
	Period 1	Period 2	Period 3	Period 4	Period 5	Period 1	Period 2	Period 3	Period 4	Period 5
Accra		41%	23%	15%	20%		24%	27%	31%	48%
Algiers	6%	0%	0%	3%	15%	0%	0%	0%	1%	15%
Bangkok	8%	, 0%	3%	, 8%	5%	. 0%	0%	0%	0%	13%
Beijing, Beijing	3%	4%	. 3%	, 3%	0%	. 0%	0%	0%	33%	37%
Buenos Aires	100%	90%	90%	70%	80%	0%	6%	45%	65%	87%
Cairo	15%	13%	17%	5%	10%	5%	14%	22%	35%	24%
Chicago	83%	80%	30%	8%	0%	. 0%	0%	3%	8%	0%
Guatemala City	84%	78%	58%	14%	5%	. 1%	29%	3%	14%	46%
Istanbul	13%	15%	3%	, 10%	10%	0%	0%	0%	0%	16%
Jeddah	0%	,	16%	5%	3%	. 0%		0%	4%	18%
Johannesburg	52%	30%	10%	3%	5%	. 0%	6%	0%	11%	41%
Kolkata	0%	. 3%	0%	, 3%	5%	. 0%	0%	0%	0%	16%
Kuwait City	0%	0%	5%	0%	0%	25%	0%	0%	4%	19%
Lagos	0%	43%	20%	5%	0%	. 3%	16%	9%	23%	41%
London	0%	. 0%	. 0%	, 0%	0%	. 0%	0%	0%	0%	0%
Los Angeles	33%	53%	28%	0%	0%	0%	0%	0%	1%	3%
Manila	35%	20%	8%	. 0%	0%	2%	0%	0%	0%	33%
Mexico City	63%	75%	50%	28%	15%	0%	0%	0%	8%	34%
Moscow	0%	5%	0%	8%	0%	0%	6%	0%	21%	75%
Mumbai	0%	. 0%	. 0%	, 3%	5%	. 0%	0%	0%	0%	0%
Nairobi	0%	3%	. 3%	, 0%	0%	15%	16%	25%	57%	68%
Paris	5%	10%	8%	3%	0%	. 0%	0%	0%	0%	2%
Santiago	60%	35%	25%	30%	5%	0%	0%	0%	0%	5%
Sao Paulo	33%	25%	23%	8%	3%	. 0%	0%	0%	7%	24%
Shanghai, Shanghai	5%	0%	8%	0%	8%	0%	0%	0%	0%	25%
Sydney	20%	10%	3%	3%	0%	0%	0%	0%	0%	0%
Tehran	0%	5%	20%	18%	0%	0%	0%	0%	0%	16%
Tel Aviv	0%	0%	0%	3%	0%	. 0%	0%	0%	0%	20%
Токуо	26%	6%	14%	10%	5%	0%	0%	0%	0%	2%
Warsaw	3%	3%	0%	, 13%	10%	0%	0%	11%	25%	39%

City Name	Share	of Reside S	ntial Area ubdivisior	in Forma ns	Land	Share of	Share of Residential Area in Housing Projects					
	Period 1	Period 2	Period 3	Period 4	Period 5	Period 1	Period 2	Period 3	Period 4	Period 5		
Accra		18%	16%	4%	7%	,	16%	17%	0%	0%		
Algiers	58%	53%	6%	14%	28%	2%	7%	6%	20%	25%		
Bangkok	13%	6%	5%	27%	9%	, 0%	1%	2%	11%	43%		
Beijing, Beijing	21%	6%	23%	4%	18%	44%	68%	72%	43%	34%		
Buenos Aires	100%	89%	51%	34%	4%	. 0%	1%	2%	1%	5%		
Cairo	36%	78%	70%	25%	9%	2%	1%	4%	6%	26%		
Chicago	94%	98%	78%	72%	64%	6%	2%	11%	18%	17%		
Guatemala City	86%	48%	52%	53%	30%	1%	0%	0%	6%	9%		
Istanbul	40%	55%	59%	50%	31%	2%	3%	13%	10%	29%		
Jeddah	33%		53%	72%	67%	0%		3%	16%	4%		
Johannesburg	98%	88%	89%	74%	38%	0%	6%	11%	14%	3%		
Kolkata	9%	4%	5%	3%	3%	, 1%	5%	5%	1%	8%		
Kuwait City	51%	100%	97%	94%	73%	24%	0%	3%	2%	4%		
Lagos	13%	43%	29%	13%	0%	. 0%	21%	4%	6%	6%		
London	24%	46%	67%	42%	87%	76%	54%	33%	49%	0%		
Los Angeles	89%	95%	92%	88%	62%	4%	5%	8%	9%	15%		
Manila	59%	54%	57%	42%	25%	0%	0%	3%	0%	6%		
Mexico City	98%	97%	97%	78%	34%	0%	1%	1%	5%	4%		
Moscow	89%	56%	48%	28%	11%	11%	38%	52%	36%	14%		
Mumbai	29%	18%	16%	17%	14%	2%	17%	16%	17%	25%		
Nairobi	70%	57%	52%	8%	10%	14%	19%	18%	3%	3%		
Paris	76%	43%	79%	53%	67%	12%	21%	11%	15%	1%		
Santiago	93%	92%	96%	74%	63%	6%	8%	4%	18%	15%		
Sao Paulo	97%	96%	96%	88%	49%	3%	4%	3%	2%	6%		
Shanghai, Shanghai	71%	51%	36%	18%	9%	, 29%	44%	56%	57%	31%		
Sydney	81%	96%	98%	95%	80%	19%	4%	2%	5%	7%		
Tehran	8%	88%	90%	75%	46%	0%	0%	3%	15%	26%		
Tel Aviv	37%	86%	87%	55%	57%	3%	0%	6%	21%	7%		
Токуо	75%	34%	39%	40%	49%	1%	3%	5%	9%	2%		
Warsaw	63%	79%	67%	51%	35%	31%	19%	22%	10%	7%		

City Name	Av	erage Plo S	t Size in Ir Subdivisior	nformal La ns	and	Average	Average Plot Size in Formal Land Subdivisions					
	Period 1	Period 2	Period 3	Period 4	Period 5	Period 1	Period 2	Period 3	Period 4	Period 5		
Accra		417	688	757	949		583	528		905		
Algiers						469		353	267	225		
Bangkok								295	216			
Beijing, Beijing				377					421			
Buenos Aires		332	277		372	168	197	311	324	484		
Cairo	128	148	87	77	595	332	665	618	486	418		
Chicago						374	463	812	1,348	1,795		
Guatemala City									748	143		
Istanbul							472	446	235	318		
Jeddah								496	583			
Johannesburg				230	205	560	1,034	1,136	960	493		
Kolkata					217	142	263	318	351			
Kuwait City								615	639	442		
Lagos				648				399	610			
London						404	491	528	698	612		
Los Angeles						665	689	780	921	789		
Manila					94	308	259	471	247	97		
Mexico City					132	109	199	172	247	196		
Moscow					1,099					962		
Mumbai						716	534	496	779			
Nairobi				2,053		357	402	2,600	1,005			
Paris						333	469	450	565	545		
Santiago							273	385	713	282		
Sao Paulo						223	213	399	279			
Shanghai, Shanghai								379	319			
Sydney						331	479	688	694	707		
Tehran								306	222	270		
Tel Aviv					554	438	413	482	460	844		
Токуо						289	166	150	224	230		
Warsaw				798	1,401			764	774	751		

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This earlier study of the sample of 120 cities continued with a second set of studies in 2009–2012 involving the creation of a set of metrics for measuring urban spatial structure and a python script for calculating these metrics with ArcGIS software. These studies included the collection, geo-referencing, and digitizing of maps at 20–25 year intervals for the 1800–2000 period for a representative sample of 30 cities; the statistical modeling of the results of all the phases; the preparation of several working papers as well as papers in peer-reviewed journals; the drafting of the Lincoln Institute's Policy Focus Report titled *Making Room for a Planet of Cities* (Angel, S. et al., 2011); and the preparation and publication of two companion volumes: the *Atlas of Urban Expansion* (Angel, S. et al., 2012) and *Planet of Cities* (Angel, S. 2012). Work on these studies was undertaken by Shlomo Angel, Jason Parent, Daniel Civco, and Alejandro Blei. All work on these studies benefited from the generous support of the Lincoln Institute of Land Policy and the direct assistance of Gregory K. Ingram, its president, and Ann LeRoyer, its director of publications at the time.

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IMAGE CREDITS

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The NYU Urban Expansion Program is a research and action program based at the Marron Institute of Urban Management and the Stern School of Business at New York University. The program was initiated in 2012 with the primary mission of lending direct assistance to municipalities of rapidly growing cities so that they can make room, using four practical steps, for their expansion. Direct assistance is provided in partnership with municipalities, focused on capacity building, empowerment, training, and regular review, rather than on providing consultancy services. The program has active urban expansion initiatives in Ethiopia and Colombia, begun as pilot projects, and now extends to a national scale. The secondary mission of the program is to monitor the quantity and quality of global urban expansion on a regular basis, focused on a stratified global sample of 200 cities. A primer describing it may be found at http://urbanizationproject.org/uploads/blog/UEPrimer2014.pdf.

UN-Habitat, the United Nations Human Settlements Programme, is working toward a better urban future. Its mission is to promote socially and environmentally sustainable human settlements development and achievement of adequate shelter for all. Mandated by the UN General Assembly in 1978 to address the issues of urban growth, it is a knowledgeable institution on urban development processes and understands the aspirations of cities and their residents. For close to forty years, UN Habitat has been working in human settlements throughout the world, focusing on building a brighter future for villages, towns, and cities of all sizes. Because of these four decades of extensive experience, from the highest levels of policy to a range of specific technical issues, UN-Habitat has gained a unique and a universally acknowledged expertise in all things urban. This has placed UN-Habitat in the best position to provide answers and achievable solutions to the current challenges faced by our cities. UN-Habitat is capitalizing on its experience and position to work with partners in order to formulate the urban vision of tomorrow. It works to ensure that cities become inclusive and affordable drivers of economic growth and social development. UN-Habitat and its projects and programs is described in detail at www.unhabitat.org.

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