RESILIENT CITIES:
AN ANALYSIS OF URBAN FORM

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ACKNOWLEDGMENT OF BIAS

This thesis acknowledges that the author has come to this project with a number of biases, and readers and academics should consider these biases while reading and analyzing the results of this thesis:

1. The author does not think that gradual urban transitions, from complex urban cores to natural areas, are absolutely necessary to have resilient urban form. While these transitions may be aesthetically pleasing or traditional and while they may be present in current U.S. urban form, the author has seen no evidence proving that such transitions are absolutely required in order for resilient urban form to exist. While these transitions might have aesthetic value, these transitions do not exist in large portions of the historical or anthropological record. In much of the record, there are stark differences between the city and the "not-city." As a result, this thesis does not try to research these transitions and only concentrates on the urban form within cities.
2. This thesis does not take the position that cities must look aesthetically pleasing. In fact, aesthetics are cultural constructs and historical relics. What one finds beautiful in one context or time period, another person will find ugly within another context or time period. Thus, this thesis analysis structure and function rather than aesthetic. Aesthetics do come into urban form as a District quality in their clumping and densities. In that are, this thesis will discuss the District quality aspects later.
3. This thesis focuses mainly on urban form influences from European sources. While this position is inherently biased, it does reflect the historical reality of United States and New World urban form. Europeans heavily influenced urban

form in the New World, and as a result, cities today have more linkage to Europe than historical pre-Columbian America, Asia and African influences.

4. This thesis is not meant to be the solution for environmental, socio-economic or political problems relating to or affecting urban form. Thus, policies and tactics affecting these highly important matters warrant a separate discussion and scientific analysis in how they can further or support good urban form or urban living.

5. This thesis is not meant to weigh one urban form philosophical intent against another; however, there are some trends in urban form which recognize the negligence of prior types of urban form.

6. The inherent bias in this thesis is that urban form is more complex than simple and more structural than simply aesthetic. Rather, urban form has evolutionary and instinctual impacts that affect how humans move through space. Those cities that have good urban form and those cities that have non-resilient urban form have the same urban elements. However, those cities that have good urban form organize those elements “better.” Those resilient cities built their form more in line with how humans perceive space rather than how policies and regulations negotiate space. Urban form is how we as humans move through space that is touched and changed by its constant interaction with humans.

CHAPTER 1.

THE INTRODUCTION AND THE RESILIENT CITY

> "[The City is] … a social work of art. -- Claude Lévi-Strauss."[1]

> "The aim of urbanism is comprehensibility and clarity of organization."[2]

> 'In order to facilitate the widespread adoption of sustainable urbanism, benchmarks for design and development are essential."[3]

All cities have some type of urban form, and that urban form has always had some type of order--whether that order be chaotic or planned, weak or strong, bourgeois or plebian, unworkable or workable, sustainable or non-sustainable, or resilient or non-resilient. Further, there has been an intermingled relationship between urban form and the people existing within the urban form--the public realm or the streets. It is the relationship between the public realm and the city that has defined how cities look and also how they function.[4] When this dialectic breaks down and fails to function, cities die or whither. When this dialectic works, the cities become resilient. As a result, the study of urban form ultimately becomes a study of urban resiliency--the Resilient City.

This thesis posits the idea that the urban city is a complex system of interactive functional space--almost cellular in nature, multi-functional, dynamic and intrinsically connected to the human form. This functional space exists in section, in plan, in layered axonometric and in volume as a dimensional network of distinct functions that interact to

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[1] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p 36.

[2] Watson, Donald. *Time-Saver Standards for Urban Design*. New York: McGraw-Hill, 2003, 3.4-1.

[3] Lewin, Susan Spencer. "Urban Sustainability and Urban Form Metrics," Journal of Green Building. 7 2 (2012): 20, 44-63. http://www.journalofgreenbuilding.com/doi/pdf/10.3992/jgb.7.2.44 (last visited July 7, 2014), p 46; Breheny, M. J, (Ed.), *Sustainable Development and Urban Form*. London: Pion, 1992, p. 19; Farr, Douglas. *Sustainable Urbanism: Urban Design with Nature*. New Jersey: John Wiley and Sons, Inc, 2008, p. 9.

[4] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 166.

form the urban city and to affect the state of public space. A view from any particular angle in isolation will prejudice each function and the whole system for it is multi-dimensional in nature and layered. These interactive functions require a certain and particular type of modulating volume in space to exist, and yet sometimes these volumes merge within a conjoined non-competing functional space. For the City to function, these spaces whether merged or conjoined for each particular function must exist, and their absence creates strain on the entire system. When all necessary functional spaces are present, their presence and interaction produce a type of order which could be called Jane Jacob's "accident and chaos," which is ironic because they are neither accident nor are they chaos. When all of these functions and their interactions exist in equilibrium, we have resilient systems and resilient cities.

What has occurred in the planning of urban forms is the preference of one function, mainly transportation design, against all others. Yet, doing so has created cities which are neither resilient nor livable nor efficient for transportation. The city was never a machine where city functions could be removed and replaced with more efficient gears--those cities died or became too expensive to maintain. What has also occurred in urban form is rigid adherence to a particular size or form in plan or section, and as a result our cities have become incapable of addressing future needs. This occurs even when those forms or benchmarks do not exist in the real world. Yet, even with these extremes, the urban city can be resuscitated.

In order to replicate these a resilient city as a system, urbanists must look at the city as a complex system. Urbanists must realize that singular objects provide not only an aesthetic quality but a structural quality intrinsic to urban form. Yet, those qualities are separate and distinct, but merged within the same object. Urbanists must determine the benchmarks for these elements and for their functions within resilient cities and determine why those functions work and evolutionarily why they are important. Most importantly, a dynamic systems approach requires that urbanists realize that one function's importance does not diminish the importance of the other types of functions within the public realm--each are independently important. There must be an understanding that even biological forms have organelles of different sizes, and yet the cutting off one will destroy the entire system.

CHAPTER 2.

THE PROBLEM

Urban design is a normative discipline focused on defining and designing future spaces and places. Yet, the present art has not created standard models or measures of performance that indicate whether a project proposal will be effective, and to what extent. While designers and planners measure carbon footprints, energy consumption, ecological impacts, etc. with sophistication, we often neglect to measure urban quality and the interaction between various types of urban form. This thesis project seeks to develop urban quality performance measures by examining existing cities sections on a large scale and by demonstrating that these measures are useful in critique and the re-designing city sections and individual developments.

This thesis looks for those averages within resilient cities, but it also does more. It looks for the standard deviations within those cities, and comes to the conclusion that, while the medians of specific sizes are important, it is the standard deviations that make a city become resilient. Like with most systems, modulation and moderation of the standard deviation is the key toward resiliency. Yet, there must be some big things and some small things, else the system will vanquish itself. This thesis is not an argument against the introduction of public policy and the imposition of standardizations. Rather, this thesis advocates for a more dynamic and powerful view of the city that allows for flexibility, the balance between planning and design, and the building of cities that become older than remembrance and yet eternally youthful--the Resilient City.

Currently, LEED for Neighborhood Development represents the most current set of urban performance measures, and the Old Fourth Ward in Atlanta has a fairly high walkability scale. Yet, while acknowledging these two measures tells us nothing the actual urban form. Both LEED and Walkability contain variable measures that allow any system to have extremely low and extremely high measures while obtaining the same score. As a result, comparing other cities to these measures becomes particularly meaningless. Benchmarks and the comparison of benchmarks on large scale does give us an idea of the city and why some cities are different than others. The results are fascinating because long held beliefs fall in the face of fact. In short, what you think is present in cities is actually not present in real cities--at least the resilient ones.

CHAPTER 3.

THE ANALYSIS AND METHODOLOGY

3.1 Morphological Study of Urban Elements and Interaction

> "If we look closely at research in urban morphology, it is apparent that, for most researchers, 'urban form' signifies the form of the urban fabric. Paradoxically, however, the concept 'urban form' has never been clearly defined."[5]

The problem with urban form analysis is that it moves, changes and manipulates constantly.[6] In short, almost every form within this study functions singularly as an edge, pathway, node or landmark while also functioning as a district quality. This does include the multiple layers of political, environmental, structurally supportive, amenity, and other layers that each of these elements have and how those layers affect urban form. These aspects both represent the unique aspect of urban form that cannot be reduced to simply independent parts, for each part while separate has a unique relationship with each other part in the whole.[7]

There are generally three types or morphological analysis--volumetric, subdivision and linkage, and the built landscape. This study will generally focus on those three.

> "Each studies the volumetric characteristics of built structures with their related open spaces to define a built landscape type. Each

[5] Levy, Albert. "Urban Morphology and the Problem of the Modern Urban Fabric: Some Questions for Research." Urban Morphology 3(2) (1999): 79. http://faculty.mu.edu.sa/public/uploads/1346018433.9078um199902_79-85.pdf (accessed July 10, 2014); Lavedan, P. *Historie de l'urbanisme*. vols 1-3. Paris: Henri Laurens, 1926, 1941, 1952; Lavedan, P. *Géographie des villes*. Paris: Gallimard, 1936; Unwin, R. *Town Planning in Practice: An Introduction to the Art of Designing Cities and Suburbs (2nd edn)*. London: Fisher Unwin, 1909 [1920]; Danger, R. *Cours d'urbanisme* Paris: Eyrolles, 1933.

[6] Levy, Albert. "Urban Morphology and the Problem of the Modern Urban Fabric: Some Questions for Research." Urban Morphology 3(2) (1999): 79. http://faculty.mu.edu.sa/public/uploads/1346018433.9078um199902_79-85.pdf (accessed July 10, 2014).

[7] Levy, Albert. "Urban Morphology and the Problem of the Modern Urban Fabric: Some Questions for Research." Urban Morphology 3(2) (1999): 79. http://faculty.mu.edu.sa/public/uploads/1346018433.9078um199902_79-85.pdf (accessed July 10, 2014).

> includes land and its sub-divisions as a constituent element of type, making land the link between building scale and city scale. Each considers the built landscape type as a morphogenic unit because it is defined by time—the time of its production, use and mutation.”[8]

> “Some focus on the typologies of neighbourhoods or identification of ‘urban structural units’. Others focus on the overall form of settlements. [And others…] concentrate on studies that address the components of these larger scale entities, namely the urban block and the street.”[9]

Morphology studies also include “street and block patterns, plot patterns, the arrangement of buildings within plots and the shapes of buildings,” and aspects of each which create different urban tissue.[10] Like many previous studies, this thesis will measure various these types of urban elements, classifications, inventories, open spaces and constructed spaces; however, this thesis will also look at the dynamic of layerings of function and spaces of volume to see if any changes of effect occur--measuring those effects.[11] Further, this study will look at the means and standard

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[8] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 77; Moudon, A. V. “Getting to know the built environment: Typomorphology” in France, in Franck, K. and Scneekloth, L. eds. *Ordering Space: Types in Architecture and Design*, New York: Van Nostrand Reinhold, 1994, 289-311.

[9] Gil, Jorge, José Nuno Beirão, Nuno Montenegro and José Pinto Duarte. “On the discovery of urban typologies: data mining the many dimensions of urban form.” Urban Morphology, 16(1) (2012): 27-40. http://www.urbanform.org/online/pdf2012/201216_27.pdf (accessed July 7, 2014), p. 28-29; Peponis, J, Allen, D, Haynie, D, Scoppa, M. and Zhang, Z. ‘Measuring the configuration of street networks’, in Proceedings of the 6th International Space Syntax Symposium (Istanbul Technical University, Turkey) (2007): 002:1-002:16; Marshall, S. and Gong, Y. “Solutions: Urban Pattern Specification.” WP4 Deliverable Report. London: Bartlett School of Planning, University College, 2009; Wineman, J. D, Marans, R. W, Schulz, A. J, van der Westhuizen, D. L, Grant-Pierson, S. and Max, P. “Contributions of Accessibility and Visibility Characteristics to Neighborhood Typologies and their Predictions of Physical Activity and Health,” in Proceedings of the 7th International Space Syntax Symposium. Stockholm, Sweden (2009): 131:1-131:10.

[10] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 77; Caniggia G. and Maffel, G. L. *Composizione Architectonica e Tipologia*. Eds. 1 and 2. Lettura dell’Edilizia di Base and Il Oprogettonell/Edilizia di Basi. Venice: Marisilio, 1979.

11 Levy, Albert. “Urban Morphology and the Problem of the Modern Urban Fabric: Some Questions for Research.” Urban Morphology 3(2) (1999): 80. http://faculty.mu.edu.sa/public/uploads/1346018433.9078um199902_79-85.pdf (accessed July 10, 2014); Conzen, M.R.G. *Alnwick, Northumberland: A study in Town-Plan Analysis*. Institute of George Philip: London, British Geographers Publication, 1960, p. 27; Rouleau, B. *Villages et faubourgs de l’ancien Paris. Historie d’un espac urbain*. Paris: Seuil, 1985; Boudon, F. Chastel, A. Couzy, A.

deviations of those numbers to determine variances in numbers also give insight as to how these factors work in the urban environment.

Some studies take a secondary approach and measure urban form changes over time. "The aim is to explain the mechanisms of evolution or creation and transformation of urban form. This approach, closely allied to the history of urban form and sometimes referred to as morphogenic, allows understanding of the passage from one stage to another in the development of fabric and the process by which it occurs."[12] Some elements are more stable than others and other morphological elements change quickly in the built environment--buildings change quickly whereas streets and cadastral elements change slowly.[13] Change does occur to all forms of urban form through comprehensive development, war or natural disaster.[14]

These studies are valuable by their very nature if not to determine how one type of urban form changes into another; however, this study is not about how elements change over time but what elements remain over time and into the present--resiliency. This thesis makes a grand logical assumption. As elements change throughout time, those resilient elements in the most resilient cities and productive cities are the urban elements which worked the best in their given location. Thus, these elements are meeting functions and needs the best in a more refined way. This does not mean that they will not become more refined, but that they are most refined in the present than in the past.

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and Hamon F. *Systèm de l'architecture urbaine: le quartier des Halles à Paris*. Paris: Centre National de Recherche Scientific, 1977; Rouleau, B. *Villages et faubourgs de l'ancien Paris. Historie d'un espac urbain*. Paris: Seuil, 1985.

12 Levy, Albert. "Urban Morphology and the Problem of the Modern Urban Fabric: Some Questions for Research." Urban Morphology 3(2) (1999): 81. http://faculty.mu.edu.sa/public/uploads/1346018433.9078um199902_79-85.pdf (accessed July 10, 2014).

13 Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 77.

14 Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 77.

> "Although these two analytical methods take into account the layering of fabrics, or 'urban sedimentation,' other models of growth and development describe change in terms of the superimposition of a major fabric over an existing one (for example, the Haussmann fabric superimposed on the medieval Parisian fabric) or by the juxtaposition of different fabrics over time, reflecting successive rings of urban growth."[15]

What is also important to understand about urban form is that there is no 'magic number.' There is no single ratio that explains it all. What one finds is that there are innumerable ratios, and how one perceives the 'goodness' or 'badness' of those ratios is a political, cultural and individual design decision or public policy decision. This thesis does take the position that ratios that are more similar in resilient cities become more important for resiliency in general, whereas those numbers that are inconsistent in resilient cities seem to indicate that they are not as important for cities in general.

3.2 Geographic Information System and Internet Data

This thesis will involve analyzing specific elements of urban form in one kilometer sections of San Francisco, New York City, Portland, Amsterdam, Barcelona and Paris. This analysis will include geographic spatial data provided by the planning authorities of each city and external sources, and this study will analyze patterns, quantifiable numbers, medians and standard deviations from that data. Where the data is inaccessible, this study will utilize online sources such as OpenStreetMap.com, Google Earth, Google Maps, Yahoo Maps, and other spatial mapping systems to approximate data. With this data is it important to understand that, while overcount will not be an issue, undercount of resilient forms might make some data like "trees" less than they otherwise would be. This is because some data is obstructed in satellite photos and data, whereas other data is not. When found or tabulated, this study will place those

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[15] Levy, Albert. "Urban Morphology and the Problem of the Modern Urban Fabric: Some Questions for Research." Urban Morphology 3(2) (1999): 81. http://faculty.mu.edu.sa/public/uploads/1346018433.9078um199902_79-85.pdf (accessed July 10, 2014).

numbers within a geospatial format like Geographic Information Systems (GIS/ESRI) and analyze that data along with the other data. Further, some of the data from planning departments is not complete, and this study has corrected that data with satellite data when possible. Given the size of the study areas, this study hopes that the total numbers analyzed will become finer approximations when errors cancel themselves and merge into median numbers.

When comparing issues of resiliency, it became mandatory to find a system which accept, change and analyze real data. As a result, this study heavily relies upon Geographic Information Systems (GIS/ESRI) and its capabilities. GIS has the power and spatial ability to change the schematic design process. It can analyze large sections of urban form within proposed developments or current conditions to determine multiple schema or options that might be followed. Further, these numbers are within ‘real spatial space’ that is the best current approximation for real urban form at real dimensions. This system allows accurate data to be entered and analyzed and it allows for changes to that data to occur when schematic design decisions are finalized. GIS works collaboratively with design without making design decisions--because while computers are not affected by millions of years of evolutionary spatial influence, people are.

Most importantly, GIS is not affected by a human tendencies to rely upon experience rather than empirical data and to incorporate data that might have a cultural or discriminatory influence--ex. perceived safety. Most items measured in urban form have been gross or accumulated masses of numbers like density or street connectivity with others like Robert Wood Johnson’s Active Living research that have multiple types of analysis that are culturally specific.[16] While this data is useful, there are ‘but for’

[16] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 1; Active Living Research. “Tools and

causation problems with some data of this type because it relies upon human feelings without cancelling out the cultural influences influencing that data. When analyzing urban form, one cannot assume that 'but for' the presence or density of a specific urban form. A function exists or does not exist. Without empirical data, a form's existence only alludes to a possibility of a cause rather than an absolute or specific cause. Empirical data tends to be scientific and objective, but it does not indicate how people use the form in the real world. So this must be an important consideration when reviewing this thesis.

> "Physical features individually may not tell us much about the experience of walking down a particular street. Specifically, they do not capture people's overall perceptions of the street environment, perceptions that may have complex or subtle relationships to physical features."[17]

Further, given time constraints, this thesis cannot possibly analyze every type of urban form. This thesis does encourage others to do so, and this thesis encourages others to refine this data when better and more accurate geospatial data is found or created.

3.3 Resiliency and Productivity Within Urban Form

Within urban form, 'resiliency' and 'productivity' are used differently than in this thesis. Many designers and policy-makers use 'resiliency' as a term to address a city's environmental impact, carbon footprint or environmentally sustainable policies.[18]

> "Planning to effectively meet the conditions and realities of a Post Carbon, Climate Responsible world will require a shift in our current understanding of what constitutes good urban design and planning.

Measures." *Active Living Research.* http://activelivingresearch.org/files/AuditToolsComparisonTable.pdf (accessed June 24, 2014) ("When you look at the categories involved, they are highly cultural and could be used as being concerned about graphitti, feeling insecure or having bars on windows, which could or could not be indicators of safe streets, among other things). Further, the Tools and Measures page, < http://activelivingresearch.org/open-streets-initiatives-measuring-success-toolkit> is based on representative phenomena and assumes that 'but for' the urban form, people would be there, when the reality is they might not have other actual or practical options, otherwise they would go to the next available urban option.").

[17] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 2.

[18] ResilientCity.org. "Urban Design Principles." http://www.resilientcity.org/index.cfm?id=11928 (accessed August 21, 2014).

> Many of the practices that we now take for granted, such as planning cities around automobile transportation, and zoning for single uses, will no longer be economically, environmentally, or culturally viable"[19]

However, this type of analysis is a more concerned with the environmental resiliency of an area to sustain itself within an ecological zone and whether the lifecycle or the maintainace of certain urban form exceeds an environmental carrying capacity or high stress point. Further, that analysis recognizes that the costs inherent in an urban system are not paid by those that design, produce or use certain elements 'within' urban form. While these studies are incredibly important, these studies generally look at the composition and costs related to individual elements of things, but they do not analyze how those things relate as urban elements on a spatial level.

In contrast, this thesis discusses the nature of "urban resiliency" on a morphologic and structural level. This means that while certain elements might have an economic impact upon their environment, that impact is separate and distinct from their impact upon urban form and the spatial relationships within urban form. There have been recent attempts to address urban form resiliency, but they have generally addressed multiple urban elements without making a fine distinction between how those elements classify, their spatial relationships with other urban elements, and why these elements are resilient.[20] Further, some of these studies analyze how urban form

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[19] ResilientCity.org. "Urban Design Principles." http://www.resilientcity.org/index.cfm?id=11928 (accessed August 21, 2014).

[20] Grosvenor, LSECities, and Neil Smith. "Evolving Cities: Exploring the Relations Between Urban Form resilienc and the Governance of Urban Form." http://files.lsecities.net/files/2013/12/Resilient-Urban-Form-and-Governance-Report.pdf (accessed August 21, 2014), p. 9; see also, Coaffee, J. (2009) Terrorism, Risk and the Global City: Towards Urban Resilience. Farnham: Ashgate; Pelling, M. (2003) The Vulnerability of Cities: Natural DIsasters and Social Resieince. London: Earthscan Publications; Savitch, H. V. (2008) Cities in a time of Terror: Space, Territory and Local Resilience. New York: Armock; Müller, B. (2010) Urban and Regional Resilience: A New Catchword or a Consistent Concept for Research and Practice? In B. Müller (Ed.), German Annual of Spatial Research and Policy. Berlin Heidelberg: Springer- Verlag; Vale, L. & Campanella, T. (2005) The Resilient City: How Modern Cities Recover from

changes within sudden shocks or over long lengths of time as those changes relate to public policy or economic impacts.[21] This thesis analyzes urban form and its dynamic structural and spatial relationships. This thesis takes the perspective that urban form is in a constant change, and that cities actually remove, decompose, restructure or repurpose urban elements that that cease to have continued meaning or function within an urban system. As a result, those urban elements that remain are ‘resilient’ by default, whereas those elements that morphologically or structurally change are not resilient. Yet, this does not mean that every resilient form within every city is “productive.”

This thesis takes the added step to look at the resilient forms of our most productive cities. While there are many forms within productive and non-productive cities, urban design analysis seeks to understand how forms appear within the most productive cities in order to compare how similar forms exist wthin cities that are not as productive. While this analysis could result in the ability to replicate productive forms within non-productive areas, it more importantly gives non-productive cities insight to the spatial differences between their cities and others. These cities understand how far their morphology and structure deviate from more productive dimensions and spatial relationshiops. As a result, these cities can determine if those deviations are acceptable, relevant or a concern.

Productivity is a complicated and loaded term. Depending upon the questioner or the facts analyzed, many cities are productive and simultaneously unproductive. This thesis uses various metrics to determine which city has a high level of productivity, and

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Disaster. New York: Oxford University Press; Clark, G., Evans, G & Nemecek, S. (2010) Resilient Cities: Surviving in a New World. ULI Urban Investment Network Report. London: Urban Land Institute.

[21] Grosvenor, LSECities, and Neil Smith. "Evolving Cities: Exploring the Relations Between Urban Form resilienc and the Governance of Urban Form." http://files.lsecities.net/files/2013/12/Resilient-Urban-Form-and-Governance-Report.pdf (accessed August 21, 2014), p. 9.

these metrics are independent from this studies, i.e. WalkScore, Smart Growth, Mercer Quality of Life Survey, the JLL Cities Research Center, the Innovation-Cities Project, the Global Cities Index, etc.[22] Taken as a whole, these indexes indicate that certain cities consistently rank high in several economic, social or political indexes. This thesis takes a few of those cities analyzes the similar urban forms within those cities that are resilient to find if there are similarities and dissimilarities. For efficiency purposes, the time constraints of this study require this thesis to pick and choose between the many productive cities consistently within these indexes to study, and as a result, this thesis picks six productive cities to determine the spatial dimensions and measures of their resilient urban form.

Many regard San Francisco, Portland, and New York City as three of the most resilient and best designed cities in the United States. In Europe, most regard Barcelona, Paris and Amsterdam to be urban design capitals and economic giants in their own way. Cities like San Francisco, New York, Paris, Amsterdam and Barcelona are cities that function as axes upon which civilizations revolve. Cities like Portland act as laboratories for cutting edge design theory and practice. Each city is aesthetically beautiful, and they all look different. They also provide good examples at how cities evolve over time into larger and more powerful economic, cultural, political, scientific and

[22] Mercer. Quality-of-Living Rankings. www.mercer.com (accessed August 22, 2014); Walkscore. www.walkscore.com (accessed August 22, 2014); Smart Growth America. www.smartgrowthamerica.org (accessed August 22, 2014); JLL. Cities Research Center. http://www.jll.com/cities-research/ (accessed August 22, 2014); National Bureau of Economic Research, "Unhappy Cities." July 2014. http://www.nber.org/papers/w20291 (accessed August 22, 2014); Innovation Cities. http://www.innovation-cities.com/indexes (accessed August 22, 2014); Florida, Richard. "The 25 Most Economically Powerful Cities in the World." CityLab, From the Atlantic. September 15, 2001. http://www.citylab.com/work/2011/09/25-most-economically-powerful-cities-world/109/#slide3 (accessed August 22, 2014); ATKearney. Global Cities Index. http://www.atkearney.com/research-studies/global-cities-index (accessed August 22, 2014).

research cores. What is most interesting about these cities is their power in the mind of all that surround them. These cities have great imageability on a regional level. Many are simply known as “the City,” even among other cities. When one travels from Oakland to San Francisco, one only needs to tell others they are going to “the City.” Everyone knows the traveler’s destination even though Oakland has a much larger population. This is the power of the resilient city.

3.3.1 *San Francisco*

San Francisco started as a Spanish presidio of San Francisco in 1776. “The Spanish foundation I March 1776 of the presidio of San Francisco, and the related mission of San Francisco de Asis (known as Mission de Dolores) has been described above.”[23] Originally centered in Yerba Buena, the commercial growth expanded with warehousing expansions in 1835 by William Richardson.[24] “He delineated a street across the front of his plot as the Calle de Funacion, from which, it was assumed, a regular gridiron would be extended.”[25] “Only one month later, however, the first mayor, Francisco de Haro, laid out a second street at an acute angle to Richardson’s, on which inauspicious basis began the planning of San Francisco.”[26] Cleaning up the previous Jean Jacque Voiget plan of 1839 commissioned by Governor Juan Alvarado was Jasper O’Farrell.

> “In 1839 Governor Juan Alvarado ordered its reorganization by Jean Jacques Voiget--a Swiss surveyor, sailor and tavern-keeper--in which latter capacity, perhaps produced the even more odd-shaped layout ... with his grid streets intersecting at 2 1/2 degrees off right angle.”[27]

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[23] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 356.
[24] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 356.
[25] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 356.
[26] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 356.
[27] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 356.

In 1847, and commissioned by mayor Lt. Washington A. Barlett, after the change of name of Yerba Buena to San Francisco, Jasper O'Farrell reworked the grid.[28] O'Farrell straightened out the lots and made a grid pattern, "which were confined as containing six lots, each 60 varas (135 square). The city was renamed after the wife of a landowner, María Francisca Felipa Beicia Carrillo Vallejo, cheating the town of Yerba Buena from recognition.[29] "On January 23, 1847, he [Lieutenant Washington Allen Bartlett of the United States Navy] proclaimed that 'San Francisco was the official name,' of the first settlement, and he ordained that it should thereafter 'be used in all official communications and public documents, or records appertaining to the town [of Yerba Buena]."[30] From land speculation and merchandising, San Francisco was born, and it became the gateway for United States westward expansion--Gold Mountain. San Francisco pulled immigrants from their own homes a world away like no other city, and its racial and political milieu created the first zoning requirements in the United States limiting Chinese land-ownership.[31] And, yet, it changed to become one of the most dominant multi-ethnic, economic and scientific cities of the Pacific Rim.

Today, San Francisco has a total population of 825,863 persons, along with its metro area of 4,335,391 persons.[32] It has a density of 17,179.1 per square mile and is the second most densely populated city in the United States.[33] The City has 15 million

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[28] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 356.

[29] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 24.

[30] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 24.

[31] Yick Wo v. Hopkins, 118 U.S. 356.

[32] Find the Best. "Comparison." http://places.findthebest.com (accessed July 10, 2014); California Department of Transportation. "Easements, Rights of Way and Types of Title." *California Department of Transportation.* http://www.dot.ca.gov/hq/row/landsurveys/Study_material/Foresberg/Chapter-05.pdf (accessed July 22, 2014); United States Census Bureau. "San Francisco (city), California." http://quickfacts.census.gov/qfd/states/06/0667000.html (accessed August 2, 2014).

[33] California Department of Transportation. "Easements, Rights of Way and Types of Title." *California Department of Transportation.*

visitors a year. It is the 44th most popular tourist location in the world and 6th most popular in the United States.[34] San Francisco has 376,942 home units, with 36.4% being owner-occupied .[35] 44.3% of persons commute by car, 32.97% use public transportation, 3.6% use bikes to commute, 9.64% walk, 2.41% use taxis and 2.09% work from home.[36] As a result, the average commute time is 31.4 minutes.[37] San Francisco's average public school rating for San Francisco is 59, and its residents are moderately educated and mainly high upper middle class.[38] It is no surprise that San Francisco ranks 32nd in the Mercer Quality of Living Survey 2010 of cities, when taking "39 factors including political, economic, environmental, personal safety, health, education, transportation and other public service factors."[39] In contrast to New York with a much older transit system, San Francisco's recent creation of the city and regional transit system, SF Muni and the Bay Area Rapid Transit network. As a result, San

http://www.dot.ca.gov/hq/row/landsurveys/Study_material/Foresberg/Chapter-05.pdf (accessed July 22, 2014); United States Census Bureau. "San Francisco (city), California." http://quickfacts.census.gov/qfd/states/06/0667000.html (accessed August 2, 2014).

[34] Euromonitor International. "Top 100 Cities Destination Ranking." *Euromonitor International blog*, January 21, 2014. http://blog.euromonitor.com/2013/01/top-100-cities-destination-ranking.html (accessed August 2, 2014).

35 California Department of Transportation. "Easements, Rights of Way and Types of Title." *California Department of Transportation.* http://www.dot.ca.gov/hq/row/landsurveys/Study_material/Foresberg/Chapter-05.pdf (accessed July 22, 2014); United States Census Bureau. "San Francisco (city), California." http://quickfacts.census.gov/qfd/states/06/0667000.html (accessed August 2, 2014); Find the Best. "Comparison." http://places.findthebest.com (accessed July 10, 2014); Find the Best. "Comparison." http://places.findthebest.com (accessed July 10, 2014).

[36] Find the Best. "Comparison." http://places.findthebest.com (accessed July 10, 2014).

[37] California Department of Transportation. "Easements, Rights of Way and Types of Title." *California Department of Transportation.* http://www.dot.ca.gov/hq/row/landsurveys/Study_material/Foresberg/Chapter-05.pdf (accessed July 22, 2014); United States Census Bureau. "San Francisco (city), California." http://quickfacts.census.gov/qfd/states/06/0667000.html (accessed August 2, 2014); Find the Best. "Comparison." http://places.findthebest.com (accessed July 10, 2014).

[38] Find the Best. "Comparison." http://places.findthebest.com (accessed July 10, 2014).

[39] Mercer. "Quality of Living Worldwide City Rankings 2010 – Mercer Survey". *Mercer.com*, May 26, 2010. http://web.archive.org/web/20110725220010/http://www.mercer.com/press-releases/quality-of-living-report-2010 (accessed August 2, 2014).

Francisco has a highly walkability factor even with its numerous hills and difficult terrain.[40] This might also result from San Francisco highly compact urban form.

> "A lower [Smart Growth] score on the index indicates a greater degree of sprawl. The average score for all metros ranked is 100. A lower score indicates below average conditions among these 83 U.S. metro areas: for example, less compact housing, a poorer mix of homes and jobs, poor street connectivity, or weaker than average town centers. A score above 100 indicates above average performance, when compared to the other metro areas ranked. Most metro areas score between 50 and 150 on the scale."[41]

According to Smart Growth America, San Francisco is one of the least sprawling cities of the United States.[42] San Francisco had an overall sprawl index score of 194.3, indicating above average performance with high residential density factors, a mixture of homes, jobs and services, a high strength of the town center and high degree of accessibility to a street network.[43] It has a Smart Growth density score of 185.97, a land use mix score of 167.17, an activity score of 230.92 and a street connectivity score of 162.83.[44] It had an 8-hour ozone level of 52 parts per billion, fatal accidents of 6.24 per 100,000 persons, 22.40 miles driven per person, an average of 1.50 vehicles per person, a high of 19.76% commuters using mass transit, 5.92% of commuters walking to

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[40] Leinberger, Christopher B. "Footloose and Fancy Free: A Field Survey of Walkable Urban Places in the Top 30 U.S. Metropolitan Areas." Metropolitan Policy Program at Brookings. http://www.brookings.edu/~/media/research/files/papers/2007/12/1128%20walkablеurbanism%20leinberger/1128_walkableurbanism_leinberger.pdf (accessed July 9, 2014), p. 4.

[41] Smart Growth America. "Measuring Sprawl 2014." April 2014. http://www.smartgrowthamerica.org/documents/measuring-sprawl-2014.pdf (accessed August 14, 2014.

[42] Smart Growth America. "Measuring Sprawl 2014." April 2014. http://www.smartgrowthamerica.org/documents/measuring-sprawl-2014.pdf (accessed August 14, 2014.

[43] Smart Growth America. "Measuring Sprawl 2014." April 2014. http://www.smartgrowthamerica.org/documents/measuring-sprawl-2014.pdf (accessed August 14, 2014.

[44] Smart Growth America. "Measuring Sprawl 2014." April 2014. http://www.smartgrowthamerica.org/documents/measuring-sprawl-2014.pdf (accessed August 14, 2014.

work, an average commute time of 29.44 minutes and an average 41.49 delay in traffic hours.[45]

> "Cable cars are mostly for tourists, but the City by the Bay is easy to get around via BART, MUNI, and bus. Nob Hill and Pacific Heights have amazing views for a reason — those hills make San Francisco walkers stronger, but it's still a great city for walking, no matter what your destination. You can work in Silicon Valley at the tech giants — or at a smaller startup and still live in the city; it's an easy commute via CalTrain. San Francisco has so much to offer — culture, art, and Golden Gate Park's mash up of people. It's easy to live the walkable lifestyle in San Francisco."[46]

San Francisco has a Walk Score of 84, a Transit Score of 80 and a Bike Score of 70. In contrast, Atlanta's has a total Walkscore is 46, a Transit Score is 43, and a Bike Score is 43.[47] With all these factors taken into consideration, San Francisco is a good example of economic and social resiliency. As a result, San Francisco is a city within this study, and this study will factor the city's results within the medians of urban form resiliency.

3.3.2 <u>New York</u>

> New York comes in for special scrutiny because it is more of a town, so to speak, than all American towns put together. It illustrates their best and worst points. Site, topography, and latitude would have destined it for true greatness had it been shaped by people with better instincts and a flair for living."[48]

New York was founded as New Amsterdam by Walloons from Flanders upon commission by the West India Company.[49] "The first permanent settlement on Manhattan Island was established by a group of Protestant Walloons from Flanders who had accepted the West India Company's terms and who, with later arrivals from Holland,

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[45] Smart Growth America. "Measuring Sprawl 2014." April 2014. http://www.smartgrowthamerica.org/documents/measuring-sprawl-2014.pdf (accessed August 14, 2014).

[46] WalkScore. "2014 City & Neighborhood Ranking." *WalkScore*.com. http://www.walkscore.com/cities-and-neighborhoods/ (accessed January 13, 2014).

[47] WalkScore. "2014 City & Neighborhood Ranking." *WalkScore*.com. http://www.walkscore.com/cities-and-neighborhoods/ (accessed January 13, 2014).

[48] Rudofsky, Bernard. Streets for People: a primer for Americans. New York: Anchor Press/Doubleday, 1969, p. 19.

[49] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 341.

began building of a town called New Amsterdam."[50] The city began as a Dutch city in 1624 by Peter Minuit as New Amsterdam.[51] Surprising, New York didn't have a real urban plan for the first 150 years of its existence.[52] Outside of New Amsterdam proper several villages grew like Harlem, Bowery Village, Wiltwyck (Kingston).[53] Many of these had a gridiron road pattern, which eventually laid the groundwork for the New York master grid. "The plan of the town (Kingston/Wiltwyck) as it appeared in 1695 shows a little gridiron street plan with stockade and blockhouse for protection …"[54] When Stuyvesant established Beverwyck in 1652, he extended and regularized the accreted plot pattern created by settlers near the fort.[55] When the English captured New Amsterdam in 1664, the British renamed it New York, and it had a population of 1,500 persons.[56] The English began to expand and grow Manhattan Island as needed without specific requirements on small lots.[57] "Instead, street by street, lot by lot, relatively small parcels of land surveyed and sold by the owners of farms adjoining the city in any way they pleased."[58]

In the 18th century, Manhattan expanded drastically, and developers and planners laid out larger tracts of land in regularized grid patterns for economic ease. "Lands lying along the Hudson belonging to Trinity Church were platted in a rectangular

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[50] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 126.
[51] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 341.
[52] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 341.
[53] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980 p. 130.
[54] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980 p. 130.
[55] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 132.
[56] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 342.
[57] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 132.
[58] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 132.

pattern by the city surveyor, Francis Maerschalck."[59] Along with the Bowevery Lane and DeLancey plan, the Trinity Church surveying set forth the rectangular fashion by which New York would grow.[60] "These three land development schemes, which helped to establish the rectangular street system in New York, can be seen on the Ratzen map of New York in 1767."[61] After the Revolutionary war, in 1804, New York wanted to expand even further up the island.[62] "In 1804 the mayor and aldermen of New York decided to survey all existing street and building lines in the city. Two years later they concluded that they should also seek more extensive powers to layout new streets in the area covered by Goerck's survey and even beyond."[63] In 1807, Simeon DeWitt, Gouverneur Morris, and John Rutherford began this work began a work that would change New York and Manhattan Island, the most complete and regularized city grid--the Commissioners' Plan of 1811.[64]

> "Owners hurried to plat their property into blocks and streets. Surveyors employed by the commissioners were greeted with general hostility. According to one account, they were often driven off properties they were attempting to survey, in one case being pelted with artichokes and cabbages by an irate woman who had made a living for twenty years selling vegetables and who did not intend to have her property divided by strangers."[65]

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[59] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 132.

[60] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 132.

[61] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 132; Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 342.

[62] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 135; Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 342.

[63] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 135.

[64] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 135; Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 124.

[65] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 135.

What is interesting is that, while the surveyors found it impossible to change the streets of the more medieval section of the city, they expanded the city with more rectangular gridpatterns. They noted that the accreted gridpatterns of the old city had high connectivity, and the surveyors did not create barriers or boundaries to distinguish the new streets from the old streets. “The commissioners found it impossible to adjust their plan to the irregular property boundaries and the random streets that already existed in the vast territory under their jurisdiction. … In the end they employed a mechanical and rigid grid, the reasons for which their reports expressed in these words:"[66] They unified both patterns into a larger pattern. They also rejected the embellishments that were the fashion of the day.[67]

> “That one of the first object which claimed attention, was the form and manner in which the business should be conducted; that is to say, whether they should confine themselves to rectilinear and rectangular streets, or whether they should adopt some of those supposed improvements, by circles, ovals, and stars, which certainly embellish a plan, whatever may be their effects as to convenience and utility. In considering that subject, they could not but bear in mind that a city is to be composed principally of the habitations of men, and that strait sided and right angled houses are the most cheap to build, and the most convenient to live in. The effect of these plain and simple reflections was decisive.”[68]

This resulted in north and south streets or avenues of 100 feet width and street lengths of 200 feet.[69] The streets flowing east to west were 60 feet wide, and some were 800 feet long, meeting the piers on each side. “A dozen north-south avenues, each 100 feet

[66] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 137.

[67] Cornell Library. “Commissioners’ Remarks,” in William Bridges, Map of the City of New York and Island of Manhattan, New York, 1811.” *Cornell Urban Planning Library*. http://urbanplanning.library.cornell.edu/DOCS/nyc1811.htm (accessed August 3, 2014); Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 137.

[68] Cornell Library. “Commissioners’ Remarks,” in William Bridges, Map of the City of New York and Island of Manhattan, New York, 1811.” *Cornell Urban Planning Library*. http://urbanplanning.library.cornell.edu/DOCS/nyc1811.htm (accessed August 3, 2014); Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 137.

[69] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 137.

wide, were laid out. Crossing these at right angles every 200 feet were no less than 155 streets, 60 feet in width, connecting the two rivers."[70] Yet, they worked from previous plans--the Goerck plan. "The similarity to the earlier Goerck plan for the old common lands of Manhattan is obvious. Not only are the street widths and intervals identical, but the location of the streets between 23td and 93rd Streets and 5th and 6th Avenues coincided exactly with the Goerck survey of 1796."[71] What this means is that they were cognizant of the past and considered the future when fashioning New York as an economic grid that allowed the most efficient transfer of goods, lots, and people with limited barriers--capitalistic at its core.

> "In 1850 42nd Street was the northern limit and the entire island was covered by about 1890. … In 1898 the present day five-borough City of New York was constituted with Brooklyn, the Bronx, Queens and Staten Island added to Manhattan. … By 1858, the creation of Central Park began after campaigns since 1844, and William Cullen Bryant.[72]

Today, New York has a population of 8,336,697 over five boroughs and a metropolitan area of 19,378,102 person.[73] It is the largest metropolitan statistical area in the United States, with a metropolitan density of 411.2 persons per square mile and with Manhattan having a density of 70,825.6 persons per square mile.[74] New York has a nonfarm employment of 7,369,711 jobs with an economically diverse economy. New York has 3.38 million residential units, and of these 31.7% of property is owner-

[70] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 137; Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 344.

[71] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 137.

[72] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 345.

[73] U.S. Census Bureau. "Quick Facts: New York County (Manhattan Borough), New York." http://quickfacts.census.gov/qfd/states/36/36061.html (accessed January 13, 2014); Find the Best. "Comparison." http://places.findthebest.com (accessed July 10, 2014).

[74] U.S. Census Bureau. "Quick Facts: New York County (Manhattan Borough), New York." http://quickfacts.census.gov/qfd/states/36/36061.html (accessed January 13, 2014); Find the Best. "Comparison." http://places.findthebest.com (accessed July 10, 2014).

occupied.[75] New York's average public school rating is 51, and its residents are moderately educated.[76] In New York, 27.2% commute by car, 55.96% use public transportation, 0.90% use bikes to commute, 10.2% walk, 1.72% use taxis and 4.05% work from home.[77] As a result, the average commute time is 38.7 minutes.[78]

New York, has an economic output of $1.1 trillion, and has a Global Economic Power Score of 984, a Financial Center Score of 770, and has an innovation rank of No. 4. Smart Growth America rated New York as the least sprawling of 83 metro areas measured with a composite score of 203.36.[79] Smart Growth also indicates that New York has a density score of 384.29, a land use mix score of 159.34, an activity centering score of 213.49 and a street connectivity score of 193.80.[80] What this means is that New York has urban form that is indicative of better land use mixtures, more street activity, more vibrancy and more urban form density on average, than even San Francisco.[81] New York has an 8-hour ozone level of 101 parts per billion, 4.83 fatal accidents per 100,000 persons, an average of 15.40 miles driven per person, an average of 0.74 vehicles per person, 48.49% of persons commuting via public transit, 9.61% persons walking to work, and an annual traffic delay of 23.41 hours. Along with growing smart, New York has the highest number of LEED-certified buildings in any city and metro area.

Along with its economic dominance, New York is a fairly walkable and livable city. New York has more than 50 million visitors a year is one of the world's top walking

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[75] Find the Best. "Comparison." http://places.findthebest.com (accessed July 10, 2014).
[76] Find the Best. "Comparison." http://places.findthebest.com (accessed July 10, 2014).
[77] Find the Best. "Comparison." http://places.findthebest.com (accessed July 10, 2014).
[78] Find the Best. "Comparison." http://places.findthebest.com (accessed July 10, 2014).
[79] Smart Growth America. "Measuring Sprawl 2014." April 2014. http://www.smartgrowthamerica.org/documents/measuring-sprawl-2014.pdf (accessed August 14, 2014.
[80] Smart Growth America. "Measuring Sprawl 2014." April 2014. http://www.smartgrowthamerica.org/documents/measuring-sprawl-2014.pdf (accessed August 14, 2014.
[81] Smart Growth America. "Measuring Sprawl 2014." April 2014. http://www.smartgrowthamerica.org/documents/measuring-sprawl-2014.pdf (accessed August 14, 2014.

cities.[82] The walk score for NYC in general is a Walk Score of 88, a Transit Score of 81, and a Bike Score of 62.

> "The Big Apple keeps getting better. New York has miles of bike lanes, bike share programs, and there's always been extensive public transportation — the subway, the LIRR, buses everywhere, and you have to try hard not to find a walkable neighborhood. On the island of Manhattan, you're never more than a 10 or 15 minute walk from a subway station; super hip Brooklyn and Williamsburg offer more of the same. The entire city has the urban density that supports walking to nearly everything: the city's great museums, playgrounds like Central Park, East Village restaurants... many New Yorkers live their whole lives without ever owning a car."[83]

Without any argument, New York is the cultural capital of the world, and is the cultural capital of the United States. Arguably, New York is also the financial capital of world.[84] With all these factors taken into consideration, New York is a good example of how urban form translates into economic and social resiliency. As a result, New York is a city within this study, and this study will factor the city's results within the medians of urban form resiliency.

3.3.3 Portland

Unlike San Francisco or New York, Portland is not a dominant economic powerhouse for it ceded that position to Seattle, Washington, in 1890, when Seattle built and expanded its deep water port. The total population of Portland is 603,106 persons,

[82] WalkScore. "2014 City & Neighborhood Ranking." *WalkScore*.com. http://www.walkscore.com/cities-and-neighborhoods/ (accessed January 13, 2014).

[83] Walkscore. "Living in New York." http://www.walkscore.com/NY/New_York (accessed July 10, 2014).

[84] Ashton, Dore, and Leonard Wallock. *New York: Culture Capital of the World*. New York, NY: Rizzoli, 1988; Barry, Dan. "A Nation challenged: in New York; New York Carries On, but Test of Its Grit Has Just Begun." *The New York Times*, October 11, 2001. http://www.nytimes.com/2001/10/11/nyregion/nation-challenged-new-york-new-york-carries-but-test-its-grit-has-just-begun.html (accessed August 3, 2014); Sorrentino, Christopher. "When He Was Seventeen." T*he New York Times*, September 16, 2007. http://www.nytimes.com/learning/teachers/featured_articles/20070917monday.html (accessed August 3, 2014); Bumiller, Elisabeth. "The Pope's Visit: the Cardinal. *The New York Times*, October 8, 1995. http://www.nytimes.com/1995/10/08/nyregion/pope-s-visit-cardinal-pope-s-important-ally-cardinal-shines-high-hierarchy.html (accessed August 3, 2014).

and it has a density of 4,375.2 persons per square mile.[85] Portland has 265,710 residential units, with 52.5% of units being owner-occupied.[86] Portland's average public school rating for San Francisco is 61, its residents are moderately educated, and the city is economically diverse.[87] In Portland, 67.3% use cars for commute, 12.14% use public transportation, 6.2% commute by bike, 5.72% walk to work, 0.93% use taxis and 7.71% work from home, and as a result, with an average commute time of 25.9 minutes.[88] Yet, many consider Portland an example of urban form given its focus on livability and its tight urban form.

Portland's gridline street grid is much like Los Angeles, Santa Monica, outer San Francisco and even Manhattan.[89] "For a series of cities with grid street patterns like Portland, Oregon, Los Angeles (in the center), Santa Monica, outer San Francisco, and to some extent even Manhattan, the street and block patterns alone are not particularly ordering."[90] Because of its small nature, many designers use Portland as a laboratory for urban form because of its new and cutting edge planning policies and practices.[91]

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[85] U.S. Census Bureau. "Quick Facts: Portland (city), Oregon." http://quickfacts.census.gov/qfd/states/41/4159000.html (accessed January 13, 2014); Find the Best. "Comparison." http://places.findthebest.com (accessed July 10, 2014)

[86] U.S. Census Bureau. "Quick Facts: Portland (city), Oregon." http://quickfacts.census.gov/qfd/states/41/4159000.html (accessed January 13, 2014); Find the Best. "Comparison." http://places.findthebest.com (accessed July 10, 2014)

[87] Find the Best. "Comparison." http://places.findthebest.com (accessed July 10, 2014)

[88] Find the Best. "Comparison." http://places.findthebest.com (accessed July 10, 2014)

[89] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 258.

[90] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 25.

[91] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 210; Abbott, C. "Planning a Sustainable city: The Promise and Performance of Portland's Urban Growth Boundary," in G. D. Squires ed. *Urban Sprawl: Causes, Consequences and Policy Responses*. Washington, DC: Urban Institute Press, 2002, pp. 207-235.

> "Portland has become a sort of living laboratory for efficient urban planning and living. The results are benefiting both the environment and the region's economy."[92]

Portland does benefit from its fine grained downtown area with some of the smallest street lengths in the United States. "[Its] central area benefited from a much finer-grained grid that created blocks only 200 feet in length."[93] As a result, when Portland adds new additions to its form, such as recent streetcars, the effect of those urban policies multiplies because of the fine grained nature. "The increased permeability of the city and raised ratio of open space to 55 percent (as opposed to 33 per cent in Seattle or New York), thereby ensuring a more human scale of development."[94] Far-thinking, Portland created an urban growth boundary which constrained growth within an area that artificially densified the city and development, thus keeping areas green while creating more vitality. Portland "has long proclaimed its urban greenness. Portland architects also design their buildings and projects to blend in with their surroundings, making for a distinctive urban aesthetic. Portland has good accessibility of that green infrastructure. Portland has a Walk score is 63, a Transit Score of 50, and a Bike Score of 70.[95] Portland ranks as the 51st most innovative city in the world, and is the most bike-friendly city in the United States.[96]

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[92] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 210; Abbott, C. "Planning a Sustainable city: The Promise and Performance of Portland's Urban Growth Boundary," in G. D. Squires ed. *Urban Sprawl: Causes, Consequences and Policy Responses*. Washington, DC: Urban Institute Press, 2002, pp. 207-235.

[93] Punter, John. Design Guidelines in American Cities: A Review of Design Policies and Guidance in Five West Coast Cities. Liverpool: Liverpool University Press, 1999, p. 66.

[94] Punter, John. Design Guidelines in American Cities: A Review of Design Policies and Guidance in Five West Coast Cities. Liverpool: Liverpool University Press, 1999, p. 66.

[95] Walkscore. "Living in San Francisco." http://www.walkscore.com/CA/San_Francisco (accessed July 10, 2014).

[96] WalkScore. "2014 City & Neighborhood Ranking." WalkScore.com. http://www.walkscore.com/cities-and-neighborhoods/ (accessed January 13, 2014).

> "Portland might be the most walking, biking, and public transit friendly city on the West Coast. Most neighborhoods have walkable food cart pods, supermarkets, movie theaters and cafes. Portland's neighborhoods are a mix of classic craftsman homes, rental apartments, and new construction condos, some of them green built and LEED certified. Hollywood has three MAX lines and four bus lines. Northwest offers maximum density, while Healy Heights and Sylvan-Highlands have great schools. The Pearl District is home to a number of tech and design start-ups, and a thriving restaurant scene that foodies love."[97]

As a result, Portland also ranks high with regard to walkability and livability.

Portland, Oregon, also ranked high on the Smart Growth America sprawl index for being a city low in sprawl—mostly due to its urban growth boundary—Portland ranked 80th.[98] Portland has a density score of 111.14, a land use mix score of 136.12, an activity score of 100.81 and a street connectivity score of 124.98.[99] Portland had a residential density factor of 58th, a mixture of jobs, homes and services of 40th, a strength in the downtown area and city center of 68th, and an accessibility of the street network of 71st. Portland had an ozone level of 57 parts per billion during an 8-hour peak zone, had 7.72 fatal accidents per 100,000 persons, had 23.60 daily miles driven per person, an average number of vehicles of 1.73 cars per person, had 7.63% of persons commuting through mass transit, had 3.46% persons walking to work, had an average commute time of 24.34 minutes and had an average annual traffic delay of 22.91 hours. With all these factors taken into consideration, Portland is an example of how urban form might translate into economic and social resiliency. What Portland has done is used urban form policy as a means of creating density within a region while

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[97] Walkscore. "Living in San Francisco." http://www.walkscore.com/CA/San_Francisco (accessed July 10, 2014).

[98] Smart Growth America. "Measuring Sprawl 2014." April 2014. http://www.smartgrowthamerica.org/documents/measuring-sprawl-2014.pdf (accessed August 14, 2014).

[99] Smart Growth America. "Measuring Sprawl 2014." April 2014. http://www.smartgrowthamerica.org/documents/measuring-sprawl-2014.pdf (accessed August 14, 2014).

protecting its natural environment. As a result, Portland is a city within this study, and this study will factor the city's results within the medians of urban form resiliency.

3.3.4 Barcelona

> "Barcelona's urban landscape has been shaped by political struggles, civil society and its geographic location. Situated in a valley on the Mediterranean coast, and surrounded by two hills, Montjuïc and Tibidabo, and two rivers, the Besòs and the Llobregat, Barcelona evolved into its full structure from the end of the nineteenth century through mainly the first half of the twentieth century. In the twenty‑first century, the city is made up of four main parts, one being the medieval Ciutat Vella 'Old City'. Another section is the Eixample 'Expansion', a residential and service area designed by Cerdà. The third part consists of the old villages scattered across the valley, which became part of the city in the twentieth century and largely developed during the 1960s and 1970s. Finally, the fourth part is new neighbourhoods redeveloped for major events, such as the Olympics in 1992 and the Forum de les Cultures in 2004, from the mid‑1980s to the present."[100]

Barcelona began as an earlier Roman city from the 5th century BCE, where settlements appeared because of the trade routes.[101] The original city was founded like other centurion founded cities with a main axes--the cardo maximus and decumanus maximus.[102] The original city was 1,500 meters long with about 76 towers.[103] "The centuriation was designed to follow on the basis of two main axes, the cardo maximus and the decumanus maximus, which crossed at the central point of the colony. Treaties of the time consider the ideal model to be when the centre coincided with the intersection of the two basic axes of the territorial system." [104]After setting the crossing

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[100] Pallares-Barbera, M, Badia, A. and Duch, J, 2011. "Cerda and Barcelona: The need for a new city and service provision." *Urbani izziv Urban Challenge*, Volume 22, no. 2 (December 2011): 122-136. http://scholar.harvard.edu/montserrat-pallares-barbera/publications/cerd%C3%A0-and-barcelona-optimal-location-services-and-urban-p-0 (accessed July 11, 2014)

[101] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 23.

[102] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, pp. 24, 27; Martín, Roland. L'Urbanisme dans la Grèce antique. Paris: Picard & Cie, 1974.

[103] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 30.

[104] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, pp. 24-25.

main streets, the Romans set the parallel and perpendicular streets to create a gridline, and these could be expanded over time.[105]

The Middle Ages reinvented the city as a center of power and new social and institutional relations.[106] Still the streets and plot formation with the creation of blocks formed a weak system. “In order to understand the urban structure of the period, it is important to remember that the streets formed a continuous but weak urban system with a very irregular layout. The streets were all different and the existence of large or public buildings helped orientation. Many were particularly characterized by dominant trade of their inhabitants.”[107] In 1260, Juame I built a new wall was to enclose the city with the viles noves, a region of 130 hectares of land.[108] “The wall extended for 5 kilometres with eight gates that provided communication with buildings scattered across the plain.”[109] Along with the castles for defense, this was part of a defensive system which for regional in nature.[110]

From 1772-1791, new construction of 4,255 works were allowed on previous locations and plots, with only 2% of construction occurring on green fields and not previously built land.[111] This development caused more densification and made the city

[105] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, pp. 25-26; Gall, J. L. *Les rites de foundation des villes romaines*. Paris: Bull. Soc. Antiq. France, 1970.
[106] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 37.
[107] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 42.
[108] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 44.
[109] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 44.
[110] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 44.
[111] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 89.

more congested, with more apartment subdivision.[112] In 1753, in response to the demolition of the Ribera district for a fort, the government planned the Barceloneta.

> "Some temporary buildings had already been constructed in this area for residential and economic uses after the widespread destruction caused by the construction of the Citadel."[113]

Designed by J. P. Verboom, it was a square model plan with a series of tight linear blocks with parallel streets, with a central square for special activities.[114] The design was in a north-south direction for sunlight purposes and protect against eastern winds, but also it was a 'well-defined housing model and specific desire to design the city on the basis of layout."[115] The houses in the Barceloneta measured 8.40 x 8.40 meters [26.8 feet x 26.8 feet], and were built between party walls, a façade and an interior wall.[116] Yet, the need for residential dwellings fragmented the buildings into smaller apartments without ventilation, creating more social problems.[117]

In 1850 Cerdà proposed the extension of the Barcelona city urban plan, a new 9 x 3 km extension.[118] With many of the changes detailed in this paper, Cerdà set in motion many of the qualities that we recognize in Barcelona today.[119] However, Cerdà

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[112] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 89.

[113] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 89; Beigel, Florian, and Philip Christou. Architecture as City: Saemangeum Island City. New York: SpringerWein, 2010, p. 96.

[114] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 90.

[115] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 90.

[116] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 91; Beigel, Florian, and Philip Christou. Architecture as City: Saemangeum Island City. New York: SpringerWein, 2010, p. 96.

[117] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 93.

[118] Beigel, Florian, and Philip Christou. Architecture as City: Saemangeum Island City. New York: SpringerWein, 2010, p. 92; Pallares-Barbera, M., Badia, A. and Duch, J., 2011. "Cerda and Barcelona: The need for a new city and service provision." Urbani izziv Urban Challenge, Volume 22, no. 2 (December 2011): 123. http://scholar.harvard.edu/montserrat-pallares-barbera/publications/cerd%C3%A0-and-barcelona-optimal-location-services-and-urban-p-0 (accessed July 11, 2014)

[119] Beigel, Florian, and Philip Christou. Architecture as City: Saemangeum Island City. New York: SpringerWein, 2010, p. 92; Aibar, Eduardo and Wiebe E. Bijker,

balanced urban design against the people and their needs, and the Spanish central government forced Cerdà's plan upon Barcelona.[120]

> "In the Spanish case, too, the final planning decisions were taken by the national government. In Barcelona the town actively opposed the proposal drawn up by Cerdà in consultation with the government, and a competition was arranged to find an alternative. In the end, however, they were forced to accept the Cerdà plan, which was subsequently respected to a degree that was quite unique, at any rate as regards the structure of the city blocks."[121]

After the Cerdà Plan and redevelopment of the Eixample, the 1905 Jaussely Plan solidified the connections between Barcelona and its exurbs and suburbs.[122] "It included the fundamental criteria of a desire to monumentalize the city and particular insistence on the introduction of green space, until then practically non-existent."[123] Juassely's purpose was to make Barcelona more aesthetically pleasing.[124] Jaussley used three important aspects of to change the urban form and modernize it: the zoning of activities, the use of green space, and street and avenue design.[125] While Cerdà and others looked at urban form with plans by accretion, Jaussely looked at the entire city as a whole and purposed to unify the message--like Haussmann.[126]

> "This same approach can be seen in almost all cities based on a grid, principally in America; Burnham's ideas for Chicago and San Francisco are paradigm examples, recomposing the old continuous orthogonal layout on a larger scale based on an oblique arrangement,

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"Constructing a City: The Cerda Plan for the Extension of Barcelona." Science, Technology, and Human Values, Vol. 22, No. 1 (Winter 1997): 13. http://www.jstor.org/stable/689964 (accessed July 8, 2014)

[120] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 278.

[121] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 278.

[122] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 192.

[123] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 191.

[124] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 191.

[125] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 192.

[126] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 192.

thereby highlighting certain nodes or focuses of generation of these radii."[127]

What Juassely did was connect the Eixample and the suburban network of roads and villages with a broader grid of avenues and streets linked with nodes and landmarks.[128] His extensions created more unity between the Eixample and the Cuitat Vella. In 1879, the creation of further connection between Cuitat Vella and the Eixample continued with the creation of the Artery A, Via Laietana, by the Baixeras Plan.[129] "This agreement enabled the construction of Artery A, also known as Via Laietana, to join the Eixample with the port according to a layout initial proposed by Cerdà."[130] This pathway would connect the Eixample with the industrial port, and it removed problems caused by much of the Cuitat Vella medieval grid.[131] The Via Laietana cut through the Ciutat Vella and made a transition avenue go to the port to create a larger gridline plan superimposed upon the older medieval grid. This also opened up the urban fabric to allow buildings that were previously closed to become landmarks and nodes like the cathedrals. Along with the Florensa, Darder and Plane Jamente Poterior Al PGM de 1976, these various plans created a more intricate reworking of the grids to allow for new potential uses and changes to the system to open up the grid while not destroying what was there previously--allowing those previous differences to change into their own neighborhoods and districts.

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[127] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 192; Hénard, Eugène. *La contruzione della Metrpoli.* Padua, 1972; Hines, Thomas S. *Burnham of Chicago*. Oxford: Oxford University Press, 1974.

[128] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 192.

[129] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, pp. 196-197.

[130] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 197.

[131] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 197; Xavier Peiró i Grasa, Manuel Ribas i Piera. Agents materials, autors del projectes i referències teòriques de la reforma urbana de Barcelona: 1879-1937. Barcelona: Escola Tècnica Superior d'Arquitectura de Barcelona, 1988.

For Barcelona alone, major developments began in the late 20th Century.[132] “The great urban explosion probably took place in the 20th century, when industrialisation organised the city in accordance with its strong technological development.”[133] Barceloneta became extremely populated with only 24 hectares, with over 25,000 residents.[134] There were over 1,000 persons per hectare, and 1,000 buildings with over 6,000 dwellings with over half only having 35 square meters of space.[135] The city opened the Barceloneta to allow for more space, more construction and amenities.[136] As the Franco regime ended and the Olympics funneled new funds to the city, Barcelona morphed into the European city of today.[137]

> “The recovery of Barcelona beginning in the 1980s took the form of an appreciation of existing urban spaces and structures, leading to a rebirth of the city. The urban planning instruments used were many and varied, and quiet innovative.”[138]

According to the Mercer Quality of Living Survey, Barcelona ranks 44th in the world in 2012 when taking “39 factors including political, economic, environmental, personal safety, health, education, transportation and other public service factors.”[139] Internationally, many choose Barcelona as a city to compare against others economically and with urban form. Although it is not a national capital, it is considered

[132] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 20.
[133] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 20.
[134] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 93.
[135] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 93.
[136] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 94.
[137] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 20.
[138] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 20.
[139] Mercer. "Quality of Living Worldwide City Rankings 2010 – Mercer Survey". *Mercer.com*, May 26, 2010. http://web.archive.org/web/20110725220010/http://www.mercer.com/press-releases/quality-of-living-report-2010 (accessed August 2, 2014).

cultural, economic and urban design capitals, and it is a model by which other cities compare themselves.

> “With nearly 5 million inhabitants, the Barcelona Metropolitan Region (BMR) is the second most dense urban area, the fourth most populated and the eighth most extensive in Europe. Today, the BMR generates 12% of Spain’s GDP and more than 20% of Spanish exports. Although on a subsector level, diversity is one of its main features, 30% of its nearly 2 million jobs are in the manufacturing industry, and more than 65% belong to the services industry 2004 the average income level was 13.9 thousand euros per inhabitant.”[140]

Because of the tight knit urban grid, Barcelona is very walkable and livable. Over half of the trips that people take are on foot.[141] “The Eixample is crossed by one in five of the total number of trips conducted in the Metropolitan Area with a population equivalent to one eighth and almost 1,000,000 journeys of a total of 5,000,000).”[142] The majority of trips move in the vertical direction from the mountain to the sea, because there are more vertical openings than horizontal pathways across the Barcelona plain.[143] While parking presents a huge problem in most of the world, Barcelona has only 40% onsite parking for blocks, much of the parking at intersections or underground. “Underground cars park beneath public thoroughfares, first built in the 1960s represent overall more than 2 kilometers of street and surface area equivalent to the land occupied by ten Eixample street blocks, or the built surface area of two blocks.”[144] Along with this, Barcelona has an efficient mass transit system, the Eixample has multiple mass transit connections and lengths.[145]

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[140] Garcia-López, Miquel-Àngel. “Population suburbanization in Barcelona, 1991–2005: Is its spatial structure changing?” Journal of Housing Economics 19 (2010): 121. www.elsevier.com/locate/jhec (accessed July 8, 2014).
[141] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 304.
[142] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 304.
[143] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 304.
[144] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 304.
[145] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, pp. 304-306.

With its serendipitous history, Barcelona became the final evolution of Sixtus V's fully modern and unified city, for it has lasted more than 2,000 years while other cities have come and gone. Barcelona's economic power and design history alone make it a unique city to study, and, as a result, this study will factor the city's results within the medians of urban form resiliency.

3.3.5 Paris

> "It is noteworthy that new development shave no usually resulted from long-term planning, but rather from a succession of sporadic impetuses--the initiatives of men who possessed at once a grand design, a considerable political willpower and the financial means to bring their ideas to fruition."[146]

Paris began as a Roman castra that expanded into a large medieval road pattern of accumulated blocks.[147] As its medieval core expanded, Paris became more difficult to imagine and navigate for residents and, most importantly, for those in power. While Paris did have a history of pinpoint changes to the urban grid, its inability to address the urban grid as a whole made any small attempts ineffective.[148]

> "An impenetrable core of slums formed the center of the city; neither Louis XIV nor Napoléon I had been able to break through it. An old city had never been remodeled intact. Inspired by the example of London's rebuilding, and armed with the expropriation law and the 1850 law against rental of unsanitary housing, the Emperor ordered the overpopulated districts opened up."[149]

As a show of political and economic necessity, Napoléon III pushed through radical changes which would result in the hiring of Haussmann, who drastically changed the city's trajectory. Because of Baron Haussmann from 1853 to 1869, Paris became a

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[146] Cohen, Jean-Louis. Paris: La Ville et Ses Projects: A City in the Making: Babylone. Paris: Pavillion de L'Arsenal, 1988, p.12

[147] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 15.

[148] Cohen, Jean-Louis. Paris: La Ville et Ses Projects: A City in the Making: Babylone. Paris: Pavillion de L'Arsenal, 1988, p.12

[149] Couperie, Pierre. Paris Through the Ages. Paris: Geeorge Braziller, Inc, 1968, p. 65; Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 79.

city of streets and streetscapes.[150] As a result of Haussmann, Paris became one of the wonders of the world with its newly created spaces, public places and rationalized streetgrid. As a result of the problems and disorder of 1848, Napoléon III wanted a changed urban form and a show of power, and Napoléon III used Haussmann as an instrumentality to meet these ends.[151] Haussmann decided to impose a series of radial street patterns and cross-city diagonals in order to break the city into parts and impose a gridpattern upon the city.[152] These new changes allowed the city to incorporate new structural systems that improved the public health, safety and welfare--especially the cholera, the slums, overcrowding and economic issues.[153]

> "After having drawn up a triangulated plan of the city and, for the first time, surveyed its land forms with precision, they cut through Paris in three campaigns: La Cité was razed, the Rue de Rivoli connected with Rue St-Antonie (the quay had formed the only crosstown artery in Paris), a north-south corridor opened (Blvd. de Strasbourg and Blvd. St.-Michel), the circle of grand boulevards completed (Blvd. St-Germain), the radiating circles of the Place d'Italie, of the Place du Château-d'Eau (Républic), and the Chaillot (Place de l'Etoile) laid out." This included a new water delivery and sewage system which allowed Paris to grow.[154]

What one sees now is a Baroque street structure based on nodes and landmarks breaking through the city and creating a much greater superstructure, with recognize that previous defensive structures amounted to free space for grand boulevards.[155]

> "The 18th century map of Paris shows other characteristic traits. Through the city's fortifications were no longer of vital importance, definite boundaries continued to be maintained. They are marked by the Grands Boulevards."[156]

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[150] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, pp. 8, 65.
[151] Couperie, Pierre. Paris Through the Ages. Paris: Geeorge Braziller, Inc, 1968, p. 65.
[152] Couperie, Pierre. Paris Through the Ages. Paris: Geeorge Braziller, Inc, 1968, p. 67.
[153] Couperie, Pierre. Paris Through the Ages. Paris: Geeorge Braziller, Inc, 1968, p. 67; Couperie, Pierre. Paris Through the Ages. Paris: Geeorge Braziller, Inc, 196, p. 65; Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 83.
[154] Couperie, Pierre. Paris Through the Ages. Paris: Geeorge Braziller, Inc, 1968, p. 67.
[155] Couperie, Pierre. Paris Through the Ages. Paris: Geeorge Braziller, Inc, 1968, p. 65.
[156] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.6-4.

Haussmann also use base on common materials in the construction and also set in place new technologies to link the city with its suburbs. As part of this expansion, Haussmann used asphalt instead of stone to increase the sidewalks from 155 miles in 1842 to 683 miles in 870.[157] He also included a rail system as mass transit for Paris and its suburbs.[158]

Because of Paris' economic power, more people flooded the city and created more housing issues. The problem with housing was not housing the people who were already in Paris, but Paris was not creating new housing for new immigrants coming into the city after construction began.[159] In the city, the majority of the new residential buildings constructed were 7 to 8 stories.[160]

> "The south bank revived as construction flourished. Seven to eight-story buildings provided 215,304 new housing units, versus 117,000 destroyed."[161]

When you compare the new city with the avenues and boulevards against the previous city, there is a drastic difference. Haussmann superimposed a structure within a previous chaotic city, and thus, he laid the groundwork for other changes to follow.

After the World War II, Paris built a larger urban highway and circulatory system to allow for the extremely larger population growth.[162]

> "Boulevard Périphérque. Begun in 1957, the Périphérque will facilitate traffic between Paris and the outskirts. Began as a two 3-lane roads, it was continued as two 4-lane roads. When finished in 1970, it will be 3 km (22.5 mi), with an interchange for city and outskirts every kilometer. The La Chapelle interchange connects Périphérque, and expressway, and the Parisian network. It will be accompanied by a service area and parking lots."[163]

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[157] Couperie, Pierre. Paris Through the Ages. Paris: Geeorge Braziller, Inc, 1968, p. 67.
[158] Couperie, Pierre. Paris Through the Ages. Paris: Geeorge Braziller, Inc, 1968, p. 67.
[159] Couperie, Pierre. Paris Through the Ages. Paris: Geeorge Braziller, Inc, 1968, p. 67.
[160] Couperie, Pierre. Paris Through the Ages. Paris: Geeorge Braziller, Inc, 1968, p. 67.
[161] Couperie, Pierre. Paris Through the Ages. Paris: Geeorge Braziller, Inc, 1968, p. 67.
[162] Couperie, Pierre. Paris Through the Ages. Paris: Geeorge Braziller, Inc, 1968, p. 89.
[163] Couperie, Pierre. Paris Through the Ages. Paris: Geeorge Braziller, Inc, 1968, p. 89.

This era attempted to undo what Haussmann did by creating a modernist and uniform system of streets and blocks. As the buildings started to detach from other buildings on the block, the structure started breaking down.[164] Also, as the monuments started losing their hierarchy, their use, along with the isolation of the churches and their disuse, became under question.[165]

> "Empty of any significant order, this monumental system lost all of its meaning. With the churches isolated…, then the department store … also became a block."[166]

Yet, this modernism was halted by an attempt to create a more design-oriented city. From 1977 to 1980 in effort to make Paris more architecturally and economically stable, and to practice good urban design, the "mayor of Paris wished to reverse this long-standing trend in an unambiguous and spectacular manner, and instructions were sent out to the various municipal departments that research and development funds were to be allotted first and foremost to the eastern sectors of the city."[167] The eastern part of the city was generally separate from the western side, which had most of the wealthy parts of the city with embassies and large architectural pieces.[168] This eastern section had a large immigrant population and little public spaces, and those parts of the urban design that were intact, were poorly maintained.[169]

Today, Paris is continually considered one of the most cultural, economic and urban design capitals, and each represent models by which other cities try to compare

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[164] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 28.

[165] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 28.

[166] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 28.

[167] Cohen, Jean-Louis. Paris: La Ville et Ses Projects: A City in the Making: Babylone. Paris: Pavillion de L'Arsenal, 1988, p. 14.

[168] Cohen, Jean-Louis. Paris: La Ville et Ses Projects: A City in the Making: Babylone. Paris: Pavillion de L'Arsenal, 1988, p. 14.

[169] Cohen, Jean-Louis. Paris: La Ville et Ses Projects: A City in the Making: Babylone. Paris: Pavillion de L'Arsenal, 1988, p. 141.

themselves. Paris is the 5th most important economic city in the world.[170] Along with New York, Paris is one the world's top walking cities, and it ranks as the 5th most innovative city in the world. According to the Mercer Quality of Living Survey, Paris ranks with San Francisco as 29th in the world in 2012 for quality of life when taking "39 factors including political, economic, environmental, personal safety, health, education, transportation and other public service factors.[171]" Unlike Barcelona, Paris overcame extremely difficult odds to become an incredible city. It did so by superimposing order via a radial gridpattern upon a previous unyielding medieval pattern. Unlike Barcelona, Paris was a capital-sized Cuitat Vella. It took Imperial power and a genius to do this, while battling the social upheavals and criticism that followed. As a result, Paris is a city within this study, and this study will factor the city's results within the medians of urban form resiliency.

3.3.6 <u>Amsterdam</u>

> "Around 1270 [or 1240] a barrier or dam was built in the Amstel, and this has given it name not only to the town itself but also to its central square, the Dam."[172]

Formed on the Amstel River dam, from the 14th to the 15th Century, Amsterdam became an economic power, and expanded from 100 acres to around 350 acres in 1450.[173] After a fire in 1451 and 1452, the government banned thatch and timber

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170 Florida, Richard. "What is the World's most Economically Powerful City?" "The Atlantic." May 8, 2011. http://www.theatlantic.com/business/archive/2012/05/what-is-the-worlds-most-economically-powerful-city/256841/ (accessed August 21, 2014).

171 Mercer. "Quality of Living Worldwide City Rankings 2010 – Mercer Survey". *Mercer.com*, May 26, 2010. http://web.archive.org/web/20110725220010/http://www.mercer.com/press-releases/quality-of-living-report-2010 (accessed August 2, 2014).

172 Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 234; Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 221.

173 Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 221.

housing and required brick and tile construction.[174] Amsterdam was a city based on site, a defensive system and the use of a city as a money making enterprise. The "fourth decisive factor was that Amsterdam was like a great and flourishing corporation in which each citizen owned a share."[175] The layout of the city required accessibility as a trading function. "Amsterdam's trading function required direct water access to individual merchant's houses and warehouses."[176] As a result, the large canal patterns linked to merchant houses and storerooms and to the larger city framework.

From 1610 to 1650, the population rapidly increased from 50,000 to 200,000.[177] Because of the increased prosperity of the Dutch merchant class, Amsterdam expanded in 1609 to include the radiating canals of the Herengracht, Keizersgracht and Prinsengracht, and the blocks between them.[178] All three canals were 80 to 88 feet wide, and they encircled the medieval city core while creating a gridpattern that allowed for ease of movement.[179]

> "Outside this girdle to the west a new area--the Jordan--was created. Its rectilinear street network was oriented diagonally in relation to the three new main canals. The whole project was realized within the space of two decades; by the beginning of the 1620s the canals appear to have been built and the blocks marked out. A rapid increase in the population, which rose from 50,000 in 1610 to 200,000 in 1650, favored the realization of the project."[180]

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174 Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 222.
175 Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 222.
176 Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 222.
177 Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 234.
178 Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 134; Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 17; Louwe, Jos en Casper van der Hoeven, *Amsterdam als stedelijk kouwwerk, een morfologiese analyse*. Nijmegen, 1985, p. 53 f.f.
179 Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 222-223.
180 Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 234.

With this new development, the first occurring of economic or social zoning also came into existence. As the new plots were sold, “merchants occupied impressive sites along the new concentric canals, while craftsman and their like were relegated to more peripheral locations.”[181] While zoning did appear later in the American system, in this Dutch example, the merchants needed the canals in order to store goods, and so their houses gave them access to the canals for economic purposes. Craftsman and others did not need this economic advantage. Their market was in situ.

In the 1860s, J. G. van Niftrik, first idealized an ideal Amsterdam. Niftrik was more concerned about the architectural aspects of the plan. “Van Niftrik’s project is indubitably an impressive attempt to create a town planned in detail, in which nothing was to be lacking. And yet it has the air of an obvious drawing-board project, added to which it was a little old-fashioned for its time.”[182] The plan included large radial patterns of blocks that had no coherence with the center of Amsterdam and the previous developments.[183] As a result, many criticized van Niftrik’s plan and doomed it from being built.[184]

> “Van Niftrik’s plan met with powerful criticism---directed no so much at the poor communications, however, as at what were claimed to be the insuperable problems which the necessary acquisition of land would entail, and for which the town had neither the legal means nor the economic resources.”[185]

Another part of this rejection was the location of the rail station, where a north more central area north of the urban core was favored.[186] “Thus after the discussion van

[181] Hall, Thomas. Planning Europe’s Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 234.
[182] Hall, Thomas. Planning Europe’s Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 239.
[183] Hall, Thomas. Planning Europe’s Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 239.
[184] Hall, Thomas. Planning Europe’s Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 239.
[185] Hall, Thomas. Planning Europe’s Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 239.
[186] Hall, Thomas. Planning Europe’s Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 239.

Niftrik's plan was rejected."[187] Unlike Barcelona, Amsterdam knew where it wanted to go, and its decisions were adamant and final.[188]

By 1875, the city had not increased past the earlier city boundaries. "In fact, the city had not increased in size since the seventeenth century, with a population still housed within the perimeter of the old city."[189] In order to expand, J. Kalff proposed to abandon the radial concentric plan and favored an orthogonal extension in two directions.[190] While the planning concentrated mainly on transportation systems, the architectural differences of working class, bourgeoisie neighborhoods can be readily seen.[191]

> "His proposal, known as the General Expression Plan for Amsterdam (Het algemeen uitbreidningsplan voor Amsterdam) and produced with the help of van Niftrik, was presented in 1876 and approved two years later."[192]

Kalff's plan was more pragmatic and based upon an adjustment of the radial conditions of the canals to a more expandable situation.[193] The important part was not that Kalff was creating the most idealized system, he was rationalizing the problem of expansion of Amsterdam and the needs of the increase population (from 224,000 to 511,000 persons) to create city that worked. What ones sees are the Amsterdam's grids, whatever they are into small pieces of neighborhoods so that there are no infinite lines.

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[187] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 239.
[188] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 239.
[189] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 58; Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 239.
[190] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 58.
[191] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 58.
[192] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 239.
[193] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 239.

The new streets and shifted grids connect and interconnect with the previous grids--complete unity.

> "Kalff's plan seems more concerned to synthesize developments that were already under way, than to steer developments itself, and landowners demands for new streets to increase building densities were provided for."[194]

Post World War I, construction came to a stop for working class and for those of upper class.[195] In Amsterdam in 1901, due to the Housing Act, the purpose of Amsterdam urban planning has been one of public housing.[196]

> "The policy has been so vigorously implemented that after Berlage's world-famous Plan Zuid of 1917, with is boulevards a' la Haussmann, such as Rooseveltlaan and Appollolaan, in later urban expansion schemes urban design and housing production fell so fervently into one another's arms that they fused."[197]

In 1900, Amsterdam contracted with H. P. Berlage in order to continue its plan to increase social housing and expand the city in a planned fashion.[198] "A first version of Berlage's plan for the major expansion of Amsterdam to the south – Plan Zuid—was completed in 1904."[199] Influenced by Ruskin and the Garden City movement, the urban expansion after Plan Zuid was more functionalist than aesthetic or classical.[200] The result is two cities that are comprised together, the classical 19th century city and the

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[194] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 240.

[195] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 89.

[196] Kloos, Maarten. Amsterdam Architecture: 1991-1993. Amsterdam: Architectura and Natura Press, 1994, p. 15; Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 243; Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, pp. 89-90.

[197] Kloos, Maarten. Amsterdam Architecture: 1991-1993. Amsterdam: Architectura and Natura Press, 1994, pp. 15-16.

[198] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 243.

[199] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 243; Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 138.

[200] Kloos, Maarten. Amsterdam Architecture: 1991-1993. Amsterdam: Architectura and Natura Press, 1994, p. 16.

modernist city with constructionist, futurist, cubist and realist links.[201] Within this city, what formed was the urban core and the suburbs--the grootstad and the voorstad (suburbs).

> “After all, the residents of Buitenveldert or Wattergraafsmeer talk about ‘the city’ when they refer to Amsterdam’s city centre--at least, if they’re not already said ‘I’m going to Amsterdam.’”[202]

From the 1910-1920, the Garden City concept was prevalent in the Netherlands.[203] While Howard’s ideas had a traditional model within Dutch architecture with the center close, no genuine garden city was built in the Netherlands even though it was influential on Dutch architecture and planning.[204] Instead, Amsterdam developers and planners built the “monumental town house construction.”[205] Inward looking garden houses are the exception and not the rule in the Netherlands.[206] Instead, Amsterdam took the largeness of the Garden City movement and just crated large urban housing projects.[207] These projects included Plan Zuid in the South (1915-1917) where the block becomes the “measure of things.”[208]

> “Berlage’s second plan is exceptionally large and generously dimensioned: the streets are wide, the park and green spaces spaciously laid out and the housing blocks massive. Although construction began in the 1920s, it was not until just before the

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[201] Kloos, Maarten. Amsterdam Architecture: 1991-1993. Amsterdam: Architectura and Natura Press, 1994, p. 16.
[202] Kloos, Maarten. Amsterdam Architecture: 1991-1993. Amsterdam: Architectura and Natura Press, 1994, pp. 16-17.
[203] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 20.
[204] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 20; Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 23.
[205] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 21.
[206] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 21.
[207] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, pp. 20-21; Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 56.
[208] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 22.

> Second World War that this high point in Dutch urban planning was finally completed."[209]

From the 1920-1930s, the urban planning tended to be based upon concepts of previous design rather than more modern concepts. "Throughout the 1920s the majority of urban design plans continued to be based on concepts developed in the previous century."[210] With the 1930s, there became the functional city concept, with the influence in CIAM.

> "What set the concept of 'functional city' apart was its radical approach to general accepted notions. The widely espoused spatial separation of functions, for example, acquired a very specific interpretation in the 'functional city' where urban life was reduced to four main functions (home, work, recreation and traffic) which were to be rigidly separated from one another spatially."[211]

Because of modernism in the 1950s and 1960s, the block dissolved, and the field was considered not streets but a field of objects.[212] This was heavily influenced by Le Corbusier and Giedion.[213] As these projects began to get built, even planners who did not adhere to CIAM's ideas of functionality agreed with modernist concepts of light, air and space that were independent of the highly philosophical aspects of functionality.[214] They changed their designs to meet these points of agreement. "On the whole though functionalists and traditionalists tended to fight less over matters of town planning than architecture."[215] From the post-World War II period of rapid development and increased

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[209] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 22.
[210] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 40.
[211] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 54.
[212] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 256.
[213] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 256.
[214] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, pp. 54-55; Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 56.
[215] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 54.

population, the 1930s to 1940s and 1950s were about expanding the urban form to create a more open city.[216]

> "From 1850 to 1920, after emerging from a long period of economic stagnation, Amsterdam's population grew by almost three times from 230,000 to 683,000 inhabitants."[217]

As a result, there was a concern of not only having enough housing but also with providing enough access for circulation. "The open city that resulted from construction of spacious estates of open row housing was ideally suited to motorized traffic."[218] This included building large motorways and expressways similar in fashion to what occurred in the United States, though in the Netherlands, this became a great concern.[219]

> "Apart from changes wrought by traffic corridors and new infrastructure, the cities were also drastically transformed by redevelopment and slum clearance, terms which referred to the demolition of old, often rundown inner-city areas. 'Redevelopment' usually meant wholesale demolition followed by the construction of new buildings that had little or nothing in common with what had gone before. This continued to be standard practice until about 1970."[220]

In the 1960s and 1970s, several Spatial Planning reports regarding agriculture were produced, and urban planning continued much as it did before. "The largest project undertaking in Amsterdam was a planning experiment involving a new construction of a whole new borough in the Bijlmermeer, an area to the southeast of Amsterdam."[221] Considered the city of tomorrow, the urban development did not adhere to traditional notions of the street in town planning usually incorporated in Dutch planning systems, rather the more modernist approaches of the "tower blocks disposed in a park-

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[216] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 58.
[217] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 58.
[218] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 86.
[219] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 86.
[220] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 87.
[221] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 105.

like setting crisscrossed by foot and cycle paths, the Bijlmermeer was an extreme elaboration of the 1930s concept of living in green surroundings."[222] "By the late 1960s, these plans met resistance from the public.[223]

By the 1970s and 1980s there was a move away from the motorized highways and expressways and away from the towers in the park. "The swing away from large-scale, car-based urban planning to small-scale designed tailored to people walking, cycling and playing, is epitomized in this history of the Prins Bernard viaduct in The Hague."[224] There were attempts of the polynucleated city like Almere, where "each core is a self-contained entity with its own centre and a distinctive atmosphere and character."[225] However, there started to be a reaction against "cauliflower urbanism" with the resent, cul-de-sacs and home zones.[226] The Dutch considered it to create a diffuse picture of urbanism. "Usually such plans were then developed splotch by splotch which in some cases resulted in planners losing sight of the overall picture."[227]

By the 1980s-1990s, the "city came back into fashion."[228] After the neighborhood and village urbanism of the 1970s, the urbanism became more about the urban areas and city.[229] "Strong form was also the guiding principle in the design of new suburban developments. Corpus den Hoorn in Groningen, Nieuw Sloten in Amsterdam and

[222] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 105.
[223] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 107.
[224] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 124.
[225] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 125.
[226] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 125.
[227] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 125.
[228] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 136.
[229] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 136.

Prinseland in Rotterdam are all characterized by a high degree of organization."[230] This included interest in the high rise and the more compact centers. "The compact city was a concept that surfaced in the 1980s and with which everyone, from high-rise lobbyists to environmental activists, could agree."[231] This idea became "urban regeneration"[232]

> "The idea was to give each district and each neighbourhood a distinct identity of its own."[233]

From the 1990s to 2000s, many of these previously developed large housing complexes and large scale developments started to under changes to become more Districts than neighborhoods. What one sees today is a system of development that focuses on the creation of unique sections of the city, the District, rather than creating monuments of sameness.

The most interesting fact of Amsterdam is that it is truly the only planned major city in the Western World. This is because the Dutch had to reclaim the land in order to build Amsterdam, and all other cities are constructed on dry land.[234] The Dutch built Amsterdam through the steady water control and management, plot building, the maintaining of dikes and the reclamation of land.[235] As a result, Amsterdam did not suffer Barcelona's mistakes or Paris' sheer luck, and it became a world economic and colonial power by will alone. Many choose Amsterdam as a cultural, economic and urban design capitals for it performs economically, and it is the definition of a designed city and landscape. According to the Mercer Quality of Living Survey, Amsterdam ranks

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230 Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 137.

231 Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 137.

232 Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, pp. 137-138.

233 Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 154.

234 Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 139

235 Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, pp. 15, 139.

12th in the world in 2012 when taking “39 factors including political, economic, environmental, personal safety, health, education, transportation and other public service factors. Cities were compared to New York City which was given a base score of 100.[236]” As a result, Amsterdam is a city within this study, and this study will factor the city’s results within the medians of urban form resiliency.

3.3.7 Site Selection

The Site Areas in these cities are of similar shape and size. The average size of the Site Areas is 1 kilometer square, and this study chose the sites to have a similar context. The criteria for Site Selection were: 1 kilometer size, a large enough park near or within the site are of similar size to the other site areas, and to have generalized urban form that was representative of the city at large. In the San Francisco Site Area, most of the urban form is rectilinear with a small amount of curved streets. In Portland, all of the Site Area has both small and medium sized blocks representing the city at large. The Portland Site Area also has architectural infill with represents the vast majority of the city while being tightly fit. In New York, the Site Area has a large park and has architectural infill which is also tightly fit. Because of the limited open source spatial data, the Barcelona Site was chosen in the largest area where GIS spatial files could be found, while being similar to the other Site Areas. Because most of the urban form in Paris is very similar, the Site Area’s bounding streets cut an approximate 1 kilometer section from the urban grid, and this study used that section as the test area. In Amsterdam, the larger park and the canals cut an approximate 1 kilometer section within the city, and this study used that section as the Test Area. All of the Site Areas are representative of the test city. None are the most resilient areas. This study felt that

[236] Mercer. "Quality of Living Worldwide City Rankings 2010 – Mercer Survey". *Mercer.com*, May 26, 2010. http://web.archive.org/web/20110725220010/http://www.mercer.com/press-releases/quality-of-living-report-2010 (accessed August 2, 2014).

picking the most resilient areas of each of these cities would be limited by size and would not give a good approximation of how urban form is working in that particular city.

CHAPTER 4.

URBAN FORM ANALYSIS AND RESILIENT URBAN FORM

> "[The] more space a city devotes to movement, the more the exchange space becomes diluted and scattered. The more diluted and scattered the exchanged opportunities, the more the city begins to lose the very thing that makes a city: a concentration of exchange opportunities." [237]

In order to change the present urban condition, an analysis must take place to determine the form, amount, elements, position and dynamics of urban form within our most resilient cities. This will give planners an idea of what benchmarked ranges and numbers are necessary in order to assess the resiliency and completeness of their own communities, and to see what can be done through development or financial means in order to improve their situation. This requires a multi-pronged analysis.

First, this requires an understanding of benchmarking systems and the historical trajectory of how urban form evolved in the United States. This gives one a better understanding of systemic changes to urban form and which periods caused benchmarking changing.

Second, this require an understanding that not all cities are important for resiliency benchmarking. A perceived flaw in present data is that all cities are within analysis cohorts, and as a result one factors non-performing urban form into an analysis of urban form in general. Cohorts which include non-performing urban form are best to get averages and statistics for what urban form is as a whole, but these are not to cohorts that one should establish when determine what is the best urban form. As a result, this thesis has taken the subjective determination to study six respected resilient

[237] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 103; Engwich, D *Street Reclaiming, Creating Liveable Streets and Vibrant Communities* British Columbia: New Society Publishers, 1999, p. 19.

cities to determine their similarities in urban form, and uses those numbers to compare against numbers from the Old Fourth Ward in Atlanta.

Third, this requires a theoretical understanding of urban form as an urban structure, why it exists within the evolutionary and psychological record, and how each type of urban form in the present exists under this framework. This is important because many types of urban from elements actually perform multiple urban form functions. In order to ascertain the benchmarks for those functions, one needs to understand what the benchmark represents.

> "To understand cities, we have to deal outright with combinations or mixtures of uses, not separate uses, as the essential phenomena."[238]

Fourth, when the benchmark numbers have means and standard deviations, one can compare other cities and their means and standard deviations with these resilient benchmarked numbers to see whether areas of similarity or dissimilarity may be found. As a result, instead of studying one factor, one can use these benchmark numbered to see the broader picture of how these cities relate to each other and determine a schematic design approach to retrofit non-performing cities.

[238] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 188.

CHAPTER 5.

URBAN FORM AND LEED FOR NEIGHBORHOOD DEVELOPMENT

5.1 Cities are Complex Systems

> "Instead of attempting to substitute art for life, city designers should return to a strategy ennobling both to art and to life: a strategy of illuminating and clarifying life and helping to explain to us its meanings and order—in this case, helping to illuminate, clarify and explain the order of cities.[239]

Urban form is more than just the planning of streets or blocks in any particular direction. Urban form is the planning of complex types of orders that allow people to move through space. "To see complex systems of functional order as order, and not as chaos, takes understanding."[240] Unfortunately, when urban planning tends to occur, it generally happens as piecemeal redevelopments or the scattering of elements within space with no particular purpose or for simply the sake of duplication.[241] Rarely does urban design represent a functional order that allows people to go through their city with ease, and even though the resulting designs are often beautiful to behold, they are usually failures at form and order.

> We are constantly being told simple-minded lies about order in cities; talked down to in effect, assured that duplication represents order. It is the easiest thing in the world to seize hold of a few forms, give them a regimented regularity, and try to palm this off in the same of order. However, simple regimented regularity and significant systems of functional order are seldom coincident in this world."[242]

Thus, design becomes an exercise of the placement of discrete urban elements or parts in the abstract or in philosophical reasoning. Almost in an architectural way, we

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[239] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 489.
[240] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 489.
[241] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 489.
[242] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 489.

see these elements as sculptural events that can be transported from one place to another with great assurity that their effects will be the same in the new location. What we end up with is a morass of building-like and street-like things that need retrofitting or resuscitation from new urbanists or those interested in recreating urban form.

> "Imaging buildings that exist in isolation--you can't, they don't. Even the house on the perfect greenfield site with no other built form in sight has a context. Yet we do imagine buildings like this. And, whilst the greenfield building is more likely to be photographed with the trees and lawn, the infill city site is likely to be photographed with adjacent buildings, the buildings across the street, even the street itself, all carefully screen out."[243]

What this ultimately becomes is understanding urban form as it is and respecting it as one finds it. Urban form contains fronts, backs, sides, streets, enclosures, linings, spaces, the public, private, hard, soft, busy, quiet, chaotic, hot, cold, the entire environments of place that we live within, and the things that we self-select to not see.[244] Urban form is unstatic and ever-changing, it evolves, and it cannot be contained or regimented, for it is alive. It breathes like we breathe and dies like we die--just at different scales of time. As a result, we must consider cities as very complex system rather than maps that one can find quickly on webpages and internet searches. Cities are complex systems in the very same manner as analogous organic systems.[245]

> "To use the human body as an analogy, frameworks are the skeletal structures on which an urban area is constructed. Frameworks can be natural or manmade."[246]

What we can say is that the political, policy and form impositions upon the street have variable levels of success and many times great failure, because they impose upon the street or public realm hurdles as the street tries to evolve and limitations as the street

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[243] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. xiii.
[244] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. xiii.
[245] Gindroz, Ray, et al. The Urban Design Handbook: Techniques and Working Methods. New York: W.W. Norton and Company, 2003, p. 29.
[246] Gindroz, Ray, et al. The Urban Design Handbook: Techniques and Working Methods. New York: W.W. Norton and Company, 2003, p. 29]

tries to change. Still, there is nothing ultimately wrong with wanting safe sidewalks, safe areas for children, superblocks, small blocks, large residential areas or other types of policy impositions upon urban form. It is just that many times these philosophical, form or policy impositions retard the natural evolution of the street with impositions and they block urban from system optimization. Left with an ability to seek equilibrium, the city system will evolve and become more resilient.[247]

> "As well as evolution towards optimum block sizes, Siksna concluded that incremental change generally overcame or, at least, reduced the deficiencies of the initial layout."[248]

In order to implement urban form designs, many have set up policy systems which negotiate sizes and shapes of urban form elements in order to make designed cities more productive or implement some aspect of public policy. These associations have used their organizational experience and intelligence to create checklists of urban form requirements to consider or to adhere while considering designs. In 2009, The U.S. Green Building Council ["USGBC"], the Council of New Urbanism ["CNU"] and the Natural Resource Defense Council ["NRDC"] coordinated their efforts to produce probably the most important and influential of these checklists, known worldwide as the Leadership in Energy and Environmental Design, Neighborhood Development ["LEED ND"] certifying program.'

5.2 Development of LEED-ND and Similar Systems

The Leadership in Energy and Environmental Design for Neighborhood Development [LEED-ND] green building certification program is currently one of the most advanced and comprehensive systems of urban form analysis.[249] In addressing

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[247] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 102.
[248] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 102
[249] Leadership in Energy & Environmental Design. "LEED." http://www.usgbc.org/leed (accessed May 15, 2014).

urban design as whole, the USGBC, CNU, and the NRDC joined together to “to develop a rating system for neighborhood planning and development based on the combined principles of smart growth, New Urbanism, and green infrastructure and building.”[250] LEED-ND represents a trifecta of public purpose, policy and directive that weaves anticipated effects of construction and urban development within the United States, and it asks the questions of whether this future is changeable for the better.[251] LEED-ND attempts to address the disparities within urban form at a crucial time before further population explosions within the United States threatened to turn more land into sprawl.[252] LEED-ND takes a political position that past and present urban development methods of urban development with segregated uses, high greenhouse gas production and automobile-dependent sprawl is not how urban design should function for the betterment of people or society.[253] In doing so, it posits the idea that that “green development” is not only beneficial for the environment, but also for society, public

[250] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. xii; U.S. Environmental Protection Agency. “Sustainable Design and Green Building Toolkit for Local Governments,” U.S. Environmental Protection Agency, Smart Growth. http://www.epa.gov/dced/publications.htm, http://www.epa.gov/dced/sg_guidelines.htm and http://www.epa.gov/dced/pdf/sg_guidelines.pdf (accessed August 2, 2014); Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 287.

[251] Steuteville, Robert and Philip Langdoc and Special Contributions. “New Urbanism Best Practices Guide.” Texas Tech University Department of Architecture at El Paso. http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28.

[252] Steuteville, Robert and Philip Langdoc and Special Contributions. “New Urbanism Best Practices Guide.” Texas Tech University Department of Architecture at El Paso. http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, p. xi.

[253] Steuteville, Robert and Philip Langdoc and Special Contributions. “New Urbanism Best Practices Guide.” Texas Tech University Department of Architecture at El Paso. http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, p. xi.

health, and then national economies when total costs incorporate the negative externalities laid upon the public in future clean-up costs.[254]

> "Unlike other LEED rating systems, which focus primarily on green building practices and offer only a few credits for site selection and design, LEED for Neighborhood Development places emphasis on the site selection, design, and construction elements that bring buildings and infrastructure together into a neighborhood and relate the neighborhood to its landscape as well as its local and regional context."[255]

Creating the LEED-ND checklist and rating system, the purpose was to address a problem larger than just as single building, but the larger framework and scale of overall development and planning on a city, regional and national scale. LEED-ND takes aim at various building code and ordinance systems that make sustainable building almost impossible or regulations or administrative actions that make sustainable urban practices less attractive. Combating previous modernist attitudes of urban form, LEED-ND addresses "dispersed uses with few distinct centers, spatial separation of all

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[254] Steuteville, Robert and Philip Langdoc and Special Contributions. "New Urbanism Best Practices Guide." Texas Tech University Department of Architecture at El Paso. http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, p. xi ("In contrast, by placing residences and jobs proximate to each other, thoughtful neighborhood planning and development can limit automobile trips and the associated greenhouse gas emissions. Mixed-use development and walkable streets encourage walking, bicycling, and public transportation for daily errands and commuting. Environmentally responsible buildings and infrastructure are an important component of any green neighborhood, further reducing greenhouse gas emissions by decreasing energy consumption. Green buildings and infrastructure also lessen negative consequences for water resources, air quality, and natural resource consumption. Green neighborhood developments are beneficial to the community and the individual as well as the environment. The character of a neighborhood, including its streets, homes, workplaces, shops, and public spaces, significantly affects the quality of life. Green neighborhood developments enable a wide variety of residents to be part of the community by including housing of varying types and price ranges. Green developments respect historical resources and the existing community fabric; they preserve open space and encourage access to parks. Green buildings, community gardens, and streets and public spaces that encourage physical activity are beneficial for public health. Combine the substantial environmental and social benefits and the case for green neighborhoods makes itself.")

[255] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. xii.

key daily activities, excessive land consumption, street designed for cars rather than people, lack of convenient, cost-effective transit, limited choice in housing supply, and fear of density."[256]

> "Unlike other LEED rating systems, which focus primarily on green building practices and offer only a few credits for site selection and design, LEED for Neighborhood Development places emphasis on the site selection, design, and construction elements that bring buildings and infrastructure together into a neighborhood and relate the neighborhood to its landscape as well as its local and regional context."[257]

There are other systems of creating living and working neighborhoods such as Zero-Commute Living, Zero-Commute Housing, Live-Work, New Urbanist, Smart Growth, Transportation Oriented Development, Green Building and recent creations like the Buffalo Green Code.[258] Zero-Commute Living is a generalized type of planning that views "sees the need for transportation as a measure of dysfunction in planning and therefore advocates the creation of urban places that minimize the reliance on the

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256 Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 185.

257 U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. xii.

258 Dolan, Thomas. Live-Work Planning and Design: Zero-Commute Housing. Hoboken, New Jersey. John Wiley and Sons, Inc, 2012, p. 26-27; U.S. Environmental Protection Agency. "About Smart Growth." http://www.epa.gov/dced/about_sg.htm (accessed August 2, 2014); Smart Growth Online: "New Resources." http://www.smartgrowth.org/ (accessed July 10, 2014); U.S. Environmental Protection Agency. "About Smart Growth." http://www.epa.gov/dced/about_sg.htm (accessed August 2, 2014); Ohm, Brian W, James A. LaGro, Jr, and Chuck Strawser. *The Model Ordinance for a Traditional Neighbourhood Deevlopment*. Wisconsin Legislature, July 28, 2001. Approved. http://urpl.wisc.edu/people/ohm/tndord.pdf (accessed July 10, 2014; Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014); Lewin, Susan Spencer. "Urban Sustainability and Urban Form Metrics," Journal of Green Building. 7 2 (2012): 20, 44-63. http://www.journalofgreenbuilding.com/doi/pdf/10.3992/jgb.7.2.44 (last visited July 7, 2014), p. 47.

automobile."[259] Zero-Commute Housing is synonymous with Live-Work.[260] Both Zero-Commute Housing and Live-Work seek to create "compact, walkable mixed-use place served by retail, transit, parks, and other urban services" with Live-Work focusing on transforming districts into neighborhoods."[261] The purpose with Live-Work neighborhoods is to keep people, workplace, home and daily needs within a ten minute walk of each other.[262] New Urbanism, which will be addressed later, works to resuscitate and retrofit urban areas with "compact, mixed-use, walkable, connected, pedestrian-scaled neighborhoods as the building blocks of sustainable communities and regions."[263] Smart Growth is more governmental policy oriented than either methods but is used within many other types of systems to promote "focused growth…and sustainable development" without indicate the specifics of that development.[264] "'Smart growth' covers a range of development and conservation strategies that help protect our natural environment and make our communities more attractive, economically stronger, and more socially diverse."[265] Maryland first implemented Smart Growth policies in the

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[259] Dolan, Thomas. Live-Work Planning and Design: Zero-Commute Housing. Hoboken, New Jersey. John Wiley and Sons, Inc, 2012, p. 26.
[260] Dolan, Thomas. Live-Work Planning and Design: Zero-Commute Housing. Hoboken, New Jersey. John Wiley and Sons, Inc, 2012, p. 26.
[261] Dolan, Thomas. Live-Work Planning and Design: Zero-Commute Housing. Hoboken, New Jersey. John Wiley and Sons, Inc, 2012, p. 26-27.
[262] Dolan, Thomas. Live-Work Planning and Design: Zero-Commute Housing. Hoboken, New Jersey. John Wiley and Sons, Inc, 2012, p. 27.
[263] Dolan, Thomas. Live-Work Planning and Design: Zero-Commute Housing. Hoboken, New Jersey. John Wiley and Sons, Inc, 2012, p. 27.
[264] Dolan, Thomas. Live-Work Planning and Design: Zero-Commute Housing. Hoboken, New Jersey. John Wiley and Sons, Inc, 2012, p. 27; U.S. Environmental Protection Agency. "About Smart Growth." http://www.epa.gov/dced/about_sg.htm (accessed August 2, 2014); see also Lewin, Susan Spencer. "Urban Sustainability and Urban Form Metrics," Journal of Green Building. 7 2 (2012): 20, 44-63. http://www.journalofgreenbuilding.com/doi/pdf/10.3992/jgb.7.2.44 (last visited July 7, 2014), p. 47; Gillham, Oliver, and Alex S. MacLean. *The Limitless City: A Primer on the Urban Sprawl Debate*. Washington, DC: Island, 2002, pp. 155–160.
[265] U.S. Environmental Protection Agency. "Sustainable Design and Green Building Toolkit for Local Governments," U.S. Environmental Protection Agency, Smart Growth. http://www.epa.gov/dced/publications.htm, http://www.epa.gov/dced/sg_guidelines.htm and http:/; Smart Growth Online: "New Resources." http://www.smartgrowth.org/ (accessed July 10, 2014); U.S.

1950s, and regulatory authorities have sense codified Smart Growth as a "positive framework for directing development."[266]

> "National Resources Defence Council (NRDC) defines Smart Growth as solutions that 'reinvigorate our cities, bring new development that is compact, walkable, and transit-oriented, and preserve the best of our landscape for future generations.' The goal of Smart Growth is to prevent the unplanned, haphazard, and undesirable effects of uncontrolled suburbanization."[267]

What seems to be occurring is that, like a van diagram, these methods overlap in critical areas but their policy, actual implementation or areas that each consider most critical are different. Each seem to ultimately result in mixed land usage, compact building development, ranges of housing and residential choices, attractive developments, close amenities, increased stakeholder participation in building vibrant communities, and other policy objectives that are not necessarily urban form but affect urban life.[268] The difference with LEED and other systems is the objective not to just build a policy framework but to actually have a standard set of sustainability practices with real environmental effect by taking concepts which LEED used initially for building practices and expanding them in scale to neighborhood development by imposing new standards of sustainability and urbanism within development projects.[269]

Environmental Protection Agency. "About Smart Growth." http://www.epa.gov/dced/about_sg.htm (accessed August 2, 2014).

266 Lewin, Susan Spencer. "Urban Sustainability and Urban Form Metrics," Journal of Green Building. 7 2 (2012): 20, 44-63. http://www.journalofgreenbuilding.com/doi/pdf/10.3992/jgb.7.2.44 (last visited July 7, 2014), p. 47.

267 Lewin, Susan Spencer. "Urban Sustainability and Urban Form Metrics," Journal of Green Building. 7 2 (2012): 20, 47. http://www.journalofgreenbuilding.com/doi/pdf/10.3992/jgb.7.2.44 (last visited July 7, 2014)

268 U.S. Environmental Protection Agency. "About Smart Growth." http://www.epa.gov/dced/about_sg.htm (accessed August 2, 2014).

269 Lewin, Susan Spencer. "Urban Sustainability and Urban Form Metrics," Journal of Green Building. 7 2 (2012): 20, 44-63. http://www.journalofgreenbuilding.com/doi/pdf/10.3992/jgb.7.2.44 (last visited July 7, 2014), p. 48; U.S. Green Building Council, Natural Resources Defense Council, and the Congress for the New Urbanism. "A Citizen's Guide to LEED for Neighborhood Development: How to Tell if Development is Smart and Green." Natural Resources Defense Council blog.

"The stated objectives of LEED-ND rating system are to improve energy and water efficiency, revitalize existing urban areas, reduce land consumption, reduce automobile dependance, promote pedestrian activity, improve air quality, decrease polluted stormwater runoff, and build more liveable, sustainable communities for people of all income levels. This is consistent with the goals of Smart Growth and New Urbanism."[270]

These various and overlapping policies and urban philosophies have resulted in model ordinances and the implementation of various code systems such as The Model Ordinance for a Traditional Neighborhood Development in Wisconsin, City of Buffalo Green Code, EcoCity Cleveland, TND design, Smart Growth Institute, the Los Angeles Walkability Checklist, the San Louis Obispo Planning Department has multiple codes which mirror LEED-ND requirements, etc.[271] While masterful efforts of planning and policy, there are questions whether such detailed systems cause their intended results to occur. The ultimate benefit of the LEED-ND system is as a comparison system for standard building practice and a simplicity of application to specific developments. Still, that does not mean that LEED-ND itself is effective and has an intended result, and really what that intended result is.

5.3 LEED for Neighborhood Development

"LEED for Neighborhood Development integrates the principles of smart growth, urbanism and green building into the first national system for neighborhood design."[272]

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https://www.nrdc.org/cities/smartgrowth/files/citizens_guide_LEED-ND.pdf> (accessed July 9, 2014), p. 2.

[270] Lewin, Susan Spencer. "Urban Sustainability and Urban Form Metrics," Journal of Green Building. 7 2 (2012): 20, 44-63. http://www.journalofgreenbuilding.com/doi/pdf/10.3992/jgb.7.2.44 (last visited July 7, 2014), p. 48; U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. *LEED 2009 for Neighborhood Development*. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014).

[271] Ohm, Brian W, James A. LaGro, Jr, and Chuck Strawser. *The Model Ordinance for a Traditional Neighbourhood Deevlopment*. Wisconsin Legislature, July 28, 2001. Approved. http://urpl.wisc.edu/people/ohm/tndord.pdf (accessed July 10, 2014; Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014).

[272] See U.S. Environmental Protection Agency. "Sustainable Design and Green Building Toolkit for Local Governments," U.S. Environmental Protection Agency, Smart Growth. http://www.epa.gov/dced/publications.htm, http://www.epa.gov/dced/sg_guidelines.htm and

Like past attempts to create more sustainable, environmentally friendly and productive urban form, the LEED-ND program works to address past, present and future urban form elements and architectural elements to address the malignant effects that previous urban design methods have wrought upon the landscape--most particularly modernism. LEED-ND also assumes that most of these developments will be market-driven rather than government promoted, and that these efforts should be voluntary, inclusive, environmental and available to persons of all income levels.[273] The LEED-ND's preferred design standards is accomplished by the itemization and weighing of urban form, placement, location, quality and nature of communities and designs in order to facilitate "good" urban growth patterns for levels of certification. Yet, the LEED-ND system contains not only issues of urban form but also issues of policy and environmental sustainability that create added costs in development while having very little improvement upon actual urban form. While there are legitimate public policy reasons to create these checklists, checklists like LEED-ND might not represent actual design benchmarks or planning functions represented within current cities as they evolved over time--resilient cites.

As a result, cities are actually resilient, sustainable and economic powerhouses, that are flexible, walkable and livable, are not reflected within the LEED-ND requirements nor will they result from adherence to LEED-ND requirements. Further,

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http://www.epa.gov/dced/pdf/sg_guidelines.pdf (accessed August 2, 2014); Sharifi, Ayyoob, and Murayama, Akito. "A critical review of seven selected neighborhood sustainability assessment tools." *Environmental Impact Assessment Review* 38 (2013): 73–87. http://www.sciencedirect.com/science/article/pii/S0195925512000558 (accessed July 14, 2014); Sharifi, Ayyoob, and Murayama, Akito. "Neighborhood Sustainability Assessment in Action: Cross-Evaluation of Three Assessment Systems and Their Cases from the US, the UK, and Japan." *Building and Environment* 72 (2014): 243-258. http://www.sciencedirect.com/science/article/pii/S036013231300320X# (last visited July 14, 2014)

[273] Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 287.

the systems that represent checklists or point-based systems result in pockets of urbanism that have limited effect because their impact is small and they fail to retrofit cities on the skeletal or function level necessary to create more effective cities rather than just livable neighborhoods. While these systems like LEED-ND are legitimate and good impositions of public intention, they might not result in their intended effect. As a result, they reduce to unsubstantiated norms that push development more or less in a direction that might inhibit growth or city evolution into resiliency. What we might find is that while LEED-ND has a good purpose, the effect is to create small networks of areas that are resiliency-like but not actually resilient systems that have enough vitality or diversity to become resilient.

> "When city designers and planners try to find a design device that will express, in clear and easy fashion, the "skeleton" of city structure (expressways and promenades are current favorites for this purpose), they are on fundamentally the wrong track. A city is not put together like a mammal or a steel frame building—or even like a honeycomb or a coral. A city's very structure consists of mixtures of uses, and we get closest to its structural secrets when we deal with the conditions that generate diversity."[274]

What we might find is that these benchmarking systems, while good marketing, do not create systems or urban design. Still, what we might find is that these systems create opportunities for cities to become more resilient. Yet, if those cities only comply with LEED-ND or other point-based systems, they will only approach but never become urban cores that become self-propelled economic and cultural engines--Resilient Cities.

What LEED-ND focuses on are the idea of "neighborhoods" as a concept and pedestrian shed.[275] LEED-ND defines the neighborhood as a unit as a "planning unit of

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[274] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 90.

[275] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p xv.

a town."[276] This is a New Urbanist concept that evolved from prior planning policies about the city as an amalgam of separate and distinct neighborhood units rather than prior concepts of the city as the overall unit with organelle neighborhoods.[277] "By itself the neighborhood is a village, but combined with other neighborhoods it becomes a town or a city. Similarly, several neighborhoods with their centers at transit stops can constitute a transit corridor."[278] Unlike other generalist planning ideas, LEED-ND defines the neighborhoods for planning purposes as sustainable "compact, complete, and connected" communities meeting dialing individual needs within approximately a 320 acre area--which is a 1/2 square mile area of land.[279] This constitutes a 5 minute walk in either direction or a 10 minute walk from one side of the neighborhood to the other.[280] These neighborhoods have an edge, a center, streets, and specific conditions and civic uses for the inhabitants.[281] While this pedestrian shed is defined by the 1/4 mile that one person would walk, what we will see is that this is new pedagogical support for the same walkable linear unit of 1,320 feet.

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[276] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p xvi.

[277] Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 387.

[278] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p xvi.

[279] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p xvi.

[280] U.S. Green Building Council, Natural Resources Defense Council, and the Congress for the New Urbanism. "A Citizen's Guide to LEED for Neighborhood Development: How to Tell if Development is Smart and Green." Natural Resources Defense Council blog. https://www.nrdc.org/cities/smartgrowth/files/citizens_guide_LEED-ND.pdf> (accessed July 9, 2014), p. 4.

[281] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. xvi; Lewis Mumford, "The Neighbourhood and the Neighbourhood Unit," *Town Planning Review* 24 (1954): 256-270.

> "Most people will walk approximately one-quarter mile (1,320 feet) to run daily errands; beyond that, many will take a bicycle or car. Additional research shows that people will walk as far as a half-mile (2,640 feet) to reach heavy rail transit systems or more specialized shops or civic uses. Since half a square mile contains 320 acres, the core committee has decided that this size should serve as guidance for the upper limit of a LEED-ND project." [282]

Within this area, all the different types or urban morphology and their measurements are planned such as "blocks, streets, and buildings."[283] Further, within these areas, there are subjective determination as to the importance of some morphological elements over others when creating healthy communities and balances the importance of urban elements with policy implementations such as energy efficiency and green buildings.[284] What we find in LEED-ND is a dialectic of purpose and practice. We have the intention of changing urban form with by development units, and we have a policy framework that creates infusions of sustainability, new urbanist, energy and green policies within urban

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[282] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. xvi; H. Dittmar and G. Ohland, eds, *The New Transit Town: Best Practices in Transit-Oriented Development*. Washington, D.C.: Island Press, 2004, p. 120.

[283] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. xvii.

[284] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. xvii ("Walkable streets have many features, and those elements deemed most important by the core committee are encouraged by the LEED-ND Rating System. These features, such as human-scaled buildings and street widths, wide sidewalks, buildings that are pulled up to the sidewalk to create a continuous street wall, retail storefronts and other uses, and interesting street furniture and trees, are meant to create a safe, inviting, and well-used public realm with visual interest. To keep loading docks, garage openings, and utilities away from sidewalks, neighborhoods with walkable streets often feature alleys."); U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. xvii-xviii; Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 387.

form.[285] Inherent within the LEED-ND is an implied concept that better urban form contributes to greater sustainability.[286]

As a measure of flexibility, LEED-ND as a system applies to multiple areas of urbanity, and using a New Urbanist framework, LEED-ND could apply to all areas from T1 to T5/T6--from rural areas to urban core and special districts. Thus, hypothetically one could receive a similar accreditation for developments within the urban core or outside the urban core such as suburbia or exurbia. As a result, a LEED-ND certification does not necessarily indicate that the resulting development will have an ultimate impact upon its contextual situation, nor does it result in a much more dense and complete urban form--although the intention is to start the process.

From the “LEED 2009 for Neighborhood Development Rating System” one finds multiple categories relating to environmental, urban design and transportation issues. There are required and other possible points which a development may obtain for their LEED-ND certification type, up to a maximum of 110 points. This includes 27 possible points for Smart Location and Linkage, 44 possible points for Neighborhood Pattern and Design, 29 possible points for Green Infrastructure and Buildings, 6 possible points for Innovation and Design Process, and 4 possible points for Regional Priority Credit. While one can use this checklist for developments of any scale, LEED-ND recommends that one use this checklist on projects of less or equal to 320 acres--a neighborhood unit scale of 1/2 square miles or 1.29499 square kilometers.[287]

[285] Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 387.

[286] Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 388.

[287] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014) (“There is no minimum or maximum size for a LEED-ND project, but the core committee’s research has determined that a reasonable minimum size is at least two habitable buildings and that the maximum area that can appropriately be considered a neighborhood is 320 acres, or half a square mile. A project larger than 320 acres is eligible but may find documenting certain credits difficult and may want to consider dividing the

When analyzing LEED-ND for urban form, one ultimately comes to the conclusion that only 12 point-based categories of LEED-ND actually address the elements of urban form in a substantive manner, whereas the rest are policy implications that might affect urban form but are not urban form. The remaining requirements are not insubstantial or unimportant, rather they represent critical public policy issues that relate to cosmetic, aesthetic, environmental, sustainability, and other worthy aspects that impact urban form, but they are not urban form. As a result, this thesis will concentrate on those areas of urban form that LEED-ND actually addresses, and this thesis leaves the remaining categories for further analysis at a later time.[288] The categories that this

area into separate LEED-ND projects, each smaller than 320 acres. Although projects may contain only a single use, typically a mix of uses will provide the most amenities to residents and workers and enable people to drive less and safely walk or bike more. Small infill projects that are single use but complement existing neighboring uses, such as a new affordable-housing infill development in a neighborhood that is already well served by retail and commercial uses, are also good candidates for certification.")

[288] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014) ("Imperiled Species and Ecological Communities Conservation," ("To conserve imperiled species and ecological communities.")p 10; "Wetland and Water Body Conservation," ("To preserve water quality, natural hydrology, habitat, and biodiversity through conservation of wetlands and water bodies.") p 12; Agricultural Land Conservation, ("To preserve irreplaceable agricultural resources by protecting prime and unique soils on farmland and forestland from development.") p. 15; Floodplain Avoidance, ("To protect life and property, promote open space and habitat conservation, and enhance water quality and natural hydrological systems.") p. 19; Preferred Locations (the locations in this study exist within cities or are neighborhoods within these cities) ("To encourage development within existing cities, suburbs, and towns to reduce adverse environmental and public health effects associated with sprawl. To reduce development pressure beyond the limits of existing development. To conserve natural and financial resources required for construction and maintenance of infrastructure.") p. 22; Brownfields Redevelopment ("To encourage the reuse of land by developing sites that are complicated by environmental contamination, thereby reducing pressure on undeveloped land.") (All of these sites would classify as Brownfield or high priority redevelopment areas.), p 26; the "Housing and Jobs Proximity" (this requirement cannot be tested in this thesis because there is no indication that the jobs in the tested areas have any relationship to the residences in the same areas), but this location will be tested in that commercial or non-residential parcels are within certain limitations from residential parcels; p. 31; "Steep Slope Protection" (category cannot be addressed because in the areas tested, the slopes have already been modified by human habitation), p. 34; the "Site Design for Habitat or Wetland and Water Body Conservation" will not be tested because in the present locations, the habitat or wetland areas have already been used or

drained, thus, while there might be wetland, habitat or water bodies outside of these buildable areas, this cannot really be tested within these communities) ("The following features are not considered wetlands, water bodies, or buffer land that must be protected: a. Previously developed land. b. Man-made water bodies (such as industrial mining pits, concrete-lined canals, or stormwater retention ponds) that lack natural edges and floors or native ecological communities in the water and along the edge c. Man-made linear wetlands that result from the interruption of natural drainages by existing rights-of-way. d. Wetlands that were created incidentally by human activity and have been rated "poor" for all measured wetland functions. Wetland quality assessment must be performed by a qualified biologist using a method that is accepted by state or regional permitting agencies."), p. 36; 'Restoration of Habitat or Wetlands and Water Bodies" (this category cannot be tested, but it will be noted if there are planning designs which intend to restore habitats or some type), p. 38; "Long-Term Conservation Management of Habitat or Wetlands and Water Bodies" (cannot be ascertained in the test areas because the long term conservation and management of habitat or wetlands which are present or not present creates jurisdictional difficulties), p. 39); "Mixed-Use Neighborhood Centers" cannot really be determined by this paper given the lack of specificity of ground and public data, p. 55; part of the scales related to "Mixed-Income Diverse Communities" cannot really be determined by this data, though there is income data from the U.S. Census bureau, this data is related only to tracts or blocks and not to individual projects; p.57; "Transportation Demand Management" is related more toward transit development and policy, and this is outside the scope of this research, p. 65; the category "Visitability and Universal Design," will not be addressed in this thesis, because this category contains components which cannot be tested given the development area, p. 69; "Community Outreach and Involvement", will not be addressed in this paper, given that it does not relate specifically to urban form, p. 94; "Local Food Production" will not be addressed in this paper because it relates to restriction and public policy and not urban form, p. 73; the "Certified Green Building" will not be addressed in this thesis, p. 77; "Minimum Building Energy Efficiency," will not be addressed in this study, since actual surface areas of structures cannot be detained with specificity, p. 78; "Minimum Building Water Efficiency," cannot be addressed by this study because much of the data is not public information accessible for this study, p. 80; "Construction Activity Pollution Prevention," will not be addressed in this study because this information cannot be ascertained or is not publicly available for all the study locations, p. 82; "Certified Green Buildings" will not be addressed in this study because many of the study locations do not have certified green buildings, and many green buildings are not listed on publicly accessible registers, p. 83; "Building Energy Efficiency", will not be addressed in this study given that this information is not publicly available, p. 84; 'Building Water Efficiency", will not be addressed in this study because the information is not publicly available, p. 86; "Water-Efficient Landscaping," will not be addressed in this study because this information is not publicly available, p. 89; 'Existing Building Reuse," will not be addressed in this study with particularity, though it will be noted in the design section, because this is development area based, and requires information that is not publically ascertainable for the entire study areas, p. 89; "Minimized Site Disturbance in Design and Construction" will not be addressed in this thesis because development has already occurred, and there is no disturbance of site, external or internally, p. 91; while important, "Stormwater Management" issues are not addressed in this location except for the use of drainage on intersections, p. 93; 'Heat Island Reduction," will not be addressed in this thesis except of the use of tree canopies, p. 95; 'On-Site Renewable Energy Sources," will not be addressed by this thesis because this require non-publicly available information, p. 98; 'District Heating and Cooling," will not be addressed by this thesis because it requires non-publicly available information, p. 99; "Infrastructure Energy thesis will cover are: (1) smart location; (2) reduced automobile dependency (tangential); (3) bicycle networks and systems (tangential); (4) walkable streets and patterns; (5) street connectivity; (6) façade transparency; (7) compact development; (8) building diversity; (9) reduced parking footprint; (10) street network; (11) tree-lined streets and shade; and (12) access to civic and public space. Still, these categories should be considered in how directly or tangentially they relate to urban form.

5.3.1 Smart Location

LEED-ND's "Smart Location" category under "Smart Location and Linkage (SLL)," pushes developments to be more linked and connected, have a relationship to public transportation and tries to minimize automobile dependency by minimizing vehicle miles traveled.[289] "Smart Location" requires new developments to be adjacent to

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Efficiency" will not be addressed in this thesis because it addresses moreso environmental and not urban form elements in particular; however, noting of the infrastructure types will be addressed as part of the street design, p. 100; 'Wastewater Management," will not be addressed in this thesis because it deals with information outside public accessibility," p. 101; 'Recycled Content in Infrastructure," will not be addressed in this thesis because it deals with information outside public accessibility," p. 102; "Solid Waste Management Infrastructure," will not be addressed in this thesis because it deals with information outside of public accessibility, p. 103; "Light Pollution Reduction," will not be addressed in this thesis because it deals with information outside of public accessibility, p. 104; "Innovation and Exemplary Performance," will not be addressed in this thesis because it addressed development specific information which is not publicly accessible for each building within the study area, p. 107; "Accredited Professional," will not be addressed in this thesis because it addressed development specific information which is not publicly accessible for each building within the study area, p. 108; "Regional Priority" will not be addressed in this thesis because it addressed development specific information which is not publicly accessible for each building within the study area, p. 109).

[289] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 1 ("To encourage development within and near existing communities and public transit infrastructure. To encourage improvement and redevelopment of existing cities, suburbs, and towns while limiting the expansion of the development footprint in the region to appropriate circumstances. To reduce vehicle trips and vehicle miles traveled (VMT). To reduce the incidence of obesity, heart disease, and hypertension by encouraging daily physical activity associated with walking and bicycling."); U.S. Green Building Council, Natural Resources Defense Council, and the Congress for the New Urbanism. "A Citizen's Guide to LEED for Neighborhood Development: How to Tell if Development is Smart and Green." Natural Resources Defense Council

previous developments and at least 90 intersections per square mile "measured within a 1/2-mile distance of a continuous segment of the project boundary, equal to or greater than 25% of the project boundary, that is adjacent to previous development."[290] Further, "Smart Location" requires at least one intersection every 600 feet on average, with no intersection being more than 800 feet from another intersection.[291] "Smart Location" also requires at most 20% non-motorized rights-of-way.[292] The effect of these requirements are smaller block sizes and shorter street lengths. It also pushes blocks to more compact and square, which affects the perimeter of the block shape to become more orthogonal or regular. If these dynamics are applied not to developments but to the city at large, as a collection of neighborhood developments, this system would affect urban form by making that system much more compact.

5.3.2 <u>Reduced Automobile Dependency</u>

LEED-ND's "Locations with Reduced Automobile Dependence" category tries to move developments way from automobile dependency and toward more environmentally sustainable transportation methods.[293] The effect is to create developments in such a manner that they do not crease externalities upon an already taxed environmental systems. "To encourage development in locations shown to have multimodal

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blog. https://www.nrdc.org/cities/smartgrowth/files/citizens_guide_LEED-ND.pdf> (accessed July 9, 2014)s, p. 5.

[290] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 1.

[291] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 1.

[292] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014): p. 1.

[293] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 27.

transportation choices or otherwise reduced motor vehicle use, thereby reducing greenhouse gas emissions, air pollution, and other adverse environmental and public health effects associated with motor vehicle use."[294] LEED-ND requires that at least 50% of residential units be within 1/4th mile from a bus or streetcar and within 1/2 mile of mass transit (bus rapid transit stops, light or heavy rail).[295] With projects of around 500 acres or more, 40% of residential entrances must be within 1/4th a mile walking distance to transit or 1/2 mile to mass transit.[296] For larger developments, this requirement pushes developments to include new transit locations on site.[297] Projects can also locate within a transportation analysis zones where the average vehicle miles traveled (vmt) does not exceed 90% of metro area statistics.

The effect of this system is multi-fold. By incorporating these Smart Growth and Transit Oriented Development requirements, this requirement either creates new transit options or pushes residential development to be located within buffer zones from alternative transit systems. One should note that this only tangentially affects urban form because it affects, in actuality, only policies which overlay city systems with further types of transportation without ultimately changing urban form--except when transit by mass transit systems are integrated within city streets. In reality, what occurs is that

[294] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 27.

[295] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 27.

[296] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 27.

[297] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 27.

these systems mirror or layer present urban form when successful, or they add to present urban form but rarely fundamental change the framework.

5.3.3 *Bicycle Network and Storage*

> "Cycling is an efficient mode of transportation without the negative environmental effects or high installation costs of many other modes. It can improve public health by providing regular physical activity. Like pedestrian facilities, successful bicycle facilities should be arranged in a connected network, providing safe, comfortable, and well-maintained access to a variety of destinations while decreasing conflicts with cars and transit vehicles."[298]

LEED-ND proposed as "Bicycle Network and Storage" category to allow for more transportation options for residents, which works together with the reduced automobile dependency to create safer and more practical options for bicyclists. The theory behind this category is to "promote bicycling and transportation efficiency, including reduced vehicle miles traveled … [and to] support public health by encouraging utilitarian and recreational physical activity."[299] This requirement requires an existing bicycle network of 5 miles in length to be within a 1/4 mile vicinity of the project boundary, the project can be 100% residential with the bicycle network within 3 miles of the school or employment center, or the bicycle network can connects to 10 diverse use or amenities within 3 bicycling miles from the project boundary.[300] This requirement also pushes for bicycle storage to make bicycle travel more practical as an economic investment.[301]

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[298] U.S. Green Building Council, Natural Resources Defense Council, and the Congress for the New Urbanism. "A Citizen's Guide to LEED for Neighborhood Development: How to Tell if Development is Smart and Green." Natural Resources Defense Council blog. https://www.nrdc.org/cities/smartgrowth/files/citizens_guide_LEED-ND.pdf> (accessed July 9, 2014), p. 11.

[299] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 29.

[300] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 29.

[301] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development.

While this requirement calls for bicycle networks, it does not indicate how those are to be integrated as urban form. With many of these bicycle networks they are layered upon present urban from as a function like with the reduced automobile dependency requirement. Many of these changes represent either policy or material changes to the textures within urban form or the type of rerouting of activity, but they fundamentally do not change urban form. Some of these could be in-line with current traffic, and act within the parking areas. While present, the Smart Growth Institute has bicycle requirements that include a minimum 6 feet widths for bicycle paths or lanes. The New Jersey Future checklists regarding available bicycle options are hard to integrate within a scalable structure.[302] Buffer zone bicycle paths are normally 6 to 12 feet (3.5 meters) wide, and they may function within the buffer zone or a separate lane or path within the section or plan of the right-of-way.[303]

5.3.4 <u>Walkable Street and Pattern and Design</u>

Under LEED-ND's "Pattern and Design," the category "Walkable Streets" details metrics to analyze present urban form. This requirement's purpose is to "conserve land," to "promote livability, walkability, and transportation efficiency, including reduced vehicle miles traveled," and to "promote walking by providing safe, appealing, and comfortable street environments that support public health by reducing pedestrian injuries and encouraging daily physical activity."[304] For urban form, this affects building facades by requiring 90% of building frontage, and that the principle building entry facing the "street, square, park, paseo, or plaza, but not a parking lot" have at a public realm of

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http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 29.

[302] New Jersey Future. http://www.njfuture.org/ (accessed August 21, 2014).

[303] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 212.

[304] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 41.

at least 50 feet wide at a point perpendicular to each entry, when applicable.[305] This requirement also connects entries to a functional sidewalk or "equivalent provisions for walking" in order to allow for cross-traffic or pedestrian circulation."[306] This requirement also sets a height to street/width ratio of at least 15% of the structures to a 1:3 street ratio (1 units of building height for 3 units of street width).[307] When nonmotorized lanes are excluded, the ratio of building height to street width is 1:1. Lastly, this category requires continuous public sidewalks on both sides of the street for at least 90% of total streets, with a width on commercial streets of 8 feet and residential streets of 4 feet.[308] This category directly relates to urban form because it affects not only the building and height ratios, but also the walkability, accessibility and facades of streets and the public zone.

5.3.5 Connectivity

Like previous categories, the "Connected and Open Community" category reemphasizes the specific number of intersections per a given area.[309] "This means

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[305] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 41.

[306] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 41.

[307] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 41.

[308] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 41.

[309] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 44; U.S. Green Building Council, Natural Resources Defense Council, and the Congress for the New Urbanism. "A Citizen's Guide to LEED for Neighborhood Development: How to Tell if Development is Smart and Green." Natural Resources Defense Council blog. https://www.nrdc.org/cities/smartgrowth/files/citizens_guide_LEED-ND.pdf> (accessed July 9, 2014), p. 6.

frequent street connections and pathways to surrounding areas, a high degree of internal connectivity, and few barriers—such as cul-de-sacs or difficult-to-cross streets—to adjacent areas and uses."[310] The purpose of this section is for urban form, public policy and a historical matter.[311] High connectivity promotes internal and external connectivity at large and encourage developments within existing communities. Further, more connectivity allows for more multi-modal transportation options and the reduction of traffic bottlenecks within the system, thereby minimizing moments of crisis caused by the failure of limited egress.[312] This requirement proposes intersections at 140 per square mile as a minimum, in contrast to the 90 per square mile for Smart Locations.[313] Further, the lengths of streets are minimized by the lengths between rights-of-way being 800 feet.[314] "Design and build the project with at least one through-street and/or nonmotorized right-of-way intersecting or terminating at the project boundary at least every 800 feet, or at existing abutting street intervals and intersections, whichever is the shorter distance."[315] Within this category, at least 80% of buildings cannot be more than

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[310] U.S. Green Building Council, Natural Resources Defense Council, and the Congress for the New Urbanism. "A Citizen's Guide to LEED for Neighborhood Development: How to Tell if Development is Smart and Green." Natural Resources Defense Council blog. https://www.nrdc.org/cities/smartgrowth/files/citizens_guide_LEED-ND.pdf> (accessed July 9, 2014), p. 6.

[311] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 44.

[312] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 44.

[313] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 44.

[314] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 44.

[315] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development.

25 feet from the property line, and at least 50% of buildings no more than 18 feet from the property line.[316] This category also requires at least 50% of facades to be within 1 foot of sidewalks or public walking areas, with functional entries into the facades of buildings on average every 75 feet along nonresidential or mixed use buildings.[317] This connected requirement has a great impact on urban form. Basically, it affects the street sides, the block sizes, the perimeter of the blocks, and how the building meets the street by limiting setbacks and advocating for sidewalk accessibility.

5.3.6 Façade Transparency

LEED-ND also requires at least 60% of facades within the public right-of-way to have 60% transparency on their first level, within 3 to 8 feet above grade.[318] As a result, this brings visual connections between those passing by buildings with the first level of structures, allowing for commercial or more mixed uses than opaque walls. This category also requires public street parking on more than 70% of "both sides of all new and existing streets, including the project side of bordering streets."[319]

> "The percentage of on-street parking is calculated by dividing the length of LEED 2009 for Neighborhood Development street designated for parking by the total length of the curb along each street, including curb cuts, driveways, and intersection radii. Space within the parking lane that is occupied by corner bulb-outs (within 24 feet of an intersection), transit stops, and motorcycle or bicycle

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http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 44.

316 U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 49.

317 U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 49.

318 U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 50.

319 U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 50.

parking may be counted as designated for parking in this calculation. Woonerfs are not considered streets for this subsection."[320]

In contrast to LEED-ND, the EcoCityCleveland requirements address parking availability but pushes parking buildings and adds points for alleyway garage accessibility. This section of LEED-ND also requires that mixed-use or non-residential buildings have ground floor retail, along with street design speed requirements to create more safety on residential streets.[321] This section does limit the total width of driveways to ensure that they constitute no more than 10% of the length of sidewalks to ensure more accessibility and connectivity on the block in general.[322] One should note that while street speeds are more policy related except with regard to lane width, transparency and total width of driveways are directly related to urban form. The transparency of buildings with façade

[320] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), pp. 50-51.

[321] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 51 ("In nonresidential or mixed-use projects, 50% or more of the total number of office buildings include groundfloor retail along 60% of the length of the street-level façade; 100% of mixed-use buildings include groundfloor retail, live-work spaces, and/or ground-floor dwelling units along at least 60% of the street-level façade; and all businesses and/or other community services on the ground floor are accessible directly from sidewalks along a public space, such as a street, square, paseo, or plaza, but not a parking lot."), and ("At least 40% of all street frontage within the project has a minimum building-height-to-street-width ratio of 1:3 (i.e, a minimum of 1 foot of building height for every 3 feet of street width). Nonmotorized rights-of-way may be counted toward the 40% requirement, but 100% of such spaces must have a minimum 1:1 ratio of building height to street width. Projects with bordering street frontage must meet only their proportional share of the height-to-width ratio (i.e, only on the project side of the street). Street frontage is measured in linear feet. Building height is measured to eaves or the top of the roof for a flat-roof structure, and street width is measured façade to façade. For building frontages with multiple heights, use the weighted average height of all frontage segments based on each segment's height weighted by the segment's share of total building width. Alleys and driveways are excluded.")

[322] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 52.

actual creates a modulation of the interactive space between the private and public realm by granting visual but no physical access.

5.3.7 Compact Development

LEED-ND's Pattern and Design "Compact Development" subcategory purposes to "encourage development in existing areas to conserve land and protect farmland and wildlife habitat."[323] This subcategory's purpose also has the dual effect of creating a more livability, walkability, and transportation efficient environment that reduces vehicle miles traveled by creating an urban form that encourages daily physical activity and alternative modes of transportation by being compact.[324] So, by requiring more density of development, the development itself encourages more walkability by making the distances between uses minimal--so that walking is more than theoretical. This requirement achieves this by increasing building density on buildable land.[325] There is a sliding scale of weighed points depending upon how many buildings per acre exist (square footage), up to a maximum of 6 points.[326] Further, this dense development encourages more densification upon already developed land as being more economical than continued sprawl. While seemingly not an aspect of urban form, this requirement does affect urban form in many instances. It increases built forms upon already developed land which encourages the possibility of lot perimeter development. Further,

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[323] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 53.

[324] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 53.

[325] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 53.

[326] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 53.

it addresses lot coverage and mass which further affects block mass and volumes and the relationship between the public space and the block--enclosure.

5.3.8 Building Diversity

In this section LEED-ND addresses the building diversity types and income diversity within urban form. From an urban form point-of-view and on first glance, this does not necessarily affect urban form or analyze urban form. However, as one will see and on closer inspection, this is critical to urban form for what it actually studies. U.S. Census data about income differences and income diversity is usually on a block level, and as result, there is no specificity about the type of urban form related to income diversity. However, if one just thinks about the issue for a while, income diversity within a given location is really a conversation about building stock diversity and smaller or cheaper space options within a given location. Thus, the “Mixed-Income Diverse Communities” category does have an impact upon urban form by creating building diversity and impacting the extent of future development according to style, age and type of structure. [327]

> “In addition, a neighborhood with a wide range of housing types and sizes—such as large and small townhouses, duplexes, single-family homes, apartment buildings, or special needs housing—can support a diverse population that includes students, families, seniors, group housing, young singles, or couples.”[328]

[327] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 57; U.S. Green Building Council, Natural Resources Defense Council, and the Congress for the New Urbanism. “A Citizen’s Guide to LEED for Neighborhood Development: How to Tell if Development is Smart and Green.” Natural Resources Defense Council blog. https://www.nrdc.org/cities/smartgrowth/files/citizens_guide_LEED-ND.pdf> (accessed July 9, 2014), pp. 9, 11.

[328] U.S. Green Building Council, Natural Resources Defense Council, and the Congress for the New Urbanism. “A Citizen’s Guide to LEED for Neighborhood Development: How to Tell if Development is Smart and Green.” Natural Resources Defense Council blog. https://www.nrdc.org/cities/smartgrowth/files/citizens_guide_LEED-ND.pdf> (accessed July 9, 2014), p. 9.

From urban form this might not seem important, but by having diversity of housing stock and a balance of district characteristic styles and different types of developments, it allows areas to evolve and constantly update, remove, renew and build new structures. It allows urban form to be resilient from a building component. LEED-ND numbers the amount of building styles and then divides the total number of buildings by the total number of styles to gain a diversity component, which it sums together to get a diversity index.[329] LEED-ND then assessed points at 0.5, 0.6 and above 0.7 designations, with the 0.7 designation receiving the most points.[330] In this thesis the "Existing Building Reuse"[331] and "Historic Resource Preservation and Adaptive Use"[332] will not be studied with specificity because of the difficulty to obtain information and the inability of this thesis to address these components. As a side note Traditional Neighborhood Development ["TND"] methods also consider the type and style of the development. TND views the various types of buildings in a given area, and to then take the types, and sums of the types, and then divides the total number of units in an area—thereby giving an index. Also, EcoCity Cleveland looks at building type, i.e. village apartments, city apartments, stately homes, town homes, etc., and then relates how far these types are from the town center. This thesis will study the styles of buildings, the

[329] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 57; see also [AUR01, p. 3]

[330] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 57.

[331] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 89.

[332] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 90.

widths of residential buildings, whether buildings are multi-family or single-family and what is the given area on the block of those buildings. This tells the nature of the diversity of building index.

5.3.9 Reduced Parking Footprint

> "Large surface parking lots discourage pedestrian access from sidewalks and other nearby buildings, especially when they are located between sidewalks and buildings. Parking lots also diminish the quality of nearby public spaces like parks, plazas, or sidewalks. The pavement used to construct parking lots also leads to more polluted stormwater runoff after rainstorms. LEED-ND calls for all off-street parking not to exceed a maximum size and to be located to the side or rear of or underneath buildings."[333]

Within the LEED-ND "Reduced Parking Footprint," subcategory, the purpose seems to push the urban form to have more density of building structures and create less dependency upon auto-transit by creating a park-point for the community.[334] The purpose is also to "design parking to increase the pedestrian orientation of projects and minimize the adverse environmental effects of parking facilities. … [and to] reduce public health risks by encouraging daily physical activity associated with walking and bicycling."[335] LEED-ND requires that no more than 20% of total buildable area be related

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[333] U.S. Green Building Council, Natural Resources Defense Council, and the Congress for the New Urbanism. "A Citizen's Guide to LEED for Neighborhood Development: How to Tell if Development is Smart and Green." Natural Resources Defense Council blog. https://www.nrdc.org/cities/smartgrowth/files/citizens_guide_LEED-ND.pdf> (accessed July 9, 2014), p. 10.

[334] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 57; U.S. Green Building Council, Natural Resources Defense Council, and the Congress for the New Urbanism. "A Citizen's Guide to LEED for Neighborhood Development: How to Tell if Development is Smart and Green." Natural Resources Defense Council blog. https://www.nrdc.org/cities/smartgrowth/files/citizens_guide_LEED-ND.pdf> (accessed July 9, 2014), p. 10.

[335] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 60.

to parking, with no parking lot greater than 2 acres.[336] "For new nonresidential buildings and multiunit residential buildings, either do not build new off-street parking lots, or locate all new off-street surface parking lots at the side or rear of buildings, leaving building frontages facing streets free of surface parking lots."[337] This category does require bicycle storage as it relates to previous categories and carpool requirements, but these do not relate to the actual urban form of the development area.[338]

This category is multi-faceted when applied to urban form. It requires more buildout or more green open space by removing a large urban form typology that usually inhabits areas without green space or buildouts. Further, it ultimately addresses stormwater issues which, because of the impermeable surface, create systematic problems for urban form, and it addresses head island effects due to the increased heat absorption because of the non-reflective materials typically used within large parking lots. While other issues are important, this thesis will mainly focus on the build out issues and the façade issues related to the type of effect the parking lot has on the streetscape

[336] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 60 ("Use no more than 20% of the total development footprint area for all new off-street surface parking facilities, with no individual surface parking lot larger than 2 acres. For the purposes of this credit, surface parking facilities include ground-level garages unless they are underhabitable building space. Underground or multistory parking facilities can be used to provide additional capacity, and on-street parking spaces are exempt from this limitation.")

[337] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 60 ("Use no more than 20% of the total development footprint area for all new off-street surface parking facilities, with no individual surface parking lot larger than 2 acres. For the purposes of this credit, surface parking facilities include ground-level garages unless they are under habitable building space. Underground or multistory parking facilities can be used to provide additional capacity, and on-street parking spaces are exempt from this limitation.")

[338] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), pp. 60-61.

by breaking the perimeter block, by creating non-public enclosure space, and by reducing building density within a given area.

5.3.10 *Street Network, Walkable Streets*

In the category, LEED-ND purposes to create more interconnectivity like in previous sections, but it also has some public health impacts.[339] As such it works to "promote projects that have high levels of internal connectivity and are well connected to the community at large[, to] encourage development within existing communities, thereby conserving land and promoting multimodal transportation[, and to] improve public health by encouraging daily physical activity and reducing the negative effects of motor vehicle emissions."[340] This section requires the project to have "right-of-way intersects on project boundary at least every 400 feet."[341] This sector allows or bicycle or through sidewalk access if a cul de sac is part of the development.[342] This section also adds points for more intersections per square mile.[343]

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339 U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 62.

340 U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 62.

341 U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 62.

342 U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 62.

343 U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 62; see also Steuteville, Robert and Philip Langdoc and Special Contributions. "New Urbanism Best Practices Guide." *Texas Tech University Department of Architecture at El Paso.* http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, 2014), p. 5.

As an aside, the Los Angeles Walkability Checklist [“LA Walkability”] also provides some categories which are worth noting about street walkability. LA Walkability recommends the creation of a “buffer between pedestrians and moving vehicles by the use of landscape and street furniture (benches, newspaper racks, pedestrian information kiosks, bicycle.”[344] This pushes for a larger buffer region for safety than normally given in small and condensed streets focused on traffic. LA Walkability also recommends that furniture be space in a regular fashion and requires that cross-walks and signage be plainly marked.[345] “Incorporate such features as white markings, signage, and lighting so that pedestrian crossings are visible to moving vehicles during the day and night” with bulbouts or extensions to create safety for the pedestrian.[346] This is in measure to create more safety than required in the LEED-ND requirements.

The LA Walkability requirements also looks specifically and uniquely about the texture of the buildings and their facades to create diversity and tactility between the pedestrian and the building façade itself. This includes “different textures, colors, materials, and distinctive architectural features that add visual interest,” and “scale and interest to the building facade by articulated massing.”[347] This also includes the way the building meets the sidewalk and public realm with a scaling rhythm that allow for faces to

[344] Urban Design Studio and the City of Los Angeles Department of City Planning. "Walkability Checklist." http://urbandesignla.com/resources/LAWalkabilityChecklist.php (accessed August 21, 2014), p. 10]

[345] Urban Design Studio and the City of Los Angeles Department of City Planning. "Walkability Checklist." http://urbandesignla.com/resources/LAWalkabilityChecklist.php (accessed August 21, 2014), p. 11] [“Utilize street furnishings to create a consistent rhythm (i.e, consistent height of light poles or consistent shade pattern of trees.”]

[346] Urban Design Studio and the City of Los Angeles Department of City Planning. "Walkability Checklist." http://urbandesignla.com/resources/LAWalkabilityChecklist.php (accessed August 21, 2014), p. 16]

[347] Urban Design Studio and the City of Los Angeles Department of City Planning. "Walkability Checklist." http://urbandesignla.com/resources/LAWalkabilityChecklist.php (accessed August 21, 2014), p. 58-74]

come forward and back along the streets by reinforcing “the existing facade rhythm along the street with architectural elements.”[348] LA Walkability recommends that streets have more street transparency and awnings to protect people from glare in areas without trees.[349] These measures are to make the business and buildings more identifiable and create more neighborhood vibrancy.[350]

With both in consideration, the LEED-ND and LA Walkability standards address the street and walkability, in the LA Walkability’s aspect to create streets that actually attract people. On an urban form matter, the LEED-ND requirements push for more biking and walking options and also increase street connectivity through more intersections, thus shortening street lengths and making blocks more practical with finer grain. However, the LA Walkability checklists push to create streets that have facades which interact with the urban form on a more interesting level, and the checklist pushes the signs and street to have more cognitive connection to people in how they view the landscape through markers and indicators of safety and movement. This thesis will try to address the LEED-ND requirements in particular and the LA Walkability standard in general as available.

5.3.11 Tree-Lined and Shaded Streets

The LEED-ND requirement of a “Tree-Lined and Shaded Streets” has multiple applications in urban form which are important to recognize and which will be expounded

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[348] Urban Design Studio and the City of Los Angeles Department of City Planning. "Walkability Checklist." http://urbandesignla.com/resources/LAWalkabilityChecklist.php (accessed August 21, 2014), p. 59]

[349] Urban Design Studio and the City of Los Angeles Department of City Planning. "Walkability Checklist." http://urbandesignla.com/resources/LAWalkabilityChecklist.php (accessed August 21, 2014), p. 60]

[350] Urban Design Studio and the City of Los Angeles Department of City Planning. "Walkability Checklist." http://urbandesignla.com/resources/LAWalkabilityChecklist.php (accessed August 21, 2014), p. 66]

upon in this thesis later.[351] When analyzing trees, it is important to recognize what trees do within the environment, for trees do have an impact upon the thermal nature of the development area and the costs associated with heating, city heat islands, road repair, etc. "To encourage walking, bicycling, and transit use and discourage excessive motoring speeds. To reduce urban heat island effects, improve air quality, increase evapotranspiration, and reduce cooling loads in buildings."[352] However, these categories relate to trees in the aesthetic or how trees affect the system but not necessarily how trees act within urban form--which are many. A tree within an urban form is a landscape infill unit, and it creates a volume within urban from and also a relationship with people that requirements trees to be within urban form. LEED-ND requires the placement of trees to be on at least 60% of existing and new streets with an interval of no more than 40 feet between trees.[353] Alternatively, the street trees must canopy more than 40% of sidewalks in the development area.[354] This thesis will address trees as an urban form unit--similar to non-sculptural architecture.

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[351] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 75; see also Steuteville, Robert and Philip Langdoc and Special Contributions. "New Urbanism Best Practices Guide." *Texas Tech University Department of Architecture at El Paso.* http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, 2014), p. 5.

[352] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 75.

[353] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 75.

[354] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 75.

5.3.12 <u>Access to Civic and Public Space</u>

In the category “Access to Civic and Public Space,” LEED-ND requires that at least 50% of the residential areas be within some limited distance from public space. As a result, public areas such as a “square, park, or plaza” of at least 1/6 an acre must exist within a 1/4 mile walk of 90% of residential or nonresidential building entrances.[355] Further, public spaces with an area less than 1 acre must be no narrower than 1/4th of their longest length.[356] Within projects or ‘neighborhoods’ greater than 7 acres, a public area of at least 1/2 an acre must existing within the project.[357] These requirements combine with “Access to Recreation Facilities” to ensure that 90% of new or existing residences be within 1/2 mile walk of recreational areas. As forms of public health, both work to include recreational options for people in their environment to “improve physical and mental health and social capital by providing a variety of recreational facilities close to work and home to facilitate physical activity and social networking.”[358] This assumes

[355] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 67; see also Steuteville, Robert and Philip Langdoc and Special Contributions. “New Urbanism Best Practices Guide.” *Texas Tech University Department of Architecture at El Paso.* http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, 2014), p. 2.

[356] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 67; see also Steuteville, Robert and Philip Langdoc and Special Contributions. “New Urbanism Best Practices Guide.” *Texas Tech University Department of Architecture at El Paso.* http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, 2014), p. 2.

[357] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 67; see also Steuteville, Robert and Philip Langdoc and Special Contributions. “New Urbanism Best Practices Guide.” *Texas Tech University Department of Architecture at El Paso.* http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, 2014), p. 2.

[358] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-

that when areas are within the public realm at this density people will utilize those areas for creation or health related activity. There is also a requirement in the "Neighborhood Schools" category that pushes important public spaces within neighborhoods.[359] This requirement promotes "integrating schools into the neighborhood. … [to] support students' health by encouraging walking and bicycling to school."[360] This allows for 50% of residential units to have access to elementary or middle schools within 1/2 mile distance or to high schools within a 1 mile distance.[361] Health and safety issues aside, the most important part of this section actually deals touches access as a matter of urban form and not policy. This access requirement also pushes sidewalk completeness to allow those who are differently abled or seniors to be able to safety maneuver in the public realm.[362]

5.3.13 Other Important Issues Not Addressed

There are other important issues related to urban form systems that this thesis will not cover but that are important to note for future study. LEED-ND pushes urban

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version (accessed August 2, 2014), p. 67; see also Steuteville, Robert and Philip Langdoc and Special Contributions. "New Urbanism Best Practices Guide." *Texas Tech University Department of Architecture at El Paso.* http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, 2014), p. 2.

[359] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 76; see also Steuteville, Robert and Philip Langdoc and Special Contributions. "New Urbanism Best Practices Guide." *Texas Tech University Department of Architecture at El Paso.* http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, 2014), p. 6.

[360] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 76.

[361] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 76.

[362] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 67.

design to address transit facilities, stormwater management and solar orientation of blocks. Under “Transit Facilities,” LEED-ND purposes to create more transit options for people within the development area.[363] “To encourage transit use and reduce driving by providing safe, convenient, and comfortable transit waiting areas and safe and secure bicycle storage facilities for transit users.”[364] This section also pushes transit options to be located at or near the project boundary, has bicycle rack requirements, and provide bicycle shelters.[365] It is important to note that issues like parking lots, impermeable surfaces, the lack of trees, large highways, larger blocks, the lack of building density and multiple other issues affect the stormwater issues within a given area. However, Stormwater is a technical issue that depends a lot upon topographic issues like slope, drainage, soil consistency, climate, etc.[366]

In like kind, the “Solar Orientation” of block structures and the structures on those blocks is mainly a solar heating and energy efficiency issue.[367] LEED-ND requires that the blocks be within 15 degrees of a north south direction.[368] “Locate the project on

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[363] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 64.

[364] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 64.

[365] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 64.

[366] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 93.

[367] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 96.

[368] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 96.

existing blocks or design and orient the project such that 75% or more of the blocks have one axis within plus or minus 15 degrees of geographical east-west, and the east-west lengths of those blocks are at least as long as the north-south lengths of the blocks."[369] LEED-ND requires this in order "To encourage energy efficiency by creating optimum conditions for the use of passive and active solar strategies."[370] In essence, this requirement allows all aspects of the block to receive sunlight rather than have one part of the block directly blocked in various seasons, and by requiring buildings to adhere to the same structure addresses how buildings hug the block and meet up with the public space, to allow for light on each public facing façade in the built area.[371]

5.3.14 *LEED-ND Is Powerful But Limited*

Though LEED-ND seeks to change urban form to make it much more livable, walkable, and sustainable, of the 12 categories that actually address urban form either directly or indirectly, many of them overlap. Presently, the main urban form categories that LEED-ND addresses are: block sizes or areas; street lengths and dimensions; connectivity by intersection; building frontage and setbacks; sidewalk completeness and dimensions; building height ratios related to street widths; building transparencies and entries; building density and diversity; parking lot density; access to the public realm; and trees within public space. Yet this gives us more important questions about urban form and the difference between urban form and strategies of refitting or resuscitation of

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[369] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 96.

[370] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 96.

371 U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 96.

urban form. What LEED-ND represents is an attempt to address the morass of modernist architecture and urban form that permeates the total built arena. But, ultimately LEED-ND reduces urban form to small imposed action than for recognizing urban form as it exists and how it has evolved. To find out what urban form really is and its benchmarks, a deeper analysis of urban form must be undertaken and the connections between theory and how urban form exists must be found.

CHAPTER 6.

THE HISTORY OF DIS-URBANITY

> "Many of our newer communities were essentially unplanned or minimally planned to provide the dream house on the large green lot far removed from schools, stores, and other community centers."[372]

6.1 Cities in Context

> "The fabric of the city, with its people, buildings, commerce, and transportation networks, promotes relationship formation, business creation, and game-changing ideas."[373]

Cities have existed from antiquity up to the modern age in some form or fashion. Having districts relating to each other in some centric, polycentric, neighborhood, resource or hierarchical way, cities provided space for human inhabitation, economic activity, socialization, religiosity and order to form. Cities themselves have been central in the creation of the creation of national economies and in reality, and they have been central in the evolution and performance of the human species.[374] Yet, some cities are more successful or productive than others--some were resilient while others died.

> "Great design has played an instrumental role in cementing the importance of cities throughout time."[375]

This reality poses problems for urban designers and redevelopers. In order to create cities that are productive, successful and impact the region around them in beneficial ways, one must know the recipe within which these urban elements exist. One must determine their concentration, interactivity and effects in order to reproduce

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[372] Wilkie, Carter and Richard Moe. Changing Places: Rebuilding Community in the Age of Sprawl. New York: Henry Hold and Company, 1997, p. iv.

[373] American Institute of Architects. Local Leaders: cities as a Lab: Designing the Innovation Economy." American Institute of Architects: Issues and Advocacy, Local Leaders. www.aia.org/localleaders (accessed August 2, 2014), p. 5.

[374] American Institute of Architects. Local Leaders: cities as a Lab: Designing the Innovation Economy." American Institute of Architects: Issues and Advocacy, Local Leaders. www.aia.org/localleaders (accessed August 2, 2014), p. 5.

[375] American Institute of Architects. Local Leaders: cities as a Lab: Designing the Innovation Economy." American Institute of Architects: Issues and Advocacy, Local Leaders. www.aia.org/localleaders (accessed August 2, 2014), p. 7.

productive cities—or to see if this is even possible. This recipe must be distinct, practical, definable and reproducible, and yet it is historical. When designers plan cities well, the city infrastructure becomes a self-perpetuating machine that promotes economic, social and political dynamism, for this is how it has always been before only recent times.[376]

> "The historical role that cities have played as power centers cannot be overlooked within this examination. The complex economic, social, and environmental systems that undergird cities and make them possible create a web of interconnectedness in the physical sphere."[377]

6.2 Ancient Systems and the Various Gridplans

Human agriculture, species domestication and cereal production allowed humans to gather in densities from 12,000 BCE or later in various parts of the world, and as a result the city came into being.[378] While Neolithic cities like Jericho have been in existence since 12,000 BCE, most known world's oldest cities date from around 4,000 BCE, with some having continued occupation since that time.[379] Around 3,000 BCE, humans built walls, barriers and protective devices around their cities in order to protect their cities from both human, animal and environmental danger--the city edge.[380]

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[376] American Institute of Architects. Local Leaders: cities as a Lab: Designing the Innovation Economy." American Institute of Architects: Issues and Advocacy, Local Leaders. www.aia.org/localleaders (accessed August 2, 2014), p. 8.

[377] American Institute of Architects. Local Leaders: cities as a Lab: Designing the Innovation Economy." American Institute of Architects: Issues and Advocacy, Local Leaders. www.aia.org/localleaders (accessed August 2, 2014), p. 8

[378] National Geographic. "The Development of Agriculture: The Farming Revolution." *The National Geographic: Development of Agriculture*, 2014. https://genographic.nationalgeographic.com/development-of-agriculture/ (last visited July 16, 2014)

[379] Mithen, Steven. *After the Ice: a Global Human History, 20,000-5000 BCE*. 1st Pbk. Ed edition. Cambridge, Mass.: Harvard University Press, 2006; Erickson, Amanda. "A Brief History of the Birth of Urban Planning." *The Atlantic Citylab*. Aug 24, 2012. http://www.citylab.com/work/2012/08/brief-history-birth-urban-planning/2365/ (accessed August 2, 2014); See Wikipedia. "List of cities by time of continuous habitation." http://en.wikipedia.org/wiki/List_of_cities_by_time_of_continuous_habitation (last visited July 16, 2014)

[380] Wilson, P. *The Domestication of the Human Species*. New Haven: Yale University Press, 1988.

> "Built walls also conceal the inside from those outside. Concealment and display are essential in human societies occupying permanent settlements. Through size, shape, sign and symbol, walls provide the means for attracting, distracting, diverting and variously modulating attention by displaying what is felt to be public as well as concealing what is private. Walls can enhance social differences and exercise forms of social control neither possible nor needed in nomadic and non-urban societies. Wilson says this is a way we domesticate ourselves."[381]

In building these cities with their walls, we effectively domesticated ourselves with civilization and created the social and psychological framework for public and private or communal property.[382] And, yet because of these densities allowed by agriculture and the number of people needed to actually keep cities running, this private and public space acted in a particular way. "From the urban settlements that emerged in Mesopotamia and the Indus valley to now, we see mostly rectangular dwellings and other buildings placed adjacent and perpendicular to rectilinear and bent linear spaces we call streets."[383] Where these lots of granted space for familial or political units met, political or social lines or edges formed, and to maximize the space they became regularized along each other's perimeter and along the space that joined the public realm--the lot. These lots combined to form units of space which acted as islands within larger units of circulation--the block. These units of block in their negative allowed for the passage of things and people, and as they became more regular, this circulation became more efficient--the street and pathway. In Mesopotamia, for the first time in

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[381] Brown, M. Gordon. "Space, property and the first urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 4; Wilson, P. *The Domestication of the Human Species*. New Haven: Yale University Press, 1988.

[382] Brown, M. Gordon. "Space, property and the first urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 4; Wilson, P. *The Domestication of the Human Species*. New Haven: Yale University Press, 1988.

[383] Brown, M. Gordon. "Space, property and the first urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 3.

some of the oldest cities, the world discovered the rectangular building, the rectangular block, the street and the designated lot.[384] This close packing of land and people created a dynamic where the lot and the block were co-creative and co-existent.

> "Hildebrand (1999, p. 22) says prospect and refuge must occur contiguously for spatial pattern to function properly. In addition to their immediate proximity, spaces of refuge or enclosure are typically roughly orthogonal with the spaces of prospect or extension. Why rectangularity? One reason is that rectangles enable close packing of rooms and of buildings. This is clearly the case with early settlements such as Çatal Huyuk and with Ur. Another is that a human is like a rectangle, a domino, standing on end. Spatial framework theory posits our mental spatial framework is an extension of the body's three axes – head/feet, front/back, and left/right."[385]

In other places of the world, like Çatal Huyuk (7500 to 5700 BCE), there were no streets, but there was rooftop access within a system of lots and the larger superblocks of dwellings.[386] At the time, Çatal Huyuk's population ranged from 5,000 to 10,000 people without streets. In contrast, Ur (early inhabitation 6500 to 500 BC), in Mesopotamia had a population of 65,000.[387] [See Figures 9.001, 9.002, 9.003, and 9.004] While not proven, this could indicate that the street was a device of efficiency and an improvement over systems of primitive defense. With a city wall or edge in place as a defensive mechanism, the street, the lot, and the block could interlock and form a system that allowed for higher levels of density and efficient of commerce and public

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[384] Brown, M. Gordon. "Space, property and the first urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), pp. 3-5.

[385] Brown, M. Gordon. "Space, property and the first urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 5 Hildebrand, G. *Origins of Architectural Pleasure*, Oakland: University of California Press, 1999.

[386] Brown, M. Gordon. "Space, property and the first urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 4; Bogucki, P. *The Origins of Human Society*. London: Blackwell, 1999.

[387] Brown, M. Gordon. "Space, property and the first urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 4; Bogucki, P. *The Origins of Human Society*. London: Blackwell, 1999.

activity.[388] In UR what we find is building by accretion with dendritic street patterns that negotiate the climate and act as a defense and privacy mechanism, but this would change as the street began to evolve--the dendritic gridpattern.[389] The streets themselves are not completely straight, but they are formed by the rectangularization of private space, that create points of threshold and termination as the private spaces merge with the more public avenues of commerce. [Figures 9.003, and 9.004] What we

[388] Black's Law Dictionary Free 2nd Ed. Online. "Commerce." http://thelawdictionary.org/commerce/ (accessed July 24, 2014) ("Commerce: "Intercourse by way of trade and traffic between different peoples or states and the citizens or inhabitants thereof, including not only the purchase, sale, and exchange of commodities, but also the instrumentalities and agencies by which it is promoted and the means and appliances by which it is carried on, and the transportation of persons as well as of goods, both by land and by sea. Brennan v. Titusville, 153 U. S. 289, 14 Sup. Ct. 829, 38 L. Ed. 719; Railroad Co. v. Fuller, 17 Wall. 5GS, 21 L. Ed. 710; Winder v. Caldwell, 14 How. 444, 14 L. Ed. 487; Cooley v. Board of Wardens, COMMERCE 221 COMMERCIAL 12 How. 299, 13 L. Ed. 996;Trade-Mark Cases. 100 U. S. 90, 25 L. Ed. 550; Gibbons v. Ogden, 9 Wheat. 1, 6 L. Ed. 23; Brown v. Maryland, 12 Wheat 448, 6 L. Ed. 67S; Bowman v. Railroad, 125 U. S. 465, 8 Sup. Ct. 6S9, 31 L. Ed. 700; Leisy v. Hardin, 135 U. S. 100. 10 Sup. Ct. 681, 34 L. Ed. 128; Mobile County v. Kimball, 102 U. S. 691, 26 L. Ed. 238; Corfield v. Coryell, 6 Fed. Cas. 510; Fuller v. Railroad Co, 31 Iowa, 207; Passenger Cases, 7 How. 401, 12 L. Ed. 702; Robbins v. Shelby County Taxing Dist, 120 U. S. 4S9, 7 Sup. Ct. 592, 30 L. Ed. 094; Arnold v. Yanders, 50 Ohio St. 417, 47 N. E. 50, 60 Am. St. Rep. 753; Fry v. State, 63 Ind. 502, 30 Am. Rep. 23S; Webb v. Dunn, 18 Fla. 724; Oilman v. Philadelphia, 3 Wall. 724, 18 L. Ed. 96. Commerce is a term of the largest import. It comprehends intercourse for the purposes of trade in any and all its forms, including the transportation, purchase, sale, and exchange of commodities between the citizens of our country and the citizens or subjects of other countries, and between the citizens of different states. The power to regulate it embraces all the instruments by which such commerce may be conducted. Welton v. Missouri, 91 U. S. 275. 23 L. Ed. 347. Commerce is not limited to an exchange of commodities only, but includes, as well, intercourse with foreign nations and between the states; and includes the transportation of passengers. Steamboat Co. v. Livingston, 3 Cow. (N. Y.) 713; People v. Raymond, 34 Cal. 492. The words "commerce" and "trade" are synonymous, but not identical. They are often used interchangeably; but, strictly speaking, commerce relates to intercourse or dealings with foreign nations, states, or political communities, while trade denotes business intercourse or mutual traffic within the limits of a state or nation, or the buying, selling, and exchanging of articles between members of the same community. See Hooker v. Vandewater, 4 Denio (N. Y.) 353, 47 Am. Dec. 258.")

[389] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 9-19.

do find is that, as the street, the lot, and the block moved from the Levant and other areas of independent creation, they evolved.[390]

In the United States, our urban form heritage comes mainly from Greco-Roman and European influences. Between 498 and 408, Hippodamus of Miletus, an architect and urban planner, invented the Hippodamian city plan layout, which would eventually become the gridplan for cities like San Francisco, Portland and New York--the hierarchical gridpattern.[391] [See Figure 6] Hippodamus fashioned his grid in the city plan of Miletus, and created a city for a population of an ideal 10,000 persons, but which held on average 4,000 persons.[392] [See Figure 5] "It had a market-place, temple and other large buildings, and about 80 blocks of private houses--each block having average dimensions of 360 to 450 feet."[393] There are three distinct areas of grids of streets and blocks, with separate neighborhoods of areas that were defined by the fineness of the block character, and yet, without even shifting the grid, Hippodamus created a completely connective system that linked the private spaces with the central public areas. "The broader streets were 32 feet wide and the narrower 10 feet. The town was compactly built, without any open space other than the agora."[394] Miletus was also completed edged by water and protective defensive wall. What one will recognize is that the street lane is much like that of one lane today, but it was a shared street. Further, the differentiation and hierarchy of the larger streets at 32 feet would not only allow for

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390 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 9-19.

391 Burns, Alfred. "Hippodamus and the Planned City." *Historia: Zeitschrift für Alte Geschichte*, Bd. 25, H. 4 (4th Qtr, 1976); 414-428..

392 Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 58; Aristotle, *Politics 2.1267b* http://data.perseus.org/citations/urn:cts:greekLit:tlg0086.tlg035.perseus-eng1:2.1267b (accessed July 16, 2014).

393 Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 58.

394 Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 58.

more traffic, but also it would allow people to pathfind within a city of almost complete order. What we have evolved from since Ur is an evolution from dendritic forms of urban connectivity, the street, to gridlines of complete connectivity and regularity.

> "Miletus, one of the classic examples of grid planning in Antiquity. The northern section came into being in the early fifth century BC and the southern part possibly at a later stage. Hippodamus, designated by both classical and modern writers as the originator of the gird plan idea, may have taken part in the planning as a young man, but he is hardly likely to have occupied a leading position."[395]

In Selinus, Hermocrates created a grid and an acropolis with a consistent block pattern and regular intervals of the streets.[396] [See Figure 7]. "[The] plan, attributed to Hermocrates, shows a large and magnificent acropolis, with a well-arranged system of main thoroughfares between the entrance gates and surrounding walls of the interior city, and a rectangular arrangement of blocks."[397] While the majority of the streets were planned at 12-18 feet wide, the main streets were planned at 30 feet wide because of their importance.[398] What one sees is the hierarchical grid structure where two crossing avenues dominate the others thereby cutting the city into four districts. What is interesting is that the city wall is irregular which seems to imply that even within the completely connective system of girded streets that there were some differences which might have created a distinct character for certain section of the city, with some sectors having a direct religious and public component. [See Figures 7-10]

In Pompeii, while there were irregularities in the system, the system was a highly connective grid system built by accretion.[399] The blocks could be from 110 by 310 or

[395] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 10.
[396] Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 55.
[397] Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 55.
[398] Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 55.
[399] Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 60.

480 feet, and some were 200 feet square.[400] [See Figures 11-13] Established in 600 BCE, while not regularlized as in Miletus, the Pompeii grid does have gird differentiation and district characters along with road hierarchy and complete grid connectivity. An interesting aspect of these streets is the subdivision of commerce within the street. Where once there were shared streets in Ur, Pompeii and other Greek streets have sidewalks that are uplifted and paved. What one sees with the streets in Pompeii is that there are polygonal blocks of basalt with raised footpaths on either side. This differentiates both the pedestrian and the wheeled traffic addressing both commerce and stormwater issues. One should note that it took almost 6,000 years, 6500 BCE to 600 BCE, urban design became regularlized, planned and sidewalks starting in Ur to become the uplifted sidewalks in Pompeii. With this paved system we have better and more efficient lots, blocks and streets.

> "We are told that farm plots in Rome were laid out in square forms corresponding to those adopted in early Chinese systems of land division and in the system followed in the early days of colonization in the United States. The influence of these farm divisions and of military methods of laying out campus probably produced the regular forms of Roman towns, quite apart from any influence that may have come from Greece."[401]

From the Greek system, Roman cities created the regularlized grid and became disseminated through Europe via the Roman castra/castrum.[402] "With the advent of the Roman Empire the rectangular town planning model was disseminated throughout much of the then known world, not least in the Transalpine provinces."[403] [See Figures 14 and

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[400] Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 60.

[401] Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 60.

[402] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 9; Polybius. "The Histories (English translation) Book VI". The Loeb Classical Library, Volume III Section VI. 313-368. <http://penelope.uchicago.edu/Thayer/E/Roman/Texts/Polybius/6*.html> (accessed July 16, 2014)

[403] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 9.

15]. “There was the same absence of spaciousness in the residential areas of Roman as in Greek cities.”[404] The cities were built for efficiency and utility. The typical small Roman road averaged 15 feet in right-of-way, with 7-8 foot lanes to allow for traffic and 3.5-4.0 sidewalks with various intrusions into the public sidewalk by building frontages or activity.[405] [See Figures 33 and 34] Larger Roman roads could have a total street width of 15.5 feet with outside lanes of 7’9” on both sides, to allow for one way traffic.[406] This is remarkably similar to what is required today for pedestrian and street traffic for slower speeds. The roads were “layers of flat stones, crushed stones, gravel, and coarse sand mixed with lime” with paving stones and mortar providing a durable material for commerce.[407] “The blocks varied, some being from 70 to 80 feet square, as in Timgad in northern Africa; and others 225 by 240 feet, or 240 feet square, as in Turin.”[408] “A usual size approximated 120 by 240 Roman feet which was the unit of the Roman iugerum.”[409] The 240 feet square was the same size, by 63 AD, of the proscribed Roman insula.[410] In Timgad, the streets were 15 to 16 feet wide, with certain main streets sider with colonnades.[411] [See Figure 16] What one sees in Timgad is a completely regular system that is symmetric in nature with a hierarchy of streets that divides the city into quarters, with a prominent religious and public zone in the south of the city. With blocks with 70 to 80 feet length sides (490 to 640 square feet) and the streets regularized, one could fairly

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[404] Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 61.
[405] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 11.
[406] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 12.
[407] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 12.
[408] Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 61.
[409] Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 61.
[410] Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 62.
[411] Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 63.

determine his or her way simply by counting the blocks so that the blocks themselves became scalable and mapable within the pedestrian mind. The city has a complete urban clarity by form.

What we see is a regularlization of the block and the street into a more efficient unit that is at the same time hierarchical so that they became fused together. This type of system would be mimicked in larger scale in other cities like Naples and Herculaneum. In Naples and Herculaneum, the blocks measured 117 by 594 feet, with some buildings crossing two blocks.[412] One should note that this size of street is similar in pattern to blocks of one of the most resilient cities--the Manhattan grid which is 200 by 600 feet.[413] It might be that some of these grids are inherently efficient and effective for the purposes of merging human habitation, private property, commerce and expansion. Yet, what we also see is the evolution of the street in Camulodunum (Colchester, England). In Camulodunum, one sees similar gridline street patterns of similar lengths. “The first street was found 310 feet south and parallel to the north wall of the town and extending across the whole width of the Park.”[414] The streets of Camulodunum range from 23 to 25 feet wide, and at some points, those widths are less than 20 feet.[415] [See Figures 17 and 18]. Effectively from the Greek to the Roman age, we see the regularization of the block size, the differentiation of spatial use with pedestrian and non-pedestrian commerce, the use of material changes and paving, a set size and modulation of the block which sized 70/310 and 80/310 or 120/117 by 240/594 space, modulating between square and rectangular sizes. What one also finds is that these

[412] Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 62.
[413] Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 63.
[414] Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 65.
[415] Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 65.

building of gridplans occurred within a period of expansion of the Roman Empire, which resulted in the building of lots of military defensive installations which became the cores of new cities. [See Figure 19].

From the Greco-Roman period to the High Middle Ages, the changes in non-ecclesiastical administrative structure created systems which devolved from gridline systems into cities planned by accretion and the lack of coherent planning authorities. The earlier Roman castra became modulated and changed by the use of people, though the main hierarchical roads stayed fairly consistently active. [See Figure 20]. This also created a system where buildable lots of land were not created along with plots, but by the dissemination of previous agricultural lots and the integration of those lots within built masses of buildings within the cityscape.[416] While the planned quality was absent, the lots themselves still bound together into block assemblies and formed the dynamic of the lot, block and street and the relationship between public and private space.[417]

> "By the end of the twelfth century the large medieval cities of western Europe had, without any apparent overall systematic planning, acquired the physical structure which was to last until the Industrial Revolution, and in many cases even longer."[418]

As the original grids changed to become more informalized, these central grids expanded and integrated within larger networks of feudalized grids built by accretion--the informal accreted gridpattern. [See Figure 21] These can still be seen today in many old world cities where straight networks of buildings twist and turn. This accreted gridpattern tended to be is somewhere between the dendritic gridpattern building methods of UR but also with almost full connectivity as represented in the hierarchical gridpattern of the Greco-Roman age. [See Figures 21, and 22]

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[416] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 12.
[417] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 12.
[418] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 12.

With Islamic academic influence and the reintegration of Greek thought into the European landscape, the re-discovery of mathematical and philosophical reasoning brought the rise of defensive measures and idealistic philosophies and new mathematical systems comprising order. As a result, wall and battlements protecting highly dense city cores grew.[419] To combat the complexity of informally planned areas, the radial gridpattern and monumental overlay became an important urban planning mechanism that impose order upon the unplanned nature of the informal accreted gridpattern. As evident with the reworking of the Roman and Parisian accreted gridpatterns by Vitruvius and Haussmann, the superimposition of forcelines created order with larger hierarchical streets than the previously small streets within the accreted gridpattern.

> "The radial street system, though clearly a Renaissance invention, probably claimed its legitimacy from a misinterpreted passage in Vitruvius, and was obviously regarded by many as aesthetically superior to the grid scheme, an urban design equivalent to the much admired centralized type of plan for churches. It also brought practical advantages, above all more effective control of the town and rapid communication between the centre and all points on the periphery, which was important in cases of sieges."[420]

What seemingly occurred was a balance of reality with planning. Before, the Greco-Roman hierarchical gridpattern was an improvement over the dendritic gridpattern of UR by creating a highly connective hierarchical structure of lots, blocks and streets, which allowed for quartering of cities within districts. This system allowed for pedestrian and resident pathmaking and mapmaking to understand one's place and to create efficiency within the urban system. Seemingly, the radial gridpattern, superimposed a hierarchical structure upon the accreted gridpattern by creating long avenues from

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[419] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 14.
[420] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, pp. 14-15.

nodes and landmarks within the larger system of urban form.[421] This allowed a previously inefficient system built upon block by assemblies of land lots to have mapmaking and pathmaking positives where previously there were none. In both the hierarchical girdpattern and the radial/accreted gridpattern, a need for order pushed these cities into systems of urban equilibrium. [See Figures 25-27] It is important to distinguish the radial gridpattern from the radial designs dominant in utopian citymaking. The radial gridpattern which worked with the accreted gridpattern to create a more efficient system, were tactical uses of diagonal and radial avenues or boulevards which shaved order into a previous system of accreted blocks. Complete radial street systems represented in Vitruvian influenced utopian cities or utopian additions, like in the Amsterdam city core, have either changed their grid structures as they expanded or the cities generally became unresponsive to the need for change--for these cities had problems with expanding outside of the small radial design.[422] [See Figures 23 and 24] However, the utopian city plan becomes important when realizing that modern planning methods adhere to a radial system of 1/2 to 1/4 movement focused upon a center area--whether that area is a community center, school or mall. From these forms, we have the urban form dialectic which occurs in the United States from inception to the present.

6.3 United States Colonial Times

In the United States, colonial streets were limited to settlements with very few connections between settlements--like in ancient Greece.[423] Possibly, while the first paved public street might have been in Maine, the first engineered street was the

[421] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 14.
[422] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 14.
[423] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 19.

Pennsylvania Turnpike linking Philadelphia to Lancaster in 1795.[424] [See Figure 28] "Its 62-mile … length was 20 feet … wide and was covered with broken stone and gravel. It lacked curbs but had cleared unpaved shoulders on both sides."[425] Unlike Greek and Roman paved roads with broad stones and curbs, this turnpike was clearly meant as a transportation device between settlements and not necessarily pedestrian friendly. While the United States did make attempts to create larger street networks, these halted due to the technological advancement of the railroads which made cross-country transportation extremely efficient in the 1900s.[426]

> "Expansion of the railroad system in the United States, beginning in the mid-nineteenth century, was a major force in urbanization and brought with it the ubiquitous rectilinear gridiron plan."[427]

The railroad and the push to standardize and break up and plat the United States caused the creation of the great American grid, townships, the settling of towns and the expansion of the railroad to accomplish population, political and urban expansion.[428] It is worth noting the influence the railroads had on urban expansion within the United States, for like the Roman Empire before it expanding the castra, the railroads expanded the reach of the urban form that was easiest to plot, lot, build, expand and sell--the hierarchical grid.[429] "The development of the railroad brought with it a standardized

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[424] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 19; Federal Highway Administration. "The Paintings of Carl Rakeman, 1795 - The Philadelphia and Lancaster Turnkpike Road." *Federal Highway Administration,* September 14, 2011. http://www.fhwa.dot.gov/rakeman/1795.htm (accessed July 17, 2014).

[425] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 19.

[426] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 19-20.

[427] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 25.

[428] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 25; Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 335; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 28.

[429] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 25; Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 335.

approach to street layout. The grid-iron pattern was used almost exclusively, being easy to survey and layout, and simple to subdivide."[430] Railroads received grants and tracts of land on both sides of their railroad expansion, and gridded cities began with direct access to the world via the railroad.[431] From the 18th to the Early 20th Century, the hierarchical gridline was the easiest way US cities to build, from Savannah, Philadelphia and San Francisco, and with the expansion of the railroads, this gridline expanded or began cities like Atlanta, Chicago, Denver, Birmingham, Los Angeles and Sacramento, California.

Yet, as expansion of the railroad came with the towns, so did the pollution of noise and environmental damage that citizens did not like.[432] These dense cities did not have the public, health and safety regulations and technology that would have made city life more livable. Thus, because of the lack of regulatory or technological options, dense cities and planning sentiment turned radically anti-urban and pushed for decentralization.[433] It is ironic that the very country that revolted against a colonial oppressor to practical more laisse faire capitalism, would then again turn to the British landed aristocratic system of country houses for examples of how to build the urban system and integrate country living in the city. In this Enlightenment period, romantic ideals infused within planning to save people from the city.

> "The American embrace of Enlightenment rationality weakened in the 19th century as American settlement expanded westward and confronted a nature more vast than its colonial beginnings had indicated was possible. In the years preceding the Civil War, Andrew Jackson Downing's writing questioned the validity of the neoclassical style. It was felt to be too formal and aristocratic: suitable for banks but not for a house for a normal family. Downing's proposals became

[430] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 28.
[431] Walton, Gary M; Rockoff, Hugh. "Railroads and Economic Change." *History of the American Economy (10th ed.)*. Toronto, Ontario: Thomson, 2005, pp. 313–14.
[432] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 25-26.
[433] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 25-26.

popular and house design turned toward the romantic and focused on medieval and early renaissance models."[434]

6.4 Environmental Damage and Chaos Lead to Urban Changes

"Many people dream of a better world; Howard, Wright, and Le Corbusier each went a step further and planned one."[435]

It is important to not underestimate how to what extent the Industrial revolution and the railroads damaged the world's cities. Like in Europe, cities that were once livable became large masses of accumulated filth and despair, and people were dying.[436] "During the late nineteenth century the environmental chaos of the city was considered to be linked to its social problems."[437] As a result, movements against the city began as technology and governmental action failed to address the harms caused and the social stratification. "Overcrowding and deteriorating sanitary conditions were believed to cause social and moral degeneration. Social and health reformers argued that the inevitable social disorder would be best controlled by improving the environment."[438] As a result, planning became the only mechanism to push the United States forward through urban policy and planning methods. "They enforced building codes to promote better living conditions, improve sanitation, limit fire hazards, and prevent untimely deaths."[439] They also wanted to domesticate the masses and bring these masses into the larger American politic--for racial, health or other more benign reasons. "As the turn-

[434] Brown, M. Gordon. "Space, property and the first urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 9; Brown, M. G. "Charter of the New Urbanism." *Journal of Real Estate Literature*, (10)1, (2002), pp. 147-152.

[435] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 27.

[436] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, 35].

[437] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 35; Moore, M. "Sanitary Oversight of Dwellings," *Charities Review*, 4:8 (June 1895): 438-439.

[438] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 36.

[439] Wilkie, Carter and Richard Moe. Changing Places: Rebuilding Community in the Age of Sprawl. New York: Henry Hold and Company, 1997, p. 37.

of-the-century congestion, overcrowding, and unsanitary conditions of cities increased concerns for public health. Thus, tenements and slums were the first focus of many early planning remedies."[440] This governmental and social propaganda push was not just for the resulting damage of industry but for the perceived danger of the chaos that would follow should the urban city continue to exist in its current form.[441] What resulted was a battle between the City Beautiful and the City Practical.[442]

> "The ideas of the City Practical were fully in place by the end of the first decade of the twentieth century."[443]

This rebuilding required incredibly brilliant people to look at the situation and provide ideas to address the issue. While other options were possible, architects, planners and engineers saw that this was the moment to shift from previous systems of gridline design to more philosophical changes to the core of the urban framework.[444] From this point, we get the crossing of governmental policy and funding along with philosophical changes based on the utopian city. What is interesting is how many of these philosophies and attempts occurred practically simultaneously, and as a result, aspects of each theory combined or built upon previous theories to result in the most damaging aspect of urban form, a non-functional urban result called sprawl.

> "This transformation meant the extensive rebuilding and even partial abandonment of cities of their time. Howard, Wright and Le Corbusier did not shrink from this prospect; they welcomed it. As Howard put it, the old cities had 'done their work."[445]

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[440] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 58; Christensen, Ann. The American Garden City: Concepts and Assumptions," diss. University of Minnesota, 1978, 95.

[441] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 36.

[442] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 58; Krueckeberg, Donald. The American Planner: Biographies and Recollections. New York: The Center for Public Policy: Meuthuen, Inc, 1983, p. 20.

[443] Krueckeberg, Donald. The American Planner: Biographies and Recollections. New York: The Center for Public Policy: Meuthuen, Inc, 1983, p. 20.

[444] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 28.

[445] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 28.

6.5 Elmwood: The representation of Most U.S. early planning

> "Built before the era of mega-developers, homes were constructed individually on a lot-by-lot basis by varied builders and architects, and they are of many styles, from Craftsman shingle, to Classic Revival or Mediterranean."[446]

After the earthquake of 1906 in the Bay Area, the district of Elmwood formed in Berkeley, California, due to the housing boom.[447] [See Figures 89 and 90] Elmwood represents the prior standard of suburban developments similar to streetcar developments before modernism took shape in American urban planning. "The street pattern of Elmwood, a streetcar suburb dating from the early 1900s, is a rectilinear grid, with blocks that vary in size and shape. There are no formal design feature."[448] The planning though is a hierarchical grid much like railroad towns and like other highly connective urban planning methods in since the inception of the United States--cheap, valued, easy to sell, and easy to plot.[449] This area had no defined center or not defined commercial, yet those areas evolved as the community grew. The development of the street was based upon the sell, the evolution of buildings and residents, and this dynamic resulted in a matured architectural streetscape.[450] Except the largest and most industrialized cities, Elmwood represents how most cities came into being.

> Each street becomes unique and ultimately what happens is that the development, rather than being its own separate neighborhood, becomes integrated within the larger gridpattern of the expanding city. While the neighorbood itself is still known as Elmwood, it becomes part of the larger pattern of connectivity.[451]

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[446] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 103

[447] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 110.

[448] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 102.

[449] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 104.

[450] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 203.

[451] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 101-103.

What is important though about Elmwood is not how it started but how it evolved into its present state. "Mature trees shade the narrow streets…, which have parking, as well as sidewalks with narrow planting strips along both sides."[452] Eventually, the community succumbed to the belief that by closing streets, one could reduce speeds. The community created some cul-de-sacs were created later in "Berkeley Barriers" to create safer streets for the neighborhood, 15 cul-de-sacs. "However, it is important to note that grid continuity is maintained for the pedestrian and bicyclist, a quality lacking in most suburban cul-de-sac developments."[453] They have fewer loops and cul-de-sacs than the most recent suburban patterns (lollipops on a stick"), but more than earlier suburban patterns such as the "warped parallel" pattern of the 1960s and the "loops and lollipops" pattern of the 1970s and 1980s. Yet, when comparing blocks, general points of entry, length of street patterns, grid adoption, use of alleys, block area and other metrics, there are many more linear feet of street, blocks, intersections, and access points than traditional suburban sprawl areas. What Elmwood represents is the form of the community before streets began to curve in the United States framework.

6.6 Urban Philosophers

> "Howard was an ardent cooperative socialist who utilized planning as part of his search for the cooperative commonwealth; Wright, a Jeffersonian democrat and an admirer of Henry George, was a spokesman for the American decentralist movement; and Le Corbusier had many of his most famous designs published for the first time in the pages of the revolutionary syndicalist journals he edited. All three brought a revolutionary fervor to the practice of urban design."[454]

Those who worked to change urban form were from generally the same time frame, and many knew each other. Ebenezer Howard (1850 –1928), Clarence Stein

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[452] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 104.
[453] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 105.
[454] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 29.

(1882 –1975), Raymond Unwin (1863 –1940), Clarence Perry (1872 –1944), Le Corbusier (1887 –1965), Frank Lloyd Wright (1867 –1959), Olmstead and others were from fairly the same social strata and sometimes from the same organizational networks and associations.[455] [See Figure 29] “For example, in relation of the themes of his book, Ebenezer Howard, father of the garden city, which has been such a seminal idea in the previous chapters, spent some years of his early adulthood in the United States, while Clarence Stein, one of the designers of Radburn, knew Howard and Unwin, visited Lechworth and Welwyn and worked as a consultant at Stevenage, the first of the New Towns.”[456] This cross-fertilization worked on an Anglo-American dynamic where seminal

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[455] Larry Anderson. *Benton MacKaye: Conservationist, Planner, and creator of the Appalachian Trail*. Baltimore: The Johns Hopkins University Press, 2002, p. 173; Clark, B. “Ebenezer Howard and the marriage of town and country,” *Archives of Organizational and Environmental Literature*, vol. 16, no. 1 (2003): 87-97; Stern, Robert. *The Anglo American Suburb*. London: Architectural Design Profile (1981), pp. 84, 85; Livesey, G. “Assemblage Theory, Gardens and the Legacy of the Early Garden City Movement.” *Urbanism* vol. 15, no. 3 (2011): pp.271-278; Stein, Clarence. *Toward New Towns for America*. Cambridge, Massachusetts: MIT Press, 1951; Stein, Clarence, Kermit C. Parsons, ed. *The Writings of Clarence S. Stein: Architect of the Planned Community*. Baltimore, Maryland: Johns Hopkins University Press, 1998; The Cultural Landscape Foundation. "Clarence Stein." *The Cultural Landscape Foundation blog*, 2014. http://tclf.org/pioneer/clarence-stein (accessed July 17, 2014); Saint, Andrew. “Sir Raymond (1863-1940).” *Oxford Dictionary of National Biography*. Oxford: Oxford University Press, 2004; Choay, Françoise. *Le Corbusier*. New York: George Braziller, Inc, 1960, pp. 10–11; Fishman, Robert. *Urban Utopias in the Twentieth Century: Ebenezer Howard, Frank Lloyd Wright, and Le Corbusier*. Cambridge, Massachusetts: MIT Press, 1982, p. 231; Dalrymple, Theodore. "The Architect as Totalitarian: Le Corbusier’s baleful influence". *City Journal* 19 (4) (2009). http://www.city-journal.org/2009/19_4_otbie-le-corbusier.html (accessed July 17, 2014); “Clarence Perry,” *New York Times.* Sep 7, 1944; Perry, Clarence. "The Neighborhood Unit." *Regional Survey of New York and Its Environs, Neighborhood and Community Planning.* Monograph I, Vol. 7, New York: New York Regional Plan, 1929; Perry, Clarence. “Neighborhood and Community Planning.” *Regional Survey of New York and its Environs*, Vol. VII, Monograph One, 21-140. New York, 1974.

[456] Stein, Clarence, Kermit C. Parsons, ed. *The Writings of Clarence S. Stein: Architect of the Planned Community*. Baltimore, Maryland: Johns Hopkins University Press, 1998; Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 168; Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 37; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 83; Platt, Rutherford H, Rowan A. Rowntree and Pamela C. Muick. The Ecological City: Preserving and Restroing Urban Biodiversity. Amherst: University of Massachussets, 1994, pp. 31-32; Tyler, Norman and Robert M. Ward. Planning and Community Development: A Guide for the 21st Century. New York: W. W. Norton and Company, 2011, p. 26; Campbell, Scott,

ideas from previous English urban planners were tried in laboratories in England and in the United States. Yet, unlike the English system where planning is more common law and flexible which could be worked and changed quickly through sudden changes of policy, the US system requires specific textual ordinances and regulations to impinge upon private property interests or developments in a constitutional way.[457] As a result, once instituted, planning methods are rarely changed and last longer lengths of time in the United States than in other jurisdictions.

6.7 Early Urban Planning and the Garden City

> "Howard was an ardent cooperative socialist who utilized planning as part of his search for the cooperative commonwealth; Wright, a Jeffersonian democrat and an admirer of Henry George, was a spokesman for the American decentralist movement; and Le Corbusier had many of his most famous designs published for the first time in the pages of the revolutionary syndicalist journals he edited. All three brought a revolutionary fervor to the practice of urban design."[458]

Ebenezer Howard actually saw people living in 'damaging and disparaging conditions," and he actually wanted to improve people's lives for the better.[459] [See Figure 29] The current political and city design system at that time had failed people with the wretched poor living in horrible conditions while the rich lived in idyllic estates. "He wanted to build wholly new cities in the midst of unspoiled countryside on land that would remain the property of the community as a whole."[460] In a sense, Howard saw that what was good for the upper echelons of society should percolate down to the lower

and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, pp. 23, 37-46; Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014, pp. 21-23.

457 Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, pp. 169-170.

458 Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 29-30.

459 Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 30.

460 Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 30.

classes.[461] Howard limited urban developments to 30,000 to 35,000 residents, and he surrounded communities by a greenbelt to protect them from industry and other offending uses, because, at that time, there were no technological advancements that would allow people to live near light or heavy industrial production.[462] Howard saw this utopia upon 6,000 acres with concentric patterns of open spaces and parks, and the city had radial boulevards that were 120 feet wide extending in a radial fashion from the center to the central city or other garden cities.[463] [See Figures 30 and 31] Howard saw the greenbelt city as a way to "lure people away from swollen cities like London and their dangerous concentrations of wealth and power; at the same time, the countryside would be dotted with hundreds of new communities where small-scale cooperation and direct democracy could flourish."[464]. Because of the technology of the time and the costs of construction such a new type of urban form, very few of these examples came into fruition, and so Howard's impact was limited. Yet, in time the utopian radial city would permeate urban planning on the diagrammatic and urban form level.

While Ebenezer Howard wanted to diagrammatic change the entire function of the city, Frederick Law Olmstead had smaller ambitions, but had huge immediate urban effects with patronage. Rather than create greenbelts outside of the cities, Olmstead brought the green belts into the city, and while Howard enjoyed the English countryside

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[461] Howard, E. *Garden Cities of To-morrow*. 2nd ed. London: S. Sonnenschein and Co, 1902. http://urbanplanning.library.cornell.edu/DOCS/howard.htm (accessed July 17, 2014), pp. 2-7.

[462] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 30; Howard, E. *Garden Cities of To-morrow*. 2nd ed. London: S. Sonnenschein and Co, 1902. http://urbanplanning.library.cornell.edu/DOCS/howard.htm (accessed July 17, 2014), pp. 2-7; Galantay, Ervin Y. New Towns: Antiquity to the Present. New York: George Braziller, 1975, p. 55; Platt, Rutherford H, Rowan A. Rowntree and Pamela C. Muick. The Ecological City: Preserving and Restroing Urban Biodiversity. Amherst: University of Massachussets, 1994, pp. 31-32; Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 23.

[463] Goodall, B. *Dictionary of Human Geography*. London: Penguin, 1987.

[464] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 3.

as an analogy for the greenbelt cities and satellite cities, Olmstead created parks and open spaces with roads and urban form to mimic rural or rustic landscapes.[465] Olmsted was fascinated by the picturesque and romantic English tradition, but he wanted to capture it in a setting where it never existed and create avenues of approach which usually existed outside of the city, with "curving roads and picturesque layouts."[466] Olmsted's ideals were based heavily on romantic idealism and transcendentalism that occurred at the end of the 19th century.[467] This was the Ruskin idea of nature as awe inspiring and that natural beauty could actually improve one's life.[468] Unlike Howard who wanted to take the conditions of the city away from the worker, Olmsted believed that by taking the conditions of nature to the worker, his or her life could be improved--even while in the a city-like area.

> "When he turned to planning urban parks, he invariably found the opportunity to invoke Ruskin to support his thesis that beauty--and particularly the beauty of natural landscape scenery--must be the means to improve the quality of life."[469]

Olmstead associated bad living conditions with the urban culture, and as a result, he had a preference for suburban living.[470] "Olmstead associated poor urban living conditions with the physical layouts of the American cities," which was partly true at the

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[465] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 30; Rogers, Walter. *The Professional Practice of Landscape Architecture: A Complete Guide to Starting and Running Your Own Firm*. New York: Van Nostrand Reinhold, 1997, p. 19.

[466] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 30; Krueckeberg, Donald. The American Planner: Biographies and Recollections. New York: The Center for Public Policy: Meuthuen, Inc, 1983, pp. 14-15; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 30.

[467] Krueckeberg, Donald. The American Planner: Biographies and Recollections. New York: The Center for Public Policy: Meuthuen, Inc, 1983, p. 39.

[468] Krueckeberg, Donald. The American Planner: Biographies and Recollections. New York: The Center for Public Policy: Meuthuen, Inc, 1983, p. 41.

[469] Krueckeberg, Donald. The American Planner: Biographies and Recollections. New York: The Center for Public Policy: Meuthuen, Inc, 1983, p. 41.

[470] Olmsted, Frederick Law. Report upon a Projected Improvement of the Estate of the College of California, at Berkeley, near Oakland. New York: W.C. Bryant, 1866, p. 265; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 30.

time.[471] In his 1869 plan for Riverside, Illinois, Olmstead created streets that followed panoramic views and the topography and not regularlized gridlines like in cities before.[472] [See Figure 9.032] Riverside was a suburb that was connected to a larger urban system--a garden city suburb without the diagrammatic radial forms of Howard, in the form of a bedroom rural community.

> "Olmstead and Vaux finalized realized their residential philosophy in their 1868 plan for the suburb of Riverside, Illinois, which turned a featureless 1,600 acre tract of 'low, flat, miry, and forlorn land' into a picturesque landscaped community."[473]

In Riverside, houses had 30 foot setbacks from the road to keep the houses away from road dangers and to create pleasing views.[474] "Olmsted's suburban design for Riverside, Illinois, in 1869 is among the earliest of the curvilinear street pattern suburbs that comprise the modern subdivision."[475] Olmsted created a gap between the house and the street by using trees on the property for view appreciation and use separation. The road itself had a 30 foot width, with two lanes and with pedestrian sidewalks on both sides.[476] "Trees were planted in a strip between the home and the roadway, the first time Olmsted and Vaux systematically carried out this feature in the

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[471] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 30.

[472] Olmsted, Frederick Law. Report upon a Projected Improvement of the Estate of the College of California, at Berkeley, near Oakland. New York: W.C. Bryant, 1866, p. 284; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 31.

[473] Olmsted, Frederick Law. Report upon a Projected Improvement of the Estate of the College of California, at Berkeley, near Oakland. New York: W.C. Bryant, 1866, p. 292; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 31; Krueckeberg, Donald. The American Planner: Biographies and Recollections. New York: The Center for Public Policy: Meuthuen, Inc, 1983, p. 15; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 83.

[474] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 31-32.

[475] Krueckeberg, Donald. The American Planner: Biographies and Recollections. New York: The Center for Public Policy: Meuthuen, Inc, 1983, p. 15; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 83.

[476] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 34.

suburban context."[477] "In the next decades Olmstead and his followers designed and built suburbs of similar design across the country including Brookline, Massachusetts, Forest Hill Gardens in Queens, the Country Club District of Kansas City, and Palos Verdes in Los Angeles."[478] Throughout his career, Olmsted and his associates propagated these designs on hundreds of parks, cities and college campuses throughout the United States.[479]

> "His rejection of the grid and the adoption of the curvilinear road and single family house epitomized the suburban ideal of the placid and pastoral in contrast to the efficient and mechanistic order of the urban environment."[480]

6.8 City Beautiful Movement

Concurrent with the activities of Howard and Olmsted, the City Beautiful movement advocated formal civic planning within the United States to create beautiful cityscapes and to positively influence the moral and civic virtue of city residents.[481] "Another catalyst for the movement of improvement and beautification of towns and cities was the World's Columbian Exposition in Chicago in 1893."[482] While the main purpose of the Columbian Exposition was to advocate new ideas of architecture and

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[477] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 34.

[478] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 34.

[479] Wikipedia. "Frederick Law Olmstead." http://en.wikipedia.org/wiki/Frederick_Law_Olmsted (accessed July 17, 2014); The Cultural Landscape Foundation. "Frederick Law Omsted, Sr." *The Cultural Landscape Foundation blog*. http://tclf.org/pioneer/frederick-law-olmsted-sr (accessed July 17, 2014); Olmsted Center for Landscape Presevation. http://www.nps.gov/oclp/ (accessed July 17, 2014).

[480] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 30.

[481] Bluestone, Daniel M. "Detroit's City Beautiful and the Problem of Commerce." *Journal of the Society of Architectural Historians*, Vol. XLVII, No. 3 (September 1988), pp. 245-62; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 48; Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, pp. 23-24.

[482] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 48; Wilkie, Carter and Richard Moe. Changing Places: Rebuilding Community in the Age of Sprawl. New York: Henry Hold and Company, 1997, p. 37.

design, Daniel Burnham hired architects to basically build a classical city with planning aspects that were extremely influential.[483] "Although the main aim was to improve aesthetics through public buildings, civic centers, parks and boulevard systems, advocates of the City Beautiful movement also included ordinary street improvements, good paving, street furnishings and planting in their agenda."[484] Charles Mulford Robinson who being a journalist and publicist wrote extensively about the design and planning issues of the Columbian Exposition.[485] "He addressed the need for improving transportation, site planning, watercourses, playgrounds, street patterns and widths, paving, lighting, and sanitation."[486] Following Olmsted's lead, Mulford advocated for building cities and neighborhoods around beautification projects and greening and parks rather than the previous components that formed the urban skeletal structure--lots, blocks and streets.[487]

> "Yet the City Beautiful Movement also became an easy target of criticism: it was elitist if not totalitarian, advocating the beautification of any surface while ignoring the poverty and inequality inherent in the political-economic structure of the city."[488]

Modern planners criticize the City Beautiful movement for being impractical and romantic in its notions about city planning, but the reality is only half true.[489] Most of the City Beautiful planning aspects dealt with real issues affecting the public safety, health

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483 Larson, Erik. The Devil in the White City: Murder, Magic and Madness at the Fair that Changed America. New York, New York: Crown Publishers, February 2003.
484 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 48.
485 Robinson, Charles, *The Improvement of Towns and Cities, or The Practical Basis of Civic Aesthetics*. New York: Putnam, 1902; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 48-49.
486 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 49.
487 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 49.
488 Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 24; Foglesong, Richard E. Planning the Capitalist City. Princeton: Princeton University Press, 1986; Wilson, Williams H. The City Beautiful Movement. Baltimore: Johns Hopkins University Press, 1989.
489 Wilkie, Carter and Richard Moe. Changing Places: Rebuilding Community in the Age of Sprawl. New York: Henry Hold and Company, 1997, p. 39.

and welfare and affected the total urban form plan. Even though Robinson and others advocated for civic centers and beautification projects, there was a belief that neighborhood should be focused around schools, parks and public buildings.[490] This idea worked with Olmsted and Howard's civic philosophies to set the stage for future development changes focused on neighborhood centers. "This idea was later adopted and applied all over the country through the neighborhood unit principles promoted by Clarence Perry, the Regional Planning Association, and the federal government."[491]

In his booklet about streets, Robinson stated that too many streets were inefficient and a "burden on citizens."[492] Robinson stated that there grid or other geometrical systems should not be the basis upon which streets were built, but that contours, connections to highways and how to maneuver subdivisions were also important. "With a perfectly open mind, he should simply seek the street layout that is most appropriate to the contours, that will most advantageously subdivide the property, and that will give the best connection and best shaped lots on the main highway. He should not approach this problem predisposed to adopt a gridiron, checker-board, or diagonal system."[493] Robinson pushed against the gradational grid and more toward Baroque planning methods, which ironically were superimposed grids themselves. Robinson in reality promoted the curvilinear and approach aspects of Baroque planning

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[490] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 49.

[491] Robinson, Charles. The Width and Arrangement of Streets; a Study in Town Planning. New York: The Engineering News Publishing Company, 1911, p. 178; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 49; Wilkie, Carter and Richard Moe. Changing Places: Rebuilding Community in the Age of Sprawl. New York: Henry Hold and Company, 1997, p. 41.

[492] Robinson, Charles. The Width and Arrangement of Streets; a Study in Town Planning. New York: The Engineering News Publishing Company, 1911; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 50.

[493] Robinson, Charles. The Width and Arrangement of Streets; a Study in Town Planning. New York: The Engineering News Publishing Company, 1911, p. 100-101; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 51.

without the underlying accreted grids that were also part of its superimposed structure. Robinson also starts to manipulate the benchmarks of the streetscape to further beautification.[494] Robinson's streets included 25 foot lanes and six foot buffer zones or 30 foot lanes and 9 foot buffer zones.[495]

> "If the street be fifty feet or sixty feet wide they are perhaps most pleasantly of a breath that brings the total distance from the curb to lot line up to one-half of the width of the roadway, with the walk placed a foot from the property line. The proportions of sides and center space thus becomes 1:2:1. On a fifty-foot street, we thus have a twenty-five foot roadway, a six-foot margins for grass between the paved walk and the curb; on a sixty-foot street, we have, or could have, a thirty-foot roadway and nine-foot margins. Less roadway and more margin would of course look better."[496]

These ideas would be expounded upon by Robinson, Perry and others and eventually find their way into later neighborhood-focused development theories.

6.9 Administrating the Dimensions

> "He [Clarence Perry] identified four urban locations where the idea could be applied—new sites in the suburbs, vacant sites in the central areas, predominantly apartment districts, and central areas that had suffered deterioration and required rebuilding."[497]

Clarence Perry pushed the notion that cities should think regionally because of their intricate regional workings, and with the work of him and others, the New York

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[494] Robinson, Charles. The Width and Arrangement of Streets; a Study in Town Planning. New York: The Engineering News Publishing Company, 1911, p. 114; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 51.

[495] Robinson, Charles. The Width and Arrangement of Streets; a Study in Town Planning. New York: The Engineering News Publishing Company, 1911, p. 114; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 51.

[496] Robinson, Charles. The Width and Arrangement of Streets; a Study in Town Planning. New York: The Engineering News Publishing Company, 1911, p. 114; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 51.

[497] Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 25. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014); Perry, Clarence. "The Rebuilding of Blighted Area: A Study of the Neighborhood Unit in Replanning and Plot Assemblage. New York Regional Planning Association, New York, 1933.

Regional Planning Association began.[498] [See Figure 54] "Perry began his work in 1909 for the Russell Sage Foundation, established by Mrs. Russell Sage in 1907 for the improvement of social and living conditions in the United States of America, and remained with them until he retired in 1937."[499] When recommending streets dimensions to the New York Regional Committee in 1922, Clarence Perry and Raymond Unwin set out requirements not immediately followed by developers when creating the suburban developments.[500] "Perry advocated for revision of traffic concepts and standards for the residential unit, and according to Mulford, he was instrumental in many of the ideas incorporated in Radburn."[501] Perry's aim was to find a fractional urban unit that could be representative of a whole and to expand upon that notion to create communities.[502] Looking at the small New England village in diagram and considering previous planning notions of neighborhood units filled with 30,000 to 35,000 persons, Perry wanted to

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[498] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 68; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, p. 19; Tyler, Norman and Robert M. Ward. Planning and Community Development: A Guide for the 21st Century. New York: W. W. Norton and Company, 2011, p. 76; Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 23. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014.

[499] Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 23. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014; Perry, Clarence. *The Wider Use of the School Plan*. Russell Sage Foundation, New York; Perry, Clarence. *Ten Years of the Community Centre Movement*. Russell Sage Foundation, New York.

[500] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 70.

[501] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 70; Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 170.

[502] *Environs, Neighborhood and Community Planning.* Monograph I, Vol. 7, New York: New York Regional Plan, 1929, p. 34; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 68.

include 750 to1, 500 families into a neighborhood that had 40% of its area devoted to streets or open space.[503]

> "The first complete formulation of the neighbourhood concept came in 1929, when, in a volume of the regional Survey of New York, Clarence Perry proposed a unit based on populations of between 5,000 and 9,000 people [750 to 1,500 families] that was needed to support local facilities."[504]

Perry neighborhoods included 822 single family houses, 36 row houses, 147 apartment buildings.[505] Of the 40% area as non-built space, open spaces comprised 10.6% of the total area--17 acres with the largest green space being 3.3 acres.[506] The commercial district at the neighborhood perimeter was 7.2 acres.

> "Hierarchical road networks thus segregate and fragment urban areas into enclaves. Such enclaves may be justified by arguments that define discrete territories helps generate a sense of identity, sense of community and a sense of safety and security for those living in the area, but it also a short step to a gated community, where the public space of the street is closed to the public access by gate."[507]

Perry actually started to change the street hierarchy and fewer streets in general for the public health and safety of residents.[508] "Thus, he argued, localities should protect neighborhood living through planning measures: fewer streets should be allowed to traverse residential areas; main streets should be located on viaducts bridging over cross-street traffic; and private automobile traffic should be regulated to specific routes

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[503] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 68-69; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.4-3; Galantay, Ervin Y. New Towns: Antiquity to the Present. New York: George Braziller, 1975, p. 55.

[504] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 171; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.4-3; see also Galantay, Ervin Y. New Towns: Antiquity to the Present. New York: George Braziller, 1975, p. 56.

[505] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.4-3.

[506] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.4-3.

[507] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 90; Pope, A. *Ladders*. New York: Princeton Architectural Press, 1996.

[508] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 87-88.

away from transportation facilities."[509] The neighborhood bounding rights-of-way were 160 feet wide with three others at 120 right-of-ways.[510] Perry expanded the main streets to 60 to 80 feet, leaving secondary streets at 30 to 60 feet wide and local streets at 18 to 20 feet wide.[511] "Each of these arterial highways is provided with a central roadway for through traffic and two service roadways for local traffic separated by planting strips."[512] From now on the neighborhood itself effectively became the insulae. Perry's road system made the arterial roads difficult to cross, thus isolating each neighborhood as an independent district of the city.[513] In Roman times, the block was considered an insulae (island) among a plane of streets and the city fabric. What Perry did was to functionally expand the notion of the block so that, as we shall see, what was the inner garden of the block became the green center, and what was once the perimeter block became the commercial and networked perimeter of the entire neighborhood. Thus, the city would now become a collection of independent neighborhoods than an integrated unit.

Where before there had been some differentiation in the hierarchical grid, now there would be structural hierarchy in streets where the streets function and quality

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[509] Boyer, Christine. *Dreaming the Rational City, the Myth of American City Planning*. Cambridge: MIT Press, 1983, p. 60; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 70.

[510] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 70; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p 68-69; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.4-4.

[511] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 70; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 68-69; Perry, Clarence. "The Neighborhood Unit." *Regional Survey of New York and Its Environs, Neighborhood and Community Planning.* Monograph I, Vol. 7, New York: New York Regional Plan, 1929; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 70.

[512] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.4-4.

[513] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 171.

would be inherent in the design--and mainly focused on transportation concentration. Perry also reinforced Olmsted and Robinsons' efforts to change the street quality completely and create a dendritic street pattern that discouraged traffic--thereby unintentionally locking in the ethnic and income quality of the neighborhood as a district character.[514]

> "The title "neighborhood unit" is a term of reference given, for purposes of the study described in this article, to the scheme of arrangement for a family-life community. Investigations have shown that residential communities, when they meet the universal needs of family life, have similar parts performing similar functions. In the neighborhood-unit system, those parts have been put together as an organic whole."[515]

Before, the dendritic grid contained cul-de-sacs, but the streets were also fairly straight and multi-faceted so that people could see who was coming in their direction and defining the pathway and enclosure of the streetscape. Now, the romantic and transcendentalist notions would control street design. He pushed all streets to have "[s]taggered cross streets, dead-end streets, and cul-de-sacs contribute to safety, attractiveness, and variety."[516] "If a long straight street is unavoidable, landscape circles or ovals should be interposed at junctions in such a way as to compel cautious driving."[517] When the lack of street connectivity lessened foot-traffic, Perry created shortcuts with pedestrian footpaths.[518] Perry also reinforced an inverse of previous

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[514] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 68-69.

[515] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, p. 19.

[516] Perry, Clarence. "The Neighborhood Unit." *Regional Survey of New York and Its Environs, Neighborhood and Community Planning.* Monograph I, Vol. 7, New York: New York Regional Plan, 1929; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 70.

[517] Perry, Clarence. "The Neighborhood Unit." *Regional Survey of New York and Its Environs, Neighborhood and Community Planning.* Monograph I, Vol. 7, New York: New York Regional Plan, 1929; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 70.

[518] Perry, Clarence. "The Neighborhood Unit." *Regional Survey of New York and Its Environs, Neighborhood and Community Planning.* Monograph I, Vol. 7, New York: New York Regional Plan, 1929; Southworth, Michael, and Eran Ben-

thought reinforcing the Robinson model of cul-de-sacs. “Staggered cross-streets, dead-end streets, and cul-de-sacs contribute to safety, attractiveness, and variety … cul-de sacs and dead end streets should be used only as part of a complete subdivision plan integrating both pedestrian and vehicular circulation” and that “if long blocks are used, pedestrian footpaths should offer shortcuts.”[519] Thus, Perry precipitated the push towards drastic reductions in street connectivity in policy.

> “There should be no street through the neighborhood in which the motorist can see a long stretch of uninterrupted road ahead. If a long straight street is unavoidable, landscape circles or ovals should be interposed at junctions in such a way as to compel cautious driving. Staggered cross streets, dead-end streets, and cul-de-sacs contribute to safety, attractiveness, and variety. Cul-de-sacs and dead-end streets should be used only as part of a complete subdivision plan integrating both pedestrian and vehicular circulation. If long blocks are used, pedestrian footpaths should offer shortcuts.”[520]

Perry extended the idea of the residential 1/2 mile walking radius as a safety zone within the new neighborhood from an elementary school, and he focused on the idea of walking within a certain amount of time--the 4 minute unit.[521] “Going one step further, Clarence Perry advocated self-contained neighborhoods of 5,000 people with a community center, schools, and other institutions in the center--within a four minute walk from any building.”[522] Thus, Perry focused on safety, the center and a 4 minute walking period and created the neighborhood unit. “Author Clarence Perry, for example, devised the ‘neighborhood unit,’ a physical/social arrangement on the grade school and its

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Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 70.

519 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 70.

520 Perry, Clarence. "The Neighborhood Unit." *Regional Survey of New York and Its Environs, Neighborhood and Community Planning.* Monograph I, Vol. 7, New York: New York Regional Plan, 1929; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 70.

521 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 69; Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 14.

522 Galantay, Ervin Y. New Towns: Antiquity to the Present. New York: George Braziller, 1975, p. 56.

surrounding catchment area as a basic city-building block."[523] Perry kept streets and pathways to lead people where they wanted to go, and thus traffic was a peripheral item."[524] Perry's planning was based upon one great assumption, that the only amenities that people wanted to walk to would be available within the center of the community. Otherwise, neighborhood residents, most notably domestic women working in a domestic home, would need to have an automobile in order to escape the neighborhood. In a sense, the Perry plan would enforce the domestic status of women as a resident focused on childrearing if they did not have more than one family car.

> "An important feature of this project was the location of the shops at one corner of the neighborhood at a point of maximum accessibility, not in the centre, as recommended in the British Dudley Report."[525]

Perry's system included the idea of the self-contained and self-sufficient block as the unit of the neighborhood, with all commercial and retail needs at the perimeter of the block.[526] In previous traditional models, there was no assumption that the blocks or the neighborhood would be self-sufficient.[527] In fact, the roads with their high connectivities enforced the idea that movement itself would create city self-sufficiency--with the bock being only a small unit of the larger whole. What is interesting is that the street system, based on safety which is one of the governmental regulatory powers to enforce planning mechanism, did not make the system safer. Perry brought together various concepts that were once based on real issues and real public needs concerning safety and economic and environmental disparity and then changed the urban fabric--for the public

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523 Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 14.
524 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 69; Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 14.
525 Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 171.
526 Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 25. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014).
527 Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 25. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014).

good. The financial crisis and urban national and international issues kept Perry's ideas on a limited scale, but change would soon come with further developments such as Radburn, FHA and ITE requirements and CIAM.[528] Like Cassandra, there were some members of CIAM like Siegfried Giedion who thought that such neighborhood units mechanism were doomed to failure--and unfortunately he was right.[529]

> "Because they often dissolve into low-density, incomplete suburbs. And he added, 'no partial solution is possible; only preconceived and integrated panning on a scale embracing the whole structure of modern life in all its ramifications can accomplish this task.'"[530]

Apparently Siegfried was prophetic.

6.10 Stein and Radburn

> "The neighborhood concept was undoubtedly one of the major landmark in twentieth century urban planning. Two different original ideas appeared in the same year, 1929. First, there was the idea for neighbourhoods by Clarence Stein and Henry Wright …. Secondly, there was the neighbourhood unit idea of Clarence Perry."[531]

Clarence Stein articulated his ideas of the garden city most specifically in Radburn in 1929.[532] His prime goal was to create a community for the automobile age.[533]

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[528] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 70-71.

[529] Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 14.

[530] Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 14-15.

[531] Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 21-32. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014), p. 21; Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935; Adams, T. Bassett, E.M, and Whitten R. "The Radburn project: The planning and subdivision of land," in Adams, T. Bassett, E.M. and Whitten, R. *Problems of Planning Unbuilt Areas*, Part I Monograph 3 in Committee on Regional Plan of New York and Environs ed. *Neighborhood and Community Planning*. Regional Survey Volume VII (Committee on Regioal Plan of New York and its Environs, New York), 1929, pp. 265-9; Perry, Clarence. "The Neighborhood Unit." *Regional Survey of New York and Its Environs, Neighborhood and Community Planning.* Monograph I, Vol. 7, New York: New York Regional Plan, 1929.

[532] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.7-1.

[533] Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 21-32. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014), p. 24; Stein, C.S. "The Radburn Plan. Notes on the new town planned for the City Housing Corporation," in Parsons, K.C. ed. *The Writings of Clarence S. Stein:*

During Howard's era, the automobile was not prevalent, but Stein realized this would change, and so he integrated previous changes so he stripped the lane from the street and merged it with the superblock.[534] The components of Radburn would include the separation of vehicular and pedestrian traffic, the creation of the super block, and low connectivity with cul-de-sacs and change the relationship of the home to the street.[535] [See Figures 37-41]

> "These include many key components of modernist city planning as well as what would become standard planning practice for suburban development: the superblock (traceable to Raymond Unwin's garden city work); the cul-de-sac; specialized roadways and separation of vehicular and pedestrian traffic (after the precedent of Olmsted's Central Park); and the neighborhood unit with an elementary school at its center (also developed by Clarence Perry)."[536]

In Radburn, Stein turned the house away from the street to face gardens that were central to the superblock.[537] "While the back of each house faced this court, the front of the house had a garden. Three or more of these enclaves were lined together to form a block. Enclaves within the block were separated from one another by the pedestrian pathway that ran between the front gardens of all the houses. A full 10% of total land area in Radburn was open or green space, and the commercial edges were

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Architect of the Planned Community. Johns Hopkins University Press, Baltimore, 1998, pp. 150-52.

534 Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 170.

535 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.7-1;. Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 83; Beigel, Florian, and Philip Christou. Architecture as City: Saemangeum Island City. New York: SpringerWein, 2010, p. 114.

536 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.7-1; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 83; Beigel, Florian, and Philip Christou. Architecture as City: Saemangeum Island City. New York: SpringerWein, 2010, p. 114.

537 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.7-3; Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 24. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014).

populated by commercial or apartment space.[538] What was once a lot, block and street dynamic, became a cul-de-sac, lot, park, and superblock dynamic.[539] Some state that is best considered the enclave, block, superblock and neighborhood dynamic when one completely divorces the street from urban from.[540]

The neighborhood center would be in the middle of a 1/4 to 1/2 mile shed around which residential areas would encircle.[541] [See Figure 42] In Radburn, we see the full effect of the radial plan as a radial function city rather than a traditional radial street pattern. This was a type of hierarchy that merged together the functional nature of the utopian city, the radial functionality of the previous age and the dendritic grid pattern from UR from 6,500 BCE. What was once used as a defensive mechanism in UR against human threats became a defensive mechanism against automobile, but also complete dependence upon automobiles as mode of conveyance. Radburn's new streets contrasted with the normalized 50 to 60 foot American right of way of the 1920s. Stein pushed the right of way to include 18 foot lanes, 6 foot amenity buffers, and 15 foot setbacks.[542] Now the public realm which once was the street would be pushed into the green open space behind the house, and the street would only act as a lane of transportation. What one sees is a complete divorcing of the previous lot, block and street dynamic, with even a separation of street and pedestrian walking networks.[543]

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[538] Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 24-25. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014).
[539] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 68.
[540] Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 24. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014).
[541] Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 25-26. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014).
[542] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 64.
[543] Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 26. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014).

> "The critical distinction between the Radburn model of Stein and Wright and Perry's idea was the kind of neighborhood boundary each envisaged. Although Perry was well as Stein and Wright used arterial streets to form the neighborhood boundary, Stein and Wright preferred the use of natural forms where possible. Another difference between the two models was the maximum walking distance each proposed—0.8 km in the Radburn neighbourhood and 0.4 km in the neighborhood unit model."[544]

The blocks, usually four in number, were arranged around the sides of a central parkway in such a manner so as to enclose the open green space."[545] Like previous ideas of a neighborhood, Stein determined that the resident population of 30,000 people would be subdivided into wards of 5,000 people.[546] These four or five larger superblocks merged to form the greater neighborhoods of Radburn.[547] Stein limited this concept of the typical neighbourhood to an area encircling a school or public area.[548] There was a complete separation of the pedestrian and automobile traffic, for the park served as the backbone of the neighborhood instead of the street grid or the block.[549] The use of the road network to divide the urban area into neighbourhoods with a school at the centre of each was also in advance of its period."[550] Further, breaking the grid with dendritic street patterns, Stein used the superblock as a way to focus traffic away from residential

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544 Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 25-26. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014).

545 Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 24. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014).

546 Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 170.

547 Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 21-32. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014), p. 24.

548 Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 21-32. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014), p. 25.

549 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.7-3.

550 Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 170.

housing, but also the effect created islands of residential houses that were insulated from each other.[551]

> "Another difference was that Perry envisaged the neighbourhood as a separate urban unit. When the number of units were amalgamated they would form the city."[552] …

Radburn integrated previous notions of the neighborhood, for these changes were based on safety and ease of movement. "The neighborhoods were laid out with a radius of half a mile, centering on elementary schools and playgrounds. Each was to have its own shopping center. The size of the neighborhood was determined by the number of children cared for by a single school. So as to allow for flexibility in development, we tentatively overlapping our half-mile (0.8 km) circles."[553] [See Figure 42] Stein and Wright thought of their neighborhoods are grouping and overlapping to support lager scale facilities.[554]

> "The Radburn experience provided a new basis for residential planning and a new prototype for neighborhood layout based on a circulation hierarchy. With the influence of the car growing stronger, Radburn's structure exemplified the idea for subdivision layout."[555]

But, these changes from the city grid and traditional building patterns were not new but were the logical result of previous changes in urban planning philosophy, originally meant for the public good.[556] There were large blocks before from ancient

[551] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.7-1.

[552] Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 26. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014).

[553] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.7-6.

[554] Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 26. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014).

[555] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 68.

[556] Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 22. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014); Stein, C.S. "The Radburn Plan. Notes on the new town planned for the City Housing Corporation," in Parsons, K.C. ed. *The Writings of Clarence S. Stein: Architect of the Planned Community*. Johns Hopkins University Press, Baltimore, 1998, pp.

Greece to various block typologies created in many of the railroad cities. What occurred in Radburn was the composition of these elements changed. Where superblocks once had complete connectivity, they would now be dendritic. Superblocks increased in size than they were in Lechworth and Hempstead Garden Suburbs.[557] And now, fewer units than before faced the street and more units faced inner gardens or greenways.[558] With Radburn came a synthesis of previous planning philosophies that worked to make traffic efficient while removing people from that main offending use--the street.[559] With this change, the residential areas became encircled by the lane which was regulated to automobile traffic. As a result, neighborhoods to be even more dependent upon the automobile to actually get to places of different uses, for they could not walk there. Those people who previously could have walked to commercial, industrial or residential areas now had to drive, putting more pressure on local roads than would have been, and thus putting more pressure on concentrated traffic upon the collector and arterial roads which never would have occurred before.[560]

> "They advocated the cul-de-sac as a rational escape from the limitations of the checkerboard plan, in which all streets are through streets, with the possibility of collisions between cars and pedestrians every 300 feet (91.5 m)> The cost of the through-street pavement and mainline utilities, they argued, were not fully understood, and they complained that realtors and municipal engineers had perpetuated obsolete forms."[561]

150-52 ("The intellectual foundations of their work came from Stein's involvement in the Regional Planning Association where the ideas of Patrick Geddes, Ebenezer Howard, and the economist Thorstein Veblen, the sociologist Charles Cooley, and the philosopher John Dewey were discussed."); Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 22. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014).

[557] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 64.

[558] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 64.

[559] Wilkie, Carter and Richard Moe. Changing Places: Rebuilding Community in the Age of Sprawl. New York: Henry Hold and Company, 1997, pp. 41-42.

[560] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, pp. 198-199.

[561] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 64.

Further, what had been an aberration or failure of connectivity became the preferred street pattern--the cul-de sac.[562] Justified on economic terms because of the lack of need of too many streets, per Robinson's previous theories of street needs, Stein advocated the cul-d-sac as the perfect way to escape from the checkerboard pattern of the traditional grid.[563] Once the standard practice of street redundancy became questioned, the cul-de-sac could flourish.[564] These cul-de-sacs would work with collector and then arterial streets to create hierarchy for traffic, to protect dwellings from non-localized traffic patterns.[565] Then the coup-de-grac were large 60 foot wide collector streets encircling the neighborhoods of superblocks to ensure that those inside the superblock would never walk out--they would have to drive out.[566]

> "Overall the development was able to reduce street area and the length of utilities by 25 percent what a typical gridiron street plan required. According to Stein, the cost savings for roads and public utilities, in comparison with the normal subdivision, paid for the construction of the main core parks."[567]

Ironically, with the costs saving from reduced connectivity and street patterns, the suburbs would be cheaper to build, and thus this pattern worked hand-in-hand with the governmental desire to build infrastructure and decentralize city cores--especially during periods of white flight. Racially and income discriminatory practices inherent within the urban structure became more segregated, cheaper and more possible--the very people that Howard initially wanted to help protect against the ills of the city.

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[562] Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 21-32. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014): 24]

[563] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997.: 64]

[564] Patricios, Nicholas A. "Urban Design Principles of the Original Neighborhood Concepts." Urban Morphology, 6(1) (2002): 23. http://works.bepress.com/nicholas_patricios/15/ (accessed July 10, 2014).

[565] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 64-65, 66.

[566] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 65.

[567] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 65.

6.11 CIAM the Functional Machine to the Un-City

> "Setting in Paris in 1916, he won for himself a place at the head of the avant-garde, first with his painting, then with his brilliant architectural criticism, and most profoundly with his own contributions to architecture. The Swiss artisan Jeanneret no longer existed. He had recreated himself as "Le Corbusier," the Parisian leader of the revolution in modern architecture."[568]

Jane Jacobs and other urban critiques saw Howard, Burnham and previous urban philosophers as not understanding the city, but with Le Corbusier, the trifecta of modernism bulldozed earlier traditions and replaced them with real change.[569] [See Figures 42-45] "She [Jane Jacobs] sees in Howard, Burnham, and Le Corbusier a shared uneasiness with actual cities, each of them seeking to replace the rich complexity of the real metropolis with the abstract logic of an idealized planned city."[570] While it would be simple to place Le Corbusier into the same category as Howard, Olmstead, Burnham and Robinson, there is something gnawingly and radically different between these verifiable socialists and political activists and Corbusier. Howard, Olmstead, Burnham and Robinson wanted to actually help people and wanted people to have access to the landscapes that beforehand were only for the rich. What is long forgotten within architectural and planning circles, purposefully, is that Le Corbusier was part of the Vichy France's planning and political expansion mechanism through planning and his beliefs about the Nazi party.[571]

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[568] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 31.
[569] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 24.
[570] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 24.
[571] Klapper, Bradley S. "Nazi praise sparks Swiss rethink of Le Corbusier." *Huffington Post*, October 6, 2010. <http://www.huffingtonpost.com/huff-wires/20101006/eu-switzerland-le-corbusier/> (accessed July 18, 2014); Jacobson, Samuel. "Why Politics Matter: Le Corbusier, Fascism, and UBS." *Archdaily,* August 10, 2011. http://www.archdaily.com/149885/why-politics-matter-le-corbusier-fascism-and-ubs/ (accessed July 14, 2014); Fishman, Robert. *Urban Utopias in the Twentieth Century: Ebenezer Howard, Frank Lloyd Wright, and Le Corbusier*. Cambridge, Massachusetts: MIT Press, 1982, pp. 244–246.

> "It's easy for the discussion of those views to lapse into a sort of ethical debate by-proxy, devolving into a discussion about whether or not Le Corbusier should continue to be included in the canon of twentieth century architects considering his apparent anti-Semetism and sympathy for the Nazi party."[572]

While he had to eventually distance himself from the Vichy regime due to an article which connected him to Bolshevik ideas, the reality is that Le Corbusier did not give up the core of his belief--the need to control and his view that there was something intrinsically wrong with the street and its activity.[573] He saw urban planning as a machine where pieces could be methodology taken apart and removed and parts added that had not previously existed or that had only been philosophical wanderings. Not to be understated, Le Corbusier was a brilliant architect and planner, but he desired to do away with the previous age of cities--through control and change of the urban plan. He saw himself as the advocate and designer of that change.

At the end of World War II, modernism and building began to center around the automobile and the need to make greater expansion possible by reducing construction costs.[574]

> "Grid and dendritic patterns differ in several ways. First, the grid usually gives more choice in getting from A to B. This is path redundancy. …. The second important factor is number of turns."[575]

Yet, to make a coherent system that removed redundant lanes, one would also have the danger of removing the street and the public realm. "European Modernist architects

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[572] Jacobson, Samuel. "Why Politics Matter: Le Corbusier, Fascism, and UBS." *Archdaily,* August 10, 2011. http://www.archdaily.com/149885/why-politics-matter-le-corbusier-fascism-and-ubs/ (accessed July 14, 2014); Klapper, Bradley S. "Nazi praise sparks Swiss rethink of Le Corbusier." *Huffington Post*, October 6, 2010. <http://www.huffingtonpost.com/huff-wires/20101006/eu-switzerland-le-corbusier/> (accessed July 18, 2014).

[573] Klapper, Bradley S. "Nazi praise sparks Swiss rethink of Le Corbusier." *Huffington Post*, October 6, 2010. <http://www.huffingtonpost.com/huff-wires/20101006/eu-switzerland-le-corbusier/> (accessed July 18, 2014).

[574] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 71.

[575] Brown, M. Gordon. "Space, property and the first urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 11.

found in this traffic-protected superblock the key to creating their ideal city. Architects and planners such as Le Corbusier, Walter Gropius, Ludwig Hilberseimer, and numerous others viewed the automobile and technology as the forces that would shape this new city."[576] With the inception of the International Congress for Modern Architecture [CIAM], architects and planners considered the city as more a machine than urban elements centered around and in the street. "Standarization, order, and control were the motto for economic success. Social and political reform were not far behind. Prefabricated, uniform dwellings, nested in planned cities would be the ultimate expression of an efficient society."[577] The designers began to deconstruct the past industrial city and all previous city forms to a modern city with separate uses, districts, superblocks and transportation highways that interwove between these various elements.[578] The city was about function rather than activity.

> "The epithet 'functionalist' is today regarded as a pejorative but the rediscovery of the architecture of the twenties and thirties went together with a return to fashion of the world 'rationalism.'" [579]

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[576] Corbusier, Le, and Frederick Etchells. *The City of To-morrow and Its Planning*. London: J. Rodker, 1929, p.19; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 71; Krueckeberg, Donald. The American Planner: Biographies and Recollections. New York: The Center for Public Policy: Meuthuen, Inc, 1983, p. 440; Wilkie, Carter and Richard Moe. Changing Places: Rebuilding Community in the Age of Sprawl. New York: Henry Hold and Company, 1997, pp. 43-44; Galantay, Ervin Y. New Towns: Antiquity to the Present. New York: George Braziller, 1975, p. 56; Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, pp. 7-25; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 21-22; Tyler, Norman and Robert M. Ward. Planning and Community Development: A Guide for the 21st Century. New York: W. W. Norton and Company, 2011, p. 27; Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 45; Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 23; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 87; Boddy, T. "Underground and Overhead: Building the Analogous City," in Sorkin M, ed. *Variations on a Theme Park*. New York: Noondday Press, 1992, pp. 123-153.

[577] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 71.

[578] Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 12.

[579] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 156.

From the 1920s through the 1950s, Le Corbusier's theory was that the city acted more like a functional system and that the purpose of the planner was to create a mechanistic or designed order.[580] "Functionalism envisions the city as a collection of uses to be accommodated: residence, work, leisure, and the traffic systems that serve them."[581] What is missing from this dynamic is the people within the system and how those different elements actually relate together and apart--the street. "In early functionalist though the city was characterized as a machine, in later thought, as a complex system and as a network or constellation of community centers linked to and directed by a central core."[582] Functionalists saw chaos as negative and they greeted residence, work, and leisure as discrete elements that could be manipulated and changed at will, in size and location. Activities should not mix; hence zoning is a key element of a functionalist city, for in a zoned environment, activities can proceed with little or no interference from other activities."[583] Ultimately, this becomes a system of trying to create control over something that was never controlled under any previous urban planning theory--even by Howard, Burnham, Perry and Unwin. This is the complete divorcing of the street from the city.

> "Though functionalist theory calls for the separation of activities, in one locale, the heart and core of the city, these must be comingled. The idealized purpose of the urban center is 'to enable people to meet one another to exchange ideas.'"[584]

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[580] Attoe, Wayne and Donn Logan. American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press, 1989, p. 2.

[581] Attoe, Wayne and Donn Logan. American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press, 1989, p. 2.

[582] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961); Attoe, Wayne and Donn Logan. American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press, 1989, p. 2.

[583] Attoe, Wayne and Donn Logan. American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press, 1989, p. 2.

[584] Attoe, Wayne and Donn Logan. American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press, 1989, p. 2.

The problem with CIAM and Le Corbusier's influence was not that they tried to build large structure or hyper density or create new forms of infill. There were many cities in the ancient world that were extremely dense: in 2100 BCE, Girsu in Iraq had 100,000 people; in 1991 BCE, Memphis in Egypt also had 100,000 people; in 1360 BC, Thebes in Egypt had 100,000 people; in 700 BC Nineveh in present Iraq had 100,000 people; in 600 BCE, Babylon in present Iraq had 200,000 people and, in 430 BC, it had 250,000 people; in 320 BC, Alexandria in present Egypt had more than 300,000 people; in 200 BCE, Pataliputra in present India had 350,000 people; in 180 AD, Rome had more than 800,000 people; in 500 AD, Constantinople in present Turkey had 500,000 people; and, in 700 AD, Chang'an in present China had 1,000,000 people or more.[585] Almost all of these cites lived with shared streets, some had the sidewalk and street, all had connection between the street and the building façade, and all had a lot, block and street dynamic though different grids. While this enumeration of large and dense cities might seem redundant, this is only to reinforce the fact that prior methods of city building were highly capable of producing cities that were resilient, productive, and efficient for long periods of human time, without the problems of the industrial age pollution. It was possible to build hyper dense cities quickly with technology at that time if previous methods were used. This was about changing the very nature of the city to be the un-city of self-contained building neighborhoods, with social isolation and hierarchies intact.

> "What set the concept of 'functional city' apart was its radical approach to general accepted notions. The widely espoused spatial separation of functions, for example, acquired a very specific interpretation in the 'functional city' where urban life was reduced to

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[585] Modelski, George. *World Cities: –3000 to 2000*. Washington DC: FAROS 2000, 2003; Chandler, Tertius. *Four Thousand Years of Urban Growth: An Historical Census*, Lewiston, NY: The Edwin Mellen Press, 1987; Morris, Ian. *Social Development*. Stanford University, October 2010. http://www.ianmorris.org/docs/social-development.pdf (accessed July 18, 2014); Chandler, Tertius and Gerald Fox. *3000 Years of Urban Growth*. New York, NY: Academic Press, 1974.

> four main functions (home, work, recreation and traffic) which were to be rigidly separated from one another spatially."[586]

It should be noted that in France at the time, large public buildings and residences were rare. Before Haussmann, small projects like Palais Royal or Palace des Vosges were example of public intrusions into the city.[587] "In France this happened in the case of limited speculative operations such as the Palace des Vosges and later the plot subdivision of Palais Royal, which only rarely achieved the rationalization of urban tissue as was the case of the city of Richelieu."[588] There was a rapid need to construct large numbers of residential units, but this was not ultimately what led to the functionalist city. Le Corbusier took this moment to propose large numbers of residential housing in towers in the sky. This was the creation of a dense city with extreme antisocial characteristics.[589] To make this possible, Le Corbusier would not only have to dislocate the street from the lot and block dynamic that began 6,400 years before and also irradiate the value of the street in contrast to the lane.

> "TO LIVE! To breathe—TO LIVE! Homes to inhabit. The present idea of the street must be abolished: DEATH TO THE STREET! DEATH TO THE STREET!"[590]

To destroy the street, Le Corbusier converted a previous hierarchy of streets and lanes from Radburn into the systematic flow of traffic in lanes.[591] This converted what

[586] Ibelings, Hans. 20th Century Urban Design in the Netherlands. Rotterdam: NAi Publishers, 1999, p. 54.
[587] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 156.
[588] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 156.
[589] Richard, Simon. "The Antisocial Urbanism of Le Corbusier." *Common Knowledge* 13, Issue 1 (Winter 2007): 50-66.
[590] Hilberseimer, Ludwig. *The New Regional Pattern, Industries and Gardens, Workshops and Farms*. Chicago: Paul Theobald, 1949, p. 137; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 72; Galantay, Ervin Y. New Towns: Antiquity to the Present. New York: George Braziller, 1975, p. 56.
[591] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 45.

was a multifunctional city street into a type of pathway with a single function--transportation.

> “This issue of road hierarchy goes to the very heart of the ‘revolution’ …. Although hierarchy is a rather abstract concept, it can have very concrete consequence: it has been implicated both in urban destruction (aiding and abetting demolition and severance by urban motorways) and in disurban creation (giving rise to the car-oriented townscape of bleak distributor roads.”[592]

> “Le Corbusier’s vision had no need of traditional main streets such as avenues or boulevards—so no pavement cafes, and no Champs-Elysees. This was not an oversight: the demise of the traditional street was Le Corbusier’s express intention. He intuitively know the logistical power the street had in binding up cities in their old ways. So when he attacked the traditional city he went for the jugular.” [593]

Thus, the City of To-morrow became a mode of transportation with the exclusion of human activity.[594] People would encapsulate themselves into cars at home and then open extricate from their capsules when they reached their destination. The street solely became origin and designation, and nothing in between. In this City of Tomorrow, one had buildings that were out of scale to “human and social behavior” and the streets became places that did not allow for “community interaction, shopping, and cultural activity.”[595] Given the example of the market square in human history, this type of dynamic would eradicate that option as a node or pathway in human history. While these hierarchical lanes would be defined by use and traffic loads, and places of assembly would be regulated to singular places in a controlled environment.[596] “This

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[592] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 45-46.

[593] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 45.

[594] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 72; Jenneret, Charles-Edouard (Le Corbusier). "A Contemporary City" in "The City of To-morrow and Its Planning. Dover Publications; Reissue edition, 1987 (1929). http://macaulay.cuny.edu/eportfolios/milsteinspring2013sandbox/files/2013/03/Le-Corbusier-from-The-City-of-Tomorrow-and-Its-Planning.pdf (accessed July 18, 2014).

[595] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 72.

[596] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 72.

‘Radiant City’ concept exerted tremendous influence on later new town planning notably in its rigid segregation of functional areas; vehicular-pedestrian separation and the hierarchical ordering of the traffic system based on the speed of movement.”[597] [See Figures 44-51] Each types of activity, each building, each person would be controlled and designed.[598]

> “Within the radiant city, there are government buildings, business center, railroad station and air terminal, hotels, housing, factories, warehouses, and heavy industries. The city center is residential zone, with business center and industrial section on either side. By doing so, the internal travel can be diminished by half. Each housing units is intended for 2700 residents. Each of these units can provided with its individual set of services, directly connected with family life: communal services (catering and household supplies), nursery, kindergarten, open-air playground in the park, primary school in the park. Between the ages of 1 and 14, children will have all necessary educational establishments outside their own front door, in the park.”[599]

Lost in translation were areas where people could interact on the street, creating an absence in the streetscape of activity. There was no “civic consciousness” in the plan.[600] This is because in the analysis of city structure, major components of city life were removed from that structure because they were considered messy or chaotic--they ceased to have value.[601]

> “He proposed that large tracts in the center of Paris and other major cities be leveled. In place of the old buildings, geometrically arrayed skyscrapers of glass and steel would rise out of parks, gardens, and superhighways. These towers would be the command posts of their religion. They would house a technocratic elite of planners, engineers, and intellectuals that would bring beauty and prosperity to the whole society. In his first version of the ideal city; Le Corbusier had the elite

[597] Galantay, Ervin Y. New Towns: Antiquity to the Present. New York: George Braziller, 1975, p. 55; Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 24; see also Curtis, William. Le Corbusier - Ideas and Forms. London: Phaidon Press, 2006; Curtis, William. Modern Architecture Since 1900. London: Phaidon Press, 1986.

[598] Density Atlas. "Paris City Perimeter." http://densityatlas.org/casestudies/profile.php?id=103 (accessed July 18, 2014).

[599] Density Atlas. "Paris City Perimeter." http://densityatlas.org/casestudies/profile.php?id=103 (accessed July 18, 2014).

[600] Barnett, Jonathan. *An Introduction to Urban Design*. New York: Harper & Row, 1982; Attoe, Wayne and Donn Logan. American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press, 1989, p. 2.

[601] Attoe, Wayne and Donn Logan. American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press, 1989, pp. 2-3.

> live in luxurious high-rise apartments close to the center; their subordinates were relegated to satellite cities at the outskirts. (In a later version everyone was to live in the high-rises). Le Corbusier called his plan 'the Radiant City,' a city worthy of our time."[602]

The issues the Radiant City addressed were syndication, chaos, hygiene, density and open space. Le Corbusier wanted to rid chaos and unhygienic conditions from the city, but this did not mean that he was in line with Howard or Wright considerations of democratic notions or equality--syndicalism.[603] The Radiant City's towers and green spaces were controlled areas where people of different parts of society had their place.[604] While eventually backtracking, his towers had definite social stratification where the elites would enjoy great views and the subordinates would live would elsewhere.[605] It is true that Le Corbusier ultimately changed this idea for he wanted all persons to have access to collective services.[606]

> "The emphasis in the Unité, however, is not on the individual apartment but on the collective services provided to all the residents."[607]

But unlike other planners, everyone would not have the same views or conditions in this new city. In this city, everything would be controlled--people, party, leisure, residence, work, place, labor, the family, and the remainder.

> Wright believed in a life in which labor and leisure would be one, whereas Le Corbusier subjected even the family to the stark division between work and play that makes the Radiant City. The family belongs to the realm of play. Indeed it virtually ceases to exist during the working day."[608]

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[602] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 31.
[603] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 47.
[604] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 47.
[605] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 47.
[606] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, pp. 47-51.
[607] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 51.
[608] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 50.

The towers in the garden was not an intentional effect of those advocating the Radiant City. The radiant city was a way to remove the block from the city by creating large superblocks with towers that were only incidentally attached to the ground, and then only in a diagrammatic way. The buildings were objects in space rather than contained in any real city--the buildings were effectively self-sufficient neighborhoods.[609]

> "From 1928 onwards the CIAMs did away with these remaining ties and attempted to bring back to the scale of the city the principles carried out in the avant-garde experiments. The block was dissolved and the formal vocabulary continued to be further simplified. The abolition of differences between back and front facades and between floors, a consequence of homogenizing space, led to a uniform treatment of facades, to a modular repetition of a typical cell, where openings were determined once and for all and no more expressed a dialogue between the dwelling and urban space. Buildings became objects, leading to the complete explosion of the urban tissue of which the Unité d'Habitation is the most complete manifestation."[610]

By the 1933 Third Congress, Le Corbusier and others tried to distance itself from the Garden City.[611] Their purpose was not to create a garden for people, but to transform the city itself. "Their solution was in the city itself—a city made for speed and commercial success."[612] Part of the Garden City plan was the romanticism of the garden experience and the health related benefits that living close to nature was to benefit all of the populous--with curved streets. While he liked the rectilinear straight line aspect of the U.S. grid and hated the organic nature of the European grid, Le Corbusier wanted a more efficient way for traffic circulation.[613]

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[609] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p.157.

[610] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 157.

[611] Corbusier, Le, and Frederick Etchells. *The City of To-morrow and Its Planning*. London: J. Rodker, 1929, p. 38; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 71.

[612] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 71.

[613] Corbusier, Le, and Frederick Etchells. *The City of To-morrow and Its Planning*. London: J. Rodker, 1929, p. 10-12; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 71.

> "The circulation of traffic demands the straight line; it is the proper thing for the heart of the city. The curve is ruinous, difficult and dangerous; it is a paralyzing thing…. The winding road is the Pack-Donkey's way, the straight rode is man's way. The winding road is the result of happy-go-lucky heedlessness, or looseness, lack of concentration and animality. The straight road is a reaction, an action, a positive deed, the result of self-mastery. It is sane and noble."[614]

In contrast to the Garden City, Le Corbusier's concepts of hygiene and the benefits of health were in the stark and controlled qualities of the building rather than in living close to nature. This required a very sanitary and sterile environment that was removed to a degree from nature while having green and open spaces all around it--views for view sake only. While the traditional block in Paris and Amsterdam had the internal hof or garden close and while the Garden City adherents brought the garden into the city, the Radiant city put towers in a garden block that was only an incidental remnant of older forms that could be exploded and removed.[615]

> "The rationalist architecture that developed in Germany started form a completely different analysis and it established a more abstract and fragile relationship between form and the old city. The block was only an accidental element and was soon abandoned; even though a clear relationship of the building and its associated ground space remained, as was shown in the terraces that inherited the traditional tissue."[616]

6.12 Government Policy and Sprawl

> "[On August 17, 1896, at] the Crystal Palace on Monday evening Mrs. Dristcoll, of Croydon, was knocked down by a motor car, which went over her head, death quickly ensuing. … The witness, in answer to the Coroner, denied that she saw any notice posted up 'beware of horseless carriages.'… " [She was 44.][617]
> "Here at West 74th Street and Central Park West, Henry H. Bliss dismounted from a streetcar and was struck and knocked unconscious by an automobile on the evening of September 13, 1899. When Mr. Bliss, a New York real estate man, died the next morning

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[614] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 71-72.

[615] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 156.

[616] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 157.

[617] British Newspaper Archive. "The First Fatal Motor Car Accident." *British Newspaper Archive.* <www.britishnewspaperarchive.co.uk/viewer/bl/0000265/18960819/015/0003> (accessed July 14, 2014); Wikipedia. "Bridget Discoll." http://en.wikipedia.org/wiki/Bridget_Driscoll (accessed July 14, 2014).

> from his injuries, he became the first recorded motor vehicle fatality in the Western Hemisphere."[618]

With the advent of the automobile, the issue of street safety became more important for the public in both England and the United States, especially after the first deaths of Bridget Driscoll and Henry Bliss.[619] [See Figures 35 and 36] What is interesting is that accidents, whether by horse or cart, have happened since the dawn of the city when streets, commerce and the public realm intertwined. Further, this public jaywalking was never considered a public menace for the burden was put upon the party with the greatest mass to answer for pedestrian accidents--or the pedestrian was just considered unlucky. What occurred was a unique nexus of business, philosophy and government expansion of infrastructure which used propaganda, regulation and the push for decentralization to usurp the roads away from the pedestrian and make them solely the venue of traffic--as the only form of commerce on the street.[620]

> "The newspaper coverage quite suddenly changes, so that in 1923 they're all blaming the drivers, and by late 1924 they're all blaming jaywalking."[621]

With the advent of World War I, the planners started looking at Congress and federal funding in order to create the infrastructure needed for expansion of cities, business and the automobiles. "Starting in 1917 Congress apportioned $110 million to the Bureau of Industrial Housing to plan and construction housing and transportation

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618 Citystreets. "The First Pedestrian Fatality." http://citystreets.org/projects/bliss-plaque/ (accessed July 17, 2014)

619 British Newspaper Archive. "The First Fatal Motor Car Accident." *British Newspaper Archive.* <www.britishnewspaperarchive.co.uk/viewer/bl/0000265/18960819/015/0003> (accessed July 14, 2014); Wikipedia. "Bridget Discoll." http://en.wikipedia.org/wiki/Bridget_Driscoll (accessed July 14, 2014).

620 Lewis, Aidan. "Jaywalking: How the car industry outlawed crossing the road." *BBC News*, February 11, 2014. http://www.bbc.com/news/magazine-26073797 (accessed July 17, 2014)

621 Lewis, Aidan. "Jaywalking: How the car industry outlawed crossing the road." *BBC News*, February 11, 2014. http://www.bbc.com/news/magazine-26073797 (accessed July 17, 2014)

needed for shipbuilding and armament centers."[622] This was aided by the new automobile industry which saw the road as the way for more commercial growth. Hand in hand, the decentralization efforts pushed by Olmstead, Howard, Burnham, architects, engineers and social activists wanting better living conditions for city residents than the city.[623] As a result, public interest groups like the Better Homes for America built the idea of the American Dream as a detached single-family home, which would be aided by an ability of people to commute to and from the city--separating work and the domestic home.[624] The previous urban philosophies that sought options other than then traditional development capitalizing on the technological, planning, regulatory and financial means making urban development in the suburbs possible.[625] And yet, interestingly the very menace that suburban advocates railed against, the automobile, was the very technological advance that allowed the suburb to flourish as they never had before.

> "Stein acknowledge that the Radburn plan was a reaction to the state of the city: 'American cities were certainly not places of security in the twenties. The automobile was a disturbing menace to city life in the U.S.A.--long before it was in Europe. What is interesting though is that while the Garden City movement was caused by a push to isolate nuisance effects of the automobile, it inadvertently made the problem much worse by concentrating the effect of the automobile on an urban system base almost solely upon the absence of the automobile."[626]

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[622] Boyer, Christine. Dreaming the Rational City, the Myth of American City Planning. Cambridge: MIT Press, 1983, p. 60.

[623] Boyer, Christine. *Dreaming the Rational City, the Myth of American City Planning*. Cambridge: MIT Press, 1983, p. 60; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 59.

[624] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 59.

[625] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 62; Krueckeberg, Donald. The American Planner: Biographies and Recollections. New York: The Center for Public Policy: Meuthuen, Inc, 1983, p. 440; Galantay, Ervin Y. New Towns: Antiquity to the Present. New York: George Braziller, 1975, pp. 55-56; Tyler, Norman and Robert M. Ward. Planning and Community Development: A Guide for the 21st Century. New York: W. W. Norton and Company, 2011, p. 26.

[626] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 62-63.

Yet the worse was to come. With the dendritic patterns following Radburn and the influence of CIAM efforts, the unchecked street funneled automobile traffic into rivers of concentrated dangerous automobile traffic.[627] Before Radburn, the American city would start to become more dangerous as the automobile traffic became preeminent in the public sphere. “American cities were certainly not [a place] of security in the twenties. The automobile was a disrupting menace to city life in the United States--long before it was in Europe.”[628] With over 20 street crossings a mile, what was previously a shared space became an area where casualties and injuries mounted.[629] Rather than actually blaming the automobile owner, regulators blamed the checkerboard nature of the urban fabric as the culprit.[630] The push that initially started as a way to make the lives of workers better created the means by which the green and open spaces would be used for parking, noise and traffic, and the public realm diminished.[631].

> “Radburn’s design was a reaction against city traffic and the impact of cars on residential living and as such it had to ‘accept the role of a suburb’ rather than that of a garden city.”[632]

When one combined the CIAM propositions of creating towers in the city and the disjoinder of the block with the rest of the urban framework with the Wrightian vision of the decentralized Jeffersonian Democracy and earlier notions of planning for the public good, the future of the traditional gridplans was basically set. Technocratic nature of Le

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[627] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 62-63.

[628] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.7-1.

[629] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.7-1.

[630] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.7-1.

[631] Stein, Clarence. *Toward New Towns for America*. Cambridge, Massachusetts: MIT Press, 1951, p. 23; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 62-63; Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004: 170.

[632] Stein, Clarence. *Toward New Towns for America*. Cambridge, Massachusetts: MIT Press, 1951, p. 23; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 63.

Corbusier ideology took over to make Americans more isolated, more racially polar, and more anti-socialized within the city. This dynamic became known as sprawl, and while sprawl had existed before the invention of the automobile and before later planning theories destroyed the street and the block, the reality is that sprawl in its present form and expansive size would have been impossible to occur without the confluence of technology, planning and policy.[633]

With the rapid changes in the United States and the need for infrastructure integration pushed the federal dimension to bind the country together, create a fluid workforce, push for decentralization, build a housing sector, sell automobiles and have an American autobahn.[634] "This could only be achieved through federal action. In 1921 the Federal Highway Act provided federal aid to construct 'such projects as will expedite the completion of an adequate and connected system of highways, interstate in character.'"[635] This action allowed for the creation, improvement and expansion of more than 600,000 roads and highways, with a total cost of construction estimated at $426 billion for highways alone.[636] "Although states were expanding their road systems, a coherent national road network had yet to be developed, one that would be coordinated

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633 Bhatta, B. Analysis of Urban Growth and Sprawl from Remote Sensing Data. Heidelberg: Springer, 2010, p. 1.6, p. 7.

634 McNichol, Dan The Roads that Built America: The Incredible Story of the U.S. Interstate System. New York: Sterling Publishing, 2006; Schwantes, Carlos Arnaldo. Going Places: Transportation Redefines the Twentieth-Century West. Bloomington, IN: Indiana University Press, 2003, pp. 152–3; U.S. Department of Housing and Urban Development. "HUD – Federal Housing Administration". Washington, D.C.: US HUD, August 2012. http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/fhahistory (accessed August 2, 2014).

635 Rae, John. *The Road and the Car in American Life*. Cambridge, MA: MIT Press, 1971, p. 38; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 75.

636 Rae, John. *The Road and the Car in American Life*. Cambridge, MA: MIT Press, 1971, p. 74; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 75; Neuharth, Al "*Traveling Interstates is our Sixth Freedom.*" USA Today, June 22, 2006.

financially and technically. This could only be achieved through federal action."[637] As a result, those who were involved in the administration and planning mechanism gained influence in how the building of the United States was pursued.[638] Because those indoctrinated by the Garden City, CIAM and other planning ideologies were now in positions of power to enforce these doctrines, the question was if sprawl and the destruction of the lot, block, and street dynamic was to occur, but, really, how to implement sprawl as quickly as possible.

> "The new profession was defined as 'a…a branch of engineering which is devoted to the study and improvement of the traffic performance of road networks and terminals. Its purpose is to achieve efficient, free, and rapid flow of traffic; yet, at the same time, to prevent traffic accidents and casualties."[639]

And yet a shift occurred for the issue was not about the health benefits of the Garden City but only the efficiency of automobile transportation and the primacy of lanes and the removal of the street. This moved urban planning eventually moved from the technical and performance driven roads of the Modernism era to the technical gauging of efficiency of only automobiles of the present age.[640] In 1942, the first Traffic Engineering Handbook provided expert advance and scales of the professional practice.[641] The experts required wider lanes because they believed that the wider lanes would create safety instead of increasing speed.[642] "A lane width of 12 feet … was usually recommended for mixed truck and passenger vehicles, and 11 feet … for passenger

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[637] Rae, John. *The Road and the Car in American Life*. Cambridge, MA: MIT Press, 1971, p. 38; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 76.
[638] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 76.
[639] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 76.
[640] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 76.
[641] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 76.
[642] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 76.

cars."[643] This included 13 to 15 feet for lanes with side parking.[644] This was to allow for further expansion of the lanes in case of increased traffic.[645]

> "This applied to the Radburn superblock, which was adopted in the 1930s by the United States Federal Housing Authority as is preferred form. This was important because, as the agency that approved government-insured mortgages, it was able to encourage lenders to favour loans to houses on culs-de-sac rather than to those on the traditional layout of a grid of connected streets."[646]

In 1914, the United States Housing Corporation propagated examples of benchmarks for streets, alleyways and urban spaces.[647] [See Figure 52] In January 1935, the FHA publication about standards became important and influential within urban planning.[648] The Federal Housing Administration was a prime mover and provider of financial guarantees for the housing boom in the post-War period that allowed for the great and huge expansion of housing for Americans and the shift of Americans from cities to the suburbs.[649] While the FHA could not require all cities to adhere to certain standards, it recommended certain standards within developments that held FHA-approved housing.[650] The result was a de facto approval or endorsement of certain types of urban form.[651]

> "Yet it goes on to endorse principles: of development in those areas in which insured mortgages are desires, principles which have been

[643] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 76.

[644] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 76.

[645] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 76.

[646] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 171.

[647] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 83.

[648] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 83.

[649] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 83.

[650] Federal Housing Administration. *Subdivision Development: Standards for Insurance of Mortgages on Properties Located in Undeveloped Subdivisions*. Circular no. 5, January 10. Washington, DC: FHA, 1935; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 83.

[651] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 83.

> proved by experience and which apply with equal force to neighborhoods for wage earners as they do to those for the higher income groups."[652]

These requirements ("Minimum Requirements & Desirable Standards") pushed for subdivision layouts which fit with the topography, streets with planned widths that fit local requirements, a street system with differential levels of traffic, and hierarchies of materials depending upon use (local streets could use lesser materials because of lesser use).[653] These polices also determined proposed dimensions for the street by requesting paving based on 10 feet lanes and 8 feet parallel parking lanes, street intersections with a radius of 20 feet, trees planted near streets, blocks ranging from 600 to 1000 feet in length, lots that were at least 50 feet wide and having an area of 6,000 square feet minimum, and lots and blocks with semi-detached dwelling densities at no greater than 12 units per acre.[654] Before, the street and urban form was determined by the value of the land next adjacent the public zone and the type of use or flexibility of use within the lot. Now, the determination would be technocratic based upon numbers that resulted in cities without the densities to truly create a public street--the lane would be there as a matter of course, but there would be no vitality or density on either side of the street.

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[652] Federal Housing Administration. *Subdivision Development: Standards for Insurance of Mortgages on Properties Located in Undeveloped Subdivisions*. Circular no. 5, January 10. Washington, DC: FHA, 1935; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 83.

[653] Federal Housing Administration. *Subdivision Development: Standards for Insurance of Mortgages on Properties Located in Undeveloped Subdivisions*. Circular no. 5, January 10. Washington, DC: FHA, 1935; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 83.

[654] Federal Housing Administration. *Subdivision Development: Standards for Insurance of Mortgages on Properties Located in Undeveloped Subdivisions*. Circular no. 5, January 10. Washington, DC: FHA, 1935; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 83.

In 1936, the FHA also delved into city planning with its Bulletin "Planning Neighborhoods for Small Houses," pushing similar designs as Unwin, Perry and Stein.[655] This represents the point where at or before those who were fostered by Unwin, Perry and Stein came into the administrative position to enforce those ideas with federal power and influence. They introduced notions to discourage through traffic stating that portions of the grid should be eliminated for efficient and cost savings purposes and that streets should follow the curvilinear than be completely straight.[656] These persons advocated using "the topography to reduce costs, [and] create interesting vistas." [657] They dimensioned the lanes to 50 feet with 24-26 foot pavements, 8 foot planting/utility strips and 4 foot walks, that cul-de-sacs meeting family dwellings.[658] With steel construction, these policymakers reduced requirements to 18 foot pavements, 30 foot radius turnarounds, 15 foot setbacks and trees spaced 40 feet apart on both sides of the street.[659] "Thus, the federal government was able to exercise tremendous power through simple act of making an offer that could not be refused. The FHA was well aware of the implications of its authority."[660] The people who were part of the administration of the FHA also knew that once their policies were set in stone, they would be able to build

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[655] Federal Housing Administration. *Planning Neighborhoods for Small Houses*, Technical Bulletin no. 5. Washington, DC: FHA, July 1, 1936; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 84; Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 14.

[656] Weiss, Marc. *The Rise of the Community Builder*. New York: Columbia University Press, 1987, p. 153; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 84-85.

[657] Weiss, Marc. *The Rise of the Community Builder*. New York: Columbia University Press, 1987, p. 153; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 84-85.

[658] Weiss, Marc. *The Rise of the Community Builder*. New York: Columbia University Press, 1987, p. 153; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 84-85.

[659] Weiss, Marc. *The Rise of the Community Builder*. New York: Columbia University Press, 1987, p. 153; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 84-85.

[660] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 87.

upon those policies gradually to build a history of experience to rulemaking, implementing those rules.

> "FHA minimum standards and design regulations had set the ground rules for modern subdivision development, which shaped the wartime housing projects of the Federal Public Housing Authority and provided the basis for the post-World War II suburbanization drive; these standards were also the foundation for local government subdivision regulations."[661]

By 1941, cities began adopting FHA standards and its proposed right-of-ways of between 50 and 60 feet, with minor and dead-end streets being 22 to 40 feet.[662] They also proposed planting strips were around 6 feet with the sidewalk of around 4 feet and curb radii of about 20 to 25 feet.[663] Within short order, 160 cities required a right-of-way around 50 to 60 feet, with Montana requiring up to 80 feet minimum.[664] Some eventually required traffic lanes for minor streets to be 9 feet with parking and as low as 7 feet in some cases.[665] Most trees were required to be planted not between the pedestrian and traffic but on the property side of the sidewalk.[666] What one eventually starts to see is a move not only to exclude the pedestrian from the street, but to protect autos to the exclusion of every other function previously in the street--safety for autos.

> "While it has been customary in the past to plant street trees between the street curb and the pedestrian walk, an alternative procedure is no recommended as preferable in some cases. Trees planted along the street curb increase the severity of motor accidents and in turn are easily subjected to traffic injury; they interfere with and are interfered by telephone wires and other utilities, the limited soil and water supply at pavement edge restrain the tree growth and add replacement costs; and except on very wide streets, curb planted trees crowd in upon the traveled way. To plant street trees on the property side of

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[661] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 88.
[662] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 88.
[663] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 88.
[664] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 88.
[665] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 88.
[666] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 88.

> pedestrian walks, away from the pavement and traffic, seems more desirable, particularly on residential streets."[667]

While one might scoff at this recommendation, on its face it is absolutely true. It is true if the purpose of the street is for efficient travel for automobiles. With a progression from the anti-jaywalking propaganda at the beginning of the century, there is a full turn to manipulating those aspects of the street that once were the benefit of the pedestrian to work for the benefit of the driver. One can see how easily it comes to change lighting for autos so they overhang the street. There has been more than the shifting of burdens of accidents from the automobile to the pedestrian. What one sees is that the financial and physical burden of urban elements, like trees, becomes shifted upon the lot holder who has to find space and maintain trees upon their lot, ensuring the standardization of setbacks and the omission of the public items from public space and ownership.

> "We can have a sidewalk or omit a sidewalk, just as is best fitted to the conditions of a particular street; we can have a footway instead of a street if we prefer, or a road without a footway if that is better."[668]

Sidewalks become only a figurative for where they exist, and people are kept from the street to the only public sphere available--regulated spaces and the private habitations with a much contracted public street.[669] Beginning to engrain these changes, the construction sector begins to form organizations like the Urban Land Institute and the

[667] Lautner, Harold W. *Subdivision Regulation: An Analysis of Land Subdivision Control Practices*. Chicago: Public Administration Service, 1941, p. 1; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 88-89.

[668] Lautner, Harold W. *Subdivision Regulation: An Analysis of Land Subdivision Control Practices*. Chicago: Public Administration Service, 1941, p. 117; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 89.

[669] Lautner, Harold W. *Subdivision Regulation: An Analysis of Land Subdivision Control Practices*. Chicago: Public Administration Service, 1941, p. 117; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 89.

National Association of Home Builders Association which push to lower building requirements as cost savings measures, in favor of the private zone.[670] [See Figure 53]

> "There is a tendency in many municipalities to require excessive width for minor single family residential streets.[671]

With the standardization of these requirements through government policy, and the reinforcement of these policies through industrial sector actions, cities which once had a distinct character and neighborhoods in those cities become the same. The same standards and aesthetic qualities propagate from one side of the United States to another so that cities, neighborhoods, blocks and houses duplicate each other. "But as Jane Jacobs first observed more than three decades ago, 'every place become more like every other place, all adding up to Noplace."[672] From now on, it is federal housing and transportation policy implemented these the prior philosophies as a matter of course and as administrative procedure. As one can see, the destruction of the previous methods of building urban form was planned, implemented and consciously driven. This was not a mistake. From now, there is only sprawl.

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670 Urban Land Institute (ULI). *The Community Builders Handbook*. Washington, DC: ULI, 1947, p. 62; Urban Land Institute (ULI). Building Traffic Safety Into Residential Development. Washington, DC: ULI, 1961; Urban Land Institute (ULI). *New Approaches to Residential Land Development*, Technical Bulletin no. 40. Washington, DC: ULI, 1961; Urban Land Instiutte (ULI). *Residential Streets: Objectives, Principles and Design Considerations.* Washington, DC: ULI, 1974, 1990; National Association of Home Builders. *Home Builders Manual for Land Development*. Washington, DC: NAHB, 1950, p. 114-118; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 89.

671 Urban Land Institute (ULI). *The Community Builders Handbook*. Washington, DC: ULI, 1947, p. 62; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 89.

672 Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961); Wilkie, Carter and Richard Moe. Changing Places: Rebuilding Community in the Age of Sprawl. New York: Henry Hold and Company, 1997, p. x.

6.13 Administrative Standards and the ITE

In 1965, the Institute of Transportation Engineers [ITE] recommended new standards that were flexible and yet geared toward safety.[673] [See Figure 54] The ITE standards were to promote street systems that were safe, efficient, and pedestrian friendly, and these standards merged previous policy intents together.[674] This national standardization of these benchmarks resulted in extremely rigid standards that when incorporated into laws or regulations effectively killed the street in favor of the lane.[675]

> "The same lane widths, the same color stripes, the same palette of signs: Engineering manuals imposed rigid standardization upon American roadways, perhaps making them easier to drive and cheaper to build, but also forcing a dull uniformity across America."[676]

The ITE standards required 60 feet wide rights-of-way, pavements of 32 to 34 feet in width, curbs that included a gutter, sidewalks on both sides that were 5 feet wide, planting strips from 6 to 7 feet sloping toward street, cul-de-sacs of a maximum of 1,000 feet with 50 foot radius at end, parking lanes of 8 feet wide, driveways of 10 feet in width, 20 feet curbs and 5 foot flares on each side.[677] What one sees is that additions which were included within some streets in the past because of character of need become included on every street--every street becomes every street. What also sees structurally

[673] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 93.
[674] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 93.
[675] American Institute of Architects. Local Leaders: cities as a Lab: Designing the Innovation Economy." American Institute of Architects: Issues and Advocacy, Local Leaders. www.aia.org/localleaders (accessed August 2, 2014); Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 93-94.
[676] American Institute of Architects. Local Leaders: cities as a Lab: Designing the Innovation Economy." American Institute of Architects: Issues and Advocacy, Local Leaders. www.aia.org/localleaders (accessed August 2, 2014).
[677] Institute of Technical Engineers (ITE), Recommendation Guidelines for Subdivision Streets (Washington, DC: ITE, 1965, 1984); Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 94-95.

is the creation of a system having more impermeable surfaces, wider street spaces, more stormwater issues, longer cul-de sacs, more dendritic street patterns, less walkablability and an institutionalization of the deteriorated grid.[678] In 1990, the ITE standards decrease the planting strip to 5 feet and extended the cul-de-sac from 700 feet to 1,000 feet in maximum length with a 60 foot radius cul-de-sac node.[679] Because these standards were produced by a professional authority of persons licensed by states and regulatory systems, jurisdictions easily adopted these because of their technical nature.[680] Administrations in these jurisdictions could adopt, in a sense, very philosophical changes to the traditional mode of urban planning without admitting to the highly political nature of that change.

> "Much recently urban development in the United States has been based on a pragmatic picking and choosing among European theories and precedents, with a few homegrown techniques thrown in. But the European theories are unconvincing in American contexts. Instead of appliqué of imported ideas and homegrown methods, we need an urban design theory that is appropriate to American circumstances and allows architects, urban designers, and planners to develop a consensus about our own urban values."[681]

By accommodating automobile design within urban planning two factors occurred. First, there was the creation of dendritic patterns that bore little in relation creating a connective structure, with the dominant narrative being protecting from non-localized traffic.[682] These patterns not made neighborhoods unsafe but also isolated areas with large areas of same-use residential neighborhoods. This pattern ensured that

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678 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 95-96.

679 ITE. "Guidelines for Residential Subdivision Street Design," *Institute of Transportation Engineers Journal* 60:5 (1990): 35-36; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 96.

680 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 96.

681 Attoe, Wayne and Donn Logan. American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press, 1989, p. xi.

682 Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 174.

everyone who could drive would need to drive, and those without cars would be isolated. Second, the green space philosophized within the modern planning methods which removed the grid were now being replaced with parking lots and parking structures.[683]

6.14 Jane Jacobs, New Urbanist and the Reaction

> "The heart of New Urbanism is its principles. New urbanists believe that places should be walkable, interconnected, fine-grained, human-scale, and mixed-use to the greatest degree possible. Also they believe that places should be beautiful and spiritually satisfying; and furthermore that one can discover the keys to placemaking by carefully observing the qualities of good places."[684]

The reaction to the sprawl created from Howard to the ITE regulations began to formalize in the 1950s with Jane Jacobs and other critiques of destruction of cities in the United States.[685] Her observations about the destruction of the city and the hollowing out of urban cores, biting clarity and recognition of the street and the value of the street to the economic and cultural vitality of cities marked a turning point in the American urban planning dialectic. Jane Jacob's four generations of diversity with mixed-uses, short blocks, building diversity and density while negotiating the uncontrolled chaotic nature of the street compared drastically to the administrated and planned decoupling of the street with the cities long before.[686] While many architects, engineers and planners appreciated what Jane Jacobs had to say and while her books were essential reading in

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[683] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 174.

[684] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 12.

[685] Laurence, Peter L. "The Death and Life of Urban Design: Jane Jacobs, The Rockefeller Foundation, and the New Research in Urbanism, 1955-1965," *Journal of Urban Design* vol. 11, No. 2 (June 2006): 145-172. https://www.academia.edu/708475/_The_Death_and_Life_of_Urban_Design_Jane_Jacobs_the_Rockefeller_Foundation_and_the_New_Research_in_Urbanism_1955-1965_Journal_of_Urban_Design_2006 (accessed July 18, 2014); Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961); Dreier, Peter. "Jane Jacobs' Radical Legacy." NHI *SHelterforce Online* Issue 146 (2006). http://nhi.org/online/issues/146/janejacobslegacy.html (accessed August 2, 2014).

[686] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 151.

the schools which indoctrinated new leaders in the fields, most ignored her concerns until New Urbanists arrived on the scene with development models to actually transform small sections of the city into what areas called traditional neighborhoods.

> New Urbanism is not an entirely monolithic movement but contains different streams with different emphases, such as between the American ‘east coast’ approach—originally associated with an ‘architectonic’ approach, i.e. that of Duany Plater-Zyberk (DPZ)—and the ‘west coast’ approach of Peter Calthorpe and others, which has had a greater emphasis on transit oriented development and regional scale development.”[687]

The New Urbanists were not a monolithic group but a group of urbanists concerned with sprawl and the life of the urban center.[688] There are some similarities between the different points of view of the new urbanists. For most, the purpose of urban design was not solely for transportation purposes but to actually design areas where people wanted to live with diversity of use, neighborhoods, connectivity, fineness of grain and an aesthetic or traditional quality.[689] It is important to understand New Urbanists in a context of the time. In advocating against the warping of the dendritic gridpattern within sprawl planning, New Urbanists were the only parties advocating for creation communities using other grids, regardless of whether they be accretion gridpattenrs, hierarchical gridpatterns or radial gridpatterns. These beliefs evolved into a charter which, as it evolves, sets the framework for more dense urban structures.

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[687] Carmona, Matthew, Stephen Marshall, and Quentin Stevens. “Design Codes: Their Use and Potential.” Progress in Planning 65 (2006): 209-289. www.elsevier.com/locate/pplann (accessed July 7, 2014), p. 216.

[688] Carmona, Matthew, Stephen Marshall, and Quentin Stevens. “Design Codes: Their Use and Potential.” Progress in Planning 65 (2006): 209-289. www.elsevier.com/locate/pplann (accessed July 7, 2014), p. 216.

[689] Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 385; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 9-10; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 41-42; Lewin, Susan Spencer. “Urban Sustainability and Urban Form Metrics,” Journal of Green Building. 7 2 (2012): 20, 47. http://www.journalofgreenbuilding.com/doi/pdf/10.3992/jgb.7.2.44 (last visited July 7, 2014).

> "One important tenant of Charter of the New Urbanism is that metropolitan areas should support a framework of transportation options including walking, biking, transit and private vehicles."[690]

New Urbanists formed the Congress of the New Urbanism [CNU] to stimulate discussion about the way forward and to bring together those involved in planning, building and investment to review the way to roll back the administrative and planning mechanisms that took more than 50 years to create and establish--through no fault of most of the parties involved. The CNU viewed sprawl as not only bad planning but "disinvestment in central cities, the spread of placeless[ness…], increasing separation by race and income, environmental deterioration, loss of agricultural lands and wilderness, and the erosion of societies built heritage, as serious problems which threaten community sustainability."[691] While some would say that this is more a philosophical railing or tenant, these believes were highly documented at the time and continued to occur even after New Urbanists started practicing their planning, design and development activities.

> "New Urbanist projects strive to integrate a mix of land uses, a compact urban form, an interconnected network of streets and blocks organized around a neighborhood center, a variety of housing types and densities, and a pedestrian-oriented design with an emphasis on providing civic spaces and amenities within walking distance."[692]

Yet, since they did not have the reigns of governmental, administrative and funding mechanisms, New Urbanist practice mainly became regulated to development-based infusions of traditional planning within community who could pay for the service.[693] As a result, while their efforts to build more efficiently by constraining the lot, block and

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690 Garrick, Norman and Wesley Marshall. "The Shape of Sustainbale Street Networks for Neighborhoods and Cities." The Council for the New Urbanism. http://www.cnu.org/sites/www.cnu.org/files/garrick-marshall_cnu17.pdf (accessed July 9, 2014), p. 3.

691 Lewin, Susan Spencer. "Urban Sustainability and Urban Form Metrics," Journal of Green Building. 7 2 (2012): 20, 47. http://www.journalofgreenbuilding.com/doi/pdf/10.3992/jgb.7.2.44 (last visited July 7, 2014).

692 Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 385.

693 Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 385.

street size, New Urbanist communities became known as communities of the elite.[694] Further, since the largeness of the sprawl development patterns cost less and reaped quicker though fewer profits, New Urbanists were developing their projects on much smaller and more expensive levels than traditional development. It must not be understated the subsidies and lower costs that traditional development practices have on lowering the costs of sprawl, and though unsustainable, this drives up the cost of other types of development. As a result, their impact was initially limited, and when they did have an impact, only richer communities could afford their design expertise--as a result functionally elite communities.

For New Urbanists, the urban form is based upon principles of policy and neighborhood design. The seven principles can be summed up as the neighborhood, the edge, corridors, the human scale, transportation options, street networks and civic areas.[695] This policy is formulated with an idea of the neighborhood and the

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[694] Lydon, Miek. "Is New Urbanism Elitist?" *Planetizen*, January 11, 2006. http://www.planetizen.com/node/18474 (accessed August 2, 2014); Branes-Gelt, Susan. "New Urbanism: The Principles of this Design Philosophy Will Dominate Development Patterns as We Emerge from the Recession." *Denver Post*, May 31, 2009. http://www.denverpost.com/perspective/ci_12473094 (accessed July 18, 2014); Gallini, Jared. "Demographics and Their Relationship to the Characteristics of New Urbanism: A Preliminary Study. Applied Reseerach Project." Thesis. http://www.academia.edu/1195263/Demographics_and_Their_Relationship_to_the_Characteristics_of_New_Urbanism_A_Preliminary_Study (accessed July 18, 2014); Better Cities and Towns. "Big box debate: are new urbanists elitist?" *Better Cities and Towns,* April/May 2004. http://bettercities.net/article/big-box-debate-are-new-urbanists-elitist (accessed July 18, 2014); Saitta, Dean. "Is 'Sustainable' Urban Placemaking Elitist?" *Intercultural Urbanism*, November 12, 2013. http://www.interculturalurbanism.com/?p=3126 (accessed July 18, 2014); Popkin, S. et al. *A Decade of HOPE VI*. Washington, D.C.: The Urban Institute and the Brookings Institution, May 2004. http://www.urban.org/UploadedPDF/411002_HOPEVI.pdf (accessed July 18, 2014); DeWolf, Chris. "Why New Urbanism Fails." *Planetizen*, February 18, 2002. http://www.planetizen.com/node/42 (accessed July 18, 2014); Hetzler, Olivia, Veronica E. Medina, and David OVerfelt. "Gentrification, Displacement and New Urbanism: the Next Racial Project." *Sociation Today.* Vol. 4, No. 2, Fall 2006. http://www.ncsociology.org/sociationtoday/gent.htm (accessed July 18, 2014).

[695] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 9-10, 41-42.

neotraditional community approach.[696] "Compared with conventional suburbs, neotraditional developments, at least on the drawing board, are characterized by somewhat higher densities, mixed uses, provision of public transit, accommodation of the pedestrian and bicyclist, and a more interconnected pattern of streets."[697] Calling back the Clarence Perry's radius of walking for the neighborhood unit, the traditional neighborhood is more a pedestrian shed with a central civic area, a neighborhood size of 160 acres, bounding streets, civic parks, and a connected community.[698] [See Figures 74, 78, 79] Like before, the neighborhood comprises the basic concept of New Urbanist design.[699] The idea of the neighborhood "arguably, the planning and design of New Urbanist developments draw considerably from the idea of the neighborhood unit without explicit acknowledgment.[700] [See Figures 60, 66-71, 74] At the same time, to be fair, there are great differences between the New Traditional neighborhood and the ideas that Perry advocated. While is true that both neighborhood seem similar in design with a focus many times on curvilinear street patterns and a highly modulated block pattern, Clarence Perry worked with a neighborhood that had a street trajectory that was removing streets and adding cul-de-sacs as a matter of practice.[701] [See Figures 57-60]

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[696] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 97.

[697] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 97.

[698] Lewin, Susan Spencer. "Urban Sustainability and Urban Form Metrics," Journal of Green Building. 7 2 (2012): 20, 48. http://www.journalofgreenbuilding.com/doi/pdf/10.3992/jgb.7.2.44 (last visited July 7, 2014).

[699] Lewin, Susan Spencer. "Urban Sustainability and Urban Form Metrics," Journal of Green Building. 7 2 (2012): 20, 48. http://www.journalofgreenbuilding.com/doi/pdf/10.3992/jgb.7.2.44 (last visited July 7, 2014).

[700] Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 386; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 10; Lewin, Susan Spencer. "Urban Sustainability and Urban Form Metrics," Journal of Green Building. 7 2 (2012): 20, 48. http://www.journalofgreenbuilding.com/doi/pdf/10.3992/jgb.7.2.44 (last visited July 7, 2014).

[701] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 70.

In contrast, one of the basic tenants of New Urbanism is to add higher levels of connectivity.

> "In a country where the car has to be used to fulfill the most basic of daily needs outside the home, the New Urbanist advocate a return to the possibility of satisfying them within easy walking distance. They also advocate a traditional open street pattern that provides security and privacy without barriers, based on the assumption that face-to-face contact and interaction are necessary to make a community and that the physical pattern of development, while it cannot ensure that this communication will occur, at least makes it possible, unlike the gated community and the hierarchical street network with its culs-de-sac, which render it impossible."[702]

Like Jane Jacobs, the New Urbanists critiqued the neighborhood dendritic system as creating the automobile dependent society with neighborhoods of single income and characteristic types.[703].

> "The street pattern is conceived as a network, to create the greatest number of alternative routes from one part of the neighborhood to another. This has the great effect of providing choices and relieving vehicular congestion. The streets form a hierarchy, from broad boulevards to narrow lanes and alleys.[704]

When taken into the context of the previous 50 or more years where urban planners removed streets as an unnecessary eyesore or cost expenditure, New Urbanists began to talk about connectivity through intersection analysis, ultimately ending up with greater numbers of lane access. In effect, this coincided with Jane Jacob's discussion about the minimization of street length and creating more fineness of street and block character. Yet, Jane Jacob's discussion as centered around her personal perceptions that fineness of block type and urban form allowed for the expansion and multiplication of diversity types--building, use, ethnicities, incomes, etc. For New Urbanists, the urban form fineness allowed for the configuration of uses within traditional building aesthetics to

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[702] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 179.
[703] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, pp. 178-179.
[704] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 14.

create developed neighborhoods which would target areas of dis-unity and become exemplars of urban form, though these neighborhoods would rarely affect urban planning methods outside of those neighborhoods. The design and mixture of uses would allow emphasize more pedestrian activities within those neighborhoods.

> "The design, configuration, and mix of uses emphasize a pedestrian-oriented environment and reinforce the use of public transportation."[705]

While the aesthetic types sometimes come with theoretical philosophies or movements, the critical New Urbanist effect was to create a building movement that focused on more walkable, livable systems and open street patterns.[706]

> "Two alternatives to the conventional low density auto-dependent suburban tract development have been proposed. One is the traditional neighborhood development (TND) or neotraditional development (NTD), which looks to the classic small town for its inspiration—it is walkable, has a clear civic structure, a mix of uses and housing types, and harmonious design of its buildings and spaces. The other alternative is the pedestrian pocket, sometimes referred to as pedestrian-oriented development (POD) or transit-oriented development (TOD)." It is similar to the neotraditional development in its concerns with walkability and convenient access, but there is less emphasis on controlling architectural form and emulating historical styles."[707]

In theory, this would inadvertently stimulate a market for building such systems. It must be remembered that, at this time, public and financial systems are still pushing and building sprawl forms of urban planning, and so government mechanisms and administrative means forced New Urbanists to look for patrons who had the money to build New Urbanist neighborhoods.[708] With the costs for New Urbanist neighborhoods rising out of reach of low to moderate income persons because of demand, the market

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[705] Calthrope Associates with Minter and Associates, *Transit-Oriented Development Design Guidelines.* Sacramento County Planning Community and Development Department, November 1990, p. 5. http://www.calthorpe.com/sacramento-county (accessed August 2, 2014); Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p 98.

[706] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 179.

[707] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 97-98.

[708] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 179.

confirmed the presumption that pre-Robinson/Perry forms of city-making were wanted and in demand, even to the Bedford Plan and Park East Village with their curvilinear plans and more neighborhood design. [See Figures 55 to 65]

> "Evidence confirms that smaller is better from a social-capital point of view."[709]

New Urbanist ideas and building methods focused upon the neighborhood as a quantifiable building unit.[710] It should be noted that the neighborhood also has a very political, racial and economic history in the United States.[711] This might have been more because of the development nature of such neighborhoods or that time, and what we will see, New Urbanists and present urban planning systems do not the power of cross systems of city connectivity practiced in Haussmann/Cerdà/Sixtus V urban planning practices that superimpose linking mechanist that create greater systems of connective unity within smaller neighborhoods of fine-grained hyper-connectivity. [See Figure 76] In a sense, New Urbanists were trying to build the Cuita Vella in Barcelona, without any of the mechanisms that allowed the Cuita Vella to exist. Yet, in building neighborhood alternatives, the hope was that their success would stimulate the stoppage of sprawl type developments and the mechanisms which allowed such cheap dis-unity to occur.

> "The basic building block of a community is the neighborhood. A neighborhood standing alone can be a village or a small town. A cluster of neighborhoods form a bigger town. Clusters of many neighborhoods make up a city.[712]

If anything, there might be a tendency at least diagrammatically to move towards the utopian city structure with radial street structures or radial functions within some New

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[709] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 179.
[710] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 179.
[711] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 180.
[712] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 14.

Urbanist ideas while creating the neighborhood dynamic. [See Figures 77, 81-83]. Yet, the neighborhood concept is central to New Urbanist ideas, and yet defined in a manner which is similar to Clarence Perry but with a different focus. [See Figures 66, 71, and 79] Where Perry considered the pedestrian shed of the neighborhood to be related to safety reasons, the New Urbanism paradigm shifts the distance from the shed to be based upon walking distance--basically the same distance. [See Figures 66, 71, and 79]

> "The neighborhood is limited in physical size, with a well-defined edge and a center. The size of a neighborhood is usually based on the distance that a person can walk in five minutes from the center to the edge—a quarter mile. Neighborhoods have a fine-grained mix of land uses, providing opportunities for young and to find places to live, work, shop, and be entertained.[713]

Yet, it seems logical from a development point of view for both Perry and for New Urbanists. Perry wanted the maximum amount of land to be within a zone of safety for his neighborhoods to exist, which means that there would be the maximum amount of area within the neighborhood that people would actually walk. This does not mean though that the trajectory or even urban form components are the same--whereas much of the central retail structure of Perry's neighborhood unit exists on the periphery, the New Urbanist non-residential structures exist at the center or other places of the neighborhood unit. Further, the use of a diagrammatic urban structure does not diminish the value of a city in its fruition or a neighborhood in its creation. One could easy compare many New Urbanist plans to Borgorotisk in Russia in 1839 and its diagrammatic format, with a system that balances radicalized street systems around a chateau or public area.[714] One must remember that the Romans imprinted their own

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[713] Steuteville, Robert and Philip Langdoc and Special Contributions. "New Urbanism Best Practices Guide." *Texas Tech University Department of Architecture at El Paso.* http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, 2014), p. 14.

[714] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 41.

diagrammatic structure in the form of the castra/castrum upon many cities within their domain, as did the Chinese with their own hierarchical gridpattern, but these cities independently evolved with some becoming great cities with great streets and incredible urban places. [See Figures 9.014, 77, 81, 82, 83, and 88] What is also true is that when the Romans and the Greeks built their colonies or castra/castrum, they imprinted the socio-religious form of the street and the aesthetic upon that street to mirror their own ideals of a city or military unit.[715] So, it is not a diagrammatic form that causes a city to fail or become great.

Part of the New Urbanist neighborhood are pathway corridors and edge boundaries that link the corridor together and yet separate or define the neighborhood itself.[716]

> Human-scale sets the standard for proportion in buildings. Buildings must be disciplined in how they relate to their lots if public space is to be successfully demarcated. Because the street is the preeminent form of public space, buildings are generally expected to honor and embellish the street. Buildings also define parks and squares, which are distributed throughout the neighborhood and are designed to be appropriate for rest, recreation, or special events.[717]
>
> Treating a range of transportation options as important is fundamental. For most of the second half of the 20th Century, transportation agencies have focused almost exclusively on optimizing the convenience of automobile travel, and have dealt with transit riders, pedestrians, and bicyclists as little more than afterthoughts. We must give equal consideration to all modes of transportation to relieve congestion and to provide people with realistic choices. [718]

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[715] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 26.

[716] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 14.

[717] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 14.

[718] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 14.

These avenues, broadways and streets created problems in the past because urbanists planned for the transportation component to the exclusion of all other street functions--the streets became lanes. Both Kevin Lynch and Jane Jacobs state, in different terms, that barriers or vacuums tend to create spaces in cites that block circulation or commerce.[719] Sometimes these edges might be coastlines or large parks, but most times they become railroads, highways and large avenues. So, there is concern that something fundamental about the New Urbanist, and prior planners, use of streets to define the district might create difficulties--it might be framework and problematic.[720] Part of this effort is to create multi-modal options for transportation other than by automobile, but this is in keeping with remaking the street to comprise but not consist of only the lane. But, the roads themselves do not cause a city to fail or become great.

> "The New Urbanism has taken much of its inspiration from the small American town and the nineteenth century tradition of the city beautiful."[721]

The difficulty with buildings in urban form is how building and their facades affect the public realm. The facades border the public realm and function as thresholds into the private sphere. If the building does not meet the lot perimeter and interrelate with the block and street, the façade warps and extends the public visual and physical sphere. New Urbanists limit their buildings to the human scale, but no one really has determined functionally what that means. Like city buildings before them, the New Urbanist in the have taken their aesthetic and imprinted it within their own idea of the Agora or Forum within the urban fabric of the United States. So, an imposed aesthetic or purpose does not cause a city to fail or become great.

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719 Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 63; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 336-337

720 Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 336-337.

721 Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 180.

> Civic buildings (town halls, churches, schools, libraries, museums) belong on preferred sites such as squares or neighborhood centers, or where the view down a street terminates. Such placement helps turn civic buildings into landmarks and reinforces their symbolic and cultural importance.[722]

New Urbanists create spaces for parks and central spaces for public interaction, and diagrammatically, they have created cities where the center focus has been the center arena with dispersed parks and other recreational spaces throughout the development. New Urbanists have used these civic spaces to terminate streets and create landmarks within the development. Both Jacobs and Lynch talk about landmarks as places within urban form, and while any building can be a landmark, not every building is functionally a landmark. So, an imposed landmark or public space does not cause a city to fail or become great.

> "Two neotraditional, transit-oriented developments are classic examples of their type: Kentlands in Gaithersburg, Maryland, a traditional neighborhood development designed by Andres Duany and Elizabeth Plater-Zyberk, and Laguna West, a pedestrian pocket or POD in greater Sacramento, California designed by Peter Calthrope and Associates."[723]

In New Urbanist developments, many of the philosophical and aesthetic concepts became form, and they show an evolution of the discussion within the multi-voiced and conflicting network that remains the Congress of the New Urbanism. Seaside, Kentlands and Laguna West are good examples of the positioning of New Urbanism as a retrofitting or neotraditionalist development pattern in urban planning.[724]

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[722] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 180.

[723] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 98.

[724] AtHomenet, Inc. "Kentlands." http://www.kentlandsusa.com/ (accessed July 19, 2014); Seaside. "A Simple, Beautiful Life." http://www.seasidefl.com/ (accessed July 19, 2014); New Urban Communities. "New Urbanism: A New Approach to Urban Living." http://www.newurbancommunities.com/about/new_urbanism.html (accessed July 19, 2014); Laguna West Association. "Laguna West" http://www.lagunawest.org/ (accessed July 19, 2014.

Seaside was one of the first New Urbanist developments actually realized in form. Designed by Andrew Duany and Elizabeth Plater-Zyberk (DPZ) in 1980,[725] this was to be an archetype of the new planned community.[726] [See Figures 81, 82, 83, and 88, Seaside was a particularly small community containing about 8 acres and 2,000 persons in a remote location, but it did signal a return to traditional community planning, though in a diagrammatic form. "The street system focuses on the central area or the beach across the main coast road, which links Seaside to the other communities on the coast. The shops are located at right angles to the coast road in an arrangement that makes them easily accessible to outside clients, not just the denizens of Seaside."[727] Because of it small size, it has a limited number of commercial interests for the resident population, which can be seasonal.[728] "In spite of its small size (8 acres, with a target population of 2,000 people) and remote location on the coast of the Florida panhandle, an area of sprawling urbanization, its return to the qualities of the small town and its connected streets--which keep pedestrians and traffic together but privilege the former--were a radical departure at a time from the paradigms then current for planned developments."[729] While some scorn Seaside for its size, it important to note that Seaside is one of the first cities planned without sprawl after the Garden City and during the continuing modern movement.[730] This is also one of the first communities built to limit the speed of cars and to transfer the importance of the lane back to the public

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[725] Duany Plater-Zyberk and Company. "Seaside." http://www.dpz.com/Projects/7903 (accessed July 19, 2014).

[726] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 189; Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 30.

[727] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 192.

[728] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 192.

[729] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 189.

[730] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, pp. 190-191.

nature of the street.[731] Still, it should note be understated that is residents are mainly upper-middle class clientele who were willing to fund the project and purchase the lots, and it has a traditionalist aesthetic.[732] Further, it should be stated again that construction costs are mainly an aspect of industrial sector largeness and the ability to cut costs by producing large types of financial or material goods. Seaside had to basically self-fund, and therefore it was building by patronage or purchase.

In Kentlands, a design of Duany Plater-Zybert & Company, this 1988 development contained 1,600 development units and a projected population of 5,000.[733] [See Figure 84]

> "As one of the first new urbanist developments, Kentlands transformed the development practices of Gaithersburg, Maryland and beyond. It boasts an active pedestrian-oriented mixed-use district (a former strip-center), scores of shops and restaurants, farmers market, cinema, two grocery stores, several civic institutions and a diverse mixture of people at all stages of life. Today, this series of neighborhoods is the urban center for the surrounding suburban region."[734]

Kentlands has community and public places such as elementary and day care center, recreation center, and library, and is organized as a series of neighborhoods that react and interact with each other.[735] "Neighborhoods include the Old Farm District that incorporates the restored original farm house, the Hill District, the Gatehouse District, the Lake District, and Midtown/Downtown, a local commercial center adjacent to a shopping mall."[736] It includes landmarks at different vistas, and they function to terminate different

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[731] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, pp. 190-191.
[732] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 190.
[733] Duany Plater-Zyberk and Company. "Kentlands." http://www.dpz.com/Projects/8805 (accessed July 19, 2014); Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 98.
[734] Duany Plater-Zyberk and Company. "Kentlands." http://www.dpz.com/Projects/8805 (accessed July 19, 2014).
[735] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 98.
[736] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 98.

visual or physical points.[737] In comparison to previous sprawl, Kentlands is fairly fine grained, has mixed housing and a coherent pattern.[738] Kentlands though functions in the enlightenment or romantic street design and neighborhoods in a similar vein to Olmstead or Radburn design patterns. However, in Kentlands, there is much less an intent on architectural controls and more an interest in connecting the neighborhoods to other neighborhoods of similar form.[739]

> "The feeling of the [Kentlands] development recalls other, intimately scaled towns in the Marylands/Virginia vernacular with white picket fences, porches, and picturesque alleyways and carriage house courts."[740]

What one also sees is in Kentlands is that New Urbanists trajectory away from the Howard/Robinson/Perry model seems to be in the trajectory of change rather than form. In Kentlands, the houses back toward the street to negotiate the public and private space dynamic, while the back of the buildings has driveway or service access via alleyways.[741] In Kentland, there is a 50 foot right of way, with 36 foot street-widths containing two 10 foot driving lanes and two 8 foot parking lanes.[742] The streetscape also has a 4 foot sidewalk and planting strip buffer, with alleyways 26 feet in width containing drivable lanes of 12 feet with 7 feet strips on each side of the lane.[743] Kentland streetscapes have trees on both side of the street, but only one side of narrow

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[737] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 98.
[738] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 98.
[739] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 101.
[740] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 99.
[741] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 100.
[742] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 104.
[743] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 104.

streets.[744] Important in this dynamic is a return to a highly connected street plan and grid.[745] There is far more accessibility to local and non-localized traffic than previous sprawl-focused gridpatterns.[746] What one sees is the paradigm shift from what was once the removal of the street from urban form to the adoption of the street as an interactive dynamic that occurs when the lot, block, street and public realm unite into an interactive unit.

With Laguna West, designed by Calthorpe Associates, represents a 1,018 acre site that is about 3 times the size of Kentlands.[747] [See Figures 85, 86 and87] "Begun in 1990, it is projected to have twice as many residents: 3,300 dwelling units and a population of 8,000 to 10,000."[748] Laguna West has spaces for residential, public and light industrial space--a mixture of uses. "Light industrial space is adjacent to the center and includes an operating Apple Computer plant."[749] The neighborhood tries to create the idea of a district separate from its urban surroundings by its radial plan.

> "The most striking design feature of Laguna West are the formal axial layout and lagoons that are at first glance might suggest Versailles superimposed on Irvine. According to the designers, the radial scheme is intended to compensate for the flat uninteresting site by creating a strong focus and a grand scale."[750]

This neighborhood is largely axial or radial and centered around a focused public area.[751] "In Laguna West, a major design statement is made with the three axial

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[744] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 104.
[745] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 104.
[746] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 104.
[747] Laguna West Association. "Laguna West" http://www.lagunawest.org/ (accessed July 19, 2014.
[748] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 100.
[749] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 100.
[750] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 100.
[751] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 104.

boulevards radiating from the center, but much of the street network on which these are overlaid is not striking different from that of other suburbs where few streets are straight and cul-de-sacs are plentiful."[752] There is a hierarchy of streets with some being large enough to accommodate fire trucks, but others are as narrow as 30 feet in total.[753] The trees move back into the public sphere and out of the lot so that as they mature the street trees enclose the street en more, making them even more narrow.[754] What we see is a New Urbanist progression from an attempt in Kentlands to relink the lot, the block and the street. In Laguna West, one sees the formal attempt to create the district in an areas without topographic changes.[755] While this neighborhood is largely diagrammatic like Kentlands, we see a return of the functions of the street to their original form where various elements start to work in concert for an integrated street.

From Seaside, to Kentlands, to Laguna West, one sees a stronger sense and connection to the street, in stark contrast with the street facilitated by federal guidelines and following modernist principles of design.[756] "There is a much stronger sense of 'streetscape' than in most suburbs since many houses have front porches and yards, and garages are set to the side or back, avoiding the 'garagescape' street image."[757] Parking starts to return to both sides of the street, and the streets begin to narrow thus lessening speed.[758] "The resulting minimum width may be as narrow as 28 to 30 feet.[759]

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[752] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 104.
[753] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 104.
[754] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 104.
[755] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 100-101.
[756] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 101.
[757] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 101.
[758] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 103.
[759] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 103.

Rather than focus on dendritic street patterns to reduce speed and activity, the street form itself starts to modulate the speed of traffic--as it did before the turn of the century. “By encouraging on-street parking, neotraditional proponents argue that a row of parked vehicles enhances pedestrian activity by creating a buffer between pedestrians and moving traffic.”[760] While there was some “dart out” concern by traffic professionals, their concern over high speed starts to become more of function of the dynamic between street form and activity lessening speed and the posted speed requirements that impose penalties for excessive speeds.[761] Because of the narrower streets, smaller blocks and more fine-grained building patterns, there were more traditional types of urban form that worked together--edges, pathways, nodes, landmarks, and districts. The relationship between connectivity, street scape and vitality started to shift towards traditional paradigms--even though they came under the guise of traditional aesthetics.

6.15 Complete Communities or Resilient Cities?

> “Into the 1950s, new housing was built on streets laid out in traditional and long curvilinear or ‘natural’ grids. House design got simpler as ranches and Cape Cods were built by the thousands after World War II. But into the 1960s, Suburban growth meant more houses and bigger houses. For over four decades from the1960s, the average new house size in suburban areas swelled from about 1200 square feet to over 2200 square feet while the average number of occupants got smaller. To changed size was attached changed configuration. New ideas about street layout derived in part from ideas put forward by European designers, Le Corbusier and Ludwig Hilberseimer. But more influential were the anonymous influences coming through in American traffic design that were implemented on a vast scale.”[762]

The keys element of urban planning after the incorporation of modernist thinking were the disintegration of the street with the lane, the super integration of blocks and the

[760] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 103.
[761] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 103.
[762] Brown, M. Gordon. “Space, property and the first urbanism.” The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 10.

increasing size of lots. However, this shuffling of urban elements did not happen in a vacuum. When these urban elements began to change rapidly, all other urban elements succumbed to the chopping block also. What was once the integrated component, the public right-of-way or the street, became the target of removal.

> "Each era of urban expansion has had its own conceptions of a good city, its own processes and standards for city building. A key element in the shaping of cities has been ideas of what the residential street network should be, since streets are the public framework within which neighborhood life takes place."[763]

In less than 100 years, the traditional connectivity that occurred in multiple types of building patterns shifted to one sprawl gridpattern, which while incorporating aspects of the hierarchical gridpattern and dendritic gridpatterns was fundamentally different.[764]

> "In less than a century American conceptions of good residential street network have shifted dramatically from the interconnected rectilinear grid of the turn of the century, to the fragmented grid and warped parallel streets of the 1930s and 1940s, to the discontinuous, insular patterns of cul-de-sacs and loops that have been predominated since World War II until the present time."[765]

While New Urbanism and other methods have attempted to combat the urban form, the question really becomes what would be the ultimate result of any activity to rejuvenate the urban form and what dimensions would they install into the urban landscape.

> "The history of consequences of suburban development, specifically sprawl, are well documented. Numerous books articulate the trajectory of sprawl within its historic context—from the Federal Housing Administration's mortgages for new construction, the subsidies of the interstate highway system, and the tax laws allowing accelerated depreciation of commercial development, to the evolution of Euclidean zoning's separation of uses and the cultural mandate for separation by race."[766]

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[763] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 2.

[764] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 3.

[765] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 2.

[766] Tachieva, Galina. Sprawl Repair Manual. Washington: Island Press, 2010, p. 2.

The financial, governmental, planning and architectural systems today are built upon the sprawl and discontinuous building methods that sacrifice good urban design for costs and car efficiency.[767] "Modifications have been discouraged and because higher governmental agencies have not openhandedly allowed flexibility, lesser agencies have been reluctant to do so."[768] Those who actually develop urban form still favor the idea that home, work and play are origin and destination related activities with nothing on the way, and as a result, they have pushed standards that can be mechanically adopted or administrated so that governments shield themselves from appearing to take a political or philosophical stand in favor of sprawl.[769]

> "Commercial developers favored segregated land use patterns based upon the 'drive-park-shop' concept. As a result they required standards specifying wide streets, ample parking, and ease of movement in return for taking on a project."[770]

> "We believe this is what happened with residential street standards today. The residential environment is being shaped in major ways by standards that are no longer questioned and that have become part of a rigid framework that is closed to change."[771]

Any attempt to change this trajectory have met resistance from "engineers, financial institutions, government regulators, the road building industry, as well as police and fire protection services all have vested interests in the street regulations as they have evolved."[772] What has occurred is the professional and policy standardization of benchmarks that do exactly what was intended--to create an unlivable street. It is unfortunate that in the process, costs actually rise for those who live on the periphery of

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767 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 3-4.
768 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 4.
769 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 4.
770 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 4.
771 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 3.
772 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 2.

the lane--but that has been costed also. In some areas of the United States, the automobile uses 1/2 to 2/3rds of available land that might have been used to sell lots to increase density.[773] Unlike the hierarchical grid system which had high levels of connectivity and disbursed more traffic through redundant wider roads, the sprawl gridpattern depends upon the largest roads taking the largest loads and suffering the greatest wear-and-tear. As a result, cul-de-sacs and localized roads become a huge cost because of their lack of use. While these roads constitute 80% of total automobile-used land, they only carry 15% of capacity.[774]

One should remember that one of the purposes of creating cul-de-sacs was to remove the road from sight, to make the roads safe and to cost-out the redundant road as removable cost of development. “Road engineers have sometimes been likened to religious fundamentalists: if it isn’t in the manual, then it can’t be done because children will die. The safety claims of road designers are, however, increasingly questioned.”[775] In contrast, what has occurred is the proliferation of other costs, most especially externality and maintenance costs to urban form and financial budgets. The right of way in the United States is now set at 50 to 60 feet by the Institute for Transportation Engineers, and jurisdictions incorporate these standards by regulation or law within their urban form

[773] Hanson, Mark. “Automobile Subsidies and Land Use,” *Journal of the American Planning Association*, 58:1 (Winter 1992) 66; Renner, Michael. *Rethinking the Role of the Automobile*. Washington, DC: World Watch Institute, 1988; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 4-5.

[774] United States Department of Transportation. *1990 Highway Statistics*. Washington D.C.: United States Department of Transportation, Federal Highway Administration, 1990; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 5.

[775] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 10.

requirements.[776] As a result in suburban areas where lots typically are 5,000 square feet with 56 feet rights of way, roads become 30% of the total development area.[777]

> "When typical 20-foot (6 m) driveway setbacks are included, the total amount of paved space reaches about 50 percent of the development. At present, with the cost of land representing 25 percent of the cost of a using-family house in most of the country (up from 10 percent in the 1950), one would assume that a shift toward efficient and compact subdivision planning would occur.[778]

Most important obstacles faces is the idea that the lots, street, block, and the multiplicity of functions related to the street are important in order to create better urban form.[779] "For the last half century, the building of the public realm has been handled with little regard for those it serves and for the quality of life it generates. Increasingly."[780] While design professionals receive blame, these professionals must work within the regulatory framework built by decades of historical changes and professional requirements laid upon the urban form by those who tactically wanted to destroy the street.[781] "In fact, the design and building professions must usually work within a framework of controls and standards that specify many aspects of subdivision layout."[782] However, the problem becomes what are the forms necessary that would work and create the change necessary in order to reinvigorate the street and, as a consequence, make cities and neighborhoods resilient.

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[776] Institute of Transportation Engineers, *Recommend Guidelines for Subdivision Streets*. Washington, DC: ITE, 1967, 1984, p. 5-6; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 5.

[777] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 5.

[778] Knack, Ruth E. "Rules Made to be Broken." *Planning.* 54:11 (1988): 16-22; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 5-6.

[779] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 2.

[780] Moule, Elizabeth and Stefanos Polyzoides. "The Street, the Block and the Building." Moules and Polyzoides, 2014. http://www.mparchitects.com/site/thoughts/streets-blocks-buildings (accessed July 10, 2014), p. xxi.

[781] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 3.

[782] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 3.

What planners do know is that small changes to the dimensions of urban form have huge consequences, not only for people who live within the urban form but also to the industrial sector that produces urban form or urban form elements. "For example, a modest change in pavement width can add large consequences for energy consumption, comfort and convenience, sociability, the time and effort we must spend in local trips, as well as the costs of construction and maintenance."[783] These changes have implications on how one views the American dream, whether or not one lives in a single-family house or whether one lives in multi-family housing that is ethnically or income diverse.[784] These changes can make housing more expensive or exclusive, increase maintenance costs for municipal budgets or can destroy commercial areas from possibly surviving normal economic ups and downs.[785]

> "An increase in street width also increases construction and maintenance costs proportionately, lowers densities (assuming the same lot size and housing type), and increases travel times between points."[786]

Further, present building patterns come with social costs that cannot be approximated due to their inability to be costed-out because of their unconstitutional nature. Sprawl-related urban form has resulted in discriminatory housing and urban policies related to minorities and most specifically African-Americans and those living within urban cores, especially given that many minorities and urban poor do not have automobiles to access large sprawling systems.[787] The destruction of the urban form

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[783] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 3.

[784] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 3.

[785] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 3.

[786] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 3.

[787] Tachieva, Galina. Sprawl Repair Manual. Washington: Island Press, 2010, p. 2; Sampson, Robert J, and William Julius Wilson. "Toward a Theory of Race, Crime, and Urban Inequality." *Race, Crime, and Justice: A Reader* (1995): 177-190; Kasarda, John D. "Urban Industrial Transition and the Underclass." *The Annals of the American Academy of Political and Social Science* 501.1 (1989):

helped integrate the subsidizing of discriminatory housing policies favoring white flight into governmental funding mechanism--when the city street died, it also became redlined.[788] There would have never been the creation of the suburbs and sprawl without the highly charged interaction between funding, philosophy, race and design. Unluckily this further expansion based on fear of the city cores has extended to the point where the value of expansion has crossed the threshold of costs related to transportation to and from the city.[789] If these negative aspects are to change, present modes of urban design must be reviewed and documented, and those practices which are successful must be propagated as a matter of course--rather than those that we know fail. What this will require are complete cities that have the urban forms which work together to create systems that are walkable, livable and practical.

26-47; Peterson, Paul E. "The Urban Underclass and the Poverty Paradox." *Political Science Quarterly* (1991): 617-637; Downs, Anthony. "Some Realities About Sprawl and Urban Decline." *Housing Policy Debate* 10.4 (1999): 955-974; Sanchez, Thomas W, Rich Stolz, and Jacinta S. Ma. "Moving to equity: Addressing Inequitable effects of Transportation Policies on Minorities." *Transportation Research Record: Journal of the Transportation Research Board* 1885.1 (2004): 104-110; Shen, Qing. "Location Characteristics of Inner-city Neighborhoods and Employment Accessibility of Low-wage Workers." *Environment and Planning B: Planning and Design* 25.3 (1998): 345-365; McDonald, N. C. "Critical Factors for Active Transportation to School Among Low-income and Minority students: Evidence from the 2001 National Household Travel Survey." *American Journal of Preventive Medicine.* 34(4) (2008): 341-344.

[788] Ford, L, and Griffin, E. "The Ghettoization of Paradise." *Geographical Review* (1979): 140-158; Duncan, M, Hood, E. T, and Neet, J. L. "Redlining Practices, Racial Resegregation, and Urban Decay: Neighborhood Housing Services as a Viable Alternative." *The Urban Lawyer* (1975): 510-539; Bickford, E. *White Flight: The Effect of Minority Presence on Post World War II Suburbanization.* Berkeley, CA.: University of California, 2007; Altfeld, C. "FHA Redlining-Inflexible Agency Guidelines Defeat Congressional Intent for the 223 (e) Acceptable Risk Program." Ariz. L. Rev, 19, 919 (1977); Schill, M. H, and Wachter, S. M. "The Spatial Bias of Federal Housing Law and Policy: Concentrated Poverty in Urban America." University of Pennsylvania Law Review, vol. 143, no. 5, 1285-1342 (1995).

[789] Tachieva, Galina. Sprawl Repair Manual. Washington: Island Press, 2010, pp. 2-3.

CHAPTER 7.

URBAN DESIGNING AND AS MESSY

> Design is about giving order, scale and beauty to buildings and the space between them.[790]

> Through these various foundations of intellectual planning history might represent distinctly different choices in imaginings of the ideal city, Jane Jacobs argues that they all suffer from a similar, dangerous misconception of how real cities actual operate."[791]

7.1 Cracks in Urban Form and Planned Sprawl

> When clarity fails to happen, the urban form becomes difficult and expands and collapses and warps like sprawl. "Without the clarity of the neighborhood structure, conventional suburban development blurs the boundaries and characteristics of neighborhoods, corridors, and districts, and sprawls across the land."[792]

The cracks in urban form began as brilliant minds considered cities more machines than complex systems of form, function and person. "The poor quality of much of the contemporary built environment and the lack of concern for overall quality is a function of both the processes by which it comes above and the forces that act on and within those processes. Much of this is attributed—rightly or wrongly—to the development industry."[793] As a result, they could manipulate the form based on single theories of use, to the exclusions of more complex views of the interactivity of city function and form. These cracks started to fragment the city into pockets of successful and deteriorating place.[794]

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[790] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. vii, forward by Richard Rogers.
[791] Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, p. 24.
[792] Tachieva, Galina. Sprawl Repair Manual. Washington: Island Press, 2010. P. 25.
[793] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 11; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p 11; Loukaitou-Sideris, A. "Cracks in the city; Addressing the Constraints and Potentials of Urban Design." *Journal of Urban Design* 1(1) (1996): 91-106.
[794] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 11.

> “Elsewhere the cracks include car-oriented, commercial strips, lacking sidewalks and pedestrian amenities, and walled or gated developments that …’ assert their privateness by defying any connection with the surround landscape.”[795]

> “In the late 1950s, urbanised areas in USA have extended outside rapidly during the suburbanisation process of residence, industry and commerce, which encroached large amount of farmland and forest, brought negative effects to environment and caused more traffic problems. This pattern of urban development out of control has been regarded as urban sprawl.[796]

The beauty of the machine is that you can replace one part with another analogous part and gradually change the internal system within the same shell. The problem is that this is not what occurs with urban form. Urban form is caused by eons of human breeding and natural selection and human intervention in the environment. Parts of the system that would make urban form more like a machine have been bred out of the human species and thus bred out of urban form.

The result of machine ideology is clear--sprawl, a type of urban form warping the urban fabric, requiring large subsidies to maintain, failing to address numerous externalities to urban form systems outside of sprawl and needing retrofitting and repair. It is not that sprawl is inherently bad. The reality is that sprawl is inherently costly that requires huge public policy, taxation, administrative and funding mechanisms to maintain it.[797] In the United States, sprawl was costly to racial dynamics and anti-urban sentiment of rural areas has been huge.[798] What is interest though is that this was not a mistake. For while urban form occurs naturally anywhere you have humans, creating infrastructure and a sprawl type topology requires a tactical destruction of previous

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[795] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p.11; Loukaitou-Sideris, A. “Cracks in the city; Addressing the Constraints and Potentials of Urban Design.” *Journal of Urban Design* 1(1) (1996): 91-92

[796] Bhatta, B. Analysis of Urban Growth and Sprawl from Remote Sensing Data. Heidelberg: Springer, 2010, 1.6, p. 7.

[797] Bhatta, B. Analysis of Urban Growth and Sprawl from Remote Sensing Data. Heidelberg: Springer, 2010, 1.6, p. 7.

[798] Bhatta, B. Analysis of Urban Growth and Sprawl from Remote Sensing Data. Heidelberg: Springer, 2010, 1.6, pp. 7-10

patterns of urban form, for urban form history is filled with cities that were far more resilient than sprawl or even well-intended developments of the present day.

7.2 Messiness of Cities

Like many planning problems find themselves inherently wicked, the problem with urban design is that urban form is inherently messy.[799] Yet, within this messiness there is complete order and clarity when things work. Cities are not just lines on the ground or a map, but within the city there are urban forms and interlocking functions that many time form coexistent symbiotic and dynamic relationships.[800] Many city systems fail to work when some functions are severed, and some functions have replacements whereas others do not. What cities represent are dynamic systems in motion that include form and infused type of social capital and memory called social tissue.

> "The concept of tissue … with the double textile and biological connections, evokes ideas of interweaving and of connections between parts, together with a capacity for adaptation. It is in contrast to the completed or fixed work, and instead, implies a process of transformations."[801]

What has generally happened in urban form is an acknowledgment of complexity but a reduction to simplicity. Most analysis only reviews land use, building structures, plot patterns and street patterns, and yet remaining magnanimity that is urban form goes unanswered or unquestioned. Further, even with these registered items, decisions are made to decide which is most important rather than how they interact.

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[799] American Institute of Architects. Local Leaders: cities as a Lab: Designing the Innovation Economy." American Institute of Architects: Issues and Advocacy, Local Leaders. www.aia.org/localleaders (accessed August 2, 2014), p. 8; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 77.

[800] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 77.

[801] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 77; Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 158; Panerai, P; Castex, J. Depaule, J C, and Samuels, I. *Urban Forms: the Death and Life of the Urban Block*, Architectural Press, Oxford, 2004.

7.3 People Are Factors Within Urban Form.

What is many times missing within the analysis is how people are utilizing city space as if they were external components unnecessary for city analysis or design. "Moving elements in a city, and in particular the people and their activities, are as important as the stationary physical parts."[802] With this interaction between meaning and form, many have stated that urban form gains meaning through human interaction and thus an identity of use.[803] With an identity of use, the form gains further meaning and use as people spatially relate to that form of a specific or complex identity.[804] Because of these infused meanings within the form, the people using that form imprint upon themselves maps of form and meaning allowing them to maneuver through space from where they are to where they want to go--placemaking and pathmaking.[805] "Each individual create and bears his own image, but there seems to be substantial agreement among members of the same group. It is these group images, exhibiting consensus among significant numbers that interest city planners who aspire to model an environment that will be used by many people."[806]

> "The systems of orientations which have been used vary widely throughout the world, changing from culture to culture, and from landscape to landscape."[807]

Where these images agree, the function and form become set, and yet these functions are multi-layered for the forms do not simply act in one way. Thus, a church can function as a landmark and it can also define a district--as can a tree.

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[802] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 2.
[803] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 8.
[804] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 8.
[805] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 7.
[806] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960: p. 7.
[807] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 7.

7.4 Shape of the City

"Cities have shape."[808]

It is important to understand the general shape of the city and how the city relates to its context. "Every city has a general shape. There are several classifications of shape."[809] As an example of larger urban form, the city's shape tells us about the larger systems in place that create unity, gridpattern, limitations and areas of future expansion.

On a larger scale, shape analysis generally means how cities look. Cities can form radiometric, rectilinear or gridline, star shaped, rings of shapes, linear, branching or dendritic, sheets or planed shapes, articulated shapes, constellations of nodes (multimodal or multi-centric cities), or satellites of girds.[810] Radiometric cities are the most common urban forms where large intense developments emanate from a central focus--such as Atlanta, Denver, Dallas, San Antonio, Houston, St. Louis, Dallas, Indianapolis, and Orlando.[811] Rectilinear cities that form have gridline forms which undulate from the center in sequences of larger streets and smaller streets, but they form block forms and streets at regular intervals such as San Francisco, New York, Chicago, Los Angeles, Portland, Minneapolis, Philadelphia, Phoenix, Detroit, San Diego, and others.[812] Star shaped cities are cities that are radiocentric like before but they sometimes lack the circular shapes around the cities like Fresno, Albuquerque.[813] Rings

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[808] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-5.
[809] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-5.
[810] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-5 to 4.3-6.
[811] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-5.
[812] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-5.
[813] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-5.

cities are those around large open spaces like the San Francisco Bay Area, Tampa Bay, or Puget Sound.[814] Linear cities where the shape results from a natural topographical issue and a transportation spine like in Atlanta's downtown to Buckhead area or the Denver to Ft. Collins corridor, or Dubai.[815] Many times, depending on what scale one views the city, we see all of these forms. In the case of systems or transportation, we see constellations of pathway networks or transportation networks whether equal that form constellations of shape or nodes as to a larger region such as San Francisco, New York City, Paris or Chicago.[816] This type of analysis allows a quick understanding of larger regions before further analysis occurs. Yet, these shapes are simplistic on their own, and they add very little to the discussion.

On a more intimate and species scale, these shapes tell us more about our relationships to the environment. These shapes form diagrams in the mind and allow us to imagine where one is and where one is going--imageability. As a part of urban form, this shape tells us how Districts, landmarks, and nodes interact on a larger scale and how pathways form the relationships between these main areas of urban form. These are evolutionary and instinctual concepts that require a diagrammatic understanding of one's environment so that a map of the environment can be conceptual.

7.5 Urban Form Performance

> "Great design has played an instrumental role in cementing the importance of cities throughout time."[817]

[814] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-5.
[815] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-5.
[816] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-6.
[817] American Institute of Architects. Local Leaders: cities as a Lab: Designing the Innovation Economy." American Institute of Architects: Issues and Advocacy, Local Leaders. www.aia.org/localleaders (accessed August 2, 2014), p. 7.

Though made of seemingly independent elements, urban form is actually made of elements which function in multiple ways and also interact to create other dynamics within the public realm, and these forms interact with humans to create meaning and imageabiltiy. This interconnectedness interjects people within the equation and opens up possibilities and difficulties when designing urban form.[818] "When well done, the design of this physical sphere can allow a unique systems-wide interconnectedness to grow among the people who live, work, and recreate in these places."[819] And yet, urban form is unique as a concept because people actually interact with urban form to make it what it is and its interaction with people will determine the effect that any particular urban form has within any given environment.

> "The surrounding buildings, streetscapes, and overall vitality of city space can enable this growth and change to take place."[820]

For Kevin Lynch, urban form revolves around a theoretical understanding of the form and processes that take place with urban elements--and how they affect people. Lynch qualifies urban form as functions of path, edge (enclosure), node, landmark, and district.[821] [See Figure 108] These are the types of functions that the many types of urban form produce within the real world, and these are how these urban form elements relate to each other in any city. What this means is that the elements themselves can be multi-functional depending on scale and their relationship to other elements.[822] What this also means that in total, these functions relate to humans in a particular way by affecting

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[818] American Institute of Architects. Local Leaders: cities as a Lab: Designing the Innovation Economy." American Institute of Architects: Issues and Advocacy, Local Leaders. www.aia.org/localleaders (accessed August 2, 2014), p. 8.

[819] American Institute of Architects. Local Leaders: cities as a Lab: Designing the Innovation Economy." American Institute of Architects: Issues and Advocacy, Local Leaders. www.aia.org/localleaders (accessed August 2, 2014), p. 8.

[820] American Institute of Architects. Local Leaders: cities as a Lab: Designing the Innovation Economy." American Institute of Architects: Issues and Advocacy, Local Leaders. www.aia.org/localleaders (accessed August 2, 2014), p. 8.

[821] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 8.

[822] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 8.

human spatial patterns, pathmaking, mapmaking and sensory perception.[823] There is a direct relationship between the observer and the object and the object's function, and yet these relationships must be held by people in general or mass in order for urban form and function to have the same effect with most people.

> "Starting at the most abstract level, the two most basic morphological elements are public open space and private development blocks or plots. Built form them mediates between urban public space and urban private space. The buildings and spaces themselves are less embedded morphological elements but require more detailed consideration, while the interfaces and thresholds are the most malleable, and where an individual and specific response becomes particularly relevant."[824]

The discussion of urban form ultimately becomes a discussion about what is actually critical for urban form and what illuminates that which is critical--"framework" and "infill."[825] Framework elements tend to be urban form types that are critical for urban form. These items can be created by anything, but they tend to show themselves as lots (subdivision), blocks and streets, while infills tend to be buildings, spaces, interfaces of the other types of urban form.[826] Framework elements are unique because once set, they are hard to fundamentally change, so they must be designed with inherent flexibility in order to address future or possible usage.[827]

> "The framework elements are the ones that need to be done right if a project is to be sustainable: decisions about the form of streets and public spaces and development blocks are far more strategic in terms of their longevity, as they are the last easy to change."[828]

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[823] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 8.
[824] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 49.
[825] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 49.
[826] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 49.
[827] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 49.
[828] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 49.

For example, cul-de-sacs inhibit future changes and circulation patterns because, after construction, infill items like buildings and land ownership issues form barriers to further development.[829] In contrast, infill elements are those items which populate the framework for issues of cultural expression, public policy, aesthetic choice, purposed design or a multitude of reasons, and they are also the items which change quickly over time--buildings, crosswalks, street lights, street materials, banister, flower pots, etc.[830] "In contrast, the less strategic 'infill' elements' like the interfaces between buildings and spaces, private and public, are often a level that shows the most cultural variation."[831] These infill issues are more important for cultural expressions, street scape, monetary value, the market, etc., but they are less important than harder elements that are harder to change when set--subdivision, lots, plots, blocks, streets.[832]

When Kevin Lynch addressed performance of urban form, there were several aspects which Lynch felt was important: vitality, sense, fit, access and control.[833] For Lynch, vitality was the "degree to which form of places support the functions, biological requirements and capabilities of human beings."[834] The "sense" of people relates to the complexity, unity and legibility of the urban form allowing people to "clearly perceived and structured in time and space" within the urban form.[835] Fitness is a question of the degree that the form and spaces match human behavior and need.[836] Access and

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[829] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 49.
[830] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 49.
[831] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 49.
[832] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 49.
[833] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 8.
[834] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 8.
[835] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 8.
[836] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 8.

accessibility relate to the practical ability of people to physically access space or gain services or information.[837] Further, human “control” of urban form is the ability of people to manage or create in the space.[838] Underlying these performance issues are efficiency and justice issues determining the total costs (including externality costs) in “creating and maintaining a place for any given level of attainment of the above environmental dimensions, while justice related to the way in which environmental benefits were distributed.”[839]

This Lynch social usage tradition was based on the idea that humans could appreciate the environment and access it.[840] While in some stated that this was with regard to pleasure, this thesis takes the perspective that important within Lynch’s analysis of urban form was that in appreciating the environment, humans make quantitative calculations that relate to instinctual reaction to certain types of urban form.

With Allan Jacobs and Donald Appleyard, when ascertaining the performance of urban form focused on the livability of the urban form environment. Both stated that livability, Identity, access to opportunities, authenticity and meaning, community and public life, urban self-reliance and environment for all the city was important, and that “a city should be a place where everyone can live in relative comfort.”[841] To achieve these goals, the City has to have livable streets and neighborhoods, and have a certain population density to allow for an intensity of land use, an integration of activities and a

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[837] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 8.

[838] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 8.

[839] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 8.

[840] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 7; Jarvis, R. “Urban Environments as Visual Art or Social Setting.” *Town Planning Review* 51(1) (1980): 50-66; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 58.

[841] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 8-9.

proximity of activities that allow a mixed-use environment.[842] Further, these uses and densities would have to be proximate to each other and have a nexus forming an interrelationship between people and place, defining the public realm.[843]

In her book and through personal investigation, Jane Jacobs stated that there were four characteristic of vitality that she noticed in considering the built environment. Jane Jacobs stated that mixed uses would activate streets and keep them vital, fineness of grain and short blocks would create more pedestrian and use permeability, diversity of building stock and the facades of buildings activated the environment and anchored the city, and density itself was required in order for a city to function.[844] She stated that District must serve more than one primary function, more than two is preferable, and that having a 24-hour community would be preferable.[845] Jacobs stated that most blocks must be short and that streets and opportunities to turn must be frequent.[846] Further, that Districts must mingle buildings of different age and condition, with a good proportion of the old and the new and cross-grained.[847] Lastly, Jacobs called for a sufficient density of people, including those in residence.[848]

> "In combination, these conditions create effective economic pools of use. Given these four conditions, not all city districts will produce a

[842] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 8-9; Jacobs Allan and Appleyard, D. "Toward an Urban Design Manifesto. A Prologue." *Journal of the American Planning Association*, 53(1) (1987): 112-120.

[843] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 8-9; Jacobs Allan and Appleyard, D. "Toward an Urban Design Manifesto. A Prologue." *Journal of the American Planning Association*, 53(1) (1987): 112-120.

[844] Jacobs, Allan B. *Great Streets*. Cambridge, Massachusetts: The MIT Press, 1993, p. 151; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 196-197.

[845] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 196-197.

[846] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 196-197.

[847] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 196-197.

[848] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 196-197.

> diversity equivalent to one another. The potentials of different districts will produce a diversity equivalent to one another."[849]

She saw that performance was not simply the city utility but city vitality as marked with the chaos of various interlocking and webbed activities where people related to urban form in a particular manner.[850] Jane Jacobs stated that issues of urban form had a direct cause and effect relationship with issues like "eyes on the street," where policy mechanisms were met by urban form and human interaction rather than replacement mechanism--which tend to be substandard causing cities to become substandard.

> "Concentrating on the socio-functional aspects of streets, sidewalks and parks, Jacob's close observations of human behavior emphasized their role as sites of human activity and places of social interaction."[851]

For a well-working city, Jacobs stated that a mixtures of uses would allow a diversity forms and uses leading to resiliency.[852] "How can cities generate enough mixture among uses—enough diversity—throughout enough of their territories, to sustain their own civilization."[853] Jacobs also stated that these generators would create new enterprises and ideas of all kinds for a range of enterprises in size and type.[854] Jacobs also stated that diversity of all types stimulates more diversity, as a self-perpetuating machine.[855] "Cities, however, are the natural homes of supermarkets and standard movie houses plus delicatessens, Viennese bakers, foreign groceries, art

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[849] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 197.
[850] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 7; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961)
[851] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 7.
[852] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 188.
[853] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 188.
[854] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 189.
[855] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 190; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 191.

movies, and so on, all of which can be found coexisting, the standard with the strange."[856] Jane Jacobs admitted that business of larger economy can absorb the costs of building a community, but she stated that the majority of businesses could not absorb these costs.[857] Thus, resilient communities were the least costly way of creating commerce and vitality.

Other researchers like Jan Ghel's have studied about the human interaction with urban form.[858] Yet, this thesis proposes that this relationship is much more functional and instinctual. Instinctual human interactions with the city environment require certain types of urban form to fulfill multi-functional needs within the city. As a result, urban form elements might have one form but have multiple functions depending upon human requirements--coexistence and dependence. The Public Street represents the full quanta of urban form for it contains all elements that affect urban form and its dynamic interaction with people. Within resilient cities, one might have different urban element within the Public Street, but similar functional relationships with the urban form. Still, much of the urban form following quantifiable benchmarked numbers in the macro and 1 kilometer square scale--in the mean and standard deviation. As a result, these benchmarks and their functional space can be compared with other cities to determine the differences between resilient and non-resilient areas.

> This is not novel: other examples can be found in the literature. Kropf (1996) maintains that the urban tissue is an organic whole whose form can be described at a number of levels of resolution, each concerned with different elements of urban form: streets and blocks, or plot series; plots; buildings; rooms or spaces; structures, such as walls or roofs (including details of construction); and finally, materials.[859]

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[856] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 191.

[857] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 190-191.

[858] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 7; Gehl, Jan. *Life Between Buildings: Using Public Space*. 3d. Skive: Arkitektens Forlag, 1971.

[859] Oliveira, Vítor. "Morpho: a methodology for assessing urban form." Urban Morphology, 17(1) (2013): 22.

This analysis takes the anthropological perspective that urban elements are structural by nature and have a function. Structural functionalists had the idea that social practices had a function that many times lay the groundwork for society. What we see in urban form is a similar type of practice under Kevin Lynch and Jane Jacobs, though implied. The landscape and the built form interact to provide a function for people within that form, and these systems may be more complex than upon first review. Further, when these structures are unstable, urban systems like sprawl become prevalent not as 'non-urban form' but disjointed and urban form out of equilibrium.

> "Structural functionalism, or simply functionalism, is a framework for building theory that sees society as a complex system whose parts work together to promote solidarity and stability"[860]

Without proper elements and functions met within the built environment, systems which would otherwise work with minimal effort and at equilibrium would require huge amounts of social costs in order to maintain their processes and lessen their negative externalities.

<http://www.urbanform.org/online/pdf2013/201317_21.pdf> (accessed, July 7, 2014).

[860] Macionis, Gerber, *Sociology 7th Canadian Ed.* Ontario: Pearson Canada Inc, 2010, p. 14; DeRosso, Deb. *The Structural Functional Theoretical Approach*, Report, March 16, 2004. http://www.wisc-online.com/Objects/ViewObject.aspx?ID=I2S3404 (accessed June 22, 2014)

CHAPTER 8.

URBAN FORM AS FRAMEWORK AND INFILL

8.1 Urban Form and Prospect-Refuge Theory

"We are visual animals."[861]

When analyzing urban form, it is important to understand why urban design is important, and which elements and placement within urban design are more important than others. While some consider urban form to be merely an aesthetic design of elements or simple beautification, urban design actually has always been critical to people on an instinctual, and the need for urban design evolved as humans moved from the savannah and formed hierarchical societies that created cities. Cities seem to provide the structural possibility of larger accumulations of human beings in a given location, and cities provided the administrative structure or location for religious, political and social organization.

> "Prospect-refuge theory says humans and many terrestrial animals have mental models enabling them to negotiate and test spatial/visual environments and that these models developed long before our language-conferred abilities."[862]

What is known is that early humans, and thus early city dwellers, needed to quickly recognize and understand their surroundings and the people around them, their origin, their designation, landmarks on the horizon, dangers between their origin and destination and how to quickly move to their destination without interruption.[863] This

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[861] Kaplan, Steven and Kaplan, Kaplan. Humanscape: Environments for People. North Scituate, Massachusetts: Duxbury Press, University of Michigan, 1978, p. 44.

[862] Brown, M. Gordon. "Space, Property and the First Urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 3

[863] Brown, M. Gordon. "Space, Property and the First Urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 2.

prospect-refuge theory of urban form is an evolutionary and instinctual response ingrained within humans based on flight or fight mechanism. “Prospect-refuge theory involves system … An instance of what came to be known as biologically or genetically prepared learning, the prospect-refuge hypothesis proposes the human visual system evolved to yield information about the utility of their spatial-material surroundings partly with respect to fight or flight conditions.”[864] These systems allowed humans to recognize “friends, foes and potential mates in addition to significant landscape features that could be hazards or places of safety.”[865] This is so ingrained in the human species, these decision-making processes determine what groves of trees seem dangerous in a park and why streets and buildings enclose a given location.

> … [At] both human and sub-human level[s] the ability to see and the ability to hide are both important in calculating a creature's survival prospects. …Where he has an unimpeded opportunity to see we can call it a prospect. Where he has an opportunity to hide, a refuge. …To this …aesthetic hypothesis we can apply the name prospect-refuge theory”[866]

Humans evolved in the African savanna so it seems logical that our perceptions of urban forms and elements would replicate the type of forms and their relationships within that environment. Science has found a human preference for landscape design analogous to the savannah, contrary to Romantic portrayals of the English countryside, with, for example, spaced trees with higher canopies being areas considered safer for assembly than groves of trees which hid predators.[867] “Most humans appear to prefer

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[864] Brown, M. Gordon. “Space, Property and the First Urbanism.” The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 2.

[865] Brown, M. Gordon. “Space, Property and the First Urbanism.” The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p.3.

[866] Appleton, J. *The Experience of Landscape*. New York: John Wiley, 1975, p. 73.

[867] Brown, M. Gordon. “Space, Property and the First Urbanism.” The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 3; Pinker, S. *How the Mind Works*.

groves of widely scattered trees, open at eye level, with an overhead canopy and uniformly textured ground."[868] What this might mean is that we not only replicate environmental and cognitive structures from our evolutionary history, but we respond to those structures which are most like our past. "Prospect and refuge rely on frames of reference: landmarks, long paths or boundaries (trees, rocks, ponds, rivers and mountain ranges for example)."[869] The difference between the eons in the past and humans though is that we can recreate the Savannah forms, in our own environment in the City, to allow for greater densification and a much more modern mode of production and social stratification. This is also why areas which have large groves of trees create the sense of surprise, mystery or danger within human expectation--because it denies access to information that can plainly be seen in safer areas.

> "Pinker also talks about what Kaplan and Kaplan (19xx) call mystery: paths bending around hills, gaps in foliage, undulating land, and partly blocked views grab our interest. Paths employ frames of reference and function as channels providing information about the things situated in, moving through and located along the edges of these channels. Prospect enables while refuge denies the visual acquisition of information. For humans, linked spatial channels would constitute the first information network."[870]

Harmondsworth, Middlesex, England: Penguin Books, 1997; Hildebrand, G. *Origins of Architectural Pleasure*, Oakland: University of California Press, 1999; Platt, Rutherford H, Rowan A. Rowntree and Pamela C. Muick. The Ecological City: Preserving and Restroing Urban Biodiversity. Amherst: University of Massachussets, 1994, p. 144; Balling, J.D. and Falk, J.H. "Development of Visual Preferences for Natural Environments." *Environment and Behavior* 14 (1982): 5–38.

[868] Platt, Rutherford H, Rowan A. Rowntree and Pamela C. Muick. The Ecological City: Preserving and Restroing Urban Biodiversity. Amherst: University of Massachussets, 1994, p. 114.

[869] Brown, M. Gordon. "Space, Property and the First Urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 3.

[870] Brown, M. Gordon. "Space, Property and the First Urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 3; Kaplan, Steven and Kaplan, Kaplan. Humanscape: Environments for People. North Scituate, Massachusetts: Duxbury Press, University of Michigan, 1978, Kaplan, R, and S. Kaplan. *The Experience of Nature: A Psychological Perspective*. New York: Cambridge University Press, 1989.

Given the preferences of certain landscapes and the elements of those landscapes with regard to refuge, safety and danger, is it no mere coincidence that these were replicated within the city environment.[871] [See Figure 110]

> "Pinker (1997) says we are adapted to two habitats. The African savanna, our first choice, is where most of our evolution occurred. The rest of the world has been our second choice. Considerable research indicates we find savannas innately beautiful. Hildebrand (1998) used prospect and refuge and related concepts in a qualitative analysis to show what makes Frank Lloyd Wright's architecture so attractive. We also like a landscape that is easy to explore and remember and that we have lived in long enough to know its ins and outs."[872]

Aesthetics in urban design is really a discussion about numerous cognitive processes based on preparing an urban form that is best suitable for sustaining human life. "[A]esthetic satisfaction … stems from the spontaneous perception of landscape features which, in their shapes, colours, spatial arrangements and other visible attributes, act as sign-stimuli indicative of environmental conditions favourable to survival, whether they really are favourable or not.[873] So, in a sense, the environment where humans evolved

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[871] Kirby, MaryAnn. "Nature as Refuge" *Children's Enviornments*. Vol. 6, No. 1 (1989). http://www.colorado.edu/journals/cye/6_1/NatureAsRefuge_Kirkby_Vol6_1.pdf (accessed July 20, 2014); Appleton, J. *The Experience of Landscape*. New York: John Wiley, 1975; Balling, J.D. and Falk, J.H. "Development of Visual Preferences for Natural Environments." *Environment and Behavior* 14 (1982): 5-38; Goodenough, W.H. *Description and Comparison in Cultural Anthropology*. Chicago: Aldine Press, 1970; Nassauer, Joan Iverson. "Culture and Changing Landscape Structure." *Landscape Ecology* Volume 10, Issue 4 (August 1995): 229-237 http://link.springer.com/article/10.1007/BF00129257# (accessed July 20, 2014); Cosgrove, D. "Place, Landscape, and the Dialectics of Cultural Geography." *The Canadian Geographer/Le Géographe Canadien*, 22(1) (1978): 66-72; Nasar, J. L, Fisher, B, and Grannis, M. "Proximate Physical Cues to Fear of Crime." *Landscape and Urban Planning*, 26(1) (1993): 161-178; Falk, J. H, and Balling, J. D. "Evolutionary Influence on Human Landscape Preference." *Environment and Behavior*, 2009.

[872] Brown, M. Gordon. "Space, Property and the First Urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 3; Pinker, S. *How the Mind Works*. Harmondsworth, Middlesex, England: Penguin Books, 1997; Hildebrand, G. *Origins of Architectural Pleasure*, Oakland: University of California Press, 1999.

[873] Brown, M. Gordon. "Space, Property and the First Urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 3; Appleton, J. *The Experience of Landscape*. New York: John Wiley, 1975, p. 69.

provided the stimuli for urban form issues of framework or infill, and our response to urban elements as we travel through the city might be more a response to urban elements placed in the city replicating the environments where humans evolved.

> "The difference between humans and other animals is that we can reproduce what we experienced in the savanna as built spatial-material realities. Shepard and colleagues argue natural selection has shaped inference processes guiding perception and the ways our imagery system, our "mind's eye," imagines the world so they reflect properties of the physical world (Shepard 2001). Tversky (2005) says their work demonstrates there are second-order isomorphisms, similarity spaces for perceived and for imagined stimuli having the same structure."[874]

If we are replicating evolutionary remnants of our environment within our cities within pathways, edges, districts, landmarks and nodes, it makes sense that the most optimum replication of these elements would be limited to that which is within our species' sensory perception.

> "Certain animals became binocular for predation and jumping and our own visual acuity developed in jungle treetops where primate ancestors jumped from limb to limb. We have a visual field of about 90 to 180 degrees but within this, only a tiny fraction from a few inches just in front of us to several hundred feet away can actually ever be in focus at one instant and experimental work on visual habits shows that the eye, in a random examination of surroundings, tends to follow flat lines and vertical lines."[875]

For example, the common range for human hearing is between 20 Hz and 20 kHz, which corresponds to 0.7 inches to 56 feet in actual distance.[876] It is also interesting that the normal human can also hear shouting 300 feet away, and that both of

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[874] Brown, M. Gordon. "Space, property and the first urbanism." *The Council of the new Urbanism.* https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 3.

[875] Brown, M. Gordon. "Space, Property and the First Urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 3; Shepard, P. *Man in the Landscape: An Historic View of the Esthetics of Nature*. New York: Knopf, 1967, pp. 5-7; Wandell, B. "Foundations of Vision." Cited in Itti, Laurent, Geraint Rees, and John K. Tsotsos. *Neurobiology of Attention*. Amsterdam: Elsevier Academic, 2005, Chapter 102.

[876] Rosen, Stuart, and Peter Howell. *Signals and Systems for Speech and Hearing*. 2nd. London; San Diego: Academic, 1991, p. 163; Rossing, Thomas D. *Springer Handbook of Acoustics*. New York: Springer, 2007, pp. 747, 748.

these distances fairly correspond to a fairly fine-grained right-of-way and a block size. Further, the average distance that a person can see and focus up to 3.1 miles, although a landmark or light in the distance can be seen by the human eye up to 30 miles.[877] While this does not correspond to large amounts of urban form, it does state that some forms might be seen in smaller or larger scales--for example, architectural infill versus landmarks. While these numbers are not conclusive that these were the reasons for dimensions within the urban form, it does seems logical that humans would replicate their own bodily constrains within any environment they recreate. Further, what this also states that that, from a scientific and evolutionary perspective, urban form relates to how humans as our species walked through space and people cannot be divorced from the form itself--for we gather information about form through our senses.[878] It is almost as if humans have imprinted a social capital or collective memory within the forms themselves--the important forms. Further, it is this meaning and relationship to humans that forms the elemental link between urban elements and elements that have no or little urban form meaning.

> "The past cannot be conserved and is not represented just as it is. At each stage, society reworks its own memories to adapt them to its present conditions of functioning. By means of a constant process of reconstruction, memory wrings an interpretation of the past out of present: in the form of collective memory, it strengthens the cohesion of the group in question, it is an integral part of its essence, it is transformed as the group evolves. The same thing happens with space …"[879]

It seems logical that once humans moved from hunting and gathering societies and become sedentary that humans would replicate these cognitive systems within the cities built. So, in a sense, cities are human fabrications of the environments from which

[877] Wolchover, Natalie. "How Far Can the HUman Eye See?" *Livescience*. http://www.livescience.com/33895-human-eye.html (accessed July 21, 2014).
[878] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 111.
[879] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 19.

ancestors came, with those that survived passing down encoded data and instinctual responses to certain types of form within the city environment. What is also seems is that this instinctual ability to encode and understand data in the environment became imprinted upon the city and the forms that we create daily. We build the African savannas in every city--at least the good ones.

8.2 Mapping, Imageability, Legibility and Urban Form

> “When geographers, designers and others interested in the human/environment interface refer to ‘environmental perception,’ the issues they raise often turn out to involve knowing the environment at least as much as perceiving it.”[880]

In cities, the prospect-refuge theory suggests that humans would replicate meaningful form elements into their environment to transfer clues about the city environment. What this ultimately becomes is the construction and placement of forms that create mental maps or images within the built environment that creates maps to link people to maneuvering through space.[881] “The cognitive map idea, although proposed by Tolman back in 1948, has sparked little interest until relatively recently.”[882] This map would be based upon the instinctual and shared human experience and be based in the forms that were important during the evolutionary process--pathways, edges, districts/home, nodes, and landmarks. The expectation of how these forms act in space would reinforce the shared experience and cause these elements to work as intended--aside from the innate qualities of the element itself.[883] When the interrelationship between form and people worked, the maps were coherent and successful--resilient.

> “The pattern of connections one has experienced in the world. These connections in turn constitute the paths in the map. They provide the relational structure that makes the stored information more than a

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[880] Kaplan, Steven and Kaplan, Kaplan. Humanscape: Environments for People. North Scituate, Massachusetts: Duxbury Press, University of Michigan, 1978, p. 42.
[881] Kaplan, Steven and Kaplan, Kaplan. Humanscape: Environments for People. North Scituate, Massachusetts: Duxbury Press, University of Michigan, 1978, p. 43.
[882] Kaplan, Steven and Kaplan, Kaplan. Humanscape: Environments for People. North Scituate, Massachusetts: Duxbury Press, University of Michigan, 1978, p. 42.
[883] Kaplan, Steven and Kaplan, Kaplan. Humanscape: Environments for People. North Scituate, Massachusetts: Duxbury Press, University of Michigan, 1978, p. 43.

> mere collection of places. In other words, they impose an orderly arrangement that makes the term map appropriate."[884]

The built environment contains items that are too large to be completely perceived by any person. There is too much information, and some information is unimportant to most of those within the built environment. Further, some doubt that humans, as a group and individually, can actually perceive the whole city or region anyway with extreme specificity. "First, we are speaking only about spaces so large that they cannot be perceived at once, not of those perceivable in a brief series of glances; problems of the latter kind already have been treated adequately."[885] This is because we are not talking about simply points on maps but also three dimensional points that change in space and have different meaning depending on context and location.[886] Maps on paper are only diagrammatic presentations of cognitive maps contained in the human mind.[887] This means that successful urban form creates context clues that help humans navigate through the urban form--the larger the street, the more likely it leads to a gate, and the more likely it leads from one city to the next--the city must be imageable and understandable.[888] [See Figure 144]

> Imageability is about place. Imageability is related to a "sense of place."[889]

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[884] Kaplan, Steven and Kaplan, Kaplan. Humanscape: Environments for People. North Scituate, Massachusetts: Duxbury Press, University of Michigan, 1978, p. 43.
[885] Kaplan, Steven and Kaplan, Kaplan. Humanscape: Environments for People. North Scituate, Massachusetts: Duxbury Press, University of Michigan, 1978, p. 45.
[886] Kaplan, Steven and Kaplan, Kaplan. Humanscape: Environments for People. North Scituate, Massachusetts: Duxbury Press, University of Michigan, 1978, p. 45.
[887] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 111.
[888] Kaplan, Steven and Kaplan, Kaplan. Humanscape: Environments for People. North Scituate, Massachusetts: Duxbury Press, University of Michigan, 1978, p. 421.
[889] Cullen, Gorgon. *The Concise Townscape.* London: Reed Educational and Professional Publishing, 1961, p. 152; Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 5; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 113-115.

Kevin Lynch argued that people understand the city and built environment as a series of mental maps that allow people to move around the city with ease and placemake their location within that build environment.

> "Lynch argued that the ease within which we could mentally organize the environment into a coherent pattern or 'image' was related to our ability to navigate through it--a quality he referred to as 'legibility.' A clear image enables one to 'move about easily and quickly' while an 'ordered environment' can '…serve as a broad frame of reference, an organizer of activity or belief or knowledge."[890]

Lynch's research grew upon the idea of legibility of that mental map, and observing that cities had districts, landmarks, pathways and other types of fundamental urban form, Lynch proposed that these urban elements and their form created a map or pattern which evoked "a strong image in any given observer."[891] This 'imageability' of the urban form allowed the residents to navigate the urban form, and inversely one could say, the lack of imageability would make it more difficult for residents to navigate any urban form.[892] Imageabilty also is the quantitative impression that people have upon a location, a place, where the physical attributes leave lasting impressions that imprint upon the mind.[893] Imageabilty may also be influenced by "enclosure, human scale, transparency, complexity, coherence, legibility, and linkage---and is in some sense the net effect of these qualities."[894]

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[890] Lynch, Kevin. *The Image of the City*. Cambridge, Massachusetts: MIT Press, 1960, p. 4; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 112-113.

[891] Lynch, Kevin. *The Image of the City*. Cambridge, Massachusetts: MIT Press, 1960, p. 9; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 113.

[892] Lynch, Kevin. *The Image of the City*. Cambridge, Massachusetts: MIT Press, 1960, p. 9; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 113; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 115-116.

[893] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 5; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 113-115.

[894] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 6.

> Mental 'maps' and images of places and environments, particularly shared or common images, are therefore a central part of studies of environmental perception in urban design."[895]

While each individual map would be different for every person, with fundamental forms there would be enough overlap to make a coherent mental map for large populations of people.[896] All humans would have similar sensory relationships with their environment and a joined instinctual relationship with base environmental forms from our past. Thus, we would gather environmental information in a similar way and respond to that fundamental environmental elements in a similar way. Thus, these mental maps would contain fundamental aspects of the city that formed elements to traverse that environment. Each of these elements in this physical and mental map would have identity, structure and meaning. The urban element's identity would be its innate meaning or distinction from other things.[897] An urban element's structure would be the urban element's spatial relationship to the observer and other objects--its urban structural position.[898] The urban element's meaning would be the meaning that a person gives it, whether practical or emotional.[899] Lynch stated that from these things, one could determine how urban elements function in space and how people utilize these elements within the built environment.[900]

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[895] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 112.

[896] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 112.

[897] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 113; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 8.

[898] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 113; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 8.

[899] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 113; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 8.

[900] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 113.

It is important to recognize that these maps might be culturally specific.[901] "For those steeped in Western traditions of urban design, exposure to Japanese cities can be perplexing and baffling experience. Shelton notes that, to most Western eyes, Japanese cities '…lack civic spaces, sidewalks, squares, parks, vistas, etc.; in other words, they lack those physical components that have come to be viewed as hallmark of a civilized Western city."[902] There are also differences within societies in what types of things are within urban form.[903] However, this might be more a difference in how urban form function or element incarnates within that society. One might not be really talking about Japanese "civic spaces, sidewalks, squares, parks, [or] vistas" but Japanese city edges, pathways, districts, nodes and landmarks--though how they appear look different even though their function is the same.[904] What one sees is that the more fundamental an urban form type, the more type or function of the type was represented cross-culturally. "Lynch contended that in 'every case' the basic ideas had held, ' … with the important proviso that image are much modified by culture and familiarity.' He noted that the existence of the basic elements of the city image ' … seem astonishingly similar in some very diverse cultures and places."[905] As stated before, the Prospect-Refuge Theory

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[901] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 112; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 50; Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 51.

[902] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 50; Shelton, B. *Learning from the Japanese City: Western Meets East in Urban Design*. London: E and F N Spon, 1999.

[903] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 50.

[904] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 50; Shelton, B. *Learning from the Japanese City: Western Meets East in Urban Design*. London: E and F N Spon, 1999

[905] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 113; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, Lynch, K. "Reconsidering the Image of the City," in Banjeree, T. and Southworh, M, eds. *City Sense and City*

inherent within human evolution may be the cause of these similarities; for, while the element as it looks might be cross-culturally different and distinct, the urban element's form or function is represented cross-culturally and quite similar.[906]

> "Rather than image, Lynch had initially been interested in legibility--that is, how people oriented themselves and navigated within cities. Lynch argued that the ease with which we could mentally organize the environment into a coherent pattern or 'image' was related to our ability to navigate through it--a quality he referred to as 'legibility.' A clear image enables one to 'move about easily and quickly', while an 'ordered environment' can '… serve as a broad frame of reference, an organizer of activity or belief or knowledge."[907]

With Kevin Lynch's legibility and considerations that support legibility, one can assume that some cities are more legible and imageable than others.[908]

> "Places that rate high on these qualities are likely to rate high on imageability as well--the neighborhoods of Paris or San Francisco for example. However, places that rate low on these qualities may also evoke strong images, though ones that people may prefer to forget. Urban designers focus on the strength of positive images in discussing imageability and sense of place."[909]

This is not about cities being beautiful, this is about cities being imaginable and mapable in the human mind.[910] "The more 'imageable' a city, the easier it is to find one's way about it, even if its street pattern is not clear. In designing a city, it is important to consider how a new development will affect the total urban image."[911] We can also state that given the cross-cultural nature of these inherent ways of reacting to the urban

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Design: Writings and Projects of Kevin Lynch. Cambridge, Mass.: MIT Press, 1991, p. 247-256.

906 Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p.113.

907 Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 4; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 113.

908 Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 112-113.

909 Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 6; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 113-115.

910 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-3; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 113-115.

911 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-3.

environment and the duplication of these urban form elements within the City, there are fundamental aspects of urban form and that which is not fundamental--framework and infill. [See Figures 108 and 109]

Lynch characterized urban form framework items as pathways, edges, nodes, landmarks and districts.[912] [See Figure 129]

> "Paths, landmarks, nodes, districts, and edges are the skeletal elements of a city form. Upon that basic framework hangs a tapestry of embellishing characteristics which all together constitute the personality of a city. To build a broader vocabulary upon this basic framework we must consider landforms, natural verdure, climate, several aspects of urban form itself, certain details and several lesser facets of form."[913]

As a result we map our environment in very specific ways. We come from Districts or homes where everyone is similar or things are similar. We walk on pathways from nodes of activity while using landmarks for their directional or personal quality. We pass through edges at proscribed edges like thresholds. And, we do this without even thinking about it, because we were born to think this way. What this requires is an understanding of what comes first--the spatial edge.

[912] Watson, Donald. *Time-Saver Standards for Urban Design*. New York: McGraw-Hill, 2003, 4.3-3.

[913] Watson, Donald. *Time-Saver Standards for Urban Design*. New York: McGraw-Hill, 2003, 4.3-3.

CHAPTER 9.

EDGES, AREAS AND PRIVACY IN FRAMEWORK

> "The space is somehow 'bonded.' The boundaries may be clear or indistinct; they may be in the form of lines or other imaged areas. The neighborhood may be bounded by a street or another neighborhood, for example. Further, there may be boundaries within boundaries; as an individual "images" a city, he may image neighborhoods within the city as bounded entities."[914]

Within the urban environment, edges are those things which are on the sides of pathways or ways of conveyance through the built environment and are not used or considered pathways by persons.[915] [See Figure 111] "Edges are the linear elements not considered paths: they are usually, but not quite always, the boundaries between two types of areas. They act as lateral references."[916] Edges form the boundaries of things and act as lateral references for urban form elements and their constitution.[917] For both Jacobs and Lynch, these barriers could be actual, visual, physical or functional in nature.[918]

> "An edge may be more than simply a dominant barrier,' writes Lynch, ' if some visual or motion penetration is allowed through it—if it is, as it were, structured to some depth with the regions on either side."[919] "While continuity and visibility are crucial, strong edges are not necessarily impenetrable. Many edges are uniting seams, rather than isolating barriers, and it is interesting to see the differences in effect."[920]

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[914] Kaplan, Steven and Kaplan, Kaplan. Humanscape: Environments for People. North Scituate, Massachusetts: Duxbury Press, University of Michigan, 1978, p. 46.
[915] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003. 2.9-1.
[916] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 47, 62.
[917] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 62.
[918] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 349.
[919] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961) p. 349.
[920] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960:, p. 65.

Thus, edges can contain or enclose an area, join or seam, terminate or end, divide or fragment, or limit or slow motion between things and people--edges need not stop actual movement between the edges.[921] [See Figures 112 and 113] “Such edges may be barriers, more or less penetrable, which close one region off from other; or they may be seams, lines along which two regions are related or joined together.”[922] Some of these seams can be uniting or dividing.[923] What this means is that there are fundamental boundaries within the built environment that contain space, whether inside or outside--edges, lines, areas. “Edges are linear elements not considered paths: they are usually, but not quite always, the boundaries between two kinds of areas.”[924] Further, within the built environment there are edges that are made of urban form and there are edges that are political or spatial edges for the edges to an area of space for infill to populate--lot edge and block/street edge. Types of borders can be pathways like railroads, boulevards, universities, parks, civic centers, large hospital grounds, and physical decay itself acting as an edge.[925]

> “The termination of a district is its edge. Some districts have no distinct edges at all but gradually taper off and blend into another district. When two districts are joined at an edge they form a seam. Fifth Avenue is an eastern edge for Central Park. A narrow park may be a joining seam for two urban neighborhoods.”[926]

Before being torn down, the walls within Barcelona created social, political and urban edges of the city that functioned to slide the city in parts. In 1854, as the process

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921 Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010 p. 114; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 47, 62, 63, 100.
922 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-1, 2.9-4.
923 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-4.
924 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-4.
925 Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), 336.
926 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-2.

of tearing the walls down occurred, the city responded by enthusiastically responded by helping tear down the edge.

> As soon as the news of the government's long-desired permission to pull down the wall was known, there was a general rejoicing in the city, and its shops were emptied of pickaxes and crowbars overnight. Almost every citizen rushed to the wall to participate in its demolition, either by using the appropriate tools or by supporting orally those who were actually doing the work. The wall was, probably, the most hated construction of that time in a European city.[927]

Barcelona then unified.

Edges also define urban framework edges, districts, nodes or landmarks. It is important to note that all the framework urban form types have an edge condition, but this condition addresses those conditions with the framework element. With districts, when districts have no distinct edges, they blend with other districts and both districts become fuzzy. The more distinct the edge, the more distinct the framework type will be in relation to other framework urban elements. Jacobs stated that these edges tend to concentrate activity on a physical border--or they could be made also of concentrated activity at a border. “Borders, they sometimes reason, are a feasible means of heightening intensity, and of giving a city a sharp, clear form, as medieval town walls apparently did with medieval towns.”[928] In doing so they create definition for either the rea or the activities involved.

Edges can be manmade or natural such as forests, rivers, streams, cliffs, “railroad cuts, edges of development, [or] walls.”[929] Edges have different levels of penetration with some edges being completely impenetrable and others having visible or

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[927] Aibar, Eduardo and Wiebe E. Bijker, “Constructing a City: The Cerda Plan for the Extension of Barcelona.” Science, Technology, and Human Values, Vol. 22, No. 1 (Winter 1997): 3. http://www.jstor.org/stable/689964 (accessed July 8, 2014).
[928] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 342.
[929] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-1.

physical permeability.[930] [See Figure 112] There are strong natural edges such as rivers and streams that create distinct boundaries--they are more impermeable in some ways than others, although not completely impermeable[931]. "The Charles River in Boston is the best example and has all of these qualities."[932] Unnatural edges can be fences or turnpikes such as the manmade fence in Jersey City. "In Jersey City, the waterfront was also a strong edge, but a rather forbidding one. It was a no-man's land, a region beyond the barbed wire."[933]

Portland is known for its park system and for the urban growth boundary.

> "Portland is perhaps best known for its urban growth boundary (UGB). First established in 1979 and expanded little since then, the boundary encompasses 24 cities, parts of three counties, and approximately 1.3 million people.3 Under the requirements of Oregon's land use statutes, all land outside the UGB—with exceptions—is designated for resource use and prohibited from urban development." [934]

The land within the UGB must be planned and adhere to the zoning and building requirements. As a result, what appears is a functional and artificial edge to the city--much in the same way that the coastline affect San Francisco and island characteristic affects Manhattan. "Proponents argue that Portland's UGB has successfully served to

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[930] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-1.

[931] One should note that Rivers and streams in particular and their function has changed in time. Rivers and steams were pathways of transportation in ancient times that joined areas together. So, while urban form did have an edge with the river or body of water, the water itself also worked as a pathway for transportation or economic reasons.

[932] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-4.

[933] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-4.

[934] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), 210; Abbott, C. "Planning a Sustainable city: The Promise and Performance of Portland's Urban Growth Boundary," in G. D. Squires ed. *Urban Sprawl: Causes, Consequences and Policy Responses*. Washington, DC: Urban Institute Press, 2002, pp. 207–235; Nelson, A. C. "Oregon's Urban Growth Boundary Policy as a Landmark Planning Tool," in C. Abbott, D. Howe, and S. Adler eds. *Planning the Oregon Way: A Twenty-Year Evaluation*. Corvallis, OR: OSU Press, 1994, pp. 25–47.

contain urban sprawl, minimize public service costs, and protect natural resources and open space."[935] Opponents of the UGB have stated that the effect has been the stifling of urban growth and increases to housing costs--in much the same way that the impermeable edge has done exactly the same things to San Francisco and Manhattan.[936] However, at the same time, the edge may has artificially created a much more concentrated commercial activity than it would have had before the UGB--given the small population relative to much larger cities with larger populations. This edge is concentrating all activity in one location--creating a vibrant and dense urban form.

In the 1980s, Barcelona worked to create new parks and places for people to gather and to provide recreational resources for the city--citywide rather than focused in specific locations.

> "The city sought to maximise its green structure throughout the entire urban fabric. From this we can deduce two hypotheses underlying intervention: firstly, it was necessary to work on the small empty gaps in the existing urban conglomerate, and secondly, the selection of the criteria of opportunity—which spaces were most available in relation to the adjacent residential fabric."[937]

To accomplish this, Barcelona selected derelict buildings and industries that took up space but were not being utilized.[938] Barcelona took little notice of the suitability of the parks, just their location and the maximum value they could get from the various attempts."[939] The squares and gardens were small, but they were completely integrated

[935] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 210.

[936] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 210.

[937] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 355.

[938] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 355.

[939] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 356.

into the total fabric of the urban core. “The sheer number of schemes carried out (over 150) and their quality represented a thoroughgoing rehabilitation of Barcelona’s urban space.”[940] What is interesting though with Barcelona is what they did not do. They did not succumb to the large park void issue. Barcelona does have extremely large parks, but they tend to function on the periphery where they create an edge to the city.[941] The effect is that Barcelona is completely surrounding by an almost impermeable edge with the coast, the park of Montuïc and the mountains. As a result, while the greenspace allowed is small within the city within small to mid-sized parks including parks incorporated in the Streets and pathways, those parks can be completely utilized by the populous without becoming edges to the city.[942]

> “They included the seafront, restructured as a great linear park with public beaches; the western slope of Monjuïc, descending into the Llobregat delta, where various Olympic sports amenities were installed; Vall d’Hebron on the north of the city, retrieving residential land for use as a large park with facilities in one of the densest sectors; and Diagonal Park, as this thoroughfare’s western extreme, completing the city’s large sports area.”[943]

Some types of urban form become edges because of their nature or dimension, as a result some edges can be pathways. “Where this was so, and where the ordinary observer was not shut off from moving on the path, then the circulation image seemed to be a dominating one. The element was usually pictured as a path, reinforced by boundary characteristics.”[944] This is true with large streets and also with coastal regions, where water transportation is an option.

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940 Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 356.

941 Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, pp. 358-361.

942 Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, pp. 358-361.

943 Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 358.

944 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-4.

Some edges are political, social or spatial in nature and they tend to cause infill or construction to occur--lots, blocks, or voids. These tend to affect and regulate the type of activity around them. An edge could be Central Park, which has historically created economic voids on one side and limited economic activity to another side for it has been fairly impermeable. “Some of these most unpleasant edges, such as the banks of the Hackensack River with its burning dump areas, seemed to be mentally erased.”[945] These borders might have intended or unintended social effects or have political ramifications. “Railroad tracks are the classic examples of borders, so much so that they came to stand, long ago, for social borders too—“the other side of the tracts”—a connotation incidentally, associated with small towns rather than with big cities.”[946] Depending on the political nature of the area, borders are set in the landscape, and those borders may create unintended districts which exist within urban form.

> “In the case of a railroad track, the district lying to one side may do better or worse than the district lying to the other side.”[947]

Edges can also be permanent or impermanent, with different spans of longevity of that permanentness.[948] While walls are impermanent, blocks and the subdivision of land last long periods of time.

> “Barriers differ in their permanence, their permeability, and their quality (“natural” or “artificial”). A construction project in the middle of a superhighway decreases permeability and is impermanent; a flood, also impermanent, reduces permeability to zero. The frontier between Mexico and the United States is temporarily quite impermeable when rumors are received that a shipment of marijuana is expected; all travelers attempting to cross the border then experience difficulty.” [949]

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945 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-4.

946 Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 336.

947 Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 336.

948 Kaplan, Steven and Kaplan, Kaplan. Humanscape: Environments for People. North Scituate, Massachusetts: Duxbury Press, University of Michigan, 1978, p. 46.

949 Kaplan, Steven and Kaplan, Kaplan. Humanscape: Environments for People. North Scituate, Massachusetts: Duxbury Press, University of Michigan, 1978, p. 46.

Though this is true, this thesis will address the most permanent edges. Other types of edges which are impermanent (building facades, tree lines, façade walls, etc.) will be addressed in with the Street or in the District where these more impermanent items register as infill, rather than framework.

> "In summary, the space of which we are speaking is bounded; one-, two-, or three-dimensional; and consists in a probably finite (given the limitations of the human organism) collection of points [of anywhere from zero through three dimensions]; of paths between them; and of interposed barriers."[950]

While edges function on the ground, they also are three dimensional affecting permeability or strength.[951] Thus, edges confine, join, divide and limit space in the three dimensions. Maps or normal analysis generally does not indicate how these volumes of space react against each other. What this means is that edges must be considered in a multi-dimensional way in how people inhabit space and relate to the edge rather than as an abstract one or two dimensional item.[952] On this dimensional level, many types of edges are elevated such as railways. "The elevated railways of Jersey City and Boston are examples of what might be called overhead edges. Yet high overhead edges, which would not be barriers at the ground level, might in the future by very effective orientation elements in a city."[953] As elevated edges, they do not form ground edges, while having an urban effect--Highline in New York City.[954]

Some edges are strong or weak depending on permeability.[955] Jane Jacobs expressed this weakness or strength as a type of active and passivity that borders

[950] Kaplan, Steven and Kaplan, Kaplan. Humanscape: Environments for People. North Scituate, Massachusetts: Duxbury Press, University of Michigan, 1978, p. 46.
[951] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 66.
[952] Kaplan, Steven and Kaplan, Kaplan. Humanscape: Environments for People. North Scituate, Massachusetts: Duxbury Press, University of Michigan, 1978, p. 48.
[953] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-4.
[954] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 66.
[955] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960l, p. 62.

placed upon design.[956] This permeability can be on large scale or regard the ability to allow access in a given area. In large scale, it might depends on the location or type. “They are strong in Boston and Jersey City but weaker in Los Angeles.”[957] On a smaller scale, the permeability will affect accessibility of lots and blocks, via unofficial pathways or thresholds. When an edge becomes more impermeable, it also becomes more dominant in relation to other types of urban from.

> “An edge may be more than simply a dominant barrier if some visual or motion penetration is allowed through it—if it is, as it were, structured to some depth with the regions on either side. It then becomes a seam rather than a barrier, a line of exchange along which two areas are sewn together.”[958]

An example of permeable barriers are loggias or galleries which break up the building façade to a degree and allow access. This is a weaker barrier than a city wall, which dominates the area and limits all conveyance. In contrast, the sprawl edge at urban areas is so destabilized that it create a completely permeable and diluted edge.

> “The suburban edge is diluted in its interface with the natural boundaries; sprawl leapfrogs other sprawl and encroaches in areas that need to be protected, such as productive farmland and natural habitat.”[959]

Edges draw distinction to district areas.[960] “Figueroa and Sunset Streets, and to a lesser extent Los Angeles and Olympic Streets, were usually thought of as the edges of the Los Angeles Business District.”[961] These edges in effect create the neighborhoods and gridline/block areas which form units within the city. This is the effect that happens

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[956] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 336.
[957] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-4.
[958] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 100.
[959] Tachieva, Galina. Sprawl Repair Manual. Washington: Island Press, 2010, p. 25.
[960] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 63.
[961] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 65.

when highways and interstates bifurcate areas in the city and create neighborhoods or halve neighborhoods into previously joined areas. The highway become an edge.

> “Interesting enough, they were stronger in this respect than the Hollywood and Harbor Freeway, which also can be thought of as major boundaries, and are both much more important as paths and physically more imposing.”[962]

Edges can be straight or curved for the quality of the edge determines its legibility. Unfortunately, curved edges become more confusing and difficult for people to assess. As a result, organic edges are more difficult to maintain than straighter edges, which are easier to visualize and use in pathmaking by observers.[963] “When several such edges are curving and intersecting overhead, as they do near North Station, the result may be quite confusing.”[964]

Edges can have directional qualities. “Edges may also, like paths, have directional qualities. The Charles River edge, for example, has the obvious side-from-side differentiation of water and city, and the end-from-end distinction provided by Beacon Hill.”[965] Very few edges have a directional quality though, and it might depend on context or location rather than the type of edge. Jacobs was concerned about the permeability of borders with multi-directional traffic, stopping traffic in one or more directions.[966]

> “Some borders damp down use by making travel across them a one-way affair. Housing projects are examples of this. The people cross back and forth across the border (usually, in any appreciable numbers, at only one side of the project or at most two sides.) The adjoining people, for the most part, stay strictly over on their side of the border and treat the line as a dead end of use.”[967]

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[962] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 65.
[963] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 66.
[964] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 66.
[965] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-4.
[966] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p.341.
[967] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 341.

Edges can create functional difficulties with how the edge meets with other types of urban form. These are instances where the edge is badly planned or does not mediate well between both sides of the edge. "They fail to get a by-the-way circulation of people going beyond them in the direction of the border, because few are going to that Beyond."[968] Jacobs also cautioned that the size, permeability, terminus quality and frequency of border created issues. "The root trouble with borders, as city neighbors, is that they are apt to form dead ends for most users of city streets. They represent, for most people, most of the time, barriers."[969] As a result, areas of the city become unusable because there is no circulation or ability of uses to move along with people, causing areas to be shunned, and to have stalled diversity and economic development.[970]

> Barriers may be symmetrical (the same when approached from one member of a pair of point as from the other) or nonsymmetrical. The city of Providence, Rhode Island, for example, was for most travelers between Boston and New York prior to the completion of the turnpikes, a nonsymmetrical barrier; that is, the north-south and south-north routes through the city where different and it was considerably more difficult to traverse the city in one direction than in the other."[971]

Jacobs refers to Lynch when addressing the functional problems with impermeable barriers. "Lynch was speaking of visual or esthetic problems concerning borders, and the same principle, exactly, applies to many functional problems caused by borders."[972]

> "An edge may be more than simply a dominant barrier,' writes Lynch, ' if some visual or motion penetration is allowed through it—if it is, as it were, structured to some depth with the regions on either side."[973]

[968] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 338.
[969] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 338.
[970] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 338, 344.
[971] Kaplan, Steven and Kaplan, Kaplan. Humanscape: Environments for People. North Scituate, Massachusetts: Duxbury Press, University of Michigan, 1978, p. 46.
[972] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 349.
[973] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 349.

Jacobs also referred to the problem by creating districts and areas like civic centers, which by their very nature create barriers or edges to other city areas.[974] They create voids or vacuums in the city which have unintended negative effects on other areas of the built environment. “The phenomena of border vacuums is baffling to city designers, especially to those who sincerely value urban liveliness and variety and dislike both deadness and nondescript sprawl.”[975] As a result, these areas can not only be urban form barriers within the city, but form negative socio-economic barriers within the city--causing physical decay.

“[They] are apt to be stagnant—a condition that precedes decay.”[976]

Because of their very nature, borders dissect things, and many times they dissect neighborhoods or districts and make those areas become weaker by dividing areas into several unsustainable sectors.[977] “Frequent borders, whether formed by arterial highways, institutions, projects, campuses, industrial parks, or any other massive uses of special land, can in this way tear a city to tatters.”[978] Jacobs also stated that edges like railroads blocked traffic in both directions. “Open railroad tracts or expressways or water barriers are common examples.”[979] Her other examples included parks which only allowed traffic in one direction, whereas neighborhoods on other many sides considered them to be borders of the community.

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[974] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 342.

[975] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 342.

[976] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 337.

[977] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 346.

[978] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 346.

[979] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 341, 342.

> "Some borders have cross-use from both directions, but it is limited, in appreciable amounts, to daylight or it falls off drastically at certain times of the year. Large parks are common examples."[980]

For Jacobs, the edge in causing a termination or the stopping of commerce or conveyance of people besot problems upon urban form. "The root trouble with borders, as city neighbors, is that they are apt to form dead ends for most users of city streets. They represent, for most people, most of the time, barriers."[981] Jacobs was concerned of the negligent use of barriers or edges in that they were being used to limit rather than define the community.[982] Borders that did not function well limited circulation of people, leaving some areas shunned or void of people--and eyes on the street.[983]

> "Every place you go in this strip brings you quickly to a border. The most shunned of these of these borders by evening, for decades, has been that of the park. But gradually and almost imperceptibly, the common consent that insecurity exists has affected more and more of the territory, until today there is only one side of one street that carries more than solitary footfalls at night. This one-side street, a stretch of Broadway, is across from the deadened perimeter of the big campus; and even it does off through much of the strip, where it becomes preempted by another border."[984]

For Jane Jacobs, edges that were more impermeable or less linear had the propensity to create economic drags on economic growth and diversity.[985] An example of impermeable edges are larger parks, parking areas, expressways, waterfronts, railroad tracts, campuses, etc. "And if we look at the parts of the cities most literally attractive—i.e., those that literally attract people, in the flesh—we find that these fortunate localities

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[980] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 342.
[981] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 338.
[982] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 338.
[983] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 338.
[984] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 341.
[985] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 337-338.

are seldom in the zones immediately adjoining massive single uses."[986] Because of their size and their strong edge, the effect upon the surrounding community might be excessive. Jacobs also talked about functional penetrations within edges that were created by safe zones, where she used parks as an example, Golden Gate Park, in San Francisco, Central Park in New York, etc.

> "On the west side there is a curious penetration of the perimeter, especially notable because it operates ad night and because it has been created by users themselves. This is a particular cross walk into the park which, by common consent, has become the path for evening and night walking of dogs, hence for other strollers, hence for anyone who wishes to go into the park and still feel safe."[987].

The parks themselves had functional impermeability because of their inhibiting nature and because of the perceived activity or safety issues within--creating border vacuums.[988] "However, the park's perimeter—especially on its west side—contains great vacuous stretches, and it exerts a bad vacuum effect along a lot of border."[989] As a result, the park had varying levels of impermeability during the day--with the park being unsafe and impermeable at night.[990] Other areas are civic centers, which because of their mass, lack of residential inhabitation, abandonment at night become functional dead zones at night and have a functional impermeable barrier around them.

9.1 Subdivision, Lots and Blocks - Edged Privacy

> "Cities have always grown at their edges, with new residential quarters taking root on established urban nodes."[991]

[986] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 338.
[987] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 347.
[988] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 347.
[989] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 347.
[990] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 347.
[991] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 1.

Because edges relate to numerous types of urban form, this chapter will discuss edges that are not touched by other types of urban form--pathway, district, node and landmark. This chapter will discuss edges that are fundamental to the framework of urban form: lots, blocks, and public and private space. These constitute the most fundamental types of urban form, and actually originated effectively more than 6500 years ago. These all area based upon a series of buildable units with the first being the private edge, the private edge making the lot and accumulations of lots making blocks. Along with the edges of other framework items, these are the important framework based areas within urban form--but these are based upon ownership and control of an area, whether that ownership is private or public.

9.2 Private and Public Space Within Urban Form

> "Starting at the most abstract level, the two most basic morphological elements are public open space and private development blocks or plots. Built form them mediates between urban public space and urban private space. The buildings and spaces themselves are less embedded morphological elements but require more detailed consideration, while the interfaces and thresholds are the most malleable, and where an individual and specific response becomes particularly relevant."[992]

While there are physical edges and dimensions of the land, there is also a private and public dimension to the edge. This edge mediates the lines between what is considered in common and those things that are considered owned by a private party. This includes private ownership of space for private activities out of the public eye--which is at a premium in cities. "Privacy is precious in cities. It is indispensable. Perhaps it is precious and indispensable everywhere, but most places you cannot get it."[993] While the architecture mediates this space with facades, windows, window treatments, etc., there is a spatial edge that modulates between what is public and what

[992] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 49.
[993] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 76.

is private--what is visible and what is not visible.[994] This edge extends into the block and into the private lot to varying degrees.

> "[U]nder this system, it is possible in a city street neighborhood to know all kinds of people without unwelcome entanglements, without boredom, necessity for excuses, explanations, fears of giving offense, embarrassments, respecting impositions or commitments, and all such paraphernalia of obligations which can accompany less limited relationships.[995]

What is considered public is formed in the street and usually on the sidewalk and so it exists outside of the block and the lot. "It is possible to be on excellent sidewalk terms with people who are very different from one-self, and even, as time passes, on familiar public terms with them."[996] For the private block, there are urban elements which negotiate this relationship--the permeability of the block perimeter, the lot public right-of-way permeability and the architectural threshold. The type of lot permeability within the block defines the block permeability. If the lots are all of the same type and permeability, the block will have one permeability. If the lots have differing levels of permeability, then it becomes important to know what type of block is in question--a large block, small block, perimeter block.

Usually architectural infill, the threshold, negotiates the lot permeability. "Built form should mediate between public and private spaces."[997] The owner of the block determines what the public side of the lot fronting the public sphere is, and what type of permeability is allowed--visual, physical or none. The combination of the various lot thresholds, how they are placed and how they are interconnected determine the total block permeability. However, this is an easy issue to assess when there are

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[994] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 77.

[995] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 81.

[996] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 81/

[997] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 57.

straightforward fronts and backs to buildings and lots. The problem might occurs in the perimeter block situation were the inner hof has varying levels of public accessibility.

> "The boundaries between public and private space are easy to manage with perimeter blocks, which can have varying levels of enclosure. Some blocks only require the suggestion of enclosure, with gaps between the buildings where access is managed by natural surveillance or gates. In other blocks that require more security and/or privacy, the building form can be a solid and continuous barrier between inside or public and private space."[998]

This private space is needed in order to substantiate the public space. Further, the private space and public space connection defines the Street façade and the various permeabilties that allow both to connect and work in cohesion. "The privacy barriers, which are necessary in these situations, create increasing proportions of inactive, blanks edges to public space--edges without windows or doors--as the transition for perimeter blocks to pavilions proceeds."[999] This private space allows people to retreat without harm, while still staying within proximity to the public sphere.[1000] The problem comes when there is too much separation or too much permeability between the private and the public sphere. Part of this connection allows for structural activities to occur like eyes on the street, where because of visual or physical permeability via openings, windows, transparency, etc., keep connected to the street and function as policemen. Where there is no permeability from the lot or block to the street, these dynamics break down.[1001]

> "City residential planning that depends, for contact among neighbors, on personals haring of this sort, and that cultivates it, often does work well socially, if rather narrowly, for self-selected upper-middle-class people. It solves easy problems for an easy kind of population. So far

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[998] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 57.

[999] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 101; Bentley, I. *Urban Transformations: Power, People and Urban Design*, Routledge, London, 1999, p. 184.

[1000] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 82-83.

[1001] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 84.

as I have been able to discover, it fails to work, however, even on its own terms, with any other kind of population."[1002]

9.2.1 Data from the Research Sites

Within the Site Areas, there were multiple edge issues that generally affected the urban form. The average number of impermeable or semi-impermeable edges within all areas was 3.50. Of these, San Francisco, Portland, New York, Amsterdam and Barcelona were well below the edge, at 86% of the mean. However, Paris and Atlanta were well above the mean, with Paris being 171% of the mean, and Atlanta being 143% of the mean. In Paris, these edges were mainly broadways and avenues and large streets with a District quality, where buildings met the public edge of the right of way. In contrast, in Atlanta, these streets were broad roadways surrounded by buildings that were far away from the public edge. With these impermeable barriers, Paris, Amsterdam and Atlanta had barriers which were large enough to break the Site Area in half. In Paris or Amsterdam, these barriers were at the edge of the Site Area. In Amsterdam specifically, the canals functioned as edge barriers that tended to break the Site in half. However, in the Old Fourth Ward, there are three main barriers which cross the district and tend to dissect the Site in half. As a result, Atlanta deviates out of the highest standard deviation of the resiliency numbers in this category.

Each Site had pathways or routes which tended to seam the District together. The average number of these routes was 16. Of these cities, San Francisco, Portland, Amsterdam and Barcelona tended to have many more of the routes that seemed the Site together. Atlanta had the least with only 38% of the mean. As a result, Atlanta was below the lowest standard deviation of edges that seam.

[1002] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 85.

Each Site had pathways or routes which were natural edges, and the average number of natural edges in the Site Areas was 50%. Of the cities, San Francisco had natural edges which tended to work on both sides of the Site, and both were hill related. In Amsterdam, the canals acted as natural edges. Although man-made, they tended to function along with the Street system in a way that a stream or river would function.

In the Site Areas, the majority of the edges that were pathway related were of hierarchical gridline in nature. The mean of hierarchical gridline was 53.83 grid shapes. While most of the Site Areas had near or above the norm, Amsterdam had 69% of the mean, with Atlanta having 45% of the mean. With Amsterdam one should note that most of the shapes were curved shapes with a highly detailed and fine shape network. In the Atlanta Site Area, this was not the case.

Many of the Site Areas had organic arterial routes. The average organic arterial street length was 0.17. In this category, both San Francisco and Atlanta had higher organic routes than the other Site Areas, with San Francisco having 5 routes that were organic and arterial, and Atlanta having 12 lengths. However, one should note that in San Francisco’s case, the organic arterial routes are in line with the natural topography of the area. Atlanta’s routes had no relationship with the topography and seem to have be a matter of intentional placement. In contrast with organic arterial routes, all of the Site Areas had gridline or regularized arterial routes, with the mean being 3.17 routes.

Within the Site areas, the mean number of street lengths that were radial in nature was 1.5 routes. This is because Paris and Barcelona all have radial routes lengths, with Paris having a superimposed radial grid upon a much older medieval structure and with Barcelona imposing a radial grid upon a hierarchical gridpattern. Atlanta also has 67% of the mean. One should note that San Francisco does have a radial route immediately outside of the Site Area, Market Street, but this was not included in the Site Area numbers. Also, New York has radial routes in Brooklyn and other areas, but these numbers were outside of the Site Area.

When considering the general degree of the site blocks and gridpatterns, what one sees is that there is general disagreement across the board. None of the Site Areas aligned with true north, with Atlanta being closest at 0.64 degrees from True North. Within the Site Areas in each respect city, San Francisco was 175.64 degrees, Portland was 27.40, New York was 28.69, Paris was 160.52, Amsterdam was 156.20, and Barcelona was 313.92 from True North. As a result, one could state that with the exception of Barcelona which specifically aligned its gridline to meet the sun in its specific context, none of the blocks had a relationship to the sun in a way which made one block more resilient than another block or gridpattern.

Within the site, there was an average of 1.67 grid shifts within the Site Areas, with Atlanta having drastically the most--given its lack of a large gridpattern. Most of the other cities had 0 to 120% of the mean gridpattern shifts. What this means is that the block groups within the site allowed for more consistency of pattern and shape, and as a result, this will affect other aspects of urban form.

9.3 The Lot: Type, Access and Value

9.3.1 <u>Lot Importance: Lot Edge and the Land Lot</u>

> "Interdependent, but distinctive, the plots provide the construction process with a fixed legal and real estate framework, which conditions the evolution of buildings and the type of use by the inhabitants."[1003]

While a land lot seems to be a cadastral area of land that is owned or controlled by a party, this is only a part of a lot. A lot is an area contained within a legal and political edge of ownership, where a party controls what occurs within that area and determines the permeability of that lot edge line--as long as, within the United States, this does not

[1003] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, pp. 162-164.

conflict with public policy. The lot is a negotiated and sold area based upon the line between the public and the private realm. This lot and this area comes with several types of control, a bundle of rights, where the owner of the lot can sue upon trespass of the 'edge' of the lot.[1004] One can violate the entire lot simply be breaking the edge without a license, and public policy many times impinges upon the property owner by determining what occurs within this lot edge.[1005] This is the area where ownership of a family, person, entity or organization and the public sphere meet and interact. While it might seem that the land lot is a recent development, the actual origination of the land lot and the bundle of rights within the private ownership of land actually come from ancient property ownership and stewardship rights in ancient Egypt, Mesopotamia and Israel.[1006] This includes rights to crops and private ownership of agriculture, rights of exclusive control and trespass, freehold ownership of the house and plot, and numerous other rights from before 1400 BCE.[1007] Through its permutations though, the lot is central to urban form not in its private property ownership, but its relationship to other plots within the density of a city structure and how the lot manipulates with regard to the public sphere. [See Figures 114 and 115] As a modern example, when you compare lots in dense cities, what one sees is that while lots by themselves surrounded by circulation space have a great deal of public permeability, they also have much less density. One

[1004] Klein, Daniel B. and John Robinson. "Property: A Bundle of Rights? Prologue to the Property Symposium," *Econ Journal Watch* 8(3) (Sept. 2011): 193-204; *United States v. Craft*, 535 U.S. 274, 278, 152 L.Ed. 2d 437, 446, 122 S.Ct. 1414, 1420 (2002).

[1005] Berger, Lawrence. "Integration of The Law Of Easements, Real Covenants And Equitable Servitudes," 43 Wash. and Lee L. Rev. 337 (1986). http://scholarlycommons.law.wlu.edu/wlulr/vol43/iss2/2 (accessed July 22, 2013)

[1006] Elickson, Robert C. and Thorland, Charles DiA, "Ancient Land Law: Mesopotamia, Egypt, Israel" *Faculty Scholarship Series*. (1995), 71 Chi.-Kent L. Rev. 357 1995-1996. http://digitalcommons.law.yale.edu/fss_papers/410 (accessed July 21, 2014).

[1007] Elickson, Robert C. and Thorland, Charles DiA, "Ancient Land Law: Mesopotamia, Egypt, Israel" *Faculty Scholarship Series*. (1995), 71 Chi.-Kent L. Rev. 357 1995-1996. http://digitalcommons.law.yale.edu/fss_papers/410 (accessed July 21, 2014).

could also image what would occur to more circular or organic forms of lots when compressed by density and the necessary efficiency of public space. [See Figure 116] Thus, what is given up with lack of permeability on all sides except where the plot meets the public realm, larger values and densities offset by the accumulation of plots into block assembles. In the United States, the lot comes with accessibility rights with a right-of-way easement, regardless of where the lot lies within a block.[1008] Thus, another value of the lot actually remains with the part of the lot connected to the public sphere or access to the public right-of-way. In Western society at least, one can see how the lot itself is important because it provides a necessary component of private property, provides a place for infill, has a dialectical relationship with the street by itself, and, in a larger assembly, ultimately creates the block.

> "The dialectical relationship between street and built plots creates the tissue and it is in the continuation of this relationship--capable of modification, extension and the substitution of buildings--where reside the capacity of the city to adapt to the demographic, economic, and cultural changes that mark its evolution. The street layout determines the relationship with site, centre and capacity for extension."[1009]

Thus, at least in the United States, the lot has blocks important functional characteristics within urban form: the dimensions and the character of the lot itself; the character of the lot edge; the relationship to the public right-of-way; and how the lot accumulates into larger assemblies called blocks.

9.3.2 Lot Dimensions, Permeability and Character

> "As with streets, plots have frequently been an object of study in urban morphology, giving rise to new concepts, such as the well-

[1008] Berger, Lawrence. "Integration of The Law Of Easements, Real Covenants And Equitable Servitudes," 43 Wash. and Lee L. Rev. 337 (1986). http://scholarlycommons.law.wlu.edu/wlulr/vol43/iss2/2 (accessed July 22, 2013); California Department of Transportation. "Easements, Rights of Way and Types of Title." *California Department of Transportation.* http://www.dot.ca.gov/hq/row/landsurveys/Study_material/Foresberg/Chapter-05.pdf (accessed July 22, 2014); T The Law Dictionary: Featuring Black's Law Ditionary Free Online Legal Dictionary 2nd Ed. "What is Easement?" http://thelawdictionary.org/easement/ (accessed July 22, 2014).

[1009] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 166.

known burgage cycle, and to innovative methods, such as metrological analysis and place syntax."[1010]

Land lot dimensions generally determine the nature and quality of the architectural infill built within the lot--that infill being building positioning, type, number, style, etc.[1011] [See Figure 135] This quality ultimately defines the flexible or inflexibility inherent within the block or whether the block actually has an identity with the function it is to serve.

> "The width of plots (their opening on the street) and their depth conditions (and are conditioned by) the type of building used. To a narrow plot corresponds the row house and the small building (the Gothic plot); to larger plots correspond villas and detached houses, houses with courtyards and apartment buildings. The regrouping of small plots or the subdivision of larger ones, when historical conditions require it, allows for the integration of new types of buildings. The same block can accommodate different buildings and densities. Courtyards and gardens can coexist with stores and small factories and several functions can be located next to one another."[1012]

Whether private or public, lot platting in generally occurs with the creation of the blocks, with each being sold or assigned to a party for ownership or control. "Cadastral units (urban blocks) are typically subdivided or 'platted' into plots or lots."[1013] While seemingly this might seem commonsensical, what it means is that the lot and the block are linked though different in nature--where one appears, the other will also appear. As this thesis noted before, the dialectic of the lot and the block occurred while the street was still in the process of evolution within the city as a form. These lots can have back

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1010 Oliveira, Vítor. "Morpho: a methodology for assessing urban form." Urban Morphology, 17(1) (2013): 21-33. <http://www.urbanform.org/online/pdf2013/201317_21.pdf> (accessed, July 7, 2014), p. 24; Conzen, M. R. G. "The Morphology of Towns in Britain During the Industrial Era," in Whitehand, J. W. R. (ed.) *The Urban Landscape: Historical Development and Management Institute of British Geographers Special Publication 13*. London: Academic Press, 1981; Slater, T. R. "The Analysis of Burgage Patterns in Medieval Towns." *Area* 13 (1981): 211-16.

1011 Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 166.

1012 Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 166.

1013 Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 79.

or cross plots, and the nature of the surveying and cutting of the lots determines the layout of the actual block and street. (See Figure 117]

> "These arrangements form an alternating A-B-A-B-A-B street pattern, where A is the main street with a high degree of spatial definition, pedestrian interests and active frontage…and B the service alley."[1014]

Thus, the lots will relate to each other on the street in particular ways related to how the lots were subdivided and formed.[1015] Each block might have a number of different sizes of lots, but those changes will have a great effect upon the street and the block.[1016] "Each lot type might have any number of setback or massing provisions."[1017] This changes the overall aesthetic of the block and the neighborhood, and affects the density of population and type of buildings within the block and neighborhood.[1018] Lots that are of different character (size, width, etc.), even if facing, will have a different character.[1019] So those lots facing a street might need to be of similar size if the same character is warranted. One solution for incompatible lot character and size would be to create new architectural infill or some other type of infill measures to equalize those differences.[1020]

As one can see, the lot size can be a huge determinate of whether the city will become resilient, and thus one can see why large to super large blocks within sprawl-

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1014 Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 80.

1015 Gindroz, Ray, et al. The Urban Design Handbook: Techniques and Working Methods. New York: W.W. Norton and Company, 2003, p. 35.

1016 Gindroz, Ray, et al. The Urban Design Handbook: Techniques and Working Methods. New York: W.W. Norton and Company, 2003, p. 39.

1017 Gindroz, Ray, et al. The Urban Design Handbook: Techniques and Working Methods. New York: W.W. Norton and Company, 2003, p. 39.

1018 Gindroz, Ray, et al. The Urban Design Handbook: Techniques and Working Methods. New York: W.W. Norton and Company, 2003, p. 39.

1019 Siksna, Arnis. "The effects of block size and form in North America and Australian City Centres." Urban Morphology I (1997): 29. http://www.urbanmorphology.org/online_unlimited/um199701_19-33.pdf (accessed July 10, 2014).

1020 Siksna, Arnis. "The effects of block size and form in North America and Australian City Centres." Urban Morphology I (1997): 29. http://www.urbanmorphology.org/online_unlimited/um199701_19-33.pdf (accessed July 10, 2014).

prone areas create fundamental problems for urban form. Lot characteristics are so important to many jurisdictions, that they devote important space within their codes and regulations for defining the different aspects of lots--normal lot lines, super-deep lots, what is a lot line, what is a rear lot, flag lots and requirements for each lot.[1021]

Lot sizes in the United States are fairly variable, but within many cities they tend to converge on similar dimensions. This does not mean that the functions will be the same, but it does mean that there is some connection, whether historical or function, for the related size of an efficient lot.   Within London and within Barcelona, more lots allow for great valuation of the lots assembled within the block, and more lots allow for greater variation within block sizes--usually lengths of blocks. Lot lengths seem to correspond to a number that is between 20 and 200 feet deep--with extreme lots being 290 feet long in New York City. Lot widths seem to be fairly small also being around 22 feet to generally 30 feet--with 50 feet being an extremely wide lot.

Commentary has stated that lots of 45 to 60 feet wide and 90 to 120 feet in depth are also "good modular units for most city centre developments."[1022]

> "In the New Town [London] and the Ensanche [Barcelona] generous lot depth, originally conceived with 40m depth [120 feet deep], provided the opportunity for division into two or more lots, and consequent intensification. In addition, lots size have been duplicated, both for large (40m long) [120 feet deep] or small lots (10m long) [30 feet deep]." [1023]

In New York, on Baltic Street, the lot corresponds to building frontage and is 22 feet wide, with the lot length being 22 feet long.[1024] On 3rd Avenue of the Upper East

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[1021] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), 2-7.

[1022] Siksna, Arnis. "The effects of block size and form in North America and Australian City Centres." Urban Morphology I (1997): 29. http://www.urbanmorphology.org/online_unlimited/um199701_19-33.pdf (accessed July 10, 2014).

[1023] Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 9.

[1024] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.

Side, the lot width is 80 feet wide while the lot length is 193 feet.[1025] On West 11th Street, the lot length is 25 feet and the lot width is also 25 feet.[1026] On Mc Dougal Street, the lot length is 30 feet mirroring the same lot length of 30 feet.[1027] On Bowling Green, the lot length is 290 feet with an average width of 20 feet.[1028] On Atlantic Avenue, the lot length is 27 feet with an average width and frontage of 27 feet.[1029] Lastly, on Fort Greene, the average lot length is 50 feet and the average frontage width is 50 feet.[1030] In Portland, on Northwest 23rd Street, the lot length is 55 feet with a frontage width of 20 feet.[1031] On Southeast Ladd Street, the lot length is 28 feet with the average frontage width of also 28 feet.[1032] Lastly, on Northwest Irvine Alley, the average lot length is 55 feet with the average lot width of 20 feet.[1033] So, when we are looking at lots, the important dimensions are a length of at the most 200 feet and a width of at the most 30 feet. But in general, one can say that in New York, and Portland, the lots are fairly long and fairly narrow. This contrasts drastically with lots within sprawl prone areas.

In surveying San Francisco in 1847, O'Farrell set the lots in relationship to the original road to Mission Dolores.[1034] "South of Market Street O'Farrell laid out blocks at right angles to it and made them four times the size of those on the north side of the

[1025] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[1026] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[1027] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[1028] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[1029] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[1030] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[1031] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.
[1032] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.
[1033] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[1034] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 24.

street, because he deemed small lots undesirable."[1035] General Stephen W. Kerney, the military governor of California before California became a territory and state of the United States sold the parcels and lots of the plan at 45 feet by 137-1/2 feet as beach lots and the big blocks of 275 feet by 275 feet.[1036]

The average minimum parcel in this test area is 2,006.65 square feet with the average maximum parcel area of 9,452.14, with average median parcel area being around 4,398.56. This shows that if fit within a rectangle, the average parcel in this test area is a 66.30 x 66.30 foot square, with an average perimeter of—quite small by most standards, and yet this space fits the generalized spaces of all uses whether commercial or residential in San Francisco. If truly squared, the average perimeter of these parcels would be 265.20 feet—which is not far off from the statistical average perimeter of these parcels, 304.03 feet, with a standard deviation of only 15.23 feet. If one takes the lot in relation to public space and the public right of way, parcel lengths perpendicular to the public space averages 114.27 feet while the width parallel to the public right of way averages 39.01 feet, with most parcels being the south side of the blocks.

From this, one can say that the width seemingly is more valuable than the length because there are far more widths on a street than a length. This is because as the lot abuts the public sphere, the value of the lot's connection to the public sphere requires more subdivisions than the length. All lot edges are not equally important, for the lot edge that abuts the public right-of-way is by far the most important aspect of the lot--along with sheer size. Thus the lot edge has differing levels of permeability on a physical and legal level--where people cannot physically or legally cross some lot lines whereas other lines allow invitees.

[1035] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 24.

[1036] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, pp. 24-25.

In Portland, there was much more connectivity in the past than in the present, and this seems to relate to later subdivisions of land and smaller lots.[1037] "Further, the results reveal that the internal connectivity fell fairly consistently as the neighborhoods aged from 1940 to 1990."[1038] Because of the relationship between lots and blocks, this effect simultaneously affected blocks. This started to change in the 1990s where the purpose was to create a finer block development. The developments in the areas of Forest Glen and Orenco Station began to be smaller and less indicative of sprawl.[1039] What there the evidence also shows is that there is a relationship between single-family lot size and neighborhood age.[1040] With the push for finer urban form, the lots also started to become smaller with sub division.

> "The figure suggests that lot sizes have fallen fairly consistently over time from an average of 12,000 square feet in 1960 to 4,800 square feet in 2000. Figure 8 also shows that while the rate of decline does not appear to accelerate, the number of extremely low-density neighborhoods diminished after 1990."[1041]

This might be caused by the Urban Growth Boundary within Portland, which is pushing an artificial market in multi-family dwellings and more expensive single-family homes--

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[1037] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 219.

[1038] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 219.

[1039] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 219.

[1040] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 219.

[1041] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 219.

similar to what has happened in San Francisco and Manhattan. As a result, there has been a decline in single-family detached housing, resulting in smaller lot sizes.[1042]

In Barcelona's Ensanche, the average for 20 street blocks, the average commercial and retail on the block is 40 per 1,000 m2 of space.[1043] "[We] … deduce that in the Eixample there is, on average 11,500 m2 of business activity per block -- that is, almost one and half floors I few locate these businesses around the perimeter of the ground floor, with 75 per cent occupation, leaving the inner courtyard free."[1044] The number of lots per block is variable but averages 20 lots.[1045] The lot width minimums are 6 meters minimum, with 13 meters being the 1859 regulation requirements.[1046] As a result, because most blocks are perimeter blocks, the building widths are variable, must mostly form a perimeter block covering the entire public face of the lot.[1047] The building depths are 20 meters in 1859 and 28 meters in 1865.[1048]

In Amsterdam, buildings are narrow and like Barcelona, they tend to be the width of the lot. "[They] average of 20 feet wide on Achterburgwal, for example, and 21 feet

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[1042] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 219.

[1043] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 300; Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 11.

[1044] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 300.

[1045] Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 11.

[1046] Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 11.

[1047] Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 11.

[1048] Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 11.

wider Pinsengracht. Newer buildings tend to be wider."[1049] This indicates that the lots are of the same size leading to far more density per block than what one would find in the United States. As the ring of canals expanded, the new city lots were around 30 feet by 190 feet. "Originally the canal plots were fixed and regular dimensions, for instance 30 feet (a foot is about 28.3 cm) wide and 190 feet deep."[1050] Building lots could be 110 feet deep an unlimited height.[1051] "The lot width on the Herengracht therefore varies between 5.75 meters and 14.75 meters. Here the lots are 55 meters deep, including the pavement in front, with the houses averaging 30 meters in depth."[1052] Building regulations were changed to allow for small structures in the inside of the block up to 12 feet and a depth of 15 feet.[1053]

In specific areas, the widths changed due to development patterns at the time. The Vondel Park area of Amsterdam the width of dwellings ranges from 6.5 to 7.5 meters, and the range of depth is about 12.5 to 16 meters, with a dwelling size range of 150 m2 to 500 m2.[1054] The Sarphati Park area the width of the dwellings is regularly 5.6 m and the depth of 12 m.[1055] the dwelling size is about 65 m2 to 130 m2, with the

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[1049] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993.: 186.

[1050] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 21.

[1051] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 21.

[1052] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 21.

[1053] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 22; Tavern, Ed, "In't land van de belated in de niece stadt: Ideaal en werkelijkheid van de stadsuitleg in de Republiek 1580-1680." Maarssen: Gary Schwartz, 1978, p. 176.

[1054] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 37.

[1055] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 49.

majority of buildings being alcove buildings and double residences.[1056] The Spaarndammerbuurt area of Amsterdam has blocks with buildings the width of 5.9 meters, and a depth of generally 8.6 to 10 meters, with a dwelling size of 80 meters square.[1057] In Amsterdam South, the average width of dwelling was 8.5 m to 9 m, and the depth was 10.5 m to 12.5 m and the dwelling size was 96m2 to 114 m2.[1058] Nieuwmarkt the average width of the dwellings was 4.6 m, the average depth was 12 m, and the dwelling size was 55 m2, 80m2 and 100 m2.[1059] Java island has an average width of the dwellings is 4.5 m, to 5.4 m, the depth of the dwellings is 80 m2 to 180 m2, and the dwellings usually have 2-6 room apartments.[1060]

In Paris, the block divides into lesser assemblies of lots and sublots, that when joined together form the perimeter block.[1061]

> "If the management of the whole was carried out by a developer, then its realization, which depended upon private owners and on small companies, hardly ever happened all at once. The block was built in plots, one by one, although these were sometimes grouped so as to form fewer units."[1062]

The lots in the Moscou-Bertne block have various types of frontage--9, 11, 12, 19, 21, 28 and 40 meters [27, 33, 36, 54, 63, 84 and 120 feet].[1063] In other areas, lots have similar

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[1056] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 49.
[1057] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 61.
[1058] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 89.
[1059] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 185.
[1060] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 221.
[1061] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 19.
[1062] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 19.
[1063] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 22.

narrow widths in comparison to the American urban lots--8, 10, 11, 12, 15, 19, 20 and 23 meters frontage--24, 30, 33, 36, 45, 57, 60 and 69 feet.[1064] "The rectangular blocks show a similar range. Along the boulevard Péreire, the Laugier-Faraday-Bayen block, there are "six small plots of 115 square meters [1,035 square feet] each and eleven large ones of 300, 400 and up to 360 square meters [2,700 square feet, 2,700 square feet, 3,600 square feet and 4,140 square feet respectively]."[1065]

> "The corner plots have an area of 300 square meters for a frontage of 18 meters; with a strip of only 12 meters wide inserted, which allowed two small plots to be accommodated back to back. The central part is in staggered rows, with 24 meters of façade for each plot, with the exception of two leftovers of 12 meters on the back street (rue Faraday)."[1066]

In urban areas, the relationship with the lot and the market cause a unique effect to happen to larger lots-intensification and density. In studies of London and Barcelona, researchers found that larger lots within market driven systems tend to break down into finer and finer lots.[1067] This subdivision occurred with both larger and smaller blocks depending upon market forces. The subdivision of lots in the block though occurs in larger lots first, and then the remainder lots if the lots are unequal in width in relation to the public space.[1068] "There have been changes in the lots of all three case studies by the amalgamation of two or more lots. In the New Town [London] and the Ensanche [Barcelona] generous lot depth, originally conceived with 40m depth, provided the opportunity for division into two or more lots, and consequent intensification. In addition,

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1064 Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 22.

1065 Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 22.

1066 Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 22.

1067 Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 9.

1068 Siksna, Arnis. "The effects of block size and form in North America and Australian City Centres." Urban Morphology I (1997): 29. http://www.urbanmorphology.org/online_unlimited/um199701_19-33.pdf (accessed July 10, 2014).

lots size have been duplicated, both for large (40m long) or small lots (10m long)."[1069] This means two things. When cities have smaller lots, the lots are more valuable or the economy of the city is resilient enough to support the value of the smaller blocks. When there is a failure of the larger blocks, and even smaller blocks, to subdivide, then there are public policy reasons inhibiting lot intensification or the city and its market are stagnant.

An important aspect about lots is their relationship to the block. As lots increase in density and connect, they many times give up a portion of the public edge or right-of-way in order to accumulate into larger assemblies of blocks. Thus, with lots that are finer, the blocks will also be finer in quality and of different character than blocks with larger lots--even when the block is of similar size.

> "Moreover, although lot depth varies depending on block size, lot width seems to find a greater consistency in both small and large blocks. Indeed, both the New Town and Baixa blocks presented very similar lot widths when conceived, and some of these lots still prevail today in the two plans."[1070]

Yet, usually when there are more fine lots, one finds that blocks are of finer quality.

> "By comparing the Baixa lot to the New Town and the Ensanche lots, the area of Baixa lot was approximately only a quarter of the other two ones. Yet, today although Baixa lot is relatively smaller, in comparison to the New Town and the Ensanche lots, it has increased its size since 1759. Moreover, in some situations it coincides with half or a quarter of the block size. The occupancy of the block with a reduced number of lots occurred in the Ensanche (113mx113m block), in particular situations. But this it is much evident in Baixa where blocks are the smallest ones (27x71m) and some of them indicate the presence of only one or three lots."[1071]

[1069] Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 9

[1070] Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 9.

[1071] Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 9.

9.3.3 Data from the Research Sites

In the Site Areas, there was an average of 2,936 lots, with Atlanta having the fewest lots, and with Paris having the most. San Francisco had 72% of the mean, Portland had 33% of the mean, New York had 45% of the mean, Paris had 254% of the mean, Amsterdam had 146% of the mean, Barcelona had 50% of the mean and Atlanta had 22% of the mean.

For total square feet of the lots, each were fairly consistent. As noted before within Site Selection, the areas are more or less 1 kilometer sections of each city. The mean lot area is 221.31 acres and also 0.35 square miles, with the average lot area being 5,395.43 square feet. Within the Site Areas, San Francisco's site areas were only 90% of the mean, Portland's lots were 189% of the mean, Barcelona's lots were 120% of the mean, and New York's lots were 142% of the mean. Amsterdam's lots were particularly small at 33% of the mean, and Paris' lots were also extremely small at 26% of the mean. Atlanta's lots stand out because they are 261% of the mean. What this means is that with the subdivision of land being large on average, this will affect the remaining aspects of urban form as this transfers to the block and street urban form numbers. This shows when one looks at the compactness ratio with lot area over lot perimeter. San Francisco, Paris, Amsterdam are all under the mean of 16.86. Portland is 150% of the mean, New York is 126% of the mean and Barcelona is 118% of the mean. Atlanta is 181% of the mean compactness ratio. This means that not only does Atlanta have larger lots, but those lots are not compact, for they are more spread out.

When one looks at the number of lots on blocks, one also sees that while the mean lots on blocks is 42.97 lots, Atlanta and Portland have fairly low numbers of lots on blocks. San Francisco is 91% of the mean, New York is 77% of the mean, Paris is 228% of the mean, Amsterdam is 109% of the mean and Barcelona is 53% of the mean. Atlanta and Portland are 45% and 42% of the mean. In Portland's case, this is because the blocks are fairly small. This is not the case with Atlanta. In the Old Fourth Ward, there are a number of blocks that are fairly large with limited numbers of lots. As a result, this offsets the other blocks that have a more normalized lot-to-block average.

In the Site Areas, the mean length of the nonpublic edge of lots is 70.35 feet. San Francisco has 95% of the mean, Portland has 151% of the mean, New York has 119% of the mean, Paris has 28% of the mean, Amsterdam has 101% of the mean, Barcelona has 106% of the mean and Atlanta has 150% of the mean. In each case, the lots in San Francisco are consistently narrow and long, as they are in New York. However, the lot lengths on some side are balanced regularly by the smaller lengths on the small lot side of the blocks. As a result, these lots are fairly regular to a large degree. In Paris, the number is fairly small because the blocks are highly complex amalgams of internal blocks with small public access. As a result, the narrow numbers of nonpublic lots in Paris mean that the overall average of the lengths of the nonpublic side lots is small. In the Atlanta Site Area, the lots are just longer even with the consistency of patterns.

In the Site Areas, the mean length of the lot public edge is 56.94 feet. San Francisco is 66% of the mean, Portland is 169% of the mean, New York is 122% of the mean, Paris is 70% of the mean, Amsterdam is 44% of the mean, Barcelona is 129% of the mean and Atlanta is 186% of the mean. What this indicates is that Amsterdam and San Francisco lots are fairly narrow and similar, whereas New York and Barcelona lots are fairly similar in the public street. This also indicates that Portland lots are smaller though more similar to Atlanta lots than they are to more compact resilient cities like San Francisco, Amsterdam and Paris.

When steps back and looks at the larger pattern of lots and blocks, one understand why Atlanta's lots are fairly larger, longer and wider than other lot systems. Atlanta has 740% of the mean number of 68.50 large lots over 10,000 square feet. In contrast, San Francisco has 63% of the mean, Portland had 57% of the mean, Paris has 50% of the mean, and Barcelona has 99% of the mean. New York and Amsterdam have larger numbers of the mean because there are some large lots intermixed within the smaller and more regularized lot system. In those cases this is not because their lots tended to start out large, New York and Amsterdam lots that are lots tend to be merged into larger lot system though redevelopment, but they are still fairly not extremely large in comparison to the whole. In Atlanta's case, there are some very large lots, and while some lots were plainly formed through lot merger, this is not the case with many other lots that just seem to be large independent of merger.

In the Site Areas, the average number of flag lots is 4.80 lots. While Portland have no flag lots, Barcelona has 146% of the mean, San Francisco has 104% of the mean and Atlanta has 271% of the mean. Paris could not be tabulated because the data was indecipherable as to what was actually a flag lot or not. But, because of the complex lot structure, this number might be high.

9.4 The Block as an Island

While one might think the city block is a recent occurrence, the block actually by a net accumulation of assembled lots into one mass. "The city block is a fundamental element of the physical nature of urban areas."[1072] It is lot density and conjoining. While, we know it from Greco-Roman times as the insulae, but, the Roman insula meant an apartment building typology for the normal citizen, that when joined together in the plural, became the insulae--or the perimetered block.[1073] Whether a French îlot, a Dutch

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[1072] Siksna, Arnis. "The effects of block size and form in North America and Australian City Centres." Urban Morphology I (1997): 19. http://www.urbanmorphology.org/online_unlimited/um199701_19-33.pdf (accessed July 10, 2014).

[1073] Aldrete, Gregory S. *Floods of the Tiber in Ancient Rome*. Baltimore: Johns Hopkins UP, 2007, p. 213; Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 162; Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 13.

"block" or "blok," the blocks started a shared and yet independent existence aside from the lot, and as a result, they became an important element within urban form.[1074] [See Figure 143]

> "The block (in French, îlot, which etymologically means small island) is a part of the urban area 'isolated' [insulae] from the neighbouring parts of the territory by streets. Thus, the block is not an architectural form, but a group of interdependent building parts."[1075]

Yet, this block sized has changed throughout world history, with many variations within the United States. [See Figure 133] The Buffalo Green Code, defines a block as all "contiguous lots, passages, and alleys, bounded by thoroughfares, railroad rights-of-way, water bodies, or public parks," and it defines the perimeter block as "aggregate of all block side lengths of the block," while the block side is the "edge of a block adjacent to a thoroughfare, water body, railroad right-of-way, or public park."[1076] Along with the lot, the block is so important that our legal systems are built upon the block. "Interdependent, but distinctive, the plots provide the construction process with a fixed legal and real estate framework, which conditions the evolution of buildings and the type of use by the inhabitants."[1077] Both the lot and the block together define the negative space that we call the street, for it seems they evolved together and formed the street.

On blocks formed by either hierarchical gridpatterns, dendritic gridpatterns or radial girdpatterns can create linear edges on the block façade and in the block itself. But, what one should note is that, while there might be architectural infill or aesthetic add-ons onto the block, the block is really the accumulation of spatial lines that form the

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[1074] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 12.

[1075] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 162; Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 12.

[1076] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), 2-4.

[1077] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, pp. 162-164.

lot. The block will exist whether or not the architectural infill is present or not. The architectural or other types of infill only illuminate the block and define the edge--they reinforce the block. Where there is no architectural infill, the lack of density diminishes the quality of the block, but it does not remove it.

> The block itself is either formed by the streets or a part of property or space which creates the streets. "Leon Krier's statement (Krier, 1984) that "the building block is either the instrument to form streets or squares or it results from a pattern of streets and squares, fully indicates the equality of the 'building block' and the 'street' as generative urban elements."[1078]

Things built within blocks have a three dimensional and volumetric character. While being lot assemblies, blocks work differently and usually as a mass within urban form, and usually contains more than one lot. "The block is not an architectural form, but a group of independent building plots. It has a proper meaning only when it is a dialectical relationship with the road network."[1079] Blocks also form an urban unit of verticality and dimension by defining the street itself--with infill. "A vertical, ancient instrument, the traditional block allows a mutually beneficial relationship between people and vehicles in urban space."[1080]

> "If we put aside the special cases of facilities or facilities or monumental blocks, which consist of only one plot, like just one building, the block of the traditional city is rarely homogenous and the buildings on its perimeter obey some rules, especially those of that economic logic that has shaped the surrounding streets."[1081]

[1078] Lillebye, Einar. "Architectural and Functional Relationships in Street Planning: an Historical View." *Landscape and Urban Planning* 35 (1996): 91. http://www.sciencedirect.com/science/article/pii/0169204696003076 (accessed July 8, 2014); Krier, L. "Urban Components." *Archit. Design* 7/8 (1984): 44.

[1079] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 93; Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 162; Depaule, J. C. and Samuels, I. *Urban Forms: The Death and Life of the Urban Block.* Oxford: Architectural Press, 2004.

[1080] Moule, Elizabeth and Stefanos Polyzoides. "The Street, the Block and the Building." Moules and Polyzoides, 2014. http://www.mparchitects.com/site/thoughts/streets-blocks-buildings (accessed July 10, 2014), p. xxii.

[1081] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 162.

Usually, core cities have perimeter blocks because the value of the land and intensification of use require building frontages on the public sphere, resulting in limited perforations in the block façade.[1082] This perimeter characteristic creates a façade or “veneer” of buildings that can either be homogenous or heterogeneous--stock diversity. This perimeter effect can have holes or can completely surround the block creating a massing.[1083] When all of the lots have infill density on a block, the block itself has a mass an many times for a perimeter block. The perimeter block occurs when density built upon the edge of the block create a façade or veneer of building masses which work as a unit and enclose the street.

> “[This] definition does not influence at all the continuity of the enclosure and the homogeneity of perimeter buildings. Indeed, the old tissues demonstrate a great number of incomplete alignments and heterogeneous fronts, where one can see a large number of buildings of different heights along the streets--and some even recessed--gaps and walls, which shelter courtyards or gardens and allow for planting to be seen.”[1084]

Blocks define the permeable edge of what we know as the street. There are two aspects of this edge--that of the block, and that of the street. However, this edge is permeable and modulating and constantly moves over time in use and in physicality. Where the edge is more permeable, a mat, node, landmark condition can exist. Where this edge is extremely impermeable, then there is no node and very little relationship between the people and the block. This permeability of the edge of blocks as masses created serious problems for Jane Jacobs who considered impermeable edges as not

[1082] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 164; Edwards, Brian: "The European Perimeter Block," in Edwards, Brian. *Courtyard Housing: Past, Present and Future*. Abingdon: Taylor and Francis, 2006.

[1083] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 164.

[1084] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 164.

only limiting the movement of people and uses, but also they tended to create vacuums or draws upon the vibrancy of the location.[1085]

The block size dimensions go from superblock size to those that are fine grained, and blocks come in numerous configurations. Historically smaller blocks created better blocks because they are more manageable.[1086] Small blocks also force street or block services like parking to be located away from the sidewalk, underground or in the center of the block.[1087]

> "Jane Jacobs made small and variety blocks one of the key elements of what was successful about New York, and especially Manhattan, when she was analyzing The Death and Life of Great American Cities. Yet this grid does not have to be rectangular."[1088]

What one finds is that there are an unlimited number of types of sizes of blocks but they generally come in organic or orthogonal shapes and sizes, and some blocks are planned in their layout and configuration, while others build by organic accretion of blocks as needs merit or as policy changes. Look "the mediaeval street patterns--from Delft to Salisbury to Siena: twisty and apparently irregular; but still grid networks."[1089] The finer-grained the block, the finer grained the gridlined-street pattern will be.[1090]

9.4.1 The Superblock and Jane Jacobs

> "The surprisingly small literature on this topic favours the view that smaller blocks generally provide greater scope for interaction and are better suited to particular aspects of urban development than larger blocks. They tend to produce finer-mesh circulation patterns, more

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[1085] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 342.
[1086] Moule, Elizabeth and Stefanos Polyzoides. "The Street, the Block and the Building." Moules and Polyzoides, 2014. http://www.mparchitects.com/site/thoughts/streets-blocks-buildings (accessed July 10, 2014), p. xxii.
[1087] Moule, Elizabeth and Stefanos Polyzoides. "The Street, the Block and the Building." Moules and Polyzoides, 2014. http://www.mparchitects.com/site/thoughts/streets-blocks-buildings (accessed July 10, 2014), p. xxii.
[1088] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 6.
[1089] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 6.
[1090] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 6.

> potential plot frontages, and more coherent and finer-grained fabrics…"[1091]

Superblocks are large blocks created by a dendritic gridpattern mainly; although in a larger scope, they may have hierarchical gridpatterns or radial gridpattern. Superblocks are dependent upon the type of use within the block, the limited nature of circulation and cross-traffic and mostly the size of the block. [See Figure 118]

> "Large superblocks, enclosing as much as 20 hectares (50 acres), and penetrated but not divided by minor loops and finger streets, increase the grain between the circulatory and noncirculatory system."[1092]

The superblock has many reasons for being in place. It could be a large municipal park, a campus like Georgia Tech with numerous superblocks, or it can be caused by the desire for safety for children.[1093] [See Figure 118] While these public policy reasons could be met with finer blocks patterns, the effect is that the superblock has a large impact upon the streets or pathways around the block--structurally and in load. Because of their largeness, the superblocks and the limited types of access within the block, and the usual cul-de-sacs which populate the superblock, thus leaving those modes of conveyance on the roads within the superblock mainly free of traffic.[1094] "They concentrate the through traffic, keeping loads light on the minor street."[1095] As a result,

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[1091] Oliveira, Vítor. "Morpho: a methodology for assessing urban form." Urban Morphology, 17(1) (2013): 24. <http://www.urbanform.org/online/pdf2013/201317_21.pdf> (accessed, July 7, 2014); Hillier, B. "Centrality as a Process: Accounting for Attraction Inequalities in Deformed Grids." *Urban Design International* 4 (1999): 107-27; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961); Maitland, B. "Towards a Minimal Theory of Urban Structure," in Gosling, D. and Maitland, B. *Concepts of Urban Design*. London: Academy Editions, 2010, p. 153-5; Siksna, Arnis. "The Effects of Block Size and Form in North American and Australian city Centres." *Urban Morphology* 1 (1997): 19-33.

[1092] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 199.

[1093] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 199.

[1094] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, pp. 199-200.

[1095] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 199.

some streets are barely used while other pathways must become excessively large in order to handle the increased loads. Many assumed that foot-traffic and other types of use of streets could be mitigated by having other avenues of movement integrated within the superblock.

> "But some of the disadvantages of long dead ends may be mitigated by interconnecting their ends by footpaths, waterline easements, or emergency service roads--in other words, by connecting them into loops for special purposes."[1096]

However, simply because the blocks are so large, this pushes people to actually not walk the distance but become dependent on those modes of transportation which also add more loads to the available street patterns--automobiles. In an analysis of walking distance, San Francisco's Bay Area Rapid Transit study in 1976 found that of the 30% of people who walked regularly: 80% of those walked for less than 10 minutes; 45% walked under 6 minutes (approximately 1,350 feet); and 35% walked between 6-10 minutes (approximately 1,350 to 2,250 feet).[1097] Further, the study found that it generally took 6 minutes for a person to walk 1,320 feet, when the average walking distance and time for a person taking a trip was 7.2 minutes and 1,600 feet.[1098] When Pushkarev and Zupan reviewed walking and mass transit, they found that only 1% of people would walk 30 minutes or more than 1.5 miles and only 50% of people would walk more than 6 minutes or 0.3 miles or 1,760 feet to a non-downtown rail station.[1099] In other studies, research

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[1096] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 200.

[1097] Sherrett, A. "BART's First Five Years; Transportation and Travel Impacts." Technical Report DOT-P-30-79-8, prepared for U.S. Department of Transportation and U.S. Department of Housing and Urban Development, Washington, DC, 1979.

[1098] Sherrett, A. "BART's First Five Years; Transportation and Travel Impacts." Technical Report DOT-P-30-79-8, prepared for U.S. Department of Transportation and U.S. Department of Housing and Urban Development, Washington, DC, 1979.

[1099] Fairfax County. "Walking Distance Abstracts." *Fairfax County.* http://www.fairfaxcounty.gov/planning/tod_docs/walking_distance_abstracts.pdf (accessed July 22, 2014); Pushkarev, B. S, and Zupan, J. M. "Where Transit Works: Urban Densities for Public Transportation." *Urban Transportation: Perspectives and Prospects* (1982): 341-344; Pushkarev, B. S, and Zupan, J. M. "Public Transportation and Land Use Policy," New York Regional Plan Association (1977).

found that, given the lack of walkability in the American urban form, Americans will walk about 400 feet to 1/4 of a mile to a location or place that they want to go.[1100] "Several researchers have found that the distance Americans will walk for typical day trips is quite limited, varying from 400 feet … to about ¼ mile."[1101] Untermann found that only 70% of Americans would walk 500 feet for daily errands while 40% would only walk 1/5th a mile, with only 10% walking 1/2 a mile.[1102] What this means is that given the size of Georgia Tech alone, less than 1% of people would walk across only one of Georgia Tech's superblocks. [Figure 118] Rather than use trails and pedestrian lanes, people find alternative means of transportation--automobiles.[1103]

> "In projects, people are apt to avoid malls and cross-malls which are there, but are pointless." [1104]

When Jacobs discusses blocks, she was concerned that larger blocks discouraged people from traversing or inhabiting them. In discussing New York City's relatively small blocks by comparison, Jacobs stated that even 200 feet by 600 feet blocks could create sterile neighborhoods.[1105] Jacobs stated that shorter blocks tended to have more density, building diversity and vibrancy, whereas long blocks and superblocks tended to stunt city life.[1106] "The supply of feasible spots for commerce

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[1100] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 107.

[1101] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 107.

[1102] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 107; Untermann, Richard K. "Accommodating the Predesetrian: Adapting Towns and Neighborhoods for Walking and Bicycling," in *Personal Travel in the US*, Vol 2, a Report of the Findings from 1983-1984 NPTS. Washington, DC: United States Department of Transportation, 1990.

[1103] Keating, W. Dennis, Norman Krumholz. "Neighborhood Planning." *Journal of Planning Education and Research* 20 (1) (2000): 111–114; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 243.

[1104] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 243.

[1105] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 233-235.

[1106] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 243; Krueckeberg, Donald. The American Planner:

would increase considerably, and so could the distribution and convenience of their placement."[1107] With larger blocks depending upon their own resident population, they fail to provide the opportunities for commerce and rarely draw people to them.[1108] "Long blocks, in their nature, thwart the potential advantages that cities offer to incubation, experimentation, and many small or special enterprises, insofar as these depend upon drawing their customers or clients from among much larger cross-sections of passing public."[1109] Through participant observation, Jacobs noticed that smaller blocks allowed for more street activity. "Because of its long blocks, the West Side has never been physically capable of forming the intricate pools of fluid street use necessary to support urban density."[1110] She noticed that in many places of the United States, small blocks were associated with city vitality in contrast to the larger blocks of the modernist age.

> "In city districts that become successful and magnetic, streets are virtually never made to disappear. Quite the contrary. When it is possible, they multiply. Thus in Rittenhouse Square district in Philadelphia and Georgetown in the District of Columbia, what was once back alleys down the centers of blocks have become streets with buildings fronting them, and users using them like streets. In Philadelphia, they often include commerce."[1111]

Jacobs argued that the policies that were either romantic, cost efficiency or cause street destruction by removing streets obliterated the fine grained nature of the urban environment and pushed people to actually stop walking--thus creating safety and other structural problems upon which city life depended.[1112]

Biographies and Recollections. New York: The Center for Public Policy: Meuthuen, Inc, 1983, p. 440.

[1107] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 236.

[1108] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 238.

[1109] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 238.

[1110] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 241.

[1111] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 241.

[1112] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 243.

> “Frequent streets are not an end in themselves. They are a means toward an end. If that end—generating diversity and catalyzing the plans of many people besides planners—is thwarted by too repressing zoning, or by regimented construction that precludes the flexible growth of diversity, nothing significant can be accomplished by short blocks. Frequent streets are effective in helping to generate diversity only because of the way they perform. The means by which they work (attracting mixtures of users along them) and the results they can help accomplish (the growth of diversity) are inextricably related. The relationship is reciprocal.”[1113]

9.4.2 Smaller, Larger, Perimeter Blocks

> “Portland, Oregon, with its uniform 200-foot square blocks, is as finely scaled as contemporary Boston.”[1114]

What is also important is that the blocks not be all the same size, nor do they need to be. Thus, strict adherence to gridline plans or to rigid benchmarks is unwarranted and unnecessary. “A balance needs to be struck between arguments for smaller blocks—based on considerations of pedestrian permeability, walkability and the social use of space—and those for larger blocks based on the optimum distribution of built form and open space.”[1115] What much of the research states is that block diversity encourages flexibility and resilient systems. “Rather than a single, repeated block size, a range of block sizes (including small blocks) may encourage and facilitate greater diversity of building types and land uses.”[1116] While the smallest block patterns tend to be located in the central cores of cities, this could be simply a time figment. Many cities began during a period of hierarchical gridpattern city expansion rather than recently in the 1930s when larger more modernist blocks became prevalent, as cities expanded into

[1113] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 243.
[1114] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 261.
[1115] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 98.
[1116] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 98; Love, T. “Urban Design after Battery Park City: Opportunities for Variety and Vitality,” in Krieger, A and Sanders, eds. *Urban Design*. Minneapolis: University of Minnesota Press, 2009, p. 208-226; Campbell, Scott, and Susan S. Fainstein. Readings in Planning Theory. Oxford: Wiley-Blackwell, 2011, pp. 139-151.

sprawl.[1117] Still, regardless of the times when various blocks formed, the smaller blocks tend to perform better than the larger and more sprawling block systems.

> "Small blocks are nevertheless often advocated for a variety of reasons including vitality, permeability, visual interest and legibility."[1118]

Recalling Jane Jacobs, smaller blocks are preferable because they tend to increase more connections, vitality and urbanity. "If the main cause for small blocks and a dense pattern is primarily economic, it is this very same reason which has created the intimate character of a highly urban environment. Such an environment is the basis of urban culture, of intense social, cultural and economic exchange."[1119] Thus, the only reasons for adherence to a gridpattern or type of block system should not be only economic or performance related, but multiple reasons. Still, there are actual reasons which distinguish larger and smaller block systems.

Siksna found that blocks that were more rectangular contained more block space in proportion to street space and thus were more of value to create more density of lots than the square blocks. "Layouts with rectangular blocks contain more block area in proportion to street space than layouts with square blocks which provided street widths are similar."[1120] Yet, square blocks with 4-8 lots have more practical than larger

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1117 Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 99.

1118 Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 99; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961); Jacobs, Jane. *The Economy of Cities*. New York: Random House, 1969.

1119 Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 99; Krier, L. "Urban Components" in Papadakis, A and Watson, H eds. *New Classicism: Omnibus*. London: Academy Editions, 1990, p. 196-211.

1120 Siksna, Arnis. "The effects of block size and form in North America and Australian City Centres." Urban Morphology I (1997): 25. http://www.urbanmorphology.org/online_unlimited/um199701_19-33.pdf (accessed July 10, 2014).

rectangular blocks with more than 8 lots because they encourage amalgamations into regular quarter block lots or half-block parcels.[1121]

Much of the research details that smaller blocks are actually more practical and flexible than the superblock. While researching, Siksna found that smaller blocks ranging from 3,600 to 20,000 [32,400 to 180,000 square feet] meters square were more suitable for city use than larger blocks.[1122] Like lots over time, the larger blocks over 20,000 meters square [180,000 square feet or a block with 424 foot lengths] tended to break down and become smaller blocks.[1123] This implies that the larger blocks were neither practical nor efficient for city systems.[1124] Unlike larger block systems which cross-block buildings create huge monumental buildings that functions as vacuums within the urban environment, smaller blocks can actually have a single building, a small numbers of buildings and create more usability over a space, without corresponding light and environmental issues which create problems during occupation.[1125]

> "Small blocks may be either a single building or entirely built over with perhaps a light well or atrium space in the centre of the block."[1126]

[1121] Siksna, Arnis. "The effects of block size and form in North America and Australian City Centres." Urban Morphology I (1997): 29. http://www.urbanmorphology.org/online_unlimited/um199701_19-33.pdf (accessed July 10, 2014).

[1122] Siksna, Arnis. "The effects of block size and form in North America and Australian City Centres." Urban Morphology I (1997): 25. http://www.urbanmorphology.org/online_unlimited/um199701_19-33.pdf (accessed July 10, 2014).

[1123] Siksna, Arnis. "The effects of block size and form in North America and Australian City Centres." Urban Morphology I (1997): 25. http://www.urbanmorphology.org/online_unlimited/um199701_19-33.pdf (accessed July 10, 2014).

[1124] Siksna, Arnis. "The effects of block size and form in North America and Australian City Centres." Urban Morphology I (1997): 25. http://www.urbanmorphology.org/online_unlimited/um199701_19-33.pdf (accessed July 10, 2014).

[1125] Panerai, Philippe, et al. *Urban Forms: The Death and Life of the Urban Block*. Oxford: Architectural Press, 2004, p. 162; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 99.

[1126] Panerai, Philippe, et al. *Urban Forms: The Death and Life of the Urban Block*. Oxford: Architectural Press, 2004, p. 162; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 99.

Blocks that are smaller and have more connectivity and finer circulation around the blocks, thereby allowing more areas of the block to be used by more parties than larger blocks.[1127] Smaller blocks also have more consistent building patterns on the block than blocks that are more rectangular or larger.[1128]

Service entrances for blocks assist in the subdivision by allowing access to back lots or central lots, and allow for further subdivision in larger block lots. "Back alleys assist subdivision of deep lots by providing access to new back lots, and help to maintain distinct half-block units, when lots are subdivided and amalgamated."[1129]

> "With a larger space within the block, larger perimeter blocks provide greater opportunities or biodiversity."[1130]

9.4.3 Organic or Straight Edge

While large blocks tend to break down over time into smaller block systems, the street and block system remained once initially set. Even with the addition of alleys, different uses and different positioning of buildings, the block grid system tended to remain.[1131] The question that this poses is whether organic systems by their very nature allow for lot and block intensification should the market or city need blocks to get

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[1127] Siksna, Arnis. "The effects of block size and form in North America and Australian City Centres." Urban Morphology I (1997): 25. http://www.urbanmorphology.org/online_unlimited/um199701_19-33.pdf (accessed July 10, 2014).

[1128] Siksna, Arnis. "The effects of block size and form in North America and Australian City Centres." Urban Morphology I (1997): 29. http://www.urbanmorphology.org/online_unlimited/um199701_19-33.pdf (accessed July 10, 2014).

[1129] Siksna, Arnis. "The effects of block size and form in North America and Australian City Centres." Urban Morphology I (1997): 29. http://www.urbanmorphology.org/online_unlimited/um199701_19-33.pdf (accessed July 10, 2014).

[1130] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 99; Llewelyn-Davies. *Urban Design Compendium I*. 2nd ed. Prepared in Association with Alan Baxter and Associates for English Partnerships and the Housing Corporation. London: English Partnerships and The Housing Corporation, 2000: 58.

[1131] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 101; Siksna, Arnis. "City Centre Blocks and their Evolution: A Comparative Study of Eight American and Australian CBDs." *Journal of Urban Design* 3(3) (1998): 253-283.

smaller, and this also brings to mind whether this becomes a real option for more organic or dendritic systems. Streets with connected block systems tend to stay around for a long time, and streets that do not have connected street patterns are very difficult to connect for a long time.[1132]

> "These layouts where streets and alleys initially occupied less than 30% of the area needed additional routes, thereby demonstrating a lack of sufficient initial circulation space. By the same argument, layouts with small and medium blocks (i.e. where streets and alleys initially occupied more than 40% of the area) could be regarded as too generous. By inserting additional streets, alleys, arcades and other routes, most CBDs had developed fine-meshed pedestrian networks in their retail cores."[1133]

For a city to survive and have a vital more fine grain block system over tie, the block system and street system have to allow this intensification. "As well as evolution towards optimum block sizes, Siksna concluded that incremental change generally overcame or, at least, reduced the deficiencies of the initial layout."[1134] Where more hierarchical girdline systems or radial girdpatterns would allow this to occur, organically created grids would be difficult to subdivide if they too large for the resilient system.

9.4.4 Mixture of Use and the Hof

In contrast to the smaller blocks, perimeter blocks tend to hollow out in the center and become perimeter blocks allowing for more uses. "Larger blocks are likely to be perimeter blocks where the ribbon of buildings around the edge of the block provides the public front of the development, with private or semiprivate space in the bock's interior."[1135] If the building covers the entire block, as the block grows, interior spaces within the block also grow—reminiscent of Parisian blocks with multiple parcels, or

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[1132] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 101.

[1133] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 101-102.

[1134] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 102.

[1135] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 99.

Amsterdam blocks with central green hofs, or San Francisco blocks with garden centers. What might be occurring is that larger perimeter blocks can have multiple uses from the inside to the outside of the block, whereas smaller blocks tend to be more flexible to single type of use or building population.

> "The concept of tissue, in fact, with a double textile and biological connotations, evokes ideas of interweaving and of connections between parts, together with a capacity for adaptation." [1136]

Compared to the extremely small blocks, perimeter blocks also allow for an efficient use if there is a perimeter built form and the central space is open for multi-use.[1137] Perimeter blocks had higher amounts of use because their perimeters were densely populated with intensive built structure whereas the center space could be used for a secondary use--this is also historical in nature considering the Parisian, San Francisco and Amsterdam block form.[1138]

> "Finally, while strictly connected to the logic of the block, which continued in Holland until 1934 (the date of the early work of J. J. Oud in Rotterdam), Berlage and the architects of the Amsterdam School tried out variations of the hof, a type of grouping similar to the English close, which took up again the Flemish tradition of the béguinage and introduced, with a common enclosed space, those modification that will be applied in the future in the urban tissue."[1139]

In a study by Martin, researchers found that perimeter blocks could have more space and floor area ratios if there were more stories but a smaller footprint, thus allowing for a greater central space.[1140] Further, the open space would have a different traffic relationship to allow for a free area that was surrounded by buildings which also had

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[1136] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, pp. 158-159.

[1137] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 100.

[1138] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 100; Martin, L and Marsh, L. *Urban Space and Structures*. Cambridge: Cambridge University Press, 1972.

[1139] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 148.

[1140] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 100.

access to the public right-of-way--rather than having to cross a distance to reach the street.

> "For Martin this raised 'far-reaching questions' about the relationship between built form and open spaces. The open space provide in the Seagram building layout, for example, was in the form of a series of traffic corridors; in the perimeter block form, it was a series of traffic-free courts. Although this example provides support for larger, coarser and less permeable block structures (i.e. superblocks), it also demonstrates the need to consider layout of the urban framework in three rather than two dimensions (i.e. possible configurations of urban form)."[1141]

In France, what we can say about the block is that when the block did occur Pre-Haussmann, it incorporated multi-functional use.[1142] The block along with the street or wide way (boulevard) contributed to social life. "Nevertheless the block, without being the location for a specific activity, was part of a larger continuum of social life, which was characterized by its urban quality."[1143] The block itself had activity within it as a multi-use element within a larger set of urban form, which included the dwelling and other uses in the center of the block. "The dwelling, without any doubt, was an element of the block, but not the most important one, if only because of the precarious nature of its tenure."[1144] Because of the quick changes in use and occupation, the perimeter block and the buildings in the block changed constantly.[1145] What occurred with Haussmann though is akin to land use and zoning within the United States.

> :"The Haussmann block excluded, at least from its centre, all the diversified activities that coexisted there previously in the same way as the urbanization process excluded some activities from the centre of the city. Often only those activities connected to housing could find

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1141 Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 100-101.
1142 Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 128.
1143 Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 128.
1144 Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 128.
1145 G. Duveau (1946), La vie ouvrière en France au Second Empire (Gallimard); Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 128.

> a space within a block, whose character derives, as we have noted previously, from social needs."[1146]

What Haussmann did was formalize the center of the perimeter block as an open space or non-closed space. In doing so the activities which originally were there moved from the block, and the usage became more rigid and visible, than extremely flexible and invisible.[1147]

> "If we take up again the distinctions made earlier between the perimeter of the block, which is in contact with the street through the façade of the buildings, and its centre, we realize that this functions only as a back space where some street activities (stables, sheds) are still located there). This arrangement ensured a distinction between the visible and invisible parts of housing."[1148]

Still, the activities within the center of the block were known only to those who lived within the block. So, while the activities were more regulated and there was more open space, the perimeter still allowed a more communal functionality of the space--though sanitized.[1149]

In Amsterdam, with the opening of the perimeter block, the problem of the fronts and the backs of buildings became problematic. "The process of opening up--i.e. from the point of view of the use of space and the possible mixing of the fronts and banks--can also be observed in Amsterdam."[1150] In Paris, the center of the perimeter block was still a closed communal space of block owned land that was invisible to those who did not live within the block. In Amsterdam, where the perimeter block initially had a closed space, it began to open to be a semi-public space.

> "Here the centre of the block-instead of being the place of individual appropriation, as happened in the case of a garden connected with a

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[1146] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 128.
[1147] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 128.
[1148] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 128.
[1149] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 139.
[1150] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 130.

> ground-floor dwelling (there is no functional connection with the upper floors)--becomes a passing place, accessible from outside."[1151]

Where initially the center space was either a personal parcel or a piece of land-in-common, now it became neighborhood space and, in some cases, changed the dynamic of the traditional Amsterdam lot and space

> "In all these cases one has to accept the existence of collective activities at the scale of the block or, at in the last case, at a larger scale, that of the neighborhood."[1152]

9.4.5 Intensification and Subdivision of Block Patterns

While large blocks tend to break down over time into smaller block systems, the street and block system remained once initially set. Even with the addition of alleys, different uses and different positioning of buildings, the block grid system tended to remain.[1153] This process is much easier with straightline dendritic, hierarchical gridpatterns and radial gridpatterns. The question that this poses is whether organic systems by their very nature allow for lot and block intensification should the market or city need blocks to get smaller, and this also brings to mind whether this becomes a real option for more organic or dendritic systems. Streets with connected block systems tend to stay around for a long time, and streets that do not have connected street patterns are very difficult to connect for a long time.[1154] With blocks that are curvilinear and those that intentional meet at T-intersections, this becomes problematic especially if the built form within the block prevents further subdivision.

> "The nineteenth century was marked by experiences that moved in the opposite direction from the classical tradition, aiming rather

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[1151] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 130.
[1152] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 130.
[1153] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 101; Siksna, Arnis. "City Centre Blocks and their Evolution: A Comparative Study of Eight American and Australian CBDs." *Journal of Urban Design* 3(3) (1998): 253-283.
[1154] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 101.

towards a spatial reinterpretation of the spontaneous picturesque of vernacular architecture or medieval cities."[1155]

However, this is not altogether the case. The curved roads and systems really were more inspired by the artistic movements than what was on the ground in medieval sections. In creating a more picturesque environment what also occurred were not the straight lines of medieval streets of adjoining lots, but curved streets which resembled countryside scenes--they incorporated lanes of approach from rural to urban areas within the city.

> "Initially inspired by theories from the field of literature and art history and supported by painters, ta movement strongly established itself in England that referred to the naturalist experiences of the eighteenth century, to the first garden cities of John Nash and to the working-class cottages of the beginning of the century. In 1859 the Red House, by William Morris and Philip Webb, opened the way for the Arts and Crafts Movement."[1156]

This idea built upon the garden city ideal, where the purpose of block construction was based on views around every corner rather than connectivity and efficiency of lot and block usage.[1157] When converting previous medieval gridpattenrs with overlain super grids, Berlage and with Haussmann, did incorporate views within their system but they were structured on a framework design rather than views alone--the view was to a framework landmark or to a node and not to a beautiful scene for beauty sake.[1158]

> If a city survives, the city organically overcomes the problems in a system. "As well as evolution towards optimum block sizes, Siksna concluded that incremental change generally overcame or, at least, reduced the deficiencies of the initial layout."[1159]

[1155] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 141.
[1156] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 141.
[1157] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 145.
[1158] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 145.
[1159] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 102.

9.4.6 *Empirical Block Size and Dimensions*

When looking at the block in historical and present terms, what one sees is that the block that variable but also of fine character. For the Dutch, the urban block tends to be 50 by100 meters [150 to 300 feet.] or 100 by 200 meters [300 by 600 feet]. "Dutch cities appear to have stuck to tried-and-tested means: blocks measuring 50-100 m in width by 100-200 m in length (exceptionally, 300 m in the Heemraadssingel in Rotterdam), i.e. a grid of main traffic routes measuring 200-300 m, intersected by secondary routes."[1160] The average block sizes range from 4,500 meters square [40,500 square feet] in Blijdorp to 22,000 meters square [198,000 square feet] in the Walenkamp's block in Spaarndammerbuurt)."[1161] Within the Dutch framework, the variations are small and indicate that a general small range of sizes is experiential in natural and a rational efficiency of land that has to be reclaimed. "To this 'private' area, which can change hands and be built on, one can add the area of traffic routes and public spaces which take up 25-40% of the territory (more if canals are included)."[1162] Thus, blocks make up more than 60 to 75% of total land areas within the city. In traditional block patterns, there are similar measurements actually in the United States. "The standard Philadelphia block is 400 feet square (halved by the alleys-become-streets in where the city is most successful."[1163] Savannah has small rectangular blocks, and its "layout contains a number of central squares and the circulation pattern is

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[1160] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 13.

[1161] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 13; Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 255.

[1162] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 13.

[1163] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 242.

hierarchical."[1164] In Portland the blocks are very small squares and rectangular blocks.[1165] "Individually, they can highlight differences caused by the slightly different sizes, forms and internal structure of their respective blocks."[1166]

When founded in 1624, Manhattan or New Amsterdam was planned within a series of rectangular pattern of roads and ditches, and as farm parcels.[1167] While the streets were 25 feet in total wide, the lots were 25 feet by 50 feet in total for housing.[1168] But the blocks were irregular and not planned until later expansions up Manhattan Island.[1169] It then started to grow organically and streets were added as needed, such that the medieval nature of the town required appointed surveys to lay out streets, add houses and require development to be to some normalized built pattern.[1170] As New York planned its expansion in 1804 up Manhattan Island, the blocks became more regular, with street lengths of 200 feet and 100 feet wide.[1171]

> The blocks were made 200 feet wide, north and south, separated by 60 foot streets, except that roughly every tenth street was made 100 feet wide. The north and south avenues were also laid out 100 feet wide, separated by blocks varying from 650 to 920 feet in length. There are approximately 20 blocks to the mile north and south, and six blocks east and west."[1172]

[1164] Siksna, Arnis. "The effects of block size and form in North America and Australian City Centres." Urban Morphology I (1997): 20. http://www.urbanmorphology.org/online_unlimited/um199701_19-33.pdf (accessed July 10, 2014)

[1165] Siksna, Arnis. "The effects of block size and form in North America and Australian City Centres." Urban Morphology I (1997): 20. http://www.urbanmorphology.org/online_unlimited/um199701_19-33.pdf (accessed July 10, 2014).

[1166] Siksna, Arnis. "The effects of block size and form in North America and Australian City Centres." Urban Morphology I (1997): 20. http://www.urbanmorphology.org/online_unlimited/um199701_19-33.pdf (accessed July 10, 2014).

[1167] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 126.

[1168] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 128.

[1169] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 128.

[1170] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, pp. 128-130.

[1171] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 137.

[1172] Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935, p. 125.

Although the New York expansion was part of a broader system of Street regularization, efficiency required that the East to West streets work with the piers on the sides of the Island. "To be sure, the north-south streets in New York are generally wider than the east-west streets, and Broadway and Park Avenue differ from other streets."[1173] As a result, the blocks are more narrow and long as one goes up the Island rather than an equidistant square.

The block length in Barcelona near the Paseo de Gracia are fairly short.

> "Block lengths are relatively short, 360 to 380 feet (110 o 116 meters), and because their corners run diagonally to the streets, like all corners in the late nineteenth-century city development pattern, each intersection presents a welcoming opening to streets and neighborhoods on either side."[1174]

Looking solely at the number of blocks per square mile, even inside a city various districts may have a different block structure and density. In general, Barcelona has a block density of 138 blocks per square mile, but in the Cuitat Vella in Barcelona has a block density of 300 blocks per square mile.[1175] Thus, we are not only looking at block lengths but their density per square mile in a given situation. One should note that these are two ways of measuring the same dynamic--block density.

In San Francisco, there are approximately 7,346 blocks with a maximum of 12,069,700 square feet to a minimum of 41.12 square feet. The average area of these blocks is 181,464.58 square feet, with a standard deviation of a huge 444,708.28 square feet. This is because many of the blocks in San Francisco are quite large public space areas, and they compare to the average block structure that is around 181,464.58

[1173] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 258.

[1174] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 37.

[1175] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 261.

square with an average perimeter of 1,816.03 feet, on all normal orthogonal sides. This results in a mean area/perimeter ratio of San Francisco of about 99.92.

In Portland, the Forest Glen area had a median block size (median perimeter in feet) of 3,365, had 0.026 blocks per SFDU.[1176] The Orenco Station area had a median block size (median perimeter in feet) of 830, had 0.015 blocks per SFDU.[1177]

> "As also shown in Table 3, similar changes in trends occurred in the number of blocks and the length of block perimeters. Until the early 1990s, the number of blocks in neighborhoods was falling while the perimeters of blocks were rising. Beginning in the early 1990s, however, the number of blocks began to rise while the perimeters of blocks began to fall."[1178]

This started to change in the 1990s where the purpose was to create a finer block development. The developments in the areas of Forest Glen and Orenco Station began to be smaller and less indicative of sprawl.[1179]

> "Until the early 1990s, the number of blocks in neighborhoods was falling while the perimeters of blocks were rising. Beginning in the early 1990s, however, the number of blocks began to rise while the perimeters of blocks began to fall. Somewhat surprisingly, the lengths of cul-de-sacs fell throughout the postwar period. The trends in cul-de-sacs notwithstanding, these results suggest that the street network in neighborhoods built during the 1990s began to exhibit a pattern less characteristic of urban sprawl."[1180]

[1176] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 217.

[1177] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 217.

[1178] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 219.

[1179] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 219.

[1180] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 219.

At the same time, inner connectivity has fallen within the blocks. “Indeed regression analysis reveals that the measure of external connectivity fell by about 4.06 feet per year.”[1181] This indicate the relationship between blocks and lots.

What the blocks in Barcelona remind of one of are the insulae of the ancient roman system, as a way of building a gridiron system of blocks made of buildings.[1182] The block length in Barcelona near the Paseo de Gracia are fairly short where block lengths range from 360 to 380 feet, for a total of 12,377 square meters in area.[1183]

> “This design provided for the systematic repetition of equalized sized and shape blocks (110 x 110 meters), for which a number of different variations in which was to be built upon them were developed.”[1184]

While the blocks seem quite consistent, originally, they included variations, especially as non-perimeter blocks. “What all the variations had in common was the distinction between the public street and the semi-public interior of the block. According to Cerda’s design, the outer rim of the block was never to be built up entirely solid.”[1185] This allowed various types of buildings to be developed gradually. “This allowed for all sorts of different configurations in what was built and in terms of public space permitted

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[1181] Song, Yan and Gerrit-Jan Knaap. “Measuring Urban For: Is Portland Winning the War on Sprawl?” ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 219.

[1182] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 15.

[1183] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993 p. 37; Marat-Mendes, Dr. Teresa. “Dimensioning the sustainable urban fabric.” http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 11.

[1184] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 254.

[1185] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 254.

the creation of all sort of different relations between the public street and the semi-public interior of the block."[1186] Only in a few places were Cerda's designs fully realized.[1187]

While working on the blocks plan, Cerdà continued the layout plan to continue Passeig de Gràcia (constructed in 1829) and had new proposals to make the furtherance of the plan more coherent.[1188] To address the division of property, Cerdà drafted 28 different plans and changes, planos particularios, to lay out particular plot differential.[1189] The 60 hectare extension was divided into 325 plots.[1190]

> "In the remainder of the street blocks there was often a contradiction between the perfect form of the octagonal matrix of the street blocks form of the octagonal matrix of the street blocks and the erratic or geographical layout of former farmland."[1191]

Cerdà regularized the plots through redivision. While the original plots and blocks were to be built on only two sides, Cerdà started to favor building on all four sides like the Paris perimeter block and the Amstel block. "Gradually, as he studied the arrangement of the street block in greater detail, Cerdà tended to favour building on four sides without completely closing in the block, in order to allow the use of the inner space as a garden."[1192] The inner garden was very similar to the enclose in the buildings in

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[1186] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 254.
[1187] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 254.
[1188] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p.137; Aibar, Eduardo and Wiebe E. Bijker, "Constructing a City: The Cerda Plan for the Extension of Barcelona." Science, Technology, and Human Values, Vol. 22, No. 1 (Winter 1997): 3-30. http://www.jstor.org/stable/689964 (accessed July 8, 2014), p. 11.
[1189] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 137.
[1190] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 138.
[1191] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 138.
[1192] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 138; Sabaté, Joaquìm. "Las ordenazas de construccción de Ildefonso Cerdà." Laboratorio de Urbanismo: Trabajos soìbra Cerdà y Barcelona. Barcelona, 1992.

Paris and Amsterdam, where multiple uses could apply for a private common space in the accumulation of unused property on the various lots.

> "These designs were very similar to those used in Amsterdam in the City of Rotterdam in 1858. W.N. Rose "too had based his calculations on the idea that those would create the conditions for an urban architecture characterized by, on the one hand, a strict and hierarchical orthogonal system of public streets, and on the other a variety system of semi-public interiors of the blocks."[1193]

The blocks in Paris remind of one of are the insulae of the ancient roman system, as a way of building a gridiron system of blocks made of buildings.[1194] In Paris though the insulae are building on a medieval road pattern with a superimposed larger system of gridlines based in a Baroque pattern.

> "Renaissance urbanism in Paris covers the period between Francis I and the end of the eighteenth century. During these 250 years little was done to restructure the medieval core and except for establishing Champs Elysées axis westward and laying out the Grands Boulevards, little of note was done which would predetermine the future form of the city."[1195]

The triangular block seems to be a remnant of trying to reduce the depth of the block by Haussmann while he superimposed a radial street pattern and grid upon the previous medieval block pattern. "The dimensions of the triangular block, which is the most common, vary a great deal and seem to exclude the definition of an optimal building envelope, which could have been more or less valid everywhere."[1196] Either very large blocks favored by previous ages were excluded, or the triangle block assured that depth was very small.[1197] "This was the case around the college Chaptal and in the northern portion of the Europe district, which had been restructured by Haussmann (between

[1193] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 255.

[1194] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 15.

[1195] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 194.

[1196] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 18.

[1197] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 18.

1867 and 1881), where the greatest depts. Of the block is about 60 to 65 meters, rarely reaching 90 meters, for the total area of 2,400, 6,300 and up to 20,000 square meters."[1198] These measurements would be 146.97 feet, 238.11 feet and 424.26 feet respectively, still much smaller than the typical American block, and drastically smaller than most superblocks. The rectangular blocks in contrast had the possibility of length to width ratios of 1:7 or 1:4 depending upon where the block originated, with their widths being 16 to 36 meters (48 and 108 feet respectively).[1199] "These very compact rectangular blocks are not far from becoming a single building blocks surrounded by the streets."[1200] What we see is not that the blocks have buildings that span the block, but that the blocks are so compact and that they have normal sized buildings (given a monumental city) that cover the block.

> "The block between the rue de Moscou and the rue de Berne is symmetrical in two halves about the bisecting line and, on the rue de Berene, it faces nineteen double buildings, perfectly identical over the length of 250 meters [750 feet], in one single row, backing on to the chem de fer de l"Ouest."[1201]

In the triangular plots the aim was not to achieve English uniformity with the types of plots in the triangular plots but to create form with the chaos of difference. "There were undoubtedly some acute angles that were difficult to deal with, especially for the layouts of flats. Thus, whatever one tried to do, the plots were all different. The aim was thus not to achieve a beautiful uniformity in the English manner. In many cases (but it is not absolutely so) one can find some large plots in the corners and in the centre of the block."[1202] What is important to understand that plot layout and thus block accumulation

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[1198] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 18.
[1199] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 18.
[1200] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 18.
[1201] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 19.
[1202] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 19.

is absolutely cultural, as is block sizes in dimensions. Here what we see is that since the French do not adhere to the English need for complete uniformity, uniformity is achieved through other means. It is this that makes Paris quite different from the English system.

> "More than their form, it is the plot area that varies so as to offer a range of sizes. In the Moscou-Clapeyron block of the Europe district, they range from 200 to 1,100 square meters [42.4 feet in length at 1,800 square feet and 99.49 feet in length or 9,900 square feet respectively]; in the Mosacou-Berne block, from 135 [34.85 feet length, 1,215 feet square block], which is particularly small, to 360 square meters [56.91 feet length, and 3,240 feet square blocks].[1203]

In both the triangular and the rectangular block, there are some rules for subdivision.[1204]

> "Each plot is carefully laid out so that it is perpendicular to the street. The central dividing line in the interior of the block is the bisector of the acute angle formed by the streets (in the case of corners of the triangular blocks), a median line that accommodates the geometrical irregularities. If we exclude the deep plots such as those aligned along the street, each plot is of around the same proportion."[1205]

In Amsterdam, the Amstel block remains a measuring device. "The Amstel block is formed by a continuous perimeter of buildings, which encircle a central--usually rectangular, unbuilt--space, its width varying between 40 and 45 meters up to 60 meters in some cases."[1206] The building heights are three to four stories usually, and there are supplementary attic floors which have the 'cellars."[1207] The buildings are materials of brick. The Block size of the ring canals is generally 300 feet by 450 feet, with about 84

[1203] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 22.
[1204] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 19.
[1205] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 19.
[1206] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 81.
[1207] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 81.

dwellings, 12 shops, and density of 31 dwellings/hectare.[1208] The number of stories is generally 3-5 stories.[1209]

The external façade and block consisted of the façade on street, continuous and special, accessible, urban reference, representation, exposed, architect's input.[1210] On the garden side, the issues were façade and garden, fragmented and ordinary, nonaccessible, reference to dwelling, private life, hidden, and inhabitant's input.[1211] What occurs is a communal private space or "common space" but this includes aspects of each individual parcel.[1212]

> "On the street or on the square the facades express an urban order, even a monumental one in some cases, while in the backs the private gardens of the lower dwellings and the balconies of the higher floors allow for extensions and alterations."[1213]

In some blocks, you have center squares, garden areas, and public zones.[1214] The external façade and block consisted of the façade on street, continuous and special, accessible, urban reference, representation, exposed, architect's input.[1215] On the garden side, the issues were façade and garden, fragmented and ordinary, nonaccessible, reference to dwelling, private life, hidden, and inhabitant's input.[1216] What

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[1208] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 17.

[1209] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 17.

[1210] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 81.

[1211] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 81.

[1212] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 81.

[1213] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, pp. 66-67]

[1214] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, pp. 67-68]

[1215] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 81.

[1216] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 81.

occurs is a communal private space or “common space” but this includes aspects of each individual parcel.[1217]

One should note how similar this building is with the Parisian buildings. The partisan buildings are 7 to 8 stories, and have multiple center spaces on the same block. There are no completely centralized centers of the block and buildings, as there are in Barcelona. The bloc has two opposing concepts: “long sides/corners; edge/center (or exterior/interior).”[1218] The corners of the blocks have a problem because the blocks are “too narrow for easily ensuring continuity around the corners.” There were two solutions for this, they consisted of these two options.

The Vondel Park area of Amsterdam has block sizes of 270 by 65 meters.[1219] The Sarphati Park area of Amsterdam has block sizes of 200 x 55 m, and about 248 dwellings, with 12 shops.[1220] The Spaarndammerbuurt area of Amsterdam has blocks that average 110 m x 240 m, and has about 452 dwellings, and a density of 133 dwellings per hectare.[1221] In Amsterdam South, the average block size was 45 x 300 m and 45 x 70 m, the number of dwellings was 334, the number of shops was 16, and the density of dwellings was 99 per hectare.[1222] In Nieuwmarkt, the block size of this area

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[1217] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 81.

[1218] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 81.

[1219] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 37.

[1220] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 49.

[1221] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 61.

[1222] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 89.

was 50 x 55 m, there were 195 dwellings per hectare.[1223] By the time of Java Island, Amsterdam's block sizes have become larger and the street structure is different. The block size is 90 m x 135 m, and there are has 220 dwellings, has commercial space of 4900 m2, has 108 dwellings per hectare and the dwellings are 5-10 stories.[1224]

> "Java Island is part of the redevelopment of the Eastern Docklands, the largest post-war building project within the ring road around Amsterdam."[1225]

9.4.7 Benchmark Systems of Block Size and Dimensions

When looking at block size and dimension, one can see patterns or similarities with various cities and how they organized their block structure. The transportation industry has become to understand that small blocks are possible, and many times more practicable and usable by the populous. "Always create small blocks (200 to 400 feet long). By providing more paths of travel, traffic can be better distributed; wide, pedestrian-hostile streets can be avoided, and the number of destinations within walking distance can be increased."[1226]

Still, present modern planning has pushed urban advocates like CNU members to be concerned that the urban block continues to increase, while at the same time there has been a substantial reduction of streets.[1227] "In subdivisions, they take all kinds of amorphous shapes and are often quite large. In commercial strip centers and power

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[1223] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 185.

[1224] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 221.

[1225] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 221.

[1226] Tumlin, Jeffrey. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Holboken, New Jersey: Wiley: John Wiley Sons, Inc, 2012, p. 49.

[1227] Krueckeberg, Donald. The American Planner: Biographies and Recollections. New York: The Center for Public Policy: Meuthuen, Inc, 1983, p. 440; Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 21.

centers, a block structure is often not discernible at all. In cities, modernist planners were inclined to take out streets and make blocks much larger than they were historically."[1228] What is also of note that modern planning tended to not made new blocks but merge older and smaller blocks together--causing urban stagnation and superblocks to occur.[1229]

> "The myth that plentiful city streets are "wasteful," one of the verities of orthodox planning, comes of course from the Garden City and Radiant City theorists who decried the use of land for streets because they wanted that land consolidated instead into project prairies."[1230]

From Jacobs to CNU, most state that finer block frameworks are better for urban planning reasons. "New urbanists have always contended small blocks were a key to walkable places, and have sought to reverse the trend of larger or nonexistent blocks in cities and suburbs."[1231]

The LEED for Neighborhood Development model limits the block to a specific size where no block can be more than 600 feet on one side, and with no perimeter more than 2,400 feet.

> "The size of a block shall be no more than 600 feet on a side with a perimeter of no more than 2,400 feet" is a simple example of a very powerful metric. This metric gets straight to the heart of the matter and cannot be gamed. This metric does not just help to insure walkability, connectivity, and consistency: it guarantees it."[1232]

[1228] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 21.

[1229] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 242.

[1230] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 242.

[1231] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 21.

[1232] Paul Knight, "Chicago is Rural: The Inconsistencies and Absurdities of Street Connectivity Indices" Georgia Institute of Technology, CNU 19 Academic Paper Submission, December 6, 2010 http://www.cnu.org/sites/www.cnu.org/files/knightcnu19finalpaper_0.pdf (accessed July 9, 2014), p. 6.

Organizations like the Congress for the New Urbanism ["CNU"] have looked at the block with a development model where the block composes units of 60 feet increments.[1233] With this 60 food increment, the various blocks follow how development organizes and builds various structures for similar ease and economy. "A good physical framework into which varied buildings can be placed is a 60-by-60 foot grid. Such a grid responds both to standard street widths and to standard dimensions of generic office buildings and garages."[1234] This 60 foot dynamic would result in block dimension of 240 by 300 feet, 360 by 480 feet or other measurements which would fit very large buildings and also be reducible to finer grained blocks.[1235] While this unit does give the basic lengths of the block, CNU also adds some extensions to lots within the block to allow for longer back yards and alleyways.

> "A 240-foot wide block yields lots 95 to 100 feet deep with a lane or alley. Adding 20 to 40 feet more to block width creates bigger backyards. Block length is important for walkability. A comfortable dimension is 400 feet."[1236]

The CNU framework of more flexibility than usual grid systems, but less flexible than blocks by accretion methods. It also allows for separate types of uses within similar areas, whether mixed residential or commercial uses.[1237]

> "A framework like this kind allows flexibility in the design and layout of buildings and garages; permits retail uses along designated shopping streets; accommodate a great variety of development options, from

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[1233] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 112.

[1234] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 112.

[1235] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 112.

[1236] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 22.

[1237] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 112.

> large to small; and provides possibilities for architecturally distinctive individual buildings—symbols of the companies that building them."[1238]

One of the limitations of the CNU block is the 5 minute walk or pedestrian shed, and there is an acceptance that while there should be some regularity in block creation, there should be flexibility and variability in sizes. "That is not to say that all blocks are uniformly small in new urban communities—blocks respond to uses within them and the needs of the development program. Where larger blocks are required due to parking or other considerations, skilled urbanists compensate through streetscape design to maintain an interesting pedestrian experience."[1239] As a result, there is concentration on the perimeter of the block also along with the 60 foot unit, as an issue of compactness of shape and pushing the block to be a frontage perimeter block rather than a block without vitality.

> "Placing building frontages all around the block helps maintain a pedestrian-friendly edge of to that block. It is also important to hide aspects of the built environment that are hostile to pedestrians, such as parking lots, garages, in the block interior."[1240]

Thus, the CNU blocks mainly become square or rectangular rather than organic in nature because they are compacted by length, unit and perimeter.[1241]

In contrast to both LEED and the CNU, the Buffalo Green Code has a preferred block length and perimeter.[1242] In the code, some block lengths and widths range from

[1238] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 112.

[1239] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 21.

[1240] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 21.

[1241] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 22.

[1242] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), p. 10-2.

800 to 400 feet in length and width, with a perimeter of 1,600 to 2,000 feet.[1243] Other block lengths and widths range from 400 to 1,200 feet with a bock perimeter of 1,600 feet to 4,000 feet.[1244]

When looking at the practicality of use, others have look at the type of services and activities that could occur within a block and then create multiples of those uses for flexibility by use rather than by a CNU unit, a set LEED size or block changes by types of use like the Buffalo Green Code.[1245]

> "Thus, putting into the same category 'retail' as hypermarkets and corner shops of 50 square meters [150 feet lengths] will not enable one to imagine, from the beginning of a project design the implications and transformations possible. The same area of between 100 and 200 square meters [300 feet by 600 feet] can consecutively house a shop, a small public facility, medical or parametrical services, as mall firm, an artist's studio or dwellings--sculpture (in the 'artist' category) work with the same tools as coppersmiths (in the 'artisans' or 'industrial' category)."[1246]

9.4.8 *<u>Data from the Research Sites</u>*

In the Research Site Areas, the blocks generally fell into groups which had 2.33 broad spatial patterns, and in these patterns, there were 2.50 groupings of similar types of blocks. San Francisco had 80% of the mean, Portland had 200% of the mean, New York had 40% of the mean, Paris had 80% of the mean, Amsterdam had 120% of the mean, Barcelona had 80% of the mean, and Atlanta had 400% of the mean. While most areas had 2.50 or fewer block groups or shifts, the Atlanta Site had numerous block groups because of the varied dimension of the blocks and the inconsistency of the block pattern. It seems that while the Atlanta Site might have had more consistency of block pattern, time and accreted growth changed the patterns. In these Site Areas, San

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[1243] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), p. 10-2.
[1244] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), p. 10-2.
[1245] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 162.
[1246] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 162.

Francisco was the only area where topography affected the block patterns with 6 blocks affected by topography, due to a serpentine arterial moving up the topography.

In the Site Areas, the average number of blocks was 63. San Francisco had 85% of the mean, Portland had 85% of the mean, New York had 63% of the mean, Paris had 120% of the mean, Amsterdam had 145% of the mean, Barcelona had 101% of the mean and Atlanta had 52% of the mean. One should consider this number within the fact that while the average Site Area was 0.56 square miles, San Francisco was 111% of the average size, Portland was 90% of the average size, New York was 94% of the average size, Paris was 91% of the average size, Amsterdam was 73% of the average size, Barcelona was 141% of the average size and Atlanta was 102% of the average size. This indicates that even when standardizing Atlanta's numbers, Atlanta had fewer blocks for fewer square miles of land than all of the cities by large amounts.

When looking at block shapes in the Site Areas, the mean orthogonal block shape is 59.50. In this Site Areas, San Francisco had 91% of the mean, Portland had 91% of the mean, New York had 67% of the mean, Paris had 89% of the mean, Amsterdam had 155% of the mean, Barcelona had 108% of the mean and Atlanta had 42% of the mean. Along with organic shapes, what we see is that the organic block shape mean is 3.82 blocks. Paris had 600% of the mean while Atlanta had 52% of the mean. What this indicates is that block shape alone is not an indicator of resiliency. In Paris, this high number included blocks that were rectangular in shape but formed organically into non-orthogonal shapes to superblocks. This was not the case in Atlanta where the organic nature of the shape was in the curvature alone and not in how the shape organically fit into the larger series of blocks.

When looking at a LEED walkability ratio requirement where the blocks should be around 1,500 maximum, the average mean did not satisfy that requirement. The average mean was 110% of the 1,500 walkability requirement in all of the Study Areas. San

Francisco was 112% of the mean, New York was 143% of the mean, and Paris was 103% of the mean. Only Portland at 79% of the mean, Amsterdam at 80% of the mean and Barcelona at 83% of the mean satisfied this LEED requirement of the 1,500 feet perimeter. Atlanta did not satisfy this requirement also because it was 135% of the mean, and yet the Walkability Score states that the Old Fourth Ward is 78 which is fairly high.[1247]

When looking at block dimensions, the average mean of blocks was 552.12 feet, while the average block width is 250.19 feet. The closest block system to these averages were San Francisco, New York, and surprisingly Atlanta, with each being a little bigger than the mean. Of the average lengths in the Site Areas, San Francisco had 116% of the mean, Portland had 76% of the mean, New York had 156% of the mean, Paris had 104% of the mean, Amsterdam had 79% of the mean, Barcelona had 71% of the mean and Atlanta had 130% of the mean. Of average block widths, San Francisco had 118% of the mean, Portland had 100% of the mean, New York had 128% of the mean, Paris had 44% of the mean, Amsterdam had 59% of the mean, Barcelona had 151% of the mean and Atlanta had 151% of the mean. What this means is that Amsterdam has the smallest average blocks of any Site Area. This means that correspondingly, Amsterdam will most likely have the highest number of public rights of way than any other Site Area. Further, what this means is that Portland's smaller blocks system and the small blocks in Amsterdam actually have dimensions than needed to be resilient.

When looking at the compactness of block length/width ratio, the Site Area mean is 0.49. This represents a length that is twice the width, and this has nothing to do with

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[1247] WalkScore. 'Living in Old Fourth Ward Atlanta." http://www.walkscore.com/GA/Atlanta/Old_Fourth_Ward (accessed August 14, 2014).

the actual size of the block. San Francisco is 94% of the mean, Portland is 124% of the mean, New York is 76% of the mean, Paris is 39% of the mean, Amsterdam is 69% of the mean, Barcelona is 198% of the mean and Atlanta is 107% of the mean. What this seems to indicate is that similarity in block length and width might not be important for resilient cities. This means that redundancies of gridplans block lengths and widths are not required for resilient cities to exist. Thus while some cities have more square blocks like Barcelona and Portland, others will have more rectilinear patterns like New York, Atlanta and San Francisco. Paris, will have its own pattern.

When looking at block patterns, one finds that there is great diversity within block patterns and shapes, but that this diversity is conditional by what type of grid structure is within the present system. There are an average of 0.94 grid shifts per square miles, there are an average 3.17 blocks with three sides per Site Area, and there are an average 54.17 rectangular blocks per Site Area. One should note though that Paris has more than 437% of the mean of triangular blocks, and only 58% of the mean of rectangular blocks. Amsterdam has 52% of the triangular block mean and 142% of the rectangular block mean. Barcelona has 95% of the triangular block mean and 111% of the rectangular block mean. What this seems to indicate is that one must choose to have lots of triangular blocks or many more rectangular blocks than triangular blocks in order to have connectivity and regularity in the system.

When looking at Dendritic Blocks or blocks with dendritic entrances or pendulum cul-de-sacs, an interesting dynamic occurs. There are an average 2.17 blocks with dendritic access systems in the Site Areas. San Francisco has 0% of the mean, Portland has 0% of the mean, New York has 92% of the mean, Paris has 462% of the mean, Amsterdam has 46% of the mean, Barcelona has 0% of the mean and Atlanta has 189% of the mean. What this indicates is a radical understanding of the cul-de-sac in the American and European systems. On face value, cul-de-sacs are not bad for resilient form. However, when one delves deeper, one understands that the Parisian cul-de-sacs in the study are used mainly like driveways and not like vast road systems with multiple residential entries. In the Site Area at least, they tended to be more service related than on the fronts of blocks, and they existed along with a much finer gridpattern and higher connectivity than in other systems. In contrast, the American cul-de-sacs in Atlanta tended to be on the fronts of buildings, and break connectivity of the block in general. Seemingly how one uses a cul-de-sac is more important than the fact that a cul-de-sac is present.

When looking at the Site Areas, most of the Site Areas have perimeter blocks. This is a hyper-densification of the block perimeter while leaving the core of the block open to either open space or multiuse. The average number of perimeter blocks in the Site Areas was 41. San Francisco had 1.05% of the mean, there were no perimeter blocks in Portland, New York had 71% of the mean, Paris had 59% of the mean, Amsterdam had 217% of the mean, Barcelona had 149% for the mean and Atlanta had none. What this indicates is that not only do Atlanta and Portland not have the land values which require densification of the block core, but the result is that there will be a lack of enclosure of the Street.

The average number of openings on the perimeter blocks of those cities with perimeter blocks is 1.38. San Francisco has 138% of the mean, New York has 180%, Paris has 225% of the mean, Amsterdam has 38% of the mean and Barcelona having 19% of the mean. Both Portland and Atlanta have no perimeter blocks and thus no perimeter openings. In fact with the mean of non-perimeter blocks being 22.33 blocks, Portland has 242% of the mean and Atlanta has 148% of the mean. What this means is that the perimeter blocks in Amsterdam and are much tighter and much more compact than those in either New York, Paris or San Francisco. One could extrapolate from this number that both Amsterdam and Barcelona might have more Street enclosure as a result.

The average number of alleys on blocks is 12.50. What one sees is that the blocks with alleys or service back access are those with the most perimeter openings or they are blocks that are not perimeter in nature. San Francisco has 8% of the mean, Portland has 408% of the mean, New York has 0% of the mean, Paris has 88% of the mean, Amsterdam has 56% of the mean, Barcelona has 40% of the mean and Atlanta has 272% of the mean. With Barcelona and Amsterdam, the perimeter opening almost always corresponded to an alleyway or some access and not simply an opening in then enclosure of the block. In Portland and Atlanta this was not the case, the opening of the alleyway corresponded to a regular feature in the urban form and not as a feature of the opening of a perimeter boundary. Thus, there seems to be an inverse relationship between the perimeter block and the use of the alleyway.

What is interesting is that the lack of the perimeter block also corresponded to large driveways or parking lots. The average number of blocks with driveways was 12 blocks. San Francisco had 33% of the mean, Portland had 450% of the mean, New York had 92% of the mean, Paris had 17% of the mean, Amsterdam had 8% of the mean, Barcelona had 0% of the mean and Atlanta had 267% of the mean. This seems to indicate that the perimeter block may be the result of intensification and land values and not simply just a block typology. If the land was valued more as space than as a driveway, then these other areas that have lower valued land might also have a perimeter block situation.

We also see that the most resilient cities are of similar heights. The average block height or stories in the resilient cities is 48.66 feet. San Francisco is 101% of the mean, New York is 113% of the mean, Paris is 97% of the mean, Amsterdam is 95% of the mean, and Barcelona is 163% of the mean. In contrast, Portland is 31% of the mean and Atlanta is 44% of the mean. What one starts to see is that the heights, the block types, the enclosure and multiple other factors seems to be setting Portland and Atlanta apart from the rest. What seems to be occurring is that while Portland might be a design area, it is just not the same type of city as other resilient cities. It seems to be looking more like Atlanta than the rest. The average mean stories of buildings or architectural infill is 4.06 stories for these resilient cities, a factor which includes Portland which is only 31% of the mean. One should note that if Portland is removed from the equation, the average stories would be 4.62 stories and not a 4.06 story mean.

While this study did approximate the average heights of commercial and residential structures, this became a problematic definitional issue. While in the United States, commercial and residential zoning is clear and harshly enforced, in Europe, commercial and residential activities occur on most blocks, regardless of whether zoning occurs. As a result, in the Paris, Barcelona and Amsterdam Site areas, the commercial heights are mainly 1 story, simply because commercial areas are on the 1st floor of most blocks. Further, residential apartments generally make up the remaining heights of blocks in these Site Areas. So, while the factors are taken into consideration, it becomes problematic to equalize the same factors in U.S. Site Areas with European Site Areas.

When looking at the built area of the land and development intensification, what one sees is that the most resilient cities are fairly consistent, whereas Portland is much more similar to Atlanta. Looking at the built area to total block ratio, one sees that the mean is 0.59 or 59% of the total area covered in buildings. San Francisco has 93% of the mean, New York has 95% of the mean, Paris has 114% of the mean, Amsterdam has 114% of the mean, and Barcelona has 140% of the mean. Atlanta has 47% of the mean and Portland has 44% of the mean. What this indicates is that in all the resilient areas, more than 50% of the total land area is built, and this development is generally on the edge as a perimeter block.

When stepping back and looking at the block from a larger scale, one realizes that the masses of buildings create volumes of space on the block that are built and unbuilt. The average mean volume of built space on blocks is 299,980,190.99 cubic feet. San Francisco is 91% of the mean, Portland is 13% of the mean, New York is 105% of the mean, Paris is 110% of the mean, Amsterdam is 75% of the mean, Barcelona is 206% of the mean and Atlanta is 17% of the mean. What this indicates is that the total value, building density and population in Barcelona is more than 12 times greater than Atlanta. As a result, Barcelona has an economy and vitality that is more than 12 times the Site Area. This also indicates that San Francisco and New York have a total value, building density and available room for population that is 7 times greater than the Atlanta Site.

CHAPTER 10.

PATHWAYS AND THE STREET

10.1 The Street: the Public Right-of-Way

"Streets are Public Places"[1248]

The public right-of-way [the "Street"] is an amorphous urban element that has evolved over time. [See Figures 91-107]. Actually, the Street is an extremely old urban element that has evolved over time in response to the lot and the block as working mechanisms based on the accumulation of private space, the instinctual and evolutionary dynamic of the pathway and the efficiencies and costs responding to the public sphere. "So street space forms the basic core of all urban public space—and by extension, all public space—forming a continuous network or continuum by which everything is linked to everything else."[1249] In a sense, the Street defines how humans interact on a physical and policy level, and we recognize the Street by the urban element clues indicating that a street is present. The Street has two dimensions, the public nature of the street which we call the public right of way and the physical dimensions of the street which includes but does not exclusively include the Lane. It is so important on an instinctual level that the failure to design the Street in favor of the Traffic Lane has decayed cities--as planned.

> "Streets are often the most vital yet underutilized public spaces in cities. In addition to providing space for travel, streets play a big role in the public life of cities and communities and should be designed as public spaces as well as channels for movement."[1250]

[1248] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 5.

[1249] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 13.

[1250] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 5.

> "Think of your last trip to a great European city and what, other than the historic structures and the food, was memorable. You walked its streets for house and did not tire. It is the magic of a great street environment."[1251]

One only needs to think about where people eat, shop, socialize and interact. Everything about the human experience is facilitated by the Street. "This is where active travel to work, shop, eat out, and engage in other daily activities takes place, and where walking for exercises mostly occur."[1252] With parks, squares, plazas, trails, pathways, lanes, sidewalks, trees, facades and multiple other individual aesthetic elements, the Street contains everything but the structural floors that hold volumes of things and people away from public view. It contains and is made up of the sum of everything.[1253] Yet through policy mechanisms and tradition, there is not one element that can be claimed to be the Street, for the Street encompasses the entirety of the Pathway and its edges.

10.1.1 The Pathway

> [Pathways are] "major and minor routes of circulation which people use to move about. A city has a network of major routes and a neighborhood of minor routes. A building has several main routes which people use to get to it and form it. An urban highway network is a network of pathways for a whole city. The footpaths of a college campus are pathways for the campus."[1254]

Pathways allow human movement through the urban environment in a directional nature, but yet this has not always been a formal lane.[1255] [See Figures 119 and 140]

[1251] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 1.

[1252] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 1.

[1253] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 1.

[1254] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-2.

[1255] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-1; Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 203.

“The street provides movement for commerce within the urban form.”[1256] Pathways in urban cities allow the interactivity between people that would not altogether happen within private zones--the blocks or lots.

> “Barring private gardens, which many urban people do not have or want, or immediate access to countryside or parks, streets are what constitute the outside for many urbanites; places to be when they are not indoors.”[1257]

In its relationship to Prospect-Refuge theory, the Street evolved as the pathway, with edges, while working from node to landmark and defining the districts that populate urban form, and it provides safety to a destination from an origin point. Pathways evolved within human settlements, and, with the city, these pathways formalized into public space that allowed for ingress from private space and an efficient mechanism for commerce in its broadest and legalistic sense. Within many cultures, routes of access over buildings within large urban building complexes formed pathways of access that allowed peoples to access their own private residences or lots within larger groups of lots or blocks.[1258] In Çatal Höyük, from 7500 BC to 5700 BCE, pathways were places on tops of buildings where lots units were accessible on roofs via ladders.[1259] As cities began to build walls, the defensive need to build in this matter ceased to exist, and streets began--dendritic gridplans, hierarchical gridpatterns, and radial gridpatterns. As early as 8,000 BCE, ancient city defensive wall flourished along with, not surprisingly,

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[1256] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 15.

[1257] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 4.

[1258] Sofaer, A. “The Primary Architecture of the Chacoan Culture.” *Anasazi Architecture and American Design*, 88 (1997); Adams, E. C. “The Architectural Analogue to Hopi social Organization and Room Use, and Implications for Prehistoric Northern Southwestern Culture.” *American Antiquity* (1983) 44-61; Mindeleff, V, and Mindeleff, C. *A Study of Pueblo Architecture in Tusayan and Cibola*. Washington, DC: Smithsonian Institution Press, 1989.

[1259] Kleiner, Fred S, Mamiya, Christin J. *Gardner's Art Through the Ages: The Western Perspective*. 12th ed. Belmont, California: Wadsworth Publishing, 2006, pp. 12–4.

the Street.[1260] One could say that, without the defensive necessity for pathways on top of structures, the efficiencies of lot and block development, larger economies and the need for a more efficient pathway for commerce required streets to be within the public sphere and abutting the lot and block. This cross-cultural urban element occurs in Cerdà's Barcelona and Haussmann's Paris, for it is the lot, block and street dynamic that is still with us today.

> "Pathways are channels along which the observer customarily, occasionally, or potentially moves."[1261]

As a result, pathways allow for all functional movement and accessibility across the city.[1262] In the ancient world, people named their pathways by their destination point whether that was another city, country or landmark. "In the past, streets frequently took their names from the place to which they lead--a town, a mountain, or the sea."[1263] In fact many have critiqued the American system of street naming as boring or based on fauna or biological names which do not exist in the area.[1264] This helped give mapmaking and

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[1260] Lillebye, Einar. "Architectural and Functional Relationships in Street Planning: an Historical View." *Landscape and Urban Planning* 35 (1996): 86. http://www.sciencedirect.com/science/article/pii/0169204696003076 (accessed July 8, 2014); Kleiner, Fred S, Mamiya, Christin J. *Gardner's Art Through the Ages: The Western Perspective*. 12th ed. Belmont, California: Wadsworth Publishing, 2006, pp. 12–4; Kleiner, Fred S, Mamiya, Christin J. *Gardner's Art Through the Ages: The Western Perspective*. 12th ed. Belmont, California: Wadsworth Publishing, 2006, pp. 12–4; Fletcher, Banister and Dan Cruickhank. *A History of Architecture By Published.* New York: Princeton Architectural Press, 1996, p. 20; Frederiksen, R. *Greek City Walls of the Archaic Period, 900–480 BC*. Oxford: Oxford University Press, (2011); Van de Mieroop, M. The Ancient Mesopotamian City. Oxford: Oxford University Press, 1997; Weiss, H, Courty, M. A, Wetterstrom, W, Guichard, F, Senior, L, Meadow, R, and Curnow, A. "The Genesis and Collapse of Third Millennium North Mesopotamian Civilization." Sicence 261 (1993): 995-995; Pollock, S, Steele, C, and Pope, M. "*Investigations on the Uruk Mound, Abu Salabikh*." *Iraq: British Institute for the Study of Iraq* Vol. 53, (1991): 59-68. http://www.jstor.org/stable/4200335 (accessed August 2, 2014).

[1261] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-1.

[1262] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-1.

[1263] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 153.

[1264] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 155.

placement within the city itself and divided the city into workable pieces that people could access easily--imageability.[1265]

> "Paths with clear and well-known origins and destinations had stronger identities, helped tie the city together, and gave the observer a sense of his bearings whenever he crossed them."[1266]

Problems can also arise when every pathway looks the same and distinguishing qualities become more difficult for people to imprint in their city imaging.[1267] Pathways require identity in order to function with other pathways.

> "A large number of paths may be seen as a total network, when repeating relationships are sufficiently regular and predicted. The Los Angeles grid is a good example. Almost every subject could easily put down some twenty major paths in correct relation to each other. At the same time, this very regularity made it difficult for them to distinguish one path from another."[1268]

When a pathway is easily confused with another pathway, it causes problems with the human imageability and mapmaking within the city.

> "Where major paths lacked identity, or were easily confused one from the other, the entire city image was in difficulty."[1269]

As a result, pathways have sequence, topographic and landscape effects, in that they allow for travel but then also can affect things in the landscape by their movement, may reinforce nodes and landmarks by their position and can create unity across a large area by their function.[1270] The street attaches to the landmarks and landscape to ground them in place and to form district connections or seams between the block edges.[1271]

[1265] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, p. 2.9-3.

[1266] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, p. 2.9-3.

[1267] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 60-61.

[1268] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 60-61.

[1269] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2.

[1270] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-8.

[1271] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, p. 4.3-8.

Some have stated that this s more a “melodic” relationship between pathways and landmarks, space changes, dynamic sensations or topography. But this experiential relationship with the pathways itself marks it and defines its relationship to the surrounding.[1272]

> “There is a final way of organizing a path or a set of paths which will become of increasing importance in a world of great distances and high speeds. It might be called “melodic’ in analogy to music. The events and characteristics along the path—landmarks, space changes, dynamic sensations—might be organized as a melodic line, perceived and imaged as a form which is experienced over a substantial time interval.” [1273]

People observe or interact with the entire city by moving through the pathway and so its importance is in what populates the pathway and what edges the pathway--the lot and the block facades.[1274]

Pathways are important because they allow for customary travel or circulation between an origin point and a destination point.[1275] “Paths may not only be identifiable and continuous, but have directional quality as well: one direction along the line can easily be distinguished from the reverse.”[1276] There are numerous types of paths, made up of a combination of elements rather than a simple map line--streets, walkways, transit lines, canals, etc.[1277] As long as the lot has some logical coherence and legibility, persons using the pathway will have very few problems going from node to node or district to district.

> “Paths could be important features in city images for several reasons including regular use, concentration of special uses, characteristic spatial qualities, façade characteristics, proximity to special features in

[1272] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 99.
[1273] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 99
[1274] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-1.
[1275] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960,pp. 54, 56-58.
[1276] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 54.
[1277] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 114.

> the city, visual prominence and dominance, or by virtue of their position in the overall path structure."[1278]

> "Paths with clear and well-known origins and destinations had stronger identities, helped tie the city together, and gave the observer a sense of his bearings whenever he crossed them."[1279]

When fundamental pathway problems occur, the pathway's directionality component becomes compromised.[1280] When this occurs, the pathways scaling component by a dimension range of blocks also breaks down when affects the pathway's measuring component.

> "The longitudinal streets were sharply differentiated from the cross streets in everyone's mind, much as they are in Manhattan. The long streets have individual character—Beacon Street, Marlboro Street, Commonwealth Avenue, Newbury Street, each one is different—while the cross streets act as measuring devices.[1281]

As a result of directionality, pathways that are regular and more gridline have a scaling quality where people can imagine streets and their intersections as blocks or lengths of distance apart from the name or qualities associated with the street.[1282] "Once a path has directional quality, it may have the further attribute of being scaled: one may be able to sense one's position along the total length, to grasp the distance traversed or yet to go."[1283] There is an ability to count blocks and fairly register the width of cities or the length of travel.[1284]

[1278] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 14.
[1279] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-3.
[1280] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 54, 58-61; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-3.
[1281] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-8.
[1282] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-3.
[1283] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-3.
[1284] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-3.

> "Features which facilitate scaling, of course, usually confer a sense of direction as well, except for the simple technique of counting blocks, which is directionless but can be used to compute distances."[1285]

Pathways are also reinforced by utility. Blocks and lots one should note are reinforced by policy, ownership, location or by placement alone. "The very concentration of habitual travel along a path, as by a transit line, will reinforce this familiar, continuous image."[1286] Along with blocks and lots, the pathway or the Street from the urban tissue of the built form.

> "The dialectical relationship between street and built plots creates the tissue and it is in the continuation of this relationship--capable of modification, extension and the substitution of buildings--where reside the capacity of the city to adapt to the demographic, economic, and cultural changes that mark its evolution. The street layout determines the relationship with site, centre and capacity for extension."[1287]

Pathways also take up space and volume. [1288] This space is formed by the joining of volumes and edges, by forming a seam in plan and volume between two political and spatial edges--the lot and the block. These spaces are not the same for the entire functional length of the links in a street pattern.

> "Streets make up 25% of the land in San Francisco.[1289]

The interesting thing about pathways is that they work by relating to other pathways or things. One can have lots and blocks that are independent and function alone, but pathways require interaction and people to utilize that pathway. "The paths,

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1285 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-3.

1286 Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 96.

1287 Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p.166.

1288 County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 3.

1289 County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 3.

the network of habitual or potential lines of movement through the urban complex, are the most potent means by which the whole can be ordered."[1290] Their lines are really lines of major and minor overlaying or dominating functions rather than simple structures.

> "The key lines should have some singular quality which marks them off from the surrounding channels: a concentration of some special use or activity along their margins, a characteristic spatial quality, a special texture of floor or facade, a particular lighting pattern, a unique set of smells or sounds, a typical detail or mode of planning."[1291]

A particular pathway has a direct effect upon development on a city and sometimes society scale.[1292]

> "Roads have always been an important influence on the location and growth of urban societies, but there has been little appreciation of their significance in the structural development of cities and towns."[1293]

In the City, pathways or the Streets are the dominant urban element even though they are created by a combination of dissimilar things--while blocks are assemblies of only lots.

> "For most people interviewed, paths were the predominant city elements, although their importance varied according to the degree of familiarity with the city."[1294]

Pathways have hierarchy of pattern. This dynamic is a hierarchy based on the physicality of the infrastructure. Since pathways function with other pathways, when they cross or connect they form relationships that allow placemaking and imagining of

[1290] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 96.
[1291] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 96.
[1292] Lillebye, Einar. "Architectural and Functional Relationships in Street Planning: an Historical View." *Landscape and Urban Planning* 35 (1996): 85. http://www.sciencedirect.com/science/article/pii/0169204696003076 (accessed July 8, 2014)
[1293] Lillebye, Einar. "Architectural and Functional Relationships in Street Planning: an Historical View." *Landscape and Urban Planning* 35 (1996): 85. http://www.sciencedirect.com/science/article/pii/0169204696003076 (accessed July 8, 2014)
[1294] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2.

the city where people live. In creating the pattern, they function as the skeleton of the actual city and public life.

"This is the skeleton of the city image."[1295]

These hierarchies form "major and minor routes of circulation which people use to move about. A city has a network of major routes and a neighborhood of minor routes. A building has several main routes which people use to get to it and form it. An urban highway network is a network of pathways for a whole city. The footpaths of a college campus are pathways for the campus."[1296] Thus, the hierarchy of pattern is not just based upon larger patterns but larger types of groups of patterns, where the persons might consider the social grid as the pattern of streets rather than the pattern of sidewalks, pedestrian trails or cul-de-sacs which themselves might have a subordinate gridline pattern.[1297]

Some pathways are functionally better than other pathways. For pathway purposes, straight lines trump organic or curved lines. Ornate pathways are difficult for imageability and mapping purposes. While these lines are romantic in nature, they functionally do not give distance or direction. "The line of motion should have clarity in direction. The human computer is disturbed by long successions of turnings, or by gradual, ambiguous curves which in the end produce major directional shifts."[1298] One should note that most ancient dendritic girdpatterns, hierarchical gridpatterns and radial gridpatterns streets all consisted of straight lines. It is only really in the modern period

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[1295] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 96; Lillebye, Einar. "Architectural and Functional Relationships in Street Planning: an Historical View." *Landscape and Urban Planning* 35 (1996): 86. http://www.sciencedirect.com/science/article/pii/0169204696003076 (accessed July 8, 2014)

[1296] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-2.

[1297] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-3.

[1298] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 96.

where curved lines and dendritic patterns, which are intrinsic to sprawl, became problematic for imaging purposes. Straight paths create direction and are easily defined, even if they change direction at a 90 degree angle.[1299]

> "A street is perceived, in fact, as a thing which goes toward something. The path should support this perceptually by strong termini, and by a gradient or a directional differentiation, so that it is given as sense of progression, and the opposite directions are unlike."[1300]

Pathways, that attract people, attract more people. Pathways can have a hierarchy of use apart from their physical hierarchy.[1301] "People seemed to be sensitive to variations in the amount of activity they encountered, and sometimes guided themselves largely by following the main stream of traffic."[1302] This might be because humans are social animals, and as social animals humans like to look and be around other people. This is also because pathways are social creations of movement. Further, if you have concentration of activity, then the pathway actually becomes more important than other pathways that might have spatially more hierarchy, but they are functionally less important.[1303]

Pathways are reinforced by use. When people use pathways, then those pathways obtain more functional aspects, and a result, those pathways become more historical and last longer.

> "The very concentration of habitual travel along a path, as by a transit line, will reinforce this familiar, continuous image."[1304]

[1299] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 96.
[1300] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960 p. 97.
[1301] Lynch, Kevin. *The Image of the City*. Cambridge, Massachusetts: MIT Press, 1960, pp. 49-50.
[1302] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2.
[1303] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2.
[1304] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 96.

This continuous image of the particular pathway protects it from destruction or removal. Thus, pathways that have more use not only attract more people but last longer because of their use.

Pathways also have a reinforcing, joining and hub quality of the block or edge. Even without facades, pathways with set function and coherent quality set the pathway and the block or lot in space, and the street joins the edges of the lots into the block assembly. The image actually sharpens the more functions that a pathway has--even going from one direction to two directions of transportation circulation.[1305] At the ends of the pathway, the pathways actually join and landmarks within space. This part of the joining quality is probably one of the most important parts of the pathway because it has many functions. This joining quality not only maps the city in place on the ground by joining landmarks and nodes that people can see and remember intrinsically, but it allows complete visual access so that people can visually reinforce their individual imagining of the city location. Further, this quality of joining breaks up sections of the city into units of space divided by these landmarks and nodes so that easy movement and relationships occur.

Problems generally arise when there are interruptions of the pathway or there is a lack of connectivity or legibility that is structural or systemic in nature.[1306] These problems do not have to be historical but can be caused by modern developments.[1307] If this occurs, the problem will be solved only when the structure of the pathway changes to correct the problem.

[1305] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 99.
[1306] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 57-58.
[1307] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 58-60.

When pathways have obstacles, redundancy is key for optimum performance. Without redundancy in the system, there are obstacles.[1308] Obstacles will make pathways cease to be pathways because their function ceases to exist.[1309] Yet, when there are no obstacles and the pathway can be dependent upon by people, there is dependency and reliability.

> "That the paths, once identifiable, have continuity as well, is an obvious functional necessity. People regularly depended upon this quality."[1310]

Unless there is protection or social functions that occur to obvert the danger, pathways are always dangerous and have activity. This is not because there is no danger in the street but because as the outside environment and the mixing of people and functions, it is not regulated as environments outside the pathway.[1311]

> "The space of a street is a brute fact but that it is known and functions as a street is an institutional fact. Dogs, squirrels and sometimes children, for example, recognize a street's space as a brute fact but a street can be dangerous for dogs, squirrels and children because they do not recognize a street as an institutional fact."[1312]

Thus, streets cannot function alone without corresponding social functions or policies which allow mass groups of people to function together within the urban sphere with least harm--such as "eyes on the street."

[1308] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2.

[1309] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2.

[1310] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2.

[1311] Brown, M. Gordon. "Space, Property and the First Urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 7.

[1312] Brown, M. Gordon. "Space, Property and the First Urbanism." The Council of the new Urbanism. https://www.cnu.org/sites/www.cnu.org/files/space_property_and_the_first_urbanism_brown.pdf (accessed July 10, 2014), p. 7.

When there is logic to the set of pathways, a person can actually map important pathways within their mind so that they create or imagine a city map--imageability. Once made, that person can maneuver in the urban field quite easily.[1313]

> "A large number of paths may be seen as a total network, when repeating relationships are sufficiently regular and predicted. [60] The Los Angeles grid is a good example. Almost every subject could easily put down some twenty major paths in correct relation to each other. At the same time, this very regularity made it difficult for them to distinguish one path from another."[1314]

For this to occur, the pathway has to have multiple types of aspects working in concert rather than just as a transportation lane.[1315] Directionality has nothing to do with the width of the pathway, but is just as important--if not more important. In order for this to occur, the entire public sphere or the Street has to work as a functional unit rather than as discordant parts. Some key pathway lines had similar qualities that were easy to understand, but they also have spatial qualities with a texture and fabric that define the city.[1316] The more functional aspects, the richer the image within the person's mind and the ability to navigate the city.

10.1.2 <u>Modernism and Disurbanism.</u>

> "Le Corbusier (1967) renounced the street as an inadequate transportation artery saying: 'Our streets no longer work. Streets are an obsolete notion. There ought not to be such a thing as a street, we have to create something that will replace them.'"[1317]

While planning methods only affected one aspect of the street, the straight line, modernist ideas and philosophies worked to completely change and destroy the street.

[1313] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 60-61.
[1314] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 60-61.
[1315] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp 58-61.
[1316] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960: 96]
[1317] Lillebye, Einar. "Architectural and Functional Relationships in Street Planning: an Historical View." *Landscape and Urban Planning* 35 (1996): 102. http://www.sciencedirect.com/science/article/pii/0169204696003076 (accessed July 8, 2014)

While early planning methods actually did have the safety of the pedestrian in mind when creating rules and regulations for the public good, modernist ideology worked for the safety and efficiency of the automobile by transposing the Street with the Lane. What once was a romantic idea which created different street without all of the functional aspects of traditional street design, the Street morphed into a pedestrian free zone based solely on origin and destination.[1318] The problem though is that when the functional nature of the Street became dissected, the total Street declined--even the street as transportation network. One cannot reduce the Street, an urban element composed of many type of elements and many functions, into a single lane and expect survival.[1319]

> "Jacobs identified the life of cities with their street life, what she called 'the ballet of the city street' that continuously brought together a diverse mixture of people, who not only supported the divers enterprise that were at the heart of the urban economy, but gave a city its twenty four-hour vitality."[1320]

Jane Jacobs recognize the fact that what she called the 'intricate order" of the street, and what this thesis calls the multi-functional and multi-elemental assembly called the Street, was dying because of the lack of physical and programmatic destruction of its volume.[1321]

> "Over the course of history, all sorts of urban activities have taken place on the main streets: they were not just for through passage, but for meeting, trading, hawking, busking, bear-baiting, public speaking and pillorying. If anything, they seemed to be a natural relationship between the business, most vital streets and the most significant urban places."[1322]

[1318] Urban Land Instiutte (ULI). *Residential Streets: Objectives, Principles and Design Considerations.* Washington, DC: ULI, 1974, 1990, p. 20; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997.

[1319] Lillebye, Einar. "Architectural and Functional Relationships in Street Planning: an Historical View." *Landscape and Urban Planning* 35 (1996): 99-100. http://www.sciencedirect.com/science/article/pii/0169204696003076 (accessed July 8, 2014)

[1320] Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 36.

[1321] Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 36.

[1322] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 3.

What modernism did was break the relationship of the people to the street, when many of those urban elements depended upon that relationship for existence and reinforcement.[1323] What was once a protected, legal, vital, vibrant and diverse public sphere became a place where people drove from highways to arterials to cul-de-sacs to private homes, without any human interaction and focused solely on the automobile.[1324] Whereas initially the focus of city activity was the public sphere or street, now the focus the private home.[1325]

> "In contrast, Modernism filleted the city—stripped the spine and ribs out from the urban flesh, and set up the road network as a separate system."[1326]

What also occurred was a professional shift from the design of streets to the creation of functional lanes. Thus the professionals that originally worked together to design the streets divided into separate professional groups. As a result, those persons in charge of building the skeletal public infrastructure had neither the design experience nor competence to design the Street because their purpose was to design functional and efficient lanes of transit.[1327]

> "What applied to the product also applied to the process, resulting in a division of labour between the design professions. Road layout became the preserve of highway engineers and traffic engineers, specializing in the sciences of traffic flow and the engineering design of infrastructure. Meanwhile, the architects concentrated on the buildings, creating new works of 'urban sculpture."[1328]

[1323] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 4.

[1324] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 6.

[1325] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 6-7.

[1326] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 6.

[1327] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 7; Sabey, D. L. and Baldwin, K.. "Planners' View of Highways and Transportation," *Highways and Transportation*, 34(5) (1987): 13-19; Hebbert, M. *London: More by Fortune than Design*. Chichester: John Wiley and Son, 1998.

[1328] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 7.

This is not the fault of transportation engineers though. This disturbance in the design and construction field, with regard to the Street, was a necessary means to destroy the street and create a division of labor--thus ensuring that the Street would die. The result of this effect was urban destruction called disturbance creation called sprawl.[1329]

> "The single-minded pursuit of traffic-driven approaches almost reduced the whole 'town planning' process to an elaborate and obscure mathematical calculation to optimize a very limited number of variables-such as the 'peak hour passenger car unit flow rate'—to which everything else was subordinated."[1330]

The recognition that this modernist ideology was actually hollowing out cities and caused a reaction to save the city and the Street.

> "The rhetoric of the 'motor age' has been replaced by the rhetoric of sustainability and neo-traditional urbanism. Compact, dense, mixed-use neighbourhoods are back in fashion, with a new breed of traditional-style buildings and street patterns to choose from. The street itself, once seemingly in terminal decline, has undergone something of a renaissance. Street grids are back in vogue."[1331]

What was occurring was a strict adherence to lane and transportation standards that excluded design standards that would revive the Street. With these dimensions set, it has been easier for administrators to continue these standards because they seem apolitical--when by their very nature these benchmarks are very political.[1332] In the

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[1329] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 9; Punter, John. Design Guidelines in American Cities: A Review of Design Policies and Guidance in Five West Coast Cities. Liverpool: Liverpool University Press, 1999; Punter, J. and Carmona M. *The Design Dimension of Planning*. London: E. and F. N. Spon, 1997, p. 178; Cowan, R. *The Cities Design Forgot: A Manifesto*. London: Urban Initiatives, 1995, p. 13; Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 9; Oc, T. and Tiesdell, S. *Safer City Centres: Reviving the Public Realm*. London: Paul Chapman, 1997, p. 15; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997; Bacon, Edmund N. Design of Cities. New York: Penguin Books, 1964, p. 231.

[1330] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 8.

[1331] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 9.

[1332] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 11-12.

most connected cities, transportation is only one of the functions that is present within the Street.[1333] This means that in order to resuscitate the street, a closer examination of those functions and their dimensions must be in order. This is so that codes can be reviewed or changed to ensure that proper design takes place.

> "The extensive allocation of land for circulation purposes in residential suburbia has resulted not only in the depletion of land and an increase in the economic burden for all, but it also has had social consequences. Street codes and standards that were established to facilitate vehicular travel performance have undermined residential livability."[1334]

10.2 Street Analysis

An analysis of the street requires a thorough review of what the street actually does and how it functions. When considering streets, most persons look at streets and their overall patterns--for we generally do not consider street lengths by themselves in the real world. Further, it requires an analysis of the actual structure of the street and the quantities and the benchmarks that streets require in order to physical function. This analysis also requires a review of the actual functions that the street provides that are incidental or resulting from the physical qualities or human interaction with the street. A review of street types and their historical patterns will help give a better understanding of why some streets work in a powerful way to create edges in neighborhoods or work as service access to the backs of buildings. Then, from the planar aspect of the street, there needs to be an analysis of the characteristics of the streets that not only make a street distinct but also make a street enclosed with building diversity and façade characteristics where the important part of the structure is how the building meets the street rather than the whole structure. Lastly, there is an analysis of Street design and

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[1333] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 14.

[1334] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 6.

how all of these elements have worked together on some of the great streets in the world.

10.3 Ordering and Gridpatterns: The Street Network

> "Beyond the different types of patterns—grids, curvilinear, diagonal overlays, eccentric—there are vastly different block sizes and shapes, street widths and lengths, and different mixes of these elements."[1335]

When streets come together to form patterns, the patterns that they form are called grids.[1336] With the various traditional patterns, known as dendritic, hierarchical and radial gridpatterns, and the more modernist sprawl gridpattern, which is has dendritic qualities at the closer scale and hierarchical and radial qualities at larger scales, this becomes a question of pattern versus process. Yet, when looking at the street network, it is important to look at the several characteristics that come from grids: pattern, hierarchy, figure and detail.[1337]

10.3.1 Pattern: Grids and Flow

> Some gridlines or lines within the gridline has symbolic function. "Some planned street patterns have an important symbolic function with certain meanings written into the overall plan. Traditional Chinese capital cities, for example, were planned as perfect squares, with twelve city gates, three on each side, representing the twelve months of the year; Roman new towns had two intersecting main streets representing solar axis and the line of the equinox. Such layouts are not always religious or ancient. In Washington DC, for example, the locations of the White House and the Capitol symbolize the separation of executive and legislative powers."[1338]

The pattern of the street is design that is created with the space and volume left within the public realm.[1339] We could say that form relates to supply and use relates to

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[1335] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 255.

[1336] Gindroz, Ray, et al. The Urban Design Handbook: Techniques and Working Methods. New York: W.W. Norton and Company, 2003, p. 35.

[1337] Moule, Elizabeth and Stefanos Polyzoides. "The Street, the Block and the Building." Moules and Polyzoides, 2014. http://www.mparchitects.com/site/thoughts/streets-blocks-buildings (accessed July 10, 2014), p. xxii.

[1338] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 83.

[1339] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 55.

demand. Form and use are quite straightforward and could be observed empirically by an outside agency (such as an observer from space) oblivious to the supposed 'purpose' of the street."[1340] While use is market driven, the grid form is plainly seen more so at the larger scale. "[Any] given street is always to be part of a street network." This pattern is based upon the connective sinews that relate the streets together and allow people to travel in a particular direction other than a straight line path. [See Figures 136, 138, 139 and 157] Where connections occur, or intersections, the individual roads and their purposes actually merge and allow alternative pathways for continued movement, while minimizing traffic loads.[1341] Some grids are more successful than others for traffic loads, creating a public street and for mapmaking and imaging purposes. For example, the hierarchical grid found in Roman settlements, Spanish colonial cities and the American city allows for expansion, and pinpointing of position, and yet Brasilia, Brazil is a modernist grid with huge superblocks and is hard to traverse.[1342] (See Figures 120 and 121) While from ancient times, traditional methods of grid pattern appear to still be useable and effective in present times.

> Morris, for example, examined several urban areas in terms of their dimensions and socioeconomic constrains, and in an interesting way established a comparison between block sizes that are similar, although belonging to different periods of time. Morris demonstrates that certain grids of the past appear to be well suited for mid-twentieth century city centre regeneration.[1343]

[1340] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 55.

[1341] Moule, Elizabeth and Stefanos Polyzoides. "The Street, the Block and the Building." Moules and Polyzoides, 2014. http://www.mparchitects.com/site/thoughts/streets-blocks-buildings (accessed July 10, 2014), p. xxii.

[1342] Zonu. "Brasilia Pilot Plan (Map), Brazil, April 21 1960." http://www.zonu.com/brazil_maps/Brasilia_Pilot_Plan_Map_Brazil.htm (accessed July 23, 2014); Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 13.

[1343] Morris, A.E.J. *History of Urban Form: Before the Industrial Revolutions*. London: Prentice Hall, 1972, p. 135; Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 2.

What is also apparent is that the modern gridpatterns are now under assault and criticism for the effect that they had on cities and their neighborhoods.

> "As cities recover, gone are the most damaging planning and development tendencies of the 20th Century, a time when superblocks and freeways destroyed neighborhoods, when buildings were often designed without regard to pedestrians and street life, and when suburban forms such as strip malls and gated housing developments invaded historic communities."[1344]

As one can see from this discussion that the gridpatterns are not only patterns but highly charged philosophical positions of what is better, what is more modern, and what is better.

On the city scale, the girdpatterns shows the relationship of the blocks with each other. "There are many reasons, then, to know about the physical patterns and scales of urban streets and blocks, not the least of which is that they are compelling in their own right, just as patterns."[1345] Many times grids show developments and changes in the cities and indicate time periods of city development and expansion. They also indicate how cities are different as a result, and from this one, many times, can make comparisons dependent solely on girdpatterns and street design.

> "An important place quality established by the cadastral pattern is permeability--the extent to which an environment allows people a choice of routes through and within it. In general terms, it is a measure of the opportunity for movement (a structural facet of the system)."[1346]

Grid planning and patterns are ultimately about accessing the entire urban form of the developed grid.[1347] "In general, circulation systems may be integrated or dispersed," whether those circulations systems relate to water in general or

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[1344] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, pp. 66-67.

[1345] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 203.

[1346] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 81.

[1347] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 193.

commerce.[1348] The grid thus forms channels whereby commerce or people flow from the blocks into the public realm, given access to the entire urban form rather than being limited to within the spatial corners of the block or lot.[1349] These channels have to be clear, easy, and suited for the city at the small and large scale.[1350]

Sometimes these grids are laid down as overall development patterns or by accretion. "Patterns of streets and spaces have developed over many hundreds of years, changing and evolving in the process."[1351] They have a tendency to have permanency once set, and they change rarely except by concerted effort or planning by politically powerful bodies--to varying success. "In the twentieth century, new roads have often been cut through the street pattern of older areas, frequently leaving fragmented townscapes in their wake."[1352] Yet, even with these changes, like a palimpsest, the changes in urban form can be tracked by simply looking at the gridlines that are formed.[1353]

> "But if the two areas are drawn at the same scale and cover the same amount of space on a drawing, we are likely to be surprised at their relative sizes the sizes of the streets, the blocks, etc., because we did not experience them comparatively. To look at different cities drawn at the same scale and for the same area is to gain a knowledge of relative sizes that is almost certainly "different form our experiences."[1354]

The grid within urban form generally takes four planning methods: grid planning, idealized planning, localized planning methods, or unplanned (accretion) grid

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[1348] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 194.
[1349] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 193.
[1350] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 195.
[1351] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 80.
[1352] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 80.
[1353] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 80-81.
[1354] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 203.

methods.[1355] [See Figures 147 and 148] "A basic distinction in cadastral patterns can be made between regular[, localized] or 'ideal' grids characterized by geometric regularity and organic or 'deformed' grids characterized by apparent irregularity."[1356] What occurs within the city though is that the planning methods usually converge so there are multiple remnants of different planning methods within the same city.[1357] (See Figures 122 and 141).

Grid planning or hierarchical gridplans rectangular in nature and are pretty effective--with uniform though sometimes different results. The grid planning method generally consist of rectilinear blocks, straight streets, squares and blocks meeting at T or X-intersections.[1358] The aim of this method is to create a grid that is easy to expand, and easy to plot and divide. Manhattan, Barcelona, San Francisco, Amsterdam, Paris and Portland have examples of hierarchical gridpatterns, which sometimes are triangular or prism in nature.

> "The seldom encountered triangular grid produces difficult intersections but allows straight travel in three instead of two directions, and so comes closer to providing uniform access."[1359]

In the United States, the hierarchical gridpattern (the American grid) is characteristic of time period of uniform expansion during the scientific age when the surveying of the United States took place, and townships and cities became dotted with

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[1355] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, pp. 8-9; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 82.

[1356] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 82.

[1357] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 9.

[1358] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, pp. 8-9.

[1359] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 195.

railroad established cities along transit corridors of the grid.[1360] Simply by looking at the street lines without any specificity or detail, one can see the blocks and the entire realm of the public space.[1361] Even with similar designs, the gridpattern generally is indicative of one particular city, where they stand out if drawn at the same scale. "There are also similarities between city patterns, but what stands out first is the variety. Once seen, there is no mistaking Rome or Venice or the tip of Manhattan, or Paris, Amsterdam, Cairo, Brasilia, or Irvine, California."[1362] Cities are distinguishable simply by their street grid patterns, even if their architectural infill and all other things are the same.[1363] Each stand out in particular in separate ways, usually in the ways that the grids combine in these cities because generally cities have many grids combined into grid blocks rather than a single grid.

> "The patterns of Lucca, Bologna, Copenhagen, and early Barcelona, for example, are not alike. … Of much latter vintage, the grid pattern of Savannah, Georgia, is like no other we know in its fineness and its distinguishable squares. … The grid of turn-of-the century Barcelona standards out because of its diagonal corners, even from a similar grid by the same designer in Madrid. Paris and Seoul may have large-scaled street pattern laid over more finely scaled earlier ones, but the resemblance ends there."[1364]

In the United States though, most hierarchical gridplans are similar in typology and dimension.[1365] This might be because very few cities had the organic structures of accreted grids from the medieval/feudal ages as does Europe. (See Figure 122).

[1360] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 255; Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 335; see also Jackson, Kenneth T. *Crabgrass Frontier: The Suburbanization of the United States*. New York: Oxford University Press, 1985.

[1361] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 255.

[1362] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 255.

[1363] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 255.

[1364] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 255.

[1365] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 255.

> "It is difficult, too, to distinguish in memory one U.S. suburban residential area from another (one in Walnut Creek, California, from another in Irvine, California, from still a third one on the outskirts of Phoenix, Arizona, for example), though they may indeed be different. They have overall patterns with similarity placed streets, generally without focus."[1366]

Before modernist planning, this act of rectilinear planning was the first act of the city comes in the formation of the street pattern on the landscape.[1367] "The sizes of blocks and the widths of streets appear similar in such cities, at least in proportion."[1368] To many this makes the grids in the United States boring in comparison with other cities, being that the claim to now show age--but in reality it simply shows that the United States did not go through a period of completely unplanned blocks built be accretion--almost all of the street grids in the United States were planned. This defined the public realm and the relationship the streets have with the blocks. "In the American urban tradition the cutting of a grid is a first presence of urban structure in the landscape. In this act of making a place, space is allotted for both public and private uses—of building and for open spaces."[1369] This called back to the Roman castra/castrum which set the main roads of the Roman militarized area. These highly planned and regularlized areas were built on a "plan ordinarily [comprised by] an orthogonal network of streets dividing the planned area into primary building blocks (or insulae) which are further divided into rectilinear individual plots as the basis of urban land distribution."[1370] One can see this grid pattern in Greek and Roman cities throughout Europe, and "European city planners in the USA for Philadelphia, Manhattan Island, Oklahoma City, San Francisco and

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[1366] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 255.

[1367] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 15.

[1368] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 255.

[1369] Moule, Elizabeth and Stefanos Polyzoides. "The Street, the Block and the Building." Moules and Polyzoides, 2014. http://www.mparchitects.com/site/thoughts/streets-blocks-buildings (accessed July 10, 2014), p. xxi.

[1370] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 15.

countless others, and Latin America, where the Laws of the Indies made it the mandatory basis of Spanish colonial city planning."[1371] Yet, like any grids, regularized grids can expand through accretion or further expansion of the grid.

Many criticize the hierarchical girdline as visually monotonous, for its disregard for topography and for its vulnerability to traffic, but at the same time it has been pretty successful.[1372] Mistaking grids for completely regular grids with no differentials between any streets, the critics fail to realize that most grids have larger and smaller streets which can modulate as well as dendritic gridpatterns. "Heavy or through traffic can be directed onto particular lines of the grid, and monotony can be avoided by varying the building and landscape pattern."[1373] In some ways the traditional grid offers more traffic modulation and control because there are more access points and traffic options which lessen traffic upon any one egress point.

> "All flows may be made one-way, alternating between one line and the next parallel one. Capacities will increase, and intersections will be simplified, with most of the conflicting maneuvers eliminated."[1374]

The grid has a built in efficiency and redundancy, so that when blockages occur, travel can still run effectively upon other routes because of the connectivity.[1375] Further, within time, and as lots and blocks tend to become finer, the grids become simpler over time.

> "The grids used to layout cities in the USA have become simpler over time. The public squares and diagonal streets, which constituted important features of earlier street patterns--Savannah, Philadelphia, Washington--were omitted in later street patterns in favour of simpler, unadorned systems of straight streets and rectangular blocks, by which large, relatively plain tracts of land could easily be divided into manageable plots and sold off."[1376]

[1371] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 15.
[1372] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 195.
[1373] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 195.
[1374] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 195.
[1375] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 195-196.
[1376] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 82]; Reps, John. Town Planning in

The girdline in the United States offered an opportunity for quick ownership and expansion with their ease in replication. "Noting that few American cities used the grid-iron as 'more than an equitable expedient,' Morris regards Savannah as an important exception and suggests the urban mid-west's geometry might have been 'less monotonously debasing' under its influence."[1377] This is more difficult with other grid systems with efficiency, ease of valuation and creation of the public sphere.

In the 14th Century Franciscan monk named Francesco Eiximenis lived in Barcelona.[1378] He developed a plan to reinvent Barcelona according to an ideal regularized gridline that did not match with the current accumulated grids at that time. "In the context of a strong urban planning dynamic of the time, Eiximenis brought a humanist approach to the ideal city, designed a complex city that took into account geographic al and aesthetic aspects of internal structure."[1379] He regularized the smaller block systems and lengths within the square and created a more systematic gridline organized by a Renaissance ideal of space.[1380]

> "Compared to the difficulty of understanding the aggregated space of the Gothic city, the Renaissance city features space as a system of organization in itself."[1381]

Frontier America. Columbia and London: University of Missouri Press, 1980; Reps, John William. *The Making of Urban America: A History of City Planning in the United States*. Princeton, NJ: Princeton UP, 1965.

1377 Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 82; Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, Morris, A.E.J. *History of Urban Form: Before the Industrial Revolutions*. London: Prentice Hall, 1972, p. 347.

1378 Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 55.

1379 Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005 p. 55; Vila, S. *La Cuidad de Eiximenis: Un Proyecto Teórico de Urbanismo en el Siglo XIV*. Valencia : Diputación Provincial de Valencia, 1984; Puig I Cadafalch, J.. *Idees Teòriques Sobrea Urbanisme en el Segle XIV*. Barcelona: IEC, 1936.

1380 Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 55.

1381 Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 55.

While it was never realized, this does indicate that many thinkers we proposing regularized ideal gridpattenrs for Barcelona before Cerdà came to fruition.

The radial gridpattern is a type of gridpattern based on cross movements from one part of the urban form to the other. While diagrammatically beginning within idealized plans of cities, this radial pattern quickly became a way to superimpose a grid upon blocks built by accretion. “Another general form is radial, in which cannels spread out from a center.”[1382] Whereas hierarchical gridpatterns create street grids which flow in four directions, the radial gridpatterns flow diagonally across the city to quickly spread across the built form. “The radial system afford the most direct line of travel for such centrally directed flows, although at high levels of traffic the central terminus becomes difficult to handle.”[1383] Successful examples of the radial gridpattern can be seen in San Francisco, Paris, Amsterdam and Barcelona, where the radial plans work efficiently with the hierarchical gridpattern or other types of gridpatterns. (See Figures 122).

Paris and Rome are the epitome of radial grid networks. One should note that like Rome, Georges-Eugène Haussmann’s recreation of Paris effectively was the superimposition of Baroque force lines over a previous medieval block structure. The force lines by avenues and boulevards allowed important points or landmarks to be seen as vistas and as ways of placemaking, thereby sidestepping the problem of recreating an entire urban structure in a gridline fashion.[1384] Where in Rome, the cohesive idea was

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[1382] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 196.

[1383] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 196.

[1384] Bacon, Edmund N. Design of Cities. New York: Penguin Books, 1964, p. 83; Cohen, Jean-Louis. Paris: La Ville et Ses Projects: A City in the Making: Babylone. Paris: Pavillion de L’Arsenal, 1988, p. 12; Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 1; Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 32; Hall, Thomas. Planning Europe’s Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, pp. 8-9, 22, 54.

force lines, in Paris, these force lines became urban form. “The interrelationship of these lines and their interaction with the old structure set into play a series of design forces which became the dominating element in the architectural work among them. Here the cohesive element is a line of force rather than a volumetric form.”[1385] Haussmann had to deal with a medieval city of convoluted streets built upon a previous Roman castra.

> “The embryo of Paris was a Roman settlement sprawling on both banks of the Seine, but concentrated during Late Antiquity to the Île de la Citè.”[1386]

After the disintegration of pax Romana, the city built by accretion with several building walls surrounding the cities original banks, showing where and how the city expanded during several development phases.[1387] “By the end of the Middle Ages Paris had become a complex urban structure of several core settlements now joined to one another.”[1388] Haussmann used the radial gridpatterns to shave a pathway through the block accumulations and to impose a hierarchy and gridpattern that allowed for efficient circulation and to actually allow for an efficient Street, while at the same time imposing monumentalism within an urban form. If there was any criticism of Haussmann it was political and economic. He invariably created a bourgeoisie city for the rich and for the taxpayer, because he considered the city wealthy if had taxpayers that were wealthy.[1389] Yet, this does not undermine the benefit to the entire urban form that resulted from his exploits, and this shows why his imposition of order on unplanned urban form is so powerful.[1390]

[1385] Bacon, Edmund N. Design of Cities. New York: Penguin Books, 1964, p. 83.
[1386] Hall, Thomas. Planning Europe’s Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 55.
[1387] Hall, Thomas. Planning Europe’s Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 56.
[1388] Hall, Thomas. Planning Europe’s Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 56.
[1389] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, pp. 2-7.
[1390] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, pp. 2-7.

> "The technical challenge was that of modernization and sanitation and, more importantly, the improvement of living conditions, transport and infrastructure, Haussmann's city experienced the most profound structural change to become a planned city."[1391]

The result of his aims created efficient changes and directions of services, goods, markets, etc. "facilities, in the contemporary meaning, appeared everywhere: town halls, offices, ministries, schools, post offices, markets abattoirs, hospitals, prisons, barracks, chambers of commerce, stations and so forth."[1392] The beauty of Haussmann's action is that this proof that the gridline effectiveness actually affects the urban experience and can drastically change in urban form from messy to perceptively progressive.[1393]

In Barcelona, one of the initial plans actually approved by the city was the Rovira i Trias radial block pattern which was fundamentally smaller than Cerdà's Plan, ad more like New Orleans or Amsterdam's core expansion than surprisingly than other cities.[1394]

> "Rovia i Trias's proposal is more sophisticated and indicates an attempt to combine a traditional design language with the demands of a modern town. ... The new urban area is divided by a series of main streets, radiating out from the old town in trapezoid [132] sectors, in a way that is reminiscent of the radial plans of the planning theorists."[1395]

Rovia i Trias plan was based on a highly designed network of streets and blocks of grids that was artistic but would have been hard to expand. "If Rovia I Trias's project

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[1391] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 8.

[1392] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 8.

[1393] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 8.

[1394] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 123; Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, 132; Aibar, Eduardo and Wiebe E. Bijker, "Constructing a City: The Cerda Plan for the Extension of Barcelona." Science, Technology, and Human Values, Vol. 22, No. 1 (Winter 1997): 7. http://www.jstor.org/stable/689964 (accessed July 8, 2014).

[1395] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, pp. 132-133.

could be described as an obvious ‘architect’s plan’, then Cerdá’s proposal is an equally evidence ‘engineer’s plan.”[1396] It is very interesting when talking about planning how sophisticated plans based on ideal cities generally do not work, and yet they are considered sophisticated and ideal by those who review them. What is interesting is that in very few other situations have plans like Trias actually worked. In Amsterdam, the radial canal plan was tried and then abandoned as the further expansions to the city went against the economic practicalities of development and future realities of the needed ease of expansion.

> “The three canals of the 1607 plan are the Herengrracht, the Keizersgracht and the Prinsengracht, named in sequence out from the centre.”[1397]

In From 1586 to 1622, in Amsterdam, the expansion of the city beyond the original urban core of canals and dikes began with three wide canal broadways. These canals were functional in that they allowed merchants to bring their material to their attic storage units, and each were 80 feet wide.[1398] And each encircled the city in a local way allowing ease of transit and circulation of merchant goods.

> “The Herengracht, 80 feet wide, had been excavated in 1586, and the Keizersgracht, 88 feet wide, in 1593.”[1399]
> “The third canal, the Prinsengracht, 80 feet wide, was excavated later, in 1622.”[1400]

[1396] Hall, Thomas. Planning Europe’s Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 33; Beigel, Florian, and Philip Christou. Architecture as City: Saemangeum Island City. New York: SpringerWein, 2010, p. 92; Aibar, Eduardo and Wiebe E. Bijker, “Constructing a City: The Cerda Plan for the Extension of Barcelona.” Science, Technology, and Human Values, Vol. 22, No. 1 (Winter 1997): 13. http://www.jstor.org/stable/689964 (accessed July 8, 2014).
[1397] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 222.
[1398] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, pp. 222-223.
[1399] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, pp. 222-223.
[1400] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 223.

These canals were radial away from the city center in a ring of canals.[1401] Unlike other radial plans though these were functionally related to the speed and nature of water traffic and commerce. Further, this really encircling plan allowed people to know exactly where they were in relation to the medieval urban core without getting lost.

San Francisco's grid dates back to before 1847 when the city was Yerba Buena, when it was originally a smaller settlement within a Spanish settlement. In 1847, and commissioned by mayor Lt. Washington A. Barlett, after the change of name of Yerba Buena to San Francisco, Jasper O'Farrell reworked the grid.[1402] O'Farrell wanted to change the grid and introduce new patterns, but he was voted down. "He is said to have tried to introduce streets adapted to the hilly terrain; but landowners would tolerate no deviation from the gridiron street system shown on Vioget's map of the town, because they considered this pattern most convenient for the subdivision of lots."[1403] In doing so, O'Farrell straightened out the lots and made a grid pattern, "which were confined as containing six lots, each 60 varas (135 square). O'Farrell cut diagonally across the southern side of the grid and separated San Francisco by a 45 degree street--Market Street.[1404] This section of the city would join together as Y- and T- intersections to create unity between the two corresponding gridpatterns--each regularized grids.[1405] O'Farrell then set to install a regularized grid over the hilly terrain, which allowed San Francisco to expand exceptionally quickly during the gold rush of 1848.[1406]

[1401] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 223.
[1402] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 356.
[1403] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 24.
[1404] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 356.
[1405] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 356.
[1406] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, pp. 356-357.

In 1870 in San Francisco, the city wanted to connect various portions of the city together to make straighter pathways of direction.[1407] As a result, developers cut through a large portions of the waterfront to produce Montgomery, now Columbus, Avenue.[1408] "A magnificent new Avenue…is soon to be opened from the upper end of Montgomery Street to North Beach, more than a mile through the built up portion of the city."[1409] In order to do this though the city had to rationalize not only the pathway, but it had to shave off portions of previous lots and blocks without creating more disunity.[1410]

After the San Francisco fire of 1906, James Duval Phelan, former mayor and lawyer, worked to create a more detailed development plan for San Francisco with his associates.[1411] Phelan and his associates worked to get Daniel Hudson Burnham involved in the creation of the plan for the city.[1412] Burnham wanted to create series of arteries for circulation, like the concentric rings that worked in Paris, Berlin and other areas.[1413]

> "Such a system permits rapid and easy movement throughout a city and its environs and is regarded by most contemporary city planners as the ideal."[1414]

Burnham also created radiating lines like spokes in a wheel which allowed or further development.

> "But the intermediary circuit boulevards, if carried in a concentric form would be impractical because of the numerous hills. He proposed

[1407] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 58.
[1408] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 58.
[1409] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 58.
[1410] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 58.
[1411] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, pp. 98-99.
[1412] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 99.
[1413] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 102.
[1414] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 102.

> however, to create an irregular inner chain more or less concentric to the inner circuit."[1415]

When the earthquake of 1906 hit, the Burnham plan was forgotten.

> "The most historic part of San Francisco was ashes, rubble, contorted scraps of metal, and shattered walls. … The loss of property amounted to at least half a billion dollars. Exactly how great the loss of life was will never be known."[1416]

In New York, when the expansion of the city began from Lower Manhattan, the city planners had to decide whether or not to have an idealized city or a girdline pattern. They opted for the gridline pattern based on efficiency reasons and future expansion--which they thought would never occur.

> "That one of the first object which claimed attention, was the form and manner in which the business should be conducted; that is to say, whether they should confine themselves to rectilinear and rectangular streets, or whether they should adopt some of those supposed improvements, by circles, ovals, and stars, which certainly embellish a plan, whatever may be their effects as to convenience and utility. In considering that subject, they could not but bear in mind that a city is to be composed principally of the habitations of men, and that strait sided and right angled houses are the most cheap to build, and the most convenient to live in. The effect of these plain and simple reflections was decisive."[1417]

The surveyors worked against the backdrop of Baroque design where focal points for important uses and vistas for those important buildings or nodes would be required in city design.[1418] The surveyors were motivated not by philosophical details but only the buying and selling and improvement of the property.[1419] While some consider have considered the gridiron a disaster for modern city planning, it is interesting how flexible

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[1415] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 102.
[1416] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 109.
[1417] Cornell University. "Commissioners' Remarks," in William Bridges, Map of the City of New York and Island of Manhattan, New York, 1811." *Cornell Urban Planning Library*. http://urbanplanning.library.cornell.edu/DOCS/nyc1811.htm (accessed August 3, 2014); Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 137.
[1418] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 140.
[1419] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 140.

the design has been and how resilient the structure has been for city economy and the ability to sustain great densities of people. “To be sure, the north-south streets in New York are generally wider than the east-west streets, and Broadway and Park Avenue differ from other streets.”[1420] Gridline in the city do not have to be monotonous.

> “The 1811 plan of midtown Manhattan had abroad, short-block avenues for large buildings and narrow, long-block streets for smaller houses, while open squares (e.g. Washington Square), wider avenues (e.g. Park Avenue) and the meander of Broadway induce differentiation and interest.”[1421]

The gridline has some interruptions such as Broadway and Central Park and others that create some diversity, but it is uniform enough and gridline enough to be easy to imagine.[1422] In fact, what one finds is that the gridline is so easily imagined, that the person spreads the gridline over all of Manhattan Island rather than just in the areas where the gridline actually exists.

> “The 1811 plan of midtown Manhattan had abroad, short-block avenues for large buildings and narrow, long-block streets for smaller houses, while open squares (e.g. Washington Square), wider avenues (e.g. Park Avenue) and the meander of Broadway induce differentiation and interest.”[1423]

The idealized plan refers to creating models or projects based on ideal situations or by certain philosophies. “Ideal city planning refers to either to creation of model projects illustrating theoretical concepts of the ideal form and function of the town, or to towns create under the inspiration of such notions.”[1424] (See Figures 125 and 126).

[1420] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 258.
[1421] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 83.
[1422] Hall, Thomas. Planning Europe’s Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 11.
[1423] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 83.
[1424] Hall, Thomas. Planning Europe’s Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 9.

In the 17th Century, Simon Stevin created the ideal plan, plan and building for Amsterdam.[1425] His blocks measured around 300 feet x 300 feet, and act as a perimeter block.

> "In Stevin's ideal plan a block of about 100x100 meters is divided into two tiers of ten equal lots. The building must abut one another and the facades must be provided with awnings. These rules has a double purpose: on the one hand, for the residents, the enclosed back gardens decreased the danger of thieves breaking and entering; on the other, for pedestrians on the public street, the continuous building frontage and awnings provided protection from sun, rain and wind."[1426]

What is interesting is that in the Dutch case, the safety precautions were to block off the back of the block and to create an enclosed façade or perimeter building network, so that the only entrance was the façade.[1427] Further on the canal sized blocks, there was unity in the plot size so that the canals would have unit across the city. "Fixing the lot size along the canals emphasized the unity of the canal."[1428] This unit had previously occurred in the ring system of the canals, where the large lots met the canals with the smaller lots on the radial streets "on which tradesmen could establish themselves and where commercial traffic was concentrated."[1429] What is also interesting about the block is how similar the block dimensions are to Cerdà's block in Barcelona which had dimensions that were 360 x 380 feet with a similar perimeter block façade.[1430]

[1425] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 253.

[1426] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 253.

[1427] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 253.

[1428] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 253.

[1429] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 253.

[1430] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 37; Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 11.

In 1937, Barcelona had the opportunity to change to a more idealized plan. In response to the economic situation in Barcelona with density, immigrants, substandard housing, illegal housing and world changes, GATEPAC (the Group of Spanish Artists and Technicians for the Promotion of Contemporary Architecture) formed, with a purpose of transforming Barcelona into a functionalist perspective of habitation, leisure, work and circulation--mirroring CIAM and Le Corbusier's ideas of the mechanical city.[1431] Before, there was the appearance of the Marcià to radically change Barcelona in a series of large super blocked streets, so that it would become a functional city.[1432] The Marcià plan based some of its changes on views rather than traditional areas of human habitation, and focused on creating areas of habitation, production areas such as the port and industrial areas, creating a civic center, having recreational sectors and have highly focused traffic and circulation networks.[1433]

> "In this case, the Marcià Plan reinterpreted the Cerdà layout, seeking a superior hierarchy in the street system--the supergrid of three streets by three streets--in order to allow a more hygienic, less built-up form of construction."[1434]

Along with these efforts, Le Corbusier worked to impose the Villa Radieuse upon Barcelona with low cost residential expansion, high density buildings that were much larger than the Cerdà Eixample or the Cuitat Vella system of grid making in blocks.

> "The suggested model of dwellings adopted the 400 x 400 metre module, corresponding to three by three complete street blocks of Cerdà' layout. On the basis of this unit, the district produces six groups of new houses with narrow facades comprising a ground floor and two storeys. Tis scheme produced a density of over 60 dwellings per hectare, making it possible to calculate the repercussions of the cost of urban services per house, with regard to both construction and maintenance."[1435]

[1431] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, pp. 248-257.
[1432] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, pp. 248-249.
[1433] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 253.
[1434] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 254.
[1435] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 256.

While this was well intentioned, the purpose was not to create a functioning city framework with these design. The function was to maximize habitation and corresponding water and sewage systems and maximizing focused circulation traffic without regard to how people were actually going to use the space. There was even the theoretical use of trees in ways that trees do not work in either the environment or in urban form.

> "The dwellings would share communal services distributed within the maco-block, and the urbanization of the public space was complemented by the planting of a tree in front of each house to make the plot division and provide a common element that changed in the course of the year to generate outward expression."[1436]

The interesting use of trees shows a shift from prior notions of planning to a more philosophical notion of urban design. Environmentally, trees create shade, reduce heating, create assembly, address toxins, and mediate humidity for very little cost. But they were never token indications of ownership. In 1936 along with the establishment of right wing dominion in Spain and Catalonia, the Statute of Catalonia was suspended and GATCPAC became incorporated into the SAC (Societat d'Arquitectes de Catalunya).[1437] Josep Luís Sert was forced to go into exile where he moved to the United States, becoming Harvard's Director of the Harvard Design School, where he furthered the use of modernism in the United States, in 1937 which was one of the beginning periods of modernist expansion outside of the cities--sprawl.[1438]

Localized planning methods create functional or ceremonial functions within a city. "This type of planning is often aimed primarily at providing for ceremonial functions,

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[1436] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 258.
[1437] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 262.
[1438] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 262.

creating a splendid setting for a prince or for ecclesiastical or temporal institutions, or for the city itself; aesthetic considerations are thus crucial."[1439]

Founded by the Dutch in 1624, New York was planned as a series of narrow parcels.[1440] "These parcels were long and narrow, 450 rods long and varying in width from 55 to 80 rods. A rectangular pattern of roads and ditches, the later presumably for controlled drainage and irrigation on the Dutch pattern, was specified to serve the farm parcels."[1441] They said out streets that were 25 feet in total wide, with lots that were 25 feet by 50 feet in total for housing.[1442] The center square of the entire endeavor was a market square of 100 feet by 165 feet, and on it were a church, hospital, and school.[1443] It was a symmetrical pattern that the town was unable to continue and carry out when funding became an issue.[1444] It then started to grow organically and streets were added as needed, such that the medieval nature of the town required appointed surveys to lay out streets, add houses and require development to be to some normalized built pattern.[1445]

> "Owners hurried to plat their property into blocks and streets. Surveyors employed by the commissioners were greeted with general hostility. According to one account, they were often driven off properties they were attempting to survey, in one case being pelted with artichokes and cabbages by an irate woman who had made a living for twenty years selling vegetables and who did not intend to have her property divided by strangers."[1446]

[1439] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 9.

[1440] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 126.

[1441] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 126.

[1442] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 128.

[1443] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 128.

[1444] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 128.

[1445] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, pp. 128-130.

[1446] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 135.

What is interesting is that while the surveys were taking place in New York for the extension, city planners decided to forgo changing the streets that were in the more accretion sections of the city. Instead, they created the new gridlines and patterns to attach to the accreted streets already present.

> "The commissioners found it impossible to adjust their plan to the irregular property boundaries and the random streets that already existed in the vast territory under their jurisdiction."[1447]

Unplanned or irregular building by accretion results in irregular and winding streets, usually within medieval or feudal buildings systems. "Unplanned or spontaneous urban development is determined by factors such as topography, existing paths or tracks and buildings, traffic flows, ownerships boundaries, etc. This often results in winding streets and irregular plots."[1448] In many European cities, where the grids were initially set as Roman castra, their cities expanded through use and accretion to remove the regularity of the previous Roman grid--while keeping the larger and most functionally important streets intact--such as London, Paris and Barcelona.[1449]

10.3.2 Changed, Romantic and Deformed Gridplans

There are other gridplans which exist in nebulous or infantile states. These gridplans have aspects of the previous gridplans. Some also function like previous gridplans at different stages of development.

Linear gridplans are systems based upon aspects of the grid without extensions, and they are generally known as "roadtowns."[1450] One systems of intersection join the linear gridplans, these systems start to expand in other types of grids. However, there

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[1447] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 137.
[1448] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 9.
[1449] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 16.
[1450] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, pp. 196-197.

are some cities like Atlanta or Dubai that maintain a linear aspect to the gridline within the build environment, although in the broader context the linear aspect is within a broader gridpattern. (See Figure 123) When the liner gridplan expands into a gridpattern, it sometimes expands with offset, and thus it becomes a T-grid system where there is a deliberate and intentional disordering of the gridline system, from what it would otherwise become--consistent connectivity and X-intersections. (See Figures 127 and 128]. Many justify T-intersections as easy ways to flow with the typology, slow traffic and tend to be economical, but these can create complete disorder if unregulated and used on large scale.[1451] Even more than the sprawl pattern, they completely divorce from place and imageability.

Romantic grids or deformed grids are traditional gridpatterns with curvilinear street networks. These are not the medieval systems which tend to be straight street oriented based on the building façade, these are systems where the framework street is intentionally curved for a symbolic reason--the picturesque.

> "Curvilinear layouts derived from English picturesque designs of the early nineteen century, such as Jon Nash's 1823 design for Park Village, near Regent's Park. Another early example was Olmstead and Vaux's 1868 plan for Riverside near Chicago."[1452]

Camillo Sitte criticized the rigidity of the gridline because all streets ran perpendicular until they reached the countryside.[1453] Similar to the oblique pathways of approachment to Greek temples used to bring magnanimity of the temple area, the roads from rural to the city are completely different roads in type and function. These roads not only allow transportation between different cities, but also the aggrandizement

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1451 Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 197.

1452 Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 83.

1453 Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 83; Sitte C. *City Planning According to Artistic Principles*, trans Collins, G R and Collins, C. C. 1965. London: Phaidon Press, London, 1989.

the city itself in the approach[1454]. "Approach routes present cities to us. They must satisfy the visual requirement of presenting architecture and cities in their best light, while enabling us to find our destination readily."[1455] One could say that there might have been confusion between rural to urban pathways of approach within the city. Many like Sitte did note the difference and complained about the traditional gridlines within the city on aesthetic grounds. Many took a similar approach and worked to bring rural lines of approach into the city to create more pleasing urban environments, which created gridlines that were immediately visually terminating within short distances.

> "During the late nineteenth century and early decades of the twentieth century, the dominance of rectilinear patterns provoked reaction in the form of continuous curvilinear layouts, where wide, shallow plots (in contrast to deep narrow plots) gave an impression of spaciousness."[1456]

The effect of these street was to create interesting views based on surprise, because there was a reduction in permeability, these streets also created exclusive neighborhoods which limited the area to localized traffic. "While the curves contain views and add visual interest to newly developing neighbourhoods and suburbs, they also reduced visual permeability, discouraging non-residents from entering."[1457] This might not be the purpose of curved roads used en masse, but this is the effect. These roads work in the country because they enhance an already permeable visual and physical existence. "In the open landscape, existing and proposed routes should be examined and assessed with a view of how well they relate to the natural terrain."[1458] In

[1454] Except highways which are only lanes of transport and divorced from their context.
[1455] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-9.
[1456] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 83.
[1457] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 83.
[1458] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-8.

order for these roads to work, the cities densities of people or building stock must reduce to countryside levels.

Organic and curvilinear streets create problems for the pathway as an edge, and this is a fundamental issue. When instinctually, humans use pathways for their directional qualities, the physical and visual line of motion is important for its clarity and its direction.[1459] Granted, hierarchical, radial and even ancient dendritic gridpatterns are simplistic, but that is why they are also powerful--their simplicity creates ease of movement and ease of imagining of the entire cityscape. The important aspect of a pathway is not that is a pathway but that people can easily use the pathway for its intended purposes and functions.

> "A street is perceived, in fact, as a thing which goes toward something. The path should support this perceptually by strong termini, and by a gradient or a directional differentiation, so that it is given as sense of progression, and the opposite directions are unlike."[1460]

Most recently, neotraditionalists like the CNU have fought for traditionalist approaches that focus on the before mentioned traditional gridpattern. While some neotraditionalist approaches have traditionalist approaches, others have traditionalist plus early planning approaches with more romantic designs.[1461] It should be noted that while the romantic gridpatterns have a large degree of blocks that have less connectivity throughout the district, purposefully, the neotraditionalist districts have more hierarchical grid connections and intersections, leading to more ease of movement. To be fair, it would be appropriate to consider neotraditional design at some undesignated place between romantic and traditional gridplans to varying degree.

[1459] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 96.
[1460] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 97.
[1461] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 39.

> "Neo-traditional designs, which has been one of the main stimuli behind this book, is to a significant extent associated with the desire to replicate traditional street patterns. As alluded to earlier, these neo-traditional patterns are not necessarily structurally faithful to actual traditional patterns."[1462]

Sprawl gridplans are systems that are dendritic perform functions that are similar to dendritic, hierarchical and radial gridpatterns. On a smaller scale, they have the dendritic grid patterns, but many times on a larger scale, they form large or deformed hierarchical or radial gridpatterns. This is because on a larger scale, no dendritic system is completely dendritic and for efficiency purposes, it too must break down into grid pieces. (See Figure 124)

> "While deformed grids usually have a picturesque character as a result of the changing spatial enclosure, regular grids have been criticized for their supposed monotony."[1463]

10.3.3 Hierarchies: Use/Function and Structural

> "So, some kind of hierarchy can be 'good' from an urban design point of view—although it is not necessarily clear or consistent what this 'good hierarchy' entails. It might be contrasted with 'bad' hierarchy of conventional engineering approaches, but even here, the distinction is not necessarily clear."[1464]

When grids form, the pathways within those grids generally create hierarchies of use and function hierarchies and structural hierarchies. These divisions and hierarchies allow designers and planners to distinguish exactly the types of qualities wanted or expected from certain urban grids.[1465] Use and function hierarchies are determined by empirical studies of find detail rather than form, and in these studies, one finds that vehicular use of gridlines is not necessarily the most important function--among other

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[1462] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 39.
[1463] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 83.
[1464] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 35.
[1465] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 35.

uses.[1466] These functional hierarchies tend to regulate the spaces floating in the gridplan (blocks and lots) as more rooms or units of cellular space--urban rooms.[1467] The intent of perspective though tends to break the city and gridpattern down as incidental to the rooms themselves rather than as inherently connected to the whole.[1468]

> "The problem with the 'rooms and corridors' analogy is that it only recognizes two possible types of space—polarised between the corridor, emphasizing circulation (usually connoting an impersonal, transient space), and the room for occupancy (usually connoting safety, comfort, ownership, identity). While these may reflect the extreme of the motorway and the precinct, this leaves no place for the traditional mixed function urban street which serves both as a circulation artery and as an urban 'place' in its own right."[1469]

Structural hierarchies are those differences or modulations in design are imprinted within form. One can see that both of these types of function are actually diagrammatic in manner. The only differences being that that use and function hierarchies occur by the interaction of humans and their environment and are neither form-based nor are they immediately visible, and structural hierarchies are design hierarchies made form and visible and are not necessarily use based. So, where these both meet the middle are gridlines where there is identity of use such that the form meets the function.[1470]

10.3.4 <u>Hierarchies of Use and Function</u>

> "…[Function] reflects actual use to some extent, but is also directed towards future needs and uses, and therefore need not reflect present conditions (a route could be designated 'tourist route' even if little tourist traffic materialized)."[1471]

[1466] Moule, Elizabeth and Stefanos Polyzoides. "The Street, the Block and the Building." Moules and Polyzoides, 2014. http://www.mparchitects.com/site/thoughts/streets-blocks-buildings (accessed July 10, 2014), p. xxii.
[1467] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 48.
[1468] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 48.
[1469] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 49.
[1470] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2.
[1471] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 56.

Concentrating on use or use and function hierarchies, for planning purposes modern roads within dendritic or traditional gridpatterns generally have functionalistic labels depending upon the loads they carry, traffic movement or their expected functions. "Systems of road hierarchy which specific a limited typology or 'hierarchy' of allowable street types—typically expressed as road types—have been criticized for being apparently based on traffic flow or road capacity."[1472] However, this becomes problematic because use and function hierarchies become confusing by their relationship and differences with other pathways--while one highway may handle large amounts of road traffic, it also handles no pedestrian traffic.

> "A variety of trip, traffic, road or network-related parameters could be used to specific the function of any given road or street, but the definitions are not necessarily clear or consistent."[1473]

Since the street began, this thesis can state with blanket assurity that humans have never built any type of gridpattern without some hierarchy--even with large gaps in the anthropological record. The Prospect-Refuge theory and many other theories of human evolution and cohabitation require this differentiation in order to spatially position one's self within the built environment.

In the modern era though, specific functions seem to have taken priority within roads and the gridpattern where efficiency, safety, amenity, and environmental quality have added new aspect to use and function hierarchy.[1474] Because some functions are more important, other functions recede. "It therefore does not take account of non-traffic

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[1472] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 34; Llewelyn-Davies. *Urban Design Compendium I*. 2nd ed. Prepared in Association with Alan Baxter and Associates for English Partnerships and the Housing Corporation. London: English Partnerships and The Housing Corporation, 2000: 75; Thorne, R. and Filmer-Sankey, W. "*Transportation*," in Thomas, R. ed. *Sustainable Urban Design: An Environmental Approach*. London: Spon Press, 2003, p. 29.

[1473] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 34.

[1474] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 47; IHT. *Transport in the Urban Environment.* London: Institution of Highways and Transportation, 1997, p. 145-147.

considerations in the urban context, although it often appears to do so by putting the traffic first, and fitting the other concerns around that."[1475] In the United States government has also taken this policy approach with Traffic Oriented Design, Smart Growth and other collaborations between highway/transportation funding and housing.[1476]

> "While the terminology differs in each case, the basic principles follow the same general pattern, with a spectrum of major roads to minor roads. Major roads tend to be associated with strategic routes, heavier traffic flows, higher design speeds, with limited access to minor roads with frontage access. Minor roads tend to be associated with more lightly trafficked, local routes, with lower design speeds and with more frequent access points and with access to building frontages."[1477]

What this ultimate becomes is a dynamic where still the functionality of the spaces floating in the grid are determined by the value of one function of the grid--transportation, reducing the Street and the Block and Lot to issues of simple access and mobility.[1478] In short, the complex system of urban form are simplified, reduced and destroyed. "This means that any street that does not fit onto this 'idealised' form does not fit into the classification."[1479]

While the act of division is called intensification with blocks and lots, the ability of the Streets to join in a coherent pattern is called arteriality.[1480] The lack of connectivity where streets become cul-de-sacs could be, in a sense, called capillarity.

> "Arteriality is a form of strategic continuity whereby all 'top tier' elements join up contiguously. Arteriality can apply at any scale: for

[1475] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 47.
[1476] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 47.
[1477] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 47.
[1478] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 50.
[1479] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 50.
[1480] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 60.

> any given level or area there may be locally strategic elements which are locally contiguous."[1481]

Gridplans which have more a completely continuous and interconnected pattern have 100% arteriality, whereas others that have a disconnected pattern do not.[1482] This is where the pattern of the grids are different and it is based upon how the streets interrelate. What one sees is that hierarchical gridpatterns have almost complete arteriality whereas sprawl related gridpatterns do not--the sprawl has capillarity but not arteriality.[1483] One could add both fractions together and produce the entire coherent pattern of the urban form.

> "For a road network, arteriality implies that each route must connect to either a route of the same status or higher status. The result is that the highest status routes all form a single continuous system (A), but sets of lower elements are not necessarily continuous (B, C). For any given level, the set of all elements from the top down to that level will form a single continuous system (A + B; or A + B + C)."[1484]

10.3.5 Hierarchies: X-, T-, and Y-Connection Pattern

The hierarchical structure of the gridpattern is based upon the intrinsic street form, and what this requires is a broader understanding intrinsic grid elements--the street length and intersection pattern.[1485] Different grids have different types of street lengths and intersection patterns, and, at a larger scale, these two create the grid pattern alone.[1486] One sees the cellular block units within the grid and also the way that the connection of the street tissue forms dimensions of the block units. Like the circulatory system within an organism, these patterns exist on the ground but also in volume. What

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[1481] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 62.
[1482] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 61.
[1483] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 61.
[1484] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 62.
[1485] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 62.
[1486] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 60-62.

one also sees is that there are gradations of differences in both organisms and urban form where smaller urban elements subdivide larger elements--and not necessarily dendritically. [See Figure 130]

The grid pattern can have a great effect upon the density of the network, grid connectivity, adding more street hierarchy and have an integrated and unified street network.[1487] What becomes clear is that the grid's clarity, legibility, and identity start to dominate the grid in order for that grid to be important for the multiple functions of which it serves.[1488] As a result, yet, the grids pattern has huge effects upon whether the street functions as promised.

In dendritic systems, there is more traffic or commerce concentration as one goes from localized cul-de-sacs to the larger arterial avenues or boulevards.[1489]

> "In effect, the term 'hierarchical' is commonly used to denote a tributary ('look and cul-de-sac') layout, in contradistinction to traditional grid layouts, even though grid layouts may also be hierarchical in nature, either by design or emergence."[1490]

No strangely, when a critical length of the dendritic path fails, then the entire system collapses--as it was planned to do. In contrast, traditional and neo-traditional New Urbanist plans are highly connected, non-dendritic and have redundant street patterns

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[1487] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 36; Llewelyn-Davies. *Urban Design Compendium I*. 2nd ed. Prepared in Association with Alan Baxter and Associates for English Partnerships and the Housing Corporation. London: English Partnerships and The Housing Corporation, 2000, p. 76; Kulash, W.M. "Traditional Neighborhood Development: Will Traffic Work?" Paper presented at the Eleventh International Pedestrian Conference, Bellevue, MA, 1990, p. 16; Ewing, R. "Pedestrian- and Transit-Friendly Design." Report prepared for the Public Transit Office, Miami. Miami: Florida Department of Transportation, 1996; McNally M. G. and Ryan, S. (1993) "A Comparative Assessment of Travel Characteristics for Neotraditional Developments. *Transportation Research Record*. 1400 (1993): 67-77; Banai, R. "Neotraditional' Settlements and Dimensions of Performance." *Environment and Planning B: Planning and Design* 23 (1996): 177-90.

[1488] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 37.

[1489] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 36.

[1490] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 36.

which stabilize the system during crisis.[1491] Yet, the traditional and neo-traditional gridpatterns do not exclude hierarchical streets, when, in fact, all of them have hierarchical street patterns.

> "As Ray Brindle points out, conventional road classification typically 'depict roads as forming a tributary … system, each road picking up traffic from less important roads and channeling it to more important roads.' While this is indeed often the case, the depicted pattern does not necessarily follow from the underlying rules of hierarchy."[1492]

The critical difference in the pattern of the hierarchical dendritic and the traditional/neo-traditional girdpatterns is in how the hierarchical grids relate and connect on the intersection of their heretical pieces.[1493]

> "The ongoing debate on street pattern often boils down to a simple polarity between 'grid' network forms versus 'tributary' (or 'loop and cul-de-sac') forms."[1494]

As a result, the way the connectivity occurs gives an indication as to how the system will function, and this is the result of the patterns created when looking at the various gridlines (of function) within the system and comparing how the total pieces of the grid connect on a much more substantive level. [See Figure 127] These connections occur on X, T and Y connections mainly and the lengths are generally either straight or curved in nature. With these pieces, one can have dendritic, tributary, radial,

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[1491] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 36.

[1492] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 36; Brindle. "Road Hierarchy and Functional Classification," in Ogden, K.W. and Taylor, S. eds. *Traffic Engineering and Management*. Melbourne: Institute of Transport Studies, Monash University, 1996, p. 55.

[1493] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 36.

[1494] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 36.

or traditional lines within any grid.[1495] There might be other types of connections, but this thesis will focus on these types for efficiency.[1496]

> "Irregular, fine scale angular, streets mostly short or crooked, varying in width, going in all directions" and "mixture of configurational properties (T- and X-junctions, some cul-de-sac; moderate connectivity."[1497]

Accretion grids occurred in Greece and can be found in feudal and Middle Age cities in Europe.[1498] When analyzing the Accretion Grid and its connective tissue, one finds that there are many more T-connectives and Y-connections than X-connectives. What this says is that since the gridlines are unplanned and created by use, there is very little administrative planning or regulation of the lots, blocks and streets.[1499] This was a system used first by horses, cart and pedestrians, and one finds these grids today in Barcelona's Citta Vella.

> "Regular, orthogonal, rectilinear, streets of consistent width, going in two directions" "mainly grid with crossroads (high connectivity). Continuity of cross routes."[1500]

The hierarchical gridpattern (planned grid or bilateral gridiron) is a type of gridpattern resulting from the Roman influence and is the gridpattern that populates most

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[1495] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 75-77; Unwin, R. *Town Planning in Practice: An Introduction to the Art of Designing Cities and Suburbs (2nd edn)*. London: Fisher Unwin, 1909 [1920]; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960; Moholy-Nagy, S. *Matrix of Man: An Illustrated History of Cartobibliography to 1865*. Glasgow: Glasgow University Library, 1968; Satoh, S. "Urban Design and Change in Japanese Castle Towns." *Built Environment*, 24(4) (1998): 217-34; Frey, H. *Designing the City: Towards a more Sustainable Urban Form*. London: Routledge, 1999.

[1496] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 83.

[1497] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 88.

[1498] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 84-85.

[1499] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 85.

[1500] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 89.

American city cores.[1501] These systems are characterized by straight road lengths with perpendicular connections, and they had horses, pedestrians, carriages and then automobile traffic. “The prevalence of the four-way perpendicular junctions naturally gives rise to bilateral directionality, with implication of a grid form at the wider scale. This grid can also be triangular in fashion where the grid is not two way direction but in three ways in a radial format. In these systems there is a high degree of X-connections in comparison to Y- or T-connections.[1502]

The romantic gridpattern is a grid that has the benefits of the hierarchical grid but also has curved street patterns, and also radial patterns.[1503] Based on the type of connectivity at the intersections, one can say that there is a mixture of T- and X-junctions with lot of cul-de-sacs. The connectivity is moderate simply because the system is not based upon connectivity and so the gridpattern reflects this.[1504]

> “Based on consistent road geometry. Curvilinear or rectilinear formations, mostly meeting at right angles.” And “loop roads with many branching routes in tree-line configurations (mainly T-junctions, mainly culs-de-sac, low connectivity)”.[1505]

The sprawl gridpattern or distributor grid is based on the single notion of traffic distribution from smaller and localized roads, to collectors and arterial roads. Sprawl gridpattern is based upon a river and branch analogy, where there is only one outlet for smaller streams in each phase of travel from one stream to another. [See Figures 131 and 1.2025] These systems have a high degree of T- and Y-connections but very few X-connections. When these are laid out with lengths that are curved in nature rather than

[1501] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 85.
[1502] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 89.
[1503] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 85.
[1504] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 85.
[1505] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 89.

straight-edged, then the pattern is noticeable similar to sprawl. [See Figure 131] Some say that this relates to the tree connectivity, but this is not true.

These X-, T- and Y-intersections tell one something significant about the gridpattern.[1506] "In almost any real street layout, there will be a mixture of the T- and X-junctions and the corresponding ratios will lie somewhere between zero and one."[1507] If the girdline system is more dendritic, then there will be more T- and Y-intersections rather than X-intersections. One can also say that in a purely dendritic system there will be no cells and the cul-de-sac ratio will be 100%, while the cell ratio is 0%.[1508] In this system the T- and Y-ratio should add up to 100% or 1 because of road structure.

10.3.6 *Resiliency by Changes to the Grid*

When administrative bodies designate the hierarchies within a system, generally these are not hierarchies but classification systems for convenience or management.[1509] There are plans though when the function and use hierarchies combine, there become historical differences in the grids by use and function--mainly in the modern age. Roman castra designers imposed use and functional and structural hierarchies within pathways to great effect --the cardo and decumanus maximus.[1510] These streets not only formed the centre of civic life and focus but they had a direction quality that divided the urban form into districts, while making public spaces accessible for use as landmarks and as nodes of assembly. One often assumes that structural hierarchies represent dendritic

[1506] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 98.
[1507] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 98.
[1508] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 98.
[1509] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 5.]
[1510] Perkins, Ward, J. B. "Early Roman Towns in Italy." *The Town Planning Review* Vol. 26, No. 3 (1955): 141–43; Bosanquet, R. C. "Greek and Roman Towns I: Streets." *The Town Planning Review* Vol. 5, No. 4 (1915): 286–93.

gridpatterns within the modern system. When one looks at the urban form history and the anthropological evidence, nothing could be further from the truth.[1511]

> "After all, ancient Roman cities effectively had 'hierarchies' of streets; in the Middle Ages, Leonardo da Vinci proposed a system of traffic segregation involving different street types. The reconstruction of London after the Great Fire of 1666, and the laying out of Edinburgh's Georgian New Town, were both based on the adoption of a 'hierarchy' of discrete street types. Despite these traditional exemplars, nowadays we often associate hierarchy with something apparently engineering-dominated, traffic-oriented, and anti-urban. We need to pin down why."[1512]

In ancient to medieval times, gridplans built by accretion were actually masters of creating modulated volumetric space that incorporated function and form within the same plane--the square or assembly area. [See Figures 9.004, 95-97, 100] In many, what one sees is a broadening of the shared Street space where squares and public space are where the normal street broadens out to form larger nodes of accumulation. This modulation of space and side should not be confused with dendritic hierarchical patterns which define pathway by differences in size and function. Dendritic streets which are hierarchical in nature for the functional concentration of traffic, traditional squares or main streets, TND or new urbanist streets are hierarchical in order to address different functional reasons, but they do not functionally funnel traffic from one small cul-de-sac to larger and more conscribed systems.[1513]

These systems are effective because the administrative bodies or persons formed these pathways with inherent flexibility and adaptability.[1514] The flexibility itself must be laid out in advance, before functions become set or conscribed.

[1511] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 46.

[1512] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 46.

[1513] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 35; ITE Transportation planning Council Committee SP-8. *Traditional Neighborhood Development Street Design Guidelines*. Washington, DC: ITE, 1999, p. 21.

[1514] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 57-58.

> "This flexibility means that a hierarchy can be laid out in advance, and not intrinsically subject to too much fluctuation. Unlike physical width which may be inconsistent over the length of a route, or traffic volume which would vary over both distance and time, a designation can stay stable indefinitely. Designating status according to a function effectively builds in flexibility: because future function is being specified, any particular route or street can be expected to grow into its intended role."[1515]

What this requires is a conception of the grids as flexible and modulating systems rather than static systems, and the modulation must be inherent in the plan.[1516] This also takes an inherently different, and really old fashioned, consideration of what streets are. The functional aspect of the street is as a route of independent units of street lengths connected in a coherent pathway or link of streets. This route modules in space, in time and in length as The Street itself changes.

> "If roads were classified by form, then the classification of a route might change along its length each time there was a change in some physical property. For example, every point at which the width of the road changed or the frontage type changed or a bus or cycle lane started or stopped would be a potential point at which the classification could change."[1517]

The interesting aspect of the Street edges is that it modulates and varies with time. As a result, while the Street position stays fairly constant and the block and the lot are more rigid, changes in either the lot, the block or the Street can fluctuate the street and its relationships.[1518] As a result, the grid shape modulates over time, especially when there are superimpositions of larger unifying gridpatterns like in Haussmann's Paris or Cerdà's Barcelona.

> "Changes have occurred in the blocks of all three case studies at different scales. In Baixa [Lisbon], changes have occurred in a less evident manner than in the New Town [London] and Ensanche [Barcelona]. Changes have occurred in all three case studies by the filling in of unbuilt areas. In the New Town and the Ensanche changes

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1515 Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 57-58.
1516 Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 58.
1517 Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 58.
1518 Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 60.

> occurred through the subdivision of blocks by with new alleys or arcades. The area of Baixa block is 7% of the area of Edinburgh block and, 14% of Barcelona block. Barcelona block (12,377m2) is approximately half of the area of the Edinburgh block (25,000m2). Interestingly, despite exhibiting different block sizes, the three plans witnessed loss in their unbuilt areas. Yet it has been the plan with the largest block (the 180mx139m New Town block) that lost mostly. The 113m x113m Ensanche block has assisted the biggest increase of built area, in comparison to its original area. In comparison, the smallest block, (Baixa block 25x71m), has assisted a significant reduction in unbuilt areas, although these were already diminutive originally.[1519]

These changes had a profound change to the gridline and the public space that actually acquired more unbuilt public space as blocks became smaller. The ability of the lots, blocks and street to work together and produce more coherent gridpatterns over the entirety of the city historically creates more resilient cities.

10.4 Figure and Detail of the Street

The street Figure acts to reinforce the blocks, lots and Street as fundamental and skeletal elements of the totality of urban form. The street Figure relates to the structural components of the actual street, in plan, section and volume, and it also defines and changes at the edge and provides the mechanisms and space which provide functions for people to interact together. These are the forms that people interact with on a daily basis. While the Figure is technically not the public realm, it fills the public realm like water in a balloon. The street detail incorporates aesthetic, signage and infill components that make this Figure technically more effective. The street could possibly live without these elements, but they make lives better and more efficient.

[1519] Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 9.

10.5 Figure of the Street

10.5.1 Structural Components

The Street's Figure is made up virtually unlimited elements which change the dynamic walking through the streetscape. This is the area where people have most or all reaction to the public realm. This thesis will conscribe those elements to how the main elements function as part of the Street: differentiation, time, connectivity, allowability, route analysis, legibility, hierarchies, orders, and detachment.[1520] This thesis has already addressed the ordering of the streets previously: with ordering and gridpatterns. Once all considered, the structure of the Street comes into clarity.

The Street structure has a necessary allotment of components which make a street function and which one can analyze.[1521] Differentiation are the actual elemental components and benchmarks which make up the street.[1522] These are the edges, the pathways, the dimensions, the volumetric interaction, the densities, intersection types and public spaces. The street Ordered Ranking analyzes how streets are ordered and ranked in terms of function and importance. These are scales of things--minor to major, and least road to square.[1523] Necessary Conditions are the elements that connect and only connect with each other and how.[1524] This area deals with connectivities and types of connectivity.

> "[In] the case of a tree, 'necessary connections' means, for example, that a branch cannot float alone' in a matrix of twigs: it must at least connect to another branch, or to a limb or the trunk."[1525]

1520 Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 160-63.

1521 Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 160-63.

1522 Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 160.

1523 Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p.: 160.

1524 Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 160.

1525 Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 160-162.

Allowable Conditions are those elements which The fourth condition is the allowable connections between different types of elements.[1526] This is the access constraint of the various types of things, where there are some types of connections that require intermediate connections or devices in order to connect.[1527]

> "From these first four structural conditions, we have fairly comprehensive sense of hierarchy—but not as yet any suggestion of the actual configuration of routes. In other words, although these four conditions are embodied in the structure of a tree or a road network, we have yet to make any specification for the tree structure of mathematical abstraction (a branching structure with no circuits)."[1528]

Distribution frequency is the frequency at which things connect in the urban form.[1529] "At this stage, the analogy implies that there would be a few main roads, several intermediate roads and many minor roads."[1530] There might be allowable relationships with different types of urban form, but they might rarely occur. Lastly, the structural configuration of things in the broadest sense so that we have an understanding of the whole picture of the street.[1531]

> "This is the sense that the tree forms a 'tree-like' system of branching, where each path eventually ends as a twig. Now finally, we have the implication for layout: the discontinuity of the minor routes in the network, epitomized by the full stop of the culs-de-sc. Here, finally, the road network becomes, mathematically, a "tree."[1532]

When we see these relationships, one can also take a bigger picture to see how they work as groups of elements rather than just singular elements. Urban form is interesting

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[1526] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 162.
[1527] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 162.
[1528] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 162.
[1529] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 164.
[1530] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 164.
[1531] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 164.
[1532] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 164.

in that, like with blocks and lots, urban form tends to order in groups and larger groups and pairs. This is their ordering relationships. Urban Elements, like Streets, tend to form order pairs and groups with dendritic, conjoined, mosaic or serial patterns.[1533]

Dendritic patterns are those roads with rigid hierarchies that branch out in an arterial fashion.[1534] Conjoined patters have hierarchies but they have completely sealed so that all roads connect.[1535] "The conjoin case is also typical of many engineering structures, where minor members connect progressively—or directly—to major members."[1536] Mosaic patterns are those which have differentiation but absolutely no hierarchy or order.

> "The mosaic case encompasses the first two discernable sense of hierarchy in the tree analogy (structural conditions one and two). While elements might be capable of ordering (such as street types of different widths), there is no definite spatial or structural ordering according to types defined in this way (there is nothing to prevent or require connection between, say, a street and a square)."[1537]

Lastly, the serial patterns are those patterns that require intermediary steps or have constraints in order to exist--accessibility.[1538]

> "The serial case could also represent any case where there is a spectrum of types whose extremities are incompatible … but where there is no arteriality (spatial nesting) necessary directed towards either end of the spectrum."[1539]

When we start looking at the actual structure of the form, what one sees is that there are broader implications which the urban form requirements that the urban elements do not

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[1533] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 72, 165.
[1534] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 172-173.
[1535] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 172-173.
[1536] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 173.
[1537] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 174.
[1538] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 174.
[1539] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 174.

necessarily convey by their analysis. Thus, there has to be some understanding about the total relationships involved and what they mean. These are crucially important to the pathmaking and imageabilty: coherency, legibility, clear typologies, hierarchy (clarity, flexibility and goodness) and interconnection.[1540] Taken together, all of these aspects of the street are important to analyze and consider when designing a Street.

10.5.2 Differentiation of Components

Differentiation is the structural make-up of the system.[1541] This differentiation relates to the Street Dimensions, Space Stax, Network Density Indexes, Intersection Types and Public Space and Observations.

10.5.2.1 Street Dimensions

Observers of cities like Allan Jacobs have noted that when the United States started to expand and build new cities, there as not only optimism and manifest destiny but also an idea of city intimacy and scale.[1542] Cities were more compact, and Great Streets were generally narrow and manageable--with the great streets being narrower and more direct than the surrounding streets, more “pathway-ish.”[1543] Yet, the narrowness or the fineness of some streets is relative to the surrounding patterns, such that it does not seem that there is a magic number by which to build urban form or the Street.

> “In turn the Via del Corso would be perceived as narrow compared to the Grand Canal, to say nothing of the Champs-Elysees which it influenced. The Grand Canal, so very wide in Venice, in such contrast to its setting, is significantly narrower than the Champs-Elysees, whose largeness stands out not only in relation to the size of the

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[1540] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 161.
[1541] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 160.
[1542] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 202.
[1543] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 203.

streets around it, but also because of the relatively infrequency of intersections with it."[1544]

The Space within the Street constitutes 25 to 35% of the total space within the city in the United States. "In the United States, from 25 to 35 percent of the city's developed land is likely to be in the public right-of-way, mostly in streets."[1545] The public right of way or the Street constitutes a large valuable amount of space within even the largest and most expensive cities.

"Streets make up 25% of the land in San Francisco.[1546]

There are many ways that the street space is measured in length, width and space. With these measurements, space is generally the allowable remainder of assumed street space needed for the valuable plots, while the street width and right of way changes depending upon the city-scape. These two are fairly connect, though the right-of-way tends to be measured by straight measurements or as ratios to preferred building heights and street enclosures. The lane though is most variable and it changes depending upon policies and new evidence. While measured as a straight width, these change in a more fluid manner and depend upon many factors--mostly the nature and size of the total right-of-way.

Street lengths are rationally related to block sizes in that they are intimately related. As the grid becomes more warped and sprawl ensues, then the streets become larger and longer and the cul-de-sacs become more prevalent.[1547] Some state that street lengths should be 80 to 100 meters [240 to 300 feet], because this length is most

[1544] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 203.

[1545] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 6.

[1546] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 3.

[1547] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 3.2-1.

convenient for pedestrian and vehicular movement.[1548] The Manhattan gridline is plotted for 600 by 200 feet grids.[1549] Some like Martin note that when the streets become more fine grain, this actually forces the buildings to become more vertical because there is more intensive use of the blocks and lots.[1550] More in line with New York City, Duany and PlaterZyberk limits street side to 230 to 600 feet which makes their street lengths flexible and yet smaller than normal blocks.[1551] Jane Jacobs in contrast mirrored the blocks of Portland, Oregon, where she recommended block sides with streets of 300 foot lengths.[1552] Alexander stated that there should be pedestrian crossings every 200 to 300 feet which would also limit block sizes to similar dimensions.[1553] In LEED Neighborhood Development "Street Network" recommendations, it proposes a right-of-way intersect every 400 feet which pushes the street intersections and street links to be around 400 feet at a maximum.[1554] Under its "Smart Location and Linkage (SLL)," recommendation, LEED-ND also recommends that development be located within buffers of 90 intersections "measured within a 1/2-mile distance of a continuous segment of the project boundary, equal to or greater than 25% of the project boundary that is adjacent

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[1548] Siksna, Arnis. "The effects of block size and form in North America and Australian City Centres." Urban Morphology I (1997): 25. http://www.urbanmorphology.org/online_unlimited/um199701_19-33.pdf (accessed July 10, 2014).

[1549] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 3.2-3.

[1550] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 3.2-3 to 3.2-5..

[1551] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 20.

[1552] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 20.

[1553] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 20.

[1554] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 62; see also Steuteville, Robert and Philip Langdoc and Special Contributions. "New Urbanism Best Practices Guide." *Texas Tech University Department of Architecture at El Paso.* http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, 2014), p. 5.

to previous development."[1555] This effectively recommends an intersection every 600 feet on average and no more than every 800 feet in particular, with at the most 20% non-motorized rights-of-way.[1556]

> "It is all a matter of proportion. In the Middle Ages, the relationship of the street's width to the height of the buildings bordering on it was well defined. It was one to two. Renaissance streets, on the other hand, were comparatively wide; Leonardo considered equal width and height ideal."[1557]

The Street width of the Right-of-Way are different all over the United States. Yet, in Lichfeld, Connecticut, the houses are 200 feet apart in residential areas, and in Fairmount Boulevard in Cleveland Heights, the right-of-way is 30 to 40 feet with 60 foot setbacks. [1558] Yet, in more urban areas, the ratios become more constrained.

In New York City, Street widths measure from 52 feet to around 100 feet on larger streets.[1559] For New York City, this has allowed the plotting and selling of land and also flexibility for the various changes within the urban form that have changed the landscape. "To be sure, the north-south streets in New York are generally wider than the east-west streets, and Broadway and Park Avenue differ from other streets."[1560] On Atlantic Avenue in Brooklyn, the roadbed is about 60 feet with the total right of way being 98 feet, with a clear pathway or lane of 12 feet.[1561] On Baltic Street and Park Slope, the

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1555 U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 1.

1556 U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 1.

1557 Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 163.

1558 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 281.

1559 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, pp. 66-69.

1560 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 258.

1561 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 31.

right of way is 53 feet.[1562] In the Upper East Side-3rd Avenue, the average roadway is about 68-70 feet with the average right of way being about 94 feet. [1563] On West 11th Street, the roadway is about 30 feet wide with a right of way of about 50 feet. [1564] The Soho-MacDouglas Street has an average roadway is about 32 feet with the right of way being about 55 feet. [1565] On Clinton Avenue, the total right of way is about 72-75 feet, and the street width is about 38-40 feet. [1566] On Bowling Green, the right of way is 70 feet.[1567] On Atlantic Avenue, the right of way is 98 feet.[1568] And, on Fort Green, the right of way is 75 feet.[1569]

Boston's Complete Streets program has lane widths at a minimum of 7 feet with a maximum of 20.5 feet in downtown commercial areas.[1570]. The Boston Complete streets capitalizes on smaller areas for residential streets to make the design speed to be smaller, and in a sense making the entire street more narrow, while in more commercial or industrial areas, the street will be much larger as a result.[1571]

[1562] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.

[1563] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 49.

[1564] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 59.

[1565] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 48.

[1566] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 58.

[1567] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66/

[1568] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.

[1569] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.

[1570] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 23.

[1571] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), pp. 22-23.

In Portland on SE Ladd Street, there is about a 64-foot right of way, with about a 40-foot road width.[1572] For the NW 23rd Street Area, the average right of way is about 55 feet, with the average roadway being about 32-35 feet.[1573] In the NW 11TH Street area, the average right of way is around 60-68 feet, with the roadway being around 38-40 feet.[1574] "In Portland, there are 60-foot versus 80-foot rights-of-way, but there is a general blanket pattern that persist over an entire square mile of these cities."[1575] So, while Portland's population is less dense and the streets are not filled with the landmarks of Midtown, the streets are fairly within the same range--from 50-100 feet wide.

Portland is one of the few cities in the United States that is actively pursuing and changing their street standards."[1576] "The Skinny Streets Program has been vigorously implemented in both established communities and new ones since 1991."[1577] The result has been that by reducing the lanes and the paved aspect to the right of way, the city has reduced maintenance costs and speeds.[1578] "Most streets are designed to be no more than 20 to 26 feet … wide depending on neighborhood parking needs."[1579] Placating fire department concerns of access during emergencies and the proven ability of fire departments to service accidents on the skinnier streets and smaller cul-de-sacs, the program has become popular with government officials and residents.[1580]

[1572] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 64.

[1573] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 53.

[1574] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 54.

[1575] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 258.

[1576] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 134.

[1577] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 134.

[1578] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 134.

[1579] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 134.

[1580] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 135.

> “Portland had been spending about a million dollars annually to install traffic calming devices because excessive street widths allowed for high speeds and cut-through traffic. Reducing the standards has not only improved the livability of the community, but has also reduced storm water runoff and the impact of grading on slopes, and has lowered costs.”[1581]

As a result, Portland’s grid is smaller by far than most cities: “the blocks are usually small (200 by 200 feet) and the streets usually narrow 60 to 80 feet.”[1582] The city is scaled for people who like to walk and want a walkable area.[1583] “Streets are not gulfs to be negotiated. Buildings, even when tall, do not loom.”[1584] The Portland grid is made for street life.[1585] One should note though that some cul de sacs in Portland are very large. The Forest Glen area had a median length of cul-de-sac (feet) of 203.[1586] The Orenco Station area had a median length of cul-de-sac (feet) of 106.[1587]

> “There, anything that reduces pedestrian use of and access to the streets is suspect.”[1588]

In Amsterdam, the nature of the canal and the street make the Street dimensions particularly difficult and confusing when relating them to other traffic. However, if one looks at the lane of traffic as a unit of barge rather than cars, what one finds is that most of these canals are particularly narrow with only 2 to 4 at the most lanes of traffic--the

[1581] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 134.
[1582] Attoe, Wayne and Donn Logan. American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press, 1989, p. 98; Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 258.
[1583] Attoe, Wayne and Donn Logan. American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press, 1989, p. 98.
[1584] Attoe, Wayne and Donn Logan. American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press, 1989, p. 98.
[1585] Attoe, Wayne and Donn Logan. American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press, 1989, p. 98.
[1586] Song, Yan and Gerrit-Jan Knaap. “Measuring Urban For: Is Portland Winning the War on Sprawl?” ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 217.
[1587] Song, Yan and Gerrit-Jan Knaap. “Measuring Urban For: Is Portland Winning the War on Sprawl?” ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 217.
[1588] Attoe, Wayne and Donn Logan. American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press, 1989, p. 98.

"unit" is the barge and not the car. As a result, the road and canal road widths, while large are actually narrow. The section can be 120 feet, with a 65 canal, and 28 feet of sidewalk on both sides.[1589] IN other places, the canal is about 73 feet, or 50 feet, or 40 feet wide, with sidewalks that range from 23 feet to 30 feet.[1590] These would probably translated for vehicular traffic, these would probably result in 23 to 30 foot sidewalk with 2 vehicular lanes for a total of 63 to 80 foot right of ways.

For conventional suburban residential streets, the average dimension includes two 10 feet lanes, and two parking zones of 7 to 8 feet. "That's an enormous street, and it shows no understanding of how traffic actually functions on thousands of miles of traditional streets," says Walter Kulash, an engineer with Glatting Jackson Kercher Anglin of Orlando, Florida."[1591] Many times there also is a general lane and yielding zone where streets are shared rather than completely divided. This leads to speeds generally of around 40 to 45 miles per hour.[1592]

In the slums of Indore, India, traditional streets are accretion gridpatterns and not a planned hierarchical gridpattern.[1593] The streets are not fully dendritic, but they act as more quasi-gridline patterns of larger blocks created by the accretion of buildings and the spaces between them. "The location of streets, open areas, and plots should take place in response to the requirements and aspirations of the project participants…"[1594] Even in this cases, we have streets that are narrow and wider. The narrow streets are

[1589] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 185.

[1590] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 185.

[1591] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 134.

[1592] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009.: 135]

[1593] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, p. 10.

[1594] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, p. 10.

around 5 to 10 feet wide, with the largest streets being 11.5 to 23 feet in lane width.[1595] Unlike the other streets in this study, these are more akin to woonerfs as shared streets rather than with a division of traffic.

The Buffalo Green Code has bases their street widths on target speeds of particular lanes. For speeds of 10 to 25 mph, their target right of way is 33 minimum to a preferred 54 feet.[1596] For only one way of vehicular traffic, the roadway is 10 feet to a maximum of 18 feet, including parking.[1597] For residential streets with a target speed of 25 mph, the right of way width is 52 to 64 feet, with two lanes 10 to 11 feet in width.[1598] For mixed-use areas of a target speed of 25 mph, the right of way is 58 to 66 feet, with two 10 to 11 feet lanes.[1599] For residential avenues of targeted 25-30 mph, the right of ways are 52 to 68 feet, 62 to 78 feet, 72 to 88 feet, and 82 to 98 feet depending on how many lanes of travel (2 to 4) are needed in the street.[1600] For mixed-use avenue zone with a target speed of 25 to 30 mph, the right of ways are 58 to 73 feet, 68 to 83 feet, 78 to 93 feet and 88 to 103 feet, with two to four lanes at 10 to 12 feet.[1601] With Residential Boulevards with a target speed of 25-30 mph, there are various right of ways ranging from 86 to 118 feet, 92 to 122 feet, 106 to 138 feet, and 112 to 142 feet, with four to 6 lanes at 10 to 12 feet.[1602] With mixed-use boulevard with a traffic speed of 25 to 30 mph, the several right of ways range from 92 to 117 feet, 98 to 127 feet, 112 to 143 feet,

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[1595] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, p. 6.

[1596] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), 10-13.

[1597] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), 10-13.

[1598] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), 10-14.

[1599] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), 10-15.

[1600] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), 10-16.

[1601] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), 10-17.

[1602] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), 10-18.

and 118 to 147 feet, with 4 to 6 lanes at 10 to 12 feet width.[1603] Lastly, for multiway boulevards with a target speed of 25-30 mph, there are four right of way options with 110 to 147 feet, 116 to 151 feet, 130 to 167 feet, and 136 to 171 feet, with 4 to 6 lanes ranging 10 to 12 feet.[1604] As one can see, even with one recommended code, there are various widths of the street and when they multiply in various zoned areas, the total roadway and Street tend to exponentially increase in size.

The width of the street is controversial as it is related to the height of the Façade Edge which will be addressed later, and yet the width is interconnected to the building height. "The width-to-height ratio of a street to the adjacent buildings is important in determining the character of the thoroughfare."[1605] In short, the Width-to-height ration has actually changed throughout time. Within today's planning though, designers considers 1:1 [1 street width to 1 building height] to be urban.[1606] Other designers state that 1.5:1 [1 1/2 street width to 1 building height] is "good," whereas 3:1 [3 streets to 1 building height] is "okay."[1607] In areas of sprawl, this relationship sometimes goes to 17:1 or 22:1 [17-22 street widths to 1 building height] which is excessively problematic, because with these ratios, one can "almost see the curvature of the Earth," Hall says dryly."[1608] With the LEED for Neighborhood Development requirements, there is a recommendation that at least 15% of new streets widths and building heights have a

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[1603] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), 10-19.

[1604] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), 10-20.

[1605] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141,

[1606] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141,

[1607] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141,

[1608] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141, ratio of 3:1 [3 street widths for 1 building height][1609] These relationship between building height and street width directly relate to the type of enclosure on the Street.

When surveying San Francisco in 1847, started surveying Market Street and setting it at 110 feet wide following the original road to Mission Dolores.[1610] The then set the connecting roads at right angles to the north and at a 45 degree angle to the south.[1611]

When founded in 1624, New York's streets were planned as fairly narrow in the New Amsterdam plan. They laid out streets that were 25 feet in total wide, with lots that were 25 feet by 50 feet in total for housing.[1612] As New York expanded north, the north and south streets or avenues were broader and 100 feet wide at street lengths of 200 feet.[1613] The streets flowing east to west were 60 feet wide. "A dozen north-south avenues, each 100 feet wide, were laid out. Crossing these at right angles every 200 feet were no less than 155 streets, 60 feet in width, connecting the two rivers."[1614] They were similar to the older Goerck plan and survey of 1796.[1615]

> "The similarity to the earlier Goerck plan for the old common lands of Manhattan is obvious. Not only are the street widths and intervals identical, but the location of the streets between 23td and 93rd Streets and 5th and 6th Avenues coincided exactly with the Goerck survey of 1796."[1616]

[1609] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 41.

[1610] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 24.

[1611] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 24.

[1612] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 128.

[1613] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 137.

[1614] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 137; Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 344.

[1615] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 137.

[1616] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 137.

What is interesting is that although New York City has fairly small blocks, even its relatively small blocks have long Street lengths.[1617] As a result, these blocks tend to push people north to south, rather than east to west. Jacobs criticized these blocks and stated that it would be better if they were 400 feet in length at most. “The supply of feasible spots for commerce would increase considerably.”[1618] She noted that because of these relatively long blocks, vitality occurred elsewhere in the city and not in areas like the West Side.

> “Theoretically, almost all of the short side streets of the East Side in the Sixties, Seventies and Eighties are residential only. It is instructive to notice how frequently and how nicely special shops like bookstores or dressmakers or restaurants have inserted themselves, usually, but not always, near the corners.”[1619]

What Jacobs might be addressing might be the cause rather than the symptom. When looking at Street lengths and their effect on urban form. Manhattan’s blocks are relatively small at even their longest lengths relative to other city blocks in other areas. Yet their relative lengths in relation to adjacent areas make other blocks more optimal for vibrancy than the longer lengths of the blocks.

> “Fifth Avenue in New York between Fortieth Street and Fifty-Ninth Street is tremendously diverse in its large and small shops, bank buildings, office buildings, churches, institutions.[1620]

As a result, planners could modulate small and long blocks within small locals to focus vitality upon specific blocks--within reason.

When creating the Ensanche in Barcelona, Cerdà believed that the streets should allow better circulation, while at the same time making a workable urban system

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[1617] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 235.
[1618] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 236.
[1619] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 240.
[1620] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 295.

that could easily expand across the Barcelona plain.[1621] "Finally, Cerdà introduced the idea of a city that was to extend right across the Barcelona Plain: the built and the future city, in what was, in a way, a complete reshaping of Barcelona.[1622] Part of this plan were streets of around 50 meters running diagonally through the city that functioned as superhighways or corridors that were completely connected to the urban form.[1623] With even larger and more important broadways that deviated from this 50 meter plan--Gran Via de les Corts Catalans, and the Aveiguda de la Diagonal.[1624] The remaining streets were much smaller and defined a hierarchy system that address traffic loads while not being dendritic--complete connectivity. "The streets were to be 20 meters wide: the carriageway should be 10 meters broad to allow four carriages alongside one another, the space assigned to pedestrians should be no less, i.e. there should be two payments each one 5 meters broad."[1625] Cerdà felt that pedestrian and lane traffic were equal, and so, while having two lanes of pedestrian traffic on the sidewalk, he also mirrored this effect by having 4 lanes of vehicular traffic per lane. This left sidewalks at 15 feet broad and the lanes 7.5 feet for each lane, with a roadway of 60 feet in total.[1626]

When considering the street width alone, some cities have actual dimensions that they generally follow. In a survey of city officials, some studies have shown that the general width of streets is 36 feet of the lane area. "The survey indicated that a roadway

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[1621] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 129.

[1622] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 129.

[1623] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 130; Aibar, Eduardo and Wiebe E. Bijker, "Constructing a City: The Cerda Plan for the Extension of Barcelona." Science, Technology, and Human Values, Vol. 22, No. 1 (Winter 1997): 10. http://www.jstor.org/stable/689964 (accessed July 8, 2014).

[1624] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 138.

[1625] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 135.

[1626] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 135.

width of 36 feet … is most widely used, and is considered to be the most appropriate dimension."[1627] But, these surveys stated that there is much more flexibility with creating narrower lands and smaller building setbacks associated with the lanes, as long as changes in lane design are practical and not the proximate or direct cause of accidents that might occur.[1628]

> "They are first and foremost public, and their design purpose, beyond that of movement of vehicles and goods, is for people."[1629]

Both the Boulevard and the Avenue function as larger Streets or public-rights-of-way that are larger than the normal street because they have larger functions than just a normal street. These areas function to create districts, pathways and emphasize landmarks and nodes. They are not simple streets and so their functional widths have to meet those requirements--they are monumental streets for a reason.

Boulevards were created in France as a way to create trees with distinct tree lined routes, while removing the original bulwarks that surrounded Paris.[1630] The word "boulevard" is a corruption of the Nordic bulvirke (bulwark) which means a palisade, a medieval form of defense work used before the employment of real walls and ramparts.[1631] Francois Loyer conceived these as "not as a single unit, but as three

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[1627] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 132.

[1628] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 132-133; Eran Ben-Joseph. *Residential Street Standards and Neighborhood Traffic Control: A Survey of Cities' Practices and Public Officials' Attitudes*, Working Paper 95-1. Berkeley, CA: Institute of Transportation Studies, 1995; Freiser, Lawrence, ed. *California Government Tort Liability Practice*. Berkeley, CA: Continuing Education of the Bar, 1992, p. 367-372.

[1629] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 36.

[1630] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 35; Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 156.

[1631] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.6-4.

distinct routes—the two sidewalks and the roadway itself—separated from each other by rows of trees."[1632]

> "Moreover an authentic boulevard suggests rows of majestic trees that eclipse the sky; parterres of coffeehouse chairs filled to capacity; outdoor restaurants; luxury shops; an opera house or two, and a couple of theaters--in short, a scene thoroughly antipodal to the American boulevard with its used-car lots and gas stations."[1633]

These were converted to tree lined streets in Paris when the walls came down, and they encircle the city.[1634] When Haussmann penned other boulevards throughout the city, these were just tree-lined streets cut through the medieval character of the city.

> "However, in the 17th century the boulevard were actually boundary lines beyond which buildings could not be erected because of uncontrolled expansion of the city was considered very dangerous."[1635]

These Streets marked the edges of neighborhoods that were meant to become major destinations, and they "have become, major destinations in their own right first as residential and then as business addresses, as shopping streets, and always as special paces of promenade."[1636] So these areas had to be wide enough for movement, traffic, public activity, and change over time.[1637] Frenchman L'Enfant brought the Avenue into the United States with the planning of Washington, D.C.[1638] Rather than the circular and walled nature of the Boulevard, these were straight wide roadways, bordered by trees

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[1632] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 35.

[1633] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 157.

[1634] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.6-4.

[1635] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.6-4.

[1636] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 35; Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 157.

[1637] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 36.

[1638] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 156.

and other object at regular intervals.[1639] The Avenue had a monumental and measuring quality within urban form.

In Barcelona, one does get an Avenue in the Paseo de Gracia, but the Street lengths are fairly short. The block lengths are fairly short at 360 to 380 feet, but the widths are fairly large.[1640] One should note that the trees add a dimension that calculates into the scale and width of the street because the scale changes with landscaped infill such as trees.[1641] The lane is fairly consistent for a larger street, with three to four lanes of traffic on both sides. "The 70 feet on each side of the central auto roadway is where the intricacy and the richness lie."[1642] However, the widths of the sidewalk at 36 feet and the median of 16 feet with planned trees make the right of way fairly large.[1643] With other amenities like slow lanes access to underground parking, the total right of way is at or exceeds 200 feet.[1644] But one should remember that this is not a normal right of way--it is a multi-modal and multi-functional street. These boulevards and avenues are streets of civic significance.[1645]

[1639] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, pp. 156-157.

[1640] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 37; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.10-3.

[1641] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 37.

[1642] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 37.

[1643] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 37.

[1644] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, pp. 37-41.

[1645] Attoe, Wayne and Donn Logan. American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press, 1989, p. 138.

In Paris, the Boulevard Saint-Michel is about 100 foot wide and runs north to south.[1646] It has a 24 foot sidewalk and tree planting area, and in total the public right-of-way averages to 98 feet.[1647]

> "The central automobile cartway, within three and sometimes four lanes in one direction and one—a bus lane—in the other, is about 50 feet … wide. The walks, generous in width, are close to 25 feet … The light-colored buildings are uniformly five floors (including the ground floor) plus an attic story."[1648]

While not an actual street alleyways do provide functional access in the block for back service or cross block traffic.[1649] Because of efficiency, many blocks in the United States have alley access--but not all blocks, not even in the most resilient cities. But, now the alleyway is being rethought as ways to create "fronts" on the alley to provide housing or intensify the block--which would lead to block intensification.[1650]

> "In San Francisco's financial district, alleys are affordable sites for restaurants and office support systems."[1651]

In the Buffalo Green Code has an alley has a proscribed width of 8 to 20 feet.[1652] In Barcelona, the Ensanche has created alleys but not as planned as in the United States. "The Ensanche has facilitated the addition of alleys and internal arcades through buildings, while the New Town has seen the disappearance of alleys and the addition of

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[1646] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 56.
[1647] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 56.
[1648] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 56.
[1649] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), 2-3.
[1650] Attoe, Wayne and Donn Logan. American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press, 1989, p. 140.
[1651] Attoe, Wayne and Donn Logan. American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press, 1989, p. 140.
[1652] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), 10-12.

new arcades through building."[1653] In San Francisco, alleys have also a walking sidewalk area of 9 feet.[1654]

In Amsterdam, the perimeter block and the front and back issue require service entries into the block area. The block is hermetically without an opening for the inner garden.[1655] As a result, on the piano noble, there is a hidden front entry in the buildings that allow back access.

> "Surprisingly, hidden behind the front door from the street there is an entry vestibule with two stairs, one running down to the front door of the souterrain, and the other leading upward to a landing and the front door of the elevated parterre."[1656]

While not technically an aspect of the Street but visually part of the street, setbacks create more visual access and lengthen the visual proportions of the streets, while keeping the same spatial and physical proportions of the street--based on access and what is within that frontage zone. LEED -ND within "Connected and Open Community" recommends that, at least 80% of buildings cannot be more than 25 feet from the property line, and at least 50% of buildings no more than 18 feet from the property line.[1657] This category also requires at least 50% of facades to be within 1 foot

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1653 Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 8.

1654 County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 84.

1655 Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 40.

1656 Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 46.

1657 U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 49.

of sidewalks or public walking areas, with functional entries into the facades of buildings on average every 75 feet along nonresidential or mixed use buildings.[1658]

Looking at the evidence, in New York, the setbacks depend upon land use stage and location. On Baltic Street in a residential area, the setbacks are 23.5 feet, while on 3rd Avenue on the Upper East Side in a mixed use are, there are no setbacks.[1659] On West 11th Street, the setbacks vary from 0 to 6 feet, and on Mc Dougal Street in New York, the setbacks in the mixed use area range from 2 feet average.[1660] On Bowling Green in the mixed use area, the setbacks are generally 1.25 feet façade depth with a 11 foot recess of windows or opening from the façade, while on Atlantic Avenue, there are generally 1 to 2 foot recessed entries.[1661] Lastly, on Fort. Green which is residential area, there are generally 16.5 to 28 feet setbacks.[1662] In Portland, on NW 23rd Street in a mixed-use area, the setbacks are 0 feet, and on SE Ladd Street, the setbacks in this residential area (with limited mixed use) vary from 28 to 30 feet.[1663] Lastly in Portland, on NW Irving Alley in this mixed-use area, the setback averages 2.5 feet.[1664] This will affect ultimately the nature of the enclosure of the street depending on how the setback affectively breaks the façade wall. However, immediately, it extends the street beyond its spatial realm into the lot itself.

[1658] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 49.

[1659] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.

[1660] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p: 66.

[1661] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.

[1662] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.

[1663] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.

[1664] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.

Using more functionalist approach toward lanes alone, the average residential lane is 10 feet with two parking zones of 7 to 8 feet on one or both sides.[1665] Lanes wider than 10 feet allow for faster and more free-flow of traffic, creating a direct relationship between traffic speed and lane danger and the width of the lane.[1666] In residential lanes without side parking to create a visible obstacle for fast-traffic, the design speeds actually are lower than the practical speed that persons will drive. "When there are no cars parked on the side of the street—which is a lot of the time—you get even higher design speeds."[1667] Thus there is a direct relationship between the design and actual speed of the lane and the danger and safety of those in residential areas.[1668] Lanes wider than 11 to 12 feet do not improve safety, and there is evidence that the 10 foot lane is far safer than the 12 foot conventional road.[1669] "This is true for both urban arterial and collector roadways. It appears that as lanes become wider (above 10 feet), many motorists lose their vigilance."[1670] The two foot increase relates to 35 to 50% more

[1665] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 134; Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 208.

[1666] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, pp. 134-5.

[1667] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 134.

[1668] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 134.

[1669] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 136; Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 208.

[1670] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 136.

injuries and accidents related to the lane.[1671] Some of the safest lanes are 24 feet wide with far more dangerous lanes being 36 to 44 feet in total, even with light traffic.[1672]

Modernist planning pushed the historical travel lanes to be between 11-13 feet to facilitate faster and more efficient movement.[1673] In fact, the Street buffers were many times removed in order to allow for a higher speed environment, and to protect cars from collisions.[1674] Many NACTO approaches toward travel lanes now state that even travel lanes should be lessened in size to facilitate safer rather than more efficient and faster movement. "Travel lanes are striped to define the intended path of travel for vehicles along. "Lane widths less than 12 feet have also historically been assumed to decrease traffic flow and capacity, a claim new research refutes."[1675] Now lanes have gone down to 7.5 to 9 feet, with a range of lanes moving toward 10 feet as the median.[1676] "Lane widths of 10 feet are appropriate in urban areas and have a positive impact on the street's safety without impacting traffic operations."[1677] Travel lanes with wider widths are more appropriate for trucks and heavier traffic. "For designated truck or transit routes, one travel lane of 11 feet may be used in each direction. In select cases,

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[1671] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 136.

[1672] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 137.

[1673] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 34.

[1674] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 34.

[1675] Petrisch, Theo "The Truth About Lane Widths," *The Pedestrian and Bicycle Information Center*. http://www.pedbikeinfo.org/data/library/details.cfm?id=4348 (accessed April 12, 2013); National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 34.

[1676] Petrisch, Theo "The Truth About Lane Widths," *The Pedestrian and Bicycle Information Center*. http://www.pedbikeinfo.org/data/library/details.cfm?id=4348 (accessed April 12, 2013); Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 208.

[1677] Petrisch, Theo "The Truth About Lane Widths," *The Pedestrian and Bicycle Information Center*. http://www.pedbikeinfo.org/data/library/details.cfm?id=4348 (accessed April 12, 2013).

narrower travel lanes (9-9.5 feet) can be effective as through lanes in conjunction with a turn lane."[1678] Even for this heavier traffic, NACTO recommends street widths no greater than 11 feet to even slow down this heavy traffic to make it safer for lane travel. "Lanes greater than 11 feet should not be used as they may cause unintended speeding and assume valuable right-of-way at the expense of other modes."[1679] What these approaches state is that lane width is more variable and changeable than the Street itself, and it changes for policy reasons based on new evidence or the failure of previous systems of street measurement.

New Urbanist planning has street widths based upon design speed of the location, but with narrower widths than normal functionalist planning methods.[1680] In residential areas below 20 mph, the transect designs recommend an 8 foot width for lanes. For design speeds between 20 and 25 mph, the lane recommendation is 9 feet.[1681] For design speeds between 25 and 35 mph, the lane recommendation is 10 feet.[1682] For design speeds above 35 mph, the lane design width is 12 feet.[1683] In effect, where the T-1 and T-2 areas have a design speed for 8-12 food wide lanes, T-3 and T-4 have a design speed of only 8-11 foot wide lanes, and T-5 to T-6 areas have a design

[1678] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 34.
[1679] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 34.
[1680] The Town Paper. "Smart Code, Version 9.2." Center for Urban Rural Interface Studies. http://curis.msstate.edu/publish/3000-BookletSC.pdf (last visited July 8, 2014), p. 43.
[1681] The Town Paper. "Smart Code, Version 9.2." Center for Urban Rural Interface Studies. http://curis.msstate.edu/publish/3000-BookletSC.pdf (last visited July 8, 2014), p. 43.
[1682] The Town Paper. "Smart Code, Version 9.2." Center for Urban Rural Interface Studies. http://curis.msstate.edu/publish/3000-BookletSC.pdf (last visited July 8, 2014), p. 43.
[1683] The Town Paper. "Smart Code, Version 9.2." Center for Urban Rural Interface Studies. http://curis.msstate.edu/publish/3000-BookletSC.pdf (last visited July 8, 2014), p. 43.

speed for 9-12 food wide lanes.[1684] While this is functionalist to a degree because it is based on speed rather than the right-of-way or Formal Street, it is still much slower and narrower than NACTO and other more functionalists street dimensions. Still though, one should note that the trajectory is or narrow lanes, but this does not necessary cause a compression or further narrowing of the enclosure of the Street.

10.5.2.2 Space Syntax

While this thesis will not approach a space syntax analysis of the Street, it is important to understanding this analysis as the way people use the Street on an everyday basis. “Space syntax is a method of configuration analysis developed by Bill Hillier and associates, which has been applied to the structure of space in buildings [111] and the structure of urban space.”[1685] Space syntax is based on axial lines and their configurations within the Street as a bounded space.[1686]

> “The basic method of analysis boils down to identifying axial lines (which have some correspondence to lines of movement, or physical routes) and transforming these lies into vertices of a graph, while the axial intersections becomes the edges.”[1687]

Most of the analysis of Street space terminates at the node or intersection, and so Space syntax overcomes this method by continuing through the axial line of movement through intersections.[1688] What this can gauge are travel times and form analysis that prove that infill, in this case architectural style, is not important as blocks, lots and streets (framework for a determination of whether cities are successful or

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[1684] The Town Paper. “Smart Code, Version 9.2.” Center for Urban Rural Interface Studies. http://curis.msstate.edu/publish/3000-BookletSC.pdf (last visited July 8, 2014), p. 43.

[1685] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 111-112; Hillier and Hanson, J. *The Social Logic of Space*. Cambridge: Cambridge University Press, 1984; Hillier, B. *Space is the Machine*. Cambridge: Cambridge University Press, 1996.

[1686] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 112.

[1687] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 112.

[1688] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 112.

not.[1689] What this was successful in proving was not the unimportance of architecture, which is strikingly important with the creation of the District. Rather, it was a confirmation that the most fundamental aspects of urban form (the blocks, lots and street and the subdivision of land) are the most important aspects of laying down good urban form.

However, as part of its analysis Space syntax is subjective in that it subjectively determines the factors that are chosen to be part of the analysis.[1690] "In this respect, space syntax is no more subjective than conventional transport network analysis, whose connectivity values will depend on whether the network representation includes, for example, all minor roads and pedestrian links and passageways."[1691] However, from a practical measure, the regulation of control or test subject in any experiment have be legitimately based on economy rather than complete consideration of the total set of possible facts.

10.5.2.3 Volumetric Analysis

One of the aspects of this thesis states that much of the research of the Street is prejudiced toward the plan and section, however the volumetric aspect of the street is generally not studied. The Street because of the enclosure qualities of the architectural infill and other import urban element such as landscape infill change the dynamic of space in a volumetric way and effectively change the right and of way and street to be fundamentally different than previously known. This includes changes formed at the intersections or points of connectivity on the street and extends from the intersection to

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[1689] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 113; Hillier, B, Penn, A, Hanson, J. Grajewski, T. and Xu, J "Natural movement: or, Configuration and Attraction in Urban pedestrian Movement," *Environment and Planning B: Planning and Design*, 20 (1993): 9-66; Penn et al. 1998, Penn, A. Hillier, B, Banister, D. and Xu, J. (1998) "Configurational Modeling of Urban Movement Networks," *Environment and Planning B: Planning and Design* 25 (1993): 59-84.

[1690] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 113.

[1691] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 113.

other intersections. What one sees is that the volumes of the Streets tend to be overlain or merged volumes of function, required to spatially be present if the actual function is to continue.

10.6 The City Streets in General

"Streets provide the principal visual scenes in cities."[1692]

The difficulty with street design is the street has multiple characters and functions, and it forms an extremely complex type of space. It incorporates the buildings, ensembles, sequences, spaces, functions are all part of the street.[1693] What is interesting is that many who advocate for a complex view of the Street mainly still see the Street as a primarily a transportation lane in how they describe or categorize the Street typologies.[1694] But, still, there has been some change in the view of the street as a multi-functional urban element rather than concrete and asphalt.

> "Under the system of Modernism, the view of the street as an urban road prevailed; but increasingly the recognition of the street as a multi-functional urban space has been gaining ground."[1695]

For New Urbanists, there has been a push to create a street pattern connected to the Traditional Neighborhood Design, yet these are general recommendations rather than specific guidelines.[1696] In contrast, transportation engineers have a direct

[1692] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 493.
[1693] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 23.
[1694] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 23-25; ICE. *Which Way Roads?* London: Thomas Telford Publishing, 1996, p. 8; Marshall, A. "Public Transport Oriented Urban Design," in Feitelson, E. and Verhoef, E. eds. *Transport and Environment: in Search of Sustainable Solutions*. Cheltenham: Edward Elgar, 2001; IHT. *Transport in the Urban Environment.* London: Institution of Highways and Transportation, 1997, p. 146.
[1695] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 23.
[1696] "Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 35; Crane, R. "Cars Drivers and the New Suburbs," *Journal of the American Planning Association* 60(1) (1996): 51-65; ITE Transportation planning Council Committee SP-8. *Traditional Neighborhood Development Street Design Guidelines*. Washington, DC: ITE, 1999, p. 6..

component of parts to address the transportation needs, and they implement those tools to solve transportation needs to create lanes.[1697] The Urban Task Force recommends that design guidance should provide good practice examples, rather than the prescription' associated with conventional roads-oriented design guides such as DB32.[1698] However, because there are limited guidelines to help designers, the rest of the Street becomes undersigned. The Urban Task Force recommends examples rather than specific guidelines to allow for more flexibility.

The difficulty in creating great streets is that the Great Streets are foci of the community. "First and foremost, a great street should help make community: should facilitate people acting and interacting to achieve in concert what they might not achieve alone."[1699] The Great street will be a foci of the community, will create diversities of type, will bring a diverse populous and will be vibrant.[1700] The great street will be safe and comfortable. Yet, these Streets integrate all of the structural and functional pieces into a whole, and they do so in a manner which attracts people and encourages people to participate in their society.[1701] The best way to look at how these structures come into being is to look at Streets as they are designed.

10.6.1 San Francisco

> "Market symbolized San Francisco's vitality, friendliness, and America's hopes for the future. But it's not a great street now, despite major efforts to make it so. The city has changed, and Market Street has changed."[1702]

[1697] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 29.

[1698] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 33; DTLR and CABE. *By Design: Better Places to Live. A Companion Guide to PPG3*. London: Thomas Telford, 2001; Urban Task Force. *Towards an Urban Renaissance*. London: DETR/E. and F.N. Spon. 1999.

[1699] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 8.

[1700] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, pp. 8-9.

[1701] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, pp. 8-9.

[1702] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 88.

Market Street in San Francisco functions as a diagonal heart in the city that links two corresponding grids together, from the Financial District and North Beach to the North and The Mission and South of Market to the South.[1703] "Location has had a lot to do with Market Street's eminence. It is a true spine of the city, like no other San Francisco street, leading from the Ferry Building at the bay to the foot of Twin Peaks, three miles to the Southwest."[1704] Yet, the street is the focus of San Francisco's many landmarks, cultural avenues, and nodes of transportation.

> "To be sure, some important stores remain on Market, and there is even a new one, in a large building at Hallidie Plaza. There is more life and focus there, where the stores are and where the Powell Street cable car ends, than anywhere else on the street."[1705]

The cross section of Market Street is about 120 feet from building façade to building façade, with about 50 feet of that space being roadway--including four lanes, and a center area with two lanes of mass transit. There are 12.5 feet of street plantings in the furnishings area and 15.5 feet of throughway space next to the building frontage. In 1967, San Francisco voters spent $25 million to improve the street. While this was mainly to make the street aesthetically pleasing, what occurred was also interesting. They widened the sidewalk, refurbished the lights, added better curbs, placed new signage and added the details and furnishings of District quality to make the street unique--all at the expense of the lane.[1706]

10.6.2 <u>Barcelona</u>

> "In a city with perhaps the best streets in the world, the Ramblas in Barcelona stands out. Its placement in the city and in the Gothic Quarter, its grand scale in relation to its narrow, winding surroundings, and the people-welcoming nature of its design, and the quality of the

[1703] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, pp. 88.
[1704] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, pp. 88.
[1705] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, pp. 88.
[1706] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, pp. 88.

> buildings that line its edges make it a street for everyone to come to and know."[1707]

After the completion of several fortifications, the Ciutat Vella, and the walls around the surrounding suburbs (Raval), the religious and public buildings started to be located outside of the city proper and into the larger extents of Barcelona's new acquired lands.[1708] The name comes from the runoff formed during the rainy periods and the torrents from the Plain to the outlets in the sea, but this space was already created as separation spaces between the walls of previous development of the city, to new seconds of extension.[1709] This space allowed for the later construction of public spaces for promenade and recreation.

> "The land to the west of the second town was now included in Pere III's enclosure. The linear space left between Jaume I's town wall and the Raval produced the Rambla."[1710]

The Rambla's irregular plan was because of the nature of the buildings fronting it from both sides of the original city and the Raval, and the nature of the new buildings that would begin to build out the entire section as the Rambla became more of a public space.[1711] From the 16th to 18th Century, the Rambla went through periods of

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[1707] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, pp. 93.

[1708] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, pp. 59-65; Pallares-Barbera, M., Badia, A. and Duch, J., 2011. "Cerda and Barcelona: The need for a new city and service provision." Urbani izziv Urban Challenge, Volume 22, no. 2 (December 2011): 125. http://scholar.harvard.edu/montserrat-pallares-barbera/publications/cerd%C3%A0-and-barcelona-optimal-location-services-and-urban-p-0 (accessed July 11, 2014)

[1709] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, pp. 66-68; Duràn I Sampere, A. *Els noms dels carrers ens parlen de la història de la ciutat de Barcelona I la seva història*. Barcelona: Curial, 1972, p. 426, 486-506; Vila, Pau. *Origens I evolució de la Rambla*. Barcelona: Miscellànea Barcinonensis, 1965; Figuerola, Pere J. and Josep M. Martí. *La Rambla. Els seus covents. La seva història*. Barcelona: Arxiu Diocesà, 1995.

[1710] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 66.

[1711] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 66.

construction and demolition of various periods of public buildings and palaces, and in the 18th century it was realigned by urban design works.

> "In the late 18th century, between 1772 and 1807, at the time of the count of Ricla, realignment work was carried out on the Rambla. The engineer Cermeño who later designed Barceloneta was responsible for the technical supervision of realignment work."[1712]

The Ramblas comprise there street that link and lead from the Columbus statuary to the Placa de Catalunya.[1713] They do not form a straight line but a serious of lines that break through various districts at connective nodes. "The Ramblas, really there successive Ramblas leading in a long, not quite straight line from the Columbus statute at the port gradually upward to the Placa de Catalunya that marks the start of the nineteenth-century city, is a very strong presence."[1714] The street trees give affect the transparency and volume of the street by creating a canopied promenade.[1715]

> "It is a street clearly designed for people to be on, to walk, to meet, to talk. And it succeeds. The wide, central, tree-lined and canopied promenade, a focus for walking, with cartways for automobiles pushed to the sides in grand reversal of the norm, is a stroke of genius that establish the social orientations of the street."[1716]

The buildings and facades are 5 to 7 stories in height.[1717] "Many buildings of reasonably similar height (five to seven stories) line the street and define it."[1718] The first stories of the buildings are mixed use or commercial with a large amount of transparency, with entrances every 13 feet.[1719] The facades are highly detailed with

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[1712] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 69.
[1713] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 93.
[1714] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 93.
[1715] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 93.
[1716] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 93.
[1717] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 146.
[1718] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 94.
[1719] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 94.

some buildings having 15 foot wide frontage, matching the narrow lots.[1720] The street itself is a major civic area with designations and places for people to go and watch other people.

> "There is a subway stop near the theater. As if the stores and restaurants that line each side were not enough, there are, in discrete sections along the central walk, stalls that sell birds and flowers, larger stalls for magazines, and umbrella-covered tables for drink and food served from bars across the narrow auto cartways."[1721]

The tree canopies start 15 to 20 feet from the ground, but have a large canopy filling the space with volumes of transparency, and in some places covering the entire Street with enclosure space.[1722] With the trees being 21 feet apart, their large canopies merge into one mass.[1723]

> "And there are trees, Large London plane trees with branches that start some 15 to 20 feet from the ground, creating an interweaving canopy high above and green, dappled light below."[1724]

The pedestrian space includes a central 36 to 45 feet space bordered by two narrow roadway access streets of around 21 feet wide which can handle one moving and one parking lane, which themselves are bordered by 17 feet of sidewalk or loggia space off about 4-5 feet wide.[1725] The sidewalks in general range from 3-20 feet wide depending on the types of uses in the area.[1726] But, cafés and kiosks fill the public area.[1727]

[1720] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 94.
[1721] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 94.
[1722] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 95.
[1723] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 146.
[1724] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 95.
[1725] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, pp. 96-97, 146.
[1726] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, pp. 96-9.]
[1727] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 146.

> "The street is particularly appropriate to its location. The surrounding city pattern has winding streets that may be less than 10 feet wide, lined with buildings up to six stories high." [1728]

The Ramblas function like linear urban parks without the actual open space to act as edges of the city.[1729] They wind through the Gothic Cuitat Vella and link it to the rest of the new Cerdà extension--the Example.[1730] Generally in the Ciutat Vella, the streets are short and mostly 10 feet wide in some places.[1731] The Ramblas act as open spaces that allow for residents to know where they are within the city depending on the direction of the nearest Rambla.[1732] Further, the Ramblas create open space while they are still shaded from the elements.[1733] So, the Ramblas act to allow movement, protect from the environment, create open space, join the various parts of the city together, and provide a social area for people to meet. Even with a 100 foot right of way, the Ramblas have a sense of intimacy because of the large amount of public space that is actually filled with activity. "A sense of intimacy, despite the wide, almost 100-foot right-of-way, due at least in part, to narrow sidewalks, a narrow auto cartways, bay windows, signs, awnings. There is a great deal in the right-of-way."[1734]

In Barcelona on the Paseo de Gracia, there are very large public rights-of-way, with each side having 70 feet from the lanes of travel.[1735] "The 70 feet on each side of

[1728] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 96.
[1729] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 96.
[1730] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 96.
[1731] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 96.
[1732] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 96.
[1733] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 96.
[1734] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 146.
[1735] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 37.

the central auto roadway is where the intricacy and the richness lie."[1736] The Paseo de Gracia has six lanes of traffic, and moves large amounts of people in various directions. The six lanes are between 58 and 60 feet wide, about 10 feet per lane.[1737] "First there is a 16-foot-wide median strip, planted with large plane trees about 24 feet apart and reaching heights of from four to five tall stores."[1738] There are side streets that allow slower access to the main avenue. "The access road and the median act as one, a slow zone for autos and people with a variety of designs and plans to meet changing needs and to respond to changing opportunities: diagonal or parallel parking, subway entrances, ramps to and from underground parking, landscape, lighting, and sitting possibilities."[1739] The total streetscape and the public right of way is 200 feet. The total streetscape and the public right of way is 200 feet.[1740]

10.6.3 Paris

Avenue Montaigne is a street similar to other boulevards and to Paseo de Gracia in Barcelona, and as a result this is a street that acts as a civic place of importance. Though it is about a half the total width of the public right of way as Paseo de Gracia, it has similar types of things.[1741] "In total, the public right-of-way width is approximately 104 feet…. [and there] is another 7 foot … building setback on both sides, in front of the building line."[1742] The buildings are of the same height as Paseo de Gracia, which create

[1736] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 37.
[1737] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 37.
[1738] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 37.
[1739] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 37.
[1740] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 41.
[1741] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 51.
[1742] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, pp. 52-53.

a sense of enclosure.[1743] Yet, while the roadway is quite large the lanes are narrow at around 10 feet wide.[1744] There is a planting strip of 6-7 feet dividing a narrow access road from the main lanes of traffic--it allows parking and slow speed access to the lots and blocks.[1745] On both sides are sidewalks that are about 10 feet wide.[1746] In total, the total public-right of way is around 126 feet from building façade to building facade.

In Paris, the Boulevard Saint-Michel is an area with cafes and stores, as a commercial street with mixed-use.[1747] The street has trees which create transparency while enclosing the street further with their large canopies. "The mixture of natural light that filters through the trees and the welcoming transparency of the ground-floor widows of commercial uses invites the passerby and calls attention to the goods displayed on racks or tables along the sidewalks."[1748] The right of way is 100 foot wide and runs north to south. There is a 24 to 25 foot sidewalk on both sides of the street with a tree planting area. There is a central roadway of three to four lanes in one direction, with one busway--comprising a total of 50 feet. The buildings have a district quality with "light-colored buildings … uniformly five floors (including the ground floor) plus an attic story."[1749] The sidewalks crowd with activity, with commerce from the stores on lots merging into the street.

> "They are crowded with public and less public paraphernalia: kiosks benches, bus shelters, clothes racks and book tables, tables and chairs at cafes, light poles, trees, many, many people, and, for long stretches, not-so-portable metal crowd control fences, presumably

[1743] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, pp. 52-53.
[1744] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 53.
[1745] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 53.
[1746] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993 p. 53.
[1747] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 56.
[1748] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 56.
[1749] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 56.

> there to keep people from spilling over into the street or crossing where that may not be the thing to do."[1750]

The trees themselves provide transparency and 60 feet of enclosure into the street volume.[1751] With a 100 foot wide right of way, this means effectively 40 feet of the roadway is not covered by transparency--leading to a very intimate type of space. Importantly, the canopy starts at 17 feet above the ground allowing people to view the sidewalks without obstacles.

> "The canopy creates large patches of dark, moving shadows that contrast sharply with the brilliant light, perhaps made all the more so by reflections from the light-colored building facades."[1752]
> Arguably, the Avenue des Champs-Élysées is the most famous street in the world. It is the epitome of a grand boulevard, the one most thought of as preeminent; it was a model for others. Many people would also agree, including officilas responsible for its design and maintenance, that by the 1990s it was no longer what it once was and that it needed change."[1753]

The Champs-Élysées has a 230 foot wide public right of way, so this is a very large and prominent civic space. "Its two main sections are vastly different: the first, from the promenades divided by a river of fast-moving traffic; the intensely developed second section runs from Rond-Point to the Place de l'Etoile."[1754] Of the 230 foot right of way, the roadway is about 87 to 89 feet wide. [1755] "On the ground, it is held together as open grand avenue not so much by the width of its right-of-way as by its beginning and ending foci, by the uniform width of its central, ten-lane cartway, about 87 feet…, and by the large, severely pruned London plane trees that line it."[1756] The Champs-Elyssee

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1750 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, pp. 56-57.

1751 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 57.

1752 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 57.

1753 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 75.

1754 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 75.

1755 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 75.

1756 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 75.

functions to link various nodes and landmarks of Paris together to provide a greater unity for the city. The Champs-Élysées contains an 11 foot tree planting, a 23 foot side access road and a 36 foot sidewalk to building frontage.[1757] The building facades are about 4 to 5 stories high and about 75 to 80 feet in height.[1758]

> "There are many windows, many doors and cornice lines to cast shadows; there are balconies, generally light-reflective materials and colors, and eye-catching details."[1759]

The Champs-Élysées has numerous restaurants, cafes, stores and other destinations.[1760] Still, large sections of the Street are often barren--"the large spaces on either side of the central roadway, some 70 feet … on either side, are often barren."[1761] The trees are heavily pruned and so their canopies do not interfere with the views from important nodes and landmarks. The trees do not add much enclosure to the space.

> "Their form may be fine for a long vista up and down the avenue, especially when there is a parade, but they do no good whatsoever for a street user: they provide no shade, no visual protection from the center ten lanes of traffic, no immediate positive presence."[1762]

The throughway on each side are about 40 feet wide, but, there are café, kiosk and restaurant interruptions, with temporary structures producing up to 30 feet into the total Sidewalk.[1763] There are large 22 foot access lanes used for parking and stopping.[1764] The Champs-Élysées is a large boulevard with a particular function, and that function

[1757] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 76.
[1758] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 77.
[1759] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 77.
[1760] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 77.
[1761] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 77.
[1762] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 78.
[1763] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 78.
[1764] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 78-79.

was as pathway from landmark to node of circulation within the city. It was also a symbol of power, and so it was aggrandized beyond normal streets.

10.7 Data from the Research Sites

When looking at Streets, the analysis must break down to Street Lengths or Routes. A Route is a series of street lengths connected by intersections. In contrast, a Street is an individual length of Street. Sometimes the Street is known as a link. Streets change from intersection to intersection, and thus, Street analysis must also reflect those changes. In contrast, a Route is a series of streets and intersections aligned together along a pathway. By definition, a Route consists of more than one Street Length.

Within the Site Areas, there is an average of 195.67 Street lengths. Of this number, San Francisco has 70% of the mean, Portland has 107% of the mean, New York has 71% of the mean, Paris has 157% of the mean, Barcelona has 78% of the mean and Atlanta has 71% of the mean. What this seems to indicate is that the number of street lengths is not as important but must at least be around 70% of the mean. The Average street length in the Site Areas is 343.14 feet, with the average longest street in the Site Areas being 879.03 feet. Of the average street median, San Francisco's average is 113% of the mean, Portland's is 62% of the mean, New York's average street length is 117% of the mean, Paris' street length is 85% of the mean, Amsterdam's street length is 85% of the mean, Barcelona's street length is 123% of the mean and Atlanta's is 108% of the mean. When one compares these numbers to LEED's walkability requirement of 400 feet, one finds that the average length is well below the 400 foot requirement. However, when one looks at the average longest street lengths, one finds that the longest lengths are 220% more than the 400 foot requirement. Further, when one looks at the data, while there are an average of 195.67 street lengths in the Site Area, only 128.17 of the Streets satisfy the LEED 400 foot requirement. Of the 195.67 street length average number, 36.17 streets are between 401 and 500 feet, 12.83

streets are between 501 and 600 feet, and 18.60 streets are above 601 linear feet. What this indicates is that over 37% of the total street lengths fail the LEED requirement. In the Site Areas, the average length of streets above 400 feet is 600.13 feet. Still, as a whole the Sites do satisfy the LEED requirement of Site walkability even though large portions of the Sites do not.

When one looks at the average right of way, what one finds that the right of way is not a good indicator of resiliency. This is because while the right of way might be wide in some areas, the setbacks in other areas more than compensate for the right of way distance in the more resilient cities. The average right of way in the Site Areas is 63.52 feet. Of this number, San Francisco is 134% of the mean, Portland is 96% of the mean, New York is 127% of the mean, Paris is surprisingly 60% of the mean, Amsterdam is 73% of the mean, Barcelona is 110% of the mean and Atlanta is 94% of the mean. While Atlanta and Portland's streets are close to the mean, the lack of enclosure make the streets seem wider because they are less populated by people and with buildings. When one looks at the roadway, one notices that even in the largest cities, the average road width is about 40 feet wide. In the Site Areas, the average road width is 33.39 feet. Of this number San Francisco is 111% of the mean, Portland is 96% of the mean, New York is 127% of the mean, Paris is 99% of the mean, Amsterdam is 87% of the mean, Barcelona is 106% of the mean and Atlanta is 122% of the mean. It seems that the resilient cities moderate their traffic and their space not by having average widths that are large but by having specific streets that are large with the overall majority of streets being very narrow. In Paris in particular, the streets are fairly narrow and compare to Amsterdam's very narrow streets. Before this study, one already knew that the average width of the roadway in Amsterdam was quite small, but the boulevards in Paris give the illusion that the overall road widths and right of ways in Paris are wide, when they are quite narrow.

Within the Site Areas there were an average of 3.83 large serpentine or curved Routes. Within this study, San Francisco had 26% of the mean, Portland had 0% of the mean, New York had 0% of the mean, Paris had 261% of the mean, Amsterdam had 313% of the mean, Barcelona had 0% of the mean and Atlanta had 209% of the mean. What this seems to indicate is that while serpentine streets do not make bad urban form, they also must be used in moderation or in particular ways which do not destroy connectivity. What this indicates is that a complete and total girdline is not required in order to have resilient urban form.

Within the Site Areas, there were 0.83 large radial or diagonal routes. San Francisco had 0% of the mean, Portland had 0% of the mean, New York had 0% of the mean, Paris has 480% of the mean, Amsterdam had 0% of the mean, Barcelona had 120% of the mean and Atlanta had 480% of the mean. What this seems to indicate is that Paris and Atlanta are more similar with the diagonal routes. However, the diagonal routes within Paris and Barcelona break up an extremely dense and fine network of blocks and masses, and the radials within Atlanta do not. This does not mean that Atlanta is worse than Paris or Barcelona, it just means that these radials function differently than in the Atlanta Site Area.

When looking at Dendritic Street Lengths, the average mean was 4 street lengths. San Francisco had 0% of the mean, Portland had 0% of the mean, New York had 50% of the mean, Paris had 525% of the mean, Amsterdam had 25% of the mean, Barcelona had 0% of the mean and Atlanta had 600% of the mean. When one looks at dendritic streets to total streets, the average number of cul-de-sac lengths is 0.01 or 1% of total street lengths. Within the Atlanta site, there were 1,198% more cul-de-sacs than the average mean, while Paris had only 471% of the total mean. What one sees is that while before the dendritic routes were not an issue, when one breaks the route down into street lengths, the total street lengths of cul-de-sacs in Atlanta is much greater than that in Paris, when one compares these lengths to the total number of Street Lengths in the Site Area. What one begins to see is that while cul-de-sacs are not intrinsically bad for urban form, the placement of cull-de-sacs as major or minor throughways in Atlanta rather than as service access points becomes problematic. Further, the stacking of cul-de-sacs in Atlanta exacerbates the problem and compounds not only the traffic issue, but multiple other urban form issues.

When one looks at the previous cul-de-sac issue in relation to Paris and the number of accreted Streets that Paris has in relation to other resilient cities, one sees that for Paris, the cul-de-sacs represent mainly accreted forms rather than any attempt at a regularized gridplan. In contrast, much of the cul-de-sac placement in Atlanta is planned. The average number of accreted street lengths in the Site Areas is 32.17. Of this number Paris has 600% of the total number, being that it contains all of the accreted Street lengths.

When one looks at the Site Areas, one sees that a hierarchical gridpattern forms the overall majority of street length patterns with a mean of 158.67 street lengths. San Francisco has 86% of the mean, Portland has 132% of the mean, New York has 86% of the mean, Paris has 56% of the mean, Amsterdam has 145% of the mean, Barcelona has 95% of the mean and Atlanta has 69% of the mean. With this final street analysis, something has become clear. Most street lengths in resilient cities is of a hierarchical gridline quality. In Paris, the non-gridline streets are mainly accreted streets which form cul-de-sac patterns, and these streets function as service or minor access points. In Atlanta the cul-de-sac streets are designed cul-de-sac streets, and the streets function as major access points.

T-cell blocks are those blocks with at least one T-intersection. When one looks at the relationship between Streets and Blocks, one sees that the average number of T-cell blocks is 27.83. San Francisco has 50% of the mean, Portland has 65% of the mean, New York has 47% of the mean, Paris has 176% of the mean, Amsterdam has 237% of the mean, Barcelona has 25% of the mean and Atlanta has 1.04% of the mean. X-cells are blocks with at least one X-intersection. When one looks in the site area, the average number of X-cell blocks is 60.17. San Francisco is 85% of the mean, Portland is 88% of the mean, New York is 66% of the mean, Paris is 105% of the mean, Amsterdam is 153% of the mean, Barcelona is 103% of the mean and Atlanta is 55% of the mean. When one looks at these numbers what they seem to indicate is that areas which have X-cells also have T-cells, and they are not competing. These differences might result from brickwork or different weaves of blocks, but these numbers do not necessarily mean that there is a loss of connectivity. For example, an almost entire rectangular blocks Site Area like San Francisco had have significant T-cell and X-cell blocks while providing high connectivity. What this indicates is that resilient cities have a natural speed mechanism which could be used to create slower speed system by block offsetting and with the use of T-cells. Used sparingly, these could be tactfully used without destroying overall connectivity or destroying the street grid.

In contrast, Y-cells blocks are those blocks which have at least one Y-cell intersection. The average mean for Y-cell blocks in resilient cities is 0.04 or 4%. San Francisco has 45% of the mean, Portland has 0% of the mean, New York has 0% of the mean, Paris has 415% of the mean, Amsterdam has 26% of the mean, Barcelona has 114% of the mean and Atlanta has 221% of the mean. While this might seem to indicate that Y-cell blocks are also within resilient cities that would be the wrong conclusion. Most of the Parisian Y-cell blocks also exist in a triangular block system. In the Barcelona block system, most of the Y-cell-blocks are within created Y-cells that disperse traffic in a particular area. In Atlanta, the Y-cells are part of dendritic cul-de-sacs and so they are fundamentally different than the three other Site Areas. The Y-cells in Atlanta function to handle dendritic traffic patterns. In Paris and Barcelona, those Y-cells still have high connectivity.

10.8 Time: Intensity and Change

> "For the cities studied, it seems clear that the scale of blocks and of street patterns has become larger with time, especially over the last 150 years, and with distance from the center of the community in question (which of course, may well be just another way of expressing time).[1765]

Even in resilient cities there is sprawl but the rate of diversification is also higher than in cities which experience only sprawl. In Barcelona, New York, San Francisco, Portland, Amsterdam, Paris and other cities, it is easier to determine the age of various neighborhoods by the fine grain nature of the city pattern.[1766] "It is not difficult to look at the maps of Barcelona or Bari or Rome or Paris or Boston or other older cities, and to identify the later additions to them."[1767] One can do this from gridpattern maps where the various ages of expansion followed particular development patterns and sizes. "Compare any block pattern of a twentieth-century city with one of a city of more than two centuries and the contrast in scale will be striking. To a considerable extent the most recent jumps in scale may be explained by technology, most notably the advent of automobiles. Things are bigger."[1768] [See Figure 146]

Yet, as time changes cites, the sizes, scales and ordered rankings actually change. The cities become more fine-grained, and the districts become more unified. "The scale of older cities is generally much smaller and finer than that of newer cities."[1769] Traditionally, designers built cities to be more fine-grained, and, as cities age,

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[1765] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 259.
[1766] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 198.
[1767] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 159.
[1768] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 259.
[1769] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 259.

even the more modern cities break down because of intensification of use and diversification of type and elements. This happens for every type of grid lined city--this just becomes a more difficult process with urban patterns which restrict diversification and intensification. Further, as newer cities create urban form that is out of scale, the total sum of the cityscape might seem to become more large scale, but the speed of expansion with larger scale has just overtaken the natural process toward the small scale. An analysis could possibly be made by determining the rate of diversification and changes in area to the built environment by comparing this rate of area expansion by sprawl to get a good determination of how quickly the city is diversifying or changing or how quickly sprawl has overtaken the city.

10.9 Connectivity

An important aspect of the Street and its analysis are the necessary connective points where the Streets link together to be functional.[1770] This is not only how they connect, but where they connect in space.

> "[In] the case of a tree, 'necessary connections' means, for example, that a branch cannot float alone' in a matrix of twigs: it must at least connect to another branch, or to a limb or the trunk."[1771]

10.9.1 Linkage Quality and Nature

As stated before, the important aspect of the Street is not in its isolation, but how it links together multiple types of urban element and processes in order to create the Street. This linkage is designed, physical and visual in nature because that is how humans place elements within our environment.

> "Linkage refers to the physical and visual connection from building to street, building to building, space to space, or one side of the street to

[1770] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 160.

[1771] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 160-162.

> the other, which tends to unify disparate elements. Tree links, building projections, and marked crossings all create linkage."[1772]

Linkage can occur in any direction, but the linkage always defines the relationship of the positioned viewer and the positioning of the object within space. "Linkage can occur longitudinally along a street or laterally across a street. Linkages can be defined as features that promote the interconnectedness of different places and that provide convenient access between them."[1773] It is this connectivity which allows ease of movement--both physical and visual connection.[1774]

> "Urban design is concerned with the question of making comprehensible links between discrete things."[1775]

Having lots of intersections and streets does not necessarily mean that there is a lot of public space. Los Angeles has fewer intersections per mile than Bogota, but there is much more public space within the street itself.[1776] While there is more practical physical street space in Portland because of the City's extremely small grained character, Barcelona's enclosure on the Street along with the District experience of walking on the street make Barcelona seem more intimate.[1777] Even though both cities have good fundamental elements, the experiential nature of Barcelona is more intimate and of higher quality than many other cities.[1778]

> "The city's abundance of fine streets, where buildings are built to these street lines, may be accounted for in part by this pattern. … It may simply seem small, because one may experience the block as

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1772 Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 20.

1773 Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 20.

1774 Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, pp. 20-21.

1775 Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 21; Trancik, R. *Finding Lost Space: Theories of Urban Design*. New York: Van Nostrad Reindhold: 1986.

1776 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 267.

1777 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 267.

1778 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 267.

ending at the start and finish of the diagonals, which become part of the intersection."[1779]

The quality and nature of the linkage is critical when considering the linkage within urban form.[1780] It is this quality which determines the actual linkage and how it relates to people inhabiting the urban form. There might be theoretical linkage between functions and elements to the street, but until there is an actual linkage of the element to a particular place within urban form, the element will be detached from that urban space--detachment.

10.9.1.1 Scale, Complexity, Heterogeneity, Irregularity, Connectivity

The scale of the streetscape is determined to a large degree by the character and complexity of the intersections that dot the Street. [See Figure 156] The intersection characteristic will determine how the connectivity tissue of street lengths either becomes a dendritic form or a more traditional form of street pattern.[1781] The intersection characteristic provides a "quintessential street pattern shape" regardless of the scale or direction of the street lengths.[1782] Further, if one can only see the intersections, one can cognitive determine the type of structure present. What is interesting is that in order for either dendritic or traditional grids to occur, from the extremes of disconnectivity to connectivity in the urban form, planning has to take place. In a more practical way and rather than leave connectivity to change, planning has to also occur in order to avoid coherency, legality or topographic problems.[1783] "Put

[1779] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 267.
[1780] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 21.
[1781] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 153.
[1782] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 153.
[1783] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 153.

another way, it seems that it requires careful planning or ordering to achieve the balance required to avoid a natural differentiation of routes."[1784]

10.9.1.2 Scale and Density

When considering the physical dimension of walking or inhabiting space, some cities have urban form within this scale, and, as a result, a single trip will include walking past several blocks of stores rather than alone the side of one superblock. Within more walkable cities, the fine-grained scale of the framework structure allow for more opportunities for commerce, development, culture and interaction than in other cities, and a more intimate experience for residents.[1785] [See Figure 151]

> "An amazing amount of Venice, compared to almost any other major city, can be found in one square mile. Most of the Grand Canal is in that area, as is everything from near the railway station at the northwest to the Arsenal on the east."[1786]

One can review the scale of the intersection by determining the area of the public realm and the street lengths between intersections. One also can review scale as an overall picture by determining how the urban form, within Streets and intersections, looks on the landscape. When the intersections are dispersed on the landscape, the scale of the lengths between the intersections gives an indication as to whether there is more density and compression or if there is sprawl.[1787] What this also shows is that the urban form is more permeable because there of the dense number of intersections in certain points--rather than other points. Higher densities imply smaller scales.

[1784] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 153.

[1785] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 260.

[1786] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 260.

[1787] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 38; Rosenkrantz and Abraham, Rosenkrantz, V. and Abraham, M. *Integrating Transport and Urban Structure-Why it Matters and How it Works.* Paper prepared for New South Wales Department of Transportation, Sydney, 1995; Urban Task Force. *Towards an Urban Renaissance*. London: DETR/E. and F.N. Spon. 1999; DTLR and CABE. *By Design: Better Places to Live. A Companion Guide to PPG3*. London: Thomas Telford, 2001.

10.9.1.3 Complexity of Connectivity

One of the main characteristics it the complexity or detail within the intersection or with the connectivity. "Characteristic structure has a high degree of complexity and a medium to high level of connectivity."[1788] These complexity types are how the intersections, and thus the routes, express themselves from each other, and by doing so, they create different types of pathways within the urban form.

> "The characteristic structure of traditional street patterns has not traditionally been subject to systematic scrutiny as a basis for design. For a start, it has habitually been written off as being fundamentally 'unstructured' or 'amorphous', in association with its being unplanned.' Moreover, in the era of Modernism, traditional street patterns were regarded as dysfunctional, to be swept away, and so little attention was paid to how they might be formed. Yet today, neo-traditionalists would wish to replicate the currently back-in-favour qualities of traditional patterns—if only these qualities could be adequately captured. As far as the design debate is concerned, then, the primary question is 'what is desirable design?' or, more specifically, 'what is the structure of those patterns considered desirable?'"[1789]

Within gridpattern-making, there is no guarantee that traditional or neotraditional systems will have greater connectivity than dendritic gridplans. "Indeed, Michael Southworth has demonstrated that some neo-traditional designs may resemble conventional 'auto-oriented' suburbs as much as traditional grid-based neighbourhoods, in terms of proportions of crossroads and culs-de-sac."[1790] Depending on linkage quality, these systems range from completely connected (fine-grained connectivity) to completely disconnected (theoretical dendritic or tributary systems).[1791] For simplicity,

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[1788] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 154.

[1789] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 133.

[1790] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 38; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 105-107; Southworth, M. "Walkable Suburbs? An Evaluation of Neotraditional Communities at the Urban Edge," *Journal of the American Planning Association*, 63(1) (1997): 28-44; Southworth, M. "New Urbanism and the American Metropolis," *Built Environment*, 29(3) (2003): 210-26.

[1791] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 143-144.

these fall within four categories: “tributary, semi-tributary, semi-grid, and grid systems.”[1792] These intersections connect to each other basically in X-, Y- and T-intersections. [See Figures 152, 153 and155] There are more intersection types due to irregular forms, but those forms represent a small portion of the overall types represented by the X, Y and T forms.

> “[Tributary systems are] deep branching, with systematic use of culs-de-sac and/or layered loop roads. These have been commonly used … since the 1960s, for example in new towns and outer suburbs, and are typical of ‘hierarchal’ road systems.”[1793]

Completely tributary systems are the dendritic systems known mainly in sprawl areas. This system is generally noted as containing lots of “loops and lollipops” with completely localized cul-de-sacs.[1794] Pure tributary systems are theoretical because most suburbs have some type of grid connectivity at larger scale. However, true tributary systems will have almost all Y-intersections, flowing in a particular direction. It is important to note that in the true tributary system, every system has a tributary quality which compresses traffic in one direction and a distributive quality which distributes traffic to its most localized nature in the other direction.

Semi-tributary systems are those that are in older first ring suburb neighborhoods that have more tributary cul-de-sacs than the connective system. This system has a less hierarchical structure, there are more direct connections between roads than a true dendritic system, and is populated with T-junctions rather than Y-junctions.[1795]

[1792] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 143-144.

[1793] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 143.

[1794] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 92; Department of Environment, Transport and Regions (DETR)/Commission for Architecture and the Built Environment (DETR/CABE). *By Design: Urban Design in the Planning System: Towards Better Practice*. DETR, London, 2000, 40-1.

[1795] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 143; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 92.

> "[Semi-griddy] refers to the typical grid-like layouts with a variety of T- and X-junctions, typically found in the inner areas of traditional settlements."[1796]

One should note that there is a middle ground between completely griddy or tributary and that theoretically would be a Neither Griddy Nor Tributary point. At this point, the tributary and griddy nature of the structure would have equilibrium. While this theoretically would take place, this would most likely not happen for all practical purposes.

Semi-griddy systems are sometimes found in areas that were once gridded but because of age or new planning regiments, have added cul-de-sacs or road stoppage that have created some disconnectivity. However, their original connective plan is set. This grid-system has more T- and X-junctions, with X-junctions being in a larger proportion than other types of intersections.

Completely Griddy refers to the neotraditional and traditional developments that have high to total connectivity. Griddy systems are the extreme opposite from tributary systems, for every Street in the Griddy system connects as a whole system.[1797]

> "[Griddy] implies a relatively high proportion of X-junctions, typical of regular 'planned' layout such as the original planned extensions to traditional settlements, or to new settlements laid out on a grid pattern from the outset."[1798]

One should note that triangular or prism systems though may be completely griddy and yet their intersections are skewed.[1799] Thus, any griddy category should include both triangular and prism creating intersections.

> Characteristic structure has a medium or 'semi-griddy' level of connectivity (with a relative connectivity of around 0.35-0.45) arising

[1796] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 144; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 93.
[1797] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 64.
[1798] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 144.
[1799] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 93.

> from a typical mixture of short and long routes, more or less connective routes, some differentiation of depth but, overall, not too great in dept. Three-way junctions are typical in the majority, but with the likelihood of at least some crossroads and culs-de-sac. … Characteristic structure is typified by a relatively high degree of irregularity and complexity (complexity typically in the range of 0.35-0.6).[1800]

One should note that this analysis does not indicate which type of connectivity is preferred or not. While some might think that the most preferred connectivity type is the completely gridded intersection, the reality is somewhere between semi-griddy and completely griddy--with the neotraditional type. Contrary to what some might believe, this is not an actual subjective determination. In reality, market forces make this determination with the values placed upon neotraditional planning.

> "Often the kind of street pattern desired by urban designers and planners is not necessarily a formal gridiron, but a more irregular (though still grid-like) pattern, often associated with traditional networks."[1801]

These gridlines do not necessary imply monotony, but this just describes the type of Street connectivities present. "But complexity involves other qualities—even with equal connectivity; for example, deformed grids have greater complexity than regular grids."[1802] There are other factors which complicate the complexity of the intersection types and make even similar grids very different. This includes: homogeneity or heterogeneity, regularity or irregularity, reclusively or repetition, and concentration or dispersal.

The heterogeneity or homogeneity of a system tells us that all intersections look more alike or are more different. [See Figure155] This is a broad scale comparison that groups intersection characters into cohorts and compares the size of those cohorts.

[1800] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 154.

[1801] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 145.

[1802] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 92; Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 214.

“Now, as well as telling us something about the relative connectivity of the network, the spread of the scatter in a sense tell us something else about the character of the network.”[1803] The more that all intersections are of one time in a system, the more heterogeneity the system has, and the more similar all of the intersections are the more homogeneity the system has. If one adds the homogeneity and the heterogeneity if the system, they should add up to 100% of the intersections.

When one sees irregular or regular intersections, intersections that are more regular have a greater proportion of intersections of one type. [See Figure155] This is an analysis of the number of types of routes over the total number of routes. “In order to compare networks of different sizes, we can divide the number of distinct route types by the total number of routes, to obtain a property that one can call irregularity.”[1804] The more types of intersections in a system, the more irregular it is, and conversely, the more of one or few types a system has, the more regular it is. If one adds the regularity and irregularity of the system, they should add up to 100% of the intersections.[1805]

When one sees recursivity or repetition, this is how the various scales of systems connect.[1806] These are complex system and duplications of size rather than type, for either the assembly of the connection or the pattern is duplicated by repetition by duplication or recursivity in a factual series.[1807] [See Figure155]

> “Recursivity can be defined by the number of depths divided by the number of routes (where the number of depths is simple equivalent to the maximum depth). The property of recursivity clearly distinguishes layout (b) from the other two: layout (b) has a maximum recursivity of

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[1803] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 146.
[1804] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 147.
[1805] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 147.
[1806] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 147.
[1807] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 147.

1, whereas layouts (a) and (c) have a recursivity of values of 0.2 and 0.36 respectively."[1808]

10.9.1.4 Intersection Recommendations

> "Generally, there is an inverse correlation between intersections; as the former decrease the later increases. Intersections in Irvine are about one-quarter of a mile apart. For an older U.S. city, Savannah, they are regularly 125 to 300 feet apart."[1809]

When looking at built form, one recognizes that there are wide differences between proposed and actual connectivity benchmarks. While Venice has over 1,500 intersections, lower Manhattan has 200 and Irvine has 15 within the same scalar dimensions.[1810] Barcelona has over 164 intersections per square mile, while the Gothic quarter of Barcelona has over 486 intersections per square mile.[1811] Savannah, Georgia, has 530 intersections per square mile.[1812] By contrast, Brasilia has less than 100 intersections per square miles, and less than 50 blocks in total.[1813]

> "If you were to talk all of the pathways and travel all the canals of one square mile in Venice you would pass more than 1,500 separate intersections and a circle of at least 900 blocks. By contrast, in Brasilia you would find fewer than 100 intersections in a square mile and less than 50 blocks."[1814]

As a benchmarking system, LEED for Neighborhood Development under "Smart Location and Linkage (SLL), recommends a much more linked and walkable system.[1815]

[1808] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 148.

[1809] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 261.

[1810] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 261.

[1811] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 261.

[1812] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 261.

[1813] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 202.

[1814] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 202.

[1815] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 1 ("To encourage development within and near existing communities and public transit infrastructure. To encourage improvement and redevelopment of existing cities, suburbs, and towns while

It recommends that new developments be placed near older developments or city sections to create cohesion and that at least 150 per square mile or 90 intersections "measured within a 1/2-mile distance of a continuous segment of the project boundary, equal to or greater than 25% of the project boundary, that is adjacent to previous development."[1816] LEED-ND also works on the distance of the street length as a mode of creating distance. In the category "Street Network," LEED-ND purposes to create more interconnectivity like in previous sections, but it also has some public health impacts.[1817] The purpose is to create a safer area for multi-modal transportation, promote healthy lifestyles and conserve land.[1818] The effect though is to have an intersection at a minimum every 400 feet of a street length.

> "Project site with right-of-way intersects on project boundary at least every 400 feet."[1819]

With other intersection requirements like previous points, it allows for sidewalk or through-bicycle traffic if a cul de sac is part of the development.[1820] It adds up these

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limiting the expansion of the development footprint in the region to appropriate circumstances. To reduce vehicle trips and vehicle miles traveled (VMT). To reduce the incidence of obesity, heart disease, and hypertension by encouraging daily physical activity associated with walking and bicycling.")

[1816] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 1; Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 151.

[1817] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 62.

[1818] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 62.

[1819] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 62.

[1820] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 62.

intersections of 400 feet on a per square mile ratio, giving points to those over 400 feet, with 400 intersections having more points.[1821] One should note that in another category, "Connected and Open Community," LEED-ND recommends 140 intersections per square mile minimum, without private connections used as part of this equation.[1822] They also require intersections be placed every 800 feet at the project boundary. "Design and build the project with at least one through-street and/or nonmotorized right-of-way intersecting or terminating at the project boundary at least every 800 feet, or at existing abutting street intervals and intersections, whichever is the shorter distance."[1823] What we see happening is a steady increase or loading of points for higher amounts of intersections in various categories.

Urban planners and critics have also given recommendations of intersections. Jane Jacobs recommended intersections every 300 feet, and Alexander recommended pedestrian road crossings every 200 to 300 feet.[1824] More in line with New York City, Duany and Plater Zyberk limits block size by 230 to 600 feet, which puts their intersections at those dimensions.[1825] Langdon took the middle ground where there was a recommendation of blocks that were 200 by 400 feet, placing the intersections at those

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[1821] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 62; see also Steuteville, Robert and Philip Langdoc and Special Contributions. "New Urbanism Best Practices Guide." *Texas Tech University Department of Architecture at El Paso.* http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, 2014), p. 5.

[1822] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 44.

[1823] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 44.

[1824] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 20.

[1825] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 20.

points also.[1826] What one seemingly finds is that there is fluctuation between the Portland and New York City's intersection density. What one does see though is a reaction to the much larger superblocks which removed intersections in favor of block mass and a move toward more intersections to allow "directness of routes,"[1827]

10.9.1.5 Intersection Connectivity and Network Density Indices

When reviewing the number of intersections in a given pattern, it is almost important to know the relationship between the possible and actual intersections. Actual intersections are those intersections which have crossing streets, and possible intersections are those cul-de-sacs, which if extended would have completed a connective intersection.[1828] What is also important is the distance between the intersection points to determine what is the external connectivity.

Traditional Neighborhood Development ["TND"] method looks at the number of intersections and determines connectivity by the developed area. TND takes the total number of intersections, subtracts the number of cul de sacs and dead ends, and then divides the remaining number with the developed area. This is more of an index of intersections per developed area than the number of intersections within a given standard area.

The CNU uses an intersection density that is calculated by the number of intersections per square mile. The intersections without cul-de-sacs is ratioed over the

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[1826] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, pp. 150-151.

[1827] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 150.

[1828] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 214.

number of intersections in total. The dead end ratio takes the cul-de-sacs and puts that ratio over the total number of intersections.

> "Overall intersection density includes the total number of nodes or intersections, including dead ends; alternatively, real intersection density only counts the 'real intersections' and does not include dead ends in the calculation while the dead end density only includes cul-de-sacs."[1829]

The LEED-ND has a type of intersection density which takes the number of intersections plus the number of cul-de-sac points proposal takes the number of intersections and subtracts the number of intersections serving cul-de-sacs.[1830] Then it puts this number over the total number of intersections to determine the density of intersections.

> "For instance, a street serving only dead ends, even if those dead ends are quite numerous, would have the same LEED-ND intersection density as no street network whatsoever."[1831]

10.9.1.6 Connected Node Ratio

The connected node ratio (CNR) analyzes the number of links that are within each intersection to determine how many links that intersection, on average, is serving. As a result, one can see that the dead ends only serve one node by definition. As a result, the higher the number, the more connected the street network.[1832] Numbers that

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[1829] Garrick, Norman and Wesley Marshall. "The Shape of Sustainbale Street Networks for Neighborhoods and Cities." The Council for the New Urbanism. http://www.cnu.org/sites/www.cnu.org/files/garrick-marshall_cnu17.pdf (accessed July 9, 2014), p. 5.

[1830] Garrick, Norman and Wesley Marshall. "The Shape of Sustainbale Street Networks for Neighborhoods and Cities." The Council for the New Urbanism. http://www.cnu.org/sites/www.cnu.org/files/garrick-marshall_cnu17.pdf (accessed July 9, 2014), p. 5.

[1831] Garrick, Norman and Wesley Marshall. "The Shape of Sustainbale Street Networks for Neighborhoods and Cities." The Council for the New Urbanism. http://www.cnu.org/sites/www.cnu.org/files/garrick-marshall_cnu17.pdf (accessed July 9, 2014), p. 5.

[1832] Garrick, Norman and Wesley Marshall. "The Shape of Sustainbale Street Networks for Neighborhoods and Cities." The Council for the New Urbanism. http://www.cnu.org/sites/www.cnu.org/files/garrick-marshall_cnu17.pdf (accessed July 9, 2014), p. 4.

are 1.4 or higher indicate that the street is more walkable, and there are fewer cul-de-sacs.[1833]

> "The connected node ratio is another measure of connectivity and represents the number of real (non-dead end) intersections divided by the total number of intersections including dead ends."[1834]

The scale on this is from 0.0 to 1.0 with 0.75 being the minimum required for a walkable community.[1835] Higher node ratios of 1.61 indicate more connectivity because there are more links associated with each intersection.[1836] Ratios closer to 0.99 show that the node network is highly grid patterned--being closer to a triangular gridpattern.[1837] However, triangular and prism gridpatterns might not work as well with this network and will need to have their ratios modulated given the nature of their grid rather than a more formalized square or rectangular gridpattern. One should also take into consideration the problem with over count on the perimeter of the system so that only those intersection points and lengths within the perimeter are taken into consideration.[1838]

[1833] Garrick, Norman and Wesley Marshall. "The Shape of Sustainbale Street Networks for Neighborhoods and Cities." The Council for the New Urbanism. http://www.cnu.org/sites/www.cnu.org/files/garrick-marshall_cnu17.pdf (accessed July 9, 2014), p. 4.

[1834] Garrick, Norman and Wesley Marshall. "The Shape of Sustainbale Street Networks for Neighborhoods and Cities." The Council for the New Urbanism. http://www.cnu.org/sites/www.cnu.org/files/garrick-marshall_cnu17.pdf (accessed July 9, 2014), p. 4.

[1835] Garrick, Norman and Wesley Marshall. "The Shape of Sustainbale Street Networks for Neighborhoods and Cities." The Council for the New Urbanism. http://www.cnu.org/sites/www.cnu.org/files/garrick-marshall_cnu17.pdf (accessed July 9, 2014), pp. 4-5.

[1836] Garrick, Norman and Wesley Marshall. "The Shape of Sustainbale Street Networks for Neighborhoods and Cities." The Council for the New Urbanism. http://www.cnu.org/sites/www.cnu.org/files/garrick-marshall_cnu17.pdf (accessed July 9, 2014), p. 6.

[1837] Garrick, Norman and Wesley Marshall. "The Shape of Sustainbale Street Networks for Neighborhoods and Cities." The Council for the New Urbanism. http://www.cnu.org/sites/www.cnu.org/files/garrick-marshall_cnu17.pdf (accessed July 9, 2014), p. 6.

[1838] Paul Knight, "Chicago is Rural: The Inconsistencies and Absurdities of Street Connectivity Indices" Georgia Institute of Technology, CNU 19 Academic Paper Submission, December 6, 2010 http://www.cnu.org/sites/www.cnu.org/files/knightcnu19finalpaper_0.pdf (accessed July 9, 2014), p. 5.

10.9.2 Allowable connections and Frequency of Elements

Another two conditions are the allowable connections and frequency of the elements.[1839] Allowable Connections are the constraints that are lain upon the various types of urban form. There are some types of urban form that only are associated with a particular urban form or series of urban form elements.[1840]This is the access constraint of the various types of things, where there are some types of connections that require intermediate connections or devices in order to connect.[1841] An example of allowable connections is arteriality where smaller forms of one type only attach to forms one scale above them. [See Figures 154 and155] In contrast, there are some other forms like purely hierarchical gridpatterns actually allow smaller forms of multiple types to attach to the largest of urban elements.

A frequency of distribution indicates the frequency at which do connect when they are allowed to connect.[1842] "At this stage, the analogy implies that there would be a few main roads, several intermediate roads and many minor roads."[1843] One would assume that those element which are minor or divide smaller spaces are more representative of the whole, whereas those elements which are larger and more accumulative represent smaller portions of the whole.

10.9.3 Data from the Research Sites

An intersection is defined as the connection point from one street length to another street length. This is very important because it shows that the number of

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[1839] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 162.
[1840] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 162.
[1841] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 162.
[1842] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 164.
[1843] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 164.

intersections that one has is not always as important as how intersections organize in space. In the Site Areas there were an average of 104.83 intersections. What is interesting is some of the best urban form and worst performing urban form have similar numbers of intersections. From the average mean of 104.83 intersections, San Francisco had 72% of the mean, Portland had 73% of the mean, New York had 57% of the mean, Paris had 181% of the mean, Amsterdam had 133% of the mean, Barcelona had 83% of the mean and Atlanta had 70% of the mean. Of the total intersections within the perimeter, to address intersection over count, these effect is also similar. While the average number of intersections is 66.33, San Francisco had 56% of the mean, Portland had 66% of the mean, New York had 45% of the mean, Paris had 210% of the mean, Amsterdam had 139% of the mean, Barcelona had 84% of the men and Atlanta had 72% of the mean. When one looks at intersections per square mile, a similar dynamic occurs. The average mean of intersections per square mile is 203.61 intersections per square mile. San Francisco had 60% of the mean, Portland had 75% of the mean, New York had 57% of the mean, Paris had 185% of the mean, Amsterdam had 169% of the mean, Barcelona had 55% of the mean and Atlanta had 63% of the mean. When one compares these number against LEED requirements of 90 or 140 intersections per square mile, the average number of intersections is 226% and 145% respectively of the LEED requirements. With this number San Francisco is 60% of the means, Portland is 75% of the means, New York is 57% of the means, Paris is 185% of the means, Amsterdam is 169% of the means, Barcelona is 55% of the means and Atlanta is 63% of the means. One only has to look at a map of the Site Section to know that something is wrong. The Atlanta Site Area should not compare equally with other types of more “connective” urban form. In reality, it is the same because what is being studied is the same. In Atlanta, there are up to 24 intersections on various lengths of cul-de-sacs in rapid successful. Each of these small lengths and intersection points factors into the total intersection analysis, and yet they do not provide real connectivity for the area. This indicate that how many intersections within a Site Area is not as important as the quality of those intersections within the Site Area.

When one looks at the intersection qualities, the evidence becomes clear. The X-intersections mean in the Site Areas is 60.17. Of this number, San Francisco has 81% of the mean, Portland has 105% of the mean, New York has 88% of the mean, Paris has 61% of the mean, Amsterdam has 133% of the mean, Barcelona has 131% of the mean and Atlanta has 65% of the mean. With total T-intersections, the average mean is 41.50 intersections. Of this number, San Francisco has 60% of the mean, Portland has 34% of the mean, New York has 17% of the mean, Paris has 335% of the mean, Amsterdam has 140% of the mean, Barcelona has 14% of the mean and Atlanta has 65% of the mean. With total Y-Intersections, the average mean is 2 per Site Area. Of this, San Francisco has 50% of the mean, Portland has 0% of the mean, New York has 0% of the mean, Paris has 500% of the mean, Amsterdam has 50% of the mean, Barcelona has 0% of the mean and Atlanta has 400% of the mean. When one looks at multi-intersections or intersections with more than 4 street length connections, one finds that the average number of 1.17 intersections per Site Area. Of this number, San Francisco has 86% of the mean, Portland has 0% of the mean, New York has 0% of the mean, Paris has 343% of the mean, Amsterdam has 0% of the mean, Barcelona has 171% of the mean and Atlanta has 0% of the mean. While some of the cities might have similar intersection numbers as Atlanta, their connections are fundamentally different. While Paris has similar Y-intersections as Atlanta, Paris also has a huge amount of the other types of intersections, thus overriding the connectivity problems that Atlanta has. Further, larger portions of Atlanta's intersections are within the Y-intersection category, thus creating the connectivity problems within the area. While the average number of Y-intersections to total intersections is 0.01% or 1%, Atlanta's ratio is 952% of the mean.

This dwarfs Paris large but smaller than Atlanta 439% of mean number. As a result, one can see, that the quality of the intersections matter more than the number of intersections.

When one looks at those intersections, one also sees that they, along with the block have a volume of public space, given the average heights and widths of the average right-of-ways in the various Site Areas. On average, the Site Area intersections represent 6,534,146.24 cubic feet of public volume. Of this number, San Francisco has 122% of the mean, Portland has 30% of the mean, New York has 118% of the mean, Paris has 104% of the mean, Amsterdam has 112% of the mean, Barcelona has 115% of the mean and Atlanta has 31% of the mean. At each intersection, there is 41,884.66 cubic feet of space. San Francisco has 155% of the mean, Portland has 30% of the mean, New York has 159% of the mean, Paris has 43% of the mean, Amsterdam has 51% of the mean, Barcelona has 161% of the mean and Atlanta has 38% of the mean. This might seem inconsistent because the numbers for each individual intersection volume shrinks for Paris and Amsterdam, but ultimately this makes sense as one will see further into this thesis. The average right-of-ways for Paris and Amsterdam are smaller than in San Francisco, Portland, New York, and Barcelona. While the total volume of space given the total number of intersections in Paris and Amsterdam might be higher or similar to these other cities, the space is much more intimate and constrained--leading to more enclosure. When one compounds this issue with the effect that trees have upon space, one sees that Paris becomes even more enclosed at the intersection than other cities. Barcelona suffers the same effect.

When trees exist within 40 feet of street intersections, they occlude vision and they create mass. In the Site Areas, the average number of trees within 40 feet of intersections is 179. Of this number, San Francisco is 73% of the mean, Portland is 101% of the mean, New York is 89% of the mean, Paris is 63% of the mean, Amsterdam is 16% of the mean, Barcelona is 258% of the mean and Atlanta is 59% of the mean. This means that within the Intersection, Parisian trees can take up more than 5% of the remaining space within the cramped distances and volumes of intersections. This also means that Portland's trees can take up to 28% of the total space of the intersection, Atlanta's trees can take more than 16% of space at the intersection, and Barcelona's trees can take up almost 20% of space at the intersection. Within the intersection these spaces take up volume and make the previous spaciousness of Barcelona intersection shrink and become more intimate. This ability to shrink space and effectively change the dynamic of enclosure within the urban area is a quality of particular importance to trees and tree placement.

10.10 Route Analysis

10.10.1 Route Structure

> "Whatever else we can say about urban patterns, we can recognize that a street pattern comprises elemental parts—streets. These relate fundamentally to paths of movement; if there is no movement, there is no street. The character of a whole street pattern will relate to the characteristics of those parts, and the way they fit together. This is a fundamental aspect of this chapter—and the rest of this book."[1844]

While individual Street links are important, it is also important to analyze the street in how people utilize the street--as pathways of travel. Thus, this requires a network analysis of street which, together, provide a corresponding function--like a main street, commercial corridor or residential area. Most analysis comes from conventional transport route analysis or space syntax, but route analysis is also an informative type of analysis for streets.[1845]

[1844] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 107.

[1845] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 107; Oliveira, Vítor. "Morpho: a methodology for assessing urban form." Urban Morphology, 17(1) (2013): 21. <http://www.urbanform.org/online/pdf2013/201317_21.pdf> (accessed, July 7, 2014).

> "Route analysis will be applied to generate new expressions of route type as well as being used to differentiate types of network, based on their structure of routes."[1846]

Route analysis is based upon the concept that these routes act functionally as one unit, and therefore they overlay regular streets with a particular type of structure that is important for that use. In order for that function to be successful, those necessary structural components must link together as a route. "Route structure analysis is based on the contention that the structure of the network is a product of the way that the routes connect up to each other."[1847] "Conversely, the character of the parts may be defined by how they relate to each other and to the whole."[1848] This analysis of a group of links tells something about the broader system because these routes might be important or this area or for the city at large.

The basic idea behind route structure analysis is that many times Street elements go through nodes and link routes together like joints and links.[1849] From joint-to-joint, there is always one more joint than links, and from link-to-link, there is always one more link than joints, but together this analysis forms a route of Street lengths and intersections.[1850] As a result, this linear aggregation of points form together a route, and that route has a specific characteristic that might be separate from those joints.[1851]

> "Route structure analysis can be used to define different types of rout, based on their combination of continuity, connectivity and depth. In terms ..., this is classification by relation."[1852]

[1846] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 108.
[1847] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 115.
[1848] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 115.
[1849] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 115.
[1850] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 115.
[1851] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 115.
[1852] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 124.

As a result, there is route hierarchy, by how joints or links add onto these routes.[1853] There is also route connectivity, which is the number of joints and links that form this route.[1854] There is route depth as a measure of the adjacent space along the route that interacts with the route.[1855] "Depth measures how distant a route is from a particular 'datum' measured in number of steps of adjacency."[1856] Yet, the depth of the route is subjective to the degree that an arbitrary length and its effects must be used within this type of analysis--for economy reasons and to quickly understand issues on the urban scale. "The selection of the datum is no more or less arbitrary than the selection of network to be analyzed in the first place—given that most urban networks are selective sub-networks of national or continental networks."[1857] Through this system there would be an easier way to define what type of route one is discussing, or one could determine the relative depth and effect a route has on a given location.[1858]

When looking at the Site Areas, one finds that there are on average 16 route that seam the site together. Of this number, San Francisco has 113% of the mean, Portland has 94% of the mean, New York has 69% of the mean, Paris has 56% of the mean, Amsterdam has 106% of the mean, Barcelona has 163% of the mean and Atlanta has 38% of the mean. When looking at the routes that divide, one notes that there are, on average, 1.67 routes that divide the Site Areas. Of this number, San Francisco has 60% of the mean, Portland has 60% of the mean, New York has 60% of the mean, Paris has

[1853] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 120.
[1854] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 120.
[1855] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 120.
[1856] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 120.
[1857] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 121.
[1858] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 126-127.

300% of the mean, Amsterdam has 60% of the mean and Atlanta has 60% of the mean. It is important to realize the Paris and Atlanta number in context. The long avenue/boulevard in the Paris site seemingly divides the area into halves; however, it extends over a long part of the Site length. In Atlanta, there are numerous paths which divide the Site, and they do not have the character or enclosure that the Parisian site has. The effective division of the Parisian site routes, might be limited by the enclosure that occurs on the street.

When looking at the Site data, the most interest aspect of Route Structure is how the Streets pair with each other in particular ways. This analysis tested how the lengths of streets paired with each other to form blocks. This test questioned whether the actual lengths of right-of-way connections within bocks is possible or present in resilient cities. In the Site Areas, 19.67 blocks had street lengths paired at below 400 feet, meaning that two street lengths of 400 feet or less paired together. This gave a complete length from right-of-way to right-of-way of about 800 feet. However, in the Sites, a total of 28.67 blocks had streets of 401 to 800 feet in length. An average of 7.33 blocks had a street pairing of 400 feet by 801 feet or more. An average of 1.33 blocks on the Sites had a street pairing of 501 to 500 feet in width by 500 to 801 feet in length. An average of 1.17 blocks had a street pairing of 501 to 600 feet in width by 801 feet or above in length. Finally, an average of 1.00 blocks in the Site Area had a street pairing of 601 feet and above by 801 feet and above. What is most interesting is that most of the average blocks in San Francisco, New York, and Barcelona had lengths much higher than the 400 by 400 foot block street lengths. What is not surprising is that Paris had the most variability of the block sizes with the overall majority of blocks paired at the 500 and above level. With an average of 19.67 blocks falling in the 400 by 400 range, only the Amsterdam Site Area compares with Portland with smaller blocks--Amsterdam has 214% of the mean versus Portland's 188% of the mean. In all other cities, the blocks have right of way length connections in the 400 by 400 to 800 and greater ranges. Thus, it seems that while fine grain is important, particular lengths below the 400 range of each particular block is not.

10.10.2 Traditional Route Analysis

Traditional Route Analysis requires the reduction of the route to abstract patterns of nodes, vertices and connective lengths that are actually divorced from the structural element.[1859] This analysis is good when addressing single functions or focusing on a particular type of relationship, but this does not contain the spatial elements required in urban design.[1860] While it is used diagrammatically and with highway systems, the resulting effect is threatens to become detachment because there is no relationship between the node and vertices and the surrounding spatial area. Even when performed best, this traditional route analysis tends to take only the origin and termination point or timeframe into consideration.

> "However, this convention is less directly effective for networks in which the routes themselves are the main focus of attention. For example, in street networks, it is often the status of different types of route that is the principle concern; junctions and intersections are effectively by-products of routes meeting or crossing."[1861]

As a result, there should be some caution when using this method solely as Street analysis because it does not necessarily distinguish between structural types and inherent urban form at all.[1862]

[1859] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 108.
[1860] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, pp. 108-109.
[1861] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 109.
[1862] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 111.

10.11 *Legibility, Measurability and Accessibility*

> Legibility refers to an orderly pattern of streets, plazas, and other large-scale elements that make a city easily understood and navigated."[1863]

Legibility refers to the ease of people to understand the spatial structure and the location's coherence for navigation in space. "Legibility refers to the ease with which the spatial structure of a place can be understood and navigated as a whole."[1864] The more legible an area is, the more people can utilize urban elements as reference points for travel.[1865] If the total plan is legible, then the plan is imaginable. While coherence of the Street is more an amalgam of issues on the District scale, legibility is the ordered pair of streets, networks and routes.[1866]

> "Lynch suggests that when faced with a new place, people automatically create a mental map that divides the city into paths, edges, districts, nodes, and landmarks. Places with strong edges, distinct landmarks, and busy nodes allow people to form detailed and relatively accurate mental maps." [1867]

Legibility tends to reflect gridplans and scales on the broader scale and how they actually hit the ground. Rectangular gridlines are easy to understand. The grid will create a pattern that might seem simple, but it is because map simplicity allows humans to grasp more portions of the map and understand it--greater imageability. Even people unfamiliar with the map or the location can grasp more connective and regular gridline maps than dendritic patterns or even neo-traditionalist patterns--although they are fairly easy for some to grasp.

> "A regular grid of streets makes it easy for people to navigate even when they are unfamiliar with a place, although it does not provide a

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[1863] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, pp. 18-19.
[1864] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, pp. 18-19.
[1865] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 18.
[1866] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 18.
[1867] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 19.

way of distinguishing one block from another. An irregular pattern of streets, which blocks are of irregular lengths and compass orientation changes from block to block, may increase the difficulty of navigating and learning the network, although it distinguishes each block with different lengths and orientations. The street network thus works together with other elements of the physical environment to determine the legibility of a place."[1868]

If a map has high legibility, there is a good chance that the map also has high measurability, and the gridpattern itself can be used by people as a measuring scale to grasp the size of the location and their trips in the Street. This can be influence by the District qualities or Details on the Street such as signage or numbering of the streets; however, in areas without landmarks like New York City or in Atlanta a crucial measuring and naming of streets is crucial for imageability of the map to take place.[1869]

> "The sudden, and particularly the rather indiscernible, shift of one grid system to another grid system, or to a non-grid, was very confusing. Subjects in Los Angeles were often quite disoriented in the area north of First Street or east of San Pedro."[1870]

When there is legibility in the gridpattern, there generally also is a type of accessibility that is enhanced by the measurability of the system. Even though vilified, many streets in the United States correct this problem with naming the street in a democratic function based numbers rather than destination or origin.[1871] These streets become instantly scalable and form relationships with adjacent streets. Others use biological streets to actual foster uniformity between the streets rather than distinctions

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[1868] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 19.

[1869] This thesis takes the perspective, within the Landmarks section, that New York City actually has no landmarks. It has thousands of buildings which, in another situation standing in isolation, would be landmarks. But, landmarks are "landmarks" by their uniqueness and their out-of-human scale nature. As a result, cities which have too many landmarks reduce them to "no landmark." In Atlanta's case, the major buildings and landmarks are on one street, WestPeachtreet Street. As a result, they only serve as linear landmarks and not the necessary landmarks by which one would actually traverse the rest of the city.

[1870] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 62.

[1871] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, 153.

and become more problematic in order to assess where someone is in the city. "In Philadelphia, Detroit, St. Louis, in almost every town, street name are invariably chestnut, cherry, magnolia, poplar, even cedar--calling up the phantasmagorical groves when in truth the streets are bordered by nothing more florid than rows of parking meters."[1872] The street grid and structure must be legible enough to correct for these problems. Wherein one instance, the naming and measurability of a street is easy, and on another, it is hard.

There are many streets which fundamentally are the same street and yet they are navigable because the street has legibility and measurability. When there are great shifts in the grid in an incoherent way, then there is less legibility within the grid even if the grid blocks and streets are of similar dimension. When there is very little legibility, then there is very little accessibility. In contrast to physical accessibility, which is a District and Edge issue, accessibility with Streets tends to be an imageability issue and a visual issue. Accessibility is an imageability issue because, if the gridplan is not imaginable, then the locations on the map will neither be accessible as spatial elements nor accessible as cognitive elements. Accessibility as visual permeability is the ability to see the routes through the environment and traverse them with either visual or physical movement.[1873]

In the Site Areas, the average blocks were generally legible, with all Sites having one or more strong edges and with clear hierarchies being present. In the Site Area, only Paris and Atlanta did not have a clear gridplan of regularized streets. As a result, both Paris and Atlanta had limited or no measurability. The average measurability in the Site areas was 83%, with a regularity of blocks in the East to West and North to South

[1872] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, 155.
[1873] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 81.

areas of 50%. What is interesting is that because of the differing shifts of the gridline, both San Francisco and Portland did not have measurability to a degree, whereas Atlanta and Paris had no measurability at all.

10.12 Hierarchy, Ordering and Rankings

Street hierarchies are relationships based upon ordered rankings. This is the ordering of elements within urban form due to size or function, so that they are linked in this hierarchical manner--for example, major to minor road, from least assembly to square. These order can have clarity or not, and they can be less rigid or more rigid. There can be clear hierarchies with recognizable route types that are ordered and connect in a consistent way.[1874] [See Figures 158, 159, and 160] This can occur in both hierarchical grid patten and dendritic gridpattern systems and the ranges in between.[1875] One can also have hierarchical rigidity where the order of rankings of urban element is followed with a specific allowable type of connection, or with more allowability of connection.[1876]

Hierarchical orders and rankings of Streets in particular give structure to a city. "Either by design or evolution, city street and block patterns can give order and structure to the city, district, or neighborhood."[1877] These larger and smaller streets tend to break the city down by important Streets into manageable parts, leading to the direct knowing of one of those parts with intimate detail and imageability of the rest of the city.

> "The object is not only to facilitate communication but also to help people know where they are, in their neighborhood, in relation to the larger community and to a larger region."[1878]

[1874] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 176.
[1875] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 176.
[1876] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 176.
[1877] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 257.
[1878] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 257.

Streets that are individually wider and longer, like Market Street in San Francisco or Champs Ellysee in Paris, give a sense of orientation to the resident and the visitor.[1879] Romans used the cardo and decumanus which through hierarchies and a flexible ordered system split the city into quarters while connecting the entire city into a coherent order.[1880]

> "The Roman cardo and decumanus were meant to give order and focus to a city, and so they still do in central Bologna after some 2,000 years. Interestingly though, the more compelling street pattern in Bologna, the one that draws one's attention forcefully both from the maps and on the ground, is that of the five streets that focus on an old eastern gate of the city." [1881]

The Ramblas and the diagonal streets in Barcelona do the same where there is cross city order and rankings through a series of streets that are ranked and flexible. "The Ramblas running through the Gothic Quarter of Barcelona and the Paseo de Gracia in the later extension of the city are also the most powerful ordering, structuring streets of their areas and, taken together, of the city itself."[1882] Market Street in San Francisco allows the various grids of San Francisco to join, becoming a seam to something which normally becomes a neighborhood edge.[1883] Amsterdam's ordered canals become the core of the city and a landmark making it easy to traverse the city core.[1884] With gridline patterns like Los Angeles, Portland and Manhattan which are not ordered but very similar, there must be other mechanism which compensate to make those areas flexible

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[1879] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 257.

[1880] Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 10.

[1881] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 257; Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 10.

[1882] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 257.

[1883] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 257.

[1884] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 257.

and resilient, because even large cities like Los Angeles or New York City are extremely imageable.[1885] What we find is that the compensating factor might be the District quality.

> "The Los Angeles grid is a good example. Almost every subject could easily put down some twenty major paths in correct relation to each other. At the same time, this very regularity made it difficult for them to distinguish one path from another."[1886]

10.12.1 Data from Research Site

When looking at the Site Areas, one can say that hierarchy is important; however, the presence of hierarchy is not as important as legibility and logic of that hierarchy. Looking at the Site Areas, the average number of visible hierarchies is 3.0. San Francisco has 100% of the mean, Portland has 100% of the mean, New York has 67% of the mean, Paris has 133% of the mean, Amsterdam has 100% of the mean, Barcelona has 100% of the mean and Atlanta has 133% of the mean. What this means is that while most of the cities have collector, arterial routes and localized but connected street lengths, Paris and Atlanta also have dendritic forms which add another layer of hierarchy to the mixture.

When one looks at non-collector or arterial streets, one finds that the average is 154 street lengths within the Site Areas. Of this number, San Francisco has 74% of the mean, Portland has 120% of the mean, New York has 71% of the mean, Paris has 125% of the mean, Amsterdam has 125% of the mean, Barcelona has 85% of the mean and Atlanta has 67% of the mean. This seems to indicate that many of the street lengths in the United States are more likely to be collector or arterial routes than local routes, or this might indicate that European streets patterns just have more localized streets that do not also function as collector or arterial routes. The exception to the last proposition is Barcelona, but the Eixample was planned to be efficient by Cerdà rather than just have

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[1885] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 258.
[1886] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-4.

more localized streets. This example of engineering represents a more Americanized pattern of street building than what occurred in Amsterdam or Paris.

10.13 Detachment and Stitching--Highways, Railways and Subways

> "Freeway design in the mid- and late twentieth century does not constitute such a period, concerned as it was with rapid movement of vehicles and therefore with a roadways removed, even walled off from its surrounding urban fabric."[1887]

When an aspect of urban form has problems with the structure of the Street figure, the urban form element may detach from the larger matrix of urban form and be independent from the surrounding urban form--detachment. This problem occurs with systems which have no relationship to the surroundings like highways and subways. And, at least in the case of highways, rather than just a lane, they function as strong edges that are very impermeable--highways, subways, light rail, rail, etc.

> "This aspect of highway engineering--the 'imageability' of the highway--is a matter of revealing its clarity of form and direction to the user. Too many highways have very poor physical relationships to the areas they serve. Rather than helping to define these areas, they often slash through them, actually acting as a blighting and disintegrating force."[1888]

The Street is not only a route of travel, but it has a relationship to the land around it--we travel in sequences in our environment on pathways from origin to destination. "Landscape, architecture, and cities are seen as sequences we travel along routes of movement."[1889] The act of movement includes the space in between to set the image of the Street in a cognitive map, and without those sequences the cognitive map has difficulty forming.

> "Routes of movement affect considerably the appearance of the landscape through which they pass and the architecture and cities

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[1887] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 33.
[1888] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-8.
[1889] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-8.

> which they serve. Routes to movement are a principal determinant of urban form."[1890]

Highways and subways have no relationship to the urban form within which they exist--unless, the highway, railway or subway is imbedded in the urban form in a rational way so that it actually connects to the urban form.[1891] Research has shown that even signage and Street details have limited effect in making the transit on highways practical, because the decisions that one must make in order to traverse the highway must be made under without a node as a point of reflection for transit or as a point of reference for direction. "Even familiar drivers showed a surprising lack of knowledge of the freeway system and its connections. General orientation to the total landscape was the greatest need of these motorists."[1892] This seems to happen with routes and lanes which work as more systems than embedded within the urban form--both subways and highways, but there are ways to overcome this. Further, this also seems to happen because there are two images being processed in the minds--one map includes the dendritic or edge systems of rails and subways, while the other map includes the Streets.[1893] Both maps connect in space at specific points, but those points do not have relationships with the surroundings.

> "The railway lines and the subway are other examples of detachment. The buried paths of the Boston subway could not be related to the rest of the environment except where they come up for air, as in crossing the river. The surface entrances of the stations may be strategic nodes of the city, but they are related along invisible conceptual linkages."[1894]

[1890] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-8.
[1891] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-8.
[1892] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-3.
[1893] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-4.
[1894] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-3.

The problem with railways and highways is that there are limited ways to stich them into the urban fabric without destroying the efficiency of the present urban fabric. There are other options, but in order to get the long distances needed for travel, stopping and movement, for these systems.

Subway and mass transit systems do interact in particular ways with the urban form, and detachment does stop in the successful systems. In New York City, the Manhattan systems have a relationship with the surrounding main roads of commerce or they have intimate relationship with nodes or landmarks in the surrounding environment. So, this system is stitched together because those points are important and they serve as avenues of direction, pathway and placement within the city form. In San Francisco, the same effect happens, where the mass transit stations match with nodes, landmarks or pathways of importance. Thus the subway is only shortening the pathway that the personal already has imagined in their head. They would know how to arrive at the destination should they continue.

> "A few paths may be imaged together as a simple structure, despite any minor irregularities, as long as they have a consistent general relationship to one another. A large number of paths may be seen as a total network, when repeating relationships are sufficiently regular and predictable."[1895]

For mass transit the test would be how strong the system mirrors the current urban framework and how its stations mirror landmarks and nodes within the environment. Since these are already imagined in the resident's mind, the subway system would be fully stitched into the framework of the already functioning urban system.

In the sub-category "Locations with Reduced Automobile Dependence," LEED-ND requires the addition of mass transit systems within the urban fabric by creation

[1895] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-4.

options for people other than vehicular transportation.[1896] Many of the reasons behind this push are environmental.

> "To encourage development in locations shown to have multimodal transportation choices or otherwise reduced motor vehicle use, thereby reducing greenhouse gas emissions, air pollution, and other adverse environmental and public health effects associated with motor vehicle use."[1897]

This mandate requires that at least 50% of residential units be within 1/4th mile from a bus or streetcar and within 1/2 mile of mass transit (bus rapid transit stops, light or heavy rail).[1898] For projects between 125, 500 acres or more, they can placing residential locations so that 40% of residential entrances are within 1/4th mile walking distance of transit or 1/2 of mass transit, or if larger, by locating new or existing transit locations on the site itself.[1899] Projects can also locate within a transportation analysis zone where the average VMT does not exceed 90% of metro area statistics. The effect of this category is to force development within a Smart Growth characterization to incorporate transportation options, already paid for by public infrastructure investments, to be utilized within developments. This saves the public costs and reduces the cost of building more expensive and traffic-inducing highway or transit systems. Yet, as a matter of urban form LEED-ND does not require that this mass transit system be stitched to the urban fabric, as long as it is accessible. As a result, there is a question of whether these

[1896] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 27.

[1897] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 27.

[1898] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 27.

[1899] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 27.

systems as proposed have the passivity of detachment from the surrounding urban form, and as a result, how successful they will be.

10.13.1 Data from Research Site

When looking at the Site Area what one sees is that this is one area where Atlanta performs well in relation to the Resilient City Site Areas. Within the Site Areas, the average relationship of subways to nodes is 1.00 or 100%. All of the Site Areas have this same relationship. All of the Site areas also satisfy the mean of having subway stations on major streets, landmarks or pathways. When analyzing whether there is a logical relationship between the present urban form and the subway system, the average is 83% or 0.83. Of the Site Areas, Barcelona is the only Site Area where there is no actual relationship between the subways and the urban form--the subway functions more as a separate system or map and only connects to the city map at points rather than lengths.

When one looks at the number of street lengths that the subway exists within the Site Area and the number of lengths that the subway system corresponds to urban form, one finds that Atlanta is one of the better systems--even with its smallness. The mean of detachment is 0.83. San Francisco, Portland, New York, Amsterdam and Atlanta have 121% of the mean, and Paris is 117% of the mean. This means that their systems in the Site Area correspond to various streets so persons in the area would have little difficulty ascertaining where the subway is going because the subway system map corresponds to the imaginable city map. In contrast, Barcelona has 0% for within the Site Area, no street lengths correspond to actual subway links. Therefore the subway is a separate map that must be understood by the casual person.

10.14 Total Structural Analysis

Taking all of the Figure Structural Analysis issues into consideration, one can give an idea of the actual structure of the system.[1900] With this structural analysis, the public space effectively becomes the Street.

> "This is the sense that the tree forms a 'tree-like' system of branching, where each path eventually ends as a twig. Now finally, we have the implication for layout: the discontinuity of the minor routes in the network, epitomized by the full stop of the culs-de-sc. Here, finally, the road network becomes, mathematically, a "tree."[1901]

10.15 Details of the Street: Elements the Street Contains

10.15.1 *The Enclosure Scale and the Human Scale Component*

> "Streets are defined in two ways: verticality, which has to do with the height of buildings or walls or trees along a street; and horizontally, which has most to do with the length of and spacing between whatever is doing the defining."[1902]

When one walks down a street, what they are using to gauge the street is the human scale of things, but the human scale is problematic because no one has really defined what the humans scale is with assurity. Mostly, if something is "out of scale" it is said to not be in "human scale."

> "Human scale refers to the size, texture, and articulation of physical elements that match the size and proportions of humans and, equally important, correspond to the speed at which humans walk."[1903]

In a sense, the definitions about human scale are really definitions about what make people more comfortable from materials, to the way buildings look and the way trees feel.[1904] However, one could state that the Empire State Building is at human scale

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[1900] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 164.
[1901] Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005, p. 164.
[1902] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 276.
[1903] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 9.
[1904] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 9.

and at monumental scale, and both might be right. The City of Seattle has defined the human scale to be “the quality of a building that includes structural or architectural components of size and proportions that relate to the human form and/or that exhibits through its structural or architectural components the human functions contained within.”[1905] Within Placer County’s Code there is more a vague determination of the human scale ranging from intimate spaces to monumental spaces and the scale is based on building typologies rather than fast and set dimensions.[1906] If buildings are built to this scale, then that would exclude the Empire State Building or the Statute of Liberty.

In Alexander’s piece, he sets the statement that any building over “four stories tall are out of human scale.”[1907] In their piece, Lennard and Lennard state that their human scale limit is six stories. [1908] Hans Blumenfeld states that there are three stories.[1909] All of these theorists disagree, and two of them would put the entire city of Paris out of human scale. This problems is one that is highly subjective and highly cultural. In Rome human scale was 66-70 feet, in Medieval Europe it was 2 times the road, in the Renaissance it was 1 times the road, in the Baroque it was 0.5 the road, depending on which area of New York one find themselves this can be from 50 to 420 to more feet, on the Champs-Elysées its 75 to 80 feet, on via Via del Corse it is 66 to 72 feet, on the Via Cola del Rienzo its 77 to 80 feet, on the Kurfurstendamm its 5-7 stories,

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1905 Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 9.

1906 Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 11.

1907 Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 9; Alexander, C, S. Ishikawa, and M. Silverstein. *A Pattern Language: Towns, Buildings, Construction*. New York: Oxford University Press, 1977.

1908 Lennard, S. H. C. and H. L. Lennard. *Livable Cities--People and Places: Social and Design Principles for the Future of the City*. Southampton, NY: Center for Urban Well-Being, 1987.

1909 Blumenfield, H. “Scale in Civic Design.” *Town Planning Review* 24 (April 1953): 35-46.

the range in all of these is from 4-9 stories, and on the Via dei Coronari, that's 4-5 stories with a right of way of 10 feet. So, the question of what is a human scale is up to question, and sometimes will depend on one's aesthetic preferences rather than whether something is out of scale or not.

> "Several authors suggest that the width of buildings, not just the height, defines human scale. For human scale, building widths should not be out of proportion to heights, as are so many buildings in the suburbs."[1910]

What we do know is that in the modern world, designers built too many monumental buildings that were constructed for the non-pedestrian traffic. We built our buildings too large so that we would be dependent upon automobiles to get from building to building just as we were dependent upon automobiles to get from neighborhood to neighborhood--brilliant modernist design.

> "Jane Holtz Kay (1997) argues that today, far too many things are built to accommodate the bulk and rapid speed of the automobile; we are 'designing or 60 mph.' when approached by foot, these things overwhelm the sense, creating disorientation."[1911]

So in a sense we know the human scale, but we at the same time cannot define the human scale, and yet we know that is based upon the Street and what it does to people.[1912]

> "To our knowledge, there has been only one previous attempt to operationalize human scale via a visual assessment survey, and this strictly with respect of architectural massing (Stamps 1998b). The most important determination was the cross-sectional area of buildings, the second was the amount of fenestration, and third was the amount of façade articulation and partitioning."[1913]

[1910] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 9.

[1911] Kay. J. H. *Asphalt Nation: How the Automobile took Over America, and How We Can Take it Back*. Berkeley: University of California Press, 1997; Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, pp. 9-10.

[1912] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 10.

[1913] Stamps, A. E. "Measures of Architectural Mass: From Vague Impressions to Definite Design Features." *Environment and Planning*. 25 (1998): 825-36; Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 11.

Rather, this thesis focuses on two scales which are within the built form--the enclosure scale and the monumental or landmark scale. The enclosure scale is the scale necessary for enclosure of the street by building or architectural infill, but this could also be done or be affected by trees. It is the effect of narrowing the street and making what was a very large avenue, very small, and it makes streets more intimate and more streamlined, defined and clear. It also is a contained space similar to the spaces that humans used to have in the center of blocks, and which are still represented in San Francisco, Amsterdam and Paris. Second, there is the landmark scale, and these are buildings or things that do not work as enclosure, but they are important aspects of urban form that work as points of reference. In this section, the issue of enclosure will be discussed.

> "Building heights along the Via del Corso in Rome reach approximately 70 feet … against a width of 36 feet…, giving a height-distance ratio of 1:0.5, and there are stretches where the height and the proportions seem oppressive. But the Via dei Greci has buildings of about 45 feet in height against a 15-foot width, a ratio of 1:0.3, and it is pleasant.[1914]
>
> It may be that the upper height on comfort and livability of the street, as measured by sunlight, temperature, and wind, that by absolute or proportional height.[1915]

The enclosure scale on a street is many times based on the width of the street to facilitate enclosure.[1916] In the ancient world, this ratio was 2 building height for 1 street width, and in the Renaissance, this changed to be 1:1. In the Baroque, this changed to be 1 building height for 1 street width.[1917] On shorelines, two or three storied buildings

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[1914] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 280.

[1915] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 280.

[1916] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141.

[1917] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 163.

defined the area.[1918] Alberti's building scale was a 1.5 building height for every 1 street width, while Haussmann's Paris' scale is 1 building height for every street width.[1919] "The two (street width) to three (height of the cornice line) proportion of streets had existed traditionally and was then formalized. Later Haussmann would change to a square section for streets but without hanging cornice height, although height above the cornice lines became greater for the city as a whole."[1920] Yet, if there are trees, are the ratios might be 1 building height to 7.2 street width) or 1 building height to 5.0 street width.[1921] In New York on Monument Avenue, the ratio is 4 building height to 1 street width, and on the Via dei Giubbonari the ratio is 1 building height to 0.4 street widths.

> "Most of the streets we have studied seem to fall within a range (vertical to horizontal) of from 1:1.1 to 1:2.5."[1922]

Today, modern planning considers the Renaissance width to be appropriate in the urban realm at 1:1 [1 street width to 1 building height] to be urban, but others state that 1.5 width to 1 building height is good, with a 3 street with for every 1 building height being "okay," when this is not represented before the modern period.[1923] Although represented in sprawl areas, ratios of 17:1 or 22:1 are used but they create such limited density that they are impractical for the urban area given the land values.[1924] LEED for Neighborhood Development requirements, there is a recommendation that at least 15%

[1918] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 277.

[1919] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 277.

[1920] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 277.

[1921] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 277.

[1922] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 279.

[1923] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141; Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 163.

[1924] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141.

of new streets widths and building heights have a ratio of 1 building height for 3 street widths, which is on the low end of the scale and much lower than the 2 building to 1 street width in the ancient world.[1925] The question to be asked when addressing these widths are is there a range or a direct number, and what issue arises when the street width continues to widen with these ratios? Or, the building height for enclosure might be actually based not on a human scale but human positioning within the environment.

> "Martens and Blumenfeld attest that at an angle of 27 degrees (height-distance ratio 1:2) the object appears … as a little world in itself, with the surroundings only dimly perceived as a background; at an angle of 18 degrees (1:3) it still dominates the picture, but now its relation to its surroundings becomes equally important. At angles of 12 degrees (1:4) or less, the object becomes part of its surroundings and speaks mainly through its silhouette."[1926]

Some have the enclosure scale to be the relationship between a quarter of the length (x) of a line 30 degrees to the side of a person facing a building. The (x) number is the proper height that the buildings should be. Thus, this would be based on human positioning and the width of the Street. But, there is no determination of where the person should be standing with assurity or whether, the better positioning is the façade at the other side of the street itself. All that being said, it is known that "ratios of 1:3.3 it is always strong" [3.3 street widths to 1 building height]. While, this thesis does not take that position though, this idea is critically important. What this means is that enclosure for normal buildings and the scale and width of streets are directly related to how humans interact with both urban elements.

> "At height to distance ratios of 1:3.3 (height there always seems to be definition, and to 1:2 definition is strong. These ratios are height (1) to width (3.3), where there is some definition, but the definition is

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1925 U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 41.

1926 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 278.

> stronger at 1 (height) and 2 (width). Where you get lower ratios at 1 (height): 5 (width), there is less definition."[1927]

Thus the wider the Street gets, buildings must be taller in order to enclose a space by a human scale--positioning.

> "The wider a street gets, the more mass or height it takes to define it, until at some point a width can be so great that real street definition, not necessarily space definition, stops, regardless of height."[1928]

Yet, Authors like Blumenfield and Maertens have just determined that three stories at 30 feet and a width of 36 feet is the appropriate human scaled building.[1929]

> "Maertens and then Blumenfeld use distances at which they report it is possible to recognize people (human scale) and distances at which facial expressions can be perceived (intimate human scale), together with angles at which objects can be perceived clearly, to judge the scale of buildings."[1930]

But, that brings into question of whether the human need to perceive a building absolutely clearly is important, or if there are other mechanisms like landmark or enclosure which also are part of the human experience. Yet, when trees are added to the mixture along with architectural infill, the problem becomes more difficult to assess. For the widest streets, where width is significantly greater than height, such as along the Champs-Elysees or the Paseo de Gracia, the trees actually work to provide the enclosure necessary to actually shorten the space and create fullness and closeness.[1931] Trees change these ratios to 1:7.2 (building height to street (open) width) in Richmond, Virginia, to 1:5.0 (1 building height to 5 street width) on Paseo de Gracia.[1932] Where buildings work best in areas of 1:1 to 1:3.3, trees work best in ratios of 1 building to 4

[1927] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 280.

[1928] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 277.

[1929] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 378.

[1930] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 278.

[1931] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 279.

[1932] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 280.

street widths, or less.[1933] What we see is that trees change the enclosure scale to be wider street widths. This might because the trees act similarly to architectural infill to create an actual similar width enclosure.

When looking at the various scales of the architectural infill on the Street, one finds that there are two competing scale. One of the scales is what is presently built, and the other scale is what mathematically one can call enclosure. What is presently built in the Site Area is an average of 48.66 feet height of the built structures. Of this mean, San Francisco is 101% of the mean, Portland is 31% of the mean, New York is 113% of the mean, Paris is 97% of the mean, Amsterdam is 95% of the mean, Barcelona is 163% of the mean and Atlanta is 44% of the mean. This completes though with the mathematical formula for enclosure that recognizes a 1/4 of the length of a 30 degree hypotenuse within a right-of-way. At this scale, the Site Areas should have a building height of 102.95 feet. As a result, on average the buildings should be 54.29 feet higher in order to reach full enclosure. This is based on the average right of way of the various cities and the average stories and heights within the various Site Areas. Of the 54.29 number, San Francisco would need to build 164% of this mean, Portland would need to build 154% of this mean, New York would need to build 139% of this mean, Paris would need to build 27% of this mean, Barcelona would need to build 62% of this mean, Amsterdam would need to build 53% of this mean and Atlanta would need to build 139% of this mean. This does not mean that the cities actually have to build up to this average height. It just means that the inability to build to this height precludes total enclosure of the area, and it states that the building height limits might be too restrictive rather than flexible.

[1933] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 280.

10.15.2 *Architectural Infill*

> "Increasingly, architecture has become the instrument of excessive self-expression. Individual buildings are often conceived of solely private, self-referential objects incapable of generating the public realm."[1934]

Architectural infill (built architectural forms) in the private or public lots and blocks become an important part of the Street because infill informs, defines and encloses the Street. When addressing Architectural Infill as a Street issue, it is important to understand architecture and its use within urban form for it functions in three ways. Architectural Infill has a structural function for the Pathway, a District function in design and street character, and a Landmark/Node function in its use within urban form. This section will address the structural function of architectural infill, which the other issues will be addressed later in this thesis. One will see why there is a problem within the urban landscape because generally architecture has willingly conscribed themselves to only one way that architecture fulfills an urban design purpose--landmarks and sculptural items--really to the detriment of entire urban form in the United States.

Architectural infill exists at the point where the private and public realm meet and join with the street within the Street façade as a perimeter block (the Street façade) or when the enclosure dynamic breaks due to setbacks that push the architectural infill away from the street to effectively widen the public visual realm. This is a dialectical relationship between the Street façade and the Street reinforces the spatial realm and creates the scene that defines the pathway.

> "The dialectical relationship between street and built plots creates the tissue and it is in the continuation of this relationship--capable of modification, extension and the substitution of buildings--where reside the capacity of the city to adapt to the demographic, economic, and

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[1934] Moule, Elizabeth and Stefanos Polyzoides. "The Street, the Block and the Building." Moules and Polyzoides, 2014. http://www.mparchitects.com/site/thoughts/streets-blocks-buildings (accessed July 10, 2014), p. xxi.

> cultural changes that mark its evolution. The street layout determines the relationship with site, centre and capacity for extension."[1935]

The Street façade is created by the architectural infill that populates the various lots in the built environment. Thus, in cities with intensive development, land values generally push the architectural infill widths to be the same or similar to the lot or plot width--as the lot meets the public realm.

> "There has often been a recognisable cycle of building development on each plot. In England, this process has been described and explained in terms of the transformation of burgage plots, which started out as long narrow field laid out perpendicular to a street or circulation route."[1936]

It is at the Street façade that the architectural piece becomes a structural element of the street enclosure. This is the point where buildings relationship, size and mass, and structural elements affect the street enclosure and interrelate beyond simply the design level.[1937] Further, their scale in relation to people in the urban form affects their effectiveness with enclosing the Street, or becoming an entirely different element within urban form--the Landmark or Node.[1938]

10.15.2.1 Enclosure and Architectural

Enclosure is so fundamental to urban form that there actually is a part of the human brain which responds to enclosed spaces, and as result the way the architecture structurally encloses the street is fundamental to the way humans experience the street.[1939] "The presence of this physiological response suggests that this ability to

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[1935] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 166.

[1936] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 78; Conzen, M.R.G. *Alnwick, Northumberland: A study in Town-Plan Analysis*. Institute of George Philip: London, British Geographers Publication, 1960, p. 27 (1), 1-122.

[1937] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 189.

[1938] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 189.

[1939] Stamps, A. E. "Evaluating Enclosure in Urban Sites." Landscape and Urban Planning, 57 (2001): 25. http://65.54.113.26/Publication/41223892 (accessed recognize enclosure is a consequence of natural selection."[1940] Enclosure occurs when architectural infill or landscape infill in particular, enclose the Street as vertical elements.[1941] While buildings can provide the enclosure, trees and other types of items, whether they be landmarks or others can create a "non-entrapment" enclosure where the enclosure is figurative and not literal. In these instances, the enclosure is made up of items which form an enclosure because of their relative nearness or consistency or linkage rather than shear walls or building heights.[1942] Horizontally enclosure occurs by enclosing or completing an area horizontal space, and vertically, they define space by creating an airy ceiling of branches and leaves."[1943] While landscape infill may humanize the height-to-width ratio of the enclosed space, it is not a solid enclosure.[1944]

> "Unlike the solid enclosure of buildings, tree lines depend on visual suggesting and illusion. Street space will seem enclosed only if trees are closely spaced."[1945]

Both architectural infill and landscape infill though proportionally change the dynamic of the spaces on the Street to create a room-like quality.[1946] The enclosure then solidifies "hereness" and creates spaces on the street that can act as either street areas or squares such as the piazzas in Italy.[1947]

> "Enclosure, or the outdoor room is, perhaps, the most powerful, the most obvious, of all of the devices to instill a sense of position, of

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July 9, 2014); Holden, C. "The Brain's Special Places." *Science* 287 (2000): 1587.

[1940] Stamps, A. E. "Evaluating Enclosure in Urban Sites." Landscape and Urban Planning, 57 (2001): 25. http://65.54.113.26/Publication/41223892 (accessed July 9, 2014).

[1941] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 6.

[1942] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 7.

[1943] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 7.

[1944] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 7.

[1945] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 7.

[1946] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013.

[1947] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 6.

> identity with the surroundings …. It embodies the idea of hereness."[1948]

Visual terminations also make enclosure occur at specific points--such as T-or Y-intersections.[1949] "Andres Duany and other new urbanists advocate closing vistas at street ends with prominent buildings, monument, fountains, or other architectural elements as a way of achieving enclosure in all directions."[1950] However, the governing elements of these visual terminations might be more landmark-ish than enclosure-ish because they function as more a node or landmark within the environment than enclose a space. They, on contrast, make the pathway of manageable length, whereas enclosure makes the pathway an intimate scale, type and character. The visual termination might only be an enclosure if it effectively did act, in unison with the rest of the urban form to effective contain a place.

What is interesting though is that the gridpattern used and the setbacks and building policies affect the type of enclosure that happens--or if any enclosure does happen. While tight gridlines, diversity of use, intensification of space and mixed uses tend to enhance the enclosure, sprawl and large setbacks tend to create breaks in enclosure--or destroy it entirely. These breaks in the enclosure create a sense of non-enclosure.

> "Enclosure is eroded by breaks in the continuity of the street wall, that is, breaks in the vertical elements, such as buildings or three rows, that line the street. Breaks in continuity that are occupied by inactive uses create dead spaces that further erode the sense of enclosure."[1951]

[1948] Alexander, C, S. Ishikawa, and M. Silverstein. *A Pattern Language: Towns, Buildings, Construction*. New York: Oxford University Press, 1977, p. 106; Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 6.
[1949] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 8.
[1950] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 8.
[1951] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 8.

In their research, Stamps and Smith found that comparisons of types of enclosures received more positive responses when the proportion of the walls were covered.[1952] Further, when there were more open spaces with a depth of view, responses were negative.[1953]

> "Using photographs of Paris, Stamps and Smith (2002) found that the perception of enclosure is positively related to the proportion of a scene covered by walls, and negatively related to the proportion of scene consisting of ground, the depth of view, and the number of sides open at the front."[1954]

What this showed is that there is actual proof, backed up by cognitive structures in the brain, that enclosures are comparatively important on the Street not as purely an aesthetic value, but as a structural value for some reason. As a result, this means that the design of architectural and landscape infill have direct impacts upon the Street as an element of urban form, on the horizontal and vertical.[1955]

Looking at the Site Data, what one finds is that the average building density is 2,426.17 building units or building groups [San Francisco] in the built environment. Of this number, San Francisco has 86% of the mean, Portland has 40% of the mean, New York has 59% of the mean, Paris has 178% of the mean, Amsterdam has 177% of the mean, Barcelona has 60% of the mean and Atlanta has 35% of the mean. When looking at the average building groupings or building units per block, one finds that the average number of buildings is 36.45. Of this number, San Francisco has 106% of the mean, Portland has 50% of the mean, New York has 98% of the mean, Paris has 156% of the mean, Amsterdam has 128% of the mean, Barcelona has 63% of the mean and Atlanta

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[1952] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 8.

[1953] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 8.

[1954] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 8; Stamps, A. E, and S. Smith. "Environmental Enclosure in Urban Settings." *Environment and Behavior* 34 (6) (2002): 781-94.

[1955] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, pp. 8-9.

has 70% of the mean. What this seems to indicate is that those areas with more population density have denser building profiles. As a result, they have more horizontal and vertical building enclosure and adapt to change quicker, provide for higher densities and are more vibrant.

While some data was available for multi-family apartments and single-family homes, this data was only available for the U.S. cities and as a result cannot be verified as an issue of resiliency. However, within the U.S. cities, one sees that while New York has few single-family detached residences, it has huge numbers of multi-family apartments. In contrast, the Site Area in San Francisco has much more single-family homes than multi-family apartment buildings.

One of the aspects of the Street and Architectural infill that affects enclosure is the set-back of buildings on lots. On average in the Site Area, the more than 293.60 in each site area had some setback, with that average setback being 5.44 feet. What one finds is that Portland and Atlanta constitute the overall majority of buildings set-back from the public zone with the Portland's numbers more than 272% of the average mean and Atlanta's numbers representing more than 740% of the average mean. New York's buildings are 155% of the average mean and San Francisco's buildings are 54$ of the average mean set-back. The Parisian numbers in this category are particularly inaccessible due to the complex nature of the internal block lots. However, even in these lots there generally is a significant perimeter block framework, so most setbacks are effectively less than 1 foot from the sidewalk. Within San Francisco, New York, Paris, Amsterdam and Barcelona, more than 80% of buildings are within 1 foot of the sidewalk satisfying the LEED requirement. Portland and Atlanta do not satisfy LEED's 50% requirement.

10.15.2.2 Horizontal Enclosure

The United States has a mixture of the English burgage system and a planned gridded system regularly used within city making. The American burgage system competed with influences for plotting domination--gridded subdivision systems of the Spanish law of the Indies, Oglethorpe's Savannah, the building of Philadelphia, the planning of Washington, D.C., the gridding of the United States during the period of Manifest Destiny, and the expansion of the railroads which facilitated Manifest Destiny. The grid system won out, and the United States became a subdivisions system based on the economy and value of the land at sale rather than the value of the land from prior agricultural plots. As a result, the building widths and stock in the United States have much more regularity than those in systems based on burgage systems.

> "Moudon's (1986) comprehensive study of San Francisco's Alamo Square neighborhood, for example, details the evolution of block, lot and building patterns. As plot owners exploited frontage onto the surrounding streets, many grid developments began with outward-facing perimeter block development, with subsequent organic/incremental development extending into the heart of the block."[1956]

Yet, with the merging and subdivision of lots through the natural aging process, architectural infill is regulated also by type of use and development patterns that push lots to be in increments of 60 feet, because economically flexible structures are themselves governed by 60 feet units--ex. parking structures. As a result, most of the widths of the blocks are based on the accommodation of various uses rather than the set lot. In the Ensanche (Barcelona) the architectural infill widths and the lots correspond as narrow buildings and lots. Most of the buildings historically vary from 39 to 51 feet to 81 to 132 feet in width, as do the lots. In areas as intensive as Barcelona, the building and lot ratio is 1:1.

[1956] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 79.

> "In the Ensanche façades have also been maintained intact, and correspond also to original narrow buildings, whose widths vary between 13 to 17m. Major changes in the façades of New Town and the Ensanche are seen in buildings whose width varies between 27 to 44m wide. Changes in façade are highly related to lot widths and changes performed in lots and buildings."[1957]

As a result, one can see that building width has two dynamics, both hardly studied. There is a perimeter relationship that is formed by the ratio between the building and lot width. Some research had determined that the relationship of the buildings should never exceed the width of the street in order to be considered "comfortable."[1958] Further, it means that there is a sense of comfortability that is associated with the building widths that is also related to the enclosed dimensions itself. This seems to imply that there is also a width-to-width ratio of the Street width as compared to the building width. What these two ultimately mean is the scale of the lot as related to the scale of the street width, and both are related to the scale of the building width.

> "An outdoors pace is positive when it has a distinct and definite shape, as definite as the shape of a room, and when its shape is as important as the shapes of the buildings which surround it." [1959]

These relationships suggest that enclosure works in urban form in the horizontal and not just the vertical. As discussed later, this relationship is far the more fundamental relationship and is crucial when discussing the perimeter block and the building height. In the horizontal, enclosure can be done with the negative of the positive space of the building masses or building facades, as it relates to the street. In a sense, this has been done before when one recognizes the negative and positive nature of space as with the

[1957] Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 9.
[1958] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 7.
[1959] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 6.

Nolli maps and figure ground diagrams recognizing public space.[1960] This overall view of perimeter block qualities gives a generalized idea and feel of how enclosed certain streets overall--with the more perimeter blocks being in the central core of cities.[1961] However, definitions like this are based on "feel" rather than dimensions and should be backed up with the necessary research that is useful to change the built environment through development.

Data from the research shows that architectural infill creates the horizontal enclosure necessary to create the Street dynamic. The average street architectural width is 36.77 in all of the Site Areas. San Francisco has 102% of this mean, Portland has 96% of this length, New York has 171% of the mean, Amsterdam has 75% of the mean, Barcelona has 116% of the mean, and Atlanta has 116% of the mean. This data also shows that while this width is important, what is more important is the area not covered by the architectural infill. The average total length of broken perimeter on the block is 12,979.21 feet of block perimeters, with the average length of block perimeters being 96,908.13 feet. When looking at the broken perimeter, San Francisco has 46% of the mean, Portland is 273% of the mean, New York has 84% of the mean, 132% of the mean, Amsterdam had 18% of the mean, 46% of the mean, and Atlanta has 355% of the mean. When one looks at the ratio of broken perimeter length to total perimeter length, the average break in the block perimeter is 15% or 0.15. San Francisco had 38% of the mean, Portland has 330% of the mean, New York has 75% of the mean, Paris has 87% of the mean, Amsterdam has 13% of the mean, Barcelona has 57% of the mean, and Atlanta has 405% of the mean. When one looks at these numbers, one realizes that Portland and Atlanta have very little street enclosure. As a result, the Street has a

[1960] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 6.
[1961] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 164.

completely different dynamic than the other streets within San Francisco, New York, Paris, Amsterdam and Barcelona. Portland and Atlanta have little horizontal street enclosure.

10.15.2.3 Vertical Enclosure and Building Height

The public sphere or the street is defined by vertical elements which interrupt the viewer's sight and the pedestrian's access. The closure can function as an undulating edge or pathway, as a permeable edge, as a connection to a node or a landmark. "A sense of enclosure results when lines of sight are so decisively blocked as to make outdoor spaces seem room-like."[1962] Whether it be increased attention, the ability locate objects in space, the sense of confinement and the survival nature of visibility, enclosure affects how we place ourselves and how we experience the pathway that is called the street.[1963]

> "In an urban setting, enclosure is formed by lining the street or plaza with unbroken building fronts of roughly equal height. The buildings become the 'walls' of the outdoor room, the street and sidewalks become the 'floor,' and if the buildings are roughly equal height, the sky projects as an invisible ceiling."[1964]

Stamp has researched various methods from the abstract method to the standard point model to determine the percentage and effect of enclosures in a circle or an area around a point or viewpoint within the environment--taking density of buildings and height into consideration.[1965] What Stamp has determined through GIS data on both

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[1962] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 6.

[1963] Stamps, A. E. "Evaluating Enclosure in Urban Sites." Landscape and Urban Planning, 57 (2001): 25-26. http://65.54.113.26/Publication/41223892 (accessed July 9, 2014)..

[1964] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 7.

[1965] Stamps, A. E. "Evaluating Enclosure in Urban Sites." Landscape and Urban Planning, 57 (2001): 30-34. http://65.54.113.26/Publication/41223892 (accessed July 9, 2014).

methods is that heights ranging from 18 feet to 96 feet with average distances of 18 feet to 387 feet are consistent with the dynamics of enclosure.[1966]

> "The Station Point method calculates spherical angles of blocking features as they would appear at a point in the region. The Abstract Method calculates two variables (average height and average distance between objects) from GIS data. Both methods generate the same estimates of proportions of view occupied by features which block movement or vision (R = 0.92) over several site factors (horizontal coverage ranging from 5 to 80%, heights ranging from 6 to over 32 m, average distances between objects of 6 m (medieval section of Paris) to 129 m (college campus in the United States), and standard deviation in heights for non s = 6 m."[1967]

This states that the dynamic in Stamp's tests run from a 1:1 ratio to a 1:4 ratio between the Street or the public right-of-way and the enclosure height. What this means is that there is range with possible intervening element upon which the enclosure dynamic exists and that the wider the Street the higher the enclosure must be in order to technically enclose the space. One should note that this corresponds to a Renaissance framework of proportion and not one of pre-renaissance Europe or the Baroque period which also have comfortable settings. From the ancient to the Renaissance world, the proportions were 2:1 and 1:1--respectively, building heights to street widths.[1968]

> "Allan Jacobs is more liberal in this regard, suggesting that the proportion of the building heights to street width should be at least 1:2. Other designers have recommended proportions has high as 3:2 and as low as 1:6 for a sense of enclosure."[1969]

What is definitely apparent is that designers with good intentions do not agree. But, what is also plainly clear is that as we move from the ancient to the modern age, the issues of enclosure are superseded by modern design requirements--which are not integral to the

[1966] Stamps, A. E. "Evaluating Enclosure in Urban Sites." Landscape and Urban Planning, 57 (2001): 40. http://65.54.113.26/Publication/41223892 (accessed July 9, 2014).

[1967] Stamps, A. E. "Evaluating Enclosure in Urban Sites." Landscape and Urban Planning, 57 (2001): 40. http://65.54.113.26/Publication/41223892 (accessed July 9, 2014).

[1968] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 163.

[1969] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 7.

human evolutionary brain or at least their important has yet to be documented by scientific data.

> "The width-to-height ratio of a street to the adjacent buildings is important in determining the character of the thoroughfare."[1970]

In San Francisco, the 1979 Zoning Ordinance set bulk and height development restrictions limited most of the city to 40 to 50 foot height, and bulk controlled in relation to height and degree of slope.[1971] "In commercial and apartment districts, height limits reached 200-240 feet, while in downtown they increased to 300 feet on the periphery and up to 700 feet in the centre."[1972] As a result, there was a conscious effort to restrict the city to more 4 to 6 story buildings creating a highly dense and yet reasonable enclosure. This is surprisingly the similar the heights used in Barcelona during Cerdà's changes. San Francisco reviewed the height changes in 1985 with its Downtown Plan. In the Downtown Plan, there were some changes, but decision makers kept the main function of the previous 1971 Design Plan.[1973] The plan did lower the tallest building heights from 700 to 550 feet in retail districts.[1974]

> "Higher FARs were possible in downtown office areas but only through the use of Transferred Development Rights (TDRs) which were part of the mechanism for protecting historic buildings."[1975]

[1970] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141.

[1971] Punter, John. Design Guidelines in American Cities: A Review of Design Policies and Guidance in Five West Coast Cities. Liverpool: Liverpool University Press, 1999, p. 108.

[1972] Punter, John. Design Guidelines in American Cities: A Review of Design Policies and Guidance in Five West Coast Cities. Liverpool: Liverpool University Press, 1999, pp. 108-109.

[1973] Punter, John. Design Guidelines in American Cities: A Review of Design Policies and Guidance in Five West Coast Cities. Liverpool: Liverpool University Press, 1999, p. 111.

[1974] Punter, John. Design Guidelines in American Cities: A Review of Design Policies and Guidance in Five West Coast Cities. Liverpool: Liverpool University Press, 1999, p. 115.

[1975] Punter, John. Design Guidelines in American Cities: A Review of Design Policies and Guidance in Five West Coast Cities. Liverpool: Liverpool University Press, 1999, p. 115.

When looking at the actual width-to-height ratio data, what we see are within the range of the Stamps data for vertical enclosure numbers in New York City and Portland.[1976] In New York, the base height is 15 feet, and building height is 38 feet, creating a 1:1 ratio with a Street width of 53 feet.[1977] On 3rd Avenue in Upper East Side, the building base is 20 feet, and the building height is 250 feet, creating a 2.8:1 ratio with the Street width of 95 feet.[1978] On West 11th Street, the building base is 12 feet, and the average building height is 50 feet, creating a 1.03:1 relationship with the 60 foot Street.[1979] On Mc Dougal Street, the average base height is 12 feet, and the average building height is 65 feet, creating a 1.48:1 relationship with a Street width of 52 feet.[1980] On Bowling Green, the average building base is 15 feet, and the average building height is 420 feet, creating a 6.21:1 relationship with a Street width of 70 feet.[1981] On Atlantic Avenue, the building base is 15 feet, and the average building height is 45 feet, creating a 0.61:1 relationship with a 98 foot right-of-way.[1982]

For Portland, the numbers are smaller but, to a degree, consistent. On NW 23rd Street, the average base height is 10 feet, and the building height is 40 feet, creating an enclosure ratio of 0.92:1 with a Street width of 54 feet.[1983] On SE Ladd Street, the base height is 25 feet, and the average building height is 35 feet, creating an enclosure ratio

[1976] Stamps, A. E. “Evaluating Enclosure in Urban Sites.” Landscape and Urban Planning, 57 (2001): 25-42. http://65.54.113.26/Publication/41223892 (accessed July 9, 2014), p. 40.
[1977] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[1978] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[1979] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[1980] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[1981] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[1982] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[1983] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.

of 0.92:1 with a street width of 65 feet.[1984] On NW Irving Avenue, the base height is 10 feet, and the building height is 40 feet, creating an enclosure ratio of 0.83:1 with a street width of 60 feet.[1985] What we see with vertical enclosure is that there is a range actually around 1:1 or higher for urban cities, and this ratio becomes much loser and less enclosed within more suburban areas. What this means is that, for enclosure, our cities are woefully underbuilt. One should note that this ratio in New York City and Portland correspond to ancient and Renaissance standards.[1986]

In Paris, at the Plaine Monceau the range of heights of the buildings are 5-6 stories, and the gross building area is 254,600 square meters, with 1507 units, and a population of 7537 person with the site area being 67,000 square feet.[1987] There is zero parking.[1988]

> "The post-Haussmannian dwellings in Plaine Monceau were originally built for the city's lower-middle bourgeois. The selected area of 6 blocks is not a single project by one developer, but rather share similar features - the courtyard. These courtyards are hidden from the street, often shared and defined by 2-4 surrounding buildings of 5-6 stories high, each floor usually has 2 units."[1989]

In Barcelona on the Paseo de Gracia, "Six buildings to a block face is normal, with lengths ranging from 30 feet to 129 feet …, but with 40 to 60 feet … seeming most

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[1984] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.

[1985] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.

[1986] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 163.

[1987] Density Atlas. "Case Studies." http://www.densityatlas.org/casestudies/ (accessed July 10, 2014).

[1988] Density Atlas. "Case Studies." http://www.densityatlas.org/casestudies/ (accessed July 10, 2014); Density Atlas. "Case Studies." http://www.densityatlas.org/casestudies/ (accessed July 10, 2014); Density Atlas. "Plaine Monceau." http://www.densityatlas.org/casestudies/profile.php?id=72 (accessed July 10, 2014).

[1989] Density Atlas. "Case Studies." http://www.densityatlas.org/casestudies/ (accessed July 10, 2014).

common."[1990] With these heights, the buildings can have anywhere from 3 to 6 stories.[1991] The transparency is in that many buildings have windows or open areas about 15 feet in size.[1992] The sidewalk levels have stores, and windows to advertise and market goods, with entrances about 25 feet apart.[1993]

The changes to the Eixample from Cerdà's original plan involve very specific periods and changes with very specific legislation. What is important is that given how a city evolves, when problems occur, there are political or public policy ways to address those concerns and refine the urban framework. In the Barcelona case, the Eixample has been refined to become more resilient by shaving off the non-resilient parts." Plots were allowed to build up to 20 meters with 50 percent construction of each plot (mostly perimeter) with the Plot ordinances of 1860-1890.[1994] The block ordinances of 1891-1941 allowed 73.6 development of the block, and pushed the depth of each building to 28 meters.[1995] The anti-congestion ordinances of 1942-1976 raised the building heights to 24.4 meters (about 7-9 stories), with a courtyard height of construction up from 4.4 meters to 5.6 meters.[1996] Because densities increased drastically, this was changed with the General Metropolitan Plan (1976) "reduced occupation slightly and the regulatory

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[1990] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 41.

[1991] Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 11.

[1992] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 41.

[1993] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 41.

[1994] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 302.

[1995] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 303.

[1996] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 303.

heights were brought back down to 20.75 meters for the overall construction and 4.5 meters in the courtyard."[1997]

In Amsterdam, the nature of the canal, the side access streets and the sidewalks create a very narrow walking space for pedestrians. Still, the buildings are quite high. "Buildings are generally there to five stories tall plus high, sloping roof areas. There is more brick than any other material."[1998] The heights of the ring blocks is generally 3 to 5 stories.[1999] The Vondel Park area of Amsterdam buildings have 3-5 stories with widths of dwellings ranges from 6.5 to 7.5 meters, and the range of depth is about 12.5 to 16 meters, with a dwelling size range of 150 m2 to 500 m2.[2000] The Sarphati Park area has buildings that are 4-5 stories and have widths of the dwellings is regularly 5.6 m and the depth of 12 m.[2001] The dwelling size is about 65 m2 to 130 m2, with the majority of buildings being alcove buildings and double residences.[2002] In the Spaarndammerbuurt area, dwellings of the houses are generally 5.9 meters wide and 8.6 meters deep. The corners of the block have buildings that are much wider.[2003] "Their block is an average of 10 meters deep and four storeys high, with a pitched roof. An unusual feature is that the

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[1997] Busquets, Joan. *Barcelona: The Urban Evolution of a Compact City*. Rovereto: Nicolodi, 2005, p. 303.

[1998] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993. P. 184.

[1999] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 17.

[2000] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 37.

[2001] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 49.

[2002] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 49.

[2003] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 69.

entrance provides access to all six upstairs dwellings from the first storey."[2004] But the inner ring buildings are lower than the outer ring buildings.[2005] In Amsterdam South, dwellings average stories was 4-5 stories, and have widths of 8.5 m to 9 m, and the depth was 10.5 m to 12.5 m and the dwelling size was 96m2 to 114 m2.[2006] In Nieuwmarkt, the average number of stories was 5-6, the average, have widths of the dwellings was 4.6 m, an average depth was 12 m, and dwelling size was 55 m2, 80m2 and 100 m2.[2007] Java island's dwellings are 5-10 stories, have width of the dwellings is 4.5 m, to 5.4 m, the depth of the dwellings is 80 m2 to 180 m2, and the dwellings usually have 2-6 room apartments.[2008]

When comparing this against critiques of the urban form, we find the same thing.[2009] Rick Hall stated that a building height to street ratio of 1:1 is intensely urban where ratios of 1:1.5 to 1:3 move from good to okay.[2010] Hall stated that ratios with a higher street ratio go to the range of needed remediation to address the sprawl--where ratios range from 1:17 to 1:22 in their extreme.[2011]

[2004] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 69.

[2005] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 69.

[2006] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 89.

[2007] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 185.

[2008] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 221.

[2009] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141.

[2010] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141.

[2011] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141.

> "With such ratios, "you can almost see the curvature of the Earth," Hall says dryly."[2012]

So what one sees is consistent, for the more architectural infill verticality, the more enclosed a Street becomes, and as a result, the more comfortable a Street becomes. However, this is limited by the horizontal enclosure that is also present, for they work in concert.

When one looks at the Site Area data, one notes that the average building height is 48.66 feet. San Francisco has 101.13% of this mean, Portland has 30.81% of the mean, New York has 112.90% of the mean, Paris has 97.19% of the mean, Amsterdam has 94.94% of the mean, Barcelona has 163.03% of the mean and Atlanta has 43.53% of the mean. This contrasts with the mathematical enclosure that related to the average roadway width in the Site Areas. Given the average roadway widths, the total height needed for enclosure is 102.95 feet. Of this average number, the San Francisco enclosure height is 134% the mean, Portland is 95% of the mean, New York is 127% of the mean, Paris is 60% of the mean, Amsterdam is 73% of the mean, Barcelona is 110% of the mean and Atlanta is 95% of the mean. What this means is that there is a differential between what is present built, and what mathematically would cause enclosure--depending on the width of the right-of-way. The average difference between what is built and what is needed for enclosure is 54.29 feet or about 4 stories. In San Francisco one would need 164% this mean, in Portland one would need 154% this mean, in New York, one would need 139% of this mean, in Paris one would need 27% of this mean, in Amsterdam one would need 53% of this mean, in Barcelona one would need 62% of this mean and in Atlanta one would need 139% of this mean. What this indicates is that even while Paris is intimate, it still can build around 2 stories and not be

[2012] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141.

oppressive. San Francisco can afford to build 6 or 7 stories and have a Barcelona type of enclosure. New York can build 6 or 7 stories in the Site Area and experience true enclosure. This does not mean that each Site Area should build up to this point. This just indicates that those areas with height restrictions that limit building up to a particular height generally will never experience an enclosed Street dynamic.

10.15.2.4   Transparency

> "Transparency refers to the degree to which people can see or perceive what lies beyond the edge of a street or other public space and, more specifically, the degree to which people can see or perceive human activity beyond the edge of a street or other public space."[2013]

Transparency is a dynamic that relates to the Street enclosure edge, and it has a great effect on how the street is experienced--mainly where humans walk, on the first floor or the base of buildings. In reality transparency affects the permeability of the spatial line between the lot and the Street, where it must negotiate permeability into and out of the lot edge. When one considers trees, awnings, windows, illuminations, gates, lattices, loggias, doors, midblock spaces, landscaping, fences, walls, and green walls, one does not think that they function in the same way, but they do.[2014] "Physical elements that influence transparency include walls, windows, doors, fences, landscaping, and openings into midblock spaces."[2015] These elements within urban form act to create transparency and the obstructed or limited perception of a part of the pathway, and they also allow access into the private zone that is the lot for they form thresholds.

> "Transparency is most critical at the street level, because this is where the greatest interaction occurs between indoors and outdoors. The

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[2013] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 11.
[2014] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, pp.11-12.
[2015] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, pp. 11-12.

> ultimate in transparency is when internal activities are 'externalized,' or brought out to the sidewalk."[2016]

While most of the items mentioned have the dual effect of creating a District quality upon the street, trees and glass substantially affect the urban form because they either shrink the enclosure (for trees) or they expand the visual enclosure (glass walls) However, is more complex depending on the canopies of the tree or the transparency of the glass. What this also brings to the question is what is the positioning of doors or entryways into the private space of the lot.

Trees affect the transparency within the pathway or the Street. The trees themselves which have high canopies do not obstruct view, but their high canopies create "partially transparent tent[s]" which shrink the enclosure, while not obstructing commerce or movement.[2017] In contrast, trees with low hanging canopies do not just shrink the enclosure, they actually obstruct the pathway.[2018] In either, the visual transparency is complicated by the limitations based on access of both types of trees. As seen before, this effect can substantially impact the ratios needed for scale within the Street where Trees tend to require more space, but they also enclose space where the architectural infill elements fail to enclose the space sufficiently.[2019]

On Atlantic Avenue in Brooklyn, what we see is that the buildings on both sides and the trees are actually part of the canopy and not part of the roadside or the building

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[2016] Llewelyn-Davies. *Urban Design Compendium I*. 2nd ed. Prepared in Association with Alan Baxter and Associates for English Partnerships and the Housing Corporation. London: English Partnerships and The Housing Corporation; Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p.12.

[2017] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p.12.

[2018] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p.12.

[2019] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 280.

wall plane.[2020] Trees can be anywhere from 31 to 35 feet from trunk to trunk.[2021] The planter dimensions of the trees, spaced about 31-34 feet apart is about 6 by 7 feet.[2022] On Bowling Green, there are no trees.[2023] On Clinton Avenue, and the average tree spacing is 27 feet, with an average number of trees per 330 feet as 11.[2024] On West 11th Street, the average tree spacing is about 29 feet, and there are about 10 trees per 330 feet.[2025] The Soho-MacDouglas Street has an average tree spacing of 47 feet.[2026] On the Upper East Side-3rd Avenue area of New York City, the average tree pit area or amenities are is 5 feet, and the average tree spacing is 12 feet.[2027] Upper East Side-3rd Avenue, there are about 8 trees per 330 feet.[2028] In Portland on SE Ladd Street, the average tree spacing is about 30 feet, with about 16 trees per 330 feet.[2029] For the NW 23rd Street Area, the average tree spacing is 35 feet.[2030] In the NW 11TH Street area, the average tree spacing of 35 feet, and there are about 9 trees per 330 feet.[2031]

[2020] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 34.
[2021] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 32.
[2022] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 32.
[2023] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 40.
[2024] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 58.
[2025] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 59.
[2026] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 48.
[2027] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 49.
[2028] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 49.
[2029] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 64.
[2030] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 53.
[2031] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 54.

Glass generally affects the transparency to the façade wall, on the edge of the pathway, thereby complicating the edge condition and the relationship between the public and the private realm within the lots and blocks.

> "The best streets have about them a quality of transparency at their edges, where the public realm of the street and the less public, often private realm of property and buildings meet. One can see or have a sense of what is behind whatever it is that defines the street; one sense an invitation to view or know, if only in the mind, what is behind the street wall."[2032]

Within windows and doors, glass creates transparency within the building façade that is practical within the city, for it allows people visual access into the private lot without trespass, leaving the spatial lot intact. On commercial streets, this is practical because it allows private items to be within the safe confines of the lot, while allowing people to view the items within the lot--for sale or enjoyment. "On the best shopping streets there may be a transition zone between the street and the actual shop doorways, a zone of receding show windows and space for outside displays that are welcoming attention getters."[2033] Glass transparency also allows light into the structures that populate the lot.[2034] "There are windowed buildings at street level in most cities that offer nothing but blind or drapes or screens that one senses have never been opened and never will be, and they are just as opaque as any thick masonry wall."[2035] Thus, the transparency allows the environment to enter the space safety and allows the outside to view the inside safety--it mediates that zone.

> "I live on the downhill side of a relatively recent San Francisco street where the homes take full advantage of spectacular views away from the street. On my side of the street there are no windows but mostly garage doors and a few entryways, often hidden from the street itself. In terms of community, of knowing neighbors in any but the most

[2032] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 285.
[2033] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 286.
[2034] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 286.
[2035] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 286.

> superficial way, it is not a good street. If one knows a neighbor well, it is likely to be someone across the street, where there are windows onto the public way. Nor is my street a particularly pleasant street on which to walk. Blank walls and garage doors suggest people are far removed, and they are."[2036]

In various codes and regulations, this transparency or glass zone, is generally 2 foot off the ground to 20 feet on the building's base. The City of San Jose's operational definition is as follows: "Transparency: A street level development standard that defines a requirement for clear or lightly tinted glass in terms of a percentage of the façade area falling within 2 feet and 20 feet above the adjacent sidewalk or walkway." (City of San Jose 2004). However, jurisdictions across the US have similar wordings and their purpose is to increase the transparency of the base of architectural infill. However, effectively what this does is make the base of the building of different character than the floors above the base of the building, and these might have dually affect the District effect of the Street.

What the evidence shows is glass transparency is varies from around 10% to around 50% of more commercial areas, where transparency is needed by showing of goods and services. In New York, on Baltic Street, glass transparency is about 10%, and on 3rd Avenue of the Upper East Side, glass transparency is about 50%.[2037] On Atlantic Avenue in Brooklyn, the average glass transparency of the area is about 50 percent, measured from 10 feet. Also Atlantic Avenue also has a security gate minimum transparency of 75%. On West 11th Street, glass transparency is about 15%, and on McDougal Street, glass transparency is about 30%.[2038] Lastly, on Bowling Green, glass transparency is about 50%, and on Fort Greene, glass transparency of the

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[2036] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, pp. 286-287.

[2037] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.

[2038] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.

first floor is about 15%.[2039] In Portland, there are similar numbers. On NW 23rd Street, the first floor glass transparency is about 15%.[2040] On SE Ladd Street, the glass transparency is about 5%, and on NW Irvine Avenue, the first floor glass transparency is about 20%.[2041] What we see with this evidence is that glass transparency on the first floor of structures modulates from 10% transparency to around 50% transparency at the most. What this means is that even in the most commercial areas, there is more privacy within transparency than accessibility.

The threshold mediates access into that private realm by allowing or limiting physical accessibility to the lot. What evidence shows is that more doorways are better along the Street façade. "The more doorways the better. The best streets are replete with entryways, as little as 12 feet apart."[2042] More evidence needs to come to light about the importance of thresholds that need to be within the perimeter wall to allow access--though this might be smaller than many realize. Theoretically there would be only one for the frontage entry of the lot, although many resilient cities have both a frontage entry and a back or service entry threshold.

What one sees though is that in resilient communities, the thresholds are actually high depending on whether the use is residential or commercial. One should note though that many times one threshold is not the only indicator of permeability because many times multi-family apartment dwellings are extremely permeable, but have only one grand threshold. In New York, on Atlantic Avenue in Brooklyn, the average number of

[2039] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[2040] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.
[2041] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[2042] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 286.

thresholds on the street is 20 entries in total.[2043] In Bowling Green, New York for downtown commercial districts there were about 10 entries for the 330 feet of sidewalk.[2044] On Clinton Avenue, the average number of entries for 330 feet is 1 residential entry and the average number of institutional entries is 3.[2045] On West 11th Street, there are about 10 residential entries and one commercial entry per 330 feet.[2046] The Soho-MacDouglas Street has 8 residential entries per 330 feet, about 18 commercial entries per 330 feet.[2047] In the Upper East Side-3rd Avenue, there are about 1 residential entry per 330 feet and 4 commercial entries.[2048] In Portland on SE Ladd Street, there are about 7 residential entries per 330 feet.[2049] Lastly, in the NW 11TH Street area, there are about 8 residential and 6 commercial entries per 330 feet.[2050]

Within benchmarking systems that require glass transparency, many of these systems require transparency in the lower range rather than closer to the 50% mark. LEED for Neighborhood development requires glass transparency for 60% of the facades of no more than 40% of the length of the blank side on the public right of way.[2051] This translates to a glass transparency of at a maximum of 25% of the Street façade, which places these requirements in the mid-range between 10% and 50% of the

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[2043] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, pp. 31-32.
[2044] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 40.
[2045] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 58.
[2046] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 59.
[2047] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 48.
[2048] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 49.
[2049] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 64.
[2050] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 54.
[2051] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 50.

evidence. Boston's Complete Streets design guide has a requirement for green walls which allow for transparency at the building's edge.

Interestingly, in Boston's Complete Streets design guide there is a requirement for green walls, which provide transparency but also green effects on the building's edge.[2052] This is to allow for transparency within areas that do not have transparency. Boston's Complete Streets guide does have environmental, stormwater, energy and policy reasons for the green walls, but they provide no purpose other than create transparency for transparency's sake alone.[2053] If the green walls were placed within the Street in order to limit or enclose the Street, they might provide a purpose that is important for the Street. Otherwise, they are merely decorative. Although, they might add to the District quality if they have prevalent usage throughout the adjacent Streets.

> "Green walls provide attractive and environmentally friendly building surfaces that help reduce energy costs, reduce stormwater runoff, and improve air quality."[2054]

When one looks at the Site Areas, one sees that there is an average of 1,860.67 trees within each Site Area. Of this number, San Francisco has 101% of the mean, Portland has 68% of the mean, New York has 99% of the mean, Paris has 94% of the mean, Amsterdam has 78% of the mean, Barcelona has 160% of the mean and Atlanta has 54% of the mean. Within the right of way or trees planted in an Avenue manner along the Street, the average number of trees in each Site Area is 1,328.83 trees. Of this number, San Francisco has 87% of the mean, Portland has 69% of the mean, New York has 104% of the mean, Amsterdam has 35% of the mean, Barcelona has 218% of

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[2052] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 33.

[2053] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 33.

[2054] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 33.

the mean and Atlanta has 34% of the mean. What this indicates is that Barcelona has far more trees in the Site Area, and many more of them are on the Street. What is interesting is that while Atlanta has many trees, is still has almost half the trees as other areas except for Amsterdam. Amsterdam is not a city with a lot of trees. Amsterdam has a number of trees on in the city landscape, but the perimeter cores of other cities, and most especially San Francisco, dwarf Amsterdam in the number of trees within the Site Area. The Average number of trees within the perimeter cores of the Site Areas is 535.83. Of this number, San Francisco has 135% of the mean, Portland has 68% of the mean, New York has 85% of the mean, Paris has 112% of the mean Amsterdam has 184% of the mean, Barcelona has 16% of the mean and Atlanta has 104% of the mean. What this indicates is that when trees are within the Site Area, Barcelona has most of the trees within the public sphere, whereas other cities have many of their trees away from the public and within the perimeter core of the block. Assuming a 20 foot diameter for each tree, this means that on average each Site Area has a total area of tree coverage of 417,253.67 square feet, with Barcelona having the most and Atlanta having the least.

Within the Site Areas, an estimated average of 155.83 streets in each Site Area has trees on both sides. Of this number San Francisco has 78% of the mean, Portland has 116% of the mean, New York has 78% of the mean, Amsterdam has 141% of the mean, Barcelona has 98% of the mean and Atlanta has 87% of the mean. When one compares the streets that adhere to LEED’s 40% sidewalk tree coverage, one finds that an average of 89% of sidewalks in the Site Areas have tree coverage. However, Paris, seems to have the least, with Paris in this Site Area barely having more than 40% of the Sidewalk as covered by trees. The remaining areas satisfy this requirement.

When one looks at the distance between trees, one finds that the average distances between trees in all of the Site Areas do have relationships with each other that might satisfy various benchmarks, but not all benchmarks. The average distance between trees in the Site Areas is 24.83 feet. Of this number, 1,004.79 trees are within 30 feet of each other, and 178 trees are between 30 and 50 feet of each other. Of the trees in the average Site Area, 1,090.03 trees are within 40 feet or less from each other, and 197.66 trees are 50 feet or more from each other on the sidewalk. Of the trees in the average Site Area, 179 are within 40 feet of the street intersection. Of the trees in the average Site Area, 434.63 trees are between 15 and 25 feet from each other, and 330.73 trees are within 30 to 40 feet from each other. Of the trees in the Site Area, more than 238.81 trees are at least 40 feet apart from each other. Within the individual Site Areas, the various Sites have trees in various distances from each other; however the most consistent length is the 30 and 40 foot length. What is also consistent is that the 15-25 foot, the 30 to 45 foot and the 40 foot measurements seem to indicate that most of the trees are within 15 and 40 feet from each other, with very few trees being more than 40 feet apart from each other. This seems to indicate that Jane Jacobs was right and that the resilient cities also follow Savannah patterns of tree placement when it comes to transparency, because the trees are spaced out enough that the trunks can easily be seen as separate.

When one looks at the Site Areas, one finds an average of 32,593.79 feet of glass transparency. While much of this data is ratioed off of either two routes or two blocks in the various Site Areas, this does seem to indicate that some areas have more glass transparency than others. Of this number, San Francisco has 106% of the mean, Portland has 24% of the mean, New York has 110% of the mean, Paris has 110% of the mean, Amsterdam has 161% of the mean, Barcelona has 88% of the mean and Atlanta has 10% of the mean. It is important to also realize that this ratio is based on glass transparency within 20 feet from the lot and block perimeter and at the edge of the right-of-way. This seems to make sense because Portland and Atlanta have fairly light building footprints in comparison to the other Site Areas. Also, Portland and Atlanta have greater setbacks, and transparencies mean practically nothing for eyes-on-the street when they are set too far back from the street. As a result, the average transparency of the first level in the Site Areas is 55% of the block perimeter. Of this number, San Francisco has 105% of the mean, Portland has 24% of the mean, New York has 115% of the mean, Paris has 85% of the mean, Amsterdam has 132% of the mean, Barcelona has 129% of the mean and Atlanta has 15% of the mean.

When looking at the physical transparencies of the Site Areas, the average number of entries on the street lengths for both sides is 24.18 entries, this is about 12 to 13 entries on each side of the street on average in each Site Area. However, each Site Area is very different. Of this average, San Francisco has 127% of the mean, Portland has 39% of the mean, New York has 85% of the mean, Paris has 116% of the mean, Amsterdam has 154% of the mean, Barcelona has 79% of the mean and Atlanta has 51% of the mean. This means that the average distance between each entry in the Site Areas is around 31.18 feet which is more than 265% of the LEED requirement. The average width of this average number of entries is 72.54 feet for each Street length. Of this number, San Francisco has 127% of the mean, Portland has 39% of the mean, New York has 85% of the mean, Paris has 116% of the mean, Amsterdam has 154% of the mean, Barcelona has 79% of the mean and Atlanta has 51% of the mean. This means that on average, there is about 14,557 feet of entry width transparency for each Site Area. When one includes the total amount of service entries and front entries within the Site Areas, the ratio to entry width to the block perimeter is 0.15 or 15% of the block perimeter in the Site Areas, with of course, Portland and Atlanta having half the number of entries as the other Site Areas.

10.15.2.5 Building Densities and Ground Coverage

> "This combination of these devices—more numerous streets, lively parks in lively places, and various nonresidential uses mingled in, together with great variations among the dwellings themselves—creates totally different effects from grimly unrelieved high densities and high ground coverages." [2055]

Related to the enclosure is the building density within urban form. Although building density is actually architectural infill populating the lots and blocks within urban form, the effect of building density is felt mainly on the Street with the Street Façade. The density affects the enclosure effectiveness of the street and also affects the population densities required to create vital and resilient districts and cities. The single family detached house represents the majority of housing in the United States. "The single-family detached house remains the mainstay in North America, accounting or half or more of annual housing starts." [2056] The single family detached house is generally built at the rate of 5 to 6 units per acre, with a 60 to 75 foot setback from the street and 5 to 10 feet spaces on either side for light purposes. [2057] At this unit density the developments result in sprawl for there is no other way to house large densities of people at this density without covering the landscape with low density developments. Some responses to this density have been to intensify with lot subdivision or flag lots creating back lot intensity.[2058] However, most of these responses are unrealistic when addressing the millions of acres within the built environment and the lower land values and excessive government financing that allowed sprawl to occur. The problem really is

[2055] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 284.
[2056] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 272.
[2057] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 272.
[2058] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, pp. 272-273.

not the single-family detached house though. The problem is understanding the densities required to create the diversity and vitality similar to resilient cities.

> "The designer is forced to construct decks for private or group outdoor spaces, or expensive garages for storing the automobiles. Hence land values must be considerably higher, and the market must strongly favor self-contained units before the construction of attached units is warranted at densities of 75 to 110 units per hectare (30 to 45 per acre).[2059]

Observational evidence shows that resilient communities actually have very high residential unit densities—dwelling units. For Jane Jacobs, the lower threshold of dwelling units per acre was around 100.[2060] She observed that relatively high numbers with modern zoning mechanisms like 20 units per acre did not allow a city to have the densities of people necessary for diversification and vibrancy to take place.[2061]

> "Unfortunately, densities high enough to bring with them innate city problems are not by any means necessary high enough to do their share in producing city liveliness, safety, convenience and interest."[2062]

Through participant observation, Jane Jacobs stated that small maximum densities had very little effect upon the vibrancy of city areas. In looking at vibrant areas within various cities she noted that an approximate number of residential units per acre was 100 units per acre, with high ground coverage.[2063] "One hundred dwellings to an acre at low ground coverages yield not even token variety—and yet this density is a probable minimum if the unfit "in-between" densities are to be avoided."[2064] Jacobs did not state if this minimum residential coverage is building coverage total, or does not take

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[2059] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 280.

[2060] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 274.

[2061] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 274.

[2062] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 274.

[2063] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 276.

[2064] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 281.

into consideration the commercial, retail and public buildings necessary to service the possible densities for 100 residential dwelling units.[2065] Unfortunately, though zoning mechanisms require much lower densities than 100 residential units per acre—even with higher ground coverages. “Low ground coverages—no matter by what means they are imposed, from local zoning to federal fiat—and diversity of buildings, and viable city densities are thus conditions that are incompatible with one another.”[2066] As a result, a lingering effect of these zoning requirements is a sparse building stock.[2067]

In Jane Jacob’s time, Greenwich Village had a unit density of 125 to 200 dwelling units per acre, and in Boston’s North End, the dwelling unit density is 275 dwelling units per acre, and Boston’s North End had a dwelling unit density of 275 dwelling units per acre.[2068]

> “Greenwich Village is such a place. It manages to house people at densities ranging from 125 to 200 dwelling units per acre, without standardization of buildings. These averages are obtained from mixtures of everything from single-family houses, houses with flats, tenements and all kinds of small apartment houses and flats, on up to elevator apartments of many different ages and sizes.”[2069]

In her analysis, Jacobs looked at Districts like Rittenhouse Square in Philadelphia and North Beach-Telegraph Hill in San Francisco, both which had approximately 100 dwelling units per acre and were vibrant enough to attract visitors and tourists.[2070] But,

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[2065] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 281.

[2066] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 281.

[2067] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 282.

[2068] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 279, 283.

[2069] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 279.

[2070] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 275.

given her experience in Boston and Greenwich Village, even she said that 100 units per acre might be too low.[2071]

> "Obviously, if the object is vital city life, the dwelling densities should go as high as they need to go to stimulate the maximum potential diversity in a district."[2072]

Jacobs noted that when cities propagate codes that require density standardization, the problem with creating districts and densities that lead to vibrancy becomes even more difficult. "It is not easy to reconcile high densities with great variety in buildings, yet it must be attempted. Anti-city planning and zoning virtually prevent it, as we shall see."[2073] As part of Eco-City Cleveland's attempt to create a more vibrant city, they require 7 residential units per buildable land or greater.[2074] This is far from even the most minimal densities Jane Jacobs noted that would create vibrancy.

While densities, another factor in effecting the enclosure is the total percentage of lot development within the city. Like dwelling units, the evidence shows that that lot development is quite high, while the available open space is quite low. In New York City, development covers 60-80% of the available land in Greenwich Village leaving 20-40% of the land as open space.[2075] "This is a high ratio of ground coverage. It is so efficient a use of the land itself, that it permits a good deal of "inefficiency" in buildings, but even so, high average densities are reached."[2076] Environmentally, this high density of land results in lesser sprawl because higher densities of people can inhabit lower

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[2071] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 276.

[2072] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 277.

[2073] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 279.

[2074] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 41.

[2075] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 279.

[2076] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 280.

square acres of land—requiring less expansion of the city edge. In contrast to the high densities in New York, Le Corbusier's Radiant City and the Garden City ideal only left 15% to 20% developed.[2077] One might state that the Radiant City provided similar densities of people, but population densities are actually a district quality and not a structural quality of the built form. The building densities create enclosure and intensify the use of the land. In contrast, the Radiant City land coverage has very little positive impact upon these two important structural components. Further, as Jane Jacobs critiqued, when open space within cities rises, the ability to create the district quality becomes lessened within the city, because the small percentage of developed land does not allow for the building stock necessary to age and diversify, allowing for further district development.[2078]

> "Mr. Whitney found that no matter how you slice it, it is physically impossible to get above low city densities 40 to an acre or thereabouts) without standardize all but the minute token of the buildings—unless ground coverage are increased, which is to say unless open space is decreased." [2079]

On contrast to the Radian City effect, Barcelona's blocks are 52.3% built and 47% unbuilt.[2080]   Yet, this category of density becomes problematic for higher levels of ground coverage do not amount to resilient communities. One could have high ground coverage and then low Street space. Jane Jacobs noted that ground coverage levels of 70% become problematic when there are fewer and fewer Streets.[2081] Jacobs noted that the percentage of developed acreage should not take away from proper street coverage with the reduction of the street systems to cul-de-sacs and superblocks.

[2077] Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p.14

[2078] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 280.

[2079] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 281.

[2080] Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 11.

[2081] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 284.

10.15.2.6 Fronts and Backs

> "Building fronts should always face the public realm, whether it is a street, public walkable, park or square."[2082]

While many consider the front and the back of the lot to be the width of the lot where the entrance or threshold of the building is located, the front and the back of the lot are actually related to the way the lot interacts with the public realm--the Street.[2083] "Frontages are how buildings address the street. In conventional development, they are not given a lot of attention, which is why the most prominent features is often the garage or the parking lot."[2084] The frontage provides space for the threshold that modulate physical entry into the lot, for the transparencies that allow the modulation of visible entry within the lot, and many times determine what is the primary entrance versus the service entrance of the space. [See Figure 134] One should note that many times the service entrance actually hit the frontage of the lot, but in the United States, it is traditional in city-making and lot subdivision that the back of the lot be adjacent to the alley--a street-like device quasi service and access. The fronts and backs are a socially constructed dynamic that indicates which aspects of the building are negotiating the public realm. "As Bentley…argues, the latter ignores 'socially-constructed' notices of front and back, which are vital in the relationship between public and private and in establishing conditions of privacy."[2085] The frontage of the lot is also crucial because it determines the length of the façade wall on the Street, which determines the type of enclosure--

[2082] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 58.
[2083] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 21.
[2084] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 21.
[2085] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 101; Bentley, I. "Urban Design as an Anti-Profession." *Urban Design Quarterly* 65 (1998): 125.

which many times leads to the perimeter block effect. It also affects the way that people enter and interact the Street and thus determining the components necessary for a complete structural Street and District quality.

> "Though other development configurations are possible, recognition of the front-back distinction tends to lead to perimeter block development, which also has a number of advantageous characteristics/features: explicitly public and private sides; the capacity to accommodate different densities of development; and a public façade that both physically defines and addresses an urban space 'socially.' Most importantly, however, it produces (or results from) a connected street pattern."[2086]

What the front and back also do is provide security access and control to the lot. "By orienting active 'fronts' to streets and public spaces, and inactive 'backs' to the private realm, activity is encouraged in streets and public spaces, and security and privacy is maintained in 'back' spaces or courts."[2087] When buildings are designed to have front and back congruency with lots, dynamic patterns result which allow for intensive lot usage, and thus intensification and diversity of the Street.[2088] When there is this congruency, then the architectural infill and the lots link together with the street in a unified whole where they support each's structural components.[2089] When they do not, one has the modernist plan where the buildings turn away from the street and thus start breaking down the Street, lot and architectural dialectic that has been with cities for thousands of years.

> "The apparent choice between buildings-defining space and freestanding object-buildings is more than one of aesthetic preference because the resultant space has different social characteristics."[2090]

[2086] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 101.

[2087] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 54.

[2088] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 54.

[2089] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 58.

[2090] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 101.

The front and the back of the building have a direct structural relationship with the structural walkability of the street. "A walkable community is impossible without good frontages."[2091] Within suburban locations, one notices that modern ideas of placement of the single-family detached houses has the front of the building pushing away from the street--the front and the back have become reversed. As a result, since people do not interact with the public zone, the public zone becomes unimportant, and thus the Street degrades.

Urban critiques like the CNU have publicly pushed against this dynamic. While most of their recommendations have design components, the effect of these components is to return the front and the back dynamic with the street and to push that front closer to the street as one goes from T1 to T6 zones.[2092] In the T4 area, the porch and the fence, dooryard and light court extent the façade toward the street and while allowing a formal setback, create a transparency dynamic which negotiates that space.[2093] Within T5, the CNU promotes strategies to extend the architectural infill façade toward the street with porches and awnings and courts.[2094] Within the T6 zone, complete connection to the street with the architectural infill front is necessary.[2095] While these are definitely design recommendation, structurally they start negotiating the

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2091 Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 21.

2092 Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, pp. 21-23.

2093 Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 23.

2094 Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 23.

2095 Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 23.

failures of past architectural and urban planning to reorient and relink the Street and architectural infill linkage.

In the Site Areas the average number of blocks with distinct fronts and backs is 63.33. On average, San Francisco has 85% of the mean, Portland has 85% of the mean, New York has 63% of the mean, Paris has 120% of the mean, in Amsterdam has 145% of the mean, Barcelona has 101% of the mean and Atlanta has 52% of the mean. Of these buildings, only 78% of the structures meet or are within 1 foot of the sidewalk. While most of the resilient cities have more than 96% of the mean, only 2% of the Portland Site Area is within 1 foot of the sidewalk. This is actually less than the Atlanta Site Area which has 7% of its buildings within 1 foot of the sidewalk.

10.15.2.7 Complementarity

> "Overwhelming, the buildings on the best streets get along with each other. They are not the same but they express respect for one another, most particularly in height and in the way they look back."[2096]

While complementary is generally a design component, there is an aspect of complementarity which is structural in nature. "Complementarity is the ability of buildings to agree in like and in kind, to get along with each other in some way.[2097] While there might be many structural complementarity analysis that take place, this thesis states that there are at a minimum three structural complementary issues that must be present in order for there to be complementarity in general: vertical complementary, horizontal complementary and roofline complementarity. One should note that none of these are about a design quality which is part of the District quality of the street as an aesthetic, and yet, these affect the Street as a structural component.

[2096] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 287.

[2097] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 287.

> "Whether by norms or by regulation (which has often been a major determining factor in height of structures along these streets), they have a sense of regularity and of order, observable in their other physical characteristics as well."[2098]

Jane Jacob's hinted at this relationship when discussing the nature of how architectural infill related to each other. "Above that, to seven or eight stories, the difference are usually one or two stories as well. Even then building heights may not be so different; a tall three-story building can be very much like a four-story one in height."[2099] What Jacobs noticed is that the roofline of the buildings affected the type of enclosure that was present, making some buildings locally out of scale than within scale. Jane Jacobs also hinted at the relationship between those that broke the structural complementarity and unsuccessfully attempted to become landmarks for pathmaking purposes, where buildings that failed to complement the roofline of their adjacent buildings also failed to become pathmaking landmarks. This might occur because in order to break the roofline to become landmarks, the pathway landmark must separate itself physically from adjacent buildings and be completely out of human scale--a pathmaking scale. In contrast, there are historic and localized landmarks which can be lower and even complement the district.

> "Here, though, it is the occasional lower buildings—museums, clubs, churches—that are the landmarks."[2100]

The issue of complementary might structurally relate the whether an infill building not only is coherent with the adjacent architectural infill but whether that architectural infill is governed by a different urban element dynamic altogether--the landmark. But it also might relate to how the buildings are structurally created and whether those

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[2098] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 288.
[2099] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 288.
[2100] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 288.

constructions are structurally congruent as they relate to the Street.[2101] What this respect also might require is a congruence of verticalness or horizontalness with floors, windows, vertical elements and horizontal elements which bind the street together structurally.

> "The variables are materials, color, cornice lines and belt courses, buildings sizes, window openings and their details, entrances, bay windows, porches, overhangs and shadow lines and details like downspouts."[2102]

Aesthetic details aside, one could determine the vertical congruence by looking at whether the materials of the buildings relate vertically to each or exist on a horizontal way. Further, horizontal complementarity might be determined by looking at whether the floors of the structures along the Street façade flow with each other, or whether there are center floors or differences in patterns. Lastly, Rooftop complementarity could be determined by determining the median floor height of the structures and then determining the relationship of the architectural infill with that median--more than likely there would be deviations from this median, where the core of the cities the deviation would be great and in residential areas, the deviation would be small.

When analyzing the buildings in the Site Area, one of the most fascinating aspects of building analysis was the complementarity of building heights and the relationship of the positive and negative relationships that these buildings had with the mean height of each Site Area. With an average height of the site areas was 48.66 feet and with an average number of buildings or building blocks in the Site Areas of 2,426.17, the average number of buildings that deviated 1 story from the average height was 693 structures in each Site Area. The average number of buildings that deviated more than 2 stories was 453.50 buildings in each Site Area. The average number of buildings that

[2101] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 289.
[2102] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 289.

deviated from the average height by 3 stories was 330.75 buildings. In total, more than 1,477.25 deviated 1 story or more from the average building height. What this means is that the complementarity ratio of buildings deviating from the normal height is 0.56 or 56%. Taken in inverse, in order for buildings to be complementary of each other with regard to height, at least 44% of all buildings must be at the same height.

10.15.3 *Sidewalks: the Public Thoroughfare*

> "Much more than a strip of sidewalk laid down next to a roadway, a great streetscape incorporates a holistic vision for the use of the street which takes into account the needs of all users."[2103]

10.15.3.1 *Public Zone*

> "Understanding that sidewalks are the most fundamental network of public open spaces that knit each neighborhood together, DCP views this work as a resource for building great sidewalks across the country—a critical component in fostering healthy, active, sustainable, and resilient future generations."[2104]

The Sidewalk exists as a structural element within the Street. While its decorative effects do determine the character of the District, the structural component of the sidewalk is a function of the division of the Street for pedestrian safety. NACTO states that the sidewalk should go beyond the "the bare minimums in both width and amenities" and that sidewalks should be on both sides of the Street.[2105] Functionally, the sidewalk protects the pedestrian from automobile, cart, horse and other types of traffic by limiting that traffic to the lane. Sidewalks and various combinations of their component elements can exist on one or both sides of the Street--or none.[2106]

[2103] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. *County and City of San Francisco Planning Department.* http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 54.

[2104] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 4.

[2105] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 40

[2106] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 40

> "[San Francisco] Sidewalks should be included on both sides of all streets throughout the city. As pedestrian crossings at intersections are considered extensions of the sidewalk, crosswalk closures create discontinuous sidewalks and should be evaluated and re-opened as appropriate (see Section 5.1)."[2107]

While the Sidewalks in the Middle Ages reverted back to a shared space of traffic, Romans built the sidewalk as early as the 4th century BC.[2108] These devices which were as much to protect the traveler from mud as to slow down the chariot in Pompeii, they appeared back in the United States mainly as a safety measure to separate the pedestrian from the dangerous roadway[2109]. "Not until the nineteenth century did the sidewalk reappear--a zone of doubtful safety, wedged in between buildings on one side and the lethal roadway on the other."[2110] Still at that time, sidewalks were considered privileged transportation space by some.[2111] The Sidewalk became a part of the reform of public life, and they rapidly changed the way Americans lived and interacted.[2112] This clear space for movement became a regulated and protected public activity, indicating where public activities should occur.[2113] At that time,

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[2107] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 98.

[2108] Loukaitou-Sideris, Anastasia, and Renia Ehrenfeucht. *Sidewalks: Conflict and Negotiation Over Public Space*. Cambridge, Massachusetts: MIT Press, 2009, p. 15.

[2109] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, 279.

[2110] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, 279.

[2111] Ehrenfeucht, Reina and Antasia Loukaitou-Sideris. "Planning Urban Sidewalks: Infrastructure, Daily Life and Destinations." Journal of Urban Design, Vol. 15. No. 4 (2010): 459–471 http://www.tandfonline.com/doi/abs/10.1080/13574809.2010.502333#.U71u_fldV8E (last accesed July 9, 2014), p. 461].

[2112] Ehrenfeucht, Reina and Antasia Loukaitou-Sideris. "Planning Urban Sidewalks: Infrastructure, Daily Life and Destinations." *Journal of Urban Design*, Vol. 15. No. 4 (2010): 459–471 http://www.tandfonline.com/doi/abs/10.1080/13574809.2010.502333#.U71u_fldV8E (last accesed July 9, 2014), p. 461.

[2113] Brown-May, A. *Melbourne Street Life: The Itinerary of Our Days*. Kew, Victoria: Australian Scholarly/Arcadia and Museum Victoria, 1998; Baldwin, P. C. *Domesticating the Street: The Reform of Public Space in Hartford, 1850–1930*. Columbus: Ohio State University Press, 1999; Ryan, M. P. *Women in Public:*

the value of the sidewalk a part of regularized Street development. Some jurisdictions recognize the complexity of the sidewalk for it functions in layers rather than as a single physical entity by affecting the Street experience, the physical space, and the public policies affecting the public realm.[2114] Yet, during the modernist age, the designers programmatically disconnected and removed the Sidewalk out of the Street--leaving only the lane. With this decline of the Street, the public space also declined.[2115]

As stated before, the Sidewalks became a space of regulated but protected public right. In the United States in particular, the sidewalks developed as a political space with very particular protections.[2116]

> "Sidewalk, streets, and parks are what are known as traditional forums and 'have immemorially been held in trust for the use of the public, and time out of mind, have been used for purposes of assembly, communicating thoughts between citizens, and discussing public questions."[2117]

Between Banners and Ballots, 1825–1880. Baltimore: Johns Hopkins University Press, 1990; Goheen, P. G. "The Ritual of the Streets in Mid-nineteenth Century Toronto," *Environment and Planning D: Society and Space* 11 (1993): 127–145; Ehrenfeucht, R. and Loukaitou-Sideris, A. "Constructing the Sidewalks: Municipal Government and the Production of Public Space in Los Angeles, Califonria, 1880–1920," *Journal of Historical Geography*, 33 (2007): 104–124; McShane, C. "Transforming the Use of Urban Space: a look at the Revolution in Street Pavements," *Journal of Urban History* 5 (1979): 279–307; Blomley, N. "Civil Rights Meets Civil Engineering: Urban Public Space and Traffic Logic," Canadian Journal of Law and Society, 22(2) (2007b): 55–72.

2114 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 5.

2115 Ehrenfeucht, Reina and Antasia Loukaitou-Sideris. "Planning Urban Sidewalks: Infrastructure, Daily Life and Destinations." Journal of Urban Design, Vol. 15. No. 4 (2010): 459–471 http://www.tandfonline.com/doi/abs/10.1080/13574809.2010.502333#.U71u_fldV8E (last accesed July 9, 2014), p. 460; Loukaitou-Sideris, A, Blumenberg, E. and Ehrenfeucht, R. "Sidewalk Democracy: Municipalities and the Regulation of Public Space," in: E. Ben-Joseph and T. Szold, eds. *Regulating Place: Standards and the Shaping of Urban America*. New York: Routledge, 2005; Loukaitou-Sideris, Anastasia, and Renia Ehrenfeucht. *Sidewalks: Conflict and Negotiation Over Public Space*. Cambridge, Massachusetts: MIT Press, 2009, p. 15.

2116 ACLU. "Guidelines for the Right to Protest." *American Civil Liberties Union of New Jersey.* https://www.aclu-nj.org/files/4213/1540/4584/RightToProtest.pdf (accessed July 27, 2014); National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 37.

2117 *Hague v. CIO*, 307 U.S. 496, 515 (1939).

As a result, the federal or state government cannot deny public access to the Sidewalk as a traditional free speech forum, though the government can make "reasonable time, place, and manner restrictions" upon this protected speech area.[2118] One does not need to make a large leap between the failure to create the public space within suburbs and many areas with discriminatory purposes and the failure of these areas to provide or maintain the sidewalk as a protected public space. Thus the sizes of the public space is crucial in modulating the needs of the community for circulation within the lane, and the size of the public zone necessary for pedestrian circulation. The Sidewalk not only controls the structural accessibility to the architectural façade but also an aspect of structural accessibility to very governing politic which defines built urban environment. Sidewalks are not just about walking space, they are public space where the public interacts and city socialization begins.[2119] "Every fine street that has been identified … is one that invites leisurely, safe walking." It sounds simple and basically it is."[2120] Interestingly, until the modern age, the sidewalk has always existed as the allowable and required connection between the lane and the architectural façade. It is not surprising that in order to destroy the Street, one would also have to move the Sidewalks.

> A city sidewalk by itself is nothing. It is an abstraction. It means something only in conjunction with the buildings and other uses that border it, or border other sidewalks very near it. The same might be said of streets, in the sense that they serve other purposes besides carrying wheeled traffic in their middles. Streets and their sidewalks, the main public places of a city, are its most vital organs. Think of a city and what comes to mind? Its streets. If a city's streets look interesting, the city looks interesting; if they look dull, the city looks dull.[2121]

[2118] Perry Education Ass'n v. Perry Local Educators' Ass'n, 460 U.S. 37, 45 (1983); National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 37.

[2119] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 272; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 45.

[2120] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 272.

[2121] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 37.

> "Urbanites need public spaces to sell their goods or labour, pass on information to others, express their disagreement with governments or employers, and celebrate and affirm individual or group identities. To achieve any of these, people need access to other people, and sidewalks can allow for these exchanges. These activities make sidewalks interesting and spaces where people want to be."[2122]

Yet, the sidewalk and its qualities have an ability to encourage or discourage the circulation of pedestrian movement. This has been recognized for some time, and it has grave implications on transportation, urban design and health policy.

> "Just as roadway expansions and improvements have historically enhanced travel for motorists, superior sidewalk design can encourage walking by making it more attractive."[2123]

Areas that have maintained and sufficient sidewalks have more walkability and livability. For areas without sufficient sidewalks, one has few options to actually walk regardless of any interest. "Walking as a form of transportation and exercise appeals to environmentalists and public health advocates alike."[2124] Another public benefit is the act of socialization and interaction in the Street, which only occurs on Sidewalks.[2125]

> "On sidewalks, activities are orderly but spontaneous and people engage with one another in various ways that integrate purposeful actions, such as vending or walking, and incidental exchanges including smiling or peoplewatching. Planning, in contrast, strives to establish priority uses and create predictable environments."[2126]

[2122] Ehrenfeucht, Reina and Antasia Loukaitou-Sideris. "Planning Urban Sidewalks: Infrastructure, Daily Life and Destinations." Journal of Urban Design, Vol. 15. No. 4 (2010): 459–471 http://www.tandfonline.com/doi/abs/10.1080/13574809.2010.502333#.U71u_fldV8E (last accesed July 9, 2014), p. 4, pp. 64-465.

[2123] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 37.

[2124] Ehrenfeucht, Reina and Antasia Loukaitou-Sideris. "Planning Urban Sidewalks: Infrastructure, Daily Life and Destinations." Journal of Urban Design, Vol. 15. No. 4 (2010): 459–471 http://www.tandfonline.com/doi/abs/10.1080/13574809.2010.502333#.U71u_fldV8E (last accesed July 9, 2014), p. 459.

[2125] Ehrenfeucht, Reina and Antasia Loukaitou-Sideris. "Planning Urban Sidewalks: Infrastructure, Daily Life and Destinations." Journal of Urban Design, Vol. 15. No. 4 (2010): 459–471 http://www.tandfonline.com/doi/abs/10.1080/13574809.2010.502333#.U71u_fldV8E (last accesed July 9, 2014), p. 460.

[2126] Ehrenfeucht, Reina and Antasia Loukaitou-Sideris. "Planning Urban Sidewalks: Infrastructure, Daily Life and Destinations." Journal of Urban Design, Vol. 15. No. 4 (2010): 459–471 http://www.tandfonline.com/doi/abs/10.1080/13574809.2010.502333#.U71u_fldV8E (last accesed July 9, 2014), p. 460.

As a powerful part of the Street, the Sidewalks have the power of reinvigorating a public space and creating activity where previously there was none with tactical approaches and urbanism.[2127]

> “Nobody enjoys sitting on a stoop or looking out a window at an empty street. Almost nobody does such a thing. Large numbers of people entertain themselves, off and on, by watching street activity.[2128]

10.15.3.2 General Sidewalks Space

In the Street the sidewalk generally consists of three specific zones: the frontage area, the throughway area, and the furnishings and buffer area [buffer-furniture-edge-extension].[2129] Each of these areas have a function that is self-supportive of the throughway area. In short, the frontage area protects the throughway area from obstacles, and the buffer area protects the throughway area and pedestrian from lane dangers and provides services and amenities for the pedestrian. The New York City Planning authority considers the sidewalk as the canopy, the area above the sidewalk, the building wall, the architectural infill façade, the roadside, the area of automobile traffic, and the ground plane.[2130] [See Figure 162] While all of these interact for the

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2127 Ehrenfeucht, Reina and Antasia Loukaitou-Sideris. “Planning Urban Sidewalks: Infrastructure, Daily Life and Destinations.” Journal of Urban Design, Vol. 15. No. 4 (2010): 459–471 http://www.tandfonline.com/doi/abs/10.1080/13574809.2010.502333#.U71u_fldV8E (last accesed July 9, 2014), p. 467; Loukaitou-Sideris, A. “Regeneration of Urban Commercial Streets: Ethnicity and Space in Three Los Angeles Neighborhoods.” *Journal of Architectural and Planning Research*, 19(4) (2002): 334–350.

2128 Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 45.

2129 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013; County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 98; National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 37.

2130 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 7.

Street and District experience this thesis will focus on the ground plane as the structural component of the sidewalk.

> "Streets in cities serve many purposes besides carrying vehicles, and city sidewalks—the pedestrian parts of the streets—serve many purposes besides carrying pedestrians."[2131]

The dimension of the Sidewalk changes depending on sidewalk components. Even Jane Jacobs stated that the sidewalks would modulate in size depending upon Street needs. What they tend to do is follow the street network, however, this changed as the streets went from traditional gridpatterns to sprawl gridpatterns--where the street and the sidewalk became disconnected. [See Figure 161] "If and when our cities learn to foster deliberately the four basic generators of diversity, popular and interesting streets will grow ever more numerous. As soon as such streets, by their use, earn sidewalk widening, it should be offered."[2132] Jacobs interesting implied though that the sidewalks module and change at the expense of the lane, rather than the inverse which occurs in modern planning designs.[2133] Usually, jurisdictions plan the sizes of sidewalks well in advance of development because it is structurally easier to plan for possible changed or added uses than to physically change the lane or architectural infill façade.[2134]

> "Not all municipalities and townships require sidewalks to be built at the onset of the new development project. It is much easier to build sidewalks at the planning stage of a new construction than to do so retroactively."[2135]

[2131] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 37.

[2132] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp.474-475.

[2133] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 474-475.

[2134] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 11.

[2135] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 11.

The Buffalo Green Code has various sidewalk widths depending on the type of street located in a particular area, yet most of these total sidewalk sizes range from 4.5 feet to 21.5 feet.[2136] With the Via del Corso where there are over 13 people per minute, the sidewalks are about 4 foot wide.[2137] There are some places where the pedestrian spill over to 6 feet.[2138] In Shanghai, the crowds force and take-over the first lane of traffic past the sidewalk, so the first lane adjacent to the sidewalk effectively becomes a modulating aspect of the sidewalk--at the expense of the lane.[2139] In New York City, on Baltic Street and Park Slope, the sidewalk width is 9.5 feet, and on 3rd Avenue in the Upper East Side, the widths are 18 feet.[2140] On West 11th Street, the average sidewalk width is 8.5 feet, and on McDougal Street in SoHo, the widths are 12 feet.[2141] In Bowling Green, the sidewalk widths are 16.25 feet, and on Atlantic Avenue, the sidewalk widths are 19 feet.[2142] Lastly, on Fort Green, the sidewalk widths are 19’11”.[2143] In Portland, sidewalk widths are similar, with NW 23rd Street sidewalks having a width of 14.5 feet, SE Ladd Street sidewalks having a width of 17.5 feet, and NW Irvine Alley sidewalks having a width of 10.5 feet.[2144] In New York, the sidewalks generally do not go below 5 feet in any location.[2145]

[2136] Buffalo Mayor’s Office of Strategic Planning. “Buffalo Green Code.” Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), pp. 10-20.
[2137] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 273.
[2138] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 273.
[2139] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 273.
[2140] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, pp. 66-67.
[2141] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, pp. 66-67.
[2142] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, pp. 66-67.
[2143] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, pp. 66-67.
[2144] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.
[2145] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 56.

Boston's Complete Streets also has frontage zones of a 0' to 2" p referred width, with a 6 to 12' preferred pedestrian or clear zone for walking, and a 1'-6" to 6' furniture or greenspace zone for a buffer.[2146] With roads being a minimum 7' in neighborhoods to a maximum of 20-6" in downtown commercial areas.[2147]. The Boston Complete streets capitalizes on smaller areas for residential streets to make the design speed to be smaller, and in a sense making the entire street more narrow, while in more commercial or industrial areas, the street will be much larger as a result.[2148]

For San Francisco's Better Streets Plan there are varying types of sidewalks depending upon the constraints within the urban area. Generally, the minimum sidewalk is generally 12-15 feet, with some residential neighborhoods having 10-12 feet, and some industrial areas having 8-10 feet, and alleyways having 6-9 feet in widths.[2149] In San Francisco with Commercial Throughways, Neighborhood, Throughways, Downtown Residential, Residential Throughways, and Mixed-Use areas, the typical section of the throughway is 15 feet from façade to curb.[2150] In Neighborhood residential the throughway from façade to curb is 12 feet.[2151] In Industrial areas, the throughway area is

[2146] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 23.

[2147] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 23.

[2148] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), pp. 22-23.

[2149] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. *County and City of San Francisco Planning Department.* http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 99.

[2150] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. *County and City of San Francisco Planning Department.* http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), pp. 62-74.

[2151] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. *County and City of San Francisco Planning Department.* http://www.sf-

10 feet.[2152] Parkways have an average throughway of 17 feet, with park edge streets having 17 feet from private property to curb.[2153] Boulevard have a lot to curb dimension of 15 feet.[2154] Alleys have a sidewalk dimension of 9 feet.[2155]

In New York and Portland, there are also varying widths dependent upon commercial or neighborhood location. On Atlantic Avenue in Brooklyn, there is a sidewalk width of 19 feet, with each plot or building ranging from 18 feet to 34 feet.[2156] Atlantic Avenue has a total 19 foot total sidewalk width.[2157] In Bowling Green, sidewalks were 16.25 feet wide.[2158] On Clinton Avenue, the total width of the pedestrian lane is 16.5 feet.[2159] On West 11th Street, the total width of the sidewalk is about 8'4", including a clear walkway of 4'0".[2160] For the Soho-MacDouglas Street, the sidewalk has a 12' foot

planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 70.

[2152] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. *County and City of San Francisco Planning Department.* http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 72.

[2153] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. *County and City of San Francisco Planning Department.* http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 76.

[2154] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. *County and City of San Francisco Planning Department.* http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 80.

[2155] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. *County and City of San Francisco Planning Department.* http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 84.

[2156] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, pp. 31-32.

[2157] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 36.

[2158] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 40.

[2159] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 58.

[2160] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 59.

total width.[2161] Upper East Side-3rd Avenue has a total width of the sidewalk area of 18' feet.[2162] In Portland, SE Ladd Street, has a 17'6" total sidewalk or pedestrian strip.[2163] For the NW 23rd Street Area, there is total sidewalk with of 15'6" feet.[2164] In the NW 11TH Street area, the total sidewalk width is 10'6".[2165]

In their Better Streets program, San Francisco divides the space within the sidewalk under the determination of whether the sidewalk is constrained or not, given the lane and the façade of the buildings.[2166] What is important about these options is that some are more flexible than others, and some, wider sidewalk throughways with the frontage zone that allows for café's, need to be together rather than apart. When we start stacking these options together we get an idea that some connections are better than others given the situation.[2167] For sidewalks constrained to 6 feet, there are three options.[2168] Option one is a 2 foot furnishing and 4 foot throughway, option two is a 6 foot sidewalk within a larger curb extension and option three is a 1 foot setback/planting, and

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2161 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 48.

2162 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 49.

2163 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 64.

2164 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 53.

2165 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 54.

2166 County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 102

2167 County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 102.

2168 County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 102.

5 foot clearway.[2169] For sidewalks constrained sidewalks from 7 to 8 feet there are six options.[2170] Option 1 is a 3 foot furnishing zone with trees and a five feet walk space, option two is a 2 foot furnishing zone and six food walk space, option three is a 4 foot walk space, a 4 foot furnishing zone and a 2 foot cur extension, and option four is a six foot walk zone, a 4 foot furnishing zone.[2171] Option five is a 2 feet furniture zone and an 8 foot furnishing zone, and lastly, option six is an 8 feet walking area with a 2 foot sitting area/frontage area.[2172] For sidewalks constrained to 9-10 feet, there are three options.[2173] Option one is a 2 foot edge zone, 4 foot, a 4 foot through zone, a 4 foot furniture zone and a 2 building façade zone.[2174] Option 2 is a 2 foot frontage zone, 6 foot throughway zone, and 4 foot furniture/tree zone.[2175] The last option is an 8 foot

[2169] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 102.

[2170] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 103.

[2171] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 103.

[2172] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 103.

[2173] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 104.

[2174] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 104.

[2175] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-throughway zone with a 2 foot frontage and 2 foot edge zone.[2176] As one can see, while there are many constraints within the urban core, there are many cities who have realized that options are available if there is enough believe in the importance of the Sidewalk.

However, urban commenters have also stated that sidewalks have a ranged width. Tumlin states that sidewalks range from an alley minimum of 6 feet to commercial minimum of 10-12 feet.[2177] Hack stated that sidewalks should be 3 feet minimum, though residential entrances may have a sidewalk of 2.5 feet in width.[2178] Jane Jacobs recommended sidewalks to be around 30 feet in width to accommodate multiple types of uses and possible future needs.[2179] "Sidewalks thirty or thirty-five feet wide can accommodate virtually any demand of incidental play put upon them—along with trees to shade the activities and sufficient space for pedestrian circulation and adult public sidewalk life and loitering."[2180] She stated that sidewalks that are smaller than 20 feet become more limited not because they do not provide ample throughway space, but because the other functions that are present within the Sidewalk start collapsing--because they need space.[2181] "The narrower the sidewalks, the more sedentary incidental play becomes. The more frequent too become sporadic forays by children into

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planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 104.

[2176] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 104.

[2177] Tumlin, Jeffrey. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Holboken, New Jersey: Wiley: John Wiley Sons, Inc, 2012, p. 60.

[2178] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 209.

[2179] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 114.

[2180] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 114.

[2181] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 114.

the vehicular roadways."[2182] Jacobs is really the only urban design critique who recognized that there are fundamental uses of the public space which are well-intentioned people consider unsafe, but which Jacobs considered necessary. She argued that even these activities were fundamental to the public zone, creating an interweaving of functions that those activities supported which were crucial to the public zone.

> "Twenty-foot sidewalks, which usually preclude rope jumping but can feasibly permit roller skating and the use of the other wheeled toys, can still be found, although the street wideners erode them year by year (often in the belief that shunned malls and 'promenades' are a constructive substitute."[2183]

Most crucial to her argument was that planned alternatives were irrelevant because they did not provide the necessary space to allow crucial public functions to occur on every street--rather than specific zones like malls.

The United States Americans with Disabilities Act though mandates sidewalks which have an effective minimum of 4 to 5 feet to allow for access to public spaces and reasonable accommodations to many other spaces.[2184] Although there might be some difference within the public realm, this law supersedes all previous historical dimensions to require at a minimum 4 to 5 feet accessibility. This is based on the right public policy that while anyone may become disabled, the differently-abled should not be left outside of a multi-layered sidewalk space that is physical and yet part of the social politic.

> "Sidewalks have a desired minimum through zone of 6 feet and an absolute minimum of 5 feet. Where a sidewalk is directly adjacent to

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[2182] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 114.

[2183] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 114.

[2184] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 209; Americans with Disabilities Act. Pub.L. 101–336, 104 Stat. 327, enacted July 26, 1990, codified at 42 U.S.C. § 12101; 42 U.S.C. §§ 12131–12165, and 42 U.S.C. §§ 12181–12189. http://library.clerk.house.gov/reference-files/PPL_101_336_AmericansWithDisabilities.pdf. (accessed August 2, 2014).

> moving traffic, the desired minimum is 8 feet, providing a minimum 2-foot buffer for street furniture and utilities."[2185]

> "It is not just total sidewalk width that matters. Sidewalks aren't just for walking; indeed, much of a typical urban sidewalk is, practically speaking unavailable to pedestrians."[2186]

10.15.3.3 Frontage Area

The frontage area within the street recognizes the fact that is human nature to stay away from edges or walls. San Francisco recognizes this area as "The area adjacent to the property line where transitions between the public sidewalk and the space within buildings occur."[2187] Frontage areas though have a repellant nature for people in their movement on the Sidewalk. "[The] pedestrians tend to shy away from edges, even more so from walls, an especially from walls featuring doors that may open at any time."[2188] But, the frontage also has an attractive nature for it abuts the transparency and permeability zone that links private property with the public realm. This frontage space recognizes the fact that those opening doors, having commerce, using awnings, having stoops, etc. tend to intrude upon the public realm in sometimes a dangerous way creating limitations for through traffic. "On sidewalks that are not wide enough to accommodate a large furnishing zone, element that would normally be sited in the later, such as news racks, trash cans, and poles, may occupy the frontage zone to

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[2185] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 40; Federal Highway Administration, "Sidewalk Corridor Width," *Designing Sidewalks and Trails for Access*. Washington, D.C.: FHWA, 2001.

[2186] Tumlin, Jeffrey. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Holboken, New Jersey: Wiley: John Wiley Sons, Inc, 2012, p. 60.

[2187] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 98; see National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 37.

[2188] Tumlin, Jeffrey. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Holboken, New Jersey: Wiley: John Wiley Sons, Inc, 2012, p. 61.

keep the throughway zone free."[2189] So, in a sense the frontage zone really protects the nature of the throughway area by placing limiting obstacle placement.

Measurements of the frontage area change from no frontage to generally 10 feet. In many jurisdictions, the frontage zone can be from 18 inches to 2 feet wide to allow for frontage effects or uses which do not inhibit the throughway zone for a clear path of transit on sidewalks.[2190] The Buffalo Green Code has various frontage zones depending on the type of street located in a particular area, yet most of these total frontage zones sizes range from 1 foot to 3 feet. [2191] For Boston's Complete Streets, the frontage area is 6 feet wide.[2192] In San Francisco, the Better Streets program frontage areas are 18 inches to 2 feet for areas within commercial zones.[2193] By having such a wide frontage zone, San Francisco can capitalize on its District quality.

> "Use: Adjacent uses may occupy this zone for outdoor displays, café or restaurant seating, and plantings, with appropriate permits. Architectural elements that encroach into the street such as awnings, canopies, and marquees may also occupy this zone. On sidewalks not wide enough to accommodate a large furnishing zone, elements that would normally be sited there such as benches, newsracks, trash cans and poles may occupy the frontage zone to keep the throughway zone clear."[2194]

[2189] Tumlin, Jeffrey. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Holboken, New Jersey: Wiley: John Wiley Sons, Inc, 2012, p. 61.

[2190] Tumlin, Jeffrey. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Holboken, New Jersey: Wiley: John Wiley Sons, Inc, 2012, p. 61.

[2191] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), pp. 10-20.

[2192] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), pp. 22-23.

[2193] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 100.

[2194] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 100.

10.15.3.4 Throughway Area

While all sidewalks might not have frontage or buffer areas, all sidewalks have throughways. The throughway is the area of clear pedestrian movement free of obstacles that has a strong impact upon the accessibility of the city, Streets, lots and blocks.[2195] Many cities do not require sidewalks or historically have not had sidewalks. Others require sidewalks on both sides of the street in retail and residential areas, but only one side of the street in Industrial areas.[2196] The Eco-City Cleveland requires sidewalks for public buildings, and the standards requires sidewalks to have a parallel nature with the architectural infill.

The dimensions of the throughway area is not consistent. There are very measured widths of sidewalks with some being 8 feet-wide on mixed-use and retail blocks and 4 feet wide for residential areas.[2197] The Buffalo Green Code has various throughway zones depending on the type of street located in a particular area, yet most of these total throughway zone sizes range from 4.5 to 10 foot to 8.5 feet.[2198] In San Francisco, the throughway area must be at least 4 feet in width and widens every to 5 feet every 200 feet due to ADA requirements.[2199] NACTO states that the pedestrian zone

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[2195] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 98; National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 37; Tumlin, Jeffrey. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Holboken, New Jersey: Wiley: John Wiley Sons, Inc, 2012, p. 61.

[2196] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 40.

[2197] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 41.

[2198] Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), pp. 10-20.

[2199] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011.

should be at a minimum 5 to 7 feet in residential settings and 8 to 12 feet in downtown commercial areas.[2200]

In San Francisco with Commercial Throughways, Neighborhood Throughways, Downtown Residential Throughways, Residential Throughways, and Mixed-Use areas, the typical section of the throughway is 15 feet from façade to curb.[2201] In Neighborhood residential the throughway from façade to curb is 12 feet.[2202] In Industrial areas, the throughway area is 10 feet.[2203] Parkways have an average throughway of 17 feet, with park edge streets having 17 feet from private property to curb.[2204] Boulevard have a lot to curb dimension of 15 feet.[2205] Alleys have a sidewalk dimension of 9 feet.[2206]

County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposa, p. 100.

2200 National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 38.

2201 County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 62-74.

2202 County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 70.

2203 County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposa, p. 72.

2204 County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 76.

2205 County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 80.

2206 County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposa, p. 84.

In New York City, Atlantic Avenue in Brooklyn has a 12 foot throughway width of sidewalk.[2207] "The clear paths are typically wider than in other typologies, and more elements such as signs, awnings, and canopies hang over the sidewalk in the canopy plane."[2208] In Bowling Green, there was a 10' clear width of the area.[2209] On Clinton Avenue, the clear width of the paved sidewalk is 6 feet.[2210] On West 11th Street, there is a clear walkway of 4'0".[2211] The Soho-MacDouglas Street has a 5'0" clear width of the sidewalk.[2212] Upper East Side-3rd Avenue has a sidewalk clear width of 13'.[2213] In New York, the throughways generally do not go below 5 feet in any location.[2214]

In Portland on SE Ladd Street, there is a 5'6" clear walking space.[2215] For the NW 23rd Street Area, there is a 7'0 clear width sidewalk area.[2216] In the NW 11TH Street area, there is a 7'6" clear width of the sidewalk.[2217]

The United States Americans with Disabilities Act mandates a clear throughway area of a minimum of 4 to 5 feet to allow for access to public spaces and reasonable accommodations to many other spaces.[2218] "Ensure that sidewalks are without major

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2207 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 36.

2208 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 38.

2209 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 40.

2210 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 58.

2211 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 59.

2212 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 48.

2213 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 49.

2214 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 56.

2215 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 64.

2216 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 53.

2217 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 54.

2218 Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 209; Americans with Disabilities Act. Pub.L. 101–336, 104 Stat. 327, enacted July 26, 1990, codified at 42 U.S.C. § 12101; 42 U.S.C. §§

gaps or deformities that would make them non-traversable for wheelchairs and other mobility devise."[2219] At least in the United States, most authorities have a good idea of why sidewalks must be made accessible and must be maintained, but budgets and constraints limit what they should do to what many times the most minimal is required.[2220]

> "The throughway zone is intended for accessible pedestrian travel only and should be clear of obstacles, including driveway aprons or other changes to cross-slope. The walking surface may be constructed of any walkable, accessible material. In limited circumstances on narrow sidewalks, ADA-compliant tree grates may be counted toward the minimum clear path of travel; however, as they are difficult to maintain to an accessible standard, this is not a preferred solution. Overhanging elements such as awnings, store signage, and bay windows may occupy this zone as long as there is a clear distance under them of at least 80 inches, as required by accessibility standards."[2221]

For reasonable person with normal abilities, one should note that some commentaries have realized that two persons walking abreast need 6 feet minimum in order to pass.[2222] Aside from any legal requirements, this physical requirement might necessitate wider sidewalks in areas where there is more commercial or public assembly activities.

12131–12165, and 42 U.S.C. §§ 12181–12189. http://library.clerk.house.gov/reference-files/PPL_101_336_AmericansWithDisabilities.pdf. (accessed August 2, 2014); Tumlin, Jeffrey. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Holboken, New Jersey: Wiley: John Wiley Sons, Inc, 2012, p. 61.

[2219] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 41; Tumlin, Jeffrey. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Holboken, New Jersey: Wiley: John Wiley Sons, Inc, 2012, p. 61.

[2220] Tumlin, Jeffrey. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Holboken, New Jersey: Wiley: John Wiley Sons, Inc, 2012, p. 61.

[2221] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 100.

[2222] Tumlin, Jeffrey. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Holboken, New Jersey: Wiley: John Wiley Sons, Inc, 2012, p. 61.

10.15.3.5 Furnishing and Buffer Area

The furnishings and buffer area is an area that provides specific services for the populous to make the Street enjoyable and function. This could be filled with many zones that provide furniture, buffer, edge and extension, depending on how the jurisdiction defines the public amenities and public needs. For many, this area protects the pedestrian from oncoming traffic by dividing both vehicular and pedestrian traffic obstacle space.[2223] In some jurisdictions, this consists of just a green zone, but NACTO and other authorities recommend that this not be the case in urban areas “The use of shoulders as substitute for sidewalks is never justified in urban areas.”[2224] As a result, in some jurisdictions like San Francisco, the buffer zone includes a furnishing zone, edge and extension zone.[2225]

> “Furnishing Zone: The portion of the sidewalk used for street trees, landscaping, transit stops, street lights, and site furnishings. Edge Zone: The area used by people getting in and out of vehicles parked at the curbside. Extension Zone: The area where pedestrian space may be extended into the parking lane, via features such as bulb-outs with mid-block plazas”[2226]

For NACTO, the buffer area allows for people to ride bicycles or for green strips or street trees.[2227] What one finds though is that the real distinction between these various models is what scale of human activity should occur in the Furnishings and Buffer Area

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[2223] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 100.

[2224] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 41.

[2225] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 100.

[2226] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposa, p. 98.

[2227] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013.:, p. 37.

from ‘most human activity’ with furnishings to least human activity with the ‘edge/extension’ zones. The Buffalo Green Code has various edge and furnishing zones depending on the type of street located in a particular area, yet most of these total edge and furnishing zone sizes range from 0 foot to 8.5 feet.[2228] Like other newer codes and like the Buffalo Green Code, San Francisco has started diversify the edge and furnishing zones depending on the context.

San Francisco has a furnishing zone that “acts as a buffer between the active pedestrian walking area (throughway zone) and street traffic.[2229] “Street trees and other landscaping, streetlights, site furnishings, traffic and parking poles and equipment, utility poles and boxes, fire hydrants, and other site furnishings should be consolidated in this zone.[2230] Through signage and materials, San Francisco creates obstacles with the materials used to provide services and amenities, and allows persons to linger in this area to create a more clear area for movement through the throughway zone.[2231] NACTO also looks at this zone as providing needed space for “lighting, benches, newspaper kiosks, utility poles, tree pits, and bicycle parking are provided.”[2232] NACTO states that this area can also be used as frontage commercial extension and to provide

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[2228] Buffalo Mayor’s Office of Strategic Planning. “Buffalo Green Code.” Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), pp. 10-20.

[2229] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 100.

[2230] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 100.

[2231] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 100.

[2232] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 39.

green infrastructure.[2233] "The street furniture zone may also consist of green infrastructure elements, such as rain gardens or flow-through planters."[2234]

For the furniture zone, San Francisco has a minimum 3 to 4 feet for this zone depending upon the projected speed of vehicles on its path.[2235] In San Francisco's edge zone, the city has placed an interface between automobiles and the pedestrians between its furniture zone and the lane.[2236] In a sense San Francisco divides this furnishings and buffer area very distinctly from those areas which people sit and linger, and those areas between the lane and the peopled zones.

> "The edge zone is the interface between the roadway and the sidewalk, and is intended for use by people accessing parked cars. To allow people to get into and out of parked vehicles, the edge zone should have a walkable surface. The edge zone may have some vertical elements, such as street lights, utility poles, parking meters, or traffic and parking signs, as long as these elements are non-continuous and allow space between for car doors to swing open and for people to access parked vehicles. Street tree basins may also intrude into the edge zone, with the same requirements. Continuous sidewalk plantings are not generally allowed in the edge zone; however, where there is no adjacent parking lane, the edge zone may contain continuous sidewalk plantings or site furnishings. See also the City's Sidewalk Landscape Permit guidelines."[2237]

[2233] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 39.

[2234] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 39.

[2235] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 100.

[2236] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 101.

[2237] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 101.

For this edge zone, San Francisco has set the area to be 2 feet wide with utility and amenity items no less than 18 inches from the edge of the Sidewalk.[2238] NACTO calls this zone an enhancement zone, and NACTO recommends that this be a green or functional barrier with the street--similar to the San Francisco model. "The enhancement/buffer zone is the space immediately next to the sidewalk that may consist of a variety of different elements. These include curb extensions, parklets, stormwater management features, parking, bike racks, bike share stations, and curbside bike lanes or cycle tracks."[2239]

Within the edge zone, San Francisco has an extension zone. This zone constricts the parking area, slow down traffic and reclaim pedestrian space from the lane.[2240] In this area, the sidewalk extends into the parking lane in order to create wider curbs mainly at intersections.[2241] This effect narrows the lanes which structurally slows traffic.

> "The extension zone refers to specific conditions where the sidewalk extends into the parking lane. Specific examples include curb extensions, flexible use of parking lanes, and bicycle parking, tree planting, and stormwater features in the parking lane. The extension zone may house elements such as landscaping, seating, stormwater facilities, and other site furnishings. Elements such as newsracks, traffic and parking signs, and kiosks may be consolidated in the

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[2238] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 101.

[2239] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013.:, p. 39.

[2240] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 101.

[2241] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 101.

> extension zone (on curb extensions) to free up sidewalk space for through travel."[2242]

The width of the edge zone for San Francisco is one or multiple lanes.[2243]

> "Sidewalks have a desired minimum through zone of 6 feet and an absolute minimum of 5 feet. Where a sidewalk is directly adjacent to moving traffic, the desired minimum is 8 feet, providing a minimum 2-foot buffer for street furniture and utilities."[2244]

When one looks at the dimensions, most of the dimensions are less than 7 feet in general but greater than 3 feet. In New York City on Atlantic Avenue, "Street furniture is often well coordinated; entrances are primarily commercial, and average building dimensions are generally larger than in the other sidewalk typologies."[2245] Also, Atlantic Avenue has a 7 foot wide planter area.[2246] In Bowling Green, there was a 5 foot amenity strip or tree line.[2247] On Clinton Avenue in New York City, the amenity strip is 3 feet.[2248] On Clinton Avenue, the grass strip of the walk way is 7.5 feet, and the average number of roadside elements is 5.[2249] On West 11th Street in New York City, the planter area is 3'6" feet, and there is usually a 3' planter on property and a 4'0" stoop height.[2250] On

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[2242] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 101.

[2243] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. *County and City of San Francisco Planning Department.* http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 101.

[2244] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 40; Federal Highway Administration, "Sidewalk Corridor Width," *Designing Sidewalks and Trails for Access*. Washington, D.C.: FHWA, 2001.

[2245] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 38.

[2246] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 36.

[2247] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 40.

[2248] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 58.

[2249] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 58.

[2250] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 59.

West 11th Street, there are also over 3 overhanging items per 330 feet.[2251] For the Soho-MacDouglas Street area in New York, there are 3'0" amenity strip and about 6 roadside elements with about 10 overhang elements for over 330 feet. [2252] Upper East Side-3rd Avenue has an amenity strip of 5'0, and there are about 7 roadside elements per 330 feet. [2253]

In Portland on SE Ladd Street, the planting strip is quite large at 12 feet, and about 4 roadside elements per 330 feet.[2254] For the NW 23rd Street Area of Portland, there is a 6'6" food amenity zone area, and a 2'0" edge zone area. [2255] In the NW 11TH Street area of Portland, there is a 3'0" amenities strip, and about 7 roadside elements per 330 feet. [2256] In the NW 11TH Street area, there are about 6 overhead hanging elements per 330 feet and about 3 overhanging items per 330 feet. [2257]

As one can see, the number of items within the public realm change depending upon whether the needs of the city are great or the District qualities are distinct and different. However, one also realizes is that while the amenities increase, the width of the Street does not change. The negative impact is felt by the lane, just as when the lane expanded, the negative impact was felt by the Sidewalk.

One should note that this data was difficult to retrieve and much had to be created via satellite photos. However, in the Site Areas, an average of 1.67 street lengths did not have a sidewalk, and 0.17 street lengths on average either had a

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2251 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p: 59.

2252 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 48.

2253 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 49.

2254 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 64.

2255 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 53.

2256 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 54.

2257 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 59.

sidewalk only one side or had a significant portion of the sidewalk removed enough to constitute a break in sidewalk coverage on one side of the street. The total lengths of street on average in the Site Areas with sidewalks was 193.83. This amounts to a 99% ratio or 0.99 of streets that have sidewalks on both sides. This exceeds LEED requirement by 110% percent.

In the Site Areas, the average sidewalk was 14.27 feet wide. Of this number, San Francisco was 104% of the mean, Portland was 95% of the mean, New York was 103% of the mean, Paris was 95% of the mean, Amsterdam was 90% of the mean, Barcelona was 114% of the mean and Atlanta was 84% of the mean. From this number, the average throughway in the Site Areas was 7.64 feet. Of this number, San Francisco had 90% of the mean, Portland had 69% of the mean, New York had 112% of the mean, Paris had 151% of the mean, Amsterdam had 92% of the mean, Barcelona had 87% of the mean and Atlanta had 96% of the mean. In the Site Areas, the average edge or extension width was 6.29 feet, and the average frontage width was 0.40 feet. While there was no good data or measurements, the average distance of street furniture from the curb was around 2 feet. One should note that this is an approximation because that distance could not be ascertained by the satellite data. What did satellite and shapefile data did show though that within commercial areas, all of the Site areas had at least 4 furniture element, and some public seating. The Atlanta Site Area did not have either in significant measure in commercial areas to warrant notation. Further, the average number of trees per street length in commercial areas was 10.80. Surprisingly, while San Francisco, New York and Barcelona had high numbers with around 120% of the mean or greater, Paris, Amsterdam and Atlanta all had similar numbers at around 53 to 68% of the mean.

10.15.4 Driveways and Their Effect on the Sidewalk

Many planning authorities address the widths of driveways and their ability to cut the sidewalk to create safety and structural obstacles. Within the built environment, driveways tend to break the sidewalk at the lot and public space barrier--the frontage. While they do not change the political nature of the zone, they change other structural and material aspects of the Sidewalk area. Driveway access limits public parking by taking valuable edge space away from the Street, and it also privatizes an area of the Sidewalk by requiring persons to move out of the public zone should a driver want to take their car from the lot to the lane. "The public sidewalk has the right of way over private crossings. The following general design guidelines should be followed to minimize disruption to pedestrians while ensuring safe operation."[2258] Further, the driveway will facilitate buildings to move further from the lot edge thereby breaking the Street enclosure.

Some planning mechanism have approached this problem by location requirement and length requirements. The EcoCityCleveland makes recommendations that push parking to the back of the lot for alleyway or service access lanes. The EcoCityCleveland requirements also limit the part of the sidewalk that may be used for driveway access, should the driveway and garage access hit the lot frontage.[2259] No more than 10% of the total liner length of the Sidewalk can be driveways.[2260] The Boston's Complete Streets Design Guide has the requirement that driveways can be no

[2258] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 37.

[2259] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 52.

[2260] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 52.

longer than 100 feet in a lot, and can only modulate from 20 to 24 feet in width for commercial areas and 10-12 feet for residential areas.[2261]

> "The design of driveways should provide a continuous and level Pedestrian Zone across the vehicular path and encourage vehicles to yield to pedestrians on the sidewalk. Driveways across public sidewalks are sometimes needed to link streets to offstreet parking facilities and loading zones, however driveways can create conflicts and require special treatments in order.[2262]

The purpose of these requirements is to keep the public way clear and to have a continuous public way that is not difficult to cross. As an urban form component, it is hard for this thesis to analyze the driveway and how it relates to urban form, except in the linear length of the driveway as a ratio of the total perimeter or sidewalk of the block. One should note that many resilient cities like Barcelona, San Francisco, Manhattan, Paris, etc. have driveways which meet with the public zone. What they do not have are alleys to provide back service access. One should note though that this might be a historical remnant because many of these cities were built long before alleyways became service access for lots, and so it is not surprising that many of these cities have hidden service access points that provide the same function.

10.15.5 Crosswalks as Facilitators of the Sidewalk

> "The presence of a crosswalk does not, in and of itself, render a street safe. Based on their surrounding contexts, speed, and overall roadway width, crosswalks often require additional safety measures such as safety islands, signals, or traffic calming."[2263]

While many times aesthetically pleasing or drab, crosswalks provide a necessary signage function for District quality. It might seem foolish, but people do need sidewalks to cross a street. People can jaywalk to cross the street, and they do so in most major

[2261] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), pp. 36-37.

[2262] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 36.

[2263] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 110.

cities in the United States and beyond--sometimes to disastrous results.[2264] Crosswalks though shift the liability of injury from the pedestrian to the automobile driver should an accident occur because they are a protected space that was created in order for the automobile to usurp the total lane. Cross-walks thus are a negotiated space--the remainder of the shared space that was once the lane.

> "Safe and frequent crosswalks support a walkable urban environment. Crosswalks should be applied where pedestrian traffic is anticipated and encouraged."[2265]

Yet, like sidewalks, crosswalks or pedestrian crossings existed in ancient Roman settlements, and they worked to actually limit lane activity rather than pedestrian activity. For pedestrians they allowed a lifted sidewalk walk with grooves that allowed wheeled movement. Yet, today Sidewalks also have a structural component that is critical to the Sidewalk and the public sphere. Structurally, crosswalks act as Sidewalk linkage from block-to-block movement and also the have a limited public or protected space because crosswalks are where the Sidewalk merges with the lane. Functionally, sidewalks also slow traffic by making the stopping and starting of vehicular traffic at regular and known intervals.[2266] They do not form physical obstacles as in Roman times, but they form conceptual or legal obstacles should pedestrian injury occur.

For the Street, their important characteristics are the relationship to the width of the crosswalk as they relate to the Sidewalk, and whether the location of the crosswalk allows for sufficient movement in the urban zone. Most cross-walks are at the corners of blocks where at a point a person can move from the Sidewalk area of the Street to another segment of the Sidewalk area of the Street. Another cross-walk is at a midpoint of the block that is too large or not well served to allow cross-block pedestrian traffic.

[2264] "The Pedestrian's Chances," The Times, Feb. 14, 1911, p. 14.
[2265] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 109.
[2266] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 110.

"Midblock crosswalks facilitate crossing to places that people want to go but that are not well served by the existing traffic network."[2267]

Many systems require that the cross-walk be as wide as the crosswalk and allow for fluid movement from the cross-walk to the sidewalk. Further, some require that the length of the crosswalk not be too long without a refuge or area (mid-road width) for the pedestrian to stay until he or she can fully cross from one Streetside to another Streetside. "Medians or safety islands create 2-stage crossing for pedestrians, which is easier and safer."[2268] NACTO recommends that pedestrian safety islands be at least 6 feet wide and 40 feet long.[2269] NACTO also cautions the use of crosswalks that are too long, which is directly proportional to the width of the road width.[2270] Some jurisdictions though take an approach like San Francisco's Better Streets plan that utilize the entire intersection as a maximized public walkway and cross-way allowing diagonal or direct crossing of the street to facilitate movement.[2271]

While much of the Site Analysis for crosswalks is under Sidewalk safety, the Sites on average had 57.17 crosswalks that were signed and obvious and 42.17 intersections that had no signed or painted crosswalks. Of the 57.17 average intersections with crosswalks, San Francisco had 61% of the mean, Portland had 16% of the mean, New York had 105% of the mean, Paris had 217% of the mean, Amsterdam had 49% of the mean Barcelona had 152% of the mean and Atlanta had 61% of the

[2267] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 114.
[2268] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 114.
[2269] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 116.
[2270] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 116.
[2271] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 96.

mean. In San Francisco and other resilient cities, the crosswalks were in either commercial areas or areas with wider roads, where narrower roads and noncommercial areas did not have crosswalks when not present. It seems though that while crosswalks in general are not indicators of resilient cities, targeted crosswalks in wide right-of-ways, wide road widths, or commercial areas is an indicator of a resilient city. In these areas, al resilient cities had very obvious crosswalks.

10.16 Street Functions

10.16.1 Resiliency

> "As a key element of the capital web, the street pattern is generally the most resilient part of the infrastructure and should have dimensions allowing it to accommodate, rather than inhibit, change."[2272]

Resiliency is a quality of urban form that responds to change.[2273] Because urban form is changeable over long period of time like blocks, lots and streets or short periods of time like architectural infill, when an urban form element is resilient, it tends to remain in the built environment.

> "The analysis of the results has shown that there is an association between urban form arrangement and change at different scales; that specific socio-economic factors influence specific physical changes; and that change can occur and not be evident. Moreover, when such changes are not evident they support an urban form that has been responding to change without major disruption of its original framework or ground rules. Hence, it is the most sustainable urban form."[2274]

The effect is that the space was useful enough to keep its original shape or the space and function have sufficiently evolved to meet with future needs. When changes do

[2272] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010.:, p. 97.

[2273] Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 13.

[2274] Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 13.

occur which are not resilient, they tend to have a lasting negative impact upon the urban form like superblocks.

> "This research has showed that there is a dynamic between the various physical elements of urban form and that those changes undertaken without concern for the collective space have deep impact on disrespect for the ground rules of the original framework and do not contribute to its sustainability."[2275]

Those forms though tend to break down over time and become more resilient if there is an intensification and densification which requires more subdivision.[2276] While this is only a theory, the evidence shows that this fact appears to be universal. As a result, this thesis takes this theory as a basis for stating that by looking at the most productive resilient cities, one can determine how urban form elements best interact in context. Thus, the benchmarking of these systems is crucial in understanding the productive benchmarks of urban form. This allows a much smaller and more reasonable set of cities to be analyzed, and it brings up an interesting dynamic.

However, in order to create a resilient city, resiliency rather than mere efficiency seems a requirement during the planning process. In 1985 while reviewing its 1971 Design Plan, planners creating The Downtown Plan had the purpose of making streetscape more practical and valuable.[2277] They did address the structural aspects that would make the environment pedestrian friendly.

> "Three of these related to open space which were in turn translated into 12 policies that sought a diversity of usable, accessible, indoor and outdoor space. These emphasized sunlit plazas and parks, with minimal wind speeds, and a variety of seating, within easy access of all workers/residents and connected to the pedestrian network; and

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[2275] Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 13.

[2276] Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014)

[2277] Punter, John. Design Guidelines in American Cities: A Review of Design Policies and Guidance in Five West Coast Cities. Liverpool: Liverpool University Press, 1999, p. 117.

> complementing, structuring and relieving urban forms through the use of natural landscape and breaks in the street wall."[2278]

They also wanted to create an inviting streetscape that made the Street comfortable and pleasing to the eye.[2279]

> "An 'interesting streetscape' objective is sought by five policies that conserve the traditional street, maintain the dominant street wall allowing setbacks above, retain cornices and projecting belt courses to top the street wall, enrich the pedestrian level through materials and design, and encourage public art."[2280]

If one is studying urban from to determine the best benchmarks, only the best and most productive cities would be part of that study. This would be a control cohort of data. All other data from all other cities would be compared to the resilient cohort to determine how they deviate from these resilient benchmarks.

> "Urban patterns where changes are less evident appear to adapt better over time, because they appear to manifest changes without major disruption to the plan principles that structured them and thereby support the success of the plan. These are more sustainable than the other urban patterns as there is a greater reutilization of structures and materials without excessive energy consumption and waste. The 'ground rules' for this form of sustainability would appear to be more universal than has hitherto been recognised."[2281]

10.16.2 Safety

> Streets in cities serve many purposes besides carrying vehicles, and city sidewalks—the pedestrian parts of the streets—serve many purposes besides carrying pedestrians."[2282]

When looking at street safety, street safety has two components: safety issues caused by lane traffic (Lane safety); and safety issues caused by pedestrian traffic

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[2278] Punter, John. Design Guidelines in American Cities: A Review of Design Policies and Guidance in Five West Coast Cities. Liverpool: Liverpool University Press, 1999, p. 117.

[2279] Punter, John. Design Guidelines in American Cities: A Review of Design Policies and Guidance in Five West Coast Cities. Liverpool: Liverpool University Press, 1999, p. 117.

[2280] Punter, John. Design Guidelines in American Cities: A Review of Design Policies and Guidance in Five West Coast Cities. Liverpool: Liverpool University Press, 1999, p. 117.

[2281] Marat-Mendes, Dr. Teresa. "Dimensioning the sustainable urban fabric." http://iscte.pt/~tmmm/textos/marat-mendes_2003.pdf (accessed July 10, 2014), p. 13.

[2282] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 37.

(Sidewalk safety). Most studies only review Lane safety, which is the safety relate to automobile accidents and pedestrians. [See Figures 163, 164, 165 and 166]. Very little study has actually occurred in determining the urban form effect on Sidewalk crime or personal safety levels --while controlling for poverty, other social causes of crime and or reasons for personal injury.

10.16.2.1 Sidewalk Safety: Eyes on the Street

> Nobody enjoys sitting on a stoop or looking out a window at an empty street. Almost nobody does such a thing. Large numbers of people entertain themselves, off and on, by watching street activity.[2283]

What we do have are critics mainly by Jane Jacobs about the function of the street in creating eyes on the street, where the urban form makes observations and self-control of the street by District residents more possible. Jane Jacobs stated that, at her time, administrative authorities did not monitor all Sidewalks for crime, yet she noticed that there were safety issues involved--intentional or not.[2284]

> "To be sure, all city sidewalks are not under surveillance in this fashion, and this is one of the troubles of the city that planning out properly to help correct. Under-used sidewalks are not under suitable surveillance for child rearing. Nor are sidewalk apt to be safe, even with eyes upon them, if they are bordered by a population which is constantly and rapidly turning over in residence—another urgent planning problem.

For Jacobs the street provided the necessary function of safety and security in a city where everyone was a stranger by very definition.[2285] "[The] bedrock attribute of a successful city district is that a person must feel personally safe and secure on the street among all the strangers. He must not feel automatically menaced by them."[2286] By feeling safe, safe Streets became safer because of the activity they attracted. What

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[2283] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 45.
[2284] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 103.
[2285] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 38.
[2286] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 38.

Jacobs was pondering was a unique cause of densely packed cities with Streets that create acceptable levels of enclosure. If people could see crime, if people could hear crime, and if people considered crime to be an immediate threat to them and their community, Jacob's noticed a tendency of people to be able to hear danger, respond to danger and consider danger a personal threat to their own property. To her, this was an unconscious and self-perpetuating function of the street caused and enforced by people. "It is kept primarily by an intricate, almost unconscious network of voluntary controls and standards among the people themselves, and enforced by the people themselves."[2287]

> "Some city streets afford no opportunity to street barbarism. The streets of the North End of Boston are outstanding examples. They are probably as safe as any place on earth in this respect. Although most of the North End's residents are Italian or of Italian descent, the district's streets are also heavily and constantly used by people of every race and background."[2288]

And yet, seemingly counterfactual to Jacob's argument was the Kitty Genovese incident in 1964.

> "In March 13, 1964, a 28-year-old woman named Catherine "Kitty" Genovese was raped and killed in two separate late-night attacks near her home in Kew Gardens, Queens. Police found that at least 38 people had seen the attacks or heard Genovese scream, but no one intervened and just one woman called the police."[2289]

While the death of Catherine Genovese was a crime and horrible, something interesting happened as a result--the community which had the urban form that allowed the crime to happen was--the Genovese bystander effect on crime safety.[2290] This is literally eyes on the Street.

> "The article ignited outrage against the 38 residents. Pundits proclaimed that it was an example of society's moral decay; on the

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[2287] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 40.

[2288] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 42.

[2289] The Learning Network."March 13, 1964 New York Woman Killed While Witnesses Do Nothing.". *The New York Times*, Learning Blogs, March 13, 2012. http://learning.blogs.nytimes.com/2012/03/13/march-13-1964-new-york-woman-killed-while-witnesses-do-nothing/ (accessed July 28, 2014)

[2290] Darley, J. M, and Latane, B. *The Unresponsive Bystander: Why Doesn't He Help*? New York, NY: Appleton Century Crofts, 1970.

> 40th anniversary of the attack, Jim Rasenberger wrote in The Times that 'the case quickly expanded into an all-consuming metaphor for the ills of contemporary urban life.' Psychologists coined the term "Genovese syndrome" to explain why people are less likely to act in an emergency if others are present."[2291]

In their study, Latané and Darley came to the conclusion that individualistic crime monitoring within the urban environment was more complex than just protecting one's self.[2292] Even well intentioned people would allow crimes to occur if they believed that others would not intervene. When people had the understanding that others would intervene, they intervened. When others do not react, bystanders will cognitively interpret that the crime that is happening is not an immediate problem for them personally, thus they do not intervene. The effect is that when the streets are empty without people to watch each other, even good citizens allow crimes to occur. What all of this analysis shows is that Jane Jacob's was right. Garcia in 2002 found that, by creating activities where people imagined being around people and intervening, the bystander effect could be overridden with social action to stop crimes.[2293] Streets that are not great streets tend to inhibit walkability and livability and thus Street activity. Without street activity there is no bystander influence to require actions to stop crimes from occurring. Without active streets, there are no eyes on the streets, and as a result crime can happen even in the best communities.

> "Garden City planners, with their hatred of the street, thought the solution to keeping children off the streets and under wholesome

[2291] The Learning Network."March 13, 1964 New York Woman Killed While Witnesses Do Nothing.". *The New York Times*, Learning Blogs, March 13, 2012. http://learning.blogs.nytimes.com/2012/03/13/march-13-1964-new-york-woman-killed-while-witnesses-do-nothing/ (accessed July 28, 2014)

[2292] Darley, J. M, and Latane, B. *The Unresponsive Bystander: Why Doesn't He Help*? New York, NY: Appleton Century Crofts, 1970; Fischer, P, Krueger, J. I, Greitemeyer, T, Vogrincic, C, Kastenmüller, A, Frey, D, et al. "The Bystander-Effect: a Meta-Analytic Review on Bystander Intervention in Dangerous and Non-Dangerous Emergencies." *Psychological Bulletin*, 137(4) (2011): 517, and *The Journal of Social Psychology* 153(1), 1-5; Christensen, K. and Levinson, D. "Encyclopedia of Community: From the Village to the Virtual World." *Band* 1 (2003): 662.

[2293] Garcia, S.M, Weaver, K, Darley, J.M, Moskowitz, G.B. "Crowded Minds: the Implicit Bystander Effect." *Journal of Personality and Social Psychology*, 83(4) (2002): 843-853.

> surveillance was to build inferior enclaves for them in the centers of super-blocks. This policy has been inherited by the designers of the Radiant Garden city. Today may large renewal areas are being replanned on the principle of enclosed park enclaves within blocks."[2294]

Jane Jacobs noticed that that by destroying the Street, modern planning had destroyed a crucial byproduct of good and dense urban form--street safety. By relegating street activity to private zones or activity zones, the modernists did not compensate by building mechanism which would replace the naturally occurring and cost free eyes on the street mechanism which existed with Street activity.

> "These uses need each other, for proper surveillance, for a public life of some vitality, and for general interest."[2295]

Jane Jacobs noted that smaller communities that were rural had the ability to self-monitor due to familial relationships and social shame.[2296] Anthropologist Ruth Benedict noted that cultures could be classified by their emphasis on social shaming and the regulation of the activities of individuals, where there were shared opinions and expectations of behavior.[2297] Social shame in smaller communities regulated criminal activities as overt social control of the many by society at large. However, social concepts of shame in these small communities do not work in the same dynamic in cities where the familial and cultural connections between people are tenable at best. While the United States is hard society with is social controls, urban areas do not have the same types of interactions which influence shame as a construct, and this might be due

2294 Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 104; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 22.

2295 Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 113.

2296 Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 45.

2297 Pattison, Stephen Pattison. *Shame:Theory, Therapy and Theology*. Cambridge: Cambridge University Press, 2000, p. 54; Ruth Benedict. *The Chrysanthemum and the Sword: Patterns of Japanese Culture*. Boston: Houghton Mifflin, 1946; Hiebert, Paul G. *Anthropological Insights for Missionaries*. Grand Rapids: Baker Book House, 1985; Shannon, Christopher. "A World Made Safe for Differences: Ruth Benedict's The Chrysanthemum and the Sword." *American Quarterly* 47 (4) (1995): 659–680.

to the Genovese bystander effect which requires people to be in eyeshot to require action. As a result, to reinforce cultures of shame and limit criminal activity, the Streets have to have people sprinkled over the length.[2298]

> "First, they give people—both residents and strangers—concrete reasons for using the sidewalks on which these enterprises face. Second, they draw people along the sidewalks past places which have no attractions to public use in themselves but which become traveled and peopled as routes to somewhere else. Third, storekeepers and other small businessmen are typically strong proponents of peace and order themselves. Fourth, the activity generated by people on errands, or people aiming for food or drink, is itself an attraction to still other people."[2299]

The urban form influences this action by providing the actual Sidewalk and Transparency requirements that allow people to interact and see actions on the Street.

Jacobs then instinctually discussed two aspects that related to the functional problems with modernist urban form: urban form interference and the lack of function compensation. Jacobs noted that structurally, some types of urban form were more conductive to eyes on the street than other types of urban form. She noticed that transparency within sight of the street induced people to see the Street. She stated that tall apartment buildings with closed windows did not allow the visual permeability that allowed people inside the lot or building to monitor Street activity.[2300] However, she noted that the urban form had to entice people to view the street, because safety mechanism themselves do not cause crimes not to happen.[2301] Making the area more lighted allowed people to view the street longer and see their pathway, but it did not, by itself, cause the street to be safer.[2302]

[2298] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 46.

[2299] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 46-47.

[2300] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 50-51.

[2301] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 54.

[2302] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 54.

Jacobs implied that when there are no eyes on the street, costly mechanism have to be in place in order to compensate for the lack of eyes on the street--which is just a byproduct of Street activity. She noticed that many affluent communities hired elevator or doormen in order to watch their buildings and create the feeling of safety.[2303] However, she said that this was a temporary fix and would cause limited improvements. Further, mechanisms like this and continued police surveillance come at great cost and are subject to times of relative affluence than downturn and budget cuts.[2304] In contrast, a vibrant Street filled with people would have eyes-on-the-street regardless of the economic situation and require only minimal costs. As a result, the moralism against having people on the Street actually created the functional reason why people felt the Street was so unsafe.

> "The reasons for Los Angeles' high crime rates are undoubtedly complex, and at least in part obscure. But of this we can be sure: thinning out a city does not insure safety from crime and fear of crime."[2305]

The cities which have a certain density and activity have the ability to self-monitor criminal activity.[2306] Cities must also have a well-working framework in order for the Street to function correctly. Jacob stated that the city must have clear demarcations between public and private life, a well working lot and block matrix with well-working permeability, there must be eyes on the street, an urban from increases density and allows for visual permeability to the Street, and a street with activity, a well-working Street that attracts pedestrians.[2307]

[2303] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 50-51.
[2304] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 50-51.
[2305] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 41.
[2306] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 42.
[2307] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 45.

> "Nobody enjoys sitting on a stoop or looking out a window at an empty street. Almost nobody does such a thing. Large numbers of people entertain themselves, off and on, by watching street activity.[2308]

10.16.2.2 Lane Safety: Traffic Speed and Land Widths

> "'The state with the highest highway fatality rate (per capita) is Wyoming, where most of the highways are rural, straight, wide, and built within the last 50 years," according to Michael Ronkin of Designing Streets for Pedestrians. 'The state with the lowest highway fatality rate (per capita) is Massachusetts, where ore of the highways are urban, twisty, narrow, and built over the last 300 years or so.'"[2309]

Most Street development is actually Lane development because the design techniques used are based mainly upon design speeds and safety mechanisms used to protect the pedestrian either crossing the lane or near the lane. Generally, wider lanes are more problematic because they entice drivers to speed, causing pedestrian injuries at higher rates.

> "The flaw in that approach is that drivers will tend to drive at the design speed, rather than the posted speed limit. Increasing the design speed merely increases the speed of traffic and this may reduce both safety and quality of the built environment."[2310]

What the evidence shows is that within wider suburban streets, there is a high degree of free flow of traffic, and often these streets are designed for 40 to 45 miles per hour.[2311] While they have parking on the side, the added parking to a lane allows low design speed lanes to facilitate higher speeds because cars are not parked in the parking zones at all times.[2312] "When there are no cars parked on the side of the

[2308] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 45.
[2309] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 138.
[2310] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141.
[2311] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 135.
[2312] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 135.

street—which is a lot of the time—you get even higher design speeds."[2313] As a result, depending upon design speeds for suburban lanes often leads to increase from 20 to 40 miles per hour on the same street.[2314] The results are dangerous. At the higher speeds, the impact speeds and force are higher and the length of lane needed for stopping is sufficiently longer.[2315] As a result, the kinetic energy of the vehicle is projected into the pedestrian, killing many.

> "An even more important circumstance results from an exponential nature of vehicular kinetic energy, and that concerns pedestrians accident deaths. Studies show that the injury and fatality rate to pedestrians goes way down when the car is traveling less than 20 mph, because of the relatively low force of impact at these speeds."[2316]

What one finds also is that built roadways with wide lanes are often empty of traffic, thereby increasing speeds of the traffic that is actually on the road. "Some of the most dangerous local streets turned out to be wide thoroughfares, 36 feet to 44 feet, with relatively light traffic."[2317] Further, unlike other types of traffic, drivers do not maintain the same distances between their vehicle and other traffic. Thus, these large distances between vehicles cause some vehicles to speed faster.[2318]

As a result, traffic planners try to control the speed of traffic by noting the relationship between traffic speed and the width of the lane or roadway. As a result, planners today

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[2313] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p.134.

[2314] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 135.

[2315] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 135.

[2316] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 135.

[2317] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 137.

[2318] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 135.

know that wider lanes make traveling actually more dangerous for both the driver and pedestrian.[2319] The measurements that are the most important are lane widths of 10, 11 and 12 feet.[2320] Evidence shoes that the 10 foot width is far safer than the 12 foot width.[2321] Wider lanes encourage drivers to drive faster and not obey speed rules or regulations.[2322]

> "The most serious injury-producing crashes" become scarcer when traveling lanes are 10 feet wide," Burden says. "This is true for both urban arterial and collector roadways. It appears that as lanes become wider (above 10 feet), many motorists lose their vigilance."[2323]

A two foot increases in lane width relates to 35 to 50% more injuries. The relationship between speed and lane width is a regression line that steadily increases from widths of 9'10" to 13'11".[2324] As this happens, speeds increase from 34.2 miles an hour at 85% speed to 59.0 miles per hour at 85% speed.[2325]

> "As the width of the lane increased, the speed on the roadway increased … When lane widths are 1 m (3.3 ft) greater, speeds are predicted to be 15 km/h (9.4 mph) faster."[2326]

[2319] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 136.

[2320] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 136.

[2321] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 135.

[2322] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 136.

[2323] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 136.

[2324] Fitzpatrick, Kay, Paul Carlson, Marcus Brewer, and Mark Woodridge. "Design Factors That Affect Driver Speed on Suburban Streets." *Transportation Research Record* 175 (2000):18-25; National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 36.

[2325] Fitzpatrick, Kay, Paul Carlson, Marcus Brewer, and Mark Woodridge. "Design Factors That Affect Driver Speed on Suburban Streets." *Transportation Research Record* 175 (2000):18-25; National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 36.

[2326] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 36.

Another design unit used is the roadway width, the lane plus parking. In residential areas, the roadways consistently range from 10 to 24 feet wide, with most being 18 to 22 feet wide in total.[2327] "Those streets are even narrower than is the norm in TNDs—where residential streets average about 27 feet wide. This, in turn, is significantly narrower than the conventional subdivision standard of about 35 feet."[2328] For safety though, Landon recommends that narrower is better with 18 to 22 roadways being the best, roadways 24 to 27 feet being good, and roadways beyond 30 feet being too wide.[2329] When the total roadway is widened from 24 to 36 feet, injuries jump 485%.[2330]

As an aspect of lane safety, there are techniques which force drivers to drive at slower speeds that do not necessarily relate to the roadway or lane width: curb extensions/bulbouts; corner radii; and roundabouts.

Signage and changes in street design can effectively change the width without structurally changing the width itself.[2331] "A well-designed street network will by its nature reduce travel speed and make the streets safer."[2332] Using simple measures to create parking and to narrow the lane are easier and cheaper than physically changing

[2327] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141.
[2328] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141.
[2329] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141.
[2330] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 136.
[2331] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 146.
[2332] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 146.

the lane. But, these designers can make physical changes if necessary in the form of the other speed reduction mechanisms noted.

Curb Extensions and Bulbouts are measures to reduce speed by narrowing the lane or by implementing actions such as tactical urbanism.[2333] Planning departments can utilize curb extensions as interim methods of changing the lane and streetscape quickly without completely changing the Street in general. These are also ways to add trees to the sidewalk and create a pedestrian safety zone as more prominent curbs. They usually include bulbouts or extensions of the curb at the end or the middle of the block, to reduce the crossing distance and to pinch the street traffic into fewer lanes.[2334]

Corner Radii and Curb returns are curbs created where the streets intersect at right angles to allow sharp or long turning radius for vehicles in the lane.[2335] This also is functional for it allows larger vehicles to turn on streets, whereas with smaller turning radii, they could not maneuver from street-to-street at right angles. Longer crossing distances create larger corner radii, and thus allow larger vehicle tonnage or allow smaller vehicles to maneuver at greater speed.[2336] The curbs do have an impact upon vehicular speed. When the curb return is high, as in suburbs, the car speed is actually

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[2333] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 45-88.

[2334] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 146.

[2335] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, pp.: 117-120.

[2336] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 97.

higher.[2337] Most New Urbanist car returns are between 5-25 feet, with most in New York City being around 10 feet.[2338]

> "May attractive new urban neighborhoods have a 10 foot curb return radius, and they work fine. This is in line with the curb return in Manhattan, which is generally 10 feet."[2339]

The Institute for Transportation Engineers recommends curb returns of 10 to 15 feet in suburban areas.[2340] What evidence shows though is that most traffic can maneuver 10 foot curb radius returns.[2341]

> "When these vehicles start to turn 6 to 7 feet from the curb, they can generally easily make the turn even with a very small curb return radius."[2342]

Roundabouts or traffic circles are in-lane speed reduction devices that mimic other urban elements but only function to reduce speed--without the added benefit of becoming a landmark or a node if they are too small. While, roundabouts are cheap, they generally have limited applicability within the United States.[2343] As a speed mechanism, roundabouts change the trajectory and the acceleration of traffic while

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2337 Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 146.

2338 Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 146.

2339 Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 146.

2340 Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 146.

2341 Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 146.

2342 Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 146.

2343 Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 149; County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 97; National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 99.

allowing the reduction of costs associated with signage.[2344] Previous roundabouts which allowed motorists to drive 35 miles an hour or more are structurally different from modern roundabouts which reduce speeds to 15 mile an hour and have 30% more capacity at intersections, with fewer accidents.[2345] Still, cities like San Francisco disfavor roundabouts because, while they may be efficient, they create difficulties with pedestrian and wayfinding movement.[2346]

> "Roundabouts have limited applicability in San Francisco, and can create difficult pedestrian and wayfinding conditions. However, they may be an appropriate and desirable treatment at complex, multi-leg intersections to simplify the traffic movements and create central public or green space."[2347]

The chicane is a speed reduction device that moves traffic from one lane to a second lane in the roadway.[2348] What is interesting they slow traffic without fundamentally changing the Street. Chicanes do not inhibit the visual pathway, they do not change the imageabilty of the street, and they allow traditional methods of

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[2344] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 149.

[2345] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 149; County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 156.

[2346] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 97.

[2347] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 97.

[2348] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), pp. 155-158; Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009.: , p. 147.

streetmaking, and yet they calm traffic. Further, they have the added benefit of adding street parking on either side of the street in areas where space is at a premium.[2349]

> "On streets with space for parking on only one side, chicanes can be created by alternating parking from side to side. Chicanes can also be formed by alternating parallel parking and perpendicular parking.[2350]

The Woonerf is a different model for lane safety. It applies the traditional merged traffic method that existed in Europe and in many areas before the introduction and reintroduction of the Sidewalk. There is the idea of the "woonerf" or shared space where the driver and the pedestrian occupy the same space.[2351]

> "Drivers and pedestrians operate more as equals, and therefore drivers become alert to clues on how to behave. They slow down and watch for pedestrians, at least in small towns. Monderman employed features such as trees, flowers, red brick paving stones, and fountains to discourage people from speeding."[2352]

What the woonerf structurally does though is that it incorporates the lane into the Sidewalk, by increasing the size of the pedestrian accessible area of the Street and by giving the pedestrian superior rights over the entire woonerf.[2353]

> "Based on consultation with users, shared space aims to accommodate pedestrian activity and vehicular movement on a single shared surface. The concept is also based on Hans Moderman's argument that behavior in traffic is more positively affected by the

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[2349] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 154.

[2350] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 154.

[2351] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 150; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 108-109; Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, pp. 204-206.

[2352] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 150.

[2353] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 150.

> design of the built environment than by conventional traffic control devices and regulations. Thus, by its design, shared space encourages negotiations of shared areas at appropriate speeds and with due consideration for other users."[2354]

The woonerf does this by creating a shared space with a modified lane that incorporates obstacles within the lane. "That the street is properly a physical and social part of the living environment, and is used simultaneously for vehicular movement, social contacts, and civic activities, has long been argued by many authors including Kevin Lynch, Donald Appleyard, Jane Jacobs, J. B. Jackson, and William Whyte."[2355] It also creates indicate spaces that simulate the Street.[2356] The idea behind the woonerf is that all spaces are shared and incorporated into the same right of way with greatly reduced speeds.[2357] Urban areas of the Netherlands, Germany, England, Australia, Japan and Israel have all tested the woonerf as a way to promote pedestrian movement and interaction.[2358]

2354 Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 108.

2355 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 109.

2356 . Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 108; County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), pp. 164-59; Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 112.

2357 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 109; Ichikawa, Kiyoshi, Kioshi Tanaka, and Hirotada Kamiya. "Living Environment and Design of 'Woonerf.'" *International Association of Traffic and Safety Sciences*, 8 (1984): 40-51; Polus, Abishai. *Evaluation of the Characteristics of Shared Streets*, Report No. 85-72 (Haifa, Israel: Transportation Research Institute, 1985); Kraay, J, Joop H. "Woonerfs and other Experiments in the Netherlands." *Built Environment* 12:1/2 (1986): 20-29; Eubank, Brenda. "A Closer Look at the users of Woonerven." in *Public Streets for Public Use*, ed. Ann Vernez Moudon. New York: Van Nostrand, 1987, p. 63-79; Engel, Ulla. "Effects of Speed Reducing Measures in Danish Residential Areas," Proceedings of Conference on Road Safety and Traffic Environment in Europe (Gothenburg, Sweden, September 1990) 95-135; Carmen Haas-Klau, Ingle Nold, Geert Böcker, and Graham Crampton, Civilized Streets: A Guide to Traffic Calming (Brighton, England; Environmental and Transport Planning, 1992).

2358 Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 109 Ichikawa, Kiyoshi, Kioshi Tanaka, In reality, it has more in common with a common American driveway or alleyway, than the Street itself.[2359] While it does reclaim the public space for pedestrian use, it also removes a lane from public usage as a part of the greater gridpattern.[2360] After all, this would be either a shared-space or a formalized street. Because it functions a driveway, the woonerf drivers have more caution within the shared space versus the lane, where the driver may assume that no pedestrian are or should be in the street. It is important to note that deaths in driveways occur, and these deaths result from an inability of many drivers to see small infants in shared spaces like driveways.[2361] However, policy and educational systems can reduce infant mortality on shared-space areas to make this more practical.

Still, one should note that the prevalence of thee woonerf might create a similar dynamic as the cul-de-sac if not specifically planned. While it does not allow a shared

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and Hirotada Kamiya. "Living Environment and Design of 'Woonerf.'" *International Association of Traffic and Safety Sciences*, 8 (1984): 40-51; Polus, Abishai. *Evaluation of the Characteristics of Shared Streets*, Report No. 85-72 (Haifa, Israel: Transportation Research Institute, 1985); Kraay, J, Joop H. "Woonerfs and other Experiments in the Netherlands." *Built Environment* 12:1/2 (1986): 20-29; Eubank, Brenda. "A Closer Look at the users of Woonerven." in *Public Streets for Public Use*, ed. Ann Vernez Moudon. New York: Van Nostrand, 1987, p. 63-79; Engel, Ulla. "Effects of Speed Reducing Measures in Danish Residential Areas," Proceedings of Conference on Road Safety and Traffic Environment in Europe (Gothenburg, Sweden, September 1990) 95-135; Carmen Haas-Klau, Ingle Nold, Geert Böcker, and Graham Crampton, Civilized Streets: A Guide to Traffic Calming (Brighton, England; Environmental and Transport Planning, 1992).

[2359] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 114.

[2360] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 109; See City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 12.

[2361] Neeman T, Wylie J, Attewell R, Glase K, Wallace A. *Driveway Deaths: Fatalities of Young Children in Australia as a Result of Low-Speed Motor Vehicle Impacts*. Road Safety Report CR 208. ATSB (April 2002); Holland, A. J, Liang, R. W, Singh, S. J, Schell, D. N, Ross, F. I, and Cass, D. T. "Driveway Motor Vehicle Injuries in Children. *Medical Journal of Australia*, 173(4) (2000): 192-197; Kravitz, H, and Korach, A. "Deaths Due to Car Driveway Accidents." *Illinois Medical Journal* 126 (1964): 688-688; Avery, J. G, and Avery, P. J. "Scandinavian and Dutch Lessons in Childhood Road Traffic Accident Prevention." *British Medical Journal* (Clinical research ed.), 285(6342) (1982): 621.

space, the chicane has the same modulating direction as the woonerf without removing actual circulation space from the city grid. Thus, in order to justify the woonerf, an area would almost have to privatize or limit public access on the woonerf in any American location, because it would tend to localize traffic, thus creating the cul-de-sac effect.

> "The keys to shared space are lower design speeds for cars and more attentive drivers. … '… the solution is not the removal of cars from the city--far from it. The most vital American public spaces are full of cars. But those cars can move slowly, due to the appropriate design of the thoroughfares.'"[2362]

Some designers note that narrow streets also have the unintended effect of increasing property values because of the safety that the more narrow lanes and roadways afford.[2363] However, this might be simply an effect rather than the function of narrower streets. Great Streets and Districts often require narrower lanes, which might have the unintended effect of safer lanes.

> "With narrow two-way streets and intermittent parking on one or both sides, cars move very slowly and pedestrians feel comfortable and safe. The best thing about narrow streets from a development point of view is that they actual raise property values while costing less money to build."[2364]

When looking at the Site Areas, one notes that the average roadway is 33.39 feet. This is fairly consistent in all areas, although Atlanta has a higher roadway width than the resilient cities. With this 33.39 foot width, San Francisco is 111% of the median, Portland is 96% of the median, New York is 102% of the median, Paris is 99% of the median, Amsterdam is 87% of the median, Barcelona is 106% of the median and Atlanta is 122% of the median. Of these roadways, the average lane width is 9.66 feet,

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[2362] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 109; Duany, A and Plater-Zyberk, E with Spreck, J. *Suburban Nation: the Rise of Sprawl and the Decline of the American Dream*. New York: North Point Press, 2000, p. 160.

[2363] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141.

[2364] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 141.

with most of the resilient cities being near or lower than this mean. Only Portland at 115% of the mean and Atlanta at 119% of the mean are not around or below the mean. The average number of lanes on roadways is 1.67. This number seems low, and it is, but this is because Paris and Amsterdam have numerous one lane roadways that the numbers are small. In contrast to the 1.67 mean lanes for roadways, San Francisco, Portland, New York, Barcelona and Atlanta are all 120% of the mean--at little more than 2 lanes per roadway. The average connector width is 2.83 in the Site Areas and the average right of way for connector lanes is 83.19 feet. With arterial streets, the average number of lanes is 3.83 lanes, and the average right of way is 111.29 feet. Taking these dimensions into consideration, on average in each site area more than 88,285,149 cubic feet of city volume is devoted to lanes, with an average of 609,466.51 cubic feet of volume devoted to each street length on average.

While not present in all cities of the study, many of the resilient cities had devoted bicycle lanes or routes, whether painted or realized. There were an average of 57.83 street lengths that represented bicycle routes in the Site Areas, with an average of 5.69 feet for each bicycle lane. Paris' average bicycle lane was extremely narrow with it being 52% of the mean, and Barcelona's lane was extremely broad being more than 153% of the mean. Barcelona's bicycle lane width though indicates the use of a buffer zone to separate the bicycle lanes from traffic. On average, more than 2764.41 lots in each site are were within 1/4 mile from each bicycle route. Within this buffer, 2,644.81 lots were residential. The bicycle routes were also within a 1/4 vicinity of 674.28 commercial lots on average in the Site Areas.

When considering structural changes to the Sidewalk and Roadway to create safety, most of the areas used chicanes, rounds, curb extensions and woonerfs sparingly. The average number of chicanes within the Site Areas was 2, the average number of rounds within the Site Areas was 0.33, and the average number of woonerfs within Site Areas was 3. What these areas did use was curb or edge extensions. In the Site Areas, there were an average number of 29.20 curb extensions. Amsterdam in particular had 475% of the mean, which means that most of the curb extensions were in Amsterdam. Amsterdam also had much of the woonerfs and the majority of the chicanes. Paris had some areas had chicanes painted on the street with signage, but the Site Area did not have significant structural changes to the street that indicated physical chicanes. One should note though that both Paris and Amsterdam had significant rounds immediately outside of the Site Areas, though these numbers were not taken into consideration for this analysis.

10.16.2.3 Intersection Safety

> "Whether while driving, shopping, walking or lingering, intersections are a focal point of activity and decision."[2365]

Intersections are areas where the Street and the Sidewalk connect and also where most of pedestrian accidents occur.[2366] "Intersections account for most serious conflicts between pedestrians, bicyclist, and drivers, but also present opportunities to reduce crashes when designed carefully."[2367] The problem with intersections is that they are structurally problematic and many times have limited visibility patterns, which make them dangerous for both driver and pedestrian. People can maneuver through the intersection through structural or signage devices, but not all are sufficient and many times cause danger--especially when only signage is involved. While it is important to study how traffic flows through the intersection, traffic efficiency cannot be the only

[2365] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 91.
[2366] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 91.
[2367] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 91.

reason for intersection design--for it is a public place of conflicting rights between those who use the lanes and those who use the Sidewalk.[2368]

> "Intersection design should allow for visibility and safety and be intuitive. "Intersection design should facilitate visibility and predictability for all users, creating an environment in which complex movements feel safe, easy, and intuitive. The design should promote eye contact between all street users, engendering a streetscape in which pedestrians, drivers, and bicyclists are aware of one another and can effectively share space."[2369]

What one finds is that like with other types of urban form, smaller and more compact intersections allow pedestrians and traffic to negotiate the intersection with fewer injuries or accidents. "Compact intersections reduce pedestrian exposure, slow traffic near conflict points, and increase visibility for all users."2370 In addition, the narrower lane removes many problematic areas within the roadway such as slip lanes, dedicated turning lanes and automobile pockets.2371 At the intersection one finds the conflux where curb radii, vehicular mass and velocity, the width of the lane and the number of distinct services that the lane provides come into conflict.2372 While education and signage can mediate most of the problems, these tend to start breaking the lane into further sections they might remove precious public space from the Sidewalk to create safer areas for bicyclists.2373 The trend today is to start moving the stopping lane further back creating safe areas at the forefront of the lane for bicycle protection.2374 However, what one starts seeing is automobile regulation that creates

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[2368] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, pp. 102-105.
[2369] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 91.
[2370] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 93.
[2371] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 93.
[2372] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 95.
[2373] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, pp. 95-97.
[2374] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 95.

more limitations on automobiles than redesigns the lane itself to be more safe at the intersection--such as narrowing the lane itself, creating curb extensions into the lane which include bicycle stopping zones and other mechanism which functionally slow traffic down.

Another option includes raising the intersection to create safety intersections similar to a woonerf or plaza that has the dual effect of slowing down traffic and creates a pathway for persons from Sidewalk to Sidewalk. "Raised intersections are flush with the sidewalk and ensure that drivers traverse the crossing slowly. Crosswalks do not need to be marked unless they are not at grade with the sidewalk. ADA-compliant ramps and detector strips are required."[2375] While not a precedent for this advance, this actually has more of a relationship with ancient Roman sidewalks that make pedestrian movement a priority and non-pedestrian movement as a convenience or necessity. This option along with bollards create a physical obstacle for the vehicle and start to reclaim the general space for pedestrians.[2376]

While these transportation design focused mechanism can provide pedestrian safety, good design of the Street itself creates intersection safety. The structural narrowing and designing of the visual obstacles near the intersection are by far the most effective mechanism to ensure the safety of the pedestrian and the vehicle at the intersection--because they integrate completely within the District quality. In Barcelona, there are very few trees near intersections with most being 40 feet from the intersection. Further, the hexagonal cut in the Barcelona block, at around 40 feet in diagonal, creates sight lines for lane and sidewalk users that allow for safety and transit of both parties.

[2375] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 98.

[2376] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 98.

Complex intersection types create problems not only for the street but also for intersection safety. Y-intersections that disrupt circulation also create pedestrian problems at the intersection because they create longer crossing lines from one side to another than what one would have with X- or T-intersections.[2377] Simply for intersection safety, NACTO recommends that many of these Y-intersections be repositioned so that they meet streets at a particular angle--like a grid.[2378]

> Traffic flow and multiphase signals result in long delays for pedestrians and cyclists, while at the same time causing confusions among drivers. Acute angled intersections reduce visibility for motorists, while obtuse intersections allow for high-speed turns. Both acute- and obtuse-angled intersections create unnecessarily long pedestrian crossings. Redesign intersections as close to 90 degrees as possible, implementing turn restrictions and street reversals where applicable."[2379]

Seemingly, at least for intersections safety alone, all streets or gridpattern are not created equal.

When looking at the Site Areas, one finds that there are on average 62.67 crosswalks for the Site Areas. On average, these crosswalks are 33.39 feet in length and 13.93 feet in width. The average area contained within each crosswalk is 461.07 square feet. Within the Site Areas, only Portland did not have a significant number of signed crosswalks with less than 20 actual crosswalk intersections in the Site Area. Only New York, Paris, Barcelona and Atlanta had crosswalks signed on all roads within the intersections. Of the crosswalks in the area only 50.33 crosswalks on average in each Site had crosswalks which were directly perpendicular to the roadway.

[2377] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 100.
[2378] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 100.
[2379] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 100.

10.16.3 Accessibility: ADA, Easements and Walkability

Accessibility is the ability of persons to access the urban form and circulate through that urban form. There are mainly three types: differently-abled accessibility, easements of accessibility and walkability. An important street function is how the street provides accessibility of all of the urban form for those living within the urban form. “One cannot forget that a major purpose of streets is to enable one to get from one place to another, not only to a location on the street but to and from areas beyond it.”[2380] People must also be able to get to the street with ease—there must be proper connectivity. “There is another kind of street accessibility to consider: people must be able to get to a street with ease.”[2381] Accessibility relates to the physical ability to access the urban environment for differently-abled bodies with an environment that allows movement due enforced by ADA requirements and for abled-bodies with a more walkable environment that allows accessibility of the urban form in general.

> Still another type of access to be considered is for handicapped people. None of the identified great streets were designed with handicapped people in [302] mind. And yet it is surprising that many of them accommodate wheelchairs with ease…”[2382]

The ADA requires accessibility for public accommodations and by public utilities--the Street.[2383] As a result, large portions of the built environment must accommodate access to all persons--regardless of handicap status. What this means is crucial. Although the environment has to meet the needs of those who are differently-abled, these accessibility requirements actually make the built form more easily accessible to seniors,

[2380] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 302.

[2381] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 302.

[2382] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, pp. 302-303.

[2383] Americans with Disabilities Act. Pub.L. 101–336, 104 Stat. 327, enacted July 26, 1990, codified at 42 U.S.C. § 12101; 42 U.S.C. §§ 12131–12165, and 42 U.S.C. §§ 12181–12189. http://library.clerk.house.gov/reference-files/PPL_101_336_AmericansWithDisabilities.pdf. (accessed August 2, 2014).

children, sick, inform or normally abled persons.[2384] One must remember that this is not only a public right, but a legal and constitutional right.

When a person who owns an internal lot does not have public access to the public realm, at least in the United States they have inherent easement rights of access to the public realm even without actual ownership of the land. This is impinging upon the property for a public policy reason, just as the public has an easement on the fronts of lots for a public policy purpose. “”Easement. A grant of one or more of the property rights of land by a property owner to, or for the use by, the public or another person or entity.”[2385] While many times those easements seem to be grants of the public by the property owner, in reality it is not. The easement is a grant of the public right into itself, whether by easement or by eminent domain, and the easement allows or impinges access or the lack of right to sue for trespass or interference with a property right, for the public good. In this sense, accessibility is the public good and the purpose of the easement or termination of a private property’s right to exclude trespass.

While differently-abled accessibility affects how an individual is impaired by structural urban form, and easements of accessibility affects a legal right of accessibility to the public realm, and walkability affects how actual accessibility of the urban form is without being automobile dependent.

> “Conventional planning tends to create streets that are barriers to pedestrians, while the New Urbanism links uses, building types, and neighbohroods through walkable streets.”[2386]

The problem with streets is that many are not walkable. In short, walkability is the built environment’s ability to create forms that are conducive to walking rather than inhibitive

[2384] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, pp. 302-303.
[2385] Buffalo Mayor’s Office of Strategic Planning. “Buffalo Green Code.” Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014), pp. 2-5.
[2386] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 134.

toward walking on the Sidewalk mainly.[2387] The six cities within this study, New York, San Francisco, Portland, Barcelona, Amsterdam and Paris, all rank as highly walkable environments. Their fine grained nature and small streets make walkability more of an option. In areas of sprawl, walkability becomes more difficult because, in sprawl's large grain structure and concentration of types of use, people have to drive in order to obtain the services or amenities for daily needs.

> "Pedestrian networks are, of course, an integral part of street design. In the neotraditional developments pedestrian access is promoted through sidewalks, some exclusive pedestrian and bicycle ways, and through an attempt to create a path network that interconnects destinations such as parks."[2388]

Research proves that in environments that are not conducive toward walking, people will engrain a lifestyle that does not require walking. This thesis extensively covered how the time and length Americans were willing to talk while discussing block dimensions, research has shown that this is generally less than 10 minutes and of nor longer than 1/2 a mile, with most walking only up to 500 feet.[2389] One should note thought that this is only after decades of living in built environments which actively

[2387] Abley, Stephen. *Walkability Scoping Paper.* March 21, 2005, and reviewed April 21, 2008. http://www.levelofservice.com/walkability-research.pdf (accessed July 28, 2014).

[2388] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 107.

[2389] Sherrett, A. "BART's First Five Years; Transportation and Travel Impacts." Technical Report DOT-P-30-79-8, prepared for U.S. Department of Transportation and U.S. Department of Housing and Urban Development, Washington, DC, 1979; Fairfax County. "Walking Distance Abstracts." *Fairfax County.* http://www.fairfaxcounty.gov/planning/tod_docs/walking_distance_abstracts.pdf (accessed July 22, 2014); See also Pushkarev, B. S, and Zupan, J. M. "Where Transit Works: Urban Densities for Public Transportation." *Urban Transportation: Perspectives and Prospects* (1982): 341-344; See also Pushkarev, B. S, and Zupan, J. M. "Public Transportation and Land Use Policy," New York Regional Plan Association (1977); Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 107; Untermann, Richard K. "Accommodating the Predesetrian: Adapting Towns and Neighborhoods for Walking and Bicycling," in *Personal Travel in the US*, Vol 2, a Report of the Findings from 1983-1984 NPTS. Washington, DC: United States Department of Transportation, 1990; Keating, W. Dennis, Norman Krumholz. "Neighborhood Planning." *Journal of Planning Education and Research* 20 (1) (2000): 111–114; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 243.

discourage walking and under zoning regimes which discouraged mixed-use areas. As the urban form alone forces Americans to drive to have basic needs met. And yet, many dense cities in the United States have high percentages of persons who commute to work as pedestrians. In 2012, while in general in the United States only 2.8% pedestrian commuter, New York City had over 10.3% pedestrian commuters, San Francisco had over 9.9% pedestrian commuters, and Portland had over 5.7% pedestrian commuters.[2390] In New York alone, this means 379,635 persons commuted as pedestrians.[2391] Even in small towns without large mass transit services like Ithaca, New York, over 42.4% of persons walk to work.[2392] In Mediums-sized cities like Provo, Utah, over 14.5% persons walk to work.[2393] In some of the largest cities like Boston, 15.1% of persons walk to work.[2394] This does not even include the percentages of persons who commute using bicycles.[2395] When given the option of a fine-grained and walkable environment, what the census evidence proves is that Americans choose to walk, with a

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[2390] McKenzie, Brian S. United States Census Bureau. "Modes Less Traveled- Bicycling and Walking to Work in the United States: 2008-2012." Report, May 2014. http://www.census.gov/hhes/commuting/files/2014/acs-25.pdf (accessed July 28, 2014).

[2391] McKenzie, Brian S. United States Census Bureau. "Modes Less Traveled- Bicycling and Walking to Work in the United States: 2008-2012." Report, May 2014. http://www.census.gov/hhes/commuting/files/2014/acs-25.pdf (accessed July 28, 2014).

[2392] McKenzie, Brian S. United States Census Bureau. "Modes Less Traveled- Bicycling and Walking to Work in the United States: 2008-2012." Report, May 2014. http://www.census.gov/hhes/commuting/files/2014/acs-25.pdf (accessed July 28, 2014).

[2393] McKenzie, Brian S. United States Census Bureau. "Modes Less Traveled- Bicycling and Walking to Work in the United States: 2008-2012." Report, May 2014. http://www.census.gov/hhes/commuting/files/2014/acs-25.pdf (accessed July 28, 2014).

[2394] McKenzie, Brian S. United States Census Bureau. "Modes Less Traveled- Bicycling and Walking to Work in the United States: 2008-2012." Report, May 2014. http://www.census.gov/hhes/commuting/files/2014/acs-25.pdf (accessed July 28, 2014)..

[2395] McKenzie, Brian S. United States Census Bureau. "Modes Less Traveled- Bicycling and Walking to Work in the United States: 2008-2012." Report, May 2014. http://www.census.gov/hhes/commuting/files/2014/acs-25.pdf (accessed July 28, 2014).

large portion of the remainder using mass transit, bicycles and other non-vehicular traffic. It is the urban form that makes walking impractical or impossible in most cases.

Walkability then is an issue of urban form. Even in some neotraditionalist communities, the location of commercial areas and the lack of mixed-use options create distances that are “too great to expect most residents to walk to them on a regular basis.”[2396] In suburbs, the distances between residential and commercial areas are so great and the pedestrian space is so corrupted, that it is only theoretically possible that someone would walk to the store.[2397] As a result, the urban form itself creates a situation where most places become auto-dependent.

In the subcategory, “Bicycle Network and Storage,” the LEED-ND purposes to “To promote bicycling and transportation efficiency, including reduced vehicle miles traveled (VMT). To support public health by encouraging utilitarian and recreational physical activity.”[2398] To comply there must be an existing bicycle network of 5 miles in length within 1/4-miles of the project boundary, or the project can be 100% residential with the bicycle network within 3 miles of the school or employment center, or the bicycle network connects to 10 diverse use within 3 bicycling miles’ distance of the project boundary.[2399] This requirement also calls for bicycle storage in multiunit residential, retail and nonresidential other than retail.[2400] This requirement calls for the creation of bicycle

[2396] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, p. 107.

[2397] Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997, pp. 107-108.

[2398] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 29.

[2399] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 29.

[2400] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 29.

networks, but it does not really indicate how these bicycle networks impart themselves upon the urban framework. While some of these could be in-line with current traffic, and act double-duty in providing areas for ease of parking or delivery-parking areas, other bicycle transit zones might be set aside from traffic in areas sheltered from roadways through tree placement or buffer zones. The Smart Growth Institute has bicycle requirements that include a minimum of 6 feet widths for bicycle paths. The New Jersey Future checklists also have bikability factors and these are incorporated into this thesis as they can be noted. Otherwise, the New Jersey Future checklists are hard to integrate within a scalable structure.

10.16.4 Sociability and Performance

> "Barring private gardens, which many urban people do not have or want, or immediate access to countryside or parks, streets are what constitute the outside for many urbanites; places to be when they are not indoors."[2401]

One Street function is to provide a place where people can socialize and assimilate into the social fabric. The Street provides a safer area where people can interact without threatening the private zones where people live. "Sociability is a large part of why cities exist and streets are a major if not the only public place for that sociability to develop."[2402] Streets provide the space for social capital to build and materialize, and Streets provide space for commerce to occur so that the society has an ability to distribute goods and services, levy taxes and provide for larger administrative aspects of growth. "And streets are places of social and commercial encounter and exchange."[2403] The Streets also function as social entertainment or promenade, to primp and find mates. "The street is movement: to watch, to pass, movement especially of

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[2401] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 4.

[2402] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 4.

[2403] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 4.

people: of fleeting faces and forms, changing postures and dress."[2404] Streets provide a protected forum for political speech to occur for the greater politic, and they allow us an ability to organize with like mindedness for mass action.

> "The street is a political space. It's on Elm Street that neighbors discuss zoning and impending national initiatives, and on Main Street, and at Fourth of July parade as well as an antinuclear march, that political celebrations take place."[2405]

Some think that by making streets wider, longer or more efficient for transportation that they will improve the Street, but unfortunately, the Street is not the lane and serves an animalist purpose of keeping people connected to larger social groups. Of course, this is only proof by observation, but Great Streets bring all people into the social milieu, leaving few people as social isolates.[2406] An aspect of Great streets are the types of establishments and venues that are necessary in order to keep people within the public venue.

> "Sidewalk cafes foster street life and have the potential to increase business along a corridor. Where provided, sidewalk cafes should not impinge upon the accessible pedestrian parkway."[2407]

Cafés are private establishments that provide entertainment and interaction for people. "French sociologist Chombart de Lauwe considers the café indispensable to city life," and he made a great taxonomy of various cafés that catered to various social strata or group within Paris. "He lists cafes for sport enthusiasts and for professionals, cafes for the old, cafes for the young, quiet cafes, noisy cafes, cafes with a history, dance cafes, hotel cafes, cafes for amorous rendez-vous, gambling cafes, and so forth."[2408] He noted

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[2404] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 4.

[2405] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 5.

[2406] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 5.

[2407] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 42

[2408] Paul-Henri Chombart de Lauwe, Des Hommes et des Villes, *Social Science*. Berkeley, University of California, 1965, p. 28; Rudofsky, Bernard. *Streets for* that walking on the street meant walking into a café or a like establishment, and this act would socialize people by putting them with a safe and protected area where they could interact with people outside of their private lives. For some, it seems interesting that people would rather argue with someone in a bar than sit at home in the privacy of their Radiant tower.

> "People with a sunny disposition who crave the light of a new day can't wait to get out into the street. Their first deliberate action of the morning is to walk to the neighborhood coffee bar, not for a meal washed down with quantities of coffee-flavored hot water but to sip what deserves to be called an elixir."[2409]

The power of these places is not that they are private establishments, but that they connect with the street physically or by extension by keeping people active and in on the Sidewalk. "The authentic café is almost always part of the street, sidewalk or no sidewalk. (The term 'sidewalk café' is an Anglicism with more than a pleonastic touch.)"[2410] These entities many times sprawl into the street scale within the permeable zone between the architectural infill façade and the actual Sidewalk throughway and the frontage zone. Effectively, they are areas where it is legal to sit, linger, meet with friends, find new friends, drink and watch the Street--and make fun of them.[2411]

> "Spreading out over the street or square, particularly at late hours, a café's seating capacity, aided by inexhaustible reserves of chairs, is prodigious."[2412]

The café is a social institution of the city, and it rarely exists outside of the city.[2413] As a result, it does not seem surprising that many social movement began in the café,

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People: a primer for Americans. New York: Anchor Press/Doubleday, 1969, p. 310.

2409 Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 308.

2410 Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 308.

2411 Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 308.

2412 Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 308.

2413 Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 308.

whether in Europe or in the United States. "'It was in the early coffeehouses,' argues Aytoun Ellis in his monograph *The Penny Universities*, 'that the great struggle for political liberty was really fought and won.'"[2414] Just like the street they were opened to anyone of any rank or social status.[2415] Some have said that the café does not exist as an institution in the United States, but they would be actually wrong.

> Lately though, even the least observant of ambulatory sidewalk superintendents could not have failed to notice an outbreak of outdoor cafes in New York, an unprecedented occurrence among a population most of whose habits were set hundreds of years ago."[2416]

In the United States, the café was political important within the s were very important during the changes and upheavals in the 1960s. "Poetry readings and discussions have been held in American cafés by the social dropouts of the 1960s without, however, affecting the nation's ways."[2417] While some say that this has not affected the larger political system, it has in strategic ways and has resulted in numerous collections of artists and politicos who connect and form new movements that have changed our view in society. These movements made the US much more a fervent place for modern art and architecture when they came to the United States. What this might indicate is that as Streets become more areas of public use, they start creating places like the cafés that creates a further self-perpetuating cycle of street activity.

> "As recently as 1956, New York City had no more than three sidewalk cafes, or roughly one for every three million inhabitants, and no pressing need seemed to exist for adding a fourth. Twelve years later, their number had increased to one hundred. In 1968 alone, twenty sprang up, not only in Manhattan's mild cosmopolitan quarters but in rustic Brooklyn and Queens."[2418]

[2414] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 310.
[2415] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 310.
[2416] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 312.
[2417] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, pp. 310-312.
[2418] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 314.

Because the café's created more Street activity, there were more eyes on the street. "In 1967 the New York City's Sidewalk Study Committee … reported to the mayor that 'more sidewalk cafes and later closing hours would bring the people back into the streets, thereby reducing the likelihood of crime in the streets."[2419] Like other cities recovering from sterilization by focus on the lane, in Boston's Complete Streets Design Guide, there is a recommendation for more street cafés and street activity, even while they note the need to keep the throughway clear for pedestrian traffic.[2420]

> "Sidewalk cafés are encouraged on all Street Types where commercial activity occurs, including industrial areas. The extension of restaurant businesses into the public way brings activity and energy to the public realm. The renting of this space by private businesses can also result in a higher level of maintenance and cleanliness. Careful attention must be given to the design and layout of sidewalk cafés to maintain sidewalk functionality and the quality of the public environment."[2421]

There are other areas of promenade and social interaction such as the monumental stairway, promenade, loggia, internal pedestrian space and squares and plazas. Those areas are too complex for this thesis, and they deserve research of their own. Needless to say, these places act as extensions or modifications of the Street itself where the Street moves to greater spaces to accommodate more or less activity. In Boston's Complete Streets Design Guide, there is a requirement for plazas as a type of pedestrian space.

> "A plaza is a pedestrian space in the public realm built for enjoyment, lingering, and as a gathering place for special events. Plazas are encouraged as a part of all streetscape designs to create a sense of place and enliven sidewalks. Successful plazas attract people through the presence of others, and support a wide variety of activities including temporary markets, art installations, and/or performances.

[2419] "City Easing Rules on Sidewalk Cafes to Encourage Idea," *The New York Times*. Dec. 5, 1967; Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 316.

[2420] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 35.

[2421] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 35.

> Plazas are also opportunities to incorporate the green and smart principles of these guidelines."[2422]

This push is to create 10% open space for Boston while addressing stormwater and environmental issues. "Plazas are excellent places to incorporate stormwater management elements. They should be as sustainable as possible and easy to maintain as they will require maintenance agreements."[2423] Time will tell though whether Bostonians adopt the space and create utilized public space or whether these spaces become larger unused spaces like some parks in the public realm.

10.16.5 *Commerce*

> "Streets are the entrails of the city, with more than a touch of scatological flavor, constipation being just one of their chronic ailments. No wonder professional diagnosticians turn up their noses at them, and art historians and sociologists look the other way."[2424]

Commerce has been with human kind for more than 150,000 years.[2425] Commercial expansion caused city expansion in every ancient civilization on every continent.[2426] While streets evolved after the beginning of trade routes, commerce made streets more commerce efficient and thus, this thesis postulates, brought Street from the rooftop in Çatal Höyük to the ground in Ur. In the United States, commerce has evolved

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[2422] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 34.

[2423] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 34.

[2424] Rudofsky, Bernard. Streets for People: a primer for Americans. New York: Anchor Press/Doubleday, 1969, p. 16.

[2425] Watson, Peter. *Ideas: A History of Thought and Invention from Fire to Freud*. New York: HarperCollins Publishers, 2005.

[2426] Stearns, Peter, ed. The Encyclopedia of World History: Ancient, Medieval, and Modern, Chronologically Arranged. 6th ed. Boston: Houghton Mifflin Harcourt, 2001, p. 37; Watson, Peter. Ideas: A History of Thought and Invention from Fire to Freud. New York: HarperCollins Publishers, 2005; Abulafia, D, Rackham, O, and Suano, M. The Mediterranean in History. Los Angeles: Getty Publications, 2011. http://shop.getty.edu/products/the-mediterranean-in-history-978-1606060575 (accessed August 2, 2014); Stefansson, V. Great Adventures and Explorations: From the Earliest Times to the Present As Told by the Explorers Themselves. Whitefish, Montana: Kessinger Publishing, 2005; Paine, Lincoln. The Sea and Civilisation: a Maritime History of the World. New York: Knopf, 2013.

as a legal concept to “not only the purchase, sale, and exchange of commodities, but also the instrumentalities and agencies by which it is promoted and the means and appliances by which it is carried on, and the transportation of persons as well as of goods, both by land and by sea” and well as any type of trading of goods.[2427] Thus, for any Street can prosper, commerce must also prosper.

> “Cities have realized that streets are an economic asset as much as a functional element.”[2428]

Along with being a mode of access to the lots and blocks and providing a public sphere, the Street acts crucially as the mechanism to distribute people, ideas, goods, services, communication, amenities and connections to the large politic. The street is the infrastructure of commerce. Without the Street there would be no commerce, and with reduction of any other Street function such as its public nature, resiliency, safety, walkability or sociability, commerce becomes degraded. While the overarching concept behind the mixed-use movement is the relaxing of zoning mechanism which limit commercial activities from residential areas, the basic concept is very clear--to keep commerce within the reach of all people. While mixed-use is more a District quality

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[2427] Black's Law Dictionary Free 2nd Ed. Online. "Commerce." http://thelawdictionary.org/commerce/ (accessed July 24, 2014); Welton v. Missouri, 91 U. S. 275. 23 L. Ed. 347; Hooker v. Vandewater, 4 Denio (N. Y.) 353, 47 Am. Dec. 258; Jacob Steamboat Co. v. Livingston, 3 Cow. (N. Y.) 713; People v. Raymond, 34 Cal. 492; Brennan v. Titusville, 153 U. S. 289, 14 Sup. Ct. 829, 38 L. Ed. 719; Railroad Co. v. Fuller, 17 Wall. 5GS, 21 L. Ed. 710; Winder v. Caldwell, 14 How. 444, 14 L. Ed. 487; Cooley v. Board of Wardens, Commerce 221 Commercial 12 How. 299, 13 L. Ed. 996;Trade-Mark Cases. 100 U. S. 90, 25 L. Ed. 550; Gibbons v. Ogden, 9 Wheat. 1, 6 L. Ed. 23; Brown v. Maryland, 12 Wheat 448, 6 L. Ed. 67S; Bowman v. Railroad, 125 U. S. 465, 8 Sup. Ct. 6S9, 31 L. Ed. 700; Leisy v. Hardin, 135 U. S. 100. 10 Sup. Ct. 681, 34 L. Ed. 128; Mobile County v. Kimball, 102 U. S. 691, 26 L. Ed. 238; Corfield v. Coryell, 6 Fed. Cas. 510; Fuller v. Railroad Co, 31 Iowa, 207; Passenger Cases, 7 How. 401, 12 L. Ed. 702; Robbins v. Shelby County Taxing Dist, 120 U. S. 4S9, 7 Sup. Ct. 592, 30 L. Ed. 094; Arnold v. Yanders, 50 Ohio St. 417, 47 N. E. 50, 60 Am. St. Rep. 753; Fry v. State, 63 Ind. 502, 30 Am. Rep. 23S; Webb v. Dunn, 18 Fla. 724; Oilman v. Philadelphia, 3 Wall. 724, 18 L. Ed. 96.

[2428] Campbell, Richard and Margaret Wittgens. *The Business Case for Active Transportation: The Economic Benefits of Walking and Cycling.”* Gloucester, ON: Go For Green, 2004; National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 5.

because it affects the character and nature of the District, this derives from a quality of the pathway that preceded and most likely created the Street. It is that fundamental.

10.16.6 *Endlessness*

> "There are, of course, two ways of trying to see the street. If a person gives a long view precedence, with its connotations of repetition and infinity, then the close-up scene and the intensity it conveys seems superfluous and offensive."[2429]

While Street gridpatterns are efficient methods of city planning, Streets also tend to have degraded imageability if they continue forever in one direction--endlessness. What occurs is a monotony that tends to have a negative effect upon the District quality of urban form, which ultimately has a negative quality on all aspects of urban form. Jane Jacobs stated that, with no diversity, with high repetition and the lacking of "freedom and life," cities became monotonous.[2430]

> "If the foreground view, on the other hand, takes precedence, then the endless repetition and continuation into lost, indefinite distances becomes the superfluous offensive and senseless element."[2431]

Jane Jacobs and Allan Jacobs discussed the idea that Streets with an endless quality tend to be the worst streets because they go on forever, never showing any diversity or limit.[2432]. She saw the monotony of the American grid as a result of diversity sacrificed for efficiency, creating an endless length of roads that create monotony.[2433] However, she cautioned that the use of these interruptions be exceptions to the rule.[2434]

[2429] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 494.

[2430] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 494; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.10-2 to 2.10-4.

[2431] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 494.

[2432] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 304; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 494.

[2433] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 495, 498-499; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2-10.2-10.4.

[2434] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 500.

“Fourth, visual interruptions get their force partially from being exceptions to the rule. Too many of the same kind can cancel themselves out.”[2435] Allan Jacobs saw roads having too much stimuli that they start to dull the senses.

> “Great streets, it seems, come in all lengths. Yet, at some point it can become difficult to sustain visual interest, diversity, eye- and thought-provoking images. Enough can become enough, or too much.”[2436]

Jane Jacobs noted that she thought this was why European visitors hated the American gridline system.[2437] She saw the monotony of the American grid as a result of diversity sacrificed for efficiency.[2438] “Often the city sacrifices efficiency for diversity, where the functional order and repetition of things creates a sense of endlessness and monotony.[2439]

> “Therefore a good many city streets (not all) need visual interruptions, cutting off the indefinite distant view and at the same time visually heightening and celebrating intense street use by giving it a hint of enclosure and entity.”[2440]

While both Allan and Jane Jacobs seem inconsistent with the need for interest and problems with monotony, they are both right.

When one adds Kevin Lynch’s conception of the Landmark and the Node as part of the theoretical understanding of urban form, one understands why. All things need a termination point in order to be understood and imagined as part of the city. Pathways and things need to be within small blocks of understandable lengths in order for them to be useful. At the same time Districts need the lengths to be small enough to create

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[2435] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 500.
[2436] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 304.
[2437] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 494.
[2438] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 495; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2-10.2-10.4.
[2439] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 495; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2-10.2-10.4.
[2440] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 495.

differences between one district and another and yet long enough so that Districts connect in a unifying whole. These termination points for major road and pathways are obtained through the use of nodes and landmarks.

> "They may consist of some special focal point like statues along Monument Avenue, or special building like the theater on the Ramblas, or a park like that along the Ringstrasse in Vienna, or perhaps a change in the street section."[2441]

By their uniqueness and limited number, they modulate the very urban form by not allowing urban form to be too small or too big.[2442] This moderating effect ensures that urban form scenes change, but also it ensures that urban form is not too unique to make imageability an enterprise only for those with the strongest memory or capacities. To solve this effect, urban form utilizes landmarks and nodes for different effects.

But, this might not be the case, this might be where other parts of urban form, namely the District, the Node and the Landmark, break up larger systems of pathways into manageable pieces for imageability purposes. This may be where the monotony of large Street networks become undiscernible to the brain, and thus these other urban elements take over to break the monotony and to limit the sizes of the street and pathways themselves. What these interruptions do is not only stop the endlessness of place but also break pathways and city are as into manageable parts of workable lengths. Jane Jacobs stated that there were many ways to break up grid by introducing irregularities and interruptions into what otherwise would be a monotonous grid. "The second means for introducing irregularities and visual interruptions where they are insufficient, is on grid streets themselves."[2443] She also noted that cities like San

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[2441] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 305.

[2442] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp.498-499; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.10-3.

[2443] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 496.

Francisco have natural topographic and environmental interruptions which cause shifts to the grid.[2444]

> "San Francisco is a city with many natural visual interruptions in a gridiron street pattern, San Francisco's streets, in general, are regular gridiron arrangements in two-dimensional plan; however, in three-dimensional topography they are masterpieces of visual interruption. The many and abrupt hills constantly make separations between the nearby scene and the distance, and this is true whether one is looking along a street toward a rise, or looking down a slope."[2445]

Older parts of cities have these interruptions as a matter of course, for they were built in various stages of development yet many time with overlying pathways that created unity between the various Districts. Where there are no unifying systems or no straight pathways upon which to imagine the city, older have problems with persons being confused about their street networks--there too much non-monotony. "Old parts of our cities which have irregular street patterns frequently do this. However, they have the disadvantage of being difficult to understand as street systems; people easily get lost in them and have a difficult time keeping them mapped out in their heads."[2446] Jacobs inferred that there must be a mixture of the two, grids which are not too large to create infinite spaces.[2447]

> "Whereas the basic street pattern is a gridiron plan, which has many advantages, there are two main ways, nevertheless, of introducing sufficient visual irregularities and interruptions into the city scene."[2448]

Her solution was to add additional streets to create more intensification and to change the grid to make a much more complex gridpattern than simple straight lines where there complete cross traffic in all directions. "The first is by adding additional streets where the

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[2444] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 497.
[2445] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 497.
[2446] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 495.
[2447] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 495.
[2448] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 495.

streets of the gridiron plan are too far apart from each other—as on the West Side of Manhattan, for example; in short, where additional streets are necessary in any case for the functional purpose of helping to generate diversity."[2449] This way, there would be differentiated movement in some directions while not sacrificing the connectivity afforded by the grid.[2450] Jacobs also noted that one could use squares, small parks or visual interruptions which by their size would not create an edge effect or vacuum to break up the speak.

> "Straight, 'endless' streets can be interrupted and the street divided around a square or plaza forming the interruption; this square can be occupied by a building. In cases where vehicular traffic can actually be dead-ended on straight streets, small parks can be thrown around from sidewalk to sidewalk; the visual interruption or diversion would be provided here by groves of trees or by small (and lets us hope, cheerful) park structures."[2451]

While Jacobs did discuss visual interruptions, one could imply that Jacobs was discussing interruptions like landmarks, nodes or district qualities which interrupt or intensify the visual perception of one's pathway.[2452] Generally, they also effectively change the directional shifts in the gridpattern to occur.[2453] These were successfully used in San Francisco, Barcelona, Paris and Amsterdam to have fully connected grids that have breaks in the gird plan to create Districts. In one, San Francisco as Jacobs noted, had the topography in order to break up the grid three dimensionally. In the others, actual shifts of the grids occurred in order to break the lines of infinity or at least point them in directions of grand landmarks which broke the sense of infinity.

[2449] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 495.

[2450] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 495-496.

[2451] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 497-498.

[2452] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 498-499; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.10-3.

[2453] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-3.

Within the Site Areas, many had an average of 1.17 repeating grids that formed large blocks. In San Francisco and Portland, these numbers were very high with the number of blocks within the grids being 171% more than the mean. New York was surprisingly only 0.86 of the mean because it had only one repeating grid of blocks. Atlanta had several blocks systems that repeated and has a 171% of mean score, but the diversity in block systems made the numbers of repeating blocks actually low. In the Site Area, the largest number of blocks averaged to be 49.67 blocks. This is because the Parisian blocks are medieval and accumulative in character and formed a large gridpattern system. Otherwise, most areas modulated from 58% of the mean to around 97% of the mean.

Within the Site area, the average longest continual route of street lengths if 4,080.56 feet. This is almost consistent throughout the various Site Areas with most Site areas being 88% to 114% of the mean. While average longest route was 4,080.56 feet, the average route length was 2,192.08 feet. The average number of route lengths is 40.33. In Amsterdam and in Paris, the numbers were extremely high with 114% and 263% of the mean respectively. In San Francisco, Portland, New York and Atlanta, the numbers were much lower with 50%, 60%, 50% and 55% respectively.

10.16.7 Parking

> "For example, if you put all of the parking in lots or structures behind the stores, then those stores will reorient to the rear, deadening the street."[2454]

Parking is a difficult issue for the street because it is a necessary evil.[2455] "It has to do with accessibility. People with automobiles would like to park as close as possible

[2454] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 62.
[2455] Attoe, Wayne and Donn Logan. American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press, 1989, pp. 137-138.

to their destinations—directly in front is best. Merchants want them to."[2456] It allows people in vehicles to get to the lots and blocks, and provides spaces for circulation in the system. However, the difficulty with parking is how parking evolved in sprawl to acres of lots causing substantial stormwater, heat island effects, multiple other environmental problems and an urban blight. As a service, Allan Jacobs indicated that, while the trajectory of parking, codes and regulations increased parking for every possible driver, parking should be of limited quantity and at levels even below demand.[2457] "At best, drivers seem to have a long shot at finding a space in the block they are designed for; they take the chance, usually lose, and then look elsewhere nearby for a place to park. That may be enough: a chance."[2458] The best cities seem to have very limited parking options and did not design their Streets with only the driver and parker in mind. In fact, the inverse is true, the worst streets have the most parking.

> "Pasadena's Colorado Boulevard is a prime example. Large ground-level lots along a street leave gaps in street definition and activity. While some say that lack of ample parking, people will not go, but that is not necessarily the case. The great streets do not have ample parking, while lots of not so great streets do.[2459]

There are ways address this problem, mainly by integrating the parking with the Street in a limited fashion by narrowing the lane or placing the parking in the center block as a parking stack or structure.[2460]

> "Ideally, as much parking should be provided in the street as possible, without dominating the street with cars or compromising pedestrian safety. This relies on good layout and street landscaping, but is very effective in keeping activity in the street."[2461]

[2456] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 305.

[2457] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 306.

[2458] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 306.

[2459] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 306.

[2460] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 306.

[2461] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 62.

On-street parking is provided with the best streets, and they have the function of allowing accessibility while not interfering with the public zone. On the great streets, while parking was available, it was of limited quantity or hidden.[2462]

> "Driveway off of the best streets, or garage entrances for access to parking or for service, are rare, even on the fine residential streets such as Monument Avenue. Though present on more streets than not, auto parking in great amounts, to any contemporary standard, is not a characteristic of great streets." They seem to do well without 'enough.'"[2463]

Street parking is usually the best option because parking structures, as they have cheaply and economically developed, become visual blights on the District quality. In historic Parisian areas, assessor streets were available before the on-street parking became available. This allowed much slower traffic and parking to occur within areas 15 feet wide, while not disrupting the flow of traffic and keeping the traffic lanes narrower.[2464] NACTO recommends that parking lanes be around 7 to 9 feet in width, while being very close to oncoming traffic.[2465] In general, parking is 8 feet wide, and it requires a certain number of lanes to be available for both sides of the street.[2466]

> "If parking will never occur or will only be sporadic because of very low densities, this minimum pavement may drop to 6 m (20 ft) for a two-way minor road. On a one way street with parking only on one side, the pavement must be 5.5 m (18ft). Such a street might be used as a short loop or as a marginal access road alongside a major thoroughfare."[2467]

[2462] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 306.

[2463] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 306.

[2464] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 35.

[2465] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 35.

[2466] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 208.

[2467] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 208.

In contrast, LEED for Neighborhood Development requires parking on both sides of the street for more than 70% of “both sides of all new and existing streets, including the project side of bordering streets.”[2468]

> “The percentage of on-street parking is calculated by dividing the length of LEED 2009 for Neighborhood Development street designated for parking by the total length of the curb along each street, including curb cuts, driveways, and intersection radii. Space within the parking lane that is occupied by corner bulb-outs (within 24 feet of an intersection), transit stops, and motorcycle or bicycle parking may be counted as designated for parking in this calculation. Woonerfs are not considered streets for this subsection.”[2469]

When considering the effect of unused parking lanes on the speed of traffic, it becomes question if this would become a good idea without other speed reduction mechanisms.

Research states that as street parking increases, street speed decreases facilitating more public safety.[2470] Looking at specific streets, we find is that street parking is a common denominator of most streets in resilient cities. In New York on Baltic Avenue and Park Slope, 3rd Avenue of the Upper East Side, W 11th Street, Mc Dougal Street, Bowling Green, Atlantic Avenue and Fort Greene all have street parking.[2471] In Portland, the same rule applies, and on NW 23rd Street, SE Ladd Street and NW Irvine Alley, SE Ladd Street, and NW Irvine Alley all have street parking.[2472]

Some critics state that parking in generally threatens the total urban fabric--including street parking. As a result, they have demanded other options like

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[2468] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 50.

[2469] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), pp. 50-51.

[2470] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 138.

[2471] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, pp. 6-7.

[2472] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.

subterranean and in-block parking.[2473] "Accommodating the pedestrian is the first order of priority for parking. Cars are best accommodated in the middle of blocks or underground."[2474] Mid-block parking desks can provide parking where mass amounts of parking are required. "Decking over parking between buildings inside a block can be a very positive move--parking requirements are met, the cars to not dominate, and an amenity space for residents can be created on the deck."[2475] This allows for high density multi-family residential housing to or commercial areas to negotiate parking without destroying the urban fabric.[2476]

> "For new nonresidential buildings and multiunit residential buildings, either do not build new off-street parking lots, or locate all new off-street surface parking lots at the side or rear of buildings, leaving building frontages facing streets free of surface parking lots."[2477]

Under the subcategory "Reduced Parking Footprint," LEED-ND purposes to reduce the parking footprint in a given area to ensure more density of building structures and less a dependence upon auto-transit that create a park-point rather than a neighborhood focus for the community.[2478] While there are many purposes for this

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[2473] Moule, Elizabeth and Stefanos Polyzoides. "The Street, the Block and the Building." Moules and Polyzoides, 2014. http://www.mparchitects.com/site/thoughts/streets-blocks-buildings (accessed July 10, 2014), p. xxiii.

[2474] Moule, Elizabeth and Stefanos Polyzoides. "The Street, the Block and the Building." Moules and Polyzoides, 2014. http://www.mparchitects.com/site/thoughts/streets-blocks-buildings (accessed July 10, 2014), p. xxiii.

[2475] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 62.

[2476] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 62.

[2477] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 60 ("Use no more than 20% of the total development footprint area for all new off-street surface parking facilities, with no individual surface parking lot larger than 2 acres. For the purposes of this credit, surface parking facilities include ground-level garages unless they are under habitable building space. Underground or multistory parking facilities can be used to provide additional capacity, and on-street parking spaces are exempt from this limitation.")

[2478] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 57.

policy, LEED-ND requires that no more than 20% of total buildable area be related to parking, with no parking lot greater than 2 acres.[2479]

In the Site areas, parking did not function as the main purpose of the right of way. Still, an average of 1.97 sides of the streets had parking, with Barcelona having parking in the intersections of the blocks. On average, there were 5 parking lots or parking structures within the Site Areas, with New York, Portland and Atlanta having the largest share. Atlanta alone has 380% of the mean in parking lots and parking structures in the Site Area. The Atlanta Site also has the largest parking structures or lots over 2 acres. While the average number of parking lots under 2 acres was 4.83, Atlanta had 331% of the mean. While the average number of parking lots over 2 acres was 0.17, Atlanta had 1,800% more than the mean. The only other cities with significant parking structures or lots were New York and Amsterdam, but still even their numbers do not come near the Atlanta Site's numbers, except with just the number of parking structures in the Site Area--with New York having 350% more than the mean of 0.67 parking structures per Site Area.

[2479] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 60 ("Use no more than 20% of the total development footprint area for all new off-street surface parking facilities, with no individual surface parking lot larger than 2 acres. For the purposes of this credit, surface parking facilities include ground-level garages unless they are underhabitable building space. Underground or multistory parking facilities can be used to provide additional capacity, and on-street parking spaces are exempt from this limitation.")

CHAPTER 11.

REFERENCE AND TERMINUS: NODES AND LANDMARKS

11.1 Nodes: Transition, Public Space, Parks, Squares

> "They say, in effect, that one has arrived, or left, or they give boundaries. They are places to meet, or reference points. 'I'll meet you at the Rond-Point entrance to the Avenue Montaigne,' or 'I live one block east of the Stonewall Jackson statute on Monument Avenue."[2480]

When one looks at the city pathways, one notices that in the Great Streets, there are urban elements that break the urban fabric and allow people to assemble or move through on their way to somewhere else.[2481] They call attention to streets, by informing the public of the importance of the pathway and the District where they are entering. They are not always pretty or memorable in themselves, but they provide a function that links Streets together.[2482] These urban elements are Nodes.

> "A node is a center of activity. Actually it is a type of landmark but is distinguished from a landmark by virtue of its active function. Where a landmark is a distinct visual object, a node is a distinct hub of activity. Times Square in New York City is both a landmark and a node."[2483]

Intrinsically, Nodes are public or private spaces on blocks within the urban fabric that allow people to enter, assemble, move and redirect their pathway.[2484] They are point so transition.[2485] Their edges are extremely permeable but defined, they tend to be closed. "The node is more defined if it has a sharp, closed boundary, and does not trail

[2480] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 296.
[2481] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-3.
[2482] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, 297.
[2483] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-3.
[2484] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 48.
[2485] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 48.

off uncertainly on every side; more remarkable if provided with one or two objects which are foci of attention."[2486] This edge has to be visible to ascertain the difference in the location and to note the changed public versus the Street, the Lot, and the Block.[2487] This edge allows people to get into the area and know how to get out of the area.[2488]

> "The joint between path and node must be visible and expressive, as it is in the case of intersection paths. The traveler must see how he enters the node, where the break occurs, and how he goes outward."[2489]

They tend to redirect or terminate a pathway, be along a pathway, or merge with a widened pathway. "On those streets particularly they provide stopping places, pauses, reference points along the path."[2490] These points thus are strategic parts of the city that are important to movement and commerce. "Nodes are points, the strategic points in a city into which an observer can enter, and which are the intensive foci to and from which he is traveling."[2491] Because of the increased activity, these Nodes heighten the senses and cause people to observe their pathway quicker and with greater assurity.[2492] "The junction, or place of a break in transportation, has compelling importance for the city observer. Because decisions must be made at junctions, people heighten their attention at such places and perceive nearby elements with more than normal clarity."[2493] Nodes

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[2486] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960: p. 102.

[2487] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 102-103.

[2488] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 102-103.

[2489] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 102-103.

[2490] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 301.

[2491] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-1; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 115; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 47.

[2492] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2-9.5.

[2493] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-5; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 72-73.

can concentrate in a certain area, they can center an area, or they can radiate out toward other areas. “Some of these concentration nodes are the focus and epitome of a district, over which their influence radiates and of which they stand as a symbol. They may be called cores.”[2494] Most importantly though, Nodes break up the urban form into manageable pieces.[2495]

> “They may be primarily junctions, places of break in transportation, a crossing or convergence of paths, moments of shift from one structure to another. Or the nodes may be simple concentrations, which gain their importance from being the condensation of some use or physical character, as a street corner hangout or an enclosed square.”[2496]

This implies that Nodes do not cover large spaces of urban form but remain a manageable size, because their purpose is not to create an edge but to join pathways together. However, this means that nodes must moderate in size because nodes must be large enough to have a physical presence but not too large to be a vacuum within the urban environment.[2497]

> “A strong physical for is not absolutely essential to the recognition of a node: Journal Square and Scollay Square. But where the space has some form, the impact is much stronger. The node becomes memorable.”[2498]

Lynch notes that Nodes can be large Districts, but he does not imply that parks or other types of nodes should also be a large.[2499] It might be that some Nodes can be larger and other Nodes tend to become vacuum or edges--parks or open space.

[2494] Bacon, Edmund N. Design of Cities. New York: Penguin Books, 1964, p. 83; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.11-6; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, 47-48.

[2495] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-1 to 2.9-2.

[2496] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-1 to 2.9-2.

[2497] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-5.

[2498] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-5.

[2499] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 72.

The Node is directly related to the Street/Pathway because they typically form the connective joints that join Streets together.

> "The concept of node is related to the concept of path, since junctions are typically the convergence of paths, events on the journey. It is similarly related to intensive foci of districts, their polarizing center. In any event, some nodal points are to be found in almost every image, and in certain cases they may be the dominant feature."[2500]

Nodes are typically scattered in the built environment. They have some space between them, and as a result they are nodes because of their lack of concentration and their lack of number. "But although conceptually they are small points in the city image, they may in reality be large squares, or somewhat extended linear shapes, or even entire central districts here the city is being considered or at a large enough level."[2501] Thus they function by bringing people together in areas of assembly where they can also move around.[2502]

> "[Piazza San Marco in Venice is] [h]ighly differentiated, rich and intricate, it stands in sharp contrast to the general character of the city and to the narrow, twisting spaces of its immediate approaches. Yet it ties firmly to the major feature of the city, the Grand Canal, and has an oriented shape that clarifies the direction from which one enters."[2503]

Plazas and squares may be nodes, for the allow people to gather in large numbers, but they are also connected with numerous Streets that allow differentiated travel.[2504] "The most notable positive street beginnings or endings include the piazza at either end of the Via dei Giubbonari …, the City Hall square at one end of Stroget, and

[2500] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2.
[2501] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2-9.5.
[2502] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-7.
[2503] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-6.
[2504] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960: 47; Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, 301.

the Placa de Catalunya that starts both the Ramblas and the Paseo de Gracia."[2505] In the United States, a few of the most important Nodes are Times Square in New York City and Union Square in San Francisco, or Pershing Square in Los Angeles.[2506]

> "In all these examples we have a sense of space. Such spaces are islands or oases in the city. But urban spaces can also be linear corridors. Avenues and streets are linear urban spaces if they are enclosed on two sides or have some element of unifying character--trees or urban buildings. Corridor spaces are spaces for linear movement. Island or oasis spaces are stopping places. Of course the two can be interconnected."[2507]

Subway Stations may act as nodes as they stich themselves to the visible urban form.[2508] Because their pathways are not part of the urban form, they only function as Nodes as they relate to important areas of transition within urban form. "The subway stations, strung along their invisible path systems, are strategic nodes. Stations themselves have many individual characteristics: some are easy to recognize…."[2509] While their pathway can be imagined, their links and nodes are not imagined in the same way as visible urban form, because they are detached. One can see the same effect with major railways stations, but, because they are mostly disconnected from important pathways and areas of circulation, they tend to be a less importance than mass transit stations.[2510]

> "Louisburg Square is another thematic concentration, a well-known quiet residential open space, redolent of the upper-class themes of the Hill, with a highly recognizable fenced park. It is a purer example of concentration than is the Jordan-Filene corner, since it is not a transfer point at all, and was only remember as being 'somewhere

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2505 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 296.
2506 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-7; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 75-76.
2507 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-7.
2508 Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 74.
2509 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-5.
2510 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-5.

> inside' Beacon Hill. Its importance as a node was out of all proportion to its functions."[2511]

> "At the beginning of the Baroque period the ordering principle in the growth of the city of Rome was the establishment of lines of force which defined the tension between various landmarks in the old city."[2512]

One of the best uses of node points was Sixtus V in the redevelopment and design of Rome--the obelisks and Churches.[2513] [See Figures 170 and 171] Sixtus V effectively used landmarks and obelisks to create several force line around the city, and he formed pathways between these relationships to cut through the previous eons of accretion growth.[2514] "The movement system emerges as a total design idea, symbolized by the obelisks positioned at its terminal points."[2515] In a city that had very few areas of transition and assembly, Sixtus V began the process of unifying the city with the use of urban form. "The Bordino engraving below, made only three years after the accession of Sixtus V to the papal thrown, shows the astonishing rapidity with which his spatial-organization idea became known and understood."[2516] (See Figure 172) The idea worked because it allowed the populous to imagine Rome for the first time as a complete image--Rome had imageability. The nodes were imprinted on the minds of the casual pedestrian and allowed commerce to increase because people knew, even in a medieval city where they were.[2517]

[2511] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2-9.5.

[2512] Bacon, Edmund N. Design of Cities. New York: Penguin Books, 1964, p. 83.

[2513] Bacon, Edmund N. Design of Cities. New York: Penguin Books, 1964, p. 137; Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, pp. 179-187; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.11.7-11.8; Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, pp. 24-26; Tyler, Norman and Robert M. Ward. Planning and Community Development: A Guide for the 21st Century. New York: W. W. Norton and Company, 2011, p. 21.

[2514] Bacon, Edmund N. Design of Cities. New York: Penguin Books, 1964, p. 137.

[2515] Bacon, Edmund N. Design of Cities. New York: Penguin Books, 1964, p. 137.

[2516] Bacon, Edmund N. Design of Cities. New York: Penguin Books, 1964, p. 138; Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997, p. 25.

[2517] Bacon, Edmund N. Design of Cities. New York: Penguin Books, 1964, p. 139.

> "Both the aesthetic design entity and the concept of a system of functional interrelationships are manifestations of the same underlying order, and the integration of the two is required if we are to solve contemporary problems on the urban scale."[2518]

Nodes can also be areas within the public domain such as public spaces, open space or parks. One should note though that this category does not mean all places that are park-like, such as street furniture parklets. Parks and areas within the public domain are nodes when they function like Nodes. Like other Nodes, public space generally has a very sharp edge because public areas are mainly lot and block based. The only other public space is the Street. [2519] Jacobs was concerned about this land because of its tendency to be large, vacuous and inaccessible.[2520] As a result, in accessible public space became obstacles to circulation rather than areas of transition--anti-nodes.[2521] Because the edge of public spaces is so strong, these largest of this "special land" tended to create huge problems for adjacent urban form.[2522]

> "Cities are about families too. Park space and other outside amenities interspersed throughout the urban environment provide opportunities for kids to play, exercise, and socialize."[2523]

One will note before that Lynch stated that areas as big as Districts could be nodes.[2524] Intrinsic in this conception though is that a District when well-functioning, is full of activity and has high connectivity--large areas of complete permeability are good areas of transition.

[2518] Bacon, Edmund N. Design of Cities. New York: Penguin Books, 1964, p. 139.
[2519] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 343.
[2520] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 343.
[2521] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 343.
[2522] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 343.
[2523] American Institute of Architects. Local Leaders: cities as a Lab: Designing the Innovation Economy." American Institute of Architects: Issues and Advocacy, Local Leaders. www.aia.org/localleaders (accessed August 2, 2014), p. 9.
[2524] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 72.

With parks and open space, the problem becomes more complex, and it becomes one of size and permeability. Open space and parks can also be effective nodes, such as gardens, parks, and Olvera Street in Los Angeles.[2525]

> "New urbanists have borrowed from numerous historic American examples—such as the greens and commons of New England towns, the squares in James Oglethorpe's plan in Savannah, Georgia, and the Spanish squares in the Southwest—and from those in other parts of the world, especially Europe."[2526]

Presently, parks are the center of most design efforts to revitalize cities and create spaces for people for recreation and use. "Cities are about families too. Park space and other outside amenities interspersed throughout the urban environment provide opportunities for kids to play, exercise, and socialize."[2527] These tend to not function as nodes and rather function as District quality improvements. "Some civic spaces function primarily as community ornaments, enhancing the appeal and value of the streets, buildings, and everything else around them. Most civic spaces, however, are designed not just to be looked at but to be used."[2528] However, the transition from simply a District quality to a Node requires actual use and movement transitions of large amounts of people.

The problem is that all parks are not functionally the same. "Moreover, large parks such as Fairmount Park in Philadelphia, Central Park and Bronx Park and Prospect Park in New York, forest Park in St. Louis, Golden Gate Park in San Francisco, Grant Park in Chicago—and even smaller Boston Common—differ much within

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2525 Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 75-76; Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 301.

2526 Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 172.

2527 American Institute of Architects. Local Leaders: cities as a Lab: Designing the Innovation Economy." American Institute of Architects: Issues and Advocacy, Local Leaders. www.aia.org/localleaders (accessed August 2, 2014), p.: 9.

2528 Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 172.

themselves from park to part, and they also receive differing influences from the different parts of their cities which they touch."[2529] Thus, when understanding parks, generally it becomes a matter of size, program and permeability.

Jane Jacobs noted that parks did not equal environmental or economic vitality. "Parks are not automatically anything, at least of all are these volatile elements stabilizers of values or of their neighborhoods and districts."[2530] She stated that parks tended to be problematic for cities as they try to revitalize poverty-stricken areas.[2531] She noted that "unpopular parks" actually created more problems because of their frequent negative effects.[2532] "Unpopular parks are troubling not only because of the waste and missed opportunities they imply, but also because of their frequent negative effects."[2533] Jacob's purpose was to bring up the idea that program within the park, the strong edges of the park, maintenance and how the park would be used should be within the calculus of whether a park introduction into urban form is necessary or wise.[2534] Further, she stated that surrounding urban form like large buildings or offices did not make the park any better.[2535] She advocated for better and smaller parks, than generalized parks just to increase greenspace.[2536]

> "This is understandable, because people in cities, with all their other interests and duties, can hardly enliven unlimited amounts of local,

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[2529] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 117.
[2530] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 119.
[2531] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 120-121.
[2532] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 123.
[2533] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 123.
[2534] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 125-127.
[2535] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 126-127.
[2536] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 133.

> generalized park. … Greatly loved neighborhood parks benefit from a certain rarity value."[2537]

Urban critics began to notice that the value of the park dependent upon size and the ability of the surrounding urban form to absorb, maintain the park and provide surveillance for the activity within the park. "Small parks, if they are popular, knit together their neighborhoods from different sides, and mingle the people from them."[2538] Small parks with high tree trunk are easily absorbed into the community--there are eyes on the park from all sides. In contrast, unlike large Districts which can become nodes, large parks generally do not have large populations of people guarding the safety of the area with their 'eyes on the park.' As a result, the higher perception of criminal activity and higher numbers of actual criminal activity push people from larger parks at specific times of day. Functionally, large parks have complete permeability during the day, and then no permeability at night.

In San Francisco, a large park the Golden Gate Park cannot be labeled as strictly a park, because it functions differently than normal small parks (as does Central Park in New York).[2539] "The park plan for San Francisco that Olmsted was officially authorized to prepare after he had already set sale for the East was in some ways less ambitious than the proposals made by the press, in other ways far more imaginative and concerned with the long-term plans of the city."[2540] To make up for this lack of parks, San Francisco and various patrons wanted Olmstead to prepare park system rather than a single park.

> "San Francisco was not so fortunate, however, as to have its supervisors heed Olmsted's advice on the layout for streets in the

[2537] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 133.
[2538] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 345.
[2539] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 117.
[2540] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 53.

> unplanned section of the city. Instead of a system of streets ascending the hills diagonally, "in such a way as to secure sufficiently easy grades, the area west of Divisadero Street was committed to the same rigid gridiron pattern as the older areas."[2541]

Instead, San Francisco eventually built Golden Gate Park, a very large civic park on "dry sands and bush-covered hillocks."[2542] While it has been an exceptional resource for the city, it also has divided the city into Districts above the park and below the park, for Golden Gate Park does not act as a normal park. It acts as an edge and much like the coastline that surrounds and limits the city.

> "Central Park on Manhattan Island in New York City was designed by Fredrick Law Olmsted and Calvert Vaux. The 840 acre rectangular park runs from 59th-110th Street, adopting New York's orderly urban grid."[2543]

Central Park was designed as organized rural country, with the rocky woodland areas and the meadow, with smaller lakes and parks in the south.[2544] "One can see Central Park as a large 'landroom' at the heart of Manhattan Island, providing a relief to the densely built surrounding city. The park is an important part of New York's urban structure."[2545] "In April 1858 Frederick Law Olmstead and Calvert Vaux won the competition for the design of Central Park and construction work on America's first major public park began." [2546] Olmstead gained the appointment to address Central Park in

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[2541] Olmsted, F. L. Preliminary Report in Regard to a Plan of Public Pleasure Grounds for the City of San Francisco. New York W.C. Bryant, 1866, p. 12.

[2542] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 53.

[2543] Beigel, Florian, and Philip Christou. Architecture as City: Saemangeum Island City. New York: SpringerWein, 2010, p. 114.

[2544] Beigel, Florian, and Philip Christou. Architecture as City: Saemangeum Island City. New York: SpringerWein, 2010, p. 114; Tyler, Norman and Robert M. Ward. Planning and Community Development: A Guide for the 21st Century. New York: W. W. Norton and Company, 2011, p. 24.

[2545] Beigel, Florian, and Philip Christou. Architecture as City: Saemangeum Island City. New York: SpringerWein, 2010, p. 114.

[2546] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 345; Krueckeberg, Donald. The American Planner: Biographies and Recollections. New York: The Center for Public Policy: Meuthuen, Inc, 1983, pp. 14-15; Tyler, Norman and Robert M. Ward. Planning and Community Development: A Guide for the 21st Century. New York: W. W. Norton and Company, 2011, p. 25; Beigel, Florian, and Philip Christou.

New York in 1857. “In 1857, he achieved appointment as supervisor of construction of Central Park in New York City and collaborated with the young English architect Calvert Vaux on its design.”

> “It is considered today to be one of the world’s greatest achievements in civic design.”[2547]

> “Olmsted and Vaux’s park design brought into the center of Manhattan’s grid a grand urban amenity on a scale never seen before.”[2548]

Yet, while the park functions to allow people within the park, the largeness of the park acts as an edge rather than a node. As a result, it creates difficulties with the surrounding urban form and limits economic expansion from one side of the park to the other. The only expansion that can occur is in a vertical direction on either side of the park as the land values become more expensive and important for developers to invest.

As parks get larger, the surrounding community cannot physical or visually absorb the area, and because of the lack of activity throughout the park, the parks functionally become barriers rather than inviting at night. Because of the public zone has a strong edge, perceptions of criminal or unsafe activity within the park keep people from the park and tend to create dividing elements within cities. The more difficulty that cities have in maintaining and providing surveillance for these large parks, the park is more doomed to become havens for malicious activities.

> “‘Street gangs’ do their ‘street fighting’ predominantly in parks and playgrounds. Where the New York Times in September 1959 summed up the worst adolescent gang outbreaks of the past decade in the city, each and every one was designated as having occurred in a park.”[2549]

Architecture as City: Saemangeum Island City. New York: SpringerWein, 2010, p. 114.

[2547] Krueckeberg, Donald. The American Planner: Biographies and Recollections. New York: The Center for Public Policy: Meuthuen, Inc, 1983, p. 15.

[2548] Tyler, Norman and Robert M. Ward. Planning and Community Development: A Guide for the 21st Century. New York: W. W. Norton and Company, 2011, p. 24.

[2549] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 99-100.

In a 2012 study, Groff and McCord found that parks tend to be associated with increased amounts of criminal activity for the surrounding community.[2550] Within Philadelphia, they noted that as a public resource, many of the parks were magnets for delinquent and illegal behaviors. Succinctly in the abstract, they stated, “Our analysis finds that neighborhood parks are associated with increased levels of crime in the surrounding area. However, specific characteristics of parks are associated with lower crime levels.”[2551] Generally, parks had higher incidences of crime than intersections within the vicinity, but some parks did not have as much crime.[2552] What the studied showed is that parks that were designed to have open views where people could see into the park and had programs that tended to cause increased activity, had less crime.[2553] Jacobs had a concern mainly about children who were afraid to go into parks--because hoodlums were there.[2554] As a result, children tended to play in streets where there was more Street activity--and more eyes on the Street.[2555]

> “In most cases (not all, fortunately), the most significant change is this: The children have moved from under the eyes of a high numerical ratio of adults, into a place where the ratio of adults is low or even nil. To think this represents an improvement in city child rearing is pure daydreaming.”[2556]

As a result, one can actually postulate why larger parks tend to be vacuous if they are large. Larger parks tend to have day restrictions on permeability and the ability of people to traverse the park safely. As a result, they cease to be nodes and only have a distinct

[2550] Groff, E, and McCord, E. S. “The Role of Neighborhood Parks as Crime Generators.” *Security Journal* 25(1) (2012): 1-24.
[2551] Groff, E, and McCord, E. S. “The Role of Neighborhood Parks as Crime Generators.” *Security Journal* 25(1) (2012): 1-24 and abstarct
[2552] Groff, E, and McCord, E. S. “The Role of Neighborhood Parks as Crime Generators.” *Security Journal* 25(1) (2012): 16-17.
[2553] Groff, E, and McCord, E. S. “The Role of Neighborhood Parks as Crime Generators.” *Security Journal* 25(1) (2012): 17-18.
[2554] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 98-100.
[2555] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961)
[2556] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 101.

District quality. Unfortunately, while smaller parks tend to improve the District values, larger parks tend to have a negative impact upon the District quality.

> "Besides tending to produce these vacuums in the nearby general land (and hence abnormally poor places for diversity or social vitality to grow, borders divide up cities into pieces."[2557]

In the category, "Access to Civic and Public Space," LEED-ND has a recommendation that at least 50% of the residential areas be within some limited distance from public space.[2558] "Locate and/or design the project such that a civic or passive-use space, such as a square, park, or plaza, at least 1/6 acre in area lies within a 1/4-mile walk distance of 90% of planned and existing dwelling units and nonresidential building entrances."[2559] This recommendation further pushes for more contiguous parks are not thin strips but 1/4 proportional to their longest length.[2560] For parks greater than 7 acres, the median width must be at least 1/2 acre or more.[2561] The

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[2557] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 345.

[2558] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 67; see also Steuteville, Robert and Philip Langdoc and Special Contributions. "New Urbanism Best Practices Guide." *Texas Tech University Department of Architecture at El Paso.* http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, 2014), p. 2.

[2559] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 67; see also Steuteville, Robert and Philip Langdoc and Special Contributions. "New Urbanism Best Practices Guide." *Texas Tech University Department of Architecture at El Paso.* http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, 2014), p. 2.

[2560] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 67; see also Steuteville, Robert and Philip Langdoc and Special Contributions. "New Urbanism Best Practices Guide." *Texas Tech University Department of Architecture at El Paso.* http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, 2014), p. 2.

[2561] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 67; see also Steuteville, Robert and Philip

“Access to Recreation Facilities” also pushes for 90% of new or existing residences be within 1/2 mile walk of recreational areas for varying policy reasons, although none of them are to increase activity or act as a node.[2562] Within the “Visitability and Universal Design” requirements there are also limitations on distances from public places. This requirement pushes 50% of residential units to be within at least 1/2 mile distance of an elementary or middle school and within 1 mile of an existing or new high school.[2563] TND uses a 1 mile (1600 meters) increment from schools, 0.125 miles from parks (200 meters), and 0.25 miles (400 meters) from transit. What is interesting is that when discussing nodes and their purpose within the urban environment, the benchmarking systems generally look for density rather than function. What is also interesting is that while public parks and services are important, there are no important differences between how either is used. While public services might be disbursed throughout the entire landscape, parks are more problematic. As a result, the design in parks within the built form might be more a functional and practical question than one of beautification or District appeal.

As one can see, nodes are important to urban from but they do not provide all of the mapmaking and imageability requirements that a city needs. Nodes have the perfect ability to create transitions within the environment. While they allow people to travel in a

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Langdoc and Special Contributions. “New Urbanism Best Practices Guide.” *Texas Tech University Department of Architecture at El Paso.* http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, 2014), p. 2.

[2562] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 67; see also Steuteville, Robert and Philip Langdoc and Special Contributions. “New Urbanism Best Practices Guide.” *Texas Tech University Department of Architecture at El Paso.* http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, 2014), p. 2.

[2563] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 76.

specific direction, they do not provide the indicators of direction. That is the function of landmarks.

11.1.1 <u>Data from Research Sites</u>

Within the Site Areas, there were an average of 104.83 intersections in each site area. Of this number, there were a much smaller number of large and important nodes, with an average for the Site Areas being 4.83 nodes. Of this number, San Francisco had 41% of the mean, the Portland Site Area had none, New York had 186% of the mean, Paris has 62% of the mean, Amsterdam had 186% of the mean, Barcelona had 124% of the mean and Atlanta had none. The average node to intersection ratio was 5%. In short, 5% of the intersections should function as larger nodes for placemaking and imageability purposes in order for the city to be resilient. Of these nodes, the average distance between them was 1,989.03 feet. Within the resilient cities, these nodes most often functioned as transit and subway joints or stations, had landmarks at the location, and had commercial areas at the location. What this means is that the Site Areas used nodes to their maximum potential by capitalizing on the nature of the node as a place for transit and assembly, by creating more draw for crowds with commercial areas and important landmarks.

The Site Areas had an average of 6.67 squares within the Site Area or 1/2 mile from the Site Area. Of these squares, they had an average square footage of 100,483.68 square feet, and they were spaced on average 2,843.30 feet apart. There were on average 9.17 small parks in the area acting as nodes, and these had an average square footage of 109,823.15 square feet. These small parks spaced about 2,133.75 feet apart. What is also important is that while many sites had a larger park, these did not function as the largest parks of the area. There were generally 1.83 large parks either in or within a 1/2 mile buffer of the Site Area. The large parks had on average 3,009,733.39 square feet of space. Unlike other areas, these parks generally functioned as edges of Districts rather than as nodes. As a result, the Parks were on average 5,687.41 feet apart.

CHAPTER 12.

LANDMARKS: ARCHITECTURAL INFILL AND NODE

> "They may be within the city or at such a distance that for all practical purposes they symbolize a constant direction. Such as isolated towers, golden domes, great hills."[2564]

Some Nodes function secondarily as a Landmark, but not all Landmarks function as Nodes.[2565] While a Node is a center of activity, the landmark can function as a distant or known visual object for the purposes of imaging the city and mapmaking the city within the mind.[2566] Entry into the landmarks is not important, for a landmarks urban form importance is external to the actual structure.[2567]

There are generally two types of landmarks: non-orienting landmarks and reference point landmarks.[2568] Good or "dignified" Landmarks also have the ability to provide a District quality to be discussed later, all Landmarks are unique and their "singularity" allows memorization, and Landmarks have the ability to multiplication effect of other urban form elements by their proximity.[2569]

> "Landmarks, the point references considered to be external o the observer, are simple physical elements that may vary widely in scale. There seemed to be a tendency for those more familiar with a city to

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[2564] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 48.

[2565] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003.: 4.3-7; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 48.

[2566] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-3.

[2567] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 48.

[2568] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 500-501; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-6; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 78.

[2569] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961); Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-6; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960: p. 78; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 500.

> rely increasingly on systems of landmarks for their guides—to enjoy uniqueness and specialization, in place of the continuities used earlier."[2570]

Because of its uniqueness, if a Landmark is located at a Node, Pathway or District, the Landmark has a multiplier effect of that urban form element. If placed in relationships to other types of urban form, they create larger dynamics for the city.[2571] This effect can crate force tensions which bring the city together, or set up the city for future changes or unification developments such as with Haussmann's Paris and Sixtus V's Rome. They often create dynamic space where patterns are formed that improve the totality of the surrounding form.[2572]

> "Here, though, it is the occasional lower buildings—museums, clubs, churches—that are the landmarks."[2573]

Anything can be a landmark from a small square, a fountain, a unique door or a barn.[2574] Non-orienting landmarks are those landmarks that do not break the horizon and cannot be seen from a distance. These can be culturally or historically important, but as a result of their height, they generally function as landmarks for persons intimate with the location.[2575] "Location at a junction involving path decisions strengthens a landmark. Historical associations, or other meanings, are powerful reinforcements, as

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[2570] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-6.

[2571] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 83.

[2572] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 83.

[2573] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 288.

[2574] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-3; Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 5; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 48; Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 288.

[2575] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003.: 2.9-6; Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 288; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-3; Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 5; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 48.

they are for Faneuil Hall or the State House in Boston."[2576] For urban form and for city imaging, some reference point landmarks are far more important for they do not require intimate knowledge, and these landmarks are generally internal to the location.[2577] In these situations, smells, sounds and various other character influences can themselves make impressions on the landmark.[2578] Although not part of the skyline, New York Public Library creates the idea of the landmark because it creates focus whereby people can place themselves. "Just so, the New York Public Library building, set in its commercial matrix at Fifth Avenue and Forty-Second Street, forms an excellent landmark, but this is not true of the public libraries of San Francisco, Pittsburgh and Philadelphia, as examples."[2579] Yet, even though it functions as a localized meeting place, it is limited is limited as a reference point landmark, because it is dwarfed by larger buildings in the mass of Manhattan.

Reference point Landmarks clearly stand out in the background, and they are important because they allow the viewer to easily understand the space and the dimension of other things.[2580] In this way, the reference point landmark marks the space in terms of scale and location, and these landmarks act generally external to their

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[2576] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-6; Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 288.

[2577] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2 and 2.9-7; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p.: 116; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 503; Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 288.

[2578] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-7.

[2579] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 502.

[2580] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 48, 78-79; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-3; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 503.

location.[2581] These landmarks act upon locals and nonlocals in the same wayfinding manner, although they might have different cultural or historic meanings due to intimate knowledge.[2582] As with Sixtus V's Rome, landmarks impress within the mind easily imaginable points from which pathways flow.[2583]

> "Figure-background contrasts seem to be the principle factor. The background against which an element stands out need not be limited to immediate surroundings."[2584]

Reference point landmarks are important in spatial ways. They are visible from multiple directions and so they allow people to place themselves in relation to the landmark. Further, they contrast with the surrounding built environment in setback and height. What actually occurs in the mind is that people, who can gauge the height of the landmark actually perform instantaneous calculations to gauge the space between them and the landmark. What they are performing is an instinctual and evolutionary remnant laid down as the Pythagoras theorem. Yet, without this ability to gauge their land between them and other places, this spatial ability ceases to exist or be practical.

> "Spatial prominence can establish elements as landmarks in either of two ways: by making the element visible from many locations (the John Hancock Building in Boston, the Richfield Oil Building of Los Angeles), or by setting up a local contrast with nearby elements, i.e. a variation in setback and height."[2585]

Reference point landmarks are more important if they are recognizable by the casual viewer.[2586] This is because people who are intimate with the District generally use other landmarks that they recognize, that are also known within the District for maneuvering

[2581] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 116.
[2582] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 116.
[2583] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 5.
[2584] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 79.
[2585] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 80.
[2586] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 81.

around their own District. But for those who do not have intimate knowledge of the location, obvious or distant viewing is necessary.[2587] This causes a bottomless effect with reference point landmarks because only their tops, or the area where they break through the average height of the surrounding area matters.[2588]

> "Most of Boston's distant landmarks, in fact, were 'bottomless;' they had a peculiar floating quality. The John Hancock Building, the Custom House, and the Court House are all dominant on the general skyline, but the location and identity of their base is by no means as significant as that of their top."[2589]

Humans use mountains or other prominent items in the environment for traversing normal environments or rural areas, it only makes sense that we do the same in cities. But, in cities, we have to build them.[2590]

> "A sequential series of landmarks, in which one detail calls up anticipation of the next and key details trigger specific moves of the observer, appeared to be a standard way in which these people traveled through the city."[2591]

Building heights that are controlled by regulation and zoning ordinances create problems for reference point landmarks because these mechanisms require building uniformity based on location, use or District character. "Control of the landmark and its context may be needed: the restriction of signs to specified surfaces, height limits which apply to all but one building."[2592] Many times, landmarks are all placed in one location, and as a result, the remaining built environment does not receive the benefits that landmarks bring.

2587 Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 81.

2588 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-7; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 81.

2589 Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 81.

2590 Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 83.

2591 Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 83.

2592 Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 101.

> "Its location is crucial: if small, there are certain zones that receive more perceptual attention than others: floor surfaces, or nearby facades at, or slightly below eye level. Any breaks in transportation—nodes, decision points—are places of intensified perception."[2593]

In this situation, cities destroy the landmark by requiring density within one location, or by limiting the size of landmarks to similar heights, styles or types.

> "A landmark is yet stronger if visible over an extended range of time or distance, more useful if the direction of view can be distinguished. If identifiable from near and far, while moving rapidly or slowly, by night or day, it then becomes a stable anchor for the perception of the complex and shifting urban world."[2594]

In 1260, during a period of constructing the new wall, several other landmarks were built to signal important places within the city. "Large institutional buildings were also constructed inside the urban enclosure. Some old churches such as Sant Pere, the cathedral and Sant Miquel were rebuilt, while others were new constructions offering health and welfare services."[2595] These buildings were placed in the city in particular areas. "These buildings were inserted at strategic points and selectively enhanced the most immediate urban spaces: the names of many streets in the old town still recall these sites."[2596] The city builders and planners inadvertently created nodes and landmarks which served as effective placemaking points for the medieval city, which met the needs of the city, did not consolidate all the public areas into one area, and helped the city coalesce into one urban structure.

> "These were generally built in the Romanesque style that inspired the singular buildings of this period. One outstanding example is the cloister of Sant Pau del Camp, which combines good Romanesque in the form of its heavy proportioned cloister with double columns and capitals, and Mudejar style, in its trilobe arches with Mudejar details."[2597]

[2593] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 101.
[2594] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 101.
[2595] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 44.
[2596] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 44.
[2597] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, pp. 44-45.

Jacobs noted that in New York City, known landmarks like the Empire State Building and the Consolidated Edison Tower were no longer landmarks in the normal sense.[2598] For people seeing them from the streets close by, these same buildings, inconsequential in their differences from neighboring buildings, are inconsequential as landmarks."[2599] As a result, non-orienting landmarks such as the New York Public Library, the Rockefeller Center and others took priority because while they could not be seen, they could be places for people to meet, and because of the highly organized grid system, these areas could be quickly found on a map.

> "The plaza at Rockefeller Center in New York is such a place; to users of the city on the ground in its vicinity it is much more of a 'landmark' than the towering structure behind it or the lesser towers further enclosing it."[2600]

As a result, one obtains large cities with no discernable landmarks. As stated before, the strength of a landmark is in its singularity or uniqueness.[2601] It becomes problematic when there are too many landmarks within a city--Midtown Manhattan. In contrast, Barcelona divides up its landmarks across the cityscape at tactical points, and as a result, it obtains the full benefit of its landmarks. Since the use of landmarks involves the singling out of one element from a host of possibilities, the key physical characteristic of this class is singularity, some aspect that is unique or memorable in the context."[2602] If there are too many landmarks within any given location, then the buildings only act as out of scale architectural infill. As a result, their ability to contrast with their environment

[2598] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 503.
[2599] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 503.
[2600] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 504.
[2601] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-6, 2.10-3; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 500; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 78.
[2602] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-6.

or give a full measure of their prominence to a particular location is quashed.[2603] In this situation, Nodes, street routes and gridpatterns, street naming and other reference points then become crucial in order for imaging the city.

In their ability to mark space, landmarks have a measurable quality by dividing urban form into finite pieces of measurable scope.[2604] As a result, they have a measurable quality in relationship to height versus distance to the viewer. As a result, their position and distance become important in gauging the totality of the urban spread.[2605] This often requires these buildings to be at landmark scale. Jane Jacobs noticed that the roofline of the buildings affected the type of enclosure present, and that some of these buildings were out of scale with the other structures. Jane Jacobs also hinted at the relationship between those that broke the structural complementarity. In a sense, these out of scale buildings were pregnant landmarks in that they were neither in scale to be normal buildings nor were they to the scale that they would become reference point landmarks. This means that reference point landmark must vertically break with the adjacent buildings in order to be a landmark.

Lastly, Landmarks can also mark a place as a character or a District.[2606] They tend to be so prominent, they start to define the District's character and quality. A good landmark will be harmonious with the urban form and add to the District quality than act as a negative to that quality.[2607] For some developers, civic structures receive landmark

[2603] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-6; Tunnard, C. and B. Pushkarev. *Man-Made America: Chaos or Control?* New Haven, CT: Yale University Press, 1963, p. 140; Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 5.

[2604] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 503.

[2605] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 503.

[2606] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 79.

[2607] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-3.

status regardless of their scale or where they place within the built environment. “Civic buildings receive the most dignified sites—usually on an important green, plaza, or square, at a key main street intersection, and/or terminating a significant axis.”[2608] For some, this results in the creation of civic centers or traditional town squares. While within smaller communities this might work, it only works when the community is small enough and the general architectural infill is small enough, that the civic structures stand out against the field. In larger communities, to be reference point landmarks, these buildings must be of landmark scale in order to stand out from the rest of the field, and they must be dispersed rather than clustered in order to have uniqueness. While parks and greens might be historic or intimate landmarks, they do not ultimately become reference point landmarks. However, this does not preclude the use of these structures to create a District quality for the District.

In the Site Areas, there were on average 5.50 referencing landmarks. In most cases these were large buildings, but with Amsterdam, the canals serve as referencing landmarks for how they encircle the medieval core. In the Site Areas, there were an average of 12.50 non-referencing landmarks. Of this number, San Francisco has 64% of the mean, Portland has 24% of the mean, New York has 80% of the mean, Paris has 216% of the mean, Amsterdam has 48% of the mean, Barcelona has 168% of the mean and the Atlanta Site had none. However, this study did not count the hospital in the Site as a referencing landmark, although it might be a referencing or non-referencing landmark for some. With an average of 18 landmarks within the or within 1/2 mile of the Site Area, these landmarks were spaced on average 1,538.41 feet apart, and the referencing landmarks on average were 343.33 feet in height. This makes most

[2608] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 170.

referencing landmarks at a different scale than normal buildings creating enclosure. In fact, the average landmark height is more than 3 times the average building height for enclosure. While many nodes had landmarks, not all landmarks worked in reference with a node. Of the 3 landmarks on average that were at nodes, there were 15 other landmarks on average that were not at nodes and which existed along pathways or terminus areas.

CHAPTER 13.

DISTRICTS, THE TRIBAL AND THE AESTHETIC

> “The termination of a district is its edge. Some districts have no distinct edges at all but gradually taper off and blend into another district. When two districts are joined at an edge they form a seam. Fifth Avenue is an eastern edge for Central Park. A narrow park may be a joining seam for two urban neighborhoods.”[2609]

13.1 The District

> “The city is composed of component neighborhoods or districts; its center, uptown, midtown, its in-town residential areas, trainyards, factor areas, suburbs, college campuses, etc. Sometimes they are distinct in form and extent--like the Wall Street area of Manhattan. Sometimes they are considerably mixed in character and do not have distinct limits--like the midtown area of Manhattan.”[2610]

Every city has Districts. “Every city consists of a series of parts which we refer to as districts or enclaves or sectors--or perhaps as quarters, precincts, or areas.”[2611] The most resilient cities have multiple Districts that reinforce not only the particular image of the District but also tend to positively characterize the city itself. Some people only have to name their District, and the world knows where they are from: Greenwich Village, the Castro, South of Market, Hollywood, Tribeca, Harlem, Upper East Side, the Golden Mile, the Ensanche, Cuitat Vella, Ginza, Potsdammer Platz, etc.

> “A small town has at least several distinguishable areas; a metropolis may have fifty or a hundred.”[2612]

A District is a section of the city of any size, usually medium to large, that a person mentally enters and knows they are in a city location of a particular character.[2613]

[2609] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-2.
[2610] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-2.
[2611] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-10.
[2612] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-10.
[2613] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-1; Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 47, 66.

Districts are recognized by the commonality of their innumerable designed characteristics such as District edge, size and measure, grain and texture, coherency and order, density and vitality, age and diversity, and complexity and contrasts. "Distinctive physical characteristics might include 'thematic continuities, such as texture, space, form, detail, symbol, building type, uses, activities, inhabitants, degree of maintenance, and/or topography."[2614] Any individual pattern, aesthetic or design would not create a district; however the overall strength in quality of all of these characteristics combined define an area, thus allowing imageability to occur. [2615] District can also be created by environmental factors such as topography or bays--San Francisco's hills and bay.[2616] Further, Districts are complex because what element might be important for one District is not important to another district.[2617] When an innumerable number of elements saturate an area with a particular characteristic, the District emerges as a particular part of the city as an urban characterization or stereotype.[2618]

> "When all factors manage to work together to such ends, a feeling of physical and psychological well-being results: the feeling that a space is so thoroughly pleasant place in which to be."[2619]

> "In a closely built city such as Boston, homogeneities of façade—[67] material, modeling, ornament, color, skyline, especially fenestration—were all basic clues in identifying major district."[2620]

[2614] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 115; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-4, 4.3-2.
[2615] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 67.
[2616] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 67-68.
[2617] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-10.
[2618] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4-311..
[2619] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 6.
[2620] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 67-68.

13.1.1 *Edge and the District*

The District does not relate to other urban forms in the same way as they relate to each other. The lot creates the block which links to the Street and pathway which is limited by the node and the landmark. The District relates only to other Districts. “Always identifiable from the inside, they are also used for exterior reference if visible from the outside.”[2621] Thus, the District edge is an important factor. These edges can be strong such as streets, blocks, boundaries, etc., and edges can be soft such as the permeable edges made by more densities of things than specific locations.

> “Some districts may have hard and precise boundaries, while others might have soft or uncertain boundaries. A district might, for example, possess no clear edges, with its distinct qualities gradually fading away into surrounding areas.”[2622]

These edges can though can be permeable and yet set by racial, ethnic or class aspects.[2623] “These edges seem to play a secondary role: they may set limits to a district, and may reinforce its identity, but they apparently have less to do with constituting it.”[2624] This might be because the edge itself is not the cause of the District. Rather the whole sum and constitution of parts create the district and the edge. This edge may be formalized, the edge might shift by market or external forces, and a formalize edge may slow a District’s natural ability to reshape, fragment or change--but it will not stop it.[2625]

The District can have substructures within it, depending on the District largeness and the component parts within the District. “There may be sub-districts, internally

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[2621] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 47.
[2622] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 115.
[2623] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 68; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-4.
[2624] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 70.
[2625] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-4.

differentiated while conforming to the whole; nodes which radiate structure by gradients or other hints; patterns of internal paths."[2626] What this says is that Districts are constantly looking of identity clues to determine how they are different and their proximate location in relation to other Districts and subdistricts.

> "[You] are somewhere in X," but "you are in in X, near Y."[2627]

Districts are also generally filled with people who have similar characteristics--they agree in some manner.[2628] Districts are introvert in some matters because people tend to live in areas which suit them, thus bringing them into contact with people who are more similar by District.[2629]

> "But for all the innate extroversion of city neighborhoods, it fails to follow that city people can therefore get along magically without neighborhoods. Even the most urbane citizen does care about the atmosphere of the street and district where he lives, not matter how much choice he has of pursuits outside of it; and the common run of cities do depend greatly on their neighborhoods for the kind of everyday lives they lead."[2630]

Still this similarity allows people to build social capital with others in their District, thus people create networks with those around them.[2631] This allows for self-governance.[2632] Aside from street neighborhoods and stating that 5,000 to 10,000 people is too small to create a neighborhood or District, Jacobs stated that Districts or neighborhoods would need up to 100,000 to be functional.[2633] One wonders whether it would practical or

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[2626] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 104.
[2627] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 104.
[2628] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 153.
[2629] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 152-3.
[2630] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 152.
[2631] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 153.
[2632] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 153.
[2633] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 153.

possible for a city to fabricate a District for so many, with such limited budgets. Thus the neighborhood becomes an issue.

13.1.2 Neighborhood versus the District

> "As a sentimental concept, "neighborhood" is harmful to city planning. It leads to attempts at warping city life into imitations of town or suburban life. Sentimentality plays with sweet intentions in place of good sense."[2634]

For some planners and for efficiency's sake, the neighborhood has been used in place of the District. Other planners and urban critics state that the neighborhood is a dangerous characterization, the neighborhood and the district are just simply different animals--one is an urban form model whereas the other is a development model.[2635]

> "Isaacs is right when he implies that the conception of neighborhood in cities is meaningless—so long as we think of neighborhoods as being self-contained units to any significant degree, modeled upon town neighborhoods."[2636]

The District and the neighborhood are actually separate qualities and defined by different measures. Where a District contained a definable concentration or quality of designed things, and the neighborhood is based on a unit of measure that harkens back to previous planning methods--the pedestrian shed.[2637] "The physical size of the neighborhood is defined by a five-minute walk from its geographic center to its edge, covering approximately a quarter of a square mile."[2638] This neighborhood scale is the

[2634] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 146.

[2635] Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 215; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 146-152.

[2636] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 152.

[2637] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 13.

[2638] Tachieva, Galina. Sprawl Repair Manual. Washington: Island Press, 2010, p. 23; Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, pp. 16, 46.

result of research based on safety factors, walkability factors and matters of policy rather than what causes an actual District to form. Further, even if a party develops a neighborhood, its district quality may change depending upon the regulations and requirements of the neighborhood and how the neighborhood changes over time. Still, many developers use District characteristics within the design of neighborhoods.[2639] For Transit Oriented Development, the neighborhood is considered a circular impact area of 125 acres, or an area with a center with a walking radius of around 1316 square feet or the same pedestrian shed.[2640] Yet both the pedestrian shed and the impact area are based on measurements of feet rather than characteristics or qualities.

Further, the District cores is different than neighborhood. “Some districts, have strong cores which radiate their influence to the perimeter or edge of the district.”[2641] Other Districts might not have a discernable center, and others may have more than one center. In contrast, designers plan a neighborhood to have one definable center.[2642]

> “A center is a focal point (and often a gathering place), not necessarily a geographic mid-point, where a variety of housing and commercial and civic amenities are provided for surrounding suburban developments.”[2643]

Ultimately what happens with a development based neighborhood model though is a proliferation of discernable centers caused by a continued gridding of pedestrian sheds, each with a discernable center.[2644] “The more the catchments of the sheds overlap, the more they tend to compete with each other and dilute each other’s viability as mixed use

[2639] Tachieva, Galina. Sprawl Repair Manual. Washington: Island Press, 2010, p. 23.
[2640] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 120-130.
[2641] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 71.
[2642] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 16.
[2643] Tachieva, Galina. Sprawl Repair Manual. Washington: Island Press, 2010, p. 25.
[2644] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 46.

centers, unless a composite shed is planned with centers whose function complement each other instead of competing."[2645] Since the neighborhoods would not compete with each other, an urban grid of centers would form near each other. Yet, together, they would not have a communal center or normal urban unity.

13.1.3 The District Generally From the Research Sites

The Site Areas on average had 1.33 planning Districts that were part of the Sites. While not intentional, the picking of the sites according to urban from measures did not coordinate with the neighborhood in existence. Ian the San Francisco, the Site Area crosses both the Castro and the Noe Valley neighborhood areas. In New York, the Site area is within the West Village. In Portland, the Site Area was within the University Park area. In Paris, the Site Area crossed both the Republique - Bastille, 11 er. Arrondissement, Nation and the Bercy 12 er. Arrondissement. In Amsterdam, the Site Area was within the Niew Pijp (Oud Zuid) area. In Barcelona the Site Area was within the L'Antiga Esquerra de, La Nova Esquerra de, and Dereta de l'Eixample zones. In Atlanta, the Site Areas was fully within the Old Fourth Ward. What this indicates is that while urban form is not fluid, Districts are. Districts are formed by more densities and clumping of form, textures, materials, and typologies rather than by roads. In the Site Areas, on average 50% of each Site Area was within another neighborhood.

Still there were some similarities with the urban from and the Districts. The average largest number of grid patterned blocks within each District was 52.17 blocks, with the average second largest block of blocks being 6.50 blocks. The average number of nodes in the District was 4.83, and the average number of street lengths in the Districts is 33.17. The Districts did have perceived centers, with many on average

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[2645] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 46.

having 2 centers. What is also interesting is that while there were perceived centers of the Districts, generally all of the Districts had at least 6.50 street lengths which were either cultural or commercial centers of each of the Site Areas.

What is interesting is that while 0.83 or 83% of the Site Areas had important views due to topological variances, only 17% of the Site Areas had street grids or blocks actually affected by the topographic areas. Amsterdam was the only city that had a street layout affected by natural or, in Amsterdam's case with its canals, manmade topographic context. In all of the cases, the only Site Area that had topological issues that affected building placement was San Francisco. Because of the hills, San Francisco has over 6 street blocks where the horizontality of the building or architectural infill is affected by the topology. In all other cases, and even in Atlanta, there were no environmental issues which significantly impacted the District or changed the structure of the urban form.

13.1.4 <u>Grain and Texture</u>

> "In the city, large blocks with buildings of varying sizes could be described as having a coarse and an uneven texture. If the building are uniform in size, they could be described as having a coarse grain but a uniform texture."[2646]

Districts have a particular fine or coarse grain and texture.[2647] Depending on the gridpattern formation, many Districts have distinct and defined Street networks which set them apart from other Districts. Whether these patterns be hierarchical gridpatterns, accreted gridpatterns, radial gridpatterns or sprawl gridpatterns, the Districts many times have a unity which is spatial in nature.[2648] Mixtures of gridpatterns may indicate separate development patterns or times of development--indicating different Districts. This level

[2646] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-7.
[2647] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-7.
[2648] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-6 to 4.3-7.

of fineness determines the character of the urban District and is more indicative that other similarities will also be present--ex. architectural infill.[2649]

13.1.5 Coherency and Complementarity

> "Coherence is the sense of visual order. The degree of coherence is influenced by the consistency and complementarity in the scale, character, and arrangement of buildings, landscaping, street furniture, paving materials, and other physical elements."[2650]

When people enter Districts they find a cohesion and complementarity in characteristics and on various scales.[2651] Unlike legibility which structurally applies to streets and large elements, complementarity relates to the unity between elements as a total form Complementarity is when the District characteristics agree in like and kind and get along with each other.[2652] Both of these characteristics produce the sameness and linkage that is required for the District characteristic to form.

> "Coherence refers to buildings, landscaping, street furniture, paving materials, and other physical elements that make an individual street appear orderly."[2653]

This subjective and aesthetic category is composed of multiple elements that have not been conscribed to a specific set.

The tests of coherency tend to be very inconsistent because it is the totality of what is seen by people on the Street. "If signs have enough characteristics in common, the street scene will appear orderly, logical, and predictable to pedestrians strolling by. If not, it will appear messy."[2654] It includes buildings, architecture, the street and the sizes

[2649] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-7.
[2650] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 16.
[2651] Cullen, Gorgon. *The Concise Townscape.* London: Reed Educational and Professional Publishing, 1961, p. 152
[2652] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 287.
[2653] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 18.
[2654] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 18.

and shapes of things and how they relate to each other. “Buildings on the best streets will get along with each other. They are not the same, but they express respect for one another, most particularly in respect to height and the way they look.”[2655] This might seem like a Street attribute, but in reality these qualities extend from Street to Street, and they express themselves on the District level. “Coherence implies not mindless repetition or blandness but, rather, continuity of design and thematic ordering.”[2656] The more coherent the pattern and the more interesting the streetscape, the District quality will be set and become fixed in the imageability of the residents.

> “Achieving coherence (often termed compatibility) may be the overriding purpose of urban design guidelines and standards. As the City of Glendale, California (2011), puts it: ‘The purpose of the design review process is to ensure compatibility and a level of design quality acceptable to the community.’”[2657]

Along with being coherent, District infill must agree in like and kind and have a degree of sameness which allows the District quality to form.[2658] “Overwhelming, the buildings on the best streets get along with each other. They are not the same but they express respect for one another, most particularly in height and in the way they look back.”[2659] This characteristic includes not only forms created by people but also those characteristics that are contextual like topological and environmental contexts--views, slopes, etc. When discussing complementarity, Jane Jacobs discussed the heights of buildings, and came to the conclusion that rooflines had to coordinate in some pattern. If

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[2655] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 16; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), Jacobs, Allan B. *Great Streets*. Cambridge, Massachusetts: The MIT Press, 1993, p. 287.

[2656] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p 17.

[2657] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 18.

[2658] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 287.

[2659] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 287.

buildings were too different, then they tended to break a type of understood inherent in the District.[2660]

> "Whether by norms or by regulation (which has often been a major determining factor in height of structures along these streets), they have a sense of regularity and of order, observable in their other physical characteristics as well."[2661]

This complementary generally is natural process unless forced by building regulations, zoning mechanisms, association requirements or other self-created rules which impose aesthetic requirements that artificially impose coherency and complementarity while simultaneously stopping complexity, aging, density, vitality, and changes in grain in texture. Like coherency, complementarity is seen on larger scales than individual infill, and more as how one item relates to a mass rather than how one infill item relates to another.[2662] "Rather, it is a series of characteristics, all of which are rarely present on any one street, but enough of which are always there to express regard and respect, one from another and for the street as a whole."[2663] These comparable details relate to aesthetic, structural or material qualities and they are considerations of this combination as a whole rather than one characteristic.

> "The variables are materials, color, cornice lines and belt courses, buildings sizes, window openings and their details, entrances, bay windows, porches, overhangs and shadow lines and details like downspouts."[2664]

While unproven, this thesis states that, like many evolutionary and biological purposes behind urban form, there might be a purpose behind this need for coherency and complentarity. In one instance, it is an inherent placement and order of things. At

[2660] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 288.
[2661] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 288.
[2662] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 289.
[2663] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 289.
[2664] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 289.

the same time, these placements and similarities between objects make other objects that have no complementarity or coherency very visible against the field of all other infill. This also might be the result of countless generations of hunter and gathering survival techniques. Even still, coherency and complementarity extend imageability which fixes a Street, Block or District within the human mind.

13.1.6 Density and Vitality

> “Samuel Johnson, for one, remarked on this relationship back in 1785. ‘Men thinly scattered,’ he said to Boswell, ‘make a shift, but a bad shift, without many things . . . It is being concentrated which produces convenience.’” [2665]

Density is a type of District quality that allows for better design or it might be caused by better design, but there is no direct causal relationship between the two. One can have extremely dense areas with bad design, one might live in an extremely well planned area with very few people. The District density will determine the ability for Street functions to work because those functions inherently depend upon the interaction between people and the Street.

> “However, it still remains that dense concentrations of people are one of the necessary conditions for flourishing city diversity.”[2666]

Density does have a direct relationship with another District characteristic--Diversity of Building Stock and Vitality. ‘Other actions to create diversity will not be successful if there are no people to live there.”[2667] But density is not actually urban form. Density is the result of urban form and a District characteristic.

> Density is usually measured but it poorly relates to urban form. ‘Urban density is one of the measures that is used frequently in urban design practice, but is also questioned by many as it relates poorly to urban form.”[2668]

[2665] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 261.

[2666] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 267.

[2667] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 267.

[2668] Pont, Meta Berghauser. Measuring Urban Form. http://repository.tudelft.nl/assets/uuid:7dd42b3d-ca3b-4039-b8fc-

The Density problem though for Districts is that regulations tend to force density to an arbitrarily low number, and as a result, various Street functions cease to exist or rarely exist organically. Density is often confused with overcrowding, which was a fundamental issue for early planners due to tenement conditions.[2669] "High densities mean large numbers of dwelling units per acre of land. Overcrowding means too many people in a dwelling of the number of rooms that it has."[2670] At the present time overcrowding means 1.5 persons per room units. With the conflation of overcrowding with density, more modern planners were able to lessen city densities by moving people out into the suburbs.[2671] As a result, Districts became void of people, and Street functions collapsed.[2672]

There are many ways to determine density with the majority of systems using density of persons or densities of residential units. What is interesting is that building codes and zoning regulations try to keep both densities at levels lower than normal market demand would naturally produce.[2673]

> "'The conclusion that municipal zoning lowers development densities should hardly come as a surprise. Among zoning's original stated purpose was to 'prevent the overcrowding of land [and] avoid under concentration of population,' he notes. 'Euclid v. Ambler, which

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cffa8586787d/278635.pdf (accessed July 8, 2014), p. 16; Alexander, E. R. "Density Measures: A Review and Analysis," *Journal of Architecture and Planning Research* 10(3) (1993): pp. 181-202; Forsyth, R. "Measuring Density: Working Definitions for Residential Density and Building Density," *Density Brief*. Minneapolis: Design Center for American Urban Landscape, University of Minnesota, 2003.

[2669] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 268; Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 14.

[2670] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 268; Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 8.

[2671] Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 14.

[2672] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 270.

[2673] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 185.

> established the constitutionality of municipal zoning, was clear in defining dense housing as part of the problem to be treated.'"[2674]

The problem remains though that the towns that people like have high densities, but they live in towns planned and regulated for low densities.[2675] Jane Jacobs stated that the minimum number of persons that could reasonable be called a District is 100,000 people in order for Streets to function correctly.[2676] Yet, for a city for cultural amenities that Districts and cities provide, larger populations may be needed.[2677]

> "The gross size of a city in terms of population is also revealing. Classifications according to size alone are quite useful. A basic population of about 200,000 to 300,000 is necessary to support basic public cultural facilities. Amsterdam, Holland, with a population of about a million people, is of the maximum size that can be traversed on foot by a hearty walker, from center to outskirts."[2678]

What is certain is that lower densities either result in undeveloped rural landscapes or landscapes covered in sprawl.[2679] This is because the market simply cannot provide goods or amenities to sprawl areas at the same scale as highly dense urban cores without an automobile dependent culture.[2680]

Jane Jacobs set minimum standards higher than her contemporaries. She stated that active urban communities can be achieved with a net minimum density of 15 dwelling units per acre and that 50 dwelling units per acre are possible without having buildings above four stories on lots.[2681] For Transit-Oriented Developments, there are

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[2674] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 185.
[2675] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 8.
[2676] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p.8.
[2677] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-6.
[2678] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-6.
[2679] American Planning Association. The Principles of Smart Development. PAS Report No. 479. Chicago: American Planning Assoociation, 1998.
[2680] American Planning Association. The Principles of Smart Development. PAS Report No. 479. Chicago: American Planning Assoociation, 1998.
[2681] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 304.

different unit densities depending on the area in question. Urban Downtown Developments have 60 units per acre, suburban centers have more than 50 units per acre, urban neighborhoods have more than 20 units per acre, suburban neighborhoods have more than 12 units per acre, commuter town centers have more than 12 units per acre, and neighborhood transit zones have more than 7 units per acre.[2682] However, designs for a certain number of units per acre does not calculate into densities actually occurring or whether or not those standards have any contextual or broader effect.

> "Those who studied transit-oriented development saw it failing miserably short of its potential as recently as 2002. In that year, a Brookings Institution report, "Transit-Oriented Development: Moving from Rhetoric to Reality," found that most of what passed for TOD was simply conventional-styled development located adjacent to transit stations. Little of it was walkable, according to the studies authorizes…. Little of it achieved a balance of residential, commercial, employment, and civic uses."[2683]

Sometimes urban services and amenities require a certain unit density in order to function or be practicable. For mass transit to work, research states that there must be a minimum of 14 units per acre.[2684] This means that suburban neighborhoods with fewer units per acre cannot afford or maintain mass transit neighborhoods, leaving out "suburban neighborhoods, neighborhood transit zones and commuter town centers mainly from this advantage."[2685]

In resilient areas, the densities are much higher than those recommended by advocates against overcrowding. Areas in San Francisco have densities of 100

[2682] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, pp. 118-119; Reconnecting America. http://www.reconnectingamerica.org/ (last visited July 10, 2014.

[2683] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 118.

[2684] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, pp. 118-119.

[2685] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, pp. 118-119.

residential units per acre--the minimum of Brooklyn in New York City.[2686] In Greenwich Village, the residential unit densities range from 125 to 200 residential units per acre, without building standardization.[2687] But these resilient areas also have the ground coverage that allows the Street to structurally function. In areas of modernist planning, the densities might be high, but the ground coverages are so low that the Street fails to function properly.

> "Stuyvesant Town was the first of a new generation of large-scale developments and public-private partnerships, and was meant to become the model and proof of the vision that mass housing needs could be satisfied through the private sector."[2688]

In New York City, Stuyvesant Town has a residential unit density of 125 dwelling units per acre, yet with only 25 coverage of the ground, the area has significant problems with creating Street vitality. [2689] As a result, the Streets do not function.[2690]

> "Streets with many people living along them or near them are more likely to have people on them than those that do not. It is a matter of numbers and ease of access."[2691]

By removing the slums, the renewal program created a super block focused on the reduction of ground coverage and the increase of high density.[2692] This was a program to create more quantifiable housing than improve the previous living conditions of the prior inhabitants.[2693] While the plan of Stuyvesant and Voisin are different, their push for

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[2686] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 275.

[2687] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 279.

[2688] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 51.

[2689] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 279-281; Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 50.

[2690] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 279.

[2691] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 304.

[2692] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, pp. 51-54.

[2693] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 51.

high density with park space around them make the similarities fit.[2694] "The MetLife design as essentially marked as a green and safe 'suburb in the city' and underlines this status through its quasi-closure and clear demarcation towards 1st Avenue and 14th Street."[2695] It was created as a suburb in Manhattan, and the result was actually quite similar with the effect upon the Street.[2696] Stuyvesant effectively destroyed the Street until market values started to redevelop and create interest in the location.

In San Francisco's North Beach-Telegraph Hill, there is a 24-hour community that high vitality. "On the other hand, for example, people who live and work in … San Francisco's North Beach-Telegraph Hill, are able to use and enjoy very considerable amounts of diversity and vitality."[2697] Areas like North Beach-Telegraph hill have densities of buildings of about 100 dwelling units per acre, in contrast to Brooklyn's.[2698] Along with this high density is a very highly developed urban form. As a result, it is the place 'to be' and demands high rents. Thus, this area has formed a more professional to affluent class of residents.

On Market Street, the large avenue that divides the city from the Financial District and North Beach to the North and The Mission and South of Market to the South, acts as not only an aspect of urban form but also as a way of focus density and vitality within the city.[2699] "Location has had a lot to do with Market Street's eminence. It is a true spine of the city, like no other San Francisco street, leading from the Ferry Building at the bay

[2694] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 57.
[2695] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 57.
[2696] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 57.
[2697] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 194.
[2698] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 275.
[2699] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 88.

to the foot of Twin Peaks, three miles to the Southwest."[2700] But, it has changed. The things for people to do and see has changed. "To be sure, some important stores remain on Market, and there is even a new one, in a large building at Hallidie Plaza. There is more life and focus there, where the stores are and where the Powell Street cable car ends, than anywhere else on the street."[2701] While this was true in Jane Jacob's time, in the present Market Street has rebound in the Market Street and Powell Street area. In this area, there is a functional node that links all types of transit within San Francisco and reinforces this area as a commercial District.

The direct results of Density is the Vitality of the urban area. Those areas with low Density have limited or no Vitality. While planning departments require designers to build for fewer densities, a conflict of priorities occurs.[2702] Many cities want to create a 24-hour street with a reasonable level of vitality. "Time and again in the 1980s and early 1990s, community groups responsible for planning and replenishing their central areas have called for streets, particularly main streets, to be what they call "24-hour" streets, areas populated with a human presence all the time."[2703] But, their density policies ensure that this will not occur. [2704]

There are many streets in New York that are vibrant, however, they are not vibrant for their entire lengths.

> "Eventually Broadway reaches Columbia University and Barnard College, one to the right, the other to the left. Here all is obvious order

[2700] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 88.

[2701] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 88.

[2702] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 303. Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 1.10-3.

[2703] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 304.

[2704] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 303. Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.10-3.

> and quiet. No more stores, no more activity generated by stores, almost no more pedestrians crossing—and no more watchers."[2705]

Jacobs noted that in areas without density, the amenities were not used and thus a waste of public funds.[2706] "The benches there go empty in even the finest weather.[2707] Certainly, these amenities made the District more aesthetically pleasing, but they had very little other impact. Yet, in the Lower East Side in Manhattan, there are vibrant streets, children playing, people watching the street that keep in touch with those on the street.[2708] In the Lower East Side as a result, there is much more monitoring and visual protections than in around Columbia.

High densities are not equivalent to overcrowding or overpopulation, and with technical advances to address issues like sanitation and public health, these areas many times become extremely vibrant. In Brooklyn, you have areas which like Brooklyn Heights have high densities. However, in areas next too Brooklyn Heights, the densities fall down considerably.[2709]

> "In Brooklyn, New York, the most generally admired, popular and upgrading neighborhood is Brooklyn Heights; it has much the highest density of dwellings in Brooklyn. Tremendous expanses of failed or decaying Brooklyn gray area have densities half those of Brooklyn Heights or less."[2710]

In Greenwich Village, the same effect occurs, the more densely populated an area, and the more valuable the land is to the populous.

[2705] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 48.
[2706] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 48.
[2707] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 48.
[2708] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 48-49.
[2709] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 264.
[2710] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 264.

> "In Manhattan, the most fashionable pocket of the midtown East Side, and the most fashionable pocket of Greenwich Village have dwelling densities in the same high range as the heart of Brooklyn Heights."[2711]

As a result, affordability becomes more of an issue rather than density. Still, even in densely populate areas, the urban form itself might inhibit the Street vitality that otherwise would occur. The urban form surrounding Battery Park acts like an edge to divide the Battery Park from the rest of New York.[2712] Although there are bridges and accessible points, the entire length of the large lanes, act to create seclusion from Lower Manhattan.

> "Battery Park itself, in the most stirring location of the city, riding into the harbor like a prow, has been made to resemble the grounds of an old people's home. Everything thus far inflicted on this district by plan (and everything more which has been proposed by plan) says in the plainest terms to human beings," Go away! Leave me alone!" Nothing says, "Come on!"[2713]

Battery Park was essentially an area that was saved from the superblock by New Urbanism.[2714] "In 1979, in New York, a group of architects that included Alexander Cooper and Stanton Eckstut produced a revised master plan for Battery Park City, a 92-acre endeavor that was destined to become the most significant Manhattan development in half a century."[2715] What Battery Park included initially a series of wharfs extending from the street grid. While most of the streets extended into the wharf, all did not.[2716] The

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[2711] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 264.

[2712] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 180; Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 30; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 218.

[2713] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 207.

[2714] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 62.

[2715] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 43; Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 181; Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 62.

[2716] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 84.

creation of Battery Park did extend many of the streets into the Park area, but not all of the streets had connectivity. The Battery Park design emphasized new urbanist street designed by following "regular arrangement of streets and blocks, respecting the long-established Manhattan street grid."[2717]

> "Instead of the superblocks and megastructures that implied one designer and a single investor for a few very large and expensive projects, these streets defined moderately sized urban blocks that were capable of accommodating buildings designed by a variety of architects using different developers according to design guidelines drawn from the characteristic New York domestic architecture of the 1920s and 1930s."[2718]

One should note though that fewer streets had cross connectivity before the project, and the connectivity post development was greater than the connectivity before development.[2719] Yet, the connectivity and Street edge inherent with the development has tampered its possible success. This is a good example how urban form can completely separate good urban form examples to the detriment of one of them with a fast edge--the Hudson and West Street/9A Highway. Otherwise, Battery Park would probably be more vibrant and integrated within the city than it is otherwise. While considered a great success, its true success has been moderated by urban form itself.

The plan for the development then created blocks and streets, the division of ownership and private and public designations of development.[2720] This was all done at the inception of the project.[2721] "The master plan's basic design principles, notably the extension of the existing street gird and the respect of a locally inspired urban and

[2717] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 43.
[2718] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 181; Banerjee, Tridib. Companion to Urban Design. New York: Routledge, 2010, p. 30.
[2719] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 84.
[2720] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p.64.
[2721] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 64.

architectural character, may sound obvious from today's point of view, but stood in stark contrast to the podium proposals and most urban visions of the late 1960s and 1970s. In order to avoid the isolation of the infill through the nuisance of West Avenue, one of the island's major traffic arteries, it had been decided to extend the grid structure of the neighboring districts of Lower Manhattan to the west."[2722] There is a large portion of the area devoted to open space.[2723] "Another important urban aspect is the very generous provision of open space –14 hectares (35 acres) in total (including 15 per cent of streets)—in the form of several squares and a park on the northern part of the infill." [2724] These areas balance the high degree of density on the built areas.[2725] This area is connected to mass transit with the underground. "Others can use the underground or the replacement of the PATH train station which is currently under construction as part of the World Trade Center redevelopment."[2726]

But, density and vitality cannot make up for the lack of good urban form within the area. When the Streets themselves and other urban form inhibit vitality, then the system must compensate through paid eyes in order for the District to be reasonably safe. On Fifth Avenue in New York, the people have to buy watchers like door hops.

> "But this street is so blank of built-in eyes, so devoid of concrete reasons for using or watching it instead of turning the first corner off of it, that if its rents were to slip below the point where they could support a plentiful hired neighborhood of doormen and elevator men, it would undoubtedly become a woefully dangerous street."[2727]

[2722] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 69.
[2723] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 69.
[2724] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 69.
[2725] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 69.
[2726] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 69.
[2727] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 51.

LEED for Neighborhood Development in its “Compact Development” category has moved to have higher densities for buildings on buildable land.[2728] There is a sliding scale of points that grant higher densities of building units per acre, up to 6 points--more than 63 residential units per acre.[2729] Yet, these standards still are not high enough to sustain the same vibrancy in areas like San Francisco or Brooklyn.[2730] Further, to achieve those unit densities, added points for much higher densities would need to be achieved.

Complexity is really the District characteristic than a Street characteristic, for while any individual street might be complex, the Street loses its complexity if it is not linked up with multiples of other streets in a District fashion. “Complexity s one perceptual quality that has been measured extensively in visual assessment studies.”[2731] Urban critics have stated that the lack of urban complexity creates a “boring” environment. “Scenes with high complexity and low coherence tend to be least liked, causing Herzog, Kaplan, and Kaplan to conclude that “highly complexity urban areas must also be highly coherent.”[2732] Complexity is a rich characteristic that is not based

[2728] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 53.

[2729] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 53.

[2730] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 53.

[2731] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 14.

[2732] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 17; Herzog, T.R, S. Kaplan, and R. Kaplan. “The Prediction of Preference for Unfamiliar Urban Places.” *Population and Environment* 5 (1) (1982): 59; Kaplan, Steven and Kaplan, Kaplan. Humanscape: Environments for People. North Scituate, Massachusetts: Duxbury Press, University of Michigan, 1978; Kaplan, R, and S. Kaplan. *The Experience of Nature: A Psychological Perspective*. New York: Cambridge University Press, 1989, p. 54.

upon the quality of materials nor it is based upon the values placed on those materials--it is visual richness or difference.[2733] This is based on the entire set of urban elements within a setting and their dimensions and effects.[2734] "That complexity of a place depends on the variety of the physical environment, specifically, the numbers and kinds of buildings, architectural diversity, and ornamentation, landscape elements, street furniture, signage and human activity."[2735] Complexity also tends to have a time factor, where age and the constant layering of change create the social and development patterns that inherently create complexity at the location.[2736] Street furniture can also create differences or complexities. "Street furniture also contributes to the complexity of street scenes. Jacobs (1993) states that pedestrian-scaled streetlights, fountains, carefully thought out benches, special paving, even public art, combine to make regal, special places."[2737]

> "Homogeneity of uses poses an unavoidable esthetic dilemma: Shall the homogeneity look as homogeneous as it is, and be frankly monotonous?"[2738]

In order for complexity to exist, contrasts between various forms must be present. While individual items might be complex in themselves, contrast is the complex

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[2733] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 13.

[2734] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 14; Elshetaway, Y. "Urban Complexity. Toward the Measurement of Physical Complexity of Streetscapes." *Journal of Architectural and Planning Research* 14 (1997): 301-16; Stamps, A. E. "Complexity of Architectural Silhouettes: From Vague Impressions to Definite Design Features." *Perceptual and Motor Skills*. 87 (1998); 1407-14; Stamps, A. E. "Sex, Complexity, and Preferences for Residential Facades." *Perceptible and Motor Skills*. 88 (1999):1301-12; Health T. S. Smith and B. Lim. "The Complexity of Tall Building Facades." *Journal of Architecture and Planning Research*. 17(3) (2000): 206-20.

[2735] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 13.

[2736] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 16.

[2737] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 15.

[2738] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 294.

relationship between urban elements. Contrast also represents the complex relationship between Districts. Unlike landmarks which are similarly unique, the contrast between Districts is what makes areas district, even though they have generally similar component parts. “Contrasts in design is what sets one street apart from another, and ultimately what makes one great and another less so.”[2739] Without this contrast the Streets that define the District with their activity will be unnoticeable and unmemorable, and as a result, they become hard for imageability purposes for persons other than those living in the locality.[2740]

> “Stroget or the Avenue Montaigne are not all that different in size or shape from other nearby streets. The Via dei Giubbonari, though more regular and longer than most of those in its immediate vicinity, might be difficult to single out from a map. Roslyn Place might be so short as to go unnoticed.”[2741]

While the lack of complexity and contrast causing monotony cannot specifically be related to sensory deprivation, directional shifts within urban form and new experiences might have a quantitative benefit to the brain because they stimulate brain activity. Human brain plasticity is the ability of the brain to change shape and function as a result of new experiences and changes in the environment.[2742] “It is now clear that experience produces multiple, dissociable changes in the brain including increases in dendritic length, increases (or decreases) in spine density, synapse formation, increased glial activity, and altered metabolic activity.”[2743] Some have also stated that the directional shifts and changes within the urban environment also enhance the visual

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[2739] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 306.

[2740] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 306.

[2741] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 306.

[2742] Kolb, B, and Whishaw, I. Q. “Brain Plasticity and Behavior.” *Annual Review of Psychology* 49(1) (1998): 43-64.

[2743] Kolb, B, and Whishaw, I. Q. “Brain Plasticity and Behavior.” *Annual Review of Psychology* 49(1) (1998): abstract.

clarity of the rest of the field.[2744] "At the same time more abrupt directional shifts may enhance visual clarity by limiting the spatial corridor, and by providing prominent sites for distinctive structures."[2745] One could say that even without proof of causation, those urban areas that are diverse, that do not experience monotony and that do not create fullness are those areas that urban planners need to build, if only for the benefit of the human brain.[2746]

13.1.7 <u>Age, Diversity (Building, Use, People and Warning)</u>

> "Between these extremes of age and evolution, there are many variations of old or new streets and rapidly or slowly developed ones. If one criterion for being outstanding is that a street stand a test of time, be long continuing, then the likelihood is that the examples of for study will be older rather than newer."[2747]

On unmistakable problem with developers or the public creating Districts is that Districts take time to build. What developers try to do is mimic time by imposing design changes within the various developments to allow for building diversity. Time allows individuals and planning authorities to "tinker" with the urban form and replace that urban form which is not resilient or which has ceased to function.[2748] Time also allows those functions and elements which function well to remain. "Major changes to the Champs-Elysee, we are led to believe, are forthcoming, but presumably they will not affect the main line of trees, or the building line."[2749]

Yet, the amount of time necessary for a great Street to form is not measurable, because for some it takes eons whereas others are developed in relatively a short period

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[2744] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003.: 2.9-3]
[2745] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003.: 2.9-3]
[2746] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003.: 2.9-3].
[2747] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 307.
[2748] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 307.
[2749] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 307.

of time.[2750] "On others, like Monument Avenue or the Paseo de Gracia, the buildings took longer, about 100 years, and on Storget the time period is still longer."[2751] Yet, there are many streets which took much less time build and make great streets; the only difference is that they designed the street for the public and not just for a single function--like the lane.[2752]

> "For the public rights-of-way, the story seems different, at least in part. The basic physical nature of most of them was established in a short period, the consequence of a decision to design and build."[2753]

However, functionally, the time that it takes is not the important factor in Street development. Rather, what time does is the important factor. Time creates diversity of building stock which allows further changes to the built environment. The more diversity in building stock, the more changes are not out of place or character to the District. While older buildings remain to keep the District quality intact, other buildings can steadily replace dilapidated buildings. The District quality may change or remain the same, but the nature of diversity is that it allows change and District renewal--it is not simply for diversity's sake.

> "To the extent that incremental building and change do bring the diversity and sense of history that can give body and substance to a street, it may be argued that smaller, rather than larger, building parcels help. Diversity is likely to be a greater initially as well as over time, as building decisions can be made incrementally."[2754]

With Age and the ability to change the built environment, Diversity begins to build an urban structure that allows continual change while remaining coherent.[2755] Time is no

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[2750] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 307.

[2751] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 307.

[2752] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 307.

[2753] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 307.

[2754] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 308.

[2755] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 297; Oliveira, Vítor. "Morpho: a methodology for assessing urban form." *Urban Morphology,* 17(1) (2013): 21-33.

small factor. With more buildings and owners, change is more likely to come incrementally rather than all at once and that, too, adds visual interest as well as a sense of community."[2756] Diversity is the result of a continual working and reworking of the mixed form, a diversity of buildings and mixture of uses occur, which allow for greater levels of Density and more Vitality. Buildings that survive the ravages of time create diversity within the built environment. "With the exception of major buildings and in the absence of conservation controls, other buildings will only tend to survive if able to adapt to new uses or the contemporary demands of existing uses--a quality known as robustness."[2757] The diversity that is there is functional in that it allows more buildings of different types to appear and not disturb the coherency of the District. Some buildings with great cultural or public meaning survive longer than others and provide a character for the districts, or function as landmarks to allow imaging of the built environment.

> "Some buildings--churches, cathedrals and public buildings--will last longer than others for a variety of reasons including the greater investment--both financial and symbolic--in their design, construction and ornamentation, and may become particularly meaningful to residents, symbolically representing the city."[2758]

But, it is time and incremental development that allows diversity to occur with different styles of buildings. Within developments, the problem comes with how do developers or

<http://www.urbanform.org/online/pdf2013/201317_21.pdf> (accessed, July 7, 2014); Caniggia G. and Maffel, G. L. *Composizione Architectonica e Tipologia*. Eds. 1 and 2. Lettura dell'Edilizia di Base and Il Oprogettonell/Edilizia di Basi. Venice: Marisilio, 1979; Muratori, S. *Studi per una Operante Storia Urbana di Venezia*. Rome: Instituto Poligrafico dello Stato, 1959; Conzen, M. R. G. "The Morphology of Towns in Britain During the Industrial Era," in Whitehand, J. W. R. (ed.) *The Urban Landscape: Historical Development and Management Institute of British Geographers Special Publication 13*. London: Academic Press, 1981; Slater, T. R. "The Analysis of Burgage Patterns in Medieval Towns." *Area* 13 (1981): 211-16

[2756] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 297.

[2757] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 79.

[2758] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 79.

well intentioned cities contract this time period to provide for diversity of building stock within shorter periods of time.

The problem with diversity is that zoning regulations and ordinances place arbitrary restrictions upon the natural evolution of the environment thus stifling the diversity that is there and destroying mixed-use potentiality.

> "Variety, activity, liveliness of physical place are likely effects of diversity of uses."[2759]

> "In the same way that a mixed-use environment creates a sustainable and diverse neighborhood by integrating both residential and commercial uses into one building or neighborhood, they also place a variety of shops, services, and amenities within walking distance of neighborhood residents and each other. This reduces car trips and facilitates walking, which contributes to health and fitness. A sustainable neighborhood also offers public facilities and services for residents and visitors in various stages of life. These can include schools, libraries, civic buildings, community centers, places of worship, recreation facilities, and community gardens. Amenities like these are critical to meeting a community's cultural, social, spiritual, and physical needs."[2760]

Land use regulations are based upon public policy propositions about the needs of a populous that, once given legal authority, gain power over large sections of city master planning.[2761] While historically used for both economic reasons and as discriminatory exclusory policies, zoning has effectively removed from the landscape a natural tendency to mix residential and economic activities.[2762] While within a state's

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[2759] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 304.

[2760] U.S. Green Building Council, Natural Resources Defense Council, and the Congress for the New Urbanism. "A Citizen's Guide to LEED for Neighborhood Development: How to Tell if Development is Smart and Green." Natural Resources Defense Council blog. https://www.nrdc.org/cities/smartgrowth/files/citizens_guide_LEED-ND.pdf> (accessed July 9, 2014), p. 11.

[2761] Oliveira, Vítor. "Morpho: a methodology for assessing urban form." Urban Morphology, 17(1) (2013): 21-33. <http://www.urbanform.org/online/pdf2013/201317_21.pdf> (accessed, July 7, 2014), p. 25/

[2762] Village of Euclid, Ohio v. Ambler Realty Co. 272 U.S. 365, 71 L.Ed. 303, 47 S.Ct. 114 (1926); City of Boerne v. Flores 521 U.S. 507 (1997); Erickson, Amanda. "A Brief History of the Birth of Urban Planning." *The Atlantic Citylab*. Aug 24, 2012. http://www.citylab.com/work/2012/08/brief-history-birth-urban-planning/2365/ (accessed August 2, 2014); Thomas Manning, June and Marsha Ritzdorf, eds. *Urban Planning and the African American Community: In the Shadows*.

legal police powers, and as long as they are not in conflict with federal powers, states allow generally local jurisdictions to create these master plans which effectively segregate activities in to Radian City regions--when planners originally just wanted to remove the most vexing heavy industrial activities away from residential areas for health and public safety reasons.[2763] Many times these policy determinations are critiqued because they enforce large segments of the populous to become car dependent, making American cities some of the most automobile dependent cities in the world--sprawl.[2764] While there is a debatable proximate cause between sprawl and automobile dependency, there is no debate about the fact that zoning, which requires creates vast economic re-sectoring, disparately impacts those populations without cars--minorities and the poor.[2765] "Compared to buildings, plot divisions and the street pattern, land uses

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Thousand Oaks, CA: Sage Publications, 1997; Rothwell, Jonathan T. and Massey, Douglas S. "Density Zoning and Class Segregation in U.S. Metropolitan Areas." *Social Science Quarterly* 91, Issue 5 (2010): 1123-1141; Rothwell, Jonathan T. and Massey, Douglas S. "The Effect of Density Zoning on Racial Segregation in U.S. Urban Areas." *Urban Affairs Review* vol. 4, no. 6 (2009): 779-806; Fedako, Jim. "Zoning is Theft." *Ludwingvon Mises Institute*, March 21, 2006. http://mises.org/daily/2077 (accessed July 30, 2014); Babcock, Richard; Fred Bosselman. *Exclusionary Zoning: Land Use Regulation and Housing in the 1970s*. New York: Praeger Publishers, 1973, p. 25; Silver, Christopher. *The Racial Origins of Zoning in American Cities*. Thousand Oaks: Sage Publications, 1997, p. 23; United States National Commission on Urban Problems, Building the American City. University of Michigan: Praeger, 1969; Ritzdorf, Marsha. *Locked Out of Paradise: Contemporary Exclusionary Zoning, the Supreme Court, and African Americans, 1970 to the Present*. Thousand Oaks: Sage Publications, 1997.

[2763] Burke, Barlow. Understanding the Law of Zoning and Land Use Controls. Newark, NJ: Lxis Nexis, 2002; Willrich, Michael. *Pox*. New York: Penguin, 2012, p. 301.

[2764] Willson, R. W. "Suburban Parking Requirements: a Tacit Policy for Automobile Use and Sprawl." *Journal of the American Planning Association*, 61(1) (1995): 29-42; Fischel, W. A. "An Economic History of Zoning and a Cure for its Exclusionary Effects." *Urban Studies* 41(2) (2004): 317-340; Tachieva, Galina. Sprawl Repair Manual. Washington: Island Press, 2010.

[2765] Fischel, W. A. "An Economic History of Zoning and a Cure for its Exclusionary Effects." *Urban Studies* 41(2) (2004): 317-340; Newman, Peter W.G and Jeffrey R. Kenworthy. *Cities and Automobile Dependence: an International. Sourcebook*. Gower Technical: Aldershot, 1989; Frank, L. and Pivot, G. "Impact of Mixed Use and Density on Three Modes of Travel." *Transportation Research Record* 1446 (1994): 44-52; Handy, S, Cao, X. and Mokhtarian, P.L. "Correlation or Causality Between the Built Environment and Travel Behavior? Evidence from Northern California." *Transportation Research Part D: Transport and Environment* 10 (6) (2005): 427-444.

are relatively temporary."[2766] Yet on an urban frame timescale, zoning mechanisms change drastically and often, but the lingering effects upon the urban form of a location can last lifetimes--sprawl, lack of building diversity, lost vitality, etc.

> "Other variables, most notably density and land uses, though not directly part of street design, are so intimately related to physical place that they cry out for discussion."[2767]

Critics have stated more flexible conceptions of economic use often leads to new building stock, changes in street patterns and a revitalized quarter throughout cities rather than concentrating new developments within specific places--to the detriment of the whole. "Incoming uses often lead, through redevelopment, to new buildings, plot amalgamations or subdivisions and, in some instances, changes to the street pattern. By contrast, displaced land uses generally re-locate to buildings in order areas and, rather than redeveloping them, adapt and convert them."[2768] This is especially true in the face of reliable information that proves historic and present demand for mixed-use product.[2769]

> "Storget may no longer have many people living along it, but as the main shopping and commercial street of Copenhagen it is anything but a vacant area and housing is not far away."[2770]

Diversity of use tends to create the most resilient places because mixed-used not only keeps locals on the Street but also brings nonlocals to the areas--creating more

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[2766] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 78.
[2767] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 293.
[2768] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 78.
[2769] Molinaro, Joseph. "National Realtors' Survey Indicates Strong Interest in Walkable Mixed-Use Neigborhoods." *Planners Web.* <http://plannersweb.com/2014/03/national-realtors-survey-indicates-strong-interest-walkable-mixed-use-neighborhoods/ (accessed July 30, 2014); Rowley, A. "Mixed-use Development: Ambiguous Concept, Simplistic Analysis and Wishful Thinking?" *Planning Practice and Research* 11(1) (1996): 85-98; Steinhoff, Steve. "Draft Market Study Shows Demand for Walkable, Mixed-Use Places in Dane County." *Capital Region Sustainable Communities*, entry posted October 4, 2013. http://www.capitalregionscrpg.org/blog/?p=713 (accessed July 30, 2014).
[2770] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 304.

activity. “Diverse uses enliven the area and the street, bring different people for different purposes, help to keep it going.”[2771] Strictly as a matter of urban form, mixed-use tends to create a market demand for a variety of buildings stock, allowing more architectural infill diversity within the District, which in turn leads to a more apparent District quality.

> “On most of these streets, there exist many different kinds of buildings designed for their uses—cinemas, theaters, or schools—or for earlier uses no longer present but adapted to present occupants—movie houses that became restaurants or stores—all of which add to interest an activity.”[2772]

The true benefit is that mixed-use development keep people within their location by providing basic needs and services without requiring automobile dependency, and they sufficiently populate the Street, allowing a vibrant Street functions to exist. While this does not make Districts self-sufficient, this is the process that makes Districts resilient, livable, and more walkable.

> “Another key ingredient. Livable towns and cities are not a series of single-use zones. And the mix can occur both horizontally and vertically.”[2773]

> “A mixture of uses, if it is to be sufficiently complex to sustain city safety, public contact and cross-uses, needs an enormous diversity of ingredients. So the first question—and I think by far the most important question—about planning cities is: How can cities generate enough mixture among uses—enough diversity—throughout enough of their territories, to sustain their own civilization.”[2774]

A side effect of the diversity of use and building stock is the diversity of people that occurs in mixed-use communities. In Districts like the Castro, Greenwich Village, there are high diversities and densities of people, and yet while costs are high, people of different economic strata and ethnic backgrounds live in this situation--because the urban form and the resulting Street attracts all types of people from different economic,

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[2771] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 304.

[2772] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 304.

[2773] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 8.

[2774] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p.188.

racial, ethnic and social strata.[2775] Without building stock diversity, the market limits residency to those who can afford building or financing costs.[2776]

> "Similarly, 'mix' should mean interweaving housing of all sorts of people, not breaking them down into one-class ghettos, whether upper or lower class. In recent housing schemes in Amsterdam, Den Haag, and Rotterdam it is impossible to tell who is buying, who is renting privately, who is a municipal tenant."[2777]

These communities begin to evolve into a mixing of family structures and people of various backgrounds that benefit the society at large and not just the District.[2778] Creating more District qualities like mass transit, affordable housing, more public facilities and support mechanisms facilitate greater District qualities that integrate the people of the District more, and make living in the District more feasible for more economic strata. Further, these qualities allow more social and physical accessibility for people as they age and it makes their lives less difficult to obtain necessary services and accommodations.[2779]

This diversity of age, building stock, use and people are important because these are beneficial ways to define Districts. Still, while edges might create it, while pathways might go through it, and while landmarks and nodes might define it, the District is

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[2775] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 244.

[2776] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 244.

[2777] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 8

[2778] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 8; Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 297; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 255.

[2779] Pont, Meta Berghauser. Measuring Urban Form. http://repository.tudelft.nl/assets/uuid:7dd42b3d-ca3b-4039-b8fc-cffa8586787d/278635.pdf (accessed July 8, 2014), p. 19; Berghauser Pont, Meta and Mashhoodi. Studying Land-Use Distribution and Mixed-use Patterns in Relation to Density, Accessibility and Urban Form. ISUF conference 2011, Montreal, August 26th-29th 2011; Song, Yan and Gerrit-Jan Knaap. "Measuring Urban For: Is Portland Winning the War on Sprawl?" ACTrees: Tree by Tree, Stret by Street: Aliance for Community Trees, 2005. http://www.actrees.org/files/Research/JAPAsong.pdf (accessed July 9, 2014), p. 214; American Planning Association. The Principles of Smart Development. PAS Report No. 479. Chicago: American Planning Assoociation, 1998.

altogether a different type of urban element. It is based on a very tribalist human animal, for ultimately the District is about ‘us’ versus ‘they.’

Without a good District framework, humans seem quite willing to find other ways to create Districts either by exclusive racial, ethnic or economic policies. Not surprisingly, once these unconscionable Districts form, those with power install urban form elements to maintain these edges--edges, pathways, streets, nodes and landmarks. Planning history has many examples of urban form such as highways tactically dividing communities and solidifying policies encouraging and continuing discrimination based on race, class or ethnicity--such as highways.[2780] While the urban elements are not inherently racist or tribal, they tend to reinforce or replicate District qualities unless removed--like the city walls of Barcelona and Paris.

It is impingent upon those working in urban form to be cautious about not planning good Districts, for the lack of planning does not stop Districts from forming from baser instincts. When district notes shift from building type to blackness, urban forms tend to reinforce tribalist notions become dangerous to policy, planning or democratic notions of equality. Thus, social stability and constitutional equality require that Districts be formed well. While urban form cannot cause racism or economic discrimination, Districts can certainly reinforce it.

> “Our difficulty is no longer how to contain people densely in metropolitan areas and avoid the ravages of disease, bad sanitation and child labor. To go on thinking in these terms is anachronistic. Our difficulty today is rather how to contain people in metropolitan areas and avoid the ravages of apathetic and helpless neighborhoods.”[2781]

[2780] Griffin, K. M. “Dividing America? The Role of ‘Division Streets’ in Residential Segregation.” Doctoral dissertation, University of Central Florida Orlando, Florida, 2012. http://etd.fcla.edu/CF/CFH0004156/Griffin_Kate_M_201205_BA.pdf (accessed July 29, 2014); Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 68.

[2781] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961).: 286]

13.1.8 *Data from Research Site*

Within the Site Area one finds that there are around 7.57 buildings or building groups per acre. On average this means that there are over 3.67 average single-family homes per acre, and 24.31 multi-family apartments per acre--with much of this data coming from New York City. In the Site Areas, there are also on average 3.35 commercial buildings per acre. This might result from the fact that within New York, Paris, Amsterdam and Barcelona, much of the first level of building stock has some commercial or non-residential character. However, unlike Portland or Atlanta, these areas have the population density to sustain these building density and vitality levels. The San Francisco Site Area has a density of 22,290.7 persons per square mile, the New York Site Area has a density of 92,834.42 persons per square mile, the Paris Site Area has a density of 51,000 persons per square mile, the Amsterdam site area has a density of 30,391.70 persons per square mile, and the Barcelona area has a density of 92,000 persons per square mile. The Portland Site Area with 5,931.8 persons per square mile and Atlanta Site Area with 8,170.7 persons per square mile do not have these densities.

As a result, the larger and more resilient cities push the District vitality numbers higher than what one would find in either Portland or Atlanta. The average number of banks in the Site Areas is 13.50. The average number of cafés or coffeehouses in the Site Areas is 19.33. The average number of restaurants is 63.50. The average number of libraries is 4.17. The average number of public or private schools is 12.83. And yet the average number of public civic centers in the area is 0.17 or 17%. With most having a 24 night life, it seems that proscribed public spaces are less important than actual public spaces within resilient cities.

What higher populations densities allow are higher diversities of use in the Site Areas. While the actual number of labeled mixed-use areas in the Site Areas is zero, this does not tell the entire story. The average number of blocks that exist as commercial only is 0.50 within the Site Areas. The number of blocks that have both commercial and residential areas is 46.17 blocks on average. The average number of blocks that have commercial, mixed use and public only is 0.67. The average number of blocks that have residential and mixed-use only is 0.33. The average number of blocks that are residential only is 15. The average number of blocks that are public only is 0.67. What one sees is that resilient cities are also economically and residentially diverse cities. Unlike many areas with large residential areas that are proscribed for residential uses only, resilient areas have large areas which have effective commercial and residential uses occurring simultaneously.

13.2 District Indicative Infill

> "Many of the best streets have trees, but not all of them. Many but not all of the best streets have special places to sit and stop along the way. Gateways, fountains, obelisks, and streetlights are among the physical, designable characteristics of great streets, but not always.[2782]

Within urban form, there are two main component parts--the framework and the infill. While the framework is important for its presence or how it structurally or functionally affects urban form, the infill is important for its density and concentration. While any individual infill is rarely uniquely important its own, as a mass or density of types, infill gains importance by creating the District. Infill makes a District, infill distinguishes one District from another, and infill influences how nonlocals or locals intimately or externally view the District. There is no District without infill. In the end, Infill reinforces District imageability by providing the necessary components for District recognition. This thesis narrows down the types of infill into three categories:

[2782] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 293.

architectural infill (buildings and facades); landscape infill (parks, trees and landscape); and Street infill (furniture, signage, bicycles, etc.).

What one finds is that all of these infill have meaning create specific messages transferred from designer to pedestrian within the built environment.[2783] These are coded messages about the District and its people, and they communicate broader messages about social forces that build the cities, lay down the plans and make the Street. Discussed more within Street infill, while any infill's structural and functional attributes are important, the communicative meaning imparted by that infill dominates over the actual material contained in the infill. Human perception of the proper encoded messages thus determines how successful that structural or functional attribute of the infill will become--for better or worse.

13.2.1 Architecture Infill, Meaning in Form

> The importance of built heritage has been part of academic debate since the seminal works of Viollet-le-Duc and Camillo Sitte, and of public debate since the publication of the Venice Charter in 1964.[2784]

Architectural Infill are the various structures that populate the built environment. Most architecture infill within the built environment are not landmarks, but these form tend to provide the most District character of any urban element. As these buildings meet the Street their Street facades change the Street dynamic for the better or worse. Further, some architectural infill have attachments and protrusions like canopies, awnings or details which protrude into the Street, and these affect the Street and the

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[2783] Rapoport, Amos. The Meaning of the Built Environment: A Nonverbal Communication Approach. Tucson: University of Arizona Press, 1982.

[2784] Oliveira, Vítor. "Morpho: a methodology for assessing urban form." Urban Morphology, 17(1) (2013): 21-33. <http://www.urbanform.org/online/pdf2013/201317_21.pdf> (accessed, July 7, 2014), p. 24.

District to varying degrees.[2785] Along with landscape infill, architectural infill is the most important type of District defining characteristic.

13.2.1.1 Architecture Infill, Facades and Landmarks

> "On Rosyln Place, it is material (brick and wood trim), windows (double-hung, many-paneled), size (two and one-half stories), and design style. For the Via dei Giubbonari, it is store sizes, shutters, colors (earth tones), materials (largely stucco, but stone and brick too), and all of the store windows, but not style, as it is along the Boulevard Saint-Michel."[2786]

Generally the architectural details, materials and style tend to be the most dominant aspects of District character.[2787] In Medieval Europe, buildings were structural masonry walls rather than partitions, skins or floors on domino platforms.[2788] "Buildings here have solid masonry bearing walls, not thin skin surfaces hanging between structural columns."[2789] As a result, the District character was one of thick walls and sturdiness, and buildings with walls that had to support the greater weights inside. "The visual--aesthetic character of urban places devices for more than their spatial qualities. The colour, textures and detailing of the surfaces defining urban space make significant contributions to its character."[2790] The diversity of the building stock gives character for the District and allows the District to evolve naturally.[2791] Architectural infill can function to terminate a pathway, create a vista, deflect ta road, create coherency, give a District a

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[2785] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 46.
[2786] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 389.
[2787] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 294.
[2788] Harvey, J. *The Mediaeval Architect*. London: Wayland Publishers, 1972; Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, 21.
[2789] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 21.
[2790] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 184.
[2791] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), pp. 291-292.

texture, and make the District inhabitable[2792]. Most importantly, the architectural infill provides a function and services for the people who occupy or utilize the structure.

> "As noted previously, Meiss uses the notion of radiance to describe the spatial impact of facades. He suggests, that while the built fabric gives an 'image of continuity, of expansiveness, stretching to infinity,' the object is … a closed element, finite, comprehensible as an entity." [2793]

While the size and structure of architectural infill is important for the Street, lot and block structurally, the architectural façade is probably the most important aspect of building design as it relates to the District. This is because the façade directly relates to the District's character, whereas the internal nature of the building relates to the inhabitants to the lot or the building as a mass.[2794] "Beacon Street and Commonwealth Avenue were distinctively partly because of the building facades that line them."[2795] The façade can have a rich façade or articulation, with pattern and rhythm, made of different materials and have verticality or horizontality.[2796] The building can relate to the Street and create an active front or relate internally or to the back of the lot or block.[2797]

When the buildings act as a façade wall, the entire wall becomes frontage for the blocks and lots and a sense of enclosure pervades the location. Yet, the building wall has to have a physical and visual transparency and permeability that allows light and air to seep into the structure and allows people to maintain connections with the Street. In

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[2792] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 184-185; Meiss, Pierre Von. *Elements of Architecture: From Form to Place*. London: Van Nostrand Reinhold, 1990, p. 75.

[2793] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 184-185; Meiss, Pierre Von. *Elements of Architecture: From Form to Place*. London: Van Nostrand Reinhold, 1990, p. 75.

[2794] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2.

[2795] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2.

[2796] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 189-190, 192.

[2797] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 192.

allowing this permeability, various devices create texture over the building façade allowing for differentiations of styles and complexity on the Street and in the District.

> "Buildings do not move. Light, though, moves over them, and the surfaces change, in lightness, darkness and shadow, and therefore in color, as it does. These changes may be slow but are changes nonetheless, and it would seem that the eyes, ever sensitive, are happy to respond. Complex building facades over which light can pass or change make for better streets than do more simple ones."[2798]

The building façade presents an opportunity for a District to diversify and define itself in relation to other Districts. Yet, because of the modernist lack of ornamentation, there was a push to see all things that all things ornamental were suspect--becoming monotones of color and shape.[2799] "This does not explain the countless streets which detailed facades of many surfaces that are every bit as uninteresting and non-eye-catching as Market Street or New York's Avenue of the Americas has largely become."[2800] More likely rigid building regulations, styles and aesthetic codes or formulations, once propagated become industry standards and thus cheaper and easier to reproduce. The issue of cost within the development model has pushed construction and maintenance into the realm of "shoddiness." "There are streets that have all the characteristics we find present on the very best streets and yet do not make the grade. Quality, or rather the lack of quality, is often the reason."[2801] What one finds in the best Streets and Districts is an attention to details that require more care and attention to details, materials, workmanship and the effect of time and wear-and-tear on building facades--and the built environment in general.[2802] The building facades represent a

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[2798] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 283.
[2799] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 284.
[2800] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 284.
[2801] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 291.
[2802] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 292.

palate whereby the District can adopt various design approaches creating a designed District characteristic and common horizontal or vertical orders, systems, approaches to light or environmental issues or aesthetic colors and materials that make the District unique.[2803] "The exercise is not for the purpose of extolling older design styles that with more surfaces are more chances for light to change and to attract and interest the eyes."[2804]

> "Market Street, in San Francisco, has proven a good case in point. Older, detailed, many surfaced buildings, perhaps not architecturally outstanding in themselves, have been replaced by fewer and larger structures, patterned, smooth-surfaced buildings over which light passes more evenly and which hold less interest for thee eye."[2805]

One of the most successful façade typologies is the perimeter block façade. "The flexibility of the perimeter block form can absorb different residential building types from apartment building to terraced houses, as well as other uses."[2806] Further by creating a mass on the Street, it functions to enclose the Street while having intensive use of the Street and Lot connection. In San Francisco, New York, Amsterdam, and Paris, the perimeter block defines areas to create effect.

> "Perimeter blocks also facilitate the integration of different housing tenures, without having to create completely separate buildings, which then often have problems with the use of management of the spaces between the buildings. With a terraced or perimeter block form, buildings can still have separate access from the street, each with their own entrance."[2807]

> "Generally, more buildings along a given length of street contribute more than do fewer buildings. At the very least, there will be one vertical line between buildings where on ends and the other begins, and that single line adds interest."[2808]

[2803] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 283.
[2804] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 284.
[2805] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 284.
[2806] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 56.
[2807] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 56.
[2808] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 297.

Boston's Complete Streets has a Vibrant Street Wall requirement which tries to create a District façade with textures.

> "Well-designed ground-floor spaces with a mix of uses are principle ingredients for a vibrant street front, particularly on Downtown Commercial, Downtown Mixed-Use, Neighborhood Main Street, and Shared Street Types. Offices, residences, and other uses that desire privacy are best placed on floors above the street level. Retail and restaurant uses are more conducive to a vibrant street wall and are preferred on the ground floor adjacent to the sidewalk. The modulation of building facades and treatments creates visual interest along the street wall. Large windows visible from the sidewalk expose activity within the building to the passerby, and help blend the boundary between the sidewalk environment and indoor spaces."[2809]

This can include awnings, lighting, signs, foliage, hanging baskets and other types of designs as part of the Street experience.[2810]

Los Angeles' the Walkability Checklist also recommends that buildings separate from sidewalks with a buffer of landscaping or grade separation, while the entrances to the buildings are on grade with transit stops and sidewalks.[2811] The checklist requires the incorporation of "different textures, colors, materials, and distinctive architectural features that add visual interest," and "scale and interest to the building facade by articulated massing."[2812] It also pushes building to create a scaling rhythm that allow for faces to come forward and back along the streets by reinforcing "the existing facade rhythm along the street with architectural elements."[2813] Interestingly, mirroring Jane

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[2809] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 32.

[2810] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 32.

[2811] Urban Design Studio and the City of Los Angeles Department of City Planning. "Walkability Checklist." http://urbandesignla.com/resources/LAWalkabilityChecklist.php (accessed August 21, 2014), p. 33-34.

[2812] Urban Design Studio and the City of Los Angeles Department of City Planning. "Walkability Checklist." http://urbandesignla.com/resources/LAWalkabilityChecklist.php (accessed August 21, 2014), p. 58-74.

[2813] Urban Design Studio and the City of Los Angeles Department of City Planning. "Walkability Checklist."

Jacobs, the Walkability Checklist pushes for eyes on the street by creating more ground level transparency, and also by shielding glare from pedestrians by providing awning when trees are not present to shade the pedestrian from heat gain.[2814]

In New York City, the buildings tend to be smaller in dimension and contain one or two lot widths within their dimension. "The overall building dimensions tend to be smaller and only contain one-to-two unit divisions within the width."[2815] With LEED for Neighborhood Development under the "Pattern and Design," there is a recommendation that of the 90% of building frontage face a "such as a street, square, park, paseo, or plaza, but not a parking lot."[2816]

While reference point landmarks are at a landmark scale, the buildings with a District must be relatively the same scale in order to create a sense of order and cohesion. However, landmarks themselves can be important to a District as a location device or as adding to the District character. 'Now let us consider that second extra service which landmarks can perform to clarify the order of cities: their ability to help state explicitly and visually that a place is important which is in truth functionally important."[2817] In fact, good landmarks will have both a Landmark quality and a District quality.[2818] This will then be an issue of cohesion, unity and whether the landmark is

http://urbandesignla.com/resources/LAWalkabilityChecklist.php (accessed August 21, 2014), p. 59.

[2814] Urban Design Studio and the City of Los Angeles Department of City Planning. "Walkability Checklist." http://urbandesignla.com/resources/LAWalkabilityChecklist.php (accessed August 21, 2014), p. 60.

[2815] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 56.

[2816] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 41.

[2817] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 505.

[2818] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961); Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-6.

defining the District or is the District defining the landmark's architectural style. The nature of the landmark further complicates matters because landmarks must be singularly different and contrast with the locality.[2819]

> "Some landmarks are very small and can only be seen close up, like a street clock, a fountain, or a small statue in a park. Landmarks are an important element of urban form because they help people to orient themselves in the city and help identify an area. A good landmark is a district but harmonious element in its urban setting."[2820]

However, non-orienting landmarks do define a District quality and can blend in with the surrounding architectural infill. Non-orienting landmarks can act as important parts or centers of the District or as intimate orienting devices.[2821] "Other landmarks are primarily local, being visible only in restricted localities and from certain approaches."[2822] However, like all landmarks, there cannot be too many landmarks within one District.[2823] Yet, still even non-orienting landmarks like churches, post offices, libraries, town halls, civic institutions and other types may be used as aspects to break up the urban fabric and shorten, terminate or define pathways and edges.[2824] "Location at a junction involving path decisions strengthens a landmark. Historical associations, or other meanings, are powerful reinforcements, as they are for Faneuil Hall or the State House

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[2819] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 80-83.

[2820] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-3.

[2821] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-3.

[2822] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2.

[2823] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-6.

2824 Tunnard, C. and B. Pushkarev. *Man-Made America: Chaos or Control?* New Haven, CT: Yale University Press, 1963, p. 140; Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 5; Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 500; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.10-3; Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 170; Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 288.

in Boston."[2825] Further, they can accentuate views, focus the eyes and create the diversity needed for vitality to occur.[2826]

> "Some civic spaces function primarily as community ornaments, enhancing the appeal and value of the streets, buildings, and everything else around them. Most civic spaces, however, are designed not just to be looked at but to be used."[2827]

There are some New Urbanists communities that use civic structures to define Districts.[2828] While they do not necessarily provide placemaking or imageability to a location, they do act as localized reference points and provide District character.[2829] This idea comes from the notion of the traditional town civic square.[2830] "New urbanists have borrowed from numerous historic American examples—such as the greens and commons of New England towns, the squares in James Oglethorpe's plan in Savannah, Georgia, and the Spanish squares in the Southwest—and from those in other parts of the world, especially Europe."[2831] While this tactic does not work with extremely large public structures with low permeability and civic centers which tend to have no residential or Street activity, this tends to work in very small developments or communities where the center is actually a center of Street and public activity.

> "The aim of the City Beautiful was the City Monumental."[2832]

[2825] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-6.

[2826] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 500.

[2827] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 172.

[2828] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 170.

[2829] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 170.

[2830] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 170.

[2831] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 172.

[2832] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 33; Platt, Rutherford H, Rowan A. Rowntree and Pamela

In San Francisco, the Civic Center represents a huge problem for the city. The result of the City Beautiful movement and a collection of landmarks and large public structures, becomes a void within a central area of civic space for itself and the surrounding community. “City after city built its civic center or its cultural center.”[2833] Yet, these civic centers like the San Francisco Civic Center became slums and disconnected to the city.[2834]

> “However they were arranged, the important point was that the monuments had been sorted out from the rest of the city, and assembled into the grandest effect thought possible, the whole being treated as a complete unit, in a separate and well-defined way.”[2835]

The problem with this tactic is that while the CNU communities and their traditional town centers generally work because they are small, larger centers with non-orienting landmarks within a mass do not work within the built environment. It might be because they take up too much space, and as a result there is no night time residential populous to have an enliven street, or it could be that landmarks, being that they are singular in nature, cannot be placed within the same location if they are too large or they will have a negative effect upon the entire location. It should be noted that while the beau arts buildings in Civic Center are beautiful, they do not serve a purpose other than as a collection of non-orienting landmarks.

13.2.1.2 Attachments and Protrusions: Transparency and Shade

> “The variables are materials, color, cornice lines and belt courses, buildings sizes, window openings and their details, entrances, bay

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C. Muick. The Ecological City: Preserving and Restroing Urban Biodiversity. Amherst: University of Massachussets, 1994, p. 27.

2833 Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 33; Platt, Rutherford H, Rowan A. Rowntree and Pamela C. Muick. The Ecological City: Preserving and Restroing Urban Biodiversity. Amherst: University of Massachussets, 1994, p. 27.

2834 Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 33.

2835 Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 33.

> windows, porches, overhangs and shadow lines and details like downspouts."[2836]

Many buildings have details which protrude into the street. These elements have an aesthetic quality and sometimes have a secondary purpose such as protecting people from environmental issues like rain, wind or dangers. "Elements such as signs, awnings and canopies often hang over the sidewalk, and entrances are evenly distributed between commercial and residential uses."[2837] Ultimately many of these hanging devices replace the transparency effect that is easily met with trees: transparency and shade.

Functionally, Shades, Awnings and other hanging devices replace tresses, lattices and trees in the built environment. They also have the benefit of being away from the throughway and out of the pedestrian's way--thus not becoming obstacles to travel. This is especially true in area where either weather or light issues become problems for commercial areas. For a District quality, awnings or other hanging device that act as shade can also have an aesthetic quality which informs the District.

> "Signs and awning canopies can be [joyful] too. The best of the signs are artfully conceived and executed store logs, like the old umbrella announcement along the Ramblas, which is hard not to look at. Such signs are public art in the best scene. Overhead awnings do something else, they create intimate spaces along streets, shady when its sunny, protected and comfortable when it is not."[2838]

Within a Transect concept, the CNU recommends various elements which attach to architectural infill and which could provide District characteristics. For the T6 urban core area, the CNU recommends galleries, arcades, a shop front and awning, a stoop or

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[2836] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 289.

[2837] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 46; see also Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 289.

[2838] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 301.

a forecourt.[2839] For the T5 urban center area, the CNU recommends a shop front and awning, a stoop, a forecourt, or a dooryard and light court combination.[2840] For the T4 general urban area, the CNU recommends the dooryard and light court or the porch and fence combination.[2841] For the T3 suburban area, the CNU recommends a porch and fence and the common lawn.[2842] For the T2 rural area, the CNU recommends a common lawn, and for the Special District, the CNU recommends a slip lane.[2843] Each of these types of frontages require certain things to make them more appropriate, however these designations do not in themselves create a District quality. To have a strong district quality, one would have to set percentages of each of the acceptable options within the Transect areas to ensure that more densities of certain frontage types are within certain Districts, whereas more densities of other frontage types are within other Districts. But, at the same time, what these Transect recommendations do is remove the setback from buildings, which cannot be moved to the Street because of costs. And so they function not as District creating qualities but transparency qualities in order to remove perceived space and thus create a sense of enclosure with the Street. In that quality, they might be successful.

[2839] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 23.

[2840] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 23.

[2841] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 23.

[2842] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 23/

[2843] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 23.

In New York, on Baltic Street, there are no awnings or building signage, and there are no stoops, balconies or fire escapes.[2844] On 3rd Avenue on the Upper East Side, there is building signage but affixed to the wall, and there are no stoops or porches. There are various facades and textures, and the façades have depth.[2845] Where there is building signage, it is attached to the façade.[2846] There are no awnings, no fire escapes, or no balconies.[2847] West 11th Street has 11 stoops or porches per 100 meters, has stoops up and down the street, and has architectural details of porches, windows, handrails, and some fences.[2848] West 11th Street has 2-3 foot fire escapes, has no balconies, and has signage.[2849] Mc Dougal Street, in Soho, has 4 porches or stoops per 100 meters, has no front yard greenery, has outdoor seating, has displays and has 6 overhanging signage, with some fixed or painted to the façade.[2850] Mc Dougal Street also has projections, retail awnings averaging 3 feet in width, and fire escapes of 2-3 feet.[2851] It has no balconies, but it does have street lamps, and signage, and bikes parked next to trees.[2852]

On Bowling Green, there are no stoops or porches, no front yard greenery, and no outdoor uses.[2853] It does have mosaic panels, displays and flag pools, and there is

[2844] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[2845] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[2846] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[2847] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[2848] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[2849] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[2850] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[2851] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[2852] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[2853] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.

building signage at 2 each fixed to façade.[2854] There are no awnings, fire escapes, or balconies.[2855] On Atlantic Avenue in New York does not have stoops or porches, but it does have signs projecting average 3 feet when available. It also has balconies, fire hydrants, bike racks, lamp pots, trash bins, and parking meters.[2856] On Fort Greene, there is one stoop or porch per 100 meters, stoops along setback, and is signage fixed to the façade.[2857] There are no awnings or balconies, but there are fire escapes and street signage.[2858]

For Portland, on NW 23rd Street, there are no stoops and porches, but there are some planters.[2859] There are some hanging signs projecting 4 feet, awnings averaging 4 feet, fire escapes, balconies, and planters with wheels.[2860] On SE Ladd Street, there are 5 porches or stoops per 100 meters. But, there are no building signage, awnings, fire escapes, balconies, and street furniture.[2861] On NW Irvine Avenue, there are no stoops or porches.[2862] There is building signage on the side of the awning, and there are awnings with an average size of 5 feet.[2863] There are no fire escapes, but there are balconies.[2864]

[2854] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[2855] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[2856] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[2857] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 67.
[2858] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 67.
[2859] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.
[2860] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.
[2861] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.
[2862] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.
[2863] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.
[2864] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.

13.2.1.3 Architectural Open Space, the Perimeter Block

While the Street has representative open and public space for residents, an aspect of the perimeter block is the creation of either private, semi-private or communally private space represented within the block core as a result intensification of the block perimeter. As far as the built form, while some have said that it seems that the building massing predetermines the plots, this is generally not the case. The building massings on these block tend to accumulate space together *in private common* with those who hold plots in the block.[2865] This is done within various societies, Amsterdam and Barcelona where precious and limited space is accumulated to form not only larger green areas but larger areas of light wells to allow for light and air to spread through central parts of the building. This is not really a recent idea as it was done in the Palace of Minos in Crete several millennia before.

Within Paris, studies of block patterns have indicated that architectural and block planning worked in concert to maximize the open space internal to the block for multiple types of usage. “For seventeen plots there were only six main courtyards of an identical size and of a simple square shape.”[2866] These courtyards also allowed ventilation of light and air to access the various parts of the block. “Some ventilation wells were used in the interior of the buildings and these were connected in pairs, overlapping on the edge of the plots. In this respect one could say that the block was a single building, a unit in which courtyards had been carved out.”[2867] To accommodate these spaces for air,

[2865] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 22.
[2866] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 22.
[2867] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 22.

common L, T and U shaped buildings allowed for the conglomeration of the open spaces for light, green and air.[2868]

> "It is because of the very heavy densification to maximize the profitability of the ground that the plots became so diminutive in relation to the building types and could no longer be regarded as an equal number of single units. The collective space of the courtyard no more coincided with the unit of the plot: it achieved a hybrid status, neither relating to a single plot, nor to the whole block."[2869]

The effect is that the usefulness of it as a private space became subsumed as its usefulness as a private collective space.[2870] As a result the area of once private space became public space, and the courtyard had to be taken care of. "The courtyard was carefully looked after, and could not become a dumping ground for objects and vehicles and to any activities, which reduced its quality. If there were alterations such as well-designed penthouses or verandas or glazed roofs, this was the owner's business. The pretext was functional (an office, for instance). In any case, it was an improvement that had to be agreed and approved by all."[2871] What we see is that the private became public because of the need to maximize floor space and the need to have green space or multi-use space. As a result, the total block had the smallest amount of greenspace in common that would allow light, air and sun to access the largest amount of floor space possible--in common.[2872] What effectively becomes internalized connectivity in the block becomes separation and building unity and continuity on the plot edge facing the street.[2873] Most interestingly, this space was utilized to allow for multiple types of uses

[2868] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 22.

[2869] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, pp. 22-24.

[2870] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 24.

[2871] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 24.

[2872] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, pp. 22-24.

[2873] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 24.

so that they would be hidden from the street. Thus, these spaces allowed for multiple uses even on blocks with mainly perimeter residential usage. The uses in the block are also related to the open space, connective space in the block. While the block space is usable, specific types of uses like commercial, residential and office were on the outside areas of the block whereas the garage, industrial, parks, sheds, gardens, public facilities, etc. were on the open are of the internalized block.[2874] Thus, while the entire block is multi-use, the multiple types of uses were location specific rather than more flexible as in the US system.

> “The block was then capable of an internal complexity that, without being codified in any specific manner, could be explored and tested, especially through the process of adaptation and correction, which was subject to certain constraints. The hierarchy towards the interior of the block often happened in a sequential order 9first courtyard, interruption, second courtyard, interruption, etc.) and the interlocking of places resulted in a subtle juxtaposition of uses. A vertical hierarchy, more or less extensive and recurring in different parts of the block complicated the horizontal hierarchy”[2875]

As a result, multiple types of usage could allow for a diversified economy close to where people lived. This

> “Multi-functionality cannot be considered at the level of the block, which is not a recognized unit of intervention; it is hardly so at the level of the building type and it is even rejected at the level of the city. In the haussmannien city the workplace was excluded from the private residential block. On the other hand, one can detect the specialization of some districts. Some residential areas appeared free from any connection to production, and were in contrast to districts that one can generally define as working-class and whether the principle of separation between workplace and living questers was not yet applied.[2876]

In Amsterdam, one can also see the perimeter block as it changes from a private, to communality private to public central block garden area. The Vondel Park area of Amsterdam, the block is hermetically closed “nowhere in the wall of facades is there an

[2874] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 35.
[2875] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 25.
[2876] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 27.

opening or passed to the area behind the houses. The interior of the block is occupied exclusively by gardens."[2877] The block dimensions were 270 meters by 65 meters wide.[2878] The lots with the gardens in the back are deeper and taller than other buildings. "Lots with a depth of 35 to more than 40 meters are no exception here."[2879] The Spaarndammerbuurt area also has long blocks with multi-room dwellings. These buildings are about 2-4 stories, have a width of 5.9 meters, and a depth of generally 8.6 to 10 meters, with a dwelling size of 80 meters square.[2880] In the center of the block there are generally public gardens.[2881] What is interesting about this block is that there is a transition occurring between the private and the private held-in-common garden and a new phase of public access.[2882] By the time of Nieuwmarkt the internal block area is been made completely open to the public and serves as a plaza.[2883] By the time of Java Island, we have an internal block structure that reclaims the centrality of the private space.[2884] The blocks have closed construction on all sides. "The blocks are comprised of closed construction on all four sides, along the quays and canals. This arrangement

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2877 Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 40.

2878 Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 40.

2879 Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 40.

2880 Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 61.

2881 Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 61.

2882 Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 61.

2883 Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 185.

2884 Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 221.

creates three distinct ‘living environments in each of the urban blocks: dwelling along the quays, dwellings along he canals, and dwelling in the interior of the block.”[2885] The buildings were about 27 meters wide, and each building was designed by a different architect.[2886]

> “Each building is subdivided into five bays of 5.4 meters. The dwellings are accessible from quay via a central shared entrance with a stair and elevator.”[2887]

These buildings form modern canal houses. The houses are 4.5 meters high and around 4 to 5 stories high. With Java Island, the Amstel block has come full circle back to the private garden and balanced it with a public space. In the center of the blocks a center private garden, and while the apartments have a public green space.[2888]

> “Each house has its own back garden, and both the main entrance on the canal and a back entrance through the shed into the garden.”[2889]
> “The court is accessible to the public by means of entrance gates and other openings in the block. The double row of buildings makes it possible to play with the position of the openings.”[2890]

What is interesting is that while Haussmann did affect the way blocks looked in Paris and the overall structure, he integrated the block use with what had occurred pre-Haussmann.

> “The Hausmannien block continued to function as the indispensable element for the structuring of city life. Like the old block, it was a unit

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[2885] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 222.
[2886] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p.223.
[2887] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 223.
[2888] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 221.
[2889] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 223.
[2890] Komossa, Susanne, Hans Meyer, Max Risselada, Sabien Thomaes, and Nynke Jutten. Atlas of the Dutch Urban Block. Thoth Publishers Bussum: Rotterdam, 2005, p. 63.

> that could be assembled with others and the city was seen as a combination of blocks."[2891]

13.2.2 Landscape Infill

> Landscape helps establish the overalls pace of the street. "These artifacts from man's historical contact with nature remains a psychically critical element of urbanism."[2892]

While all Streets in resilient cities do not have green areas, open spaces and trees, these types of landscape infill define a district and make an impact in a way similar to architectural infill. "Green areas are important elements in place-making; they enhance the legibility of a place and they increase the variety of uses in a place."[2893] Unlike architectural infill though, humans have a unique psychological connection with Trees specifically, and landscape infill provides structural and environmental benefits that no other system provides to the greater urban area. "Green areas and corridors can be for biotic support and public amenity--these can be part of the public or private realm, and some can be specifically for biotic support only."[2894] In a sense, landscape infill forms a symbiotic system of mutual benefit where, if cities create protected spaces for landscape infill, landscape infill makes the city more habitable for people. Topological or environmental infill has an impact upon the District by distinguishing certain areas like a natural landmark with their specific character or quality, and they can slice city gridlines into pieces thereby making large Districts more manageable for imageability purposes. Most importantly for urban form, landscape infill can completely define the Street

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[2891] Panerai, Philippe, et al. Urban Forms: The Death and Life of the Urban Block. Oxford: Architectural Press, 2004, p. 27.

[2892] Moule, Elizabeth and Stefanos Polyzoides. "The Street, the Block and the Building." Moules and Polyzoides, 2014. http://www.mparchitects.com/site/thoughts/streets-blocks-buildings (accessed July 10, 2014), p. xxiii.

[2893] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 2005, p. 52.

[2894] Lewis, Sally. *Front to Back: a Design Agenda for Urban Housing*. Oxford: Elsevier, Architectural Press, 200, p. 51.

experience unlike any other type of urban form other than architectural infill and at much less relative cost.

13.2.2.1 Trees and Their Functions

> "Moreover, for many people trees are the most important single characteristic of good streets."[2895]

Urban designers consider trees soft landscaping, and yet they are extremely strong in their imprint upon the District character.[2896] "[Trees] can be a decisive element in adding to place character, personality and identity."[2897] Trees actually form a symbiotic relationship with humans for mutual benefit. While trees are taller than humans, most are actually at a human scale. "Trees and other vegetation also add a sense of human scale, providing a contrast with, and a foil to, hard urban landscapes."[2898] Trees are the largest organisms that humans bring into their environment, even to climatic areas where they never existed before. But, in the urban environment, the tree and human relationship is a complicated.

> "Much of the floorscape pattern--and, indeed, the three-dimensional effect of urban space--can be reinforced and enhanced by tree planting. Trees in the urban environment need to be sited positively."[2899]

It seems that everyone wants to add as many trees as possible in every location. In San Francisco there are over 106,000 street trees in the public right of way.[2900] "Of these,

[2895] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 293.
[2896] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 199.
[2897] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 199.
[2898] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 199.
[2899] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 199.
[2900] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 24.

approximately 26,000 are maintained by DPW Bureau of Urban Forestry."[2901] The city plans to add an additional 5,000 trees per year "including trees both on private land and in the public right-of-way."[2902] The adding of trees to urban form is a much more complicated issue than just numbers.

While trees have a purely economic and functional benefit for humans, trees also have a deep psychological somewhere actually between comfort and terror. The reasons are placement and human evolution. Trees do comfort humans in urban environments have having a strong psychological effect upon us.[2903] As a result people near trees have extended lives, heal quicker and have lower heart rates.[2904] However, the evolutionary response to trees depends solely if trees exist in groves, have high canopies or whether there is impenetrable underbrush that obscures vision from predators or criminals.

> "People's responses to trees and forests are so strong and consistent that some researchers have even suggested that human beings have evolved instinctive preferences for certain types of treed environments."[2905]

[2901] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 24.

[2902] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 24.

[2903] Platt, Rutherford H, Rowan A. Rowntree and Pamela C. Muick. The Ecological City: Preserving and Restroing Urban Biodiversity. Amherst: University of Massachussets, 1994, p. 137; Schroeder H. W. "Variations in the Perception of Urban Forest Recreation Sites." *Leisure Sciences* 5(3) (1983): 221-30; Schroeder, H.W. "Psychological and Cultural Effects of Forests on People. *In Proceedings of the 1988 Society of American Foresters National Convention* 16-19 October 1988. Rochester.

[2904] Platt, Rutherford H, Rowan A. Rowntree and Pamela C. Muick. The Ecological City: Preserving and Restroing Urban Biodiversity. Amherst: University of Massachussets, 1994, p. 140.

[2905] Platt, Rutherford H, Rowan A. Rowntree and Pamela C. Muick. The Ecological City: Preserving and Restroing Urban Biodiversity. Amherst: University of Massachussets, 1994, p. 144.

What researchers found is that people respond positively to widely scattered trees that do not inhibit views of danger. Most humans appear to prefer groves of widely scattered trees, open at eye level, with an overhead canopy and uniformly textured ground."[2906] A proposed theory is that within our DNA is an instinctual remnant where those that feared grove trees survived. "It has been said that this environment may be attractive because it resembles African savannas where the human species evolved."[2907] This notion of security should not be dismissed because even the smallest parks with thick growths of trees are seen as security risks, whereas those with high canopies are deemed safe. Our notion that trees are wholly beneficial is naïve even considering recent human history--within the last 6,500 years. Before the age of sprawl, there was as great distinction between the protective walls of the city and the wilderness.

> "It is important to recognize that the images of trees and forests in our country's past have no always been positive. They include images of the 'howling wilderness' full of savage beats and other dangers. In the early years of European settlement in this country, the forest was often a barrier to cultivation and a hiding place for enemies. Fears of the forest persist to this day. Some have their roots in the past, but others are a function of more recent concerns."[2908]

As a result, the placement of trees in urban form should be as an element of urban form rather than the symbiotic benefits that humans receive from trees. When studying crime in a University setting, Moluby recommended that an option to reduce crime would be either the removal or trimming of trees and shrubbery to remove hiding

[2906] Platt, Rutherford H, Rowan A. Rowntree and Pamela C. Muick. The Ecological City: Preserving and Restroing Urban Biodiversity. Amherst: University of Massachussets, 1994, p. 114.

[2907] Platt, Rutherford H, Rowan A. Rowntree and Pamela C. Muick. The Ecological City: Preserving and Restroing Urban Biodiversity. Amherst: University of Massachussets, 1994, p. 144; Balling, J.D. and Falk, J.H. "Development of Visual Preferences for Natural Environments." *Environment and Behavior* 14 (1982): 5-38.

[2908] Platt, Rutherford H, Rowan A. Rowntree and Pamela C. Muick. The Ecological City: Preserving and Restroing Urban Biodiversity. Amherst: University of Massachussets, 1994, p. 146.

places.[2909] In 2001, Kuo and Sullivan confirmed these notions about trees and safety fear within the urban environment.[2910] They did note that well-kept trees tended to improve the crime rates, and yet they had a second finding.[2911] "They point out that, in particular, those buildings surrounded by open grassy areas and canopy trees had the lowest crime rates, suggesting that vegetation is likely to increase crime only when it affords opportunities for concealment, particularly where there is undergrowth."[2912] As a result, in urban environments and even in parks, large edges of trees present either actual or perceptions of criminal or dangerous activity within human minds. As a result, placement, canopy height and maintenance are crucial for trees. Given the psychological and criminology evidence shown, if unmaintained, misplaced, well-kept or properly ordered, the exact same tree has the ability to create a comfortable or fearful District characteristic.

> "Assuming trees are appropriate in the first place … and that someone will take care of them, trees can transform a street more easily than any other physical improvement."[2913]

[2909] Molumby, T. "Patterns of Crime in a University Housing Project. *American Behavioral Scientist* 20(2) (1976): 247-259.

[2910] F. Kuo, W. Sullivan. "Environment and Crime in the Inner City—Does Vegetation Reduce Crime?" *Environ. Behav,* 33 (2001): 343–367; Troy, A, and Grove, J. M. "Property Values, Parks, and Crime: A Hedonic Analysis in Baltimore, MD." *Landscape and Urban Planning* 87(3) (2008): 233-245; Forsyth, A, Musacchio, L, Fitzgerald, F. *Designing Small Parks: A Manual Addressing Social and Ecological Concerns*. Hoboken, NJ: J. Wiley, 2005; Michael, S, Hull, R, Zahm, D. "Environmental Factors Influencing Autoburglary—a Case Study." *Environ. Behav*. 33 (2001): 368–388; Nasar, J. L, Fisher, B, and Grannis, M. "Proximate Physical Cues to Fear of Crime." *Landscape and Urban Planning*, 26(1) (1993): 161-178.

[2911] F. Kuo, W. Sullivan. "Environment and Crime in the Inner City—Does Vegetation Reduce Crime?" *Environ. Behav,* 33 (2001): 343–367

[2912] F. Kuo, W. Sullivan. "Environment and Crime in the Inner City—Does Vegetation Reduce Crime?" *Environ. Behav,* 33 (2001): 343–367; Troy, A, and Grove, J. M. "Property Values, Parks, and Crime: A Hedonic Analysis in Baltimore, MD." *Landscape and Urban Planning* 87(3) (2008): 233-245; Forsyth, A, Musacchio, L, Fitzgerald, F. *Designing Small Parks: A Manual Addressing Social and Ecological Concerns*. Hoboken, NJ: J. Wiley, 2005; Michael, S, Hull, R, Zahm, D. "Environmental Factors Influencing Autoburglary—a Case Study." *Environ. Behav*. 33 (2001): 368–388; Nasar, J. L, Fisher, B, and Grannis, M. "Proximate Physical Cues to Fear of Crime." *Landscape and Urban Planning*, 26(1) (1993): 161-178.

[2913] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 293.

Human psychology aside, trees have symbiotic and systematic benefits for urban areas. Trees in effect create micro-climates that change the urban form around them in ways beneficial to humans.[2914] "Likewise, the strong ties between people and trees cannot be explained [simply] by the increased property values, reductions in air pollutants, and moderation in temperature."[2915] Trees reduce heat islands, which causes less structural damage and wear to urban elements.[2916] Trees condition the environment at very little cost--much less than comparable technological means.[2917] Further, trees provide benefits for wildlife and species that exist in urban areas along with humans.[2918] Yet, they are also great urban elements that function as quasi-urban element, environmental protection, and mottling effect.

> "Given a limited budget, the most effective expenditure of funds to improve a street would probably be on trees."[2919]

For humans, trees have always been a quasi-urban element--especially historic or large trees.[2920] Anthropologist Sir. James Fazier noted how trees were important

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2914 Platt, Rutherford H, Rowan A. Rowntree and Pamela C. Muick. The Ecological City: Preserving and Restroing Urban Biodiversity. Amherst: University of Massachussets, 1994, p. 137.

2915 Platt, Rutherford H, Rowan A. Rowntree and Pamela C. Muick. The Ecological City: Preserving and Restroing Urban Biodiversity. Amherst: University of Massachussets, 1994, p. 137; U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 75.

2916 Platt, Rutherford H, Rowan A. Rowntree and Pamela C. Muick. The Ecological City: Preserving and Restroing Urban Biodiversity. Amherst: University of Massachussets, 1994, pp. 152-168; U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 75; City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 48/

2917 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 293.

2918 Platt, Rutherford H, Rowan A. Rowntree and Pamela C. Muick. The Ecological City: Preserving and Restroing Urban Biodiversity. Amherst: University of Massachussets, 1994, p. 141.

2919 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 293.

2920 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, p. 4; Jones, Horace L. eds. and tr. *The Geography of Strabo. Vols 1-8*, within Roman religious practices for their ability to create a gathering place or grove.[2921] There was a famous grove at the Norse cult-center in Uppsala, Sweden "among the heathen Swedes. Trees are so powerful that we can place trees like architectural infill and create spaces or enclosures in the mind.

> "Public squares, whose overall dimensions have been clearly dictated by the spread of large trees located in their centre, are a common feature of the slums included in this study."[2922]

Trees themselves can act as Nodes, Landmarks and District indicators or they can frame these types of urban form for particular intensity.[2923] Placement and alignment of trees can create or enforce and edge. Trees create a transparency and permeable type of volume which covers the field and takes up space.

> "Avenues and streets are linear urban spaces if they are enclosed on two sides or have some element of unifying character--trees or urban buildings."[2924]

Trees can even play the part of civic and public 'buildings' in places with no funds or ability to create those public places.

> "Trees, especially large species, not only provide shade but play the role of public buildings, and become a substitute for the arcades,

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containing Books 1-17. Boston: Harvard University Press and Heinemann (1917); Gadgil, M, and Chandran, S. "Sacred groves." *India International Centre Quarterly* 19(1-2) (1992): 183-187; Chandrashekara, U. M, and Sankar, S. "Ecology and management of sacred groves in Kerala, India." *Forest Ecology and Management*, 112(1) (1998): 165-177; Farrell, E. P, Führer, E, Ryan, D, Andersson, F, Hüttl, R, and Piussi, P. "European Forest Ecosystems: Building the Future on the Legacy of the Past." *Forest Ecology and Management* 132(1) (2000): 5-20; Hughes, J. D. "Europe as Consumer of Exotic Biodiversity: Greek and Roman Times." *Landscape Research* 28(1) (2003): 21-31; Khan, M. L, Khumbongmayum, A. D, and Tripathi, R. S. "The Sacred Groves and Their Significance in Conserving Biodiversity an Overview." *International Journal of Ecology and Environmental Sciences* 34(3) (2008): 277-291.

[2921] Frazer, James George. *The Golden Bough; a Study in Magic and Religion*. New York: Macmillan, 1951, reprint of 1922 edition.

[2922] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, p. 4.

[2923] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 56-57.

[2924] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-7.

> porches and covered outdoor spaces that are part of the normal urban fabric, but that are absent in most slums."[2925]

Because of their ability to take up space and create enclosure, trees placed near roads actually slow down traffic by making drivers reduce speeds, making streets safer.[2926]

> "Between pedestrian and auto paths they can be a safety barrier for the former."[2927]

Trees provide environmental protection.[2928] Trees are ideal for shading because they modify the brightness of sunlight, making even harsh environments more hospitable to human and non-human life.[2929] "Plants and structures modify these effects [reflection because of high albedo and refraction of sunlight] by blocking the direct sun radiation."[2930] Deciduous trees are perfect seasonal modifiers because they shed their leaves in winter when more sun is needed, and they their summer leaves limit and break up sunlight to modify summer's heating effect. "Deciduous trees are ideal since they will cut off the summer sun and allow some winter sunlight through. But not all: bare-branch penetration through a dormant deciduous tree may range from 80% in the case of a

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2925 Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, p. 4.

2926 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 293; Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 137.

2927 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 293.

2928 National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 43.

2929 City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), pp. 48-49.

2930 Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 52; Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, pp. 293-294; National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 43; City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), pp. 48-49.

honey locust to only 30% for an elm."[2931] Even evergreen trees are perfect for wind-breaks and as natural adaptations to cold environments.[2932]

> "A good urban street gives shelter from the wind. On urban streets winds will measure 25 to 40 percent of the winds outside the city in the open field, unless placement of height of buildings are such that winds are accelerated."[2933]

Because of the buildings and velocities of winds created by the urban form, trees do all of these things and they make the streets more comfortable than they would otherwise be for human activities.[2934]

> "Light filters through trees give life to space. Manipulation of light and shade transforms stone, asphalt, and concrete into tapestries of sunlight and shadow."[2935]

An important aspect of trees is their mottling effect on sunlight in the urban environment.[2936] Trees create interplay between light and shadow within the urban form, and as a result, they make Street forms and elements more complex than they otherwise be on their own.[2937]

> "Their leaf patterns are almost always less dense than those of nondeciduous trees and the leaves move more, subject to even slight wind changes; they permit light—mottled, moving light—to penetrate to the pedestrian, and this quality is characteristic of the best streets."[2938]

[2931] Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, Massachusetts: MIT Press. 1984, p. 52; Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 293.

[2932] Kuhn, Michael. "Planting Trees For Energy Conservation: The Right Tree in the Right Place." *Forestry: Utah State University*, 2004. http://forestry.usu.edu/htm/city-and-town/tree-selection/planting-trees-for-energy-conservation-the-right-tree-in-the-right-place (accessed July 30, 2014).

[2933] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 275.

[2934] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 275.

[2935] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 15.

[2936] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 294; National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 43.

[2937] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 15.

[2938] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 294.

With all of the benefits, tree placement becomes important so that the tree does not become a psychological or real security danger to people and to the District.

13.2.2.2 Tree Placement and Spacing

> Street trees are a high-priority item on which to spend funds that could have a major environmental impact. Absent a commitment to do them right and to maintain them well later, the monies might just as well not be spent. Done well and maintained well, street trees are grand."[2939]

Urban designers generally set trees in avenues, urban groups, as single specimens or as rural informal settings.[2940] Their proximity and relationships are important whether on the Street or in Parks or Open Space. While transportation engineers used to believe that trees placed near the lane caused increase automobile risks, this has been proven not the case. "Transportation engineers have often opposed street trees on the grounds that a wide travel corridor, free of obstacles, is needed to protect the lives of errant motorists."[2941] It is proven that motorists slowdown in the presence of trees, and by driving more carefully, fewer car and pedestrian accidents occur.[2942] Street trees and concrete planters can reduce mid-block car crashes by 5 to 20 percent, and in a study on Colonial Drive in Orlando, "more livable" areas with trees had fewer serious mid-block crashes than conventional streets.[2943]

> "On-street parking and pedestrian-friendly roadside treatments' were 'two times less likely to experience a crash' than the purportedly safer roadways preferred by most transportation engineers."[2944]

[2939] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 295.

[2940] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 200.

[2941] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 137.

[2942] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 137; National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 43.

[2943] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 137.

[2944] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009.: 137].

NACTO states that the requirements of tree placement is based upon a variety of economic and aesthetic factors.[2945] "Requirements for tree spacing depend upon a number of key factor and should be tailored to the chosen species, standard (or desired) tree pit size, fixed property lines, setback from curb, and integration with street lights and other furniture."[2946] Traffic engineers do have problems with trees that have low canopies or are unkept because they tend to impair vehicle sight lines.

> "Street trees may be removed to satisfy sight distance or clear zone requirements only in extreme cases, where the installation of traffic control devices has been precluded."[2947]

Traffic engineers are concerned about having trees on the facade-side of the Sidewalk rather than the lane-side of the Sidewalk to protect automobile drivers from accidents.[2948] As a result, they prefer to widen the lane or street to protect the driver. "Clear zones provide a run-off zone for errant vehicles that have deviated from the main roadway and are intended to decrease the frequency and severity of fixed-project roadside crashes, forgiving driver error."[2949] Yet, having trees on the lane-side of the Sidewalk protects pedestrians from accidents should they occur, and it lowers vehicular speeds which reduces the actual possibility of traffic accidents.

> "Street trees and other roadside features are superior to wide shoulders or run-off zones, as they decrease overall speeds and encourage a more pedestrian friendly environment."[2950]

[2945] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 43.
[2946] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 43.
[2947] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 43.
[2948] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 44.
[2949] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 44.
[2950] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 44.

Some commentators have stated that it is important to keep Trees from intersections by 40 or 50 feet in order to protect these sight lines.[2951] “We come across other admonitions in regard to street res, notably to avoid street corners by 40 to 50 feet…, for reasons of sight lines and therefore of auto safety.”[2952] While trees might be fashionable for street medians or for roundabouts, trees at intersections do create dangers.[2953] If taken as fact, this effectively removes trees from 80 feet of the block length, and forces designers to space trees from the block center out toward the intersections in regular intervals.[2954] “First there are the spacing requirements and then even greater distances required at intersections to allow for left turn lanes. The results are even fewer trees and larger gaps.”[2955] What is interesting is that Barcelona has integrated this distance within the block structure.[2956] By cutting 40 feet from the end of the block to create the unique intersections and diagonals, Barcelona has increases sign lines for drivers and pedestrians alike, without dangers afforded by trees.[2957]

Allan Jacobs noticed that on many of the Great Streets, tree canopies overlapped creating a large massing effect that reinforced enclosure upon the street.[2958] In fact, this was his great qualm with the Champs-Élysées due to its rigid tree canopy

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[2951] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 294.

[2952] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 294.

[2953] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 295.

[2954] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 295.

[2955] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 295.

[2956] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 295.

[2957] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 295.

[2958] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 294.

pruning style.[2959] What Allan Jacobs noticed was that trees with interlocking canopies created intimacy and a special place.[2960]

> "Branches of trees along the Ramblas and Avenue Montaigne and the Ringstrasse, to make but three of many, overlap, and these tress have been around for a long time. The plane trees along the Viale Manlio Gelsomin, in Rome, may be that street's only saving grace, and the spacing is often 15 to 18 feet. If there is a rule of thumb to be learned from the best streets, it would be that closer is better."[2961]

Debates about pedestrian versus vehicular safety aside, authorities do not agree about how far trees are to be spaced. LEED for Neighborhood Development recognizes this fact, and in the "Tree-Lined and Shaded Streets" recommendation, it proposes that trees be used on streets within the urban environment. While basing tree benefits solely on the economic and infrastructural justifications, LEED recommends tree placement on 60% of existing trees with a maximum distance between trees as 40 feet.[2962] The Eco-City Cleveland requirements place have scales for trees in distances less than 30 feet between each other, between 30 and 50 feet from each other and greater than 50 feet. In Boston's Complete Streets Design Guide has requires different lengths by tree species. It requires short trees be 20 feet apart, medium trees be 25 feet apart and large trees be 30 feet apart.[2963] The requirements also offset trees from street furniture, curbs, edges and driveways.[2964]

[2959] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 77.

[2960] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 294.

[2961] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 294.

[2962] U.S. Green Building Council, Council of New Urbanism and Natural Resources Defense Council. LEED 2009 for Neighborhood Development. http://www.usgbc.org/resources/leed-neighborhood-development-v2009-current-version (accessed August 2, 2014), p. 75-77.

[2963] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 60.

[2964] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), p. 60.

Urban critics like Jane Jacobs have stated that the best tree spacing is 15 to 25 feet apart, and, where trees are 30 feet apart, there should be several rows of trees to create mass.[2965] She cautioned that trees be spaced more than 25 feet apart, because she implies that, unlike other District elements, trees have more value the closer they are together and even in rapid succession.[2966]

> "It is possible to find all kinds of reasons to plant them further than 25 feet apart—their health, a need to avoid having branches overlap, the required distances between light poles or even parking meters—but they don't seem to hold up in practice when spacing along the best streets is measured."[2967]

What the evidence shows is that in New York, on Baltic Street and Park Slope, the street trees average 15 feet apart.[2968] On 3rd Avenue on the Upper East Side the average distance between trees is 12 feet and, there are about 8 trees per 330 feet.[2969] On the Upper East Side-3rd Avenue area of New York City, the average tree pit area or amenities are is 5 feet, and the average tree spacing is 12 feet.[2970] On West 11th Street, the average tree spacing is about 29 feet, and there are about 10 trees per 330 feet.[2971] On Mc Dougal Street, in Soho, the average distance between trees was 47 feet.[2972] On Bowling Green, there were no street trees.[2973] On Clinton Avenue, and the average tree

[2965] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 294.
[2966] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 294.
[2967] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 294.
[2968] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[2969] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, pp. 49, 66.
[2970] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 49.
[2971] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 59.
[2972] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, pp. 48, 66.
[2973] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, pp. 40, 66.

spacing is 27 feet, and the average number of trees per 330 feet as 11.[2974] On Atlantic Avenue, the average distance between trees was 55 feet, and on Fort Greene, the average distance between trees was 27 feet.[2975] On Atlantic Avenue in Brooklyn, what we see is that the buildings on both sides and the trees are actually part of the canopy and not part of the roadside or the building wall plane.[2976] Trees can be anywhere from 31 to 35 feet from trunk to trunk, and the planter dimensions of the trees is about 6 by 7 feet.[2977]

In Portland, on NW 23rd Street, the average distance between trees was 35 feet.[2978] In Portland on SE Ladd Street, the average tree spacing is about 30 feet, with about 16 trees per 330 feet. [2979] On NW Irvine Alley, the distance between trees was 35 feet.[2980] Lastly, on NW 11TH Street area, the average tree spacing of 35 feet, and there are about 9 trees per 330 feet. [2981]

In Amsterdam, trees are generally between 20 to 43 feet distance between each other. "Trees along the narrower canals are generally closer (20 feet) than on the wider, circular canals (often over 43 feet). Tree canopies sometimes meet over the narrower canals."[2982] However, in Amsterdam, the trees are spaced to maximize the stabilization and reclamation of the ground. And, so while their importance is with shade, for the

[2974] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 58.
[2975] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 66.
[2976] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 34.
[2977] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 32.
[2978] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.
[2979] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 64.
[2980] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 69.
[2981] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 54.
[2982] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 186.

pedestrian and to make an aesthetically pleasing environment, they are structurally in place to maintain land.

What one can see is that Tree spaces are anywhere from 12 to 55 feet depending on the location, with the majority of tree spacing to be around 30 feet. As a result, the tree affects the character of the location, but there is not as much intimacy New York or Portland as in Barcelona or places with higher levels of integrated tree canopy.

13.2.2.3 Small Parks

> "Good small parks typically have a place somewhere within them commonly understood to be the center—at the very least a main crossroads and pausing point, a climax. Some small parks or squares are virtually all center, and get their intimacy from minor differences at their peripheries."[2983]

Small parks tend to have a beneficial effect upon the surrounding area. Structurally, some of these parks tend to help with stormwater management issues by providing permeable surfaces for water to recharge landscapes. Although an unstudied aspect of urban form, parks also provide places for dogs and people who dog companion to meet and socialize.[2984] In doing so, people and their dogs are less isolated and receive mutual benefits during times of stress due to heat or by urban living.[2985] Environmentally, these parks create environmental zones needed by wildlife,

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[2983] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 137.

[2984] Turner, D.C, Waiblinger E, and Meslin F-X. (2013). "Benefits of the Human-Dog Relationship." in. Macpherson, F-X. Meslin, and A.I. Vandeler (eds.) Dogs, Zoonoses and Public Health, 2nd Edition (2013): 13; Headey, B, Na, F, and Zheng, R. "Pet Dogs Benefit Owners' Health: A 'Natural Experiment'in China." *Social Indicators Research*, 87(3) (2008): 481-493

[2985] Lafortezza, R, Carrus, G, Sanesi, G, and Davies, C. "Benefits and Well-being Perceived by People Visiting Green Spaces in Periods of Heat Stress." *Urban Forestry and Urban Greening* 8(2) (2009): 97-108; Paravicini, U. "Public Spaces as a Contribution to Egalitarian Cities." VS Verlag für Sozialwissenschaften (2003): 57-80.

help reduce the heat island effect within cities, and help clean the air.[2986] For urban form though, they define a District and provide the public benefits.

However, small parks do not solve problems in the larger urban form simply by their presence. As infill, small parks only make the larger urban form better--or sometimes worse.

> "Consider the Morningside Heights area in New York City. According to planning theory it should not be in trouble at all, for it enjoys a great abundance of parkland, campus, playground and other open spaces. … Its streets are zoned in the main against 'incompatible uses' intruding into the preserves for solidly constructed, roomy, middle- and upper-class apartments. Yet by the early 1950's Morningside Heights was becoming a slum so swiftly, the surly kind of slum in which people fear to walk the streets, that the situation posed a crisis for the institutions."[2987]

In New York, many times you see larger parks or other parks as populated by the indigent, and they cease to function as parks and more as boundary areas where people do not inhabit or go to.[2988]

> "On a similar afternoon, with a temperature above ninety degrees, I was able to find in Corlears Hook park, a landscape breezy river-front oasis in Manhattan's heavily populated Lower East Side, just eighteen people, most of them lone, apparently indigent, men."[2989]

It should be noted that the parks are public places and thus these indigent persons have an actual public right to be in the parks--without exclusion. However, because of the proven links to poverty and crime, there are more opportunities for desperate people to create a District effect that is also desperate or criminally inclined. Simply having parks will not stop this District effect.

> "Too much is expected of city parks. Far from transforming any essential quality in their surroundings, far from automatically uplifting

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[2986] Platt, Rutherford H, Rowan A. Rowntree and Pamela C. Muick. The Ecological City: Preserving and Restroing Urban Biodiversity. Amherst: University of Massachussets, 1994, pp. 69-72.

[2987] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 8-9.

[2988] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 125.

[2989] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 117.

> their neighborhoods, neighborhood parks themselves are directly and drastically affected by the way the neighborhood acts upon them."[2990]

When we expect nothing except for a District appeal from parks, they are many times quite successful and provide multiple types of services for the community--even unexpected ones. Some parks like Sara Delano Roosevelt Park, where there originally was a fountain area which became a circle in the round, and an impromptu theater, because people utilized it in that way.[2991] The park is more flexible than its previous plan and as a result, it has become more resilient and a District fixture.[2992]

> Everybody is both, although some are more so: guitar players, singers, crowds of darting children, impromptu dancers, sunbathers, conversers, show-offs, photographers, tourists, and mixed in with them all a bewildering sprinkling of absorbed readers—not there for lack of choice, because quiet benches to the east are half-deserted."[2993]

Smaller parks without permeability create problems because they confuse the public and private realm within the Street. In contrast to San Francisco, in New York, there are smaller parks like Gramercy Park which is partially private and yet functions as a park on the public realm.[2994]

> "The park happens to be a fenced private yard in a public place; the properties goes with the residential buildings across the surrounding streets. It must be entered with a key. Since it is blessed with splendid trees, excellent maintenance and an air of glamor it successfully provides for the passing public a place to please the eye, and so far as the public is concerned this is its justification."[2995]

[2990] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 124.
[2991] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 137.
[2992] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 137.
[2993] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 137.
[2994] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 140.
[2995] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 140.

A problem with small parks also is that they are bounded by an edge that is in itself impermeable. Further, because of their location, they are effectively away from all centers of population and thus the people cannot access the parks.[2996]

> "Its location is at a far edge of its community, bounded on one side by the river. It is further isolated by a wide, heavy traffic street. Its internal planning runs largely to long, isolated walks without effective centers."[2997]

Many communities a sufficient amount of parks. The problem is that because of the unwalkable and inaccessible nature of the entire urban form, these parks are effectively inaccessible. When the urban form system is incomplete, the parks as landscape infill will be ineffective.

Unlike large parks which tend to be difficult and costly to maintain and to provide security, small parks have good environmental benefits for the District.[2998] While their size is too small to create a vacuous edge in the surrounding community, they also tend to have the tree placement and high canopies that allow for views across parks, allowing there to be eyes on the park. They provide places for people to congregate, play and have recreation, and they provide places for people to a type of controlled access to trees in the urban environment.

Unlike open spaces, small parts actually fulfill an urban function, without the fear of creating an edge like large parks or large amounts of open space.

> "Open spaces, being nature brought into the city or open expanses allowed to remain in their original state, cannot be described in quite the same manner as used for urban space. Their scale is given by the

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[2996] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 141.

[2997] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 141.

[2998] Platt, Rutherford H, Rowan A. Rowntree and Pamela C. Muick. *The Ecological City: Preserving and Restroing Urban Biodiversity*. Amherst: University of Massachussets, 1994, p. 69; Bedford, B. L. and E. M. Preston. "Developing the Scientific Basis for Assessing Cumulative Effects of Wetland Loss and Degradation on Landscape Functions: Status, Perspectives, and Prospects." *Environmental Management* 12 (1988): 751–71; Malthby, E. *Waterlogged Wealth.* London: Earthscan Press, 1986.

> trees, shrubs, rocks and ground surface rather than their gross width and length."[2999]

Large open spaces are fundamentally different than trees or small parks. And, their function and reason or being an urban setting is also fundamentally different. While most urban form performance an urban function, open space brings the nonurban into the urban space by bringing nature into the city within its natural form. As a result, open spaces tend to have an edge to the city creating a sense of wilderness, or their purpose is to create a land reserve for further expansion.

> "Their appearance is characterized by the sight of natural verdure rather than surrounding buildings. However, a vista of a distant building may accent a particular spot and a bridge or pathway may complement nature's forms. Open spaces in the city have a wide variety of purposes. They are a complement and foil to urban form. They are also reservoirs of land for future use."[3000]

Some cities have problems with parks because of small size, but San Francisco addresses the small park in good ways.[3001] However, throughout its development, San Francisco had few parks.[3002] The push for smaller parks increased after the building of the Golden Gate Park. "Some of these, if sufficiently small, can do another job well: simply pleading the eye. San Francisco is good at this. A tiny triangular street intersection leftover, which in most cities would either be flattened into asphalt or else have a hedge, a few benches and be a dusty nonentity…."[3003] In these small parks, they are visually available enough to have people look into the scene. In "San Francisco is a fenced miniature world of its own, a deep, cool world of water and exotic forest,

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[2999] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-7.
[3000] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 4.3-8.
[3001] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 139.
[3002] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 53.
[3003] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 139.

populated by birds that have been attracted. [3004] This might be because San Francisco is so vertical in that small pieces of land will be see vertically rather than 2 dimensionally."[3005]

> "The effect arises mainly from small bits of intensive cultivation, and it is multiplied because so much of San Francisco's greenery is vertical—window boxes, trees, vines, thick ground cover on little patches of "waste" slopes."[3006]

In its founding, New York's central square was fairly small in comparison to the larger urban plots set in a rectangular pattern of roads and ditches. [3007] The center square of the entire endeavor was a market square of 100 feet by 165 feet, and on it were a church, hospital, and school.[3008]

What is interesting is that when designers planned Manhattan, they were concerned that there was not enough open space, yet they planned Manhattan with future changes in mind with various parks and markets within the street grid--though not a large portion as what one would expect today.[3009] What is interesting is that this plan for the building up of New York coincides with Jane Jacob's conception of the park and the public needs of assembly. The parks that were created were not voids or barriers to development or changes.

> Although the amount of open space seems parsimonious by modern standards, they would have improved existing conditions substantially had they been followed. The commissioners anticipated possible criticism of the plan on the grounds of insufficient open land and advanced the following explanation. … The unfortunate results of the prejudices and mistakes of the planners of 1811 are well known today. The lack of suitable sites of public buildings, the traffic congestion at the frequent intersections, the absence of enough north-

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[3004] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 139.
[3005] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 140.
[3006] Jacobs, Jane. The Death and Life of Great American Cities. New York: The Modern Library, 1993 (1961), p. 140.
[3007] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 128.
[3008] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 128.
[3009] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 139.

> south arteries, the overbuilding on narrow lots that inevitably resulted from the shallow blocks--these are but a few of the shortcomings."[3010]

While the lack of land is criticized today as insufficient due to planning concepts today, it is interesting that this smaller amount of parkspace seemed too much to a degree for urban critics like Jacobs, because many parks were unutilized and filled with crime.

New Urbanists and others look at parks as a way to emphasize the civic space. "New urban developments emphasize the importance of greens, squares, commons, plazas or other civic spaces."[3011] While denigrated by some as cliché, in many commuinities prior to New Urbanist developments have few if any parks, and so any investment in small public infrastructure is welcome. Yet, these parks tend to have a secondary appeal in that the help define the District as being green. Trees are far more important for these communities, especially since New Urbanist communities tend to have different traditionalist architectural styles but no perimeter block. Without the trees, the architectural styles do not provide a sense of enclosure for some of these communities due to spacing and placement. However, the trees as they mature will fill up the street volume and create a sense of enclosure by creating a more intimate space. Further, if the trees have a high canopy rather than low canopy, the communites will be and seem more secure.

13.2.2.4 Topographic or Environmental Issues

Topography has the tendency to create edges within built form. It can create edges to the entire built environment with a coastline or mountain range, or it can divide up the urban form within smaller pieces called Districts. Topography has a tendency to create edges or borders within urban form. Sometimes cities follow this form or

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[3010] Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980, p. 139.

[3011] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 172.

practical, economic or environmental reasons, and at other times, the urban form eventually removes the problem--the Netherlands and their practices of reclaiming low-lying areas.

In San Francisco after O'Farrell's surveying of the city, the city ordered William Eddy, the city surveyor to survey lands west of Leavenworth and 8th Streets.[3012] The streets were gridded past the original edge of the city, and, between 1856 to 1919, San Francisco started reclaiming land by filling in the bay and removing the original salt marshes for a more commercial edge.[3013]

Pathways tend to respond to topography in different ways.

> "The fine-grained medieval street pattern of Zurich stayed huddled along the lake and river's edge until development pressures tighter with advances in technology permitted larger but nongrid patterns of development into more hilly terrain."[3014]

Rivers and waterways sometimes confine cities, as do seas or ocean patterns. They form edges of the city and ways to contrive the city into certain directions.[3015] One only has to look at the Hudson River and the San Francisco Bay to see how the river and the coastline have changed and confined each respective city. Technology does have an ability to overcome topological problems, but at great cost to the environment and the people. Yet, decisions have to be made to either change the topography or work with the topography to create edged cities and defined Districts.

> "But at some points it became impossible to continue the grid, the topography was too step, and either development ceased, to be continued only years later when preplatted public streets could be replatted to follow land contours, or the designers were not so hard-headed in the first instance and let land forms determine street and

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[3012] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 29.
[3013] Scott, Mel. The San Francisco Bay Area: a Metropolis in Perspective. Berkeley: University of California Press, 1959, p. 37.
[3014] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 256.
[3015] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 256.

> block layout. In either case, the changes in land form are reflected in the street patterns."[3016]

While some cities exist on virtually flat landscapes, such as Denver or Amsterdam, some cities have landscapes which creates District characteristics or slice the larger gridpatterns into more manageable pieces for imageability. While many analysis look at Districts in the abstract, Districts actually exist on a three dimensions plan of land which tends to have a large effect on how their residents actually experience the Streets, lots and blocks. As a result urban form will mold itself around or cut through these topography—sometimes in the most efficient and cost effective manner. As a result, areas that might seem indistinct on maps become very distinct when seen from the ground, due to the context. As a result, large gridpatterns or plan, which would work in one setting, do not work in other setting and actual changes in the gridline or patterns must take place to achieve the same effect. Manhattan, Barcelona and San Francisco are primes examples.

The island of Manhattan is almost a complete grid, its North and South avenues and its East to West Streets are fairly consistent and regular in pattern. However, taking a broader context, Manhattan is a small portion of New York City, and while it has Districts and sub-Districts of its own, the entire island is quite small in comparison to districts in other cities. As a result, even one can actually easily get around the entirety of Manhattan because the island is small enough, that the imageability of the residents and even nonlocals is pretty fixed. In contrast, Brooklyn has districts as large as the island of Manhattan. In order for Brooklyn to function, it has to break up into smaller pieces through shifts of its grid, in order for Brooklyn to have pieces sufficiently small in order to memorize.

> "More often than not, the best streets have noticeable changes in elevation, albeit none very steep. The Via dei Giubbonari drops from

[3016] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 256.

> either end toward the center, so there seems to be a middle view, if not a distant one, for much of its length, and it is possible to see where the street is going[3017]

For places broken up by the topography like the Via dei Giubbonari, San Francisco is the exemplar. San Francisco's gridpattern is so large in places that it forms a monotonous and endless whole pattern. While a grid was exceptionally function, in 1847 O'Farrell wanted the grid to expand quickly regardless of the terrain.[3018]

> In addition to the two-dimensional conflict, the sharply hilly topography of San Francisco is also constantly at odds with the rigidly rectilinear street pattern, provoking recurring criticisms of its unsuitability compared with imagined benefits of an organically derived form."[3019]

O'Farrell worked around various portions of previous laid gridlines and settlement patterns to layout the regularized grid.[3020] O'Farrell then set to install a regularized grid over the hilly terrain, which allowed San Francisco to expand exceptionally quickly during the gold rush of 1848.[3021] So, while O'Farrell's intention was not to create a District city, his city was saved in spite of the regularized grid by the terrain. If one looks at the same gridpattern volumetrically, one sees that the topography actually breaks up the gridpatterns into very small pieces with numerous hill and valleys. As a result, the scale of the grid actually breaks down into manageable Districts that are completely different on the human scale. The human scale recognizes several distinct parts of based upon topography, where the topography dips and changes while on the same grid.

[3017] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 305.
[3018] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 356.
[3019] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, pp. 356-357.
[3020] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, p. 356.
[3021] Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972, pp. 356-357.

> "In the extreme—San Francisco for example—hilly streets that offer wonderful views might even take one's mind from reality that the street itself is less than it could be."[3022]

Topography also has the practical effect in these districts of changing the expression of a specific type of urban form—the Sidewalk. In the high slope areas of San Francisco, the Sidewalks become more practical in order to maintain accessibility. "The limit would be slops so steep as to be difficult and uncomfortable for major population groups—the elderly, handicapped, mothers with young children. Otherwise, slope helps."[3023] As slopes rise particularly quickly, the Sidewalks come stairways.

> "Topography and slope help by increasing views and adding drama."[3024]

In other areas, the topography changes the District by adding particular views drama only experienced by that District

> "Walking toward the sea on the Ramblas, the view (mildly uphill) is foreshortened and there is a not unpleasant sense of more people than might actually be there, not unlike photos taken through a foreshortened lense of about 90 millimeters."[3025]

As the slope Barcelona's urban form rise toward the Pyrenees, certain Districts obtain a character simply by the view they have of the larger landscape. Thus, while the landscape or the view is not caused by an infill item, it act as infill.

> "At some point, topography and natural features such as rivers show in street patterns, including those patterns that are arbitrarily laid over hilly terrain."[3026]

What is interesting though is that in the Site Areas, none of the Sites except for San Francisco showed topographic effect. While the Site Area effectively was between

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[3022] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 305.
[3023] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 305.
[3024] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 305.
[3025] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 305.
[3026] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 256.

various hill areas, the topography did start to have an effect on architectural infill horizontality, the street structure, the creation of serpentine streets and multiple other factors. In other Site Areas, there was no impact. This does not mean that there were no hills in Manhattan. The urban designers just kept the hills in San Francisco whereas in Manhattan, the designers removed the topography as a factor.

13.2.3 Street Infill

> "Elements such as signs, awnings and canopies often hang over the sidewalk, and entrances are evenly distributed between commercial and residential uses. Note the outdoor uses, how much space they need, the more individualized street furniture, and the presence of obstacles that reduce the clear path."[3027]

Street infill are items which are placed within the Street, mainly the furnishing zone, which act to create a District quality.[3028] Many of these items provide services and functions that improve the Street. While they have a system, environmental or safety function, they function within urban form as a District component. All Street infill has an effect upon the Sidewalk and pedestrians of it spatially changes the dynamic of the space. In Storget, the use of trees on the Sidewalk area creates an enclosure which narrows the street, leading to intimacy.[3029] For many designers, the Sidewalk is the thoroughfare which has most of the necessary infill.[3030] However, this happens the entire width of the Street, from centerline to Architectural façade.

> "Details contribute mightily to the best streets: gates, fountains, benches, kiosks, paving, lights, signs, and canopies can all be

[3027] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 46.

[3028] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013; New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013; County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposa

[3029] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 27.

[3030] Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009, p. 47.

> important, at times crucially so. At the same time, some contribute less than might be thought. The most important of them deserve special attention.[3031]

On the sidewalk these elements exist in the furnishing zone providing services, places to sit, and the really small things that are crucial for great Streets to exist. "On sidewalks that are not wide enough to accommodate a large furnishing zone, element that would normally be sited in the later, such as news racks, trash cans, and poles, may occupy the frontage zone to keep the throughway zone free."[3032] While they tend to allow fluid pedestrian transit, they also inhibit traffic by presenting places for pedestrians to linger--such as a newspaper stand, bench or stoop.

> "Well-designed sidewalks are a fundamental part of good multi-modal streets. They are the building block of a great pedestrian environment and are critical to the quality of public life and pedestrian safety in San Francisco."[3033]

13.2.3.1 Communicative Meaning of Infill

A crucial aspect of the Street infill is that it actually communicates a great deal to locals and nonlocals about the Sidewalk and Street. Pavement textures and material quality have the ability to communicate to people about the space to large degree. The materials and their upkeep communicate a great deal about the District or Street's historic importance, civic importance, affluence, poverty, civic power, administrative quality, economic situation and more.[3034] These signs affect the District character greatly. However, these characteristics are fluid so what might be more important for one District as a signal or communicative characteristic is not important in other District.

[3031] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 298.

[3032] Tumlin, Jeffrey. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Holboken, New Jersey: Wiley: John Wiley Sons, Inc, 2012, p. 61.

[3033] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposa: , p. 98]

[3034] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2.

> “Pavement texture seemed to be less important, except in special cases such as Olvera Street in Los Angeles.”[3035]

What is interesting is that the materials themselves seem to be unimportant to a large degree. However, what they communicate about the District is extremely important.

> “Details in planting seemed also to be relatively unimportant, but a great deal of planting, like that on Commonwealth Avenue, could reinforce a path image very effectively.”[3036]

The most important Street infill ability is to communicate invite or dislike. “Every fine street that has been identified … is one that invites leisurely, safe walking.” It sounds simple and basically it is.”[3037] This is critical because much of modern city making has been focused on disinviting locals from cul-de-sacs and local streets. It seems that they were very effective because the Streets in those locations do communicate that to people.[3038]

> “As a pedestrian on a San Francisco street what physical, buildable characteristics are most important to achieving a great street and the answers are very likely to include words like “cleanliness,” “smooth,” and “no potholes.”[3039]

Because of District characteristic, people tend to use political force to require that this characteristic be maintained should there be deviations from the rule.

Humans have a great ability to retrieve subtle environmental hints that inform about the environment through our senses.[3040] Not only does it tell us about the current location, but it tells us about similar situations with similar elements through our ability to

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[3035] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2.

[3036] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2

[3037] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 272.

[3038] Rapoport, Amos. The Meaning of the Built Environment: A Nonverbal Communication Approach. Tucson: University of Arizona Press, 1982; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 196.

[3039] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993.: 289]

[3040] Wagner, M. The His452Tyr variant of the gene encoding the 5-HT(2a) receptor is specifically associated with consolidation of episodic memory in humans. *International Journal of Neuropsychopharmacology*, no. 11 (2008): 1163–1167.

recognize singular items or elements within the environment.[3041] And, we can remember all of these District qualities by chunking memorable pieces into manageable pieces in the mind--similar to how to chunk urban form into Districts or manageable pieces.[3042] This ability to environmentally encode information is an evolutionary and inheritable trait, because it helped us survive and exploit the environment. Those that could not do this did not pass on their DNA. The reason that we communicate through our infill might simply be because, that while subtle is how we nonverbally communicate large messages over time.[3043] Modernist planners were quite effective at communicating that Streets were only for lanes and not people.

13.2.3.2 Sidewalk Infill

> “Some streets are better than others: to be on, to do what you came to do. Boulevard Saint-Michel, in Paris, lined with stores, book tables, and cafes in similarly sized buildings covered with dancing light, is a much more pleasant street to be on than is Market Street, in San Francisco, which is somehow uncomfortable as either a walking or a driving street.”[3044]

Within the furnishing zone, most jurisdictions have similar Street infill. “Street trees and other landscaping, benches, news racks, streetlights, parking meters, signs, trash cans, utility boxes, fire hydrants, and other furnishings should be consolidated in this zone.”[3045] The many purposes of placing most Street Infill in this location are to

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[3041] Hintzman, Douglas L. and Block, Richard A. Repetition and memory: Evidence for a multiple-trace hypothesis. *Journal of Experimental Psychology* no. 88(3) (1971): 297-306.

[3042] Miller, George A. "The Magical Number Seven, Plus or Minus Two: Some Limits on our Capacity for Processing Information." *Psychological Review* 63 (1956): 81-97. http://psychclassics.yorku.ca/Miller (accessed July 31, 2014)

[3043] Rapoport, Amos. The Meaning of the Built Environment: A Nonverbal Communication Approach. Tucson: University of Arizona Press, 1982.

[3044] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 2.

[3045] Tumlin, Jeffrey. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Holboken, New Jersey: Wiley: John Wiley Sons, Inc, 2012, p. 61; Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 196; County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-create a clear throughway, to provide a protective buffer to protect the pedestrian from street traffic in the lane, to define the lane and parking area, and to, though only postulated in this thesis, to protect and not encroach upon the lot and the value of its permeable edge with the public domain.[3046] "Create a buffer between pedestrians and moving vehicles by the use of landscape and street furniture (benches, newspaper racks, pedestrian information kiosks, bicycle."[3047] By consolidating most public intrusions upon the Sidewalk and mostly within the furnishing zone, the public is protected from takings suits by landowners protecting their own interests.

For Boston's Complete Streets, the city's purpose is to have a completely accessible, functional, all-weather area, for Sidewalk vibrancy.[3048] The Boston Complete streets capitalizes on smaller areas for residential streets to make the design speed smaller, and in a sense making the entire street more narrow, while in more commercial or industrial areas, the street will be much larger as a result.[3049]

In San Francisco, the furnishing zone includes street trees, "other landscaping, streetlights, site furnishings, traffic and parking poles and equipment, utility poles and boxes, fire hydrants, and other site furnishings."[3050] San Francisco also differentiates the

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planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), pp. 75, 219.

[3046] Tumlin, Jeffrey. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Holboken, New Jersey: Wiley: John Wiley Sons, Inc, 2012, p. 61.

[3047] Urban Design Studio and the City of Los Angeles Department of City Planning. "Walkability Checklist." http://urbandesignla.com/resources/LAWalkabilityChecklist.php (accessed August 21, 2014), p. 10.

[3048] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), pp. 18-19.

[3049] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), pp. 22-23.

[3050] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 100.

furnishing zone by “paving scoring, materials, or edge treatments to indicate that the furnishing zone is a place for lingering as opposed to moving.”[3051] In San Francisco, the material communicate lingering and promenading rather than darting quickly down the Sidewalk. At the same time, the materials provide actual services for the Streetscape and Sidewalk.[3052] In its edge zone, San Francisco has “some vertical elements, such as street lights, utility poles, parking meters, or traffic and parking signs, as long as these elements are non-continuous and allow space between for car doors to swing open and for people to access parked vehicles.”[3053] In is enhancement zone, San Francisco keep more transportation related elements closer to the lane and away from the throughway.[3054]

> “The enhancement/buffer zone is the space immediately next to the sidewalk that may consist of a variety of different elements. These include curb extensions, parklets, stormwater management features, parking, bike racks, bike share stations, and curbside bike lanes or cycle tracks.”[3055]

What San Francisco has done is create further divisions between those items which are more related to the lane or to the throughway and relegated those to various spatial areas within the total Sidewalk. However, San Francisco designers noted the dilemma by providing services and furniture within the Sidewalk.

[3051] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 100.

[3052] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 100.

[3053] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 101.

[3054] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 39.

[3055] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 39.

> “A wide sidewalk offers pedestrians enough space to walk at their chosen pace, stand, sit, socialize, or merely enjoy their surroundings. Wider sidewalks also offer more space for landscaping and amenities, making the streetscape more useful and attractive and also acting as a buffer between traffic and pedestrians.”[3056]

Providing services and street furniture that crowd out valuable walking space communicates its own message to the pedestrian.

NACTO also has many of the same categories that San Francisco recommends, for the furnishings zone. “The street furniture one is defined as the section of the sidewalk between the curb and the through zone in which street furniture and amenities, such as lighting, benches, newspaper kiosks, utility poles, tree pits, and bicycle parking are provided.”[3057] NACTO also states that, functionally, the street furnishings can include green infrastructure like rain gardens and flow-through planters.[3058] NACTO’s purpose is to create a meaning of accessibility or functionality.[3059] While it does provide options for good systems, there is no quantitative leap from creating great systems to creating great systems that make people linger, to create a vital Street.

What one sees is that in the process of creating Sidewalk infill, planners and designers fall into two categories as they plan furniture. There are some that plan for furniture functions and systems, and there are those that incorporate the purpose and what the elements actually communicate into the urban form in mind.

> “Design [street furniture] to require and to incorporate the minimum of street furniture. Whenever possible, integrate and combine elements into a single unit. Remove all superfluous pieces of street furniture. Consider street furniture as a family of times, in keeping with the quality of the environment and assisting in the unification of the urban area to provide a coherent sense of identity. Position street furniture

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[3056] County and City of San Francisco, “Better Streets: San Francisco.” Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan (accessed July 11, 2014), p. 98.

[3057] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 39.

[3058] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 39.

[3059] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, pp. 40-41.

to help create and delineate space. Locate street furniture so as not to impede pedestrian or vehicular traffic or 'desire lines'."[3060]

When looking at the evidence, one sees that there are differences between various places, but as a general rule, resilient places are quite similar. On Clinton Avenue in New York City, there are an average number of 5 elements on the roadside.[3061] On West 11th Street in New York City, the planter area is 3'6" feet, with a usual 3' planter on property.[3062] There are 4'0" stoop heights and over 3 overhanging items per 330 feet.[3063] In Portland on SE Ladd Street, has about 4 roadside elements per 330 feet.[3064] What the evidence shows is is that these elements are generally low in number and spaced out--not counting trees and their particular dimensions.

13.2.3.3 Illumination: Streetlights

> The Champs-Elysee has an elegant, single-light fixture along its length, as well as lower lights for walkers along its parklike section.[3065]
>
> "The streetlights on Orange Grove Boulevard, in Pasadena, California, contribute in a major way to the quality of that street."[3066]

As functionary to the Street, streetlights provide illumination for walking in the throughway. Streetlights functionally allow areas of the Street which normally would be impermeable and inaccessible at night to be visually and physically permeable at night. They also illuminate and provide character for the District and provide District

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[3060] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 197; Strathclyde Regional Council. *Glasgow Public Realm, Strategy and Guidelines* Glasgow: Strathclyde Regional Council, 1995, p. 65.

[3061] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 58.

[3062] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 59.

[3063] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 59.

[3064] New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, p. 64.

[3065] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 299.

[3066] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 299.

character.[3067] Some cities look at lights functionally only, whereas other jurisdictions look at lights in an aesthetic quality to promote the District. The difference might be whether the lights are focused on vehicular transit or for pedestrian transit--with the pedestrian transit lights being more decorative and the lane lights having more a stark functional quality.[3068]

> "The seemingly universal choice of street engineers, one or another version of the so-called cobra light, is usually much higher and not terribly pleasant to look at; if it is necessary, it can stand apart and so serve the autos, but it is best not relied upon for where people walk."[3069]

Because of their regularity, the eye can focus on the light to create a pathway. If placed on the street, usually in the furniture zone, they create an edge for the lane and protect the pedestrian from vehicular accidents.[3070] "Because of their regularity and location, streetlights form lines, usually receding poles marked with a fixture on top that the eyes grasp and follow.[3071]

> "For many streets, simple overhead lights in the center of the street, hung from wires attached to the buildings, functionally light the street at the same time as they mark the center, a receding line for the eye to follow day or night."[3072]

The spacing of streetlights is variable. Jane Jacobs states that the best lights are spaced under 20 feet. Difficulties come when one incorporates trees into the mixture. Tree trunks can space anywhere from 12-55 feet.[3073] This could be because used in line

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[3067] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), pp. 88-89.
[3068] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 299.
[3069] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 299.
[3070] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 299.
[3071] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 299.
[3072] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 299.
[3073] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 299.

with trees, the tree canopies start around 12-20 feet. This is because jurisdictions typically align trees with the lights rather than having pedestrian lights further into the furnishings area nearest to the throughway zone. However, the spacing of lamps usually has to deal with illumination alone and the penumbra of light, rather than for a decorative or contextual purpose.[3074] However lights are tricky in that the lumen output, the time of day and how people see come into a complicated equation of perception or nighttime blindness.

> [Haussmann] "A gaslamp that is placed too high up will project light further but will not give adequate light to the immediate area around it. Obviously, that was not our goal. The higher a lamp, the greater the unlightened area at its base. By reducing the height of street lamps and the distance between the them, and decreasing the intensity of the flame in each lamp so as not to use more gas, we were able to light the city's streets better. Extremely bright lights are useless; they blind people more than they light their way."[3075]

For the Boston Complete Streets Guide, there is a focus on the appropriateness of the street lamps and how they affect the environment.[3076] Boston recommends that good streetlights be used to provide illumination and character to the area.[3077] The goal stated was to provide illumination while reducing energy and while reducing light pollution and trespass.[3078] "The goal of street lighting is to provide safe, even lighting while reducing energy consumption and costs, light trespass (unwanted light), and dark

[3074] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), pp. 88-89.
[3075] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 299.
[3076] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), pp. 88-89.
[3077] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), pp. 88-89.
[3078] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), pp. 88-89.

sky pollution."[3079] In the same vein, NACTO recommends that lighting be clear and at every intersection.

> "Street lighting should be provide at all intersections with additional care and emphasis taken at and near crosswalks."[3080]

What the plan also included were special lighting Districts with modulated designs and lumen output to substantially help and maintain the District quality of Beacon Hill, Back Bay, Fort Point Channel, Dewey Square and Convention Center/Seaport to provide a district affect.[3081] In New York, on Baltic Street, W 11th Street, Mc Dougal Street, Bowling Green and Atlantic Avenue have street lamps.[3082]

San Francisco has about 43,000 streetlights. "There are approximately 43,000 street lights in San Francisco. Of these, approximately 24,000 are managed and maintained by the SFPUC, while approximately 19,000 are maintained by PG&E. The SFPUC pays PG&E to maintain its street lights. Other departments and agencies including MUNI, DPW, Recreation and Park, the Port of San Francisco and CalTrans also maintain a small number of street and pedestrian lights." Like Boston, San Francisco also has different streetlights to maintain or accentuate the District character of Market Street and other important commercial or civic areas.

Streetlights become a problem for communities because streetlights are expensive to purchase and maintain. While they are generally good for 24-hour communities, streetlights do have unanticipated problems with trees in the built environment. When trees are placed after streetlamps, the trees will change the

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3079 City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), pp. 88-89.

3080 National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 113.

3081 City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), pp. 88-89.

3082 New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013, pp. 66-67.

dynamic and illumination qualities of the streetlamp--for the positive or negative. Thus, simply because of their cost, the sequence of streetlamp adoption is of concern. But, done well, they make a space inherently more walkable.[3083]

> "Three of the four streetlight designs along the Paseo de Gracia [in Barcelona] are important to it: Gaudi's, because of its ever-present frivolous grandness;; the ornate five-luminaire corner lights; and the single lights that proceed above head level, between the trees, along the street."[3084]

13.2.3.4 Access: Hardscape, Paving and Design

There are two types of floorscapes within the urban environment, one type if landscape infill or softscape, and the other generally consists of paving materials or hardscape.[3085] Addressing hardscape alone, many of the best streets in the world use common materials such as plain concrete like Park Avenue in New York City or asphalt like the Champs-Élysées.[3086] One could say that the materials cost has a limited value for urban form. For practicality reasons, humans have used common materials within cities since asphalt became a road element in 625 BCE in Babylon.[3087] The materials have been "brick, stone slabs, cobbles, concrete, macadam, etc." and the material and

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[3083] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 299.

[3084] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 299.

[3085] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 193-195.

[3086] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2; Simi Valley Asphalt. "Asphalt History." *Simi Valley Asphalt.* http://simivalleyasphalt.com/id15.html (accessed July 31, 2014); National Asphalt Pavement Association. "History of Asphalt." *National Asphalt Pavement Association*. https://www.asphaltpavement.org/index.php?option=com_contentandview=articleandid=21andItemid=41 (accessed July 31, 2014)

[3087] Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003, 2.9-2; Simi Valley Asphalt. "Asphalt History." *Simi Valley Asphalt.* http://simivalleyasphalt.com/id15.html (accessed July 31, 2014); National Asphalt Pavement Association. "History of Asphalt." *National Asphalt Pavement Association*. https://www.asphaltpavement.org/index.php?option=com_contentandview=articleandid=21andItemid=41 (accessed July 31, 2014) arrangement is important to use and how they relate to the rest of urban form.[3088] The different types of functions require changes of material changes of type, size, shape and alignment, with "the most common edge between vehicular and pedestrian traffic is the ubiquitous granite or concrete curb with a shallow step from pavement to road."[3089]

> "We know that the ancient Greeks were familiar with asphalt and its properties. The word asphalt comes from the Greek 'asphaltos', meaning 'secure.' The Romans changed the word to 'asphaltus,' and used the substance to seal their baths, reservoirs, and aqueducts. Many centuries later, Europeans exploring the New World discovered natural deposits of asphalt. Writing in 1595, Sir Walter Raleigh described a "plain" (or lake) of asphalt on the Island of Trinidad, off the coast of Venezuela. He used this asphalt for re-caulking his ships. What is interesting is that the materials themselves seem to be unimportant to a large degree.[3090]

Being that these materials are so expensive and cover almost the entire area of the Street, one should question what the purpose and function these materials provide before their introduction into the built environment.

> "Paving might also be designed to guide pedestrians or vehicles through an area where there are few other indications of the route to be taken: lines across otherwise monolithic surfaces, for example, give strong directional qualities. Equally, directional paving slabs generally give a human scale to urban spaces. Smaller spaces often require no additional patterning to provide a sense of scale; larger spaces generally require some form of additional patterning."[3091]

Material textures and changes can signal use changes or shifts on the Street most especially, but throughout urban form.[3092] These different articulations and placements cost little in comparison to the costs for prestige materials, although the effect might be similar or great. "In streets, floor patterns can reinforce the linear

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[3088] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, pp. 193-194.

[3089] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 194.

[3090] National Asphalt Pavement Association. "History of Asphalt." *National Asphalt Pavement Association*. https://www.asphaltpavement.org/index.php?option=com_contentandview=articleandid=21andItemid=41 (accessed July 31, 2014).

[3091] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 194.

[3092] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 194.

character of space, by expressing its character as a 'path,' by providing a sense of direction, by checking the flow of space or by suggesting a feeling of repose."[3093] The function of pavers or sidewalk materials mainly revolves around their structural or environmental effect.[3094] Further, done well, sidewalks have to last and provide accessible that is dependable and causes as few injuries as politically possible.

> "The brick sidewalks and intersection crosswalks on San Francisco's Market Street are regularly abused, and often not replaced. The granite inserts that make up the gutters are paved over in places. Only the granite curbs seems to hold up. Better to use more normal, understood paving materials that can be done well and that are more likely to be cared for."[3095]

As a result and due to federal and state regulations, cities use common materials like asphalt or concrete within street planning. While these jurisdictions might focus on the decorative effects of these materials, the most fundamental aspect of their design are the durability, cost and environmental effects--stormwater, impermeability, etc.[3096]

In The Boston Complete Streets Design guide and many other design guidelines, there is a push to have a very specify type of material effect upon the urban form of the streets and sidewalk.[3097] This push is to have more environmentally friendly, permeable surfaces which are attractive and yet which handle stormwater issues in the larger

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[3093] Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010, p. 195.

[3094] Ehrenfeucht, Reina and Antasia Loukaitou-Sideris. "Planning Urban Sidewalks: Infrastructure, Daily Life and Destinations." Journal of Urban Design, Vol. 15. No. 4 (2010): 459–471 http://www.tandfonline.com/doi/abs/10.1080/13574809.2010.502333#.U71u_fldV8E (last accesed July 9, 2014), p. 462.

[3095] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 300.

[3096] County and City of San Francisco, "Better Streets: San Francisco." Final Better Streets Plan Adopted December 2010 and implemented January 16, 2011. County and City of San Francisco Planning Department. http://www.sf-planning.org/ftp/BetterStreets/proposa; Buffalo Mayor's Office of Strategic Planning. "Buffalo Green Code." Buffalo Green Code. http://www.buffalogreencode.com/ (accessed July 11, 2014); New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013.

[3097] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), pp. 40-45.

environment.[3098] This is also a space to test new materials, to create spaces safety for people to walk and to make an enjoyable experience.

When we talk about materials it is important to remember is that their function and value are two different things, and they mean separate things to Districts. What this discussion is about the relative cultural or personal value of prestige versus common materials. The question revolves around material value and how that affects the perception of the District.

> "Street designers give a great deal of attention to special paving and to paving patterns. Special paving can cost a lot of money; in very few instances does it make a significant difference."[3099]

However when we put valued materials into the urban form, they define the district as affluent or they define a District as special in some way. Expensive materials tend to give a District quality, but this District quality tends to have a limited value--unless there is a significant structural impact that the material does give like extreme durability, like granite curbs.[3100] What we do find is that the placement and care of materials, the quality of work and the continued maintenance do have a structural impact upon urban form. Further, as one will note, many times the common element a cheaper and more practical option even with added costs of skilled-workmanship, given that ADA requirements and governmental requirements for constitutional accessibility.[3101]

> "The manner in which roads are maintained also impacts pedestrians. Asphalt, an economical and durable material, is used to pave most roads. In the past, repairing damage to asphalt roads typically entailed overlaying the existing pavement with more asphalt. Over time, the asphalt layers build up the roadway crown and can create steep

[3098] City of Boston, Transportation Department. Boston Complete Streets: Design Guidelines. 2013. www.bostoncompletestreets.org (accessed July 8, 2014), pp. 40-45.
[3099] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 300.
[3100] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 300.
[3101] Federal Highway Administration. "Bicycle & Pedestrain." *Federal Highway Administration: Bicycle and Pedestrian*, updated February 10, 2014. http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalks/chap4b.cfm (accessed July 31, 2014)

> slopes on either side of the centerline. These slopes can be difficult for crossing pedestrians to negotiate (Figure 4-50) and create rapidly changing grades at curb ramps."[3102]

What might be more reasonable and practical is a Barcelona practice of placing common and durable materials in uncommon or rich ways to create effects which look rich and have great value--thus improving the District's rich quality.

13.2.3.5 Social Status: Benches and Fountains

While these two types of urban form provide a structural purpose for Districts, they are affected by social policies related to poverty and the value of status to Districts. With seating, planning departments love seating but create policies to remove the indigent individuals from public benches. With fountains, the fountains came to the United States for hygiene and to provide public sources of water for the poor, and yet now they are seen as prestige items.

> "A remarkable number of the very best streets have benches: Storget, Paseo de Gracia, Cours Mirabeau, Avenue Montaigne, Boulevard Saint-Michel, the Ramblas, and the Grand Canal near the Piazza San Marco."[3103]

Seating in the furniture zone allows people to sit and watch other people, similar to a public stoop. "Benches help people stay on the street; they invite our presence by permitting rest, conversation, waiting for a friend, passing the time. They help to make community."[3104] Benches are best used when they are in places where people want to be or want to see other people. When benches are within the furniture zones of commercial places, they generally help the Street presence. Rarely do they find themselves on residential streets.

[3102] Federal Highway Administration. "Bicycle & Pedestrain." *Federal Highway Administration: Bicycle and Pedestrian*, updated February 10, 2014. http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalks/chap4b.cfm (accessed July 31, 2014)

[3103] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 300.

[3104] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 300.

> "They are less expected on residential streets and less presence there than on commercial streets."[3105]

For commercial areas, they allow people to sit and linger while contemplating purchases, or to rest while on outings. They allow people in cafés and restaurants see others.[3106] As a result, they are functional devices which contribute the vitality of the District. Yet, there is a negative side to benches. Benches allow the poor to also sit and linger, and they tend to create a nuisance for those trying to navigate on their own journey through the Street. Some areas have removed Sidewalks and areas from the public realm to remove this problem so they can remove the poor from the Sidewalk. However, as seen before, this removal of space from the public to private comes at a cost, when there are other mechanisms which can solve this problem like loitering enforcement.[3107] What is interesting in this discussion is that while poor is temporary, paying for taxes is a permanent part of residency. Designers and policy makers act as though the poor did not pay for the bench or for maintenance of the space, when in fact they did or will through tax contributions.

> "They can be joyful, magic-making things to look at."[3108]

Fountains in themselves are not crucial to the urban environment rather than provide a District character to the area. In Europe, they were crucial because they represented an important source of civic water for daily needs. Today, even European fountains are decorative or historic landmarks.

> "The small fountains along the Cours Mirabeau, the special circular seating at corners along the Paseo de Gracia, the drinking fountain

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3105 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 300.

3106 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 300.

3107 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 300.

3108 Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 301.

and the bird stands on the Ramblas, the statues along Monument Avenue—all of these contribute to the streets."[3109]

Unlike Europe that used fountains within civic places or prominent points, American's used public water for hygienic devices that were more like urinals. "Styled as pithily as urinals, they belong indeed in the category of hygienic appliances rather than works of art."[3110]

"New Yorkers have long been familiar with succulent drinking water; it is taken for granted as a concomitant of city life."[3111]

For Americans, fresh water and fountains are not synonymous. Whereas one is a civic right, the other is considered decadent. "The pride that the towns of other countries take in their fountains seems to them a sign of decadence."[3112] American's Puritanical slant made social critics look at European fountains with statuary with despair.[3113]

"Abroad, Americans found public fountains objectionable, if not downright disgusting. People who blushed at the sight of a naked piano leg, took to their heels when they came upon fountains where, topless down to the toes, half the population of Olympus carved in stone was splashing in the water."[3114]

For hygienic reasons, the fountain came to the U.S. so that the poor would have public sources of water.[3115] These water pumps came to cities without the statuary or heathen art attached.[3116] It is interesting that their initial competition came from those who could

[3109] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 301.

[3110] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 292.

[3111] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 283.

[3112] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 285.

[3113] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, pp. 285-6.

[3114] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 289.

[3115] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 286.

[3116] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 288.

not commercially compete with free water; so, they made fountains and public pumps as obsolete as possible.

> “Saloonkeepers, resented the competition of a free drink, saw to it that the pumps were kept out of order, and from the thoroughness of their destruction it was obvious that the damage could not have been done by children.”[3117]

There are some public fountains like San Francisco’s Lotta’s Fountain, which became a landmark after the 1906 San Francisco earthquake and fire.[3118] Others are the reflecting pool at Lincoln Center, the reflecting pool in the Mall of America, the fountain at Rockefeller Center, and the Pulitzer Fountain, but these are more nodes or landmarks, and they do not function as they did in Europe to bring water into the city to allow the city to expand.

13.2.3.6 Signage and Crosswalks

Urban signage provides signals for pedestrians that have immediate meaning to navigate the street. With signage attached to buildings addressed before, the signage in this section relates to general signage and crosswalks. General signage helps people move through the landscape whether on the Sidewalk, with signs on the arrows pointing directions, bicycle signage, placement indicators, etc., or in the lane, with vehicle signage, bicycle signage, etc.[3119] General signage also creates the complexity of a place, although not at the same level as architectural or landscape infill.

[3117] Rudofsky, Bernard. *Streets for People: a primer for Americans*. New York: Anchor Press/Doubleday, 1969, p. 288.

[3118] Pierce, Kingston. “Lotta’s Legacy: Why the homeliest landmark on Market Street deserves your attention.” *Zpub.com*, 1996. http://www.zpub.com/sf/history/crab2.html. (accessed August 2, 2014); Wikipedia. “Lotta’s Fountain.” <http://en.wikipedia.org/wiki/Lotta's_Fountain> (accessed August 2, 2013).

[3119] Urban Design Studio and the City of Los Angeles Department of City Planning. "Walkability Checklist." http://urbandesignla.com/resources/LAWalkabilityChecklist.php (accessed August 21, 2014), p. 10]

> “Signage is a major source of complexity in urban and suburban areas. If well cone, signs can add visual interest, make public spaces more inviting, and help create a sense of place.”[3120]

The most important characteristic of general signage is in its ability to create order out of what might be chaos. “However, signage must not be allowed to become chaotic and unfriendly to pedestrian traffic.”[3121] As a result, the signage needs to be visible to all pedestrians on the Street. The Los Angeles Walkability Checklist pushes buildings to have signage at or near eye level in order for the pedestrian to incorporate place making with particular places rather than blank walls or transparent windows—“Include signage at a height and of a size that is visible to pedestrians, assists in identifying the structure and its use, and facilitates access to the building entrance”[3122] Thus, for Los Angeles, the signage is at the place on the street pedestrians are most likely to look rather than a place where the pedestrian will not look.

> “Stripe all signalized crossings to reinforce yielding of vehicles turning during a green signal phase. The majority of vehicle-pedestrian incidents involve a driver who is turning.”[3123]

Crosswalks are a Street function that require signage in order to occur safety. The Los Angeles Walkability Checklist states that crosswalks be clearly marked and visible. “Incorporate such features as white markings, signage, and lighting so that pedestrian crossings are visible to moving vehicles during the day and night” with bulbouts or extensions to create safety for the pedestrian.[3124] What is important to note

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[3120] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 15.

[3121] Ewing, Reid and Otto Clemente. Measuring Urban Design: Metrics for Livable Places. Washington: Island Press, 2013, p. 15; National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 5.

[3122] Urban Design Studio and the City of Los Angeles Department of City Planning. "Walkability Checklist." http://urbandesignla.com/resources/LAWalkabilityChecklist.php (accessed August 21, 2014), p. 66.

[3123] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 113.

[3124] Urban Design Studio and the City of Los Angeles Department of City Planning. "Walkability Checklist."

is that the Walkability Checklist implies reflective materials that are visible at night, simply because the danger of pedestrians and drivers not seeing the crosswalk is high.

> "Safe and frequent crosswalks support a walkable urban environment. Crosswalks should be applied where pedestrian traffic is anticipated and encouraged."[3125]

For NACTO, crosswalks are a particular area where interest for pedestrian safety. NACTO requires various geometries and visible signage as a result whether at an intersection or midblock.[3126] Especially at public areas, crosswalk signage should be visible to protect children and vulnerable persons from vehicular accidents.[3127] NACTO though recognizes appropriately that signage, unlike architectural or landscape infill, will not make a street safe because signage does not place an obstacle between the vehicle and the pedestrian.[3128]

> "The presence of a crosswalk does not, in and of itself, render a street safe. Based on their surrounding contexts, speed, and overall roadway width, crosswalks often require additional safety measures such as safety islands, signals, or traffic calming."[3129]

When building Barcelona's block system, Cerdà wanted to ensure that his plan included circulation and safety for the automobile.

> "He had become familiar with the steam railway engine upon its implantation in Barcelona and the conditions of which he had to become acquainted in detail when working on the rail layout in Granollers and its subsequent extension to Sant Joan de les Abadesses."[3130]

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http://urbandesignla.com/resources/LAWalkabilityChecklist.php (accessed August 21, 2014), p. 16.

[3125] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 109.

[3126] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, pp. 109-114.

[3127] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 110.

[3128] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 110.

[3129] National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013, p. 110.

[3130] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 129

He felt that the city should prepare for the possibility of using future modes of transportation within the system.[3131] What is interesting is that while he wanted the city to become more flexible for the automobile, he did not make the streets with priority given to the automobile. In contrast, Cerdà made a system of streets and small changes which made use of the automobile in the city more possible.[3132] Part of this model was to create a crosswalk system incorporated within the blocks and a street system that impose a hierarchy of use.

> "His proposals for Barcelona were underlain by the force of a well established hierarchy of streets, based on two principles that still apply today: the spaces within the street sections devoted to "steam machine," now motorized vehicles, and to pedestrians are equivalent, both in regular 20-metre wide streets and more narrow ones."[3133]

Cerdà then chambered the corners of the blocks to create the smallest possible distance for crossing the block and sightlines for the auto to ensure reduced injury.

> "The second principle was that all the junctions were built with 20 meter chamfered corners to ease facility of crossing to provide a guideline for building alignment around the edges of the street block."[3134]

13.2.4 Data from Research Sites

> "Many physical details contribute to a sense of inhabitation along the canals, especially the smaller ones: many doors (often more than one per building), stoops, many windows, window boxes with flowers, benches at corners, inhabited and individualized barges and houseboats."[3135]

Many look at Districts and point to ridged requirements of material sameness or style sameness. This is only half true. It is true that, cities like Amsterdam is mainly filled with brick, which is a locally available material that does not have to be shipped long

[3131] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 129.
[3132] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 129.
[3133] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 129.
[3134] Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005, p. 129.
[3135] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 186.

distances. “Paving is often a pinkish brick or light pink-purple aggregate brick.”[3136] Further, as part of the street, the Dutch use bollards and protective obstacles to keep traffic from the interfering with pedestrian traffic. “Small bollards, where used to clearly mark parallel parking limits, make a positive difference, resulting in uninterrupted walking areas.”[3137] However, what the data shows is that materials, architecture or district indicative infill is not important to create a district unless there is sufficient density of a material, type, typology or quality in order to define a District or Street. This density seems to be around 60%, and in most of the Districts, the materials used were not at that level in most cases.

In the Site Areas, most areas did have streetlamps in commercial areas, at on average 0.83 or 83%. However, only Paris had streetlamps of such quality and in such numbers that could classify as District identifying in the Site Area. While Barcelona did have beautiful street lamps, these were in such small numbers that their densities did not rise to the level of District identifying.

When considering floorscape materials. In almost all cases, stamped concrete or concrete and tiles were used. The average number of streets lengths using tiles or stamped concrete was 25.33, with Barcelona having a number 600% of this mean. The average number of streets using brick or brick and concrete was 38.67, with Amsterdam representing 597% of the mean. The number of Site Areas with a green strip along the sidewalk edge was 42, but Portland had 483% of the mean and Atlanta had 300% of the mean. The average number of streets that used concrete only was 131.67, with almost every street having very high percentages of this mean. Almost Every Site Area had similar types of crosswalk numbers, with some having less and others having more. But,

[3136] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 186.
[3137] Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993, p. 186.

none of these sidewalks were distinct enough to provide a district quality in any Site Area. The number of textured facades which met the street front was on average 124 street lengths, but San Francisco, New York, Paris, Amsterdam, and Barcelona all had similar numbers--although Paris' numbers were 248% of mean in comparison to the other cities. The average number of awnings in the Site Areas was 193.67, with New York having the lion's share. But none of these awnings were similar enough to provide a District quality. As a whole Barcelona had horizontality of structure, verticality of structure, material type, building style, building height, and placement of structures that were indicative of a District, but the other cities had styles which were competing enough to not really register as Districts within the Same City. Each of these Site Areas were distinct against other cities, but very few of them were distinct within the same city.

What the evidence does show is that each of the Site Areas had a distinct structural style consisting of window closeness, similar horizontality, verticality, height, balcony placement, entry placement, transparency and general materiality that when taken as a whole and when looked at within the most general, hit 60%. In San Francisco, the Victorian/Narrow Vertical Building style was 104% of the mean, in New York, the Urban Apartment with balcony style was 131% of mean, in Paris the Hotel/Manse style was at 127% of mean, in Amsterdam the bricked/rowhouse style was around 140% of mean and in Barcelona the Eixample style was at 98% of mean. This does not state that materials, signage, or a particular architectural style governs a District. This does indicate that prominent and obvious things in their most general within an urban from tend to create a District if they exist on at least 60% of all of the places of every Street in the Site.

13.3 **Interrelationship between Forms (Framework)**

"All of these elements operate together, in a context."[3138]

What one finds with urban form is that it works together--for the better or for the worse.[3139] When it works together, it creates a type of order that allows imageability to occur, and functionally creates Great Streets. This interrelationship can be seen in any city and with the slight or tactical use of urban form.

> The centre's streets were too cramped, air and traffic circulation limited, and crime was on the rise. As was a times also the case during the 20th century, some of these points may have been artificially exaggerated and could be dismissed as anti-urban propaganda."[3140]

In Paris, the location of the Avenue de l'Opéra location is in the 9th Arrondissement, Paris, and dates from 1854-1879, and has a size of 40 hectares (99 acres).[3141] Haussmann used the location of the Opera to be part of a larger series of plans that created a landmark and node (the Opera) and a pathway to the Opera. This plan allowed for a reconceptualization of Paris according to urban form and allowed a unification and diagonal access to the city from various parts. "The radical transformations around Charles Gardiner's opera house are a typical example of the development logic during the Second Empire in Paris."[3142] The development created an extremely homogenous landscape, but the purpose was complex and strategic. "Today mainly known for its aesthetic qualities through the provision of a perhaps overly homogeneous streetscape, the modernization programme's actual motivations were far

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[3138] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 84.

[3139] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, p. 48.

[3140] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 77.

[3141] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 76; Tyler, Norman and Robert M. Ward. Planning and Community Development: A Guide for the 21st Century. New York: W. W. Norton and Company, 2011, p. 23.

[3142] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 76.

more complex and strategic."[3143] In the 19th century, Paris needed to be redone. Its building was far too market driven and uncontrolled, unplanned. "By the mid-19th century it was evident that the French capital was in need of major renovation works. Similar to the situation of many American cities in the pre-war period, Paris suffered from significant population losses in its central core, with the upper and upper-middle classes being drawn into new fashionable suburbs like Neuilly, Passy or Batignolles."[3144] By using the pathway, node and landmark together, Haussmann maximized the value of the effect in urban form in a way that has nothing to do with the actual purpose of the Opera itself--entertainment and promenade.

> "None of the element types isolated above exist in isolation in the real case. Districts are structured with notes, designed by edges, penetrated by paths, and sprinkled with landmarks. Elements regularly overlap and pierce one another. If this analysis begins with the differentiation of the data into categories, it must end with their reintegration into the whole image. Our studies have furnished much information about the visual character of element types."[3145]

[3143] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 76.

[3144] Firley, Eric and Katharina Grön. The Urban Masterplanning Handbook. West Sussex, United Kingdon. John Wiley and Sons Ltd, 2013, p. 77.

[3145] Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960, pp. 48-49.

CHAPTER 14.

CONCLUSION

What this evidence shows is that there are definite resiliency averages and standard deviations that can be approximated, and these numbers show great flexibility inherent within resilient cities. While the mean of these numbers are set, these cities do not exist on the mean--they exist within the standard deviations. This is the part of resiliency that is hard to grasp and even harder to instill within public policy--flexibility and modulation. Some types of urban form are more important to one city, and other forms are more important to other cities. Cities exist within a continuum that is far enough from the mean to be distinct, but not far enough from the mean to be non-resilient. In areas like the Old Fourth Ward in Atlanta, the deviations are too great to sustain the vitality, density and diversity that is present within the resilient city. What this study also states is that while cities can design their way into cutting edge urban form, it is often hard for cities like Portland to compete with other cities like San Francisco because resilient urban form requires people--great numbers of people in highly compact densities. This research shows that, while San Francisco and Amsterdam are more like each other, Barcelona and New York are more like each other. This research also shows that while similar forms might appear in both Paris and the Old Fourth Ward, they function very differently.

What this research states is that one method of benchmarking like LEED does not satisfy resiliency measures. LEED measures too few things, and, of the measures that it does perform, the numbers are too low for resiliency. Currently, LEED-ND is the best benchmarking system trying to push cities to retrofit and redevelop urban form weakened by decades of modernist ideas and planning methods. If communities refuse to adopt benchmarks like LEED-ND, there is no practical or possible way that these cities will obtain the urban form necessary in order to become cities like San Francisco, New York, Portland, Barcelona, Paris or Amsterdam. There is no possible way for them to grow into larger cities which can expand and contract with a resilient framework which allows for larger and smaller uses, that allows for cities to have the connectivity necessarily to adopt presently known and within the future unknown types of uses. But, adhering to LEED-ND will only get communities to the lowest standard deviation of resiliency. It will take more for them to become resilient.

What the evidence shows is that cities are not fated to continue their practical lives in the shadow of other cities. Cities rise and fall, cities grow and become greater cities or lesser cities. But, these are planned, and designed over time. In larger cities, these mechanisms act on a subtle level and a conscious level. On a subtle level, urban designers and architects create designs which meet with the fabric of the city in situ. On a planning level, urban planners accept or reject plans which detour from the normal fabric of what planners expect their city to become. All of this is within human control but generally occurs as a multitudes of successive events which compound and connect to produce urban fabrics which others see as a certain city. Unfortunately for cities trying to catch up to these cities, their difficulty is not their desire to obtain the same type of urban fabric as the best performing cities. Their problem is time and vision.

APPENDIX A

FIGURES AND TABLES

Figure 1 City of Ur Archaeological Photo

Reference: Stuart Smith. “The City of Ur: Archaeological Map of Ur.” University of California Santa Barbara. http://www.anth.ucsb.edu/faculty/stsmith/classes/anth3/Ur_cityview.jpg (last visited July 16, 2014).

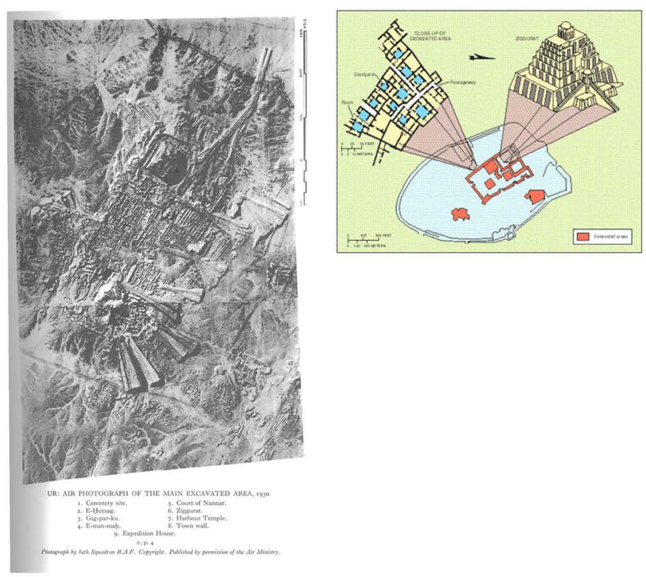


Figure 2 City of Ur Aerial Photo and Diagram

Reference: Stuart Smith. “The City of Ur: Aerial Photo of Ur.” University of California Santa Barbara. http://www.anth.ucsb.edu/faculty/stsmith/classes/anth3/Ur_cityview.jpg (last visited July 16, 2014); WorldHistoria. “Images of Ur.” <http://archive.worldhistoria.com/images-of-ur_topic15338.html> (last accessed July 16, 2014).

Figure 3 Map of City of Ur, Accreted Grid Pattern

Reference: Smith, Stuart. “The City of Ur: Photo of City.” University of California Santa Barbara. http://www.anth.ucsb.edu/faculty/stsmith/classes/anth3/Ur_cityview.jpg (last visited July 16, 2014).

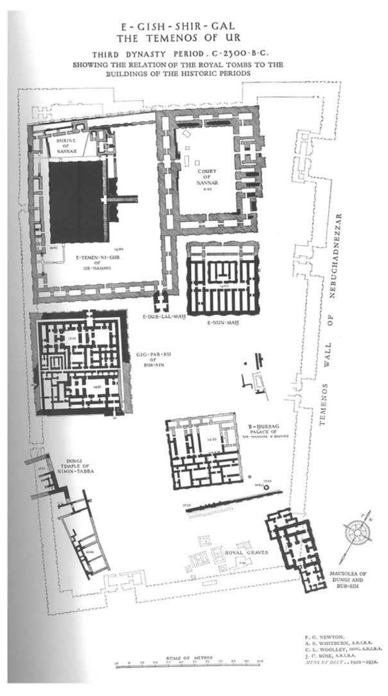


Figure 4 Main Grid Pattern of Ur, City Layout

Reference: Smith, Stuart. “The City of Ur: Photo of City.” University of California Santa Barbara. http://www.anth.ucsb.edu/faculty/stsmith/classes/anth3/Ur_cityview.jpg (accessed July 16, 2014).

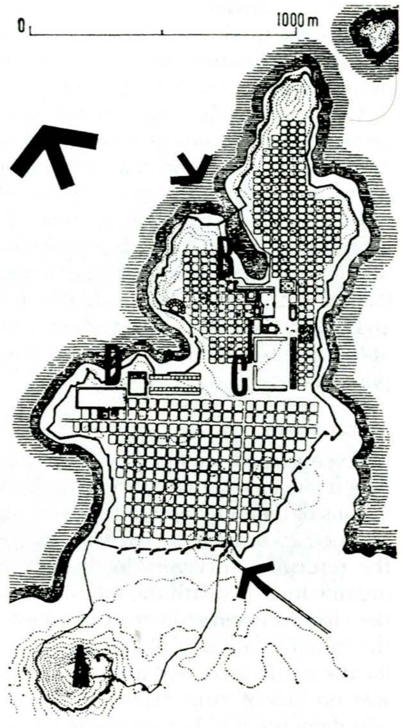


Figure 5 General Plan of Miletus, By Von Gerkan

Reference: Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972; Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997.

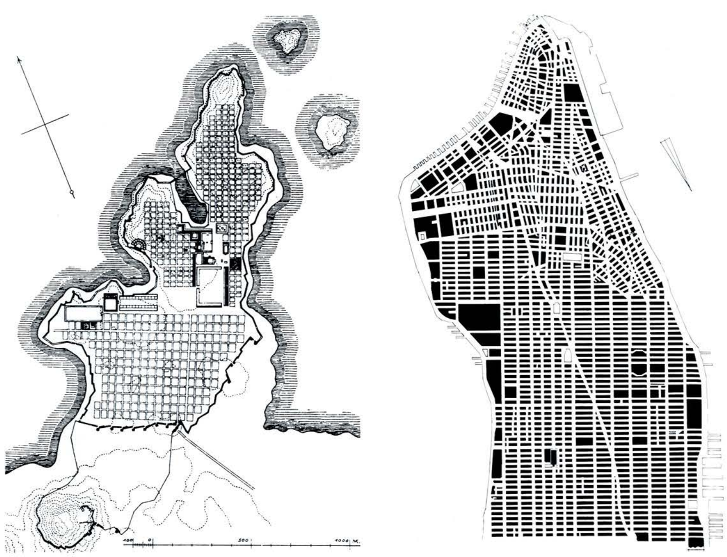


Figure 6 Miletus with New York City Grid Pattern

Reference: Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997.

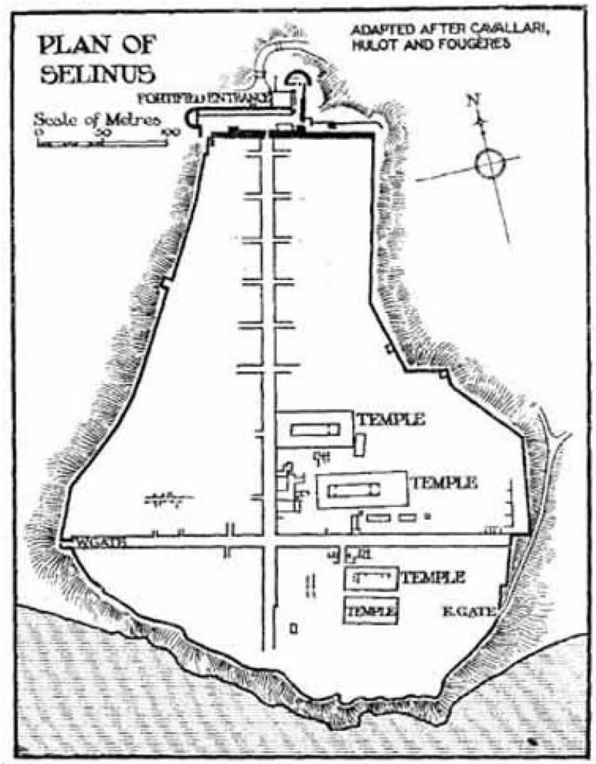


Figure 7 Plan of Selinus (Hermocrates)

Reference: Project Gutenberg. "Plan of Selinus." http://www.gutenberg.org/files/14189/14189-h/images/fig3.jpg (accessed July 16, 2014).

Figure 8 Photo of Selinus

Reference: Project Gutenberg. "Plan of Selinus." http://www.gutenberg.org/files/14189/14189-h/images/fig3.jpg (accessed July 16, 2014).

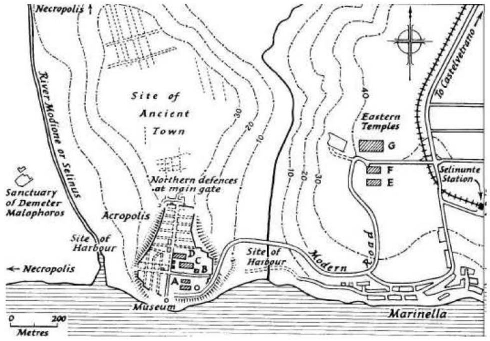


Figure 9 Selinus Map

Reference: Vaner Meer, Robert. “Selinus.” http://www.robertvandermeer.nl/Selinunte/Selinus.html (accessed July 16, 2014); Selinute. “Selinus.” http://www.selinunte.net/area_in.htm> (accessed July 16, 2014).

Figure 10 Selinus Diagrammatic Map

Reference: Selinute. “Selinus.” http://www.selinunte.net/area_in.htm (accessed July 16, 2014).

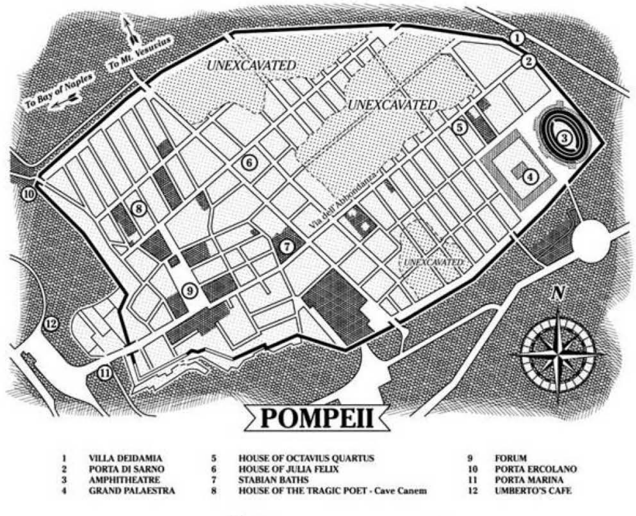


Figure 11 Map of Pompeii

Reference: i3.Photobucket. “Pompeii.” http://i3.photobucket.com/albums/y68/El_Greco/pompeii_map.jpg (accessed July 16, 2014).

Figure 12 Road in Pompeii Showing Materials

Reference: Wikipedia. “Pompeii Street.” http://en.wikipedia.org/wiki/File:PompeiiStreet.jpg (accessed July 16, 2014).

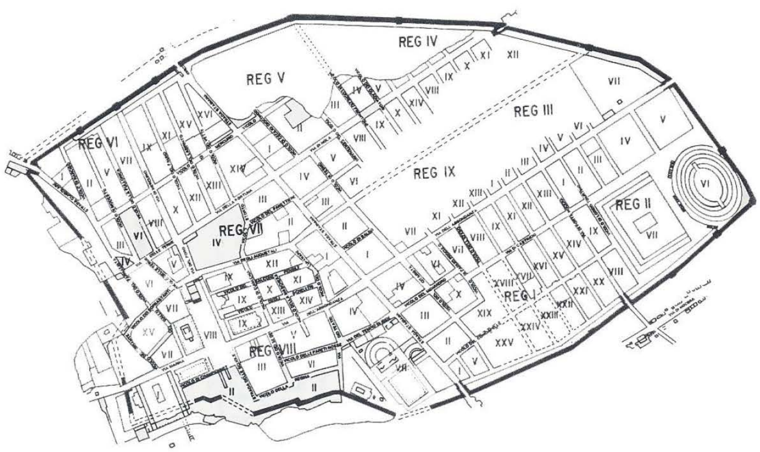


Figure 13 Plan of Pompeii

Reference: Classconnection. “Pompeii City Plan.” http://classconnection.s3.amazonaws.com/1867/flashcards/872572/jpg/pompeii-city-plan.jpg (accessed July 16, 2014).

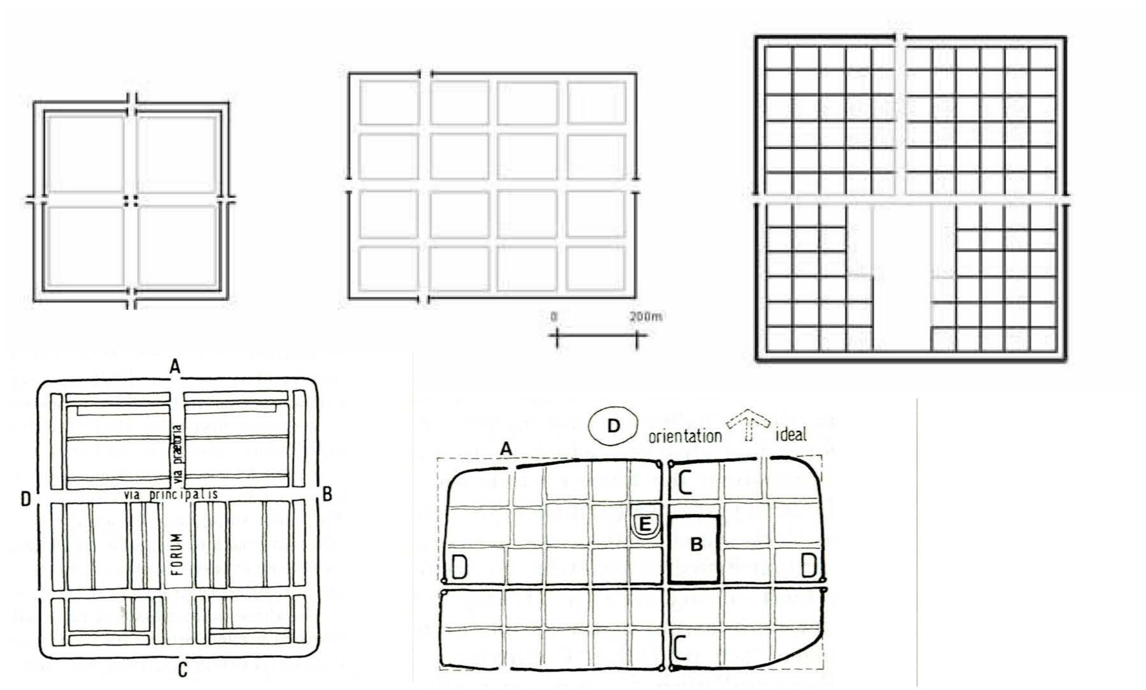


Figure 14 Castra/Castrum and the Roman City

Reference: Romanum. “Roman Camp.” http://www.imperiumromanum.edu.pl/oboz_rzymski.html (accessed July 16, 2014); Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972.

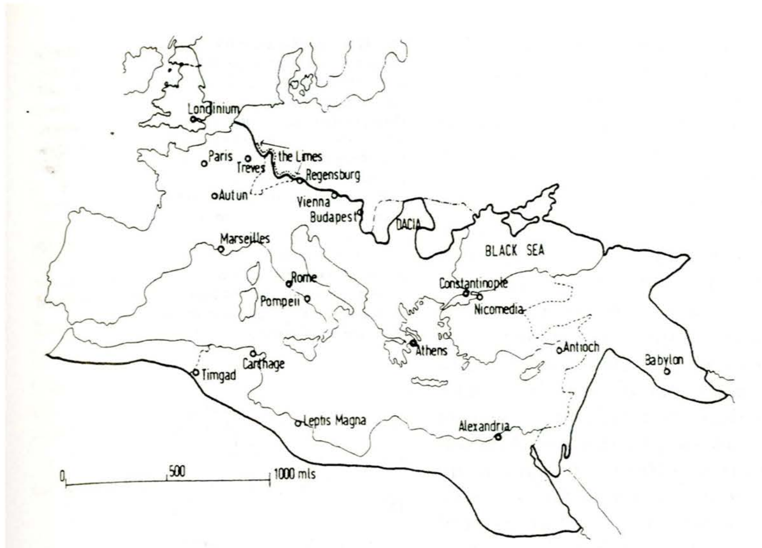


Figure 15 The Roman Castra and Roman Expansion

Reference: Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972.

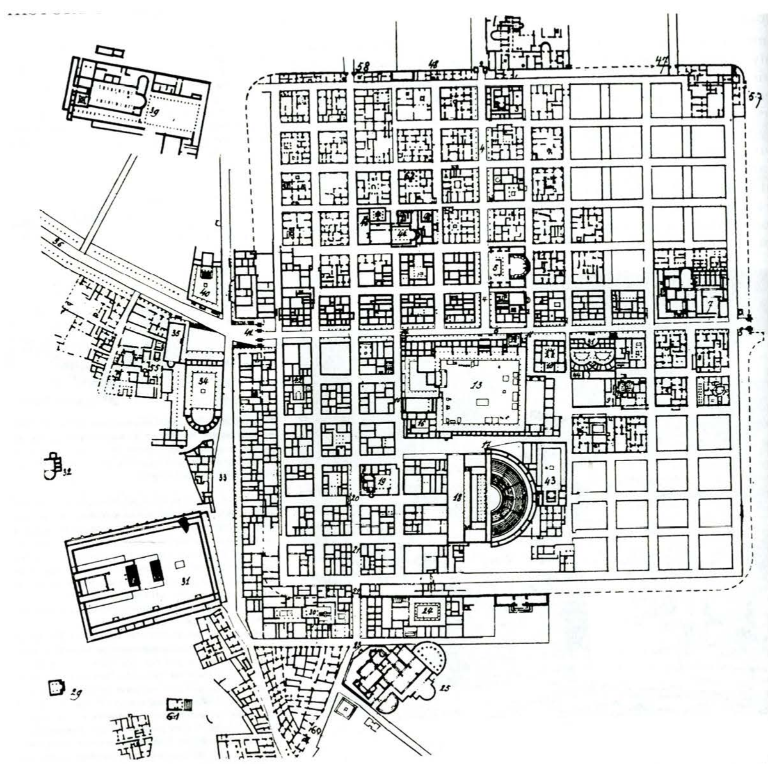


Figure 16 Timgad City Grid

Reference: Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972.

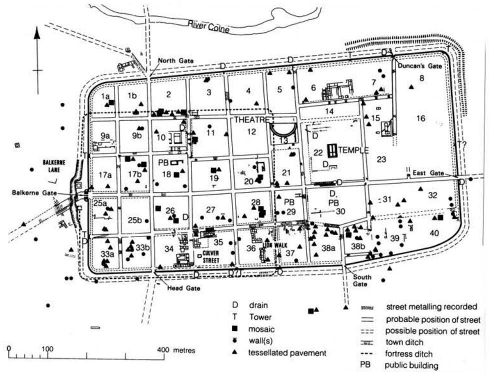


Figure 17 Camulodunum (Clochester, England) Castra

Reference: Camulos. "Guided Tour of Clochester." http://www.camulos.com/virtual/townwall2.htm (accessed July 16, 2014).

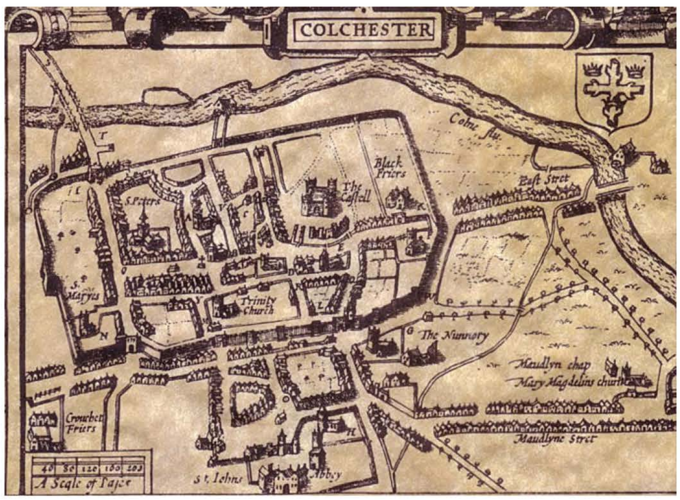


Figure 18 Old Town Plan of Clochester, England

Reference: The Old Map & Clock Company. "Historical Maps for Dad - Essex." http://www.oldmap.co.uk/Essex.php (accessed July 16, 2014).

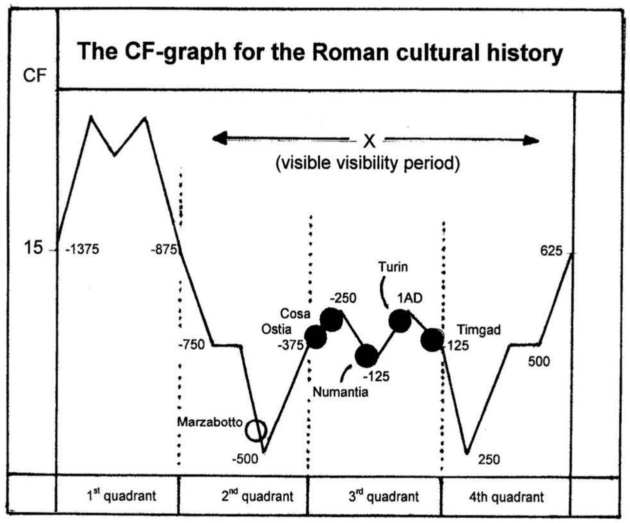


Figure 19 Roman Expansion Coincides With Period of Castra Use

Reference: Quadralectic Architecture. "4.1.3.4.3 The Roman Grid Towns." http://quadralectics.wordpress.com/4-representation/4-1-form/4-1-3-design-in-city-building/4-1-3-4-the-grid-model/4-1-3-4-3-the-roman-grid-towns/ (accessed July 17, 2014).

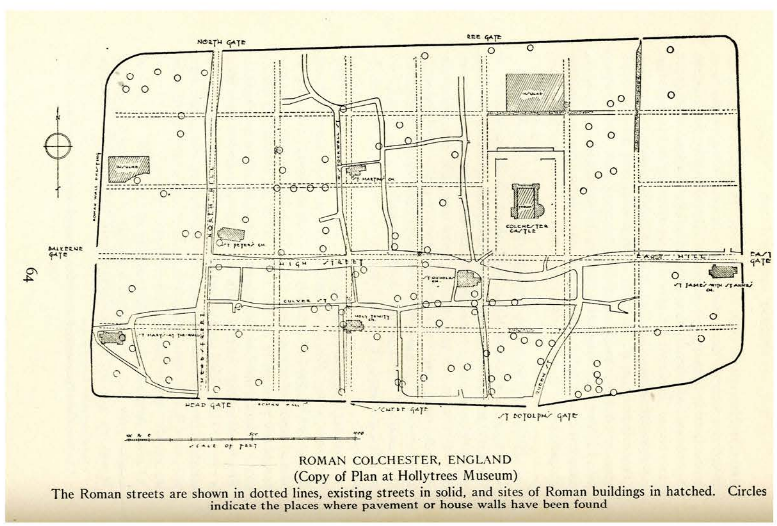
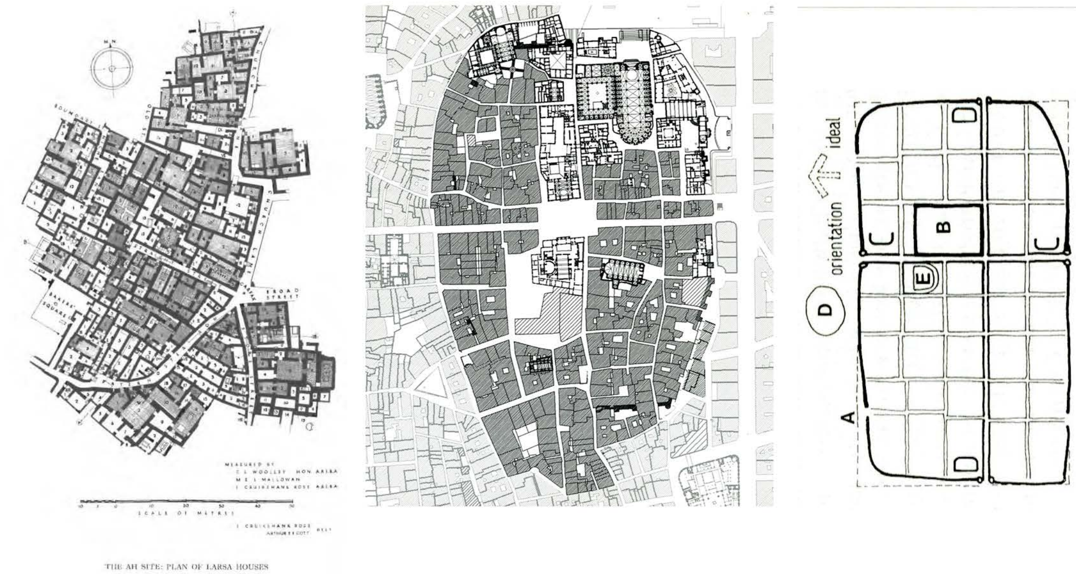


Figure 20 Clochester Castra Modified in Middle Ages

Reference: Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935.



Dendritic Gridpattern
UR

Accreted Grid
Barcelona Medieval Overlay of
Castra System

Hierarchical
Gridpattern
Typical Roman Castra

Figure 21 Gridpatterns From Castra to Accretion

Reference: Smith, Stuart. "The City of Ur: Photo of City." University of California Santa Barbara. http://www.anth.ucsb.edu/faculty/stsmith/classes/anth3/Ur_cityview.jpg (last visited July 16, 2014); Busquets, Joan. Barcelona: The Urban Evolution of a Compact City. Rovereto: Nicolodi, 2005; Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972.

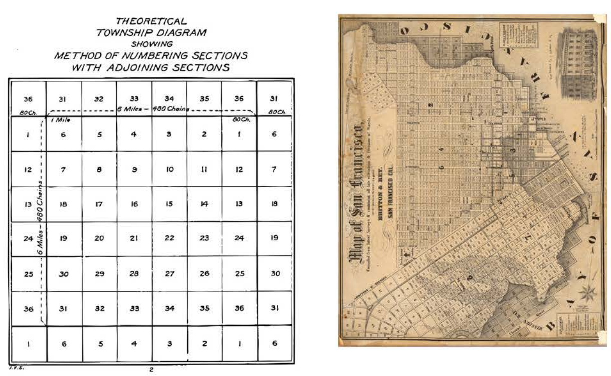
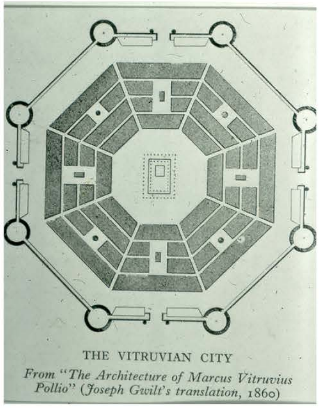


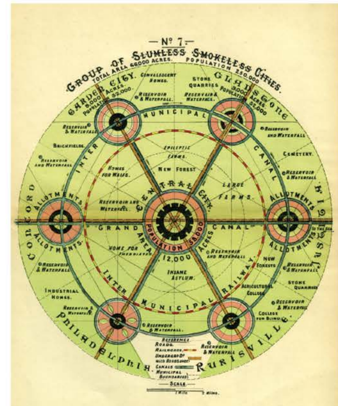
Figure 22 The Public Land Survey System and San Francisco

Reference: SPUR. "Grand Reductions: 10 Diagrams That Changed City Planning." http://www.spur.org/publications/article/2012-11-09/grand-reductions-10-diagrams-changed-city-planning (accessed July 17, 2014).

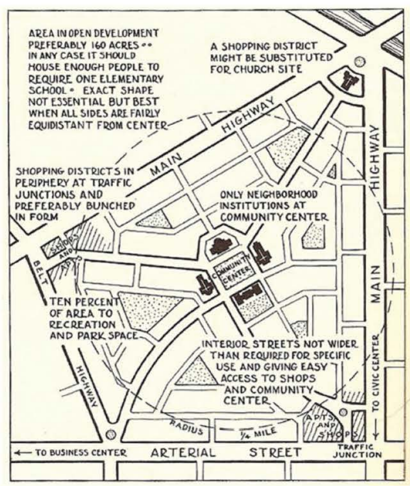


Vitruvian City Plan

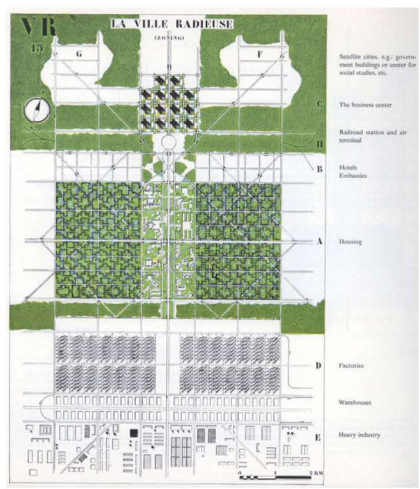
City of Palmanova



Ebenezer Howard's
Garden City



Clarence Perry's
"neighborhood unit"



Le Corbusier's
"Radiant Cities"
(1935)

Figure 23 The Utopian City

Reference: SPUR. "Grand Reductions: 10 Diagrams That Changed City Planning." <http://www.spur.org/publications/article/2012-11-09/grand-reductions-10-diagrams-changed-city-planning> (last accessed July 17, 2014).

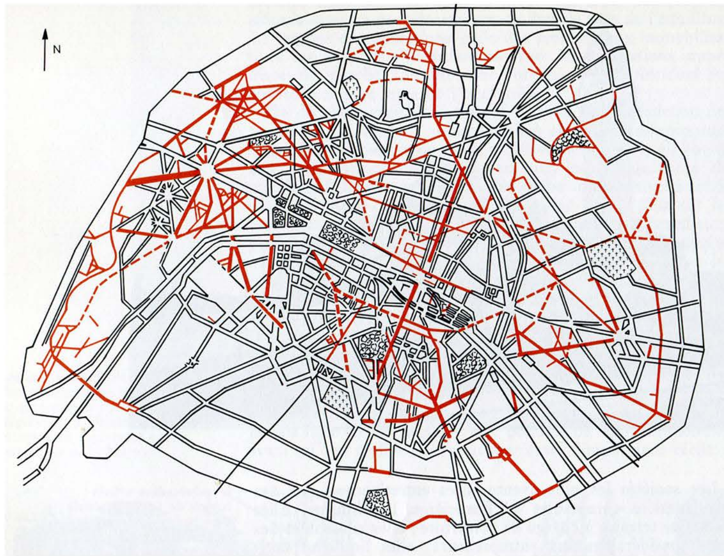


Figure 24 Radial and Connective Patterns of Haussmann's Paris

Reference: Architokyo: Urbanism and Architecture. "Tokyo's Haussmanisation and the Influence of the Paris Expositions." http://architokyo.wordpress.com/exposition/ (accessed July 17, 2014).

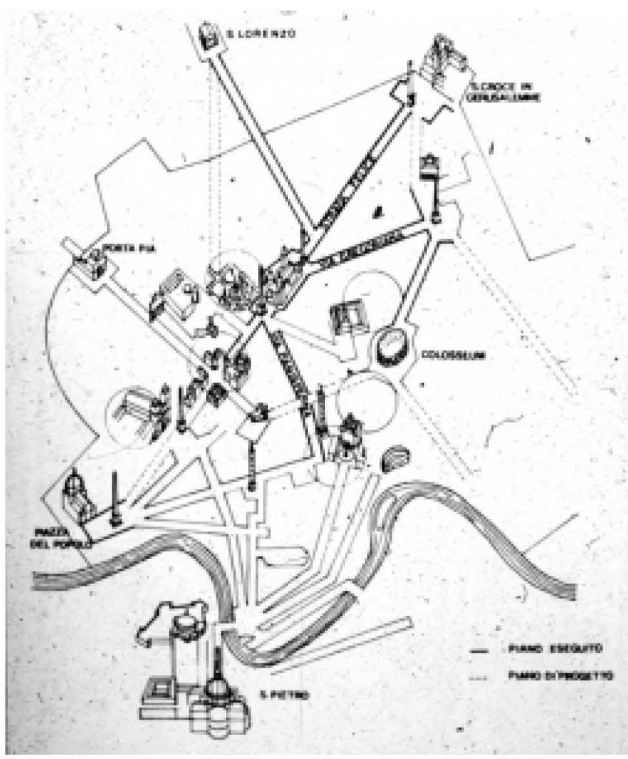


Figure 25 Rome Plan of Sixtus V and Landmarks

Reference: Landscape Architecture Study Tour. "Pope Sixtus V Plan for Rome by William Cone." http://courses.umass.edu/latour/Italy/2005/CONE/index.html (accessed July 17, 2014).

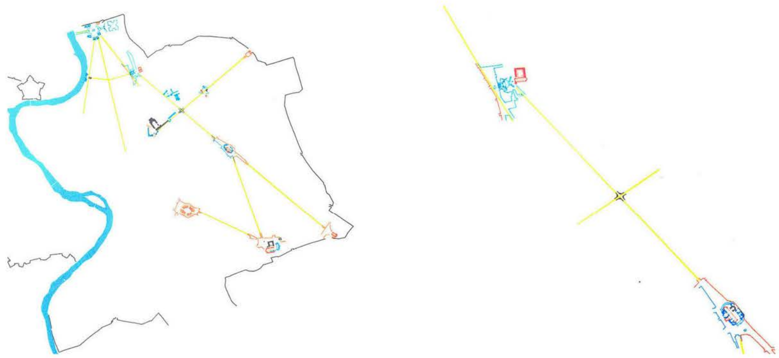


Figure 26 Rome Plan of Sixtus V and Forcelines

Reference: Landscape Architecture Study Tour. “Pope Sixtus V Plan for Rome by William Cone.” http://courses.umass.edu/latour/Italy/2005/CONE/index.html (accessed July 17, 2014); Blackspaces. “Design by Essentials--Sixtus V’s Plan for Rome.” http://blackspaces.wordpress.com/2012/02/14/design-by-essentials-sixtus-vs-plan-for-rome/ (accessed July 17, 2014); Drawing Cities. “Rome of Sixtus V.” http://drawingcities-zscapes.blogspot.com/2011/12/rome-of-sixtus-v.html (accessed July 17, 2014).

Figure 27 Rome Plan of Sixtus V, Connective Lines

Reference: MdHistory. ‘Figure 4. Pope Sixtus V’s plan for Rome, c. 1585.” http://mdhistory.net/doing_good/7001/HTML/FIG00004.HTM (accessed July 17, 2014).

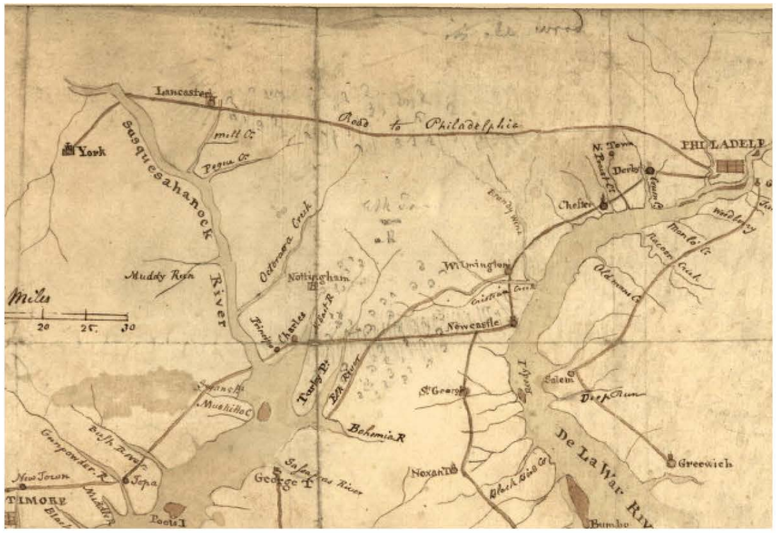


Figure 28 Philadelphia and Lancaster Turnpike Road (1795)

Reference: Federal Highway Administration. “The Paintings of Carl Rakeman, 1795 - The Philadelphia and Lancaster Turnpike Road.” http://www.fhwa.dot.gov/rakeman/1795.htm (accessed July 17, 2014); Library of Congress. “Philadelphia and Lancaster Turnpike” (Map). http://www.mapsofpa.com/roadthumb/1796roadmapcu.jpg (accessed July 17, 2014).

Frederick L. Olmsted   Clarence Perry   Ebenezer Howard   Clarence Stein

Frank L. Wright   Raymond Unwin   Le Corbusier

Figure 29 Planners of the New Age

Reference: Wikipedia. “Ebenezer Howard.” http://upload.wikimedia.org/wikipedia/commons/8/81/Ebenezer_Howard.jpg (accessed July 17, 2014); The Cultural Landscape Foundation. “Clarence Stein.” http://tclf.org/pioneer/clarence-stein (accessed July 17, 2014); Wikipedia. “Raymond Unwin. http://upload.wikimedia.org/wikipedia/commons/d/d8/Raymondunwin.jpg (accessed July 17, 2014); Onewaystreet. “Corbusier.” http://onewaystreet.typepad.com/.a/6a00d8341c86cc53ef010536e46021970b-pi (accessed July 17, 2014); Wikipedia. “Frank Lloyd Wright.” http://upload.wikimedia.org/wikipedia/commons/3/3a/Frank_Lloyd_Wright_NYWTS_3.jpg (accessed July 17, 2014); Wikipedia. “Clarence Perry.” http://upload.wikimedia.org/wikipedia/en/5/52/ClarencePerry1935.jpg (accessed July 17, 2014); Wikipedia. “Frederick Law Olmsted.” http://en.wikipedia.org/wiki/File:Portrait_of_Frederick_Law_Olmsted.jpg (accessed July 17, 2014).

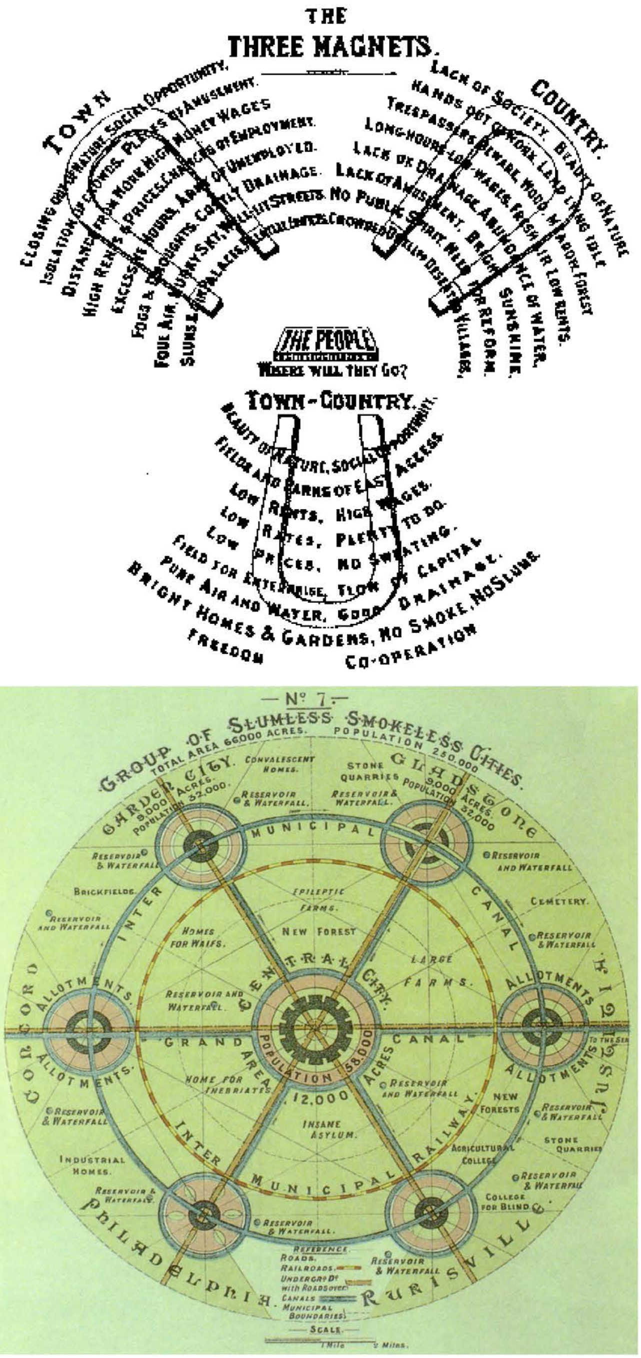


Figure 30 Garden City Concepts of Ebenezer Howard

Reference: Wikipedia. “Garden City.” http://upload.wikimedia.org/wikipedia/commons/3/3d/Garden_City_Concept_by_Howard.jpg (accessed July 17, 2014); Wikipedia. “Three Magnets.” http://upload.wikimedia.org/wikipedia/commons/5/55/Howard-three-magnets.png (accessed July 17, 2014).

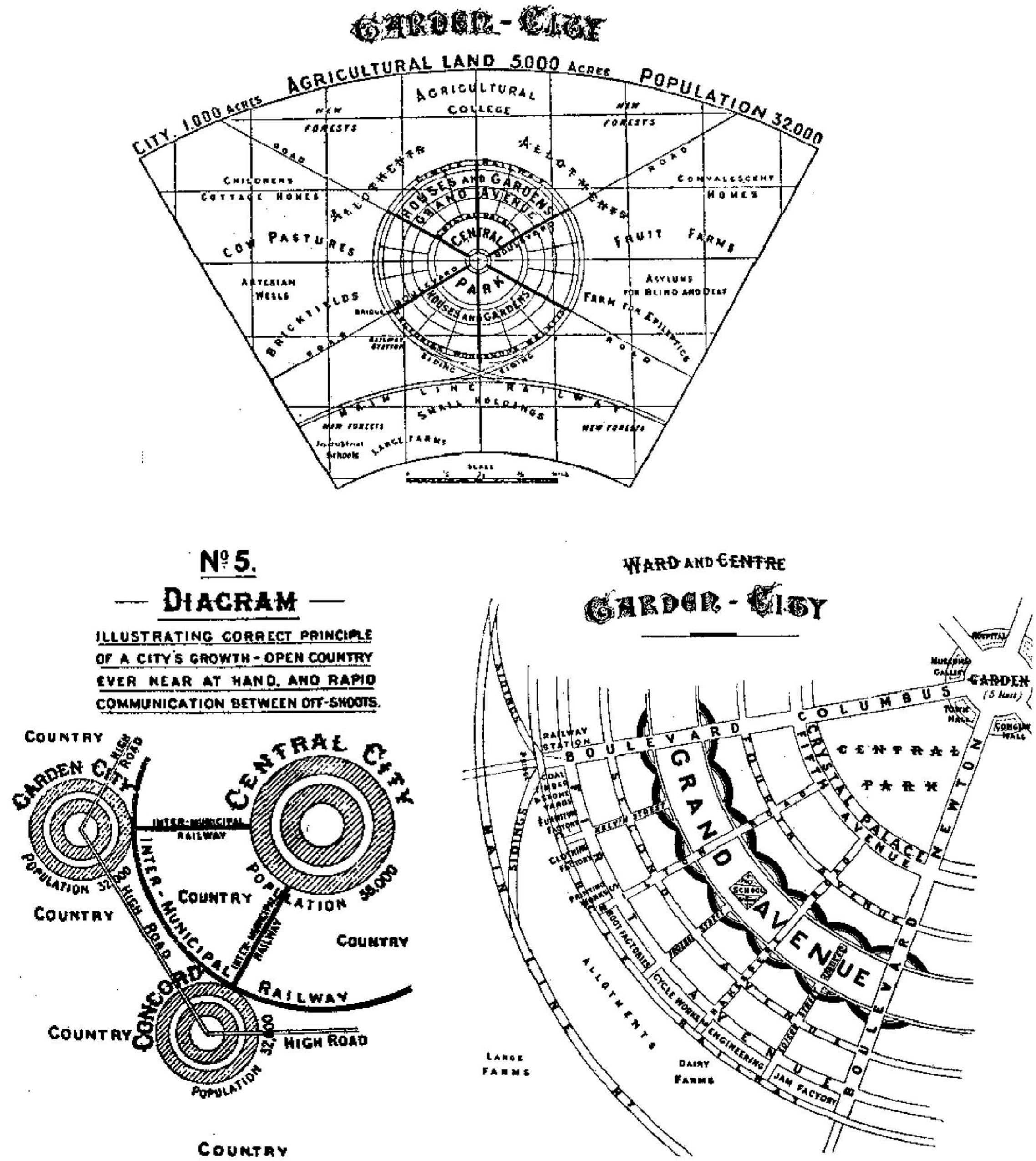
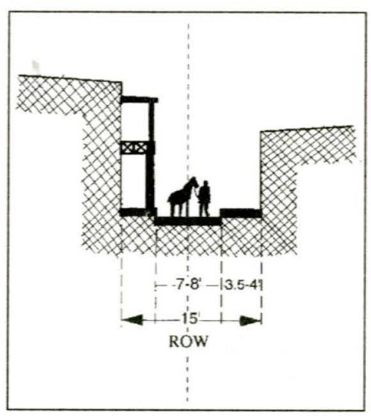


Figure 31 Garden City Concepts of Ebenezer Howard (Cont'd)

Reference: Urban Planning Library. "Garden Cities of To-morrow." http://urbanplanning.library.cornell.edu/DOCS/howard.htm (accessed July 17, 2014).

Figure 32 Master Plan of Riverside, Illinois 1869

Reference: The Frederick Law Olmsted Society of Riverside. “General Plan of Riverside.” http://www.olmstedsociety.org/wp-content/uploads/2008/11/general-plan-of-riverside.jpg (accessed July 12, 2014).



Emperor Augustus set standards for street widths in 15 B.C. The width of *vicinae*—side roads—was about 15 feet. *(© Eran Ben-Joseph)*

Figure 33 Diagram of a Roman Street of 15 BC, Herculaneum

Reference: Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997.

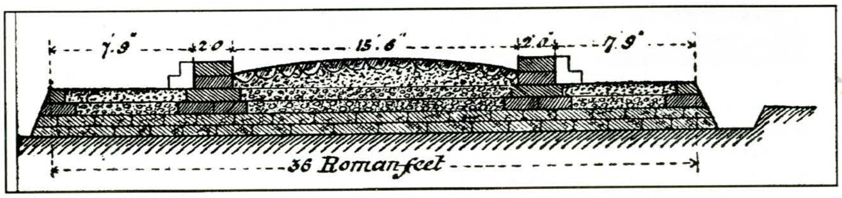


Figure 34 Typical Roman Street Cross-Section

Reference: Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997.

Figure 35 Picture of Bridget Driscoll, First Death by Auto

Reference: Thomas, Chris. "UK's First Fatal Motor Accident: Crystal Palace." Crystal Palace Magazine, August 18, 2010. http://www.crystal-palace-mag.co.uk/worlds-fatal-motor-accident-happened/ (accessed July 14, 2004); Wikipedia. "Bridget Driscoll." http://en.wikipedia.org/wiki/Bridget_Driscoll (accessed July 14, 2014); British Newspaper Archive. "The First Fatal Motor Car Accident." British Newspaper Archive. www.britishnewspaperarchive.co.uk/viewer/bl/0000265/18960819/015/0003 (accessed July 14, 2014).

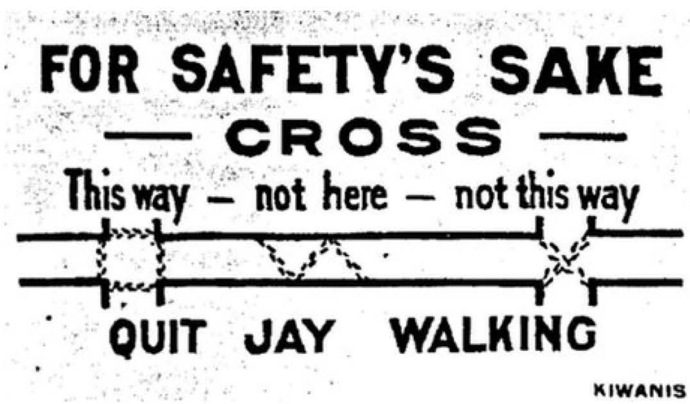


Figure 36 Henry H. Bliss and Jaywalking Propaganda

Reference: Dimeo-Ediger, Winona. "Saved By the Belt," in Johns, Chris National Geographic, Vol. 216 Issue 3 (September 2009); Wikipedia. "Henry H. Bliss." http://en.wikipedia.org/wiki/Henry_H._Bliss#cite_note-1 (accessed July 14, 2014); Citystreets. "The First Pedestrian Fatality." http://citystreets.org/projects/bliss-plaque/ (accessed July 17, 2014); Lewis, Aidan. "Jaywalking: How the car industry outlawed crossing the road." BBC News, February 11, 2014. http://www.bbc.com/news/magazine-26073797 (accessed July 17, 2014).

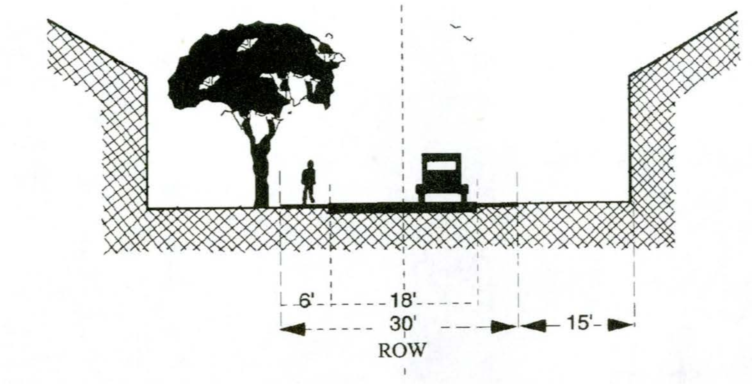


Figure 37 Radburn, New Jersey 1928. Street Section

Reference: Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997.

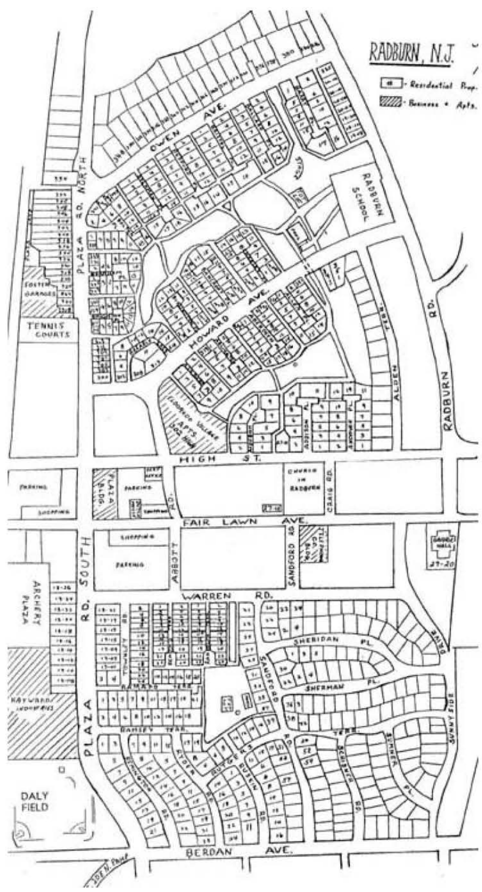


Figure 38 Radburn General Plan and Neighborhoods

Reference: Radburn. Radburn Map. http://www.radburn.org/map3.jpg (last visited July 12, 2014).

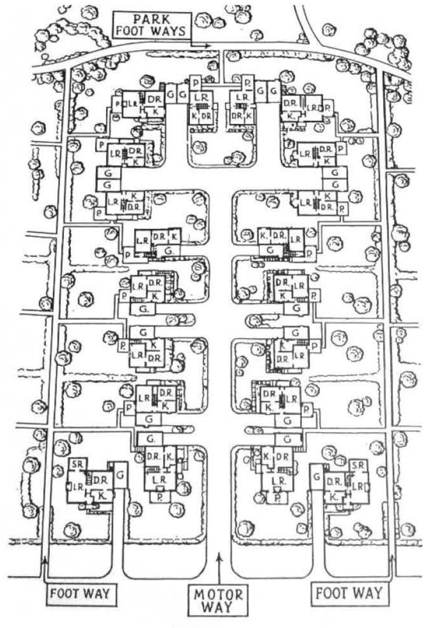


Figure 39 Radburn Cul-de-Sac Example

Reference: De Chant, Tim. Per Square Mile. Blog. http://static.persquaremile.com/wp-content/uploads/2011/03/radburn-cluster-plan.jpg (accessed July 12, 2014).

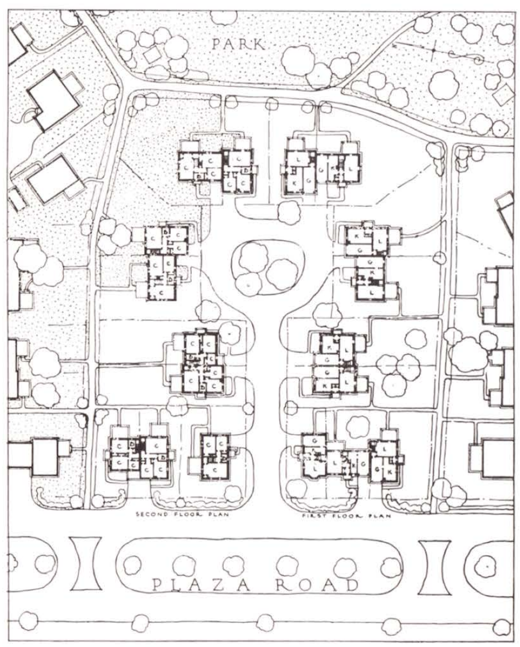


Figure 40 Radburn Cul-de-Sac Example With Round

Reference: 3.bp.blogspot.com. Radburn Cul-de-Sac. http://3.bp.blogspot.com/_5hqBYPQYY0I/S8nTcvSyKyI/AAAAAAAABjA/VdH92VHk1mU/s1600/radburn_culdesac.jpg (accessed July 12, 2014).

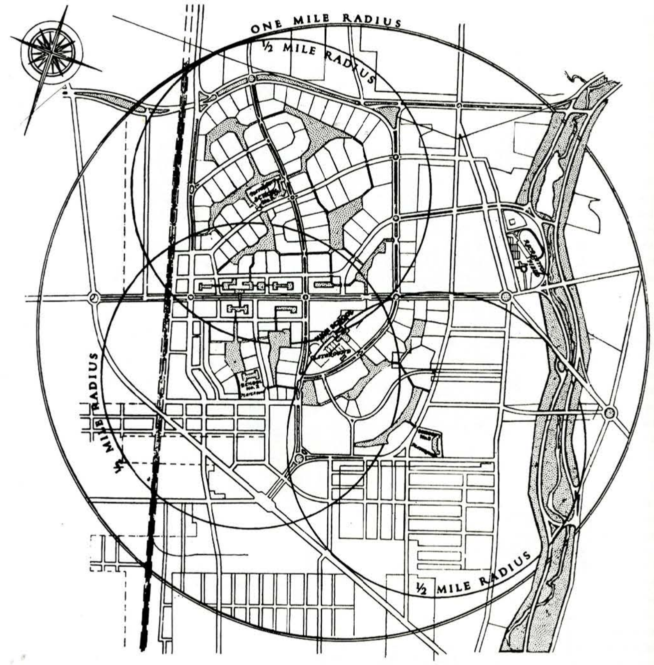


Figure 41 Radburn General Plan and Neighborhoods

Reference: Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003; DoYouCity. General Plan Showing Neighborhood. http://doyoucity.com/site_media/ckeditor/JoseMartinezSusi/2013/06/23/AAA1.jpg (accessed July 12, 2014); Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997.

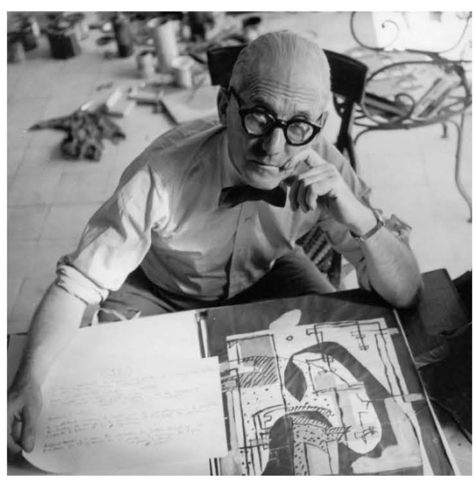


Figure 42 Le Corbusier

Reference: Jacobson, Samuel. "Why Politics Matter: Le Corbusier, Fascism, and UBS." Archdaily, August 10, 2011. http://www.archdaily.com/149885/why-politics-matter-le-corbusier-fascism-and-ubs/ (accessed July 14, 2014).

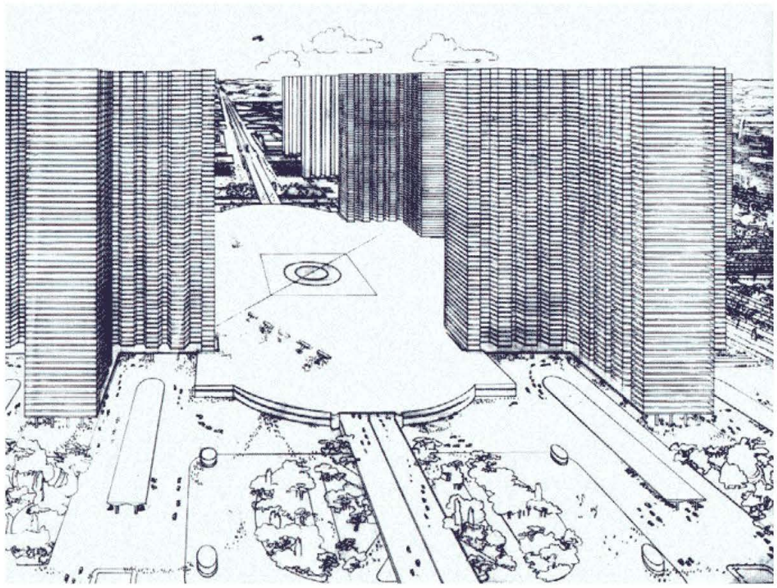


Figure 43 Plan Voisin, Le Corbusier

Reference: Jacobson, Samuel. “Why Politics Matter: Le Corbusier, Fascism, and UBS.” Archdaily, August 10, 2011. http://www.archdaily.com/149885/why-politics-matter-le-corbusier-fascism-and-ubs/ (accessed July 14, 2014).

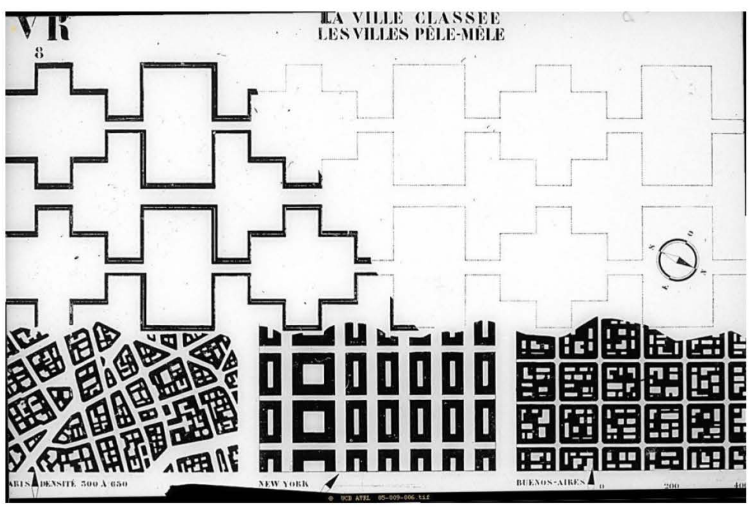


Figure 44 La Ville Classee Les Villes Pele-Mele

SReference: Jacobson, Samuel. “Why Politics Matter: Le Corbusier, Fascism, and UBS.” Archdaily, August 10, 2011. http://www.archdaily.com/149885/why-politics-matter-le-corbusier-fascism-and-ubs/ (accessed July 14, 2014).

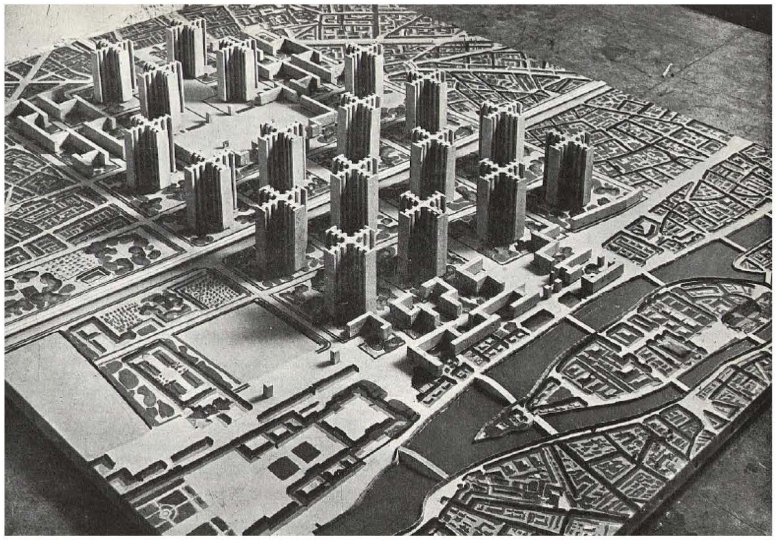


Figure 45 Plan Voisin Model With Towers

Reference: Jacobson, Samuel. "Why Politics Matter: Le Corbusier, Fascism, and UBS." Archdaily, August 10, 2011. http://www.archdaily.com/149885/why-politics-matter-le-corbusier-fascism-and-ubs/ (accessed July 14, 2014).

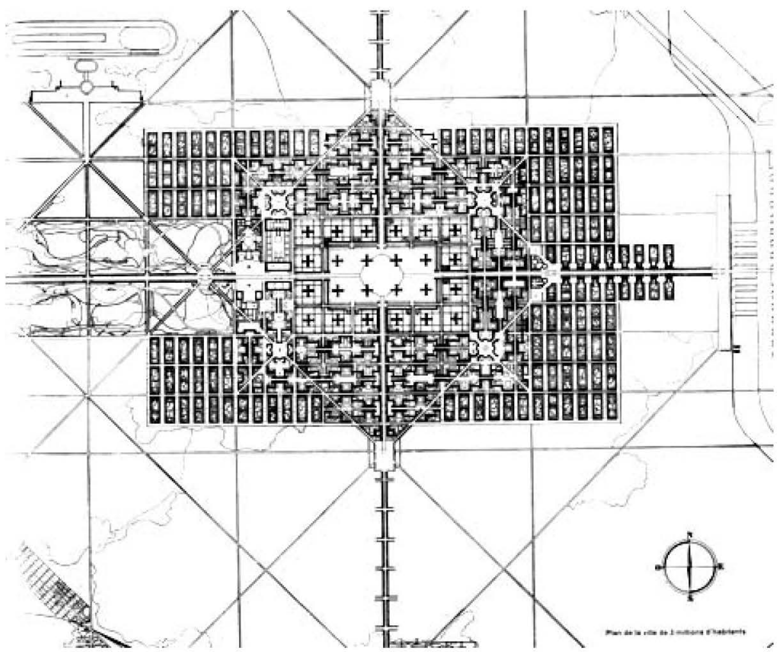


Figure 46 Corbusier City Plan

Reference: Ross Wolf. "Corbu City Plan." http://rosswolfe.files.wordpress.com/2011/04/23-corbu-city-plan.jpg (accessed July 18, 2014).

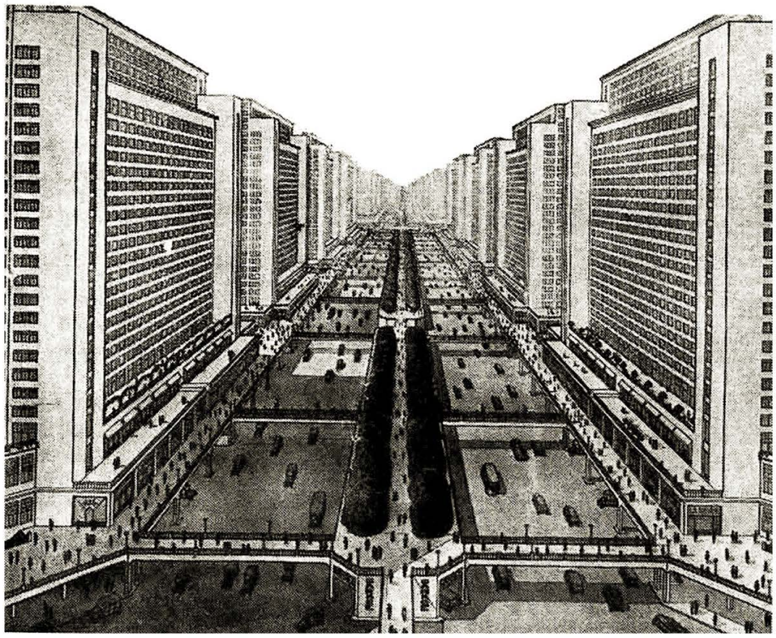


Figure 47 The Radiant City Showing Modernist Monotony

Reference: Ross Wolf. “Le Corbusier La Ville Radieuse.” http://rosswolfe.files.wordpress.com/2010/09/01_18_le_corbusier_la_ville_radieuse_1930-31.jpg (accessed July 18, 2014).

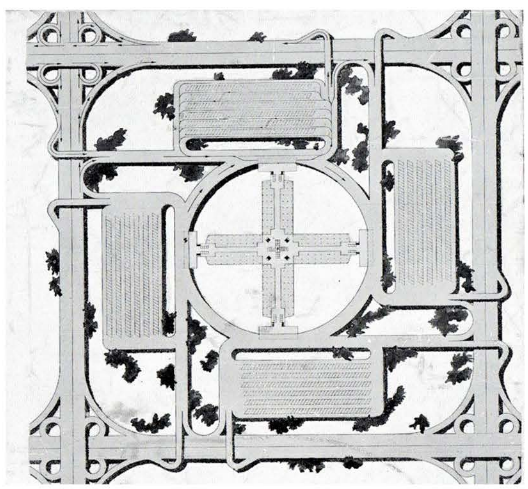


Figure 48 The Radiant City With Transportation Plan

Reference: Density Atlas. “Paris City Perimeter.” http://densityatlas.org/casestudies/profile.php?id=103 (accessed July 18, 2014).

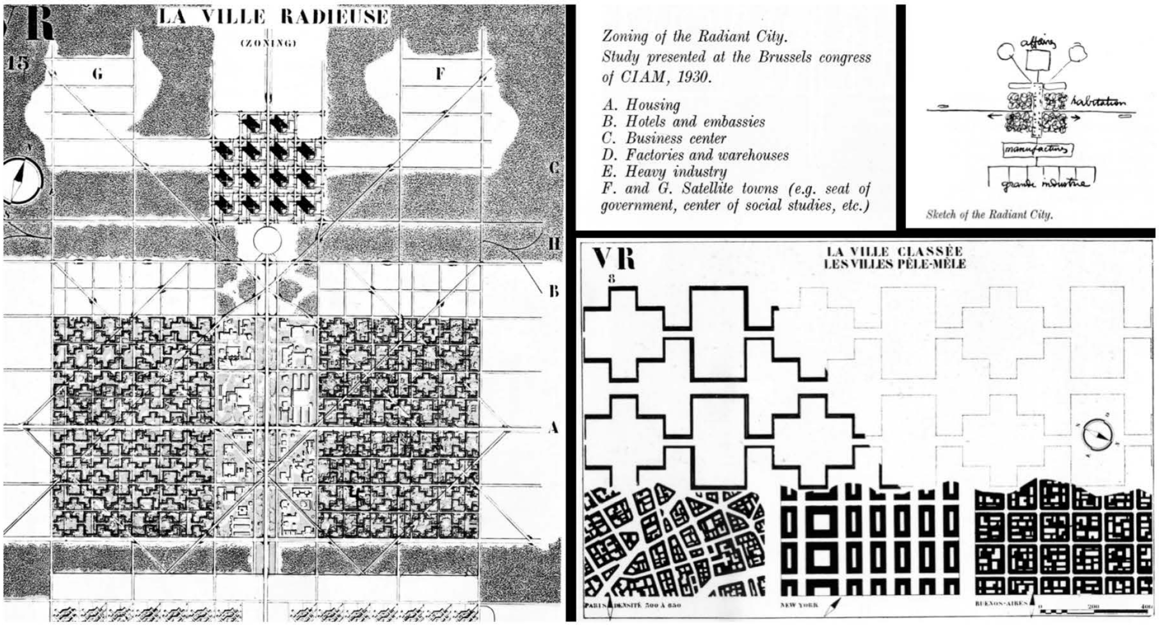


Figure 49 The Radiant City, Ideal City and Plan

Reference: Class Connections. “La Ville Radieuse.” http://classconnection.s3.amazonaws.com/1416/flashcards/678373/png/presentation-013-011.png (accessed July 18, 2014).

Figure 50 The Radiant City, Photo of Model

Reference: Alter, Lloyd. “Witold Rybczynski On The Four Paradigms of American Cities.” http://www.treehugger.com/sustainable-product-design/witold-rybczynski-on-the-four-paradigms-of-american-cities.html (accessed July 18, 2014).

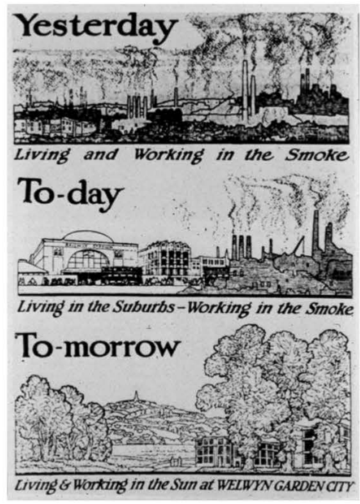


Figure 51 City of To-morrow

Reference: Khorosarchitecture Files. “Yesterday Today.” http://khorosarchitecture.files.wordpress.com/2012/03/yesterday-today.jpg (accessed July 18, 2014).

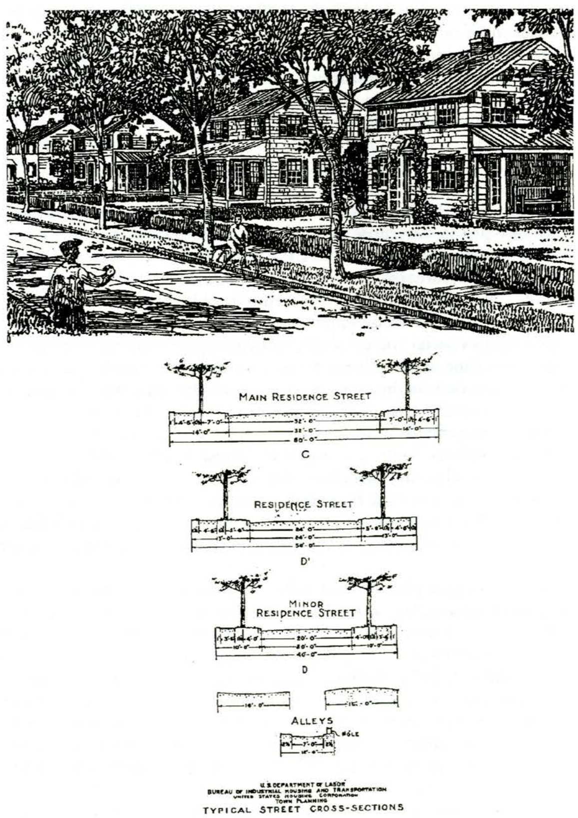


Figure 52 1914 U.S. Housing Corporation Guidelines

Reference: Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997.

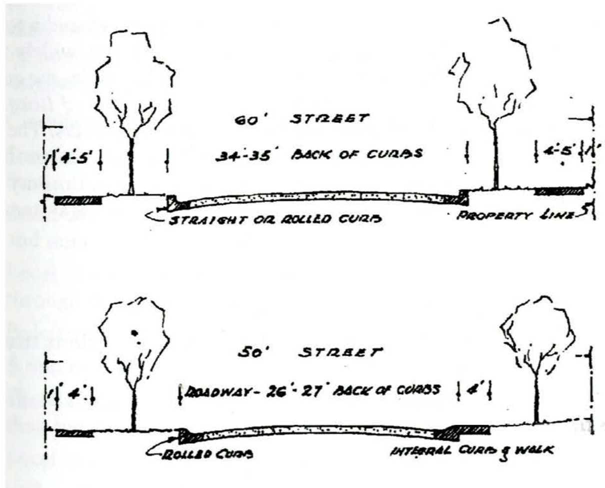


Figure 53 ULI 1947 Preferred Street Sections

Reference: Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997.

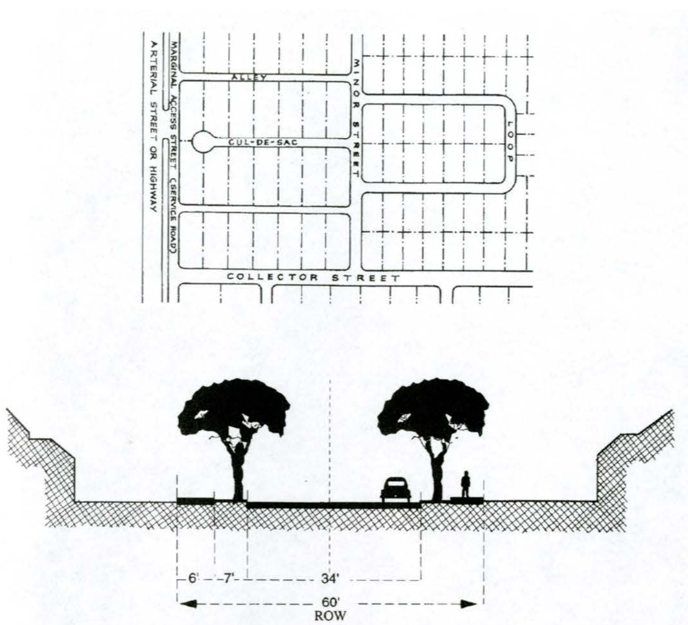


Figure 54 Institute for Transportation Engineers, 1965 and 1984

Reference: Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997.

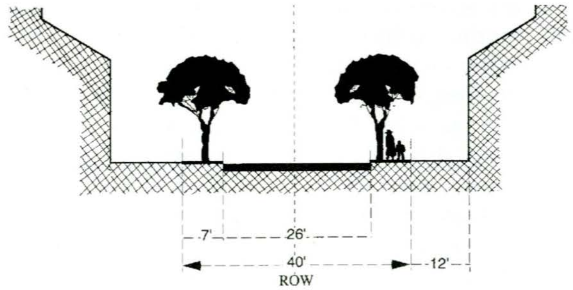


Figure 55 Bedford Park 1875, Cross-Section and Right-of-Way

Reference: Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997.

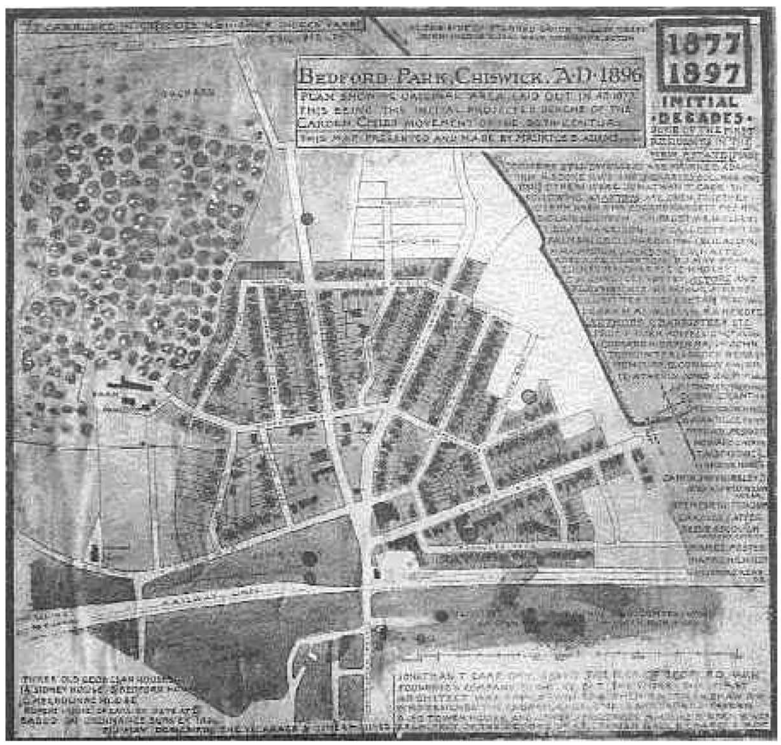


Figure 56 Bedford Park 1875 Master Plan

Reference: The Bedford Park Society. http://www.bedfordpark.org/maps/1877-97.jpg (accessed July 12, 2014).

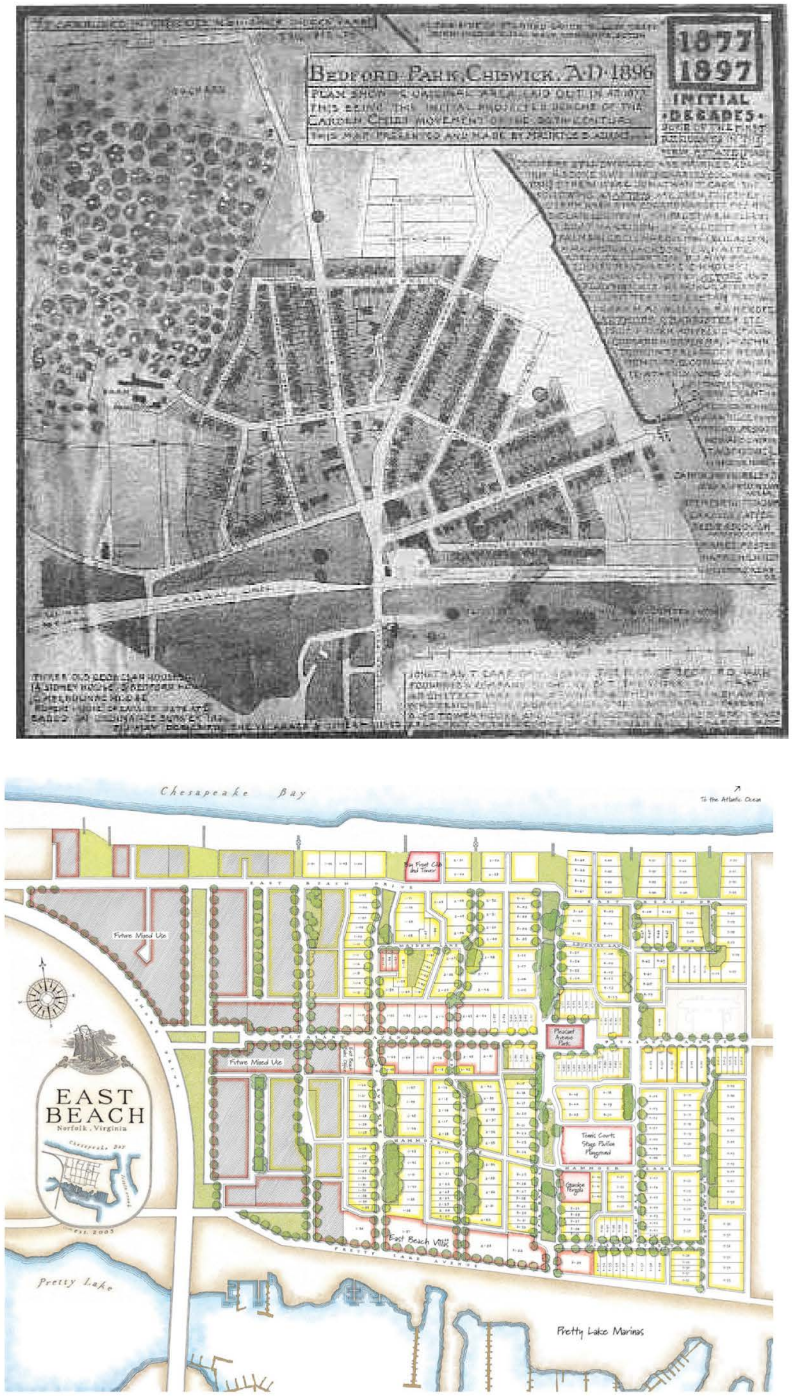


Figure 57 Comparison of Bedford Park 1875 plan with East Beach, Norfolk Plan

Reference: East Beach Norfolk. "Master Plan." http://www.eastbeachnorfolk.com/planning/master-plan.php (accessed July 19, 2014); The Bedford Park Society. http://www.bedfordpark.org/maps/1877-97.jpg (accessed July 12, 2014).

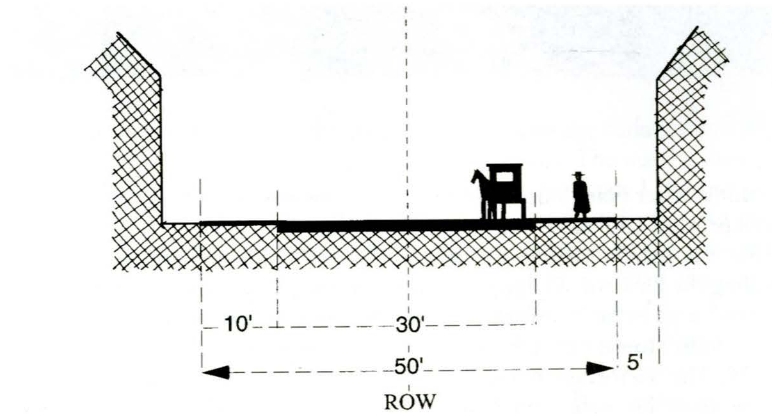


Figure 58 Park Village East 1823, Section and Measurements

Reference: Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997.

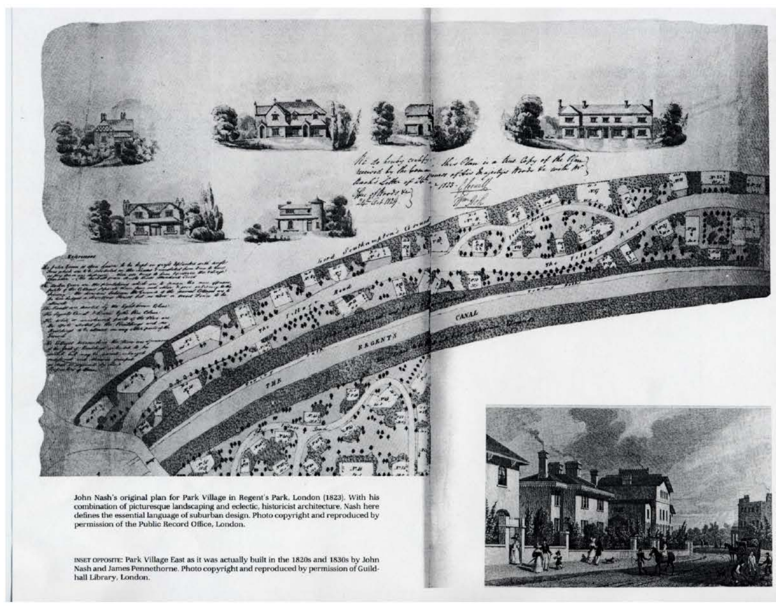


Figure 59 Park Village East 1823, Plan and Illustrations

Reference: Stanford. History 104. “Park Village Plan” http://web.stanford.edu/class/history104/coursework/maps/london/London-Plan6 (accessed July 12, 2014).

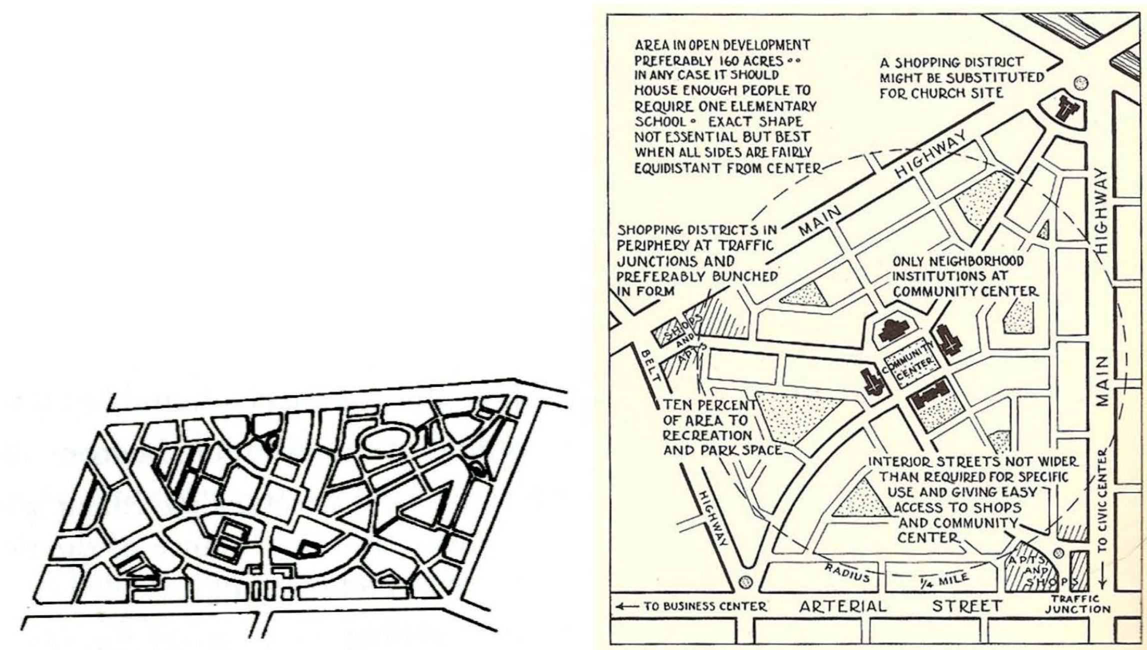


Figure 60 Clarence Perry Neighborhood Plan and Radburn Plan

Reference: Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997; Classconnection.s3.amazonaws.com. Clarence Perry Plan. http://classconnection.s3.amazonaws.com/579/flashcards/457579/jpg/neighborhood_unit_concept1320109865411.jpg (accessed July 12, 2014).

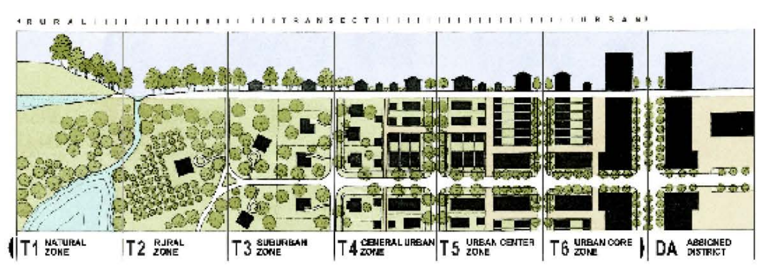


Figure 61 New Urbanist Transect

Reference: New Urbanism. "Transect." http://www.newurbanism.org/images/548_Transect.gif (accessed July 18, 2014); Transect Collection. "Transect." http://transect-collection.org/about.html (accessed July 18, 2014); Syracuse Then and Now. "'Transect' Applied to Regional Plans." http://syracusethenandnow.org/SettlementPlan/Transect.htm (accessed July 18, 2014).

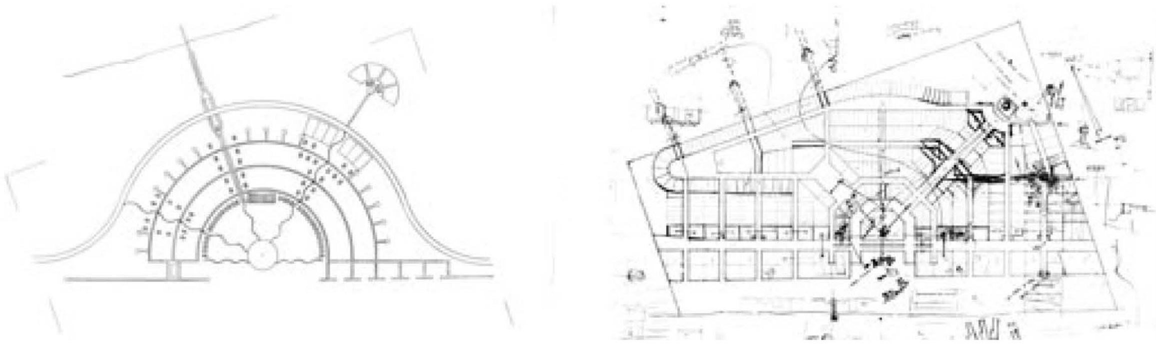


Figure 62 Seaside Diagrams

Reference: Bharne, Vinayak. “Book Review: Visions of Seaside.” Planetizen. http://www.planetizen.com/node/67006 (accessed July 19, 2014).

Figure 63 Pictures of Seaside Development

Reference: Bharne, Vinayak. “Book Review: Visions of Seaside.” Planetizen. http://www.planetizen.com/node/67006 (last accessed July 19, 2014).

Figure 64 Seaside Rendering

SOURCE: Reference: http://www.planetizen.com/node/67006 (accessed July 19, 2014).

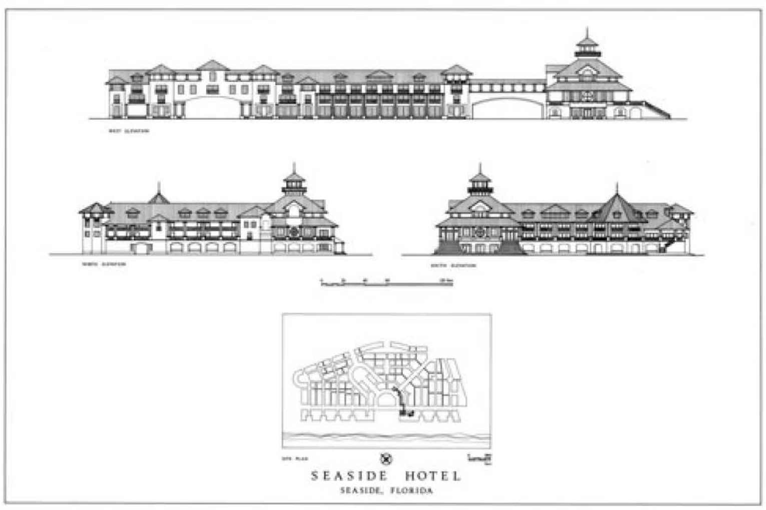


Figure 65 Alternative to Seaside by Robert A. M. Stern

Reference: Bharne, Vinayak. "Book Review: Visions of Seaside." Planetizen. http://www.planetizen.com/node/67006 (accessed July 19, 2014).

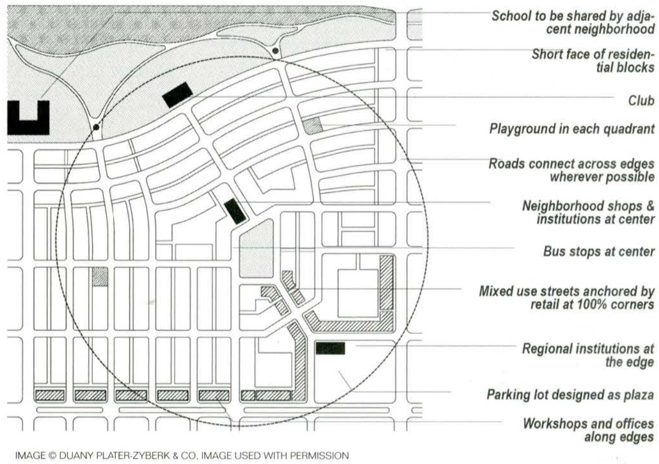
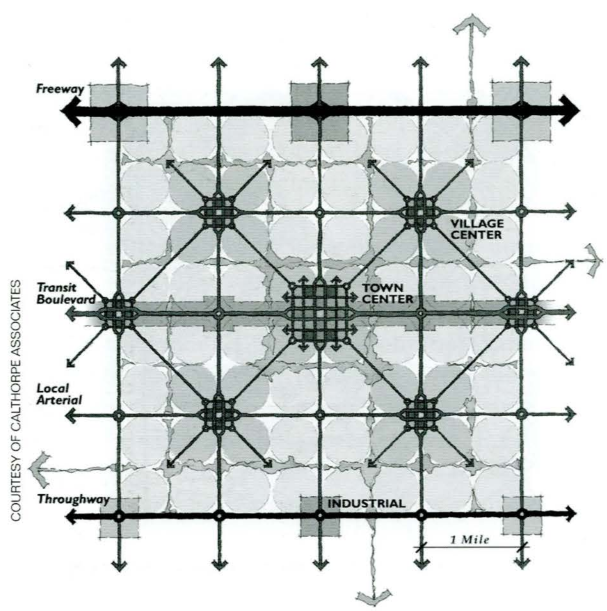


Figure 66 New Urbanist Pedestrian Shed

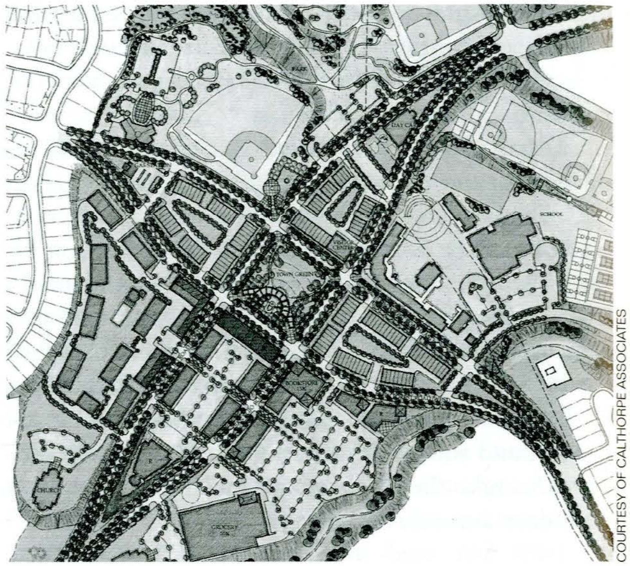
Reference: Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009.



A diagram of Peter Calthorpe's "urban network"

Figure 67 Peter Calthorpe's Urban Network

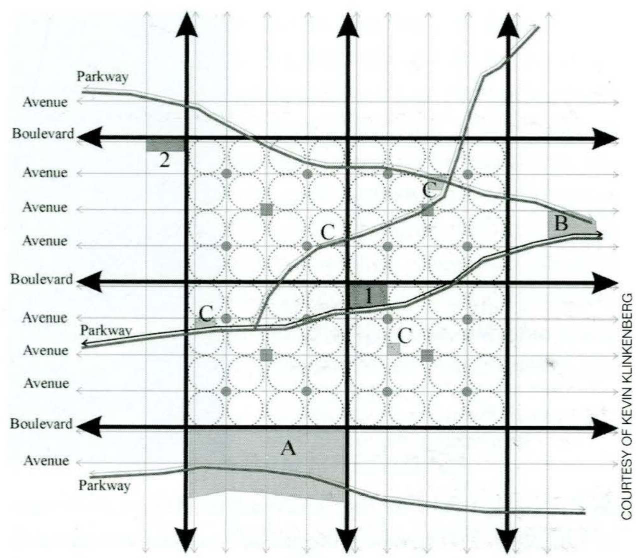
Reference: Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009.



Calthorpe's plan for one-way couplets in San Elijo Town Center.

Figure 68 San Elijo Town Center, as a New Urbanist Example.

Reference: Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009.



An alternative "urban network" concept by Kevin Klinkenberg.

Figure 69 Kevin Klinkenberg New Urbanist Diagram

Reference: Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009.

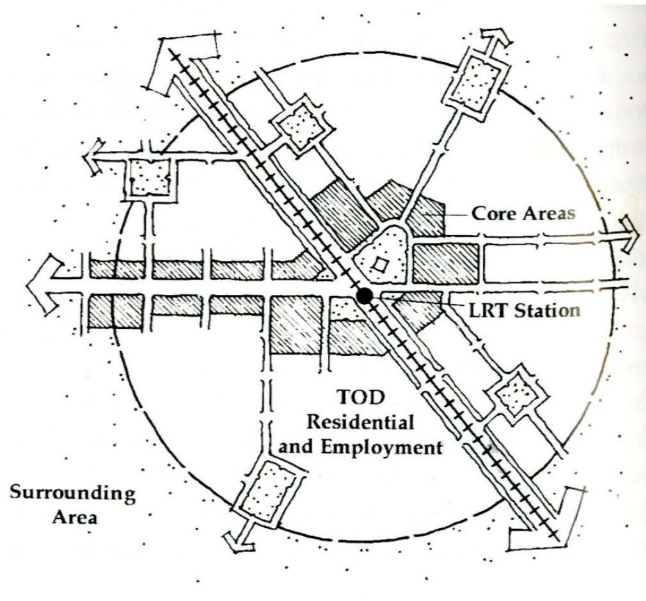


Figure 70 TOD Mixed-Use Diagram

Reference: Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009.

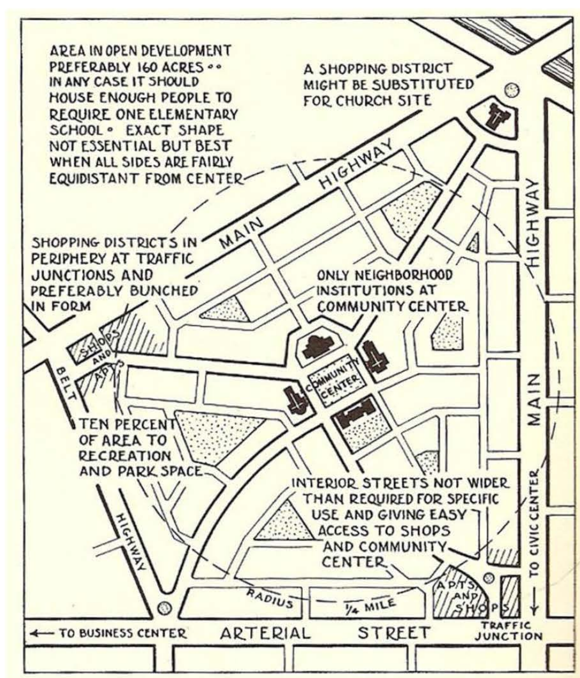


Figure 71 Clarence Perry Neighborhood Plan

Reference: Steuteville, Robert, Philip Langdon, and Special Contributors. New Urbanism Best Practices Guide. 4th ed. Ithaca, New York: New Urbanism Publications, 2009.

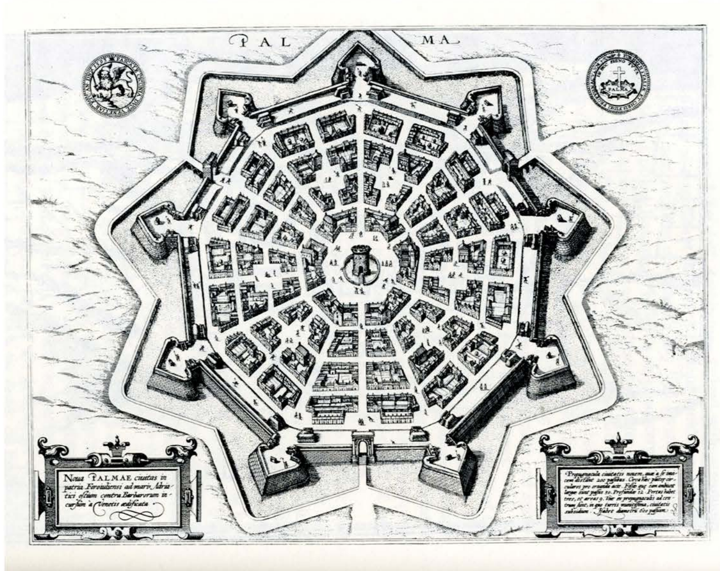


Figure 72   Ideal City: Palma Nouva, Italy 1598

Reference: Reps, John. Town Planning in Frontier America. Columbia and London: University of Missouri Press, 1980.

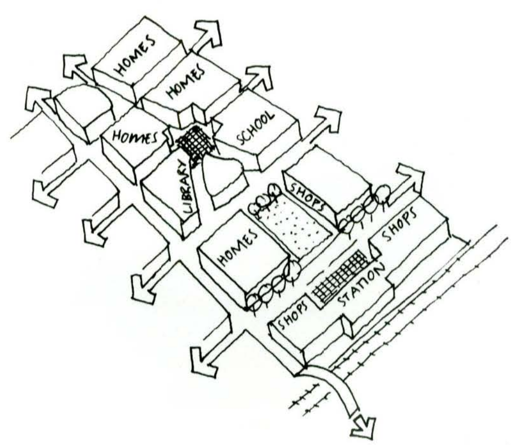


Figure 73   Basic Street Block Connectivity

Reference: Lewis, Sally. Front to Back: a Design Agenda for Urban Housing. Oxford: Elsevier, Architectural Press, 2005.

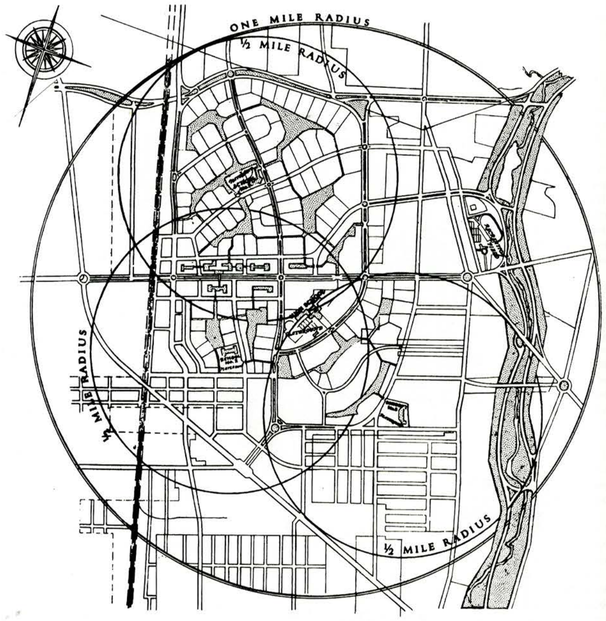


Figure 74 Radburn General Plan and Neighborhoods

Reference: Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997; Watson, Donald. Time-Saver Standards for Urban Design. New York: McGraw-Hill, 2003.

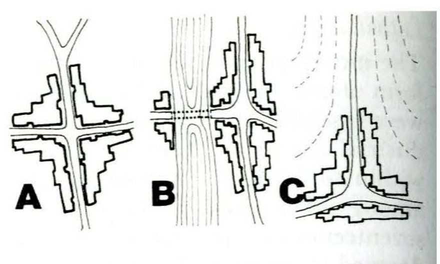


Figure 1.22 – Locational determinants: the 'market-place' factor exemplified at: A, land route crossings; B, intersections of land and water routes; C, at entrances to mountain passes.

Figure 75 Confluence and Urban Development

Reference: Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972.

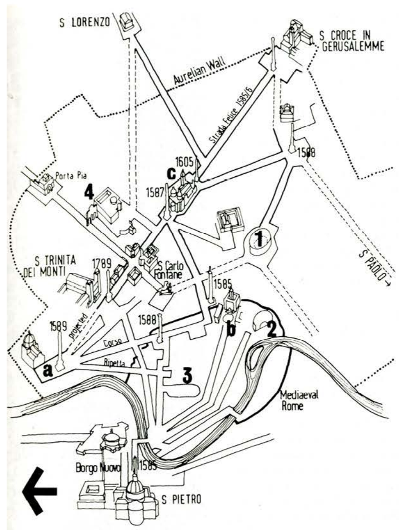


Figure 76 Baroque Force Lines of Sixtus V in Rome

Reference: Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972

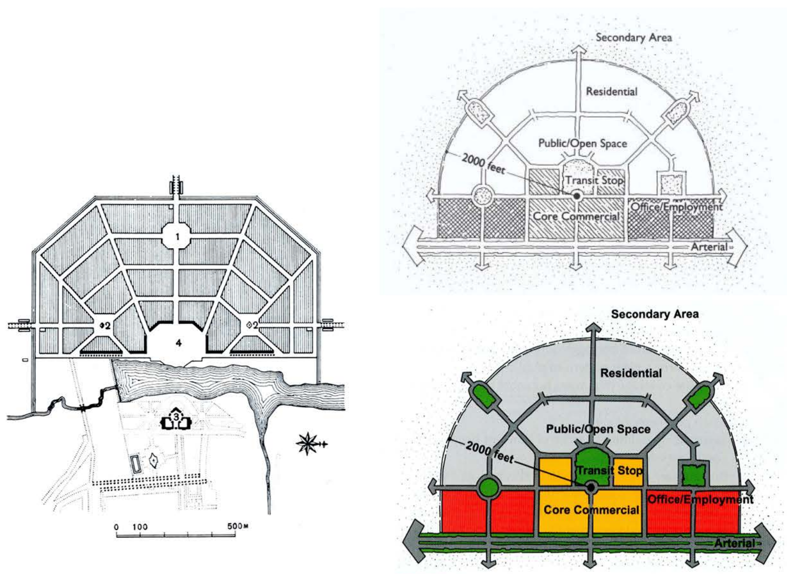


Figure 77 Calthorpe with Bogoroditsk and Transit Oriented Development

Reference: Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935; Newstimes.com. “Calthorpe Neo-Traditional Plan.” http://ww2.hdnux.com/photos/16/37/03/3797225/3/628x471.jpg (accessed July 13, 2014); Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010.

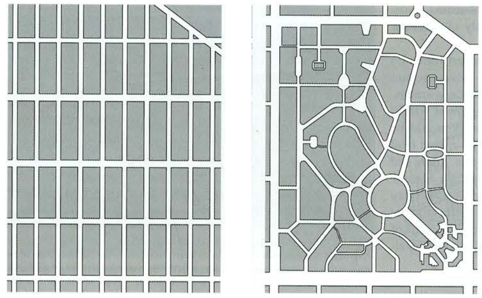


Figure 78 Clarence Perry versus the Standard Gridline

Reference: Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010.

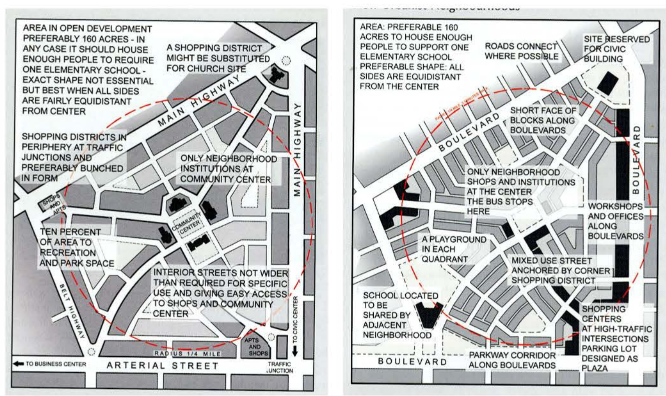


Figure 79 Comparison of Clarence Perry and New Urbanist Neighborhood

Reference: Carmona, Matthew. Public Places Urban Spaces: The Dimensions of Urban Design. 2nd ed. New York: Routledge, 2010.

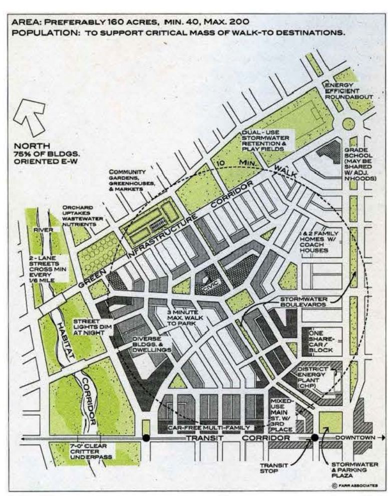


Figure 80 Sustainable Neighborhood Unit

Reference: Better Cities & Towns, “Sustainable Neighborhood Unit.” http://bettercities.net/images/18849/sustainable-neighborhood-unit (accessed July 18, 2014).

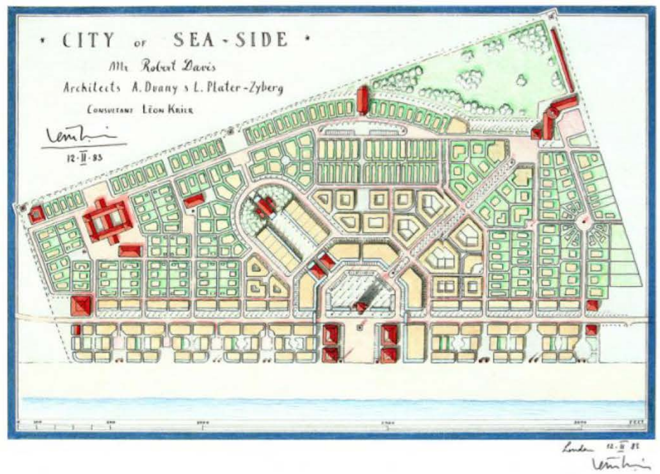
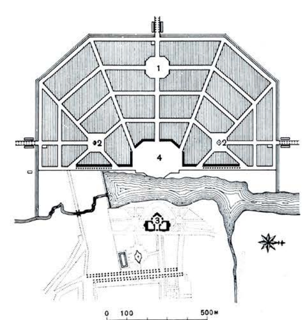


Figure 81   Sea Side Master Plan

Reference: Wired. "City of Sea Side." http://www.wired.com/images_blogs/design/2012/12/seaside-master-plan-wired-design.jpg. (accessed July 18, 2014).

Seaside Plans and Illustrations



Bogoroditsk Plan

Figure 82   Bogoroditsk plan with "Seaside Town Square and Beach front Master Plan"

Reference: Wired. "City of Sea Side." http://www.wired.com/images_blogs/design/2012/12/seaside-master-plan-wired-design.jpg. (accessed July 18, 2014); CNU. "Seaside Town Square and Beach front Master Plan." http://www.cnu.org/resources/projects/seaside-town-square-and-beachfront-master-plan-2011 (accessed July 18, 2014).

Figure 83 Bogoroditsk with Seaside, Florida, Comparison

Reference: Bogoroditsk District of Tula Oblast, Russia Google Earth (accessed July 19, 2014); Seaside, Florida. Google Earth (accessed July 19, 2014).

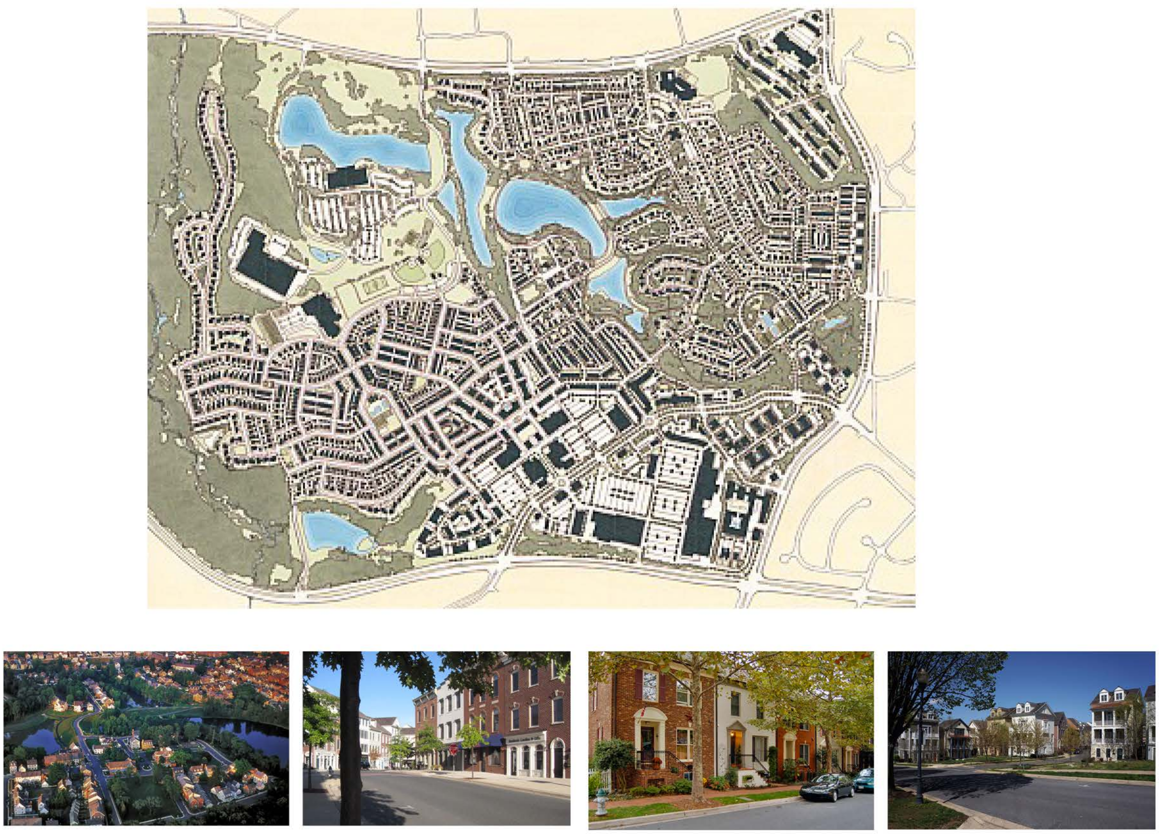


Figure 84 Kentlands Urban Plan and Photos

Reference: Duany Plater-Zyberk & Company. “Kentlands.” http://www.dpz.com/Projects/8805 (accessed August 1, 2014).

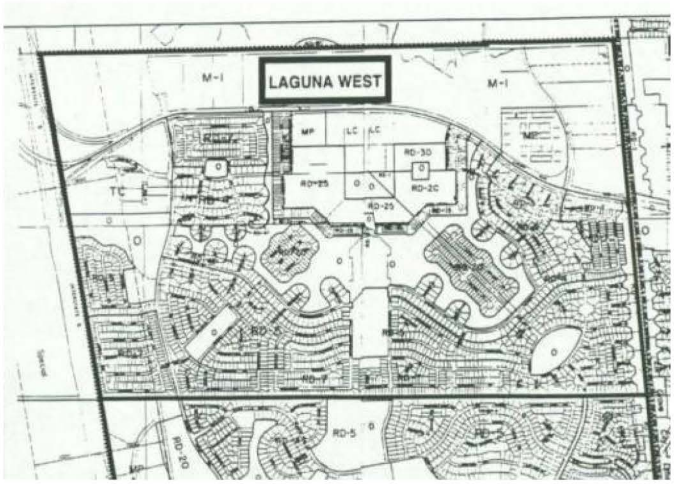


Figure 85 Laguna West (Calthorpe) Map

Reference: Grace, Melissa. Photo. “Laguna West.” http://www.melissagracephoto.com/LagunaWest/wp-content/uploads/2011/11/LW_1120111.jpg (accessed July 19, 2014).

Figure 86 Laguna West, Photos

Reference: East St. Louis Action Research Project. “Traditional Neighborhood Design.” http://www.eslarp.uiuc.edu/arch/ARCH371-F99/groups/o/tnd.html (accessed July 19, 2014).

Figure 87 Laguna West (Calthorpe), Map and Illustrations

Reference: East St. Louis Action Research Project. “Traditional Neighborhood Design.” http://www.eslarp.uiuc.edu/arch/ARCH371-F99/groups/o/tnd.html (accessed July 19, 2014).

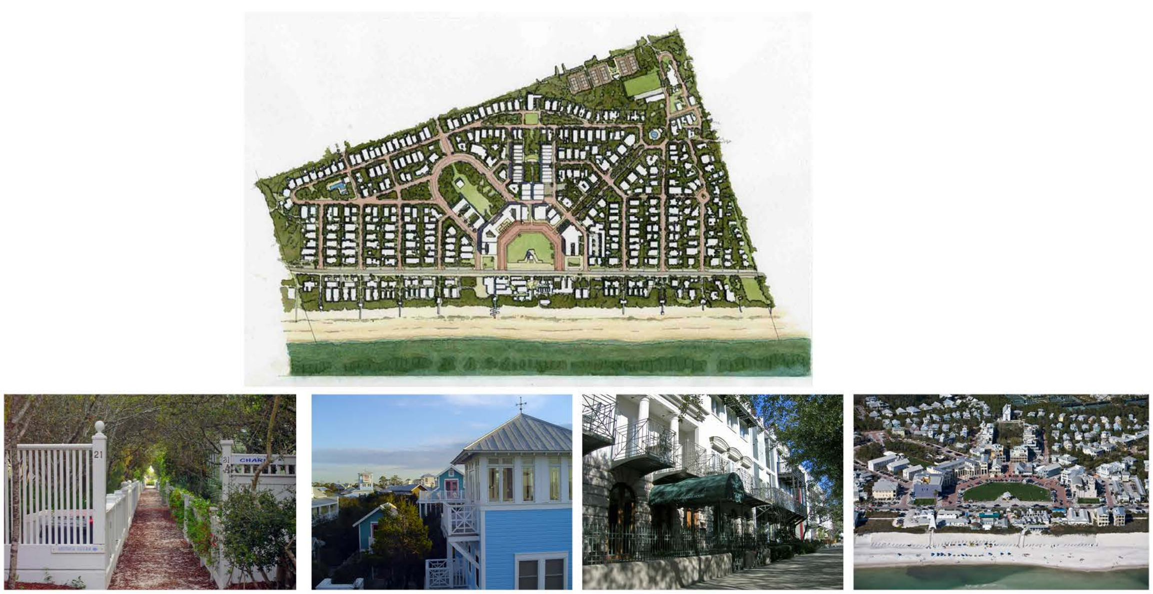


Figure 88 Seaside, Map and Photos

Reference: East St. Louis Action Research Project. “Traditional Neighborhood Design.” http://www.eslarp.uiuc.edu/arch/ARCH371-F99/groups/o/tnd.html (accessed July 19, 2014).

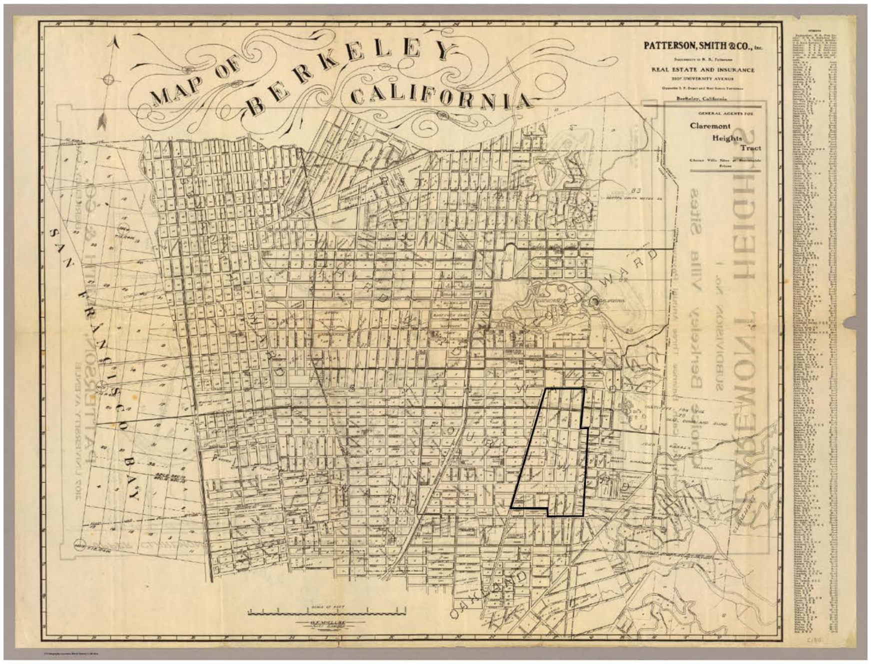


Figure 89 Berkeley California (Elmwood noted)

Reference: Rumsey, David. “Map of Berkeley California.” http://www.davidrumsey.com/rumsey/Size4/D0113/5317001.jpg (accessed July 18, 2014).

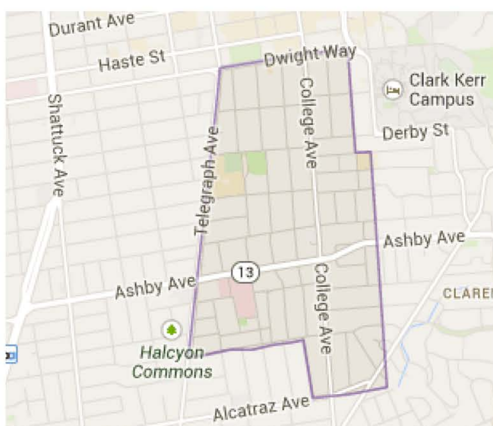


Figure 9 Elmwood Map

Reference: Google Maps. maps.google.com (accessed July 19, 2014).

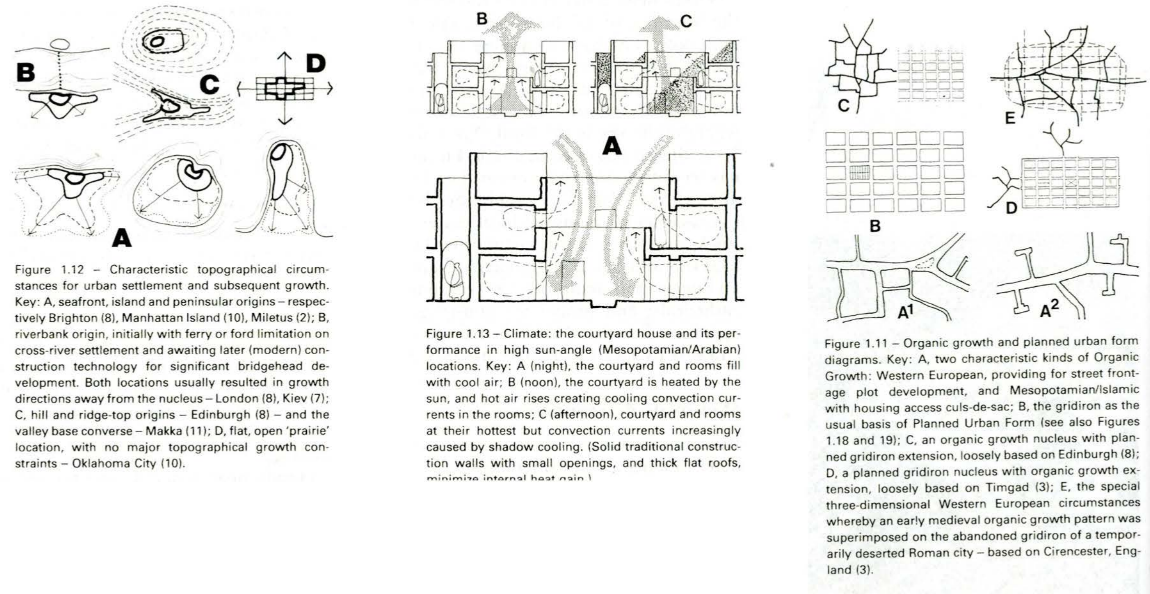


Figure 91 Ancient street patterns

Reference: Morris, A.E.J. History of Urban Form: Before the Industrial Revolutions. London: Prentice Hall, 1972.

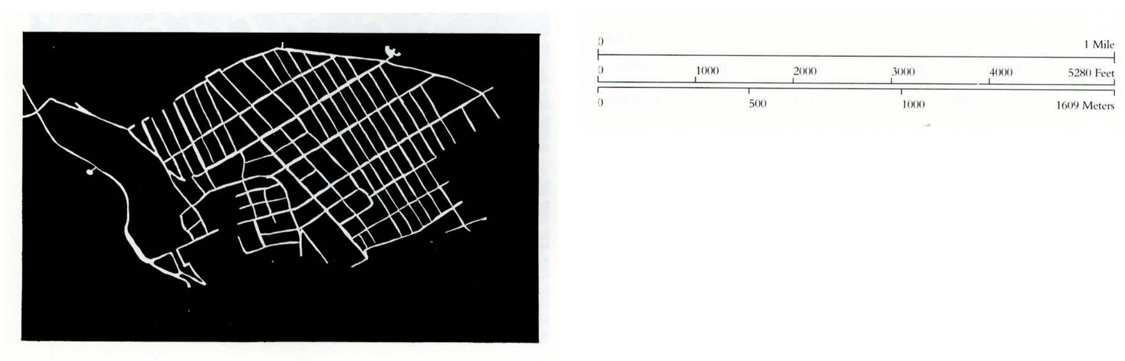


Figure 92 Ancient Pompeii

Reference: Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993.

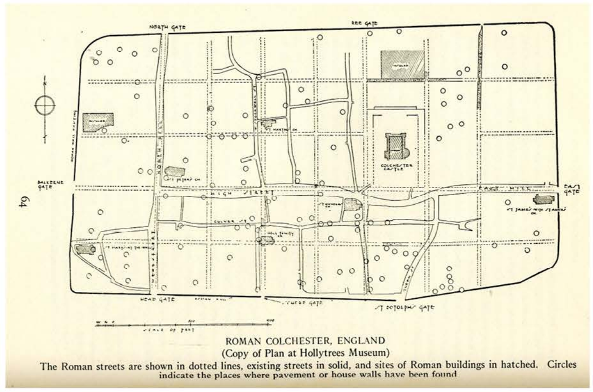


Figure 93 Roman Castra of Clochester, England

Reference: Adams, Thomas, D. Eng. Outline of Town and City Planning: A Review of Past Efforts and Modern Aims. New York: Russel Sage Foundation, 1935.

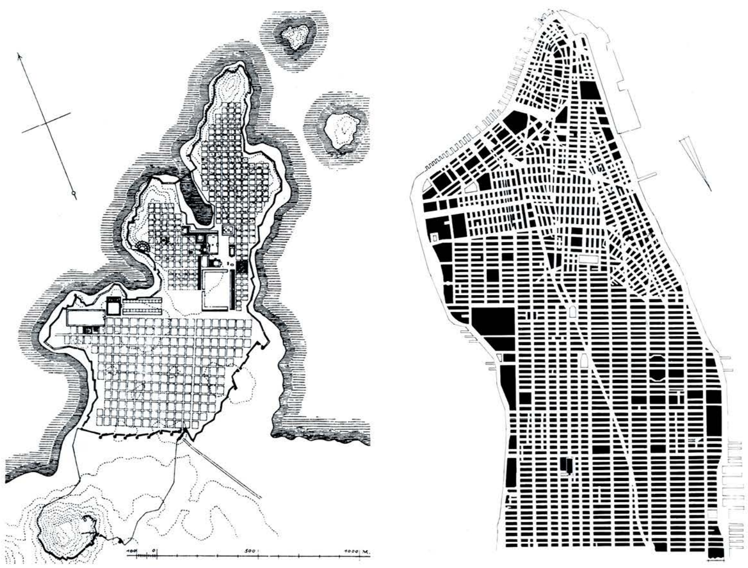


Figure 94 Comparison of Miletus with Manhattan, New York City

Reference: Hall, Thomas. Planning Europe's Capital Cities: Aspects of Nineteenth Century Urban Developments. London: E and FN SPon/Chapman and Hall, 1997.

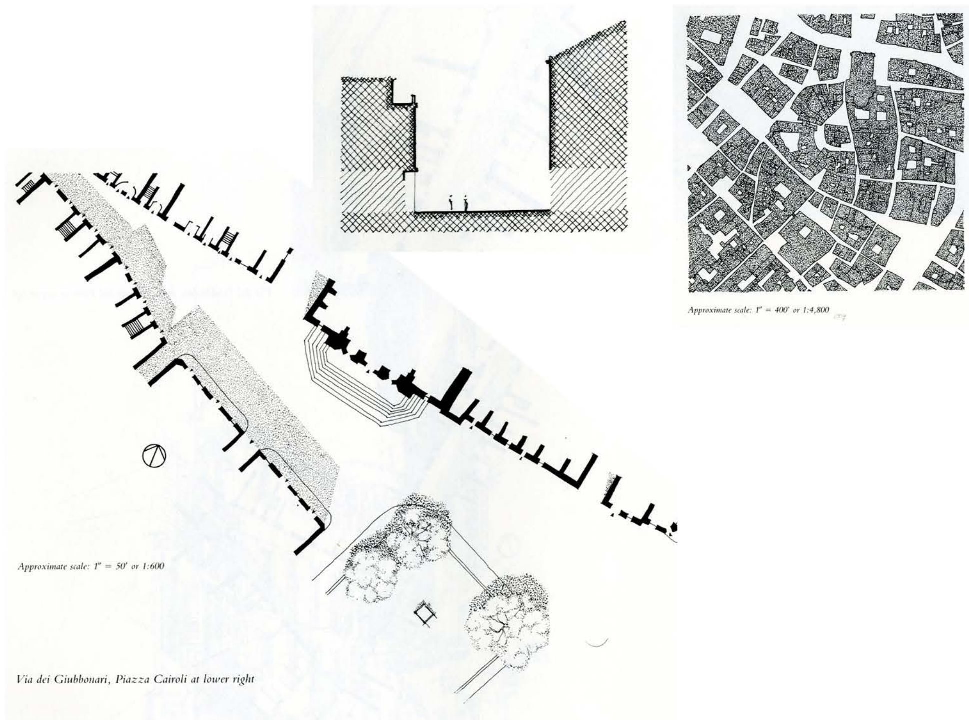


Figure 95 Medieval Streets

Reference: Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993.

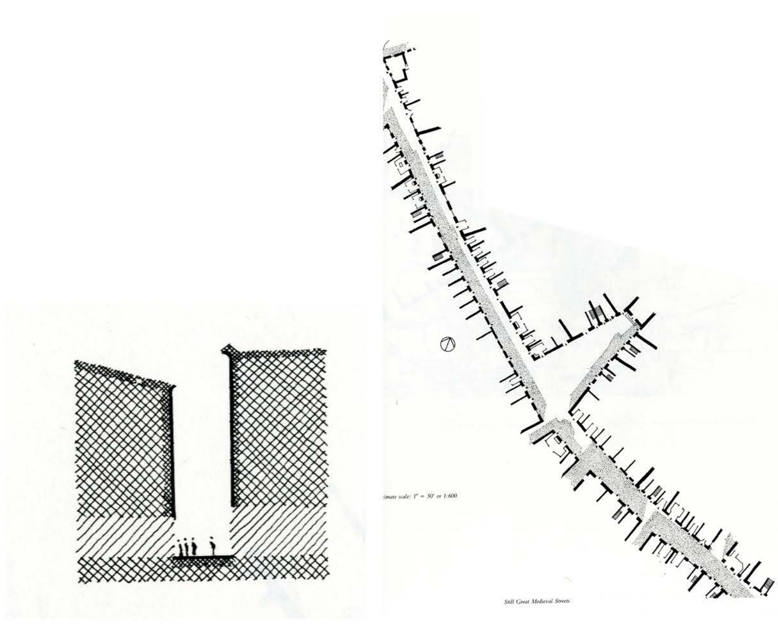


Figure 96 Medieval Streets of Via dei Giubbonari

Reference: Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993.

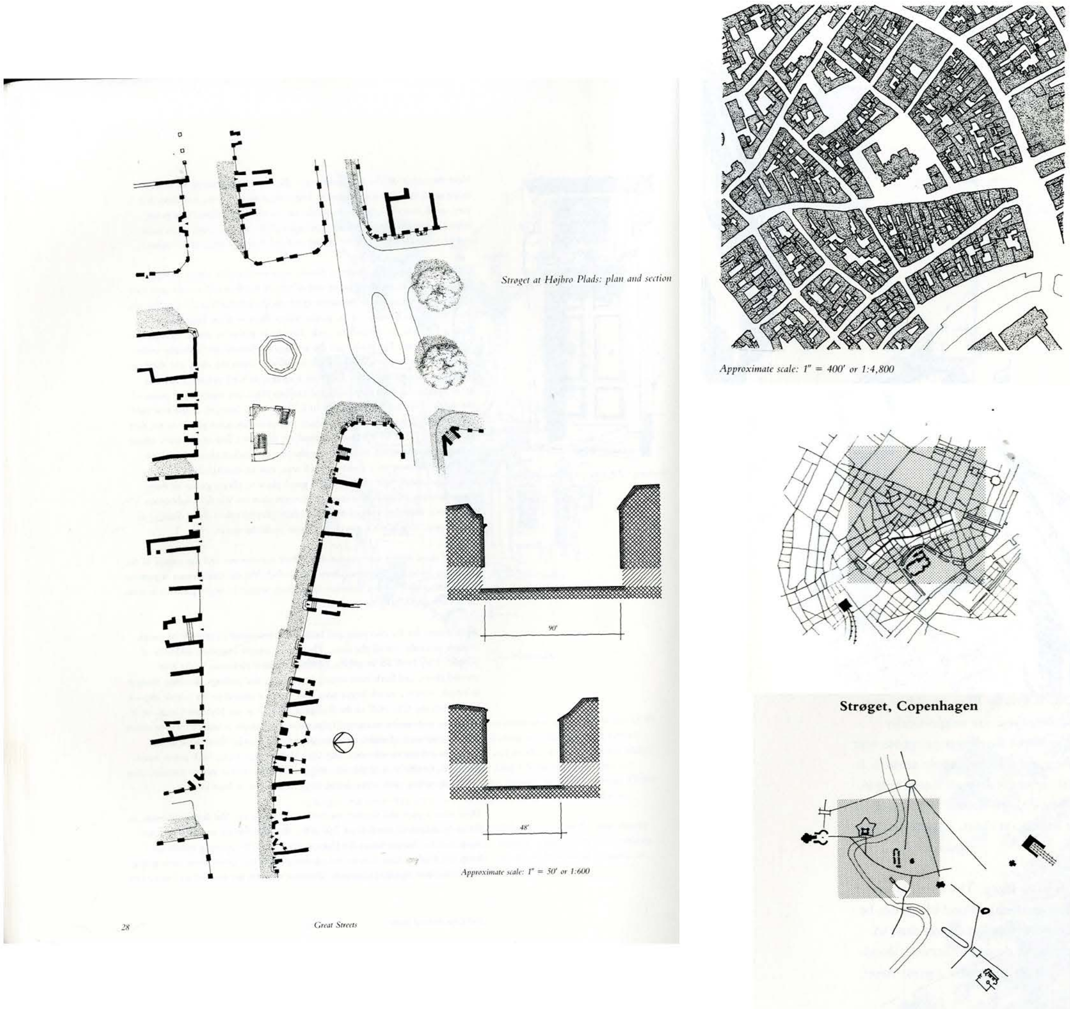


Figure 97 Medieval Streets of Storget, Copenhagen

Reference: Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993.

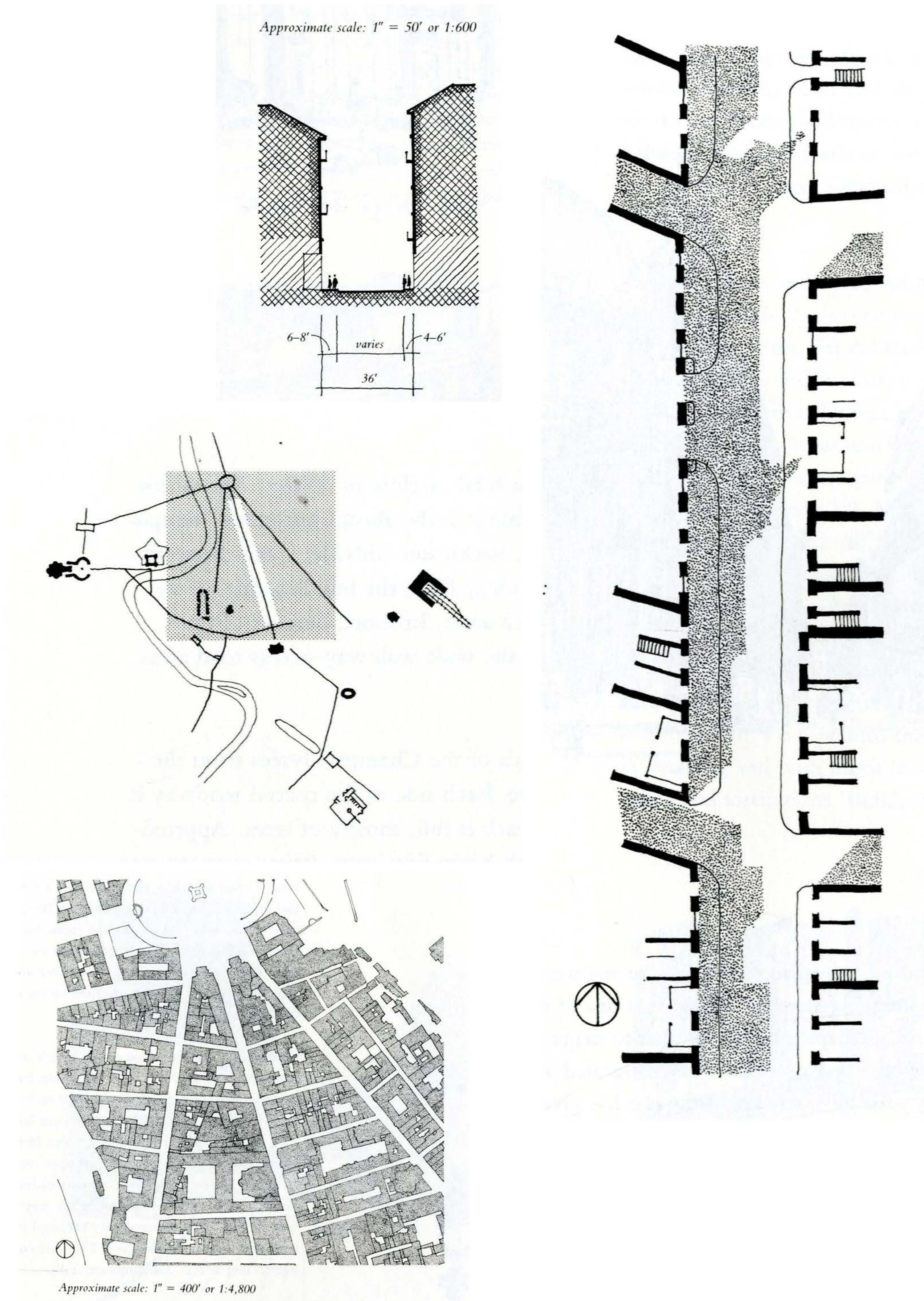


Figure 98 Via del Corso keyplan, plan and sections.

Reference: Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993.

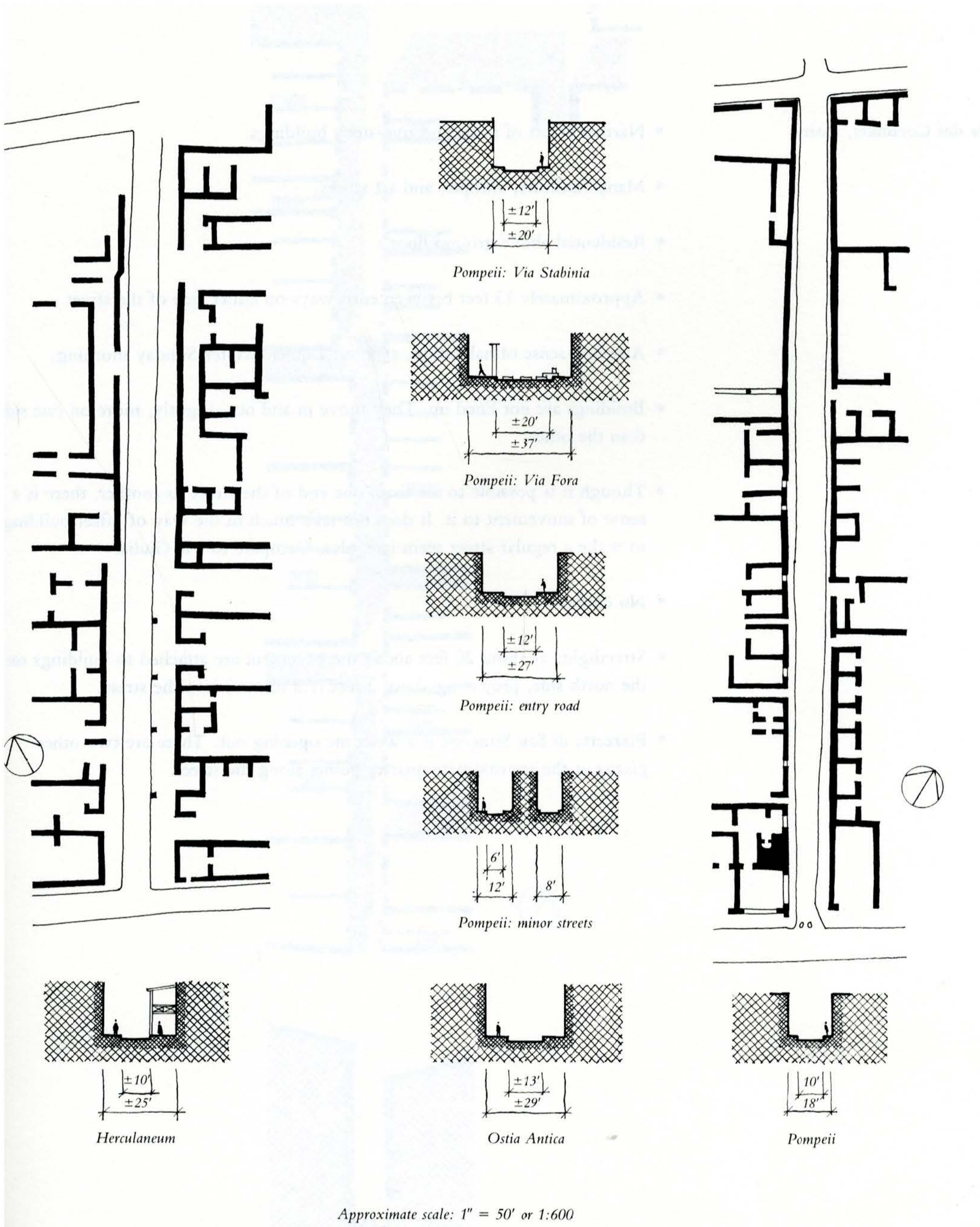
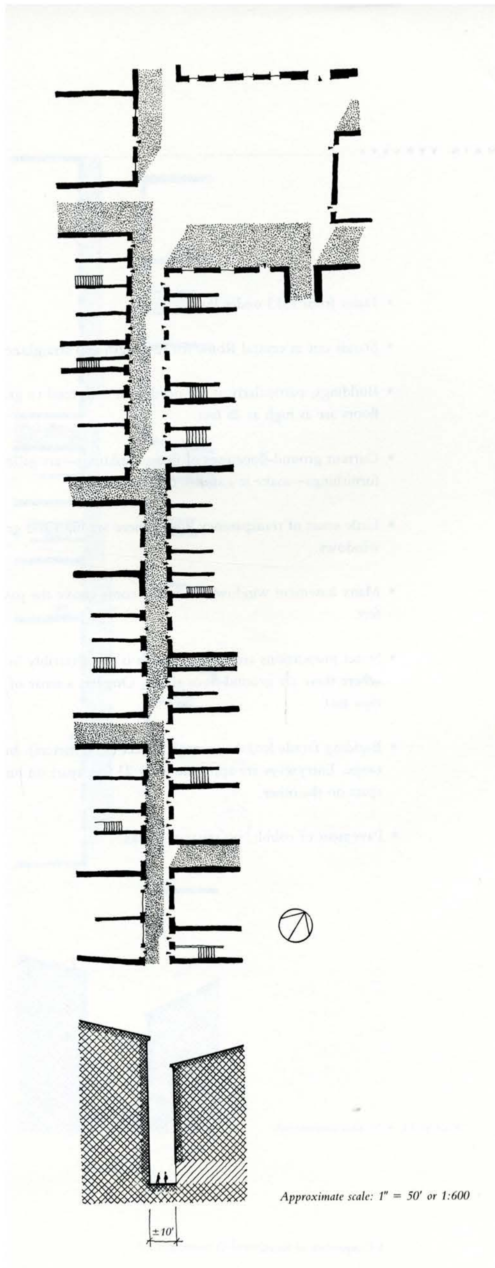
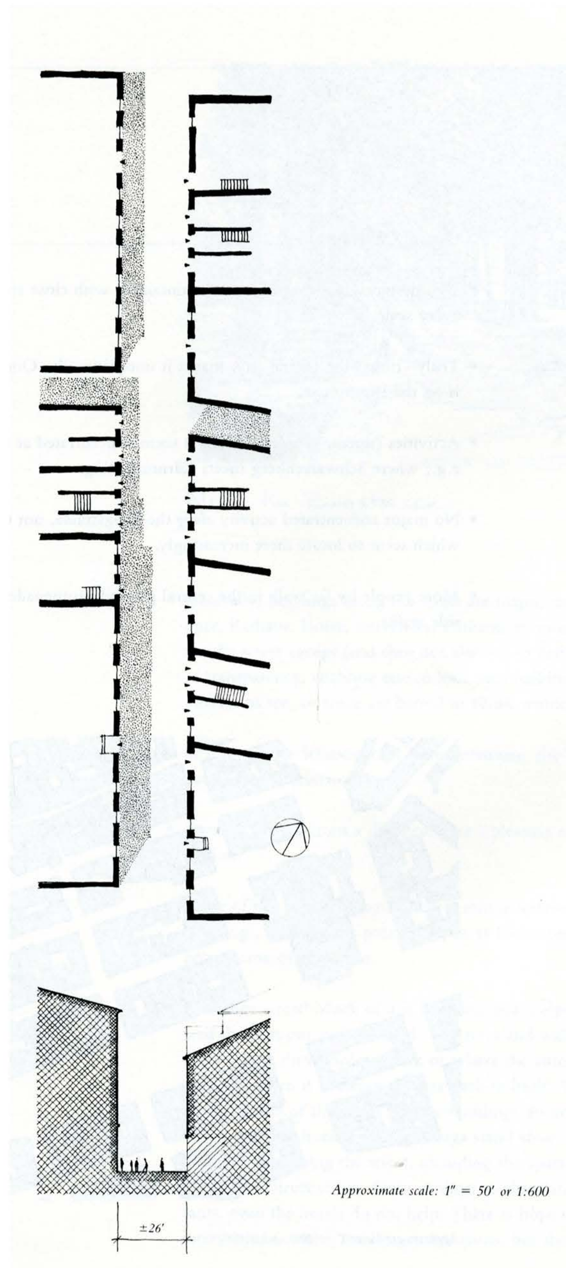


Figure 99 Sections and Plans of Pompeii, Herculaneum and Ostia Antica

Reference: Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993.



Via dei Coronari, Rome



Via Giulia, Rome

Figure 100 Sections and Plans of Via dei Coronari and Via Giulia, Rome

Reference: Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993.

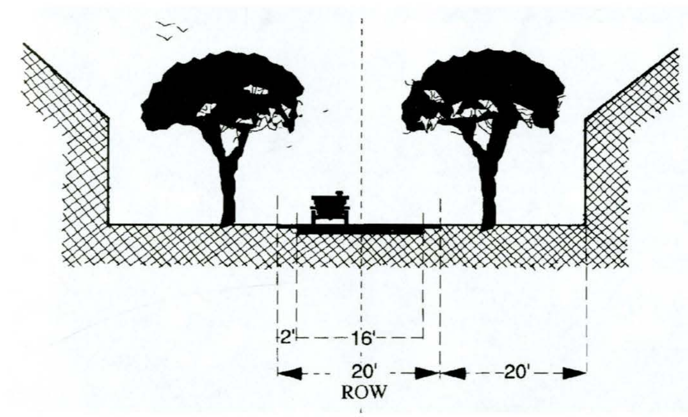


Figure 101 Hampstead Gardens, Cross-Section of Right-of-Way

Reference: Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997.

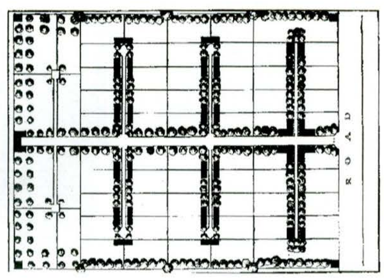


Figure 102 Hampstead Gardens, Union and Parker Used Cul-de-sacs

Reference: Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997.

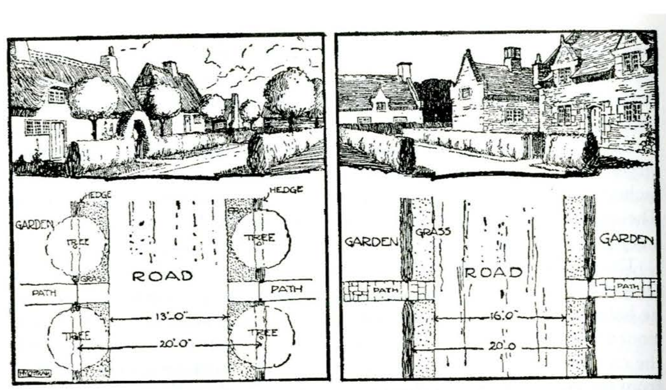


Figure 103 Hampstead Gardens. Various Road Sections

Reference: Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997.

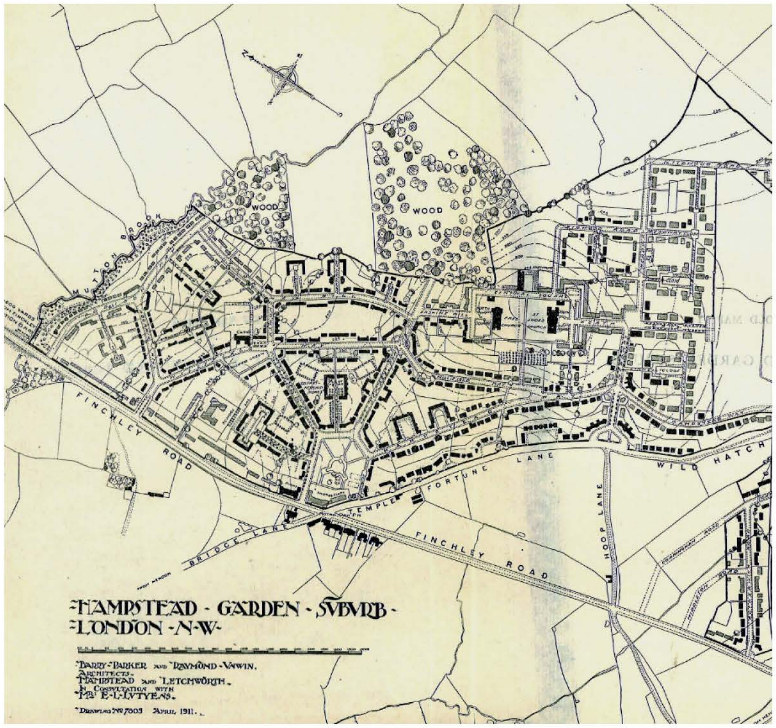


Figure 104 Hampstead Gardens General Plan

Reference: Arquiscopio. "Proyecto de Suburbio Jardín en Hampstead." http://arquiscopio.com/archivo/2012/06/17/proyecto-de-suburbio-jardin-en-hampstead/ (accessed July 12, 2014).

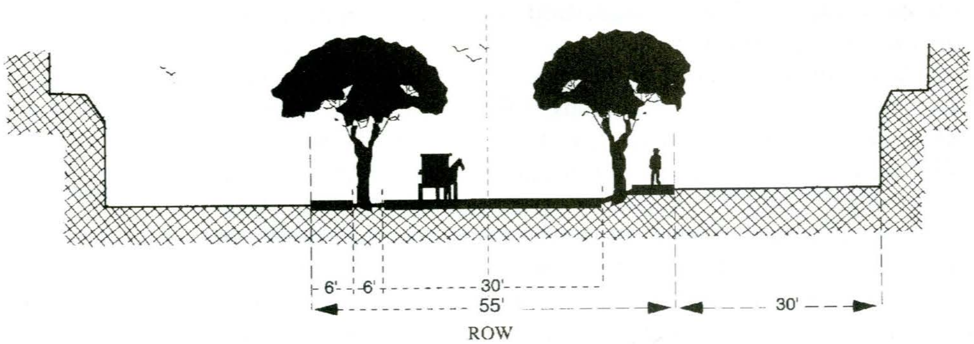


Figure 105 Riverside, Illinois (1868)

Reference: Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997.

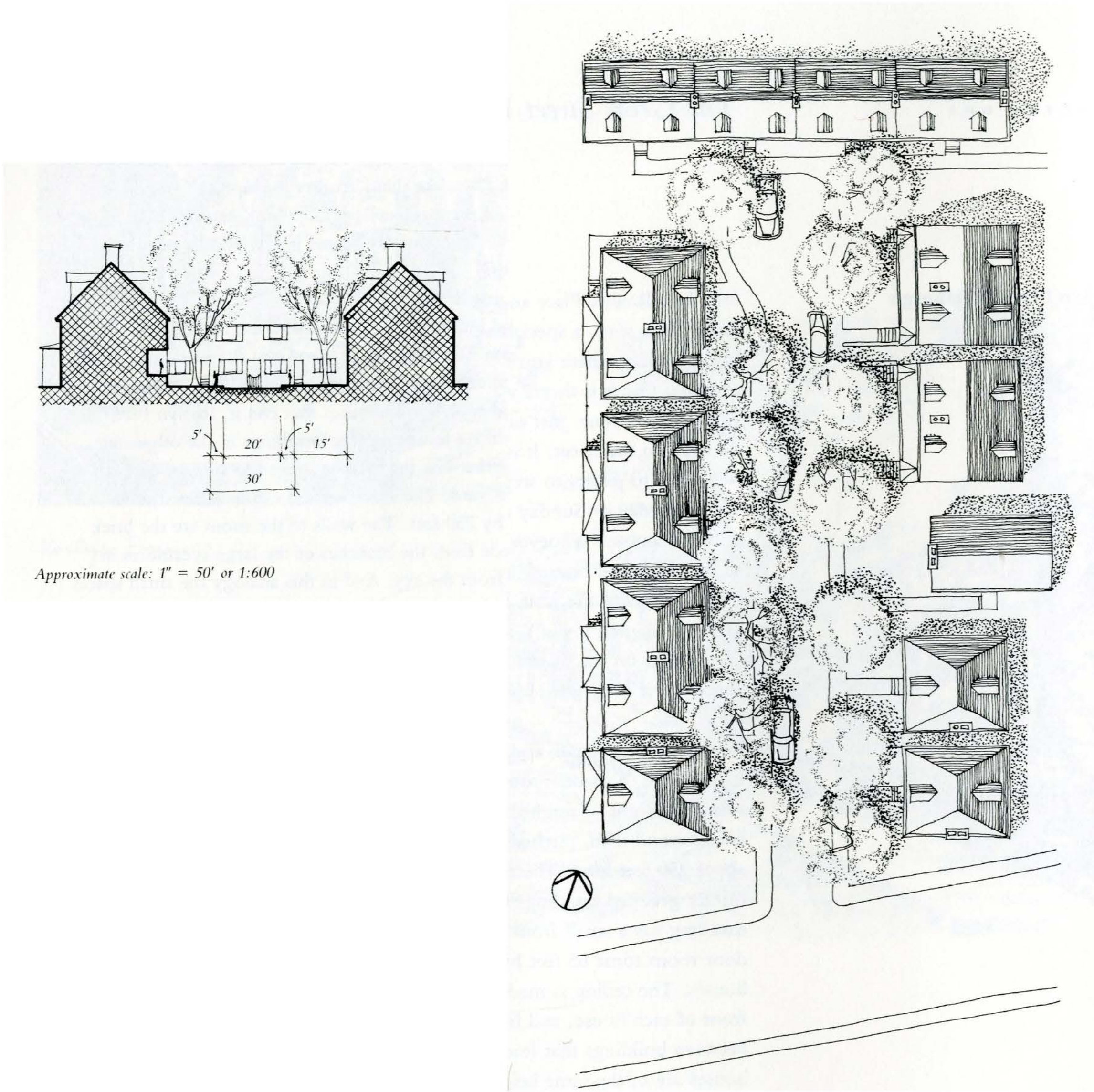


Figure 106 Roslyn Place Plan and Section

Reference: Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993.

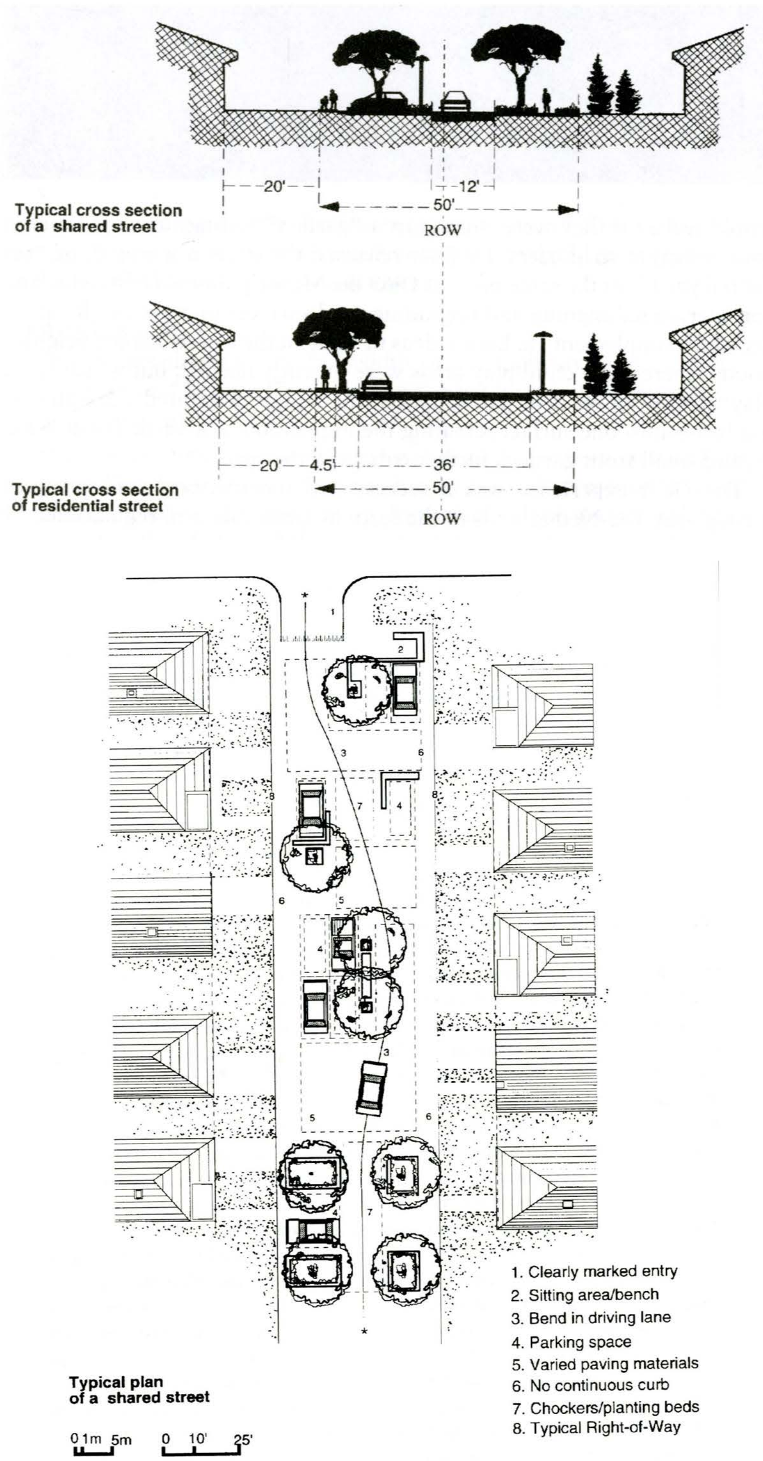


Figure 107 Shared Street

Reference: Southworth, Michael, and Eran Ben-Joseph. Streets and the Shaping of Towns and Cities. New York: McGraw-Hill, 1997.

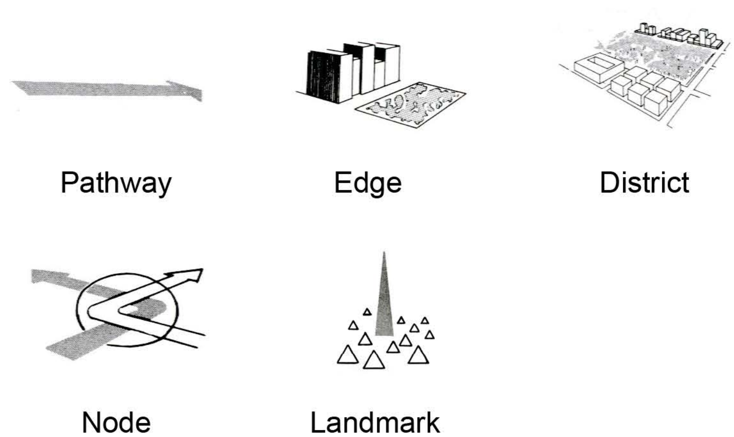


Figure 108 Framework Elements of Urban Form

Reference: Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960.

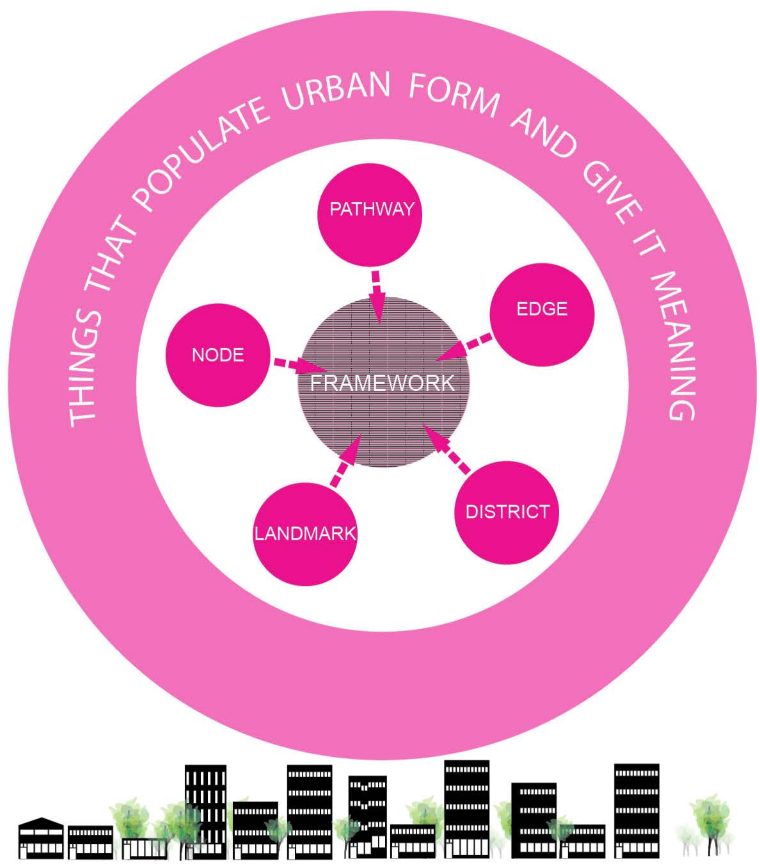
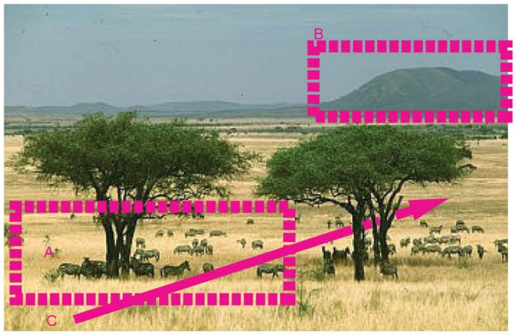


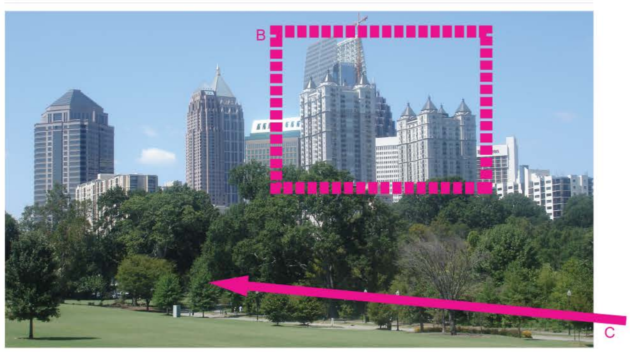
Figure 109 Framework and Lynchian Five Aspects of Urban Form



Serengeti

Serengeti

New York, Central Park



A - District / Infill
B - Landmark
C - Pathway
D - Edge
E - Node

Midtown, Atlanta

Figure 110 Framework and Infill and Prospect Refuge Theory

Reference: Blue Planet Times. “Serengeti.” http://www.blueplanetbiomes.org/images/serengeti01.jpg (accessed July 20, 2014).

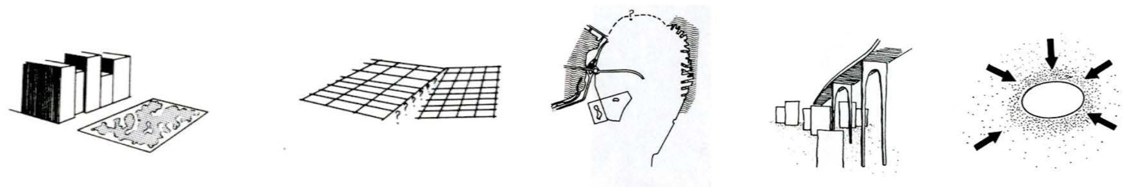


Figure 111 Edges Within Framework

Reference: Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960.

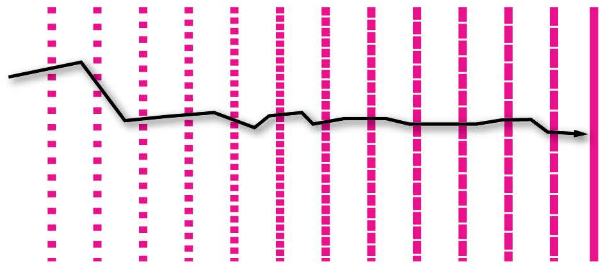


Figure 112 Edge Permeability, Examples of Lengths

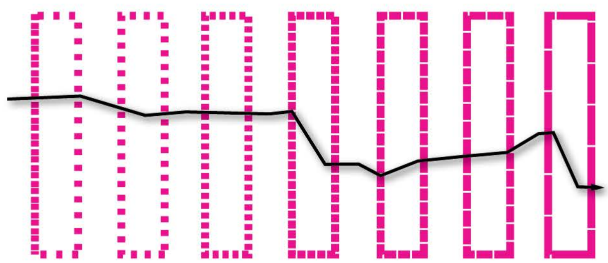


Figure 113 Edge Permeability, Examples of Areas

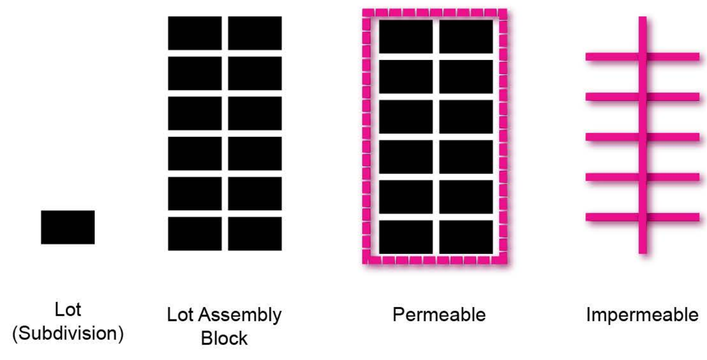


Figure 114 Lots And Effect of Permeable and Impermeable Edge

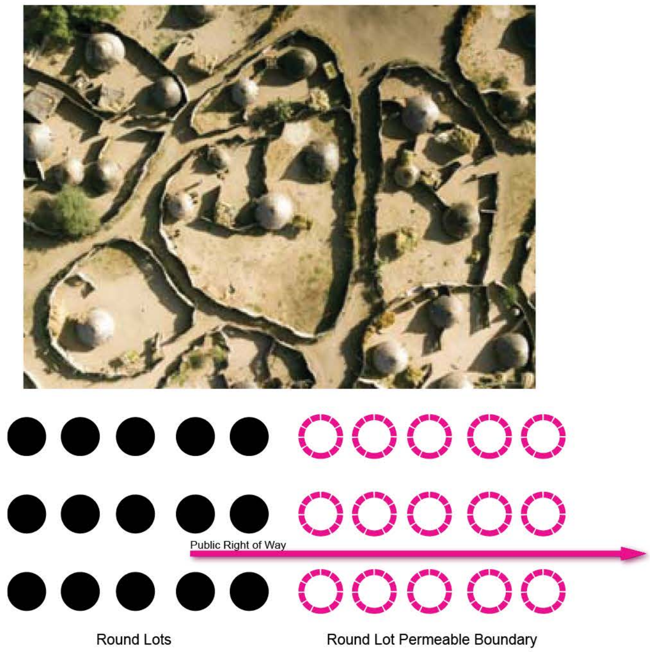


Figure 115 Village in Chad, And Circular Lot Inefficiencies

Reference: Chad Villages. http://www.worldatlas.com/webimage/countrys/africa/chad/tdpics/aaaphotos/villages.jpg (accessed July 21, 2014).

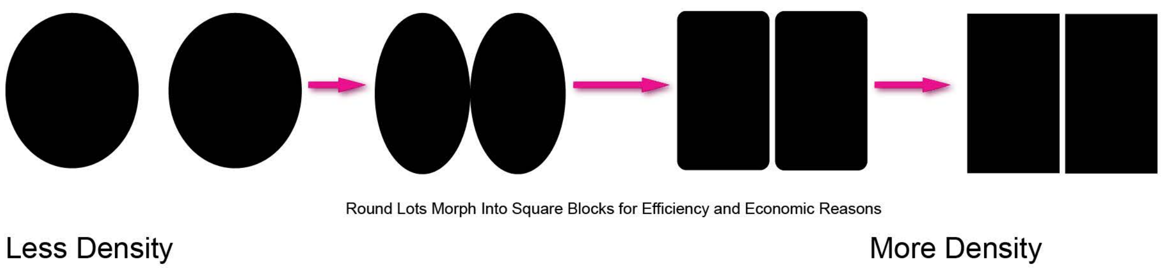


Figure 116 Compression Of Circular Lots Into Square Blocks

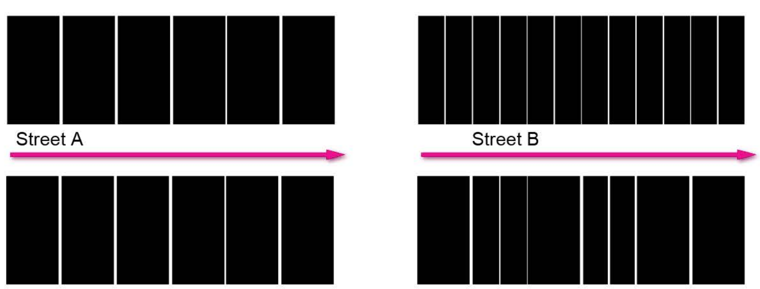


Figure 117 Effect of Lots Upon Street and Pathway

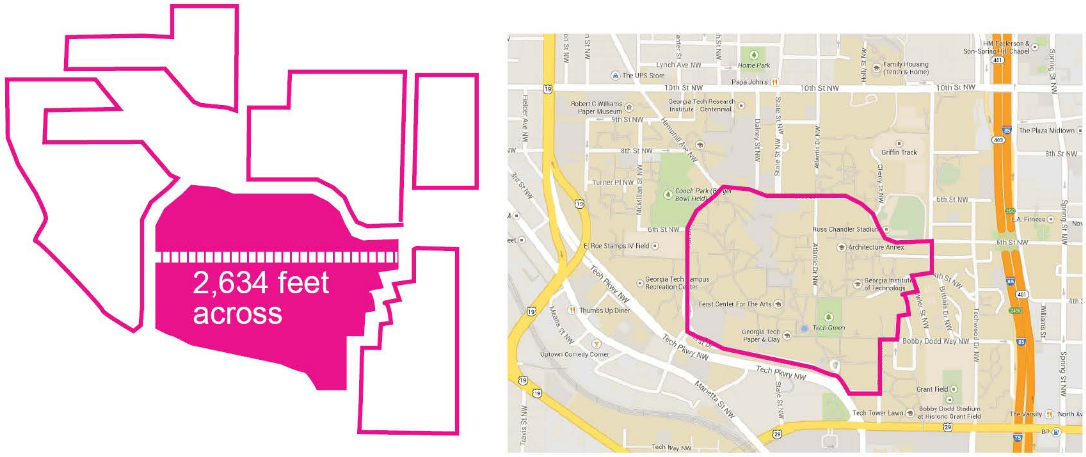


Figure 118 Georgia Tech “Campus” Superblocks

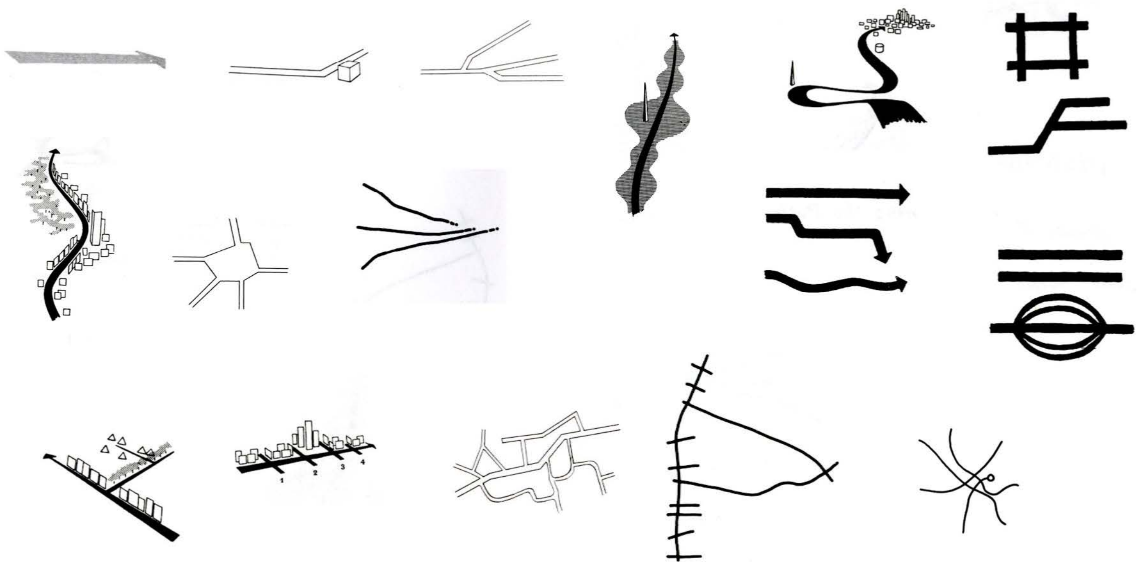


Figure 119 Pathways.

Reference: Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960.

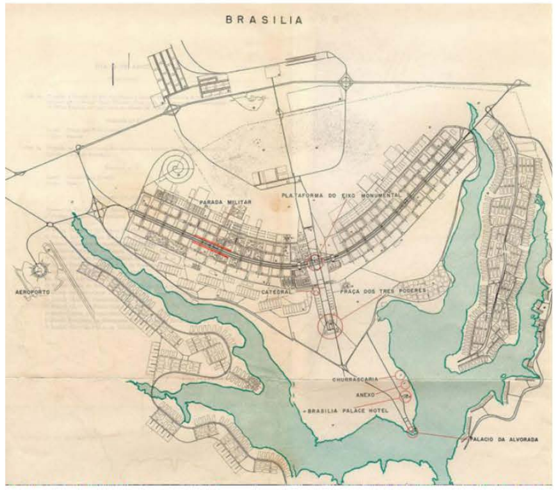


Figure 120 Plotting of Brasilia, Brazil, 1960

Reference: Zonu. "Brasilia Plan Map Brazil." http://www.zonu.com/brazil_maps/Brasilia_Pilot_Plan_Map_Brazil.htm (accessed July 23, 2014).

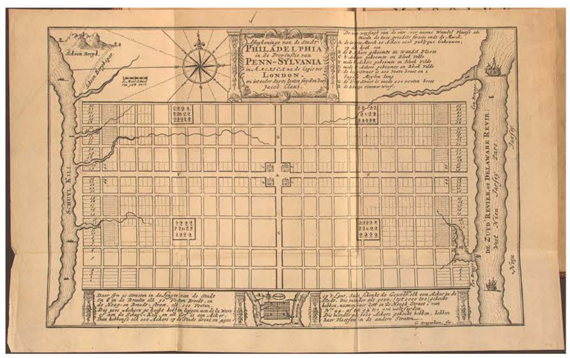


Figure 121 Map of Philadelphia, Pennsylvania, 1684

Reference: Library of Congress. Map of Philadelphia. http://www.loc.gov/exhibits/religion/images/vc006400.jpg. (accessed July 23, 2014).

Accretion or Grid With Distortion | Hierarchical | Radial

Figure 122 Traditional gridpatterns

Reference: Munson's City. "Which street pattern represents your continent?" http://munsonscity.wordpress.com/tag/radial-grid/ (accessed July 24, 2014).

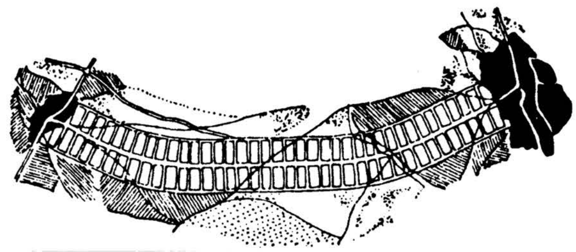
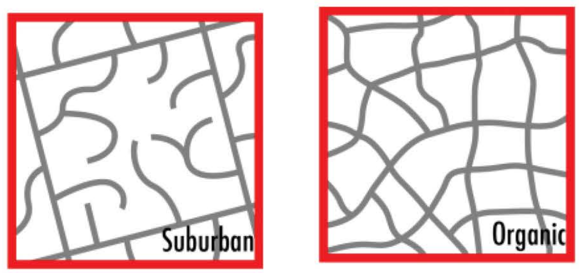


Figure 123 Linear cities

Reference: Qradrelectics. http://quadralectics.files.wordpress.com/2013/10/643.jpg (accessed July 24, 2014).

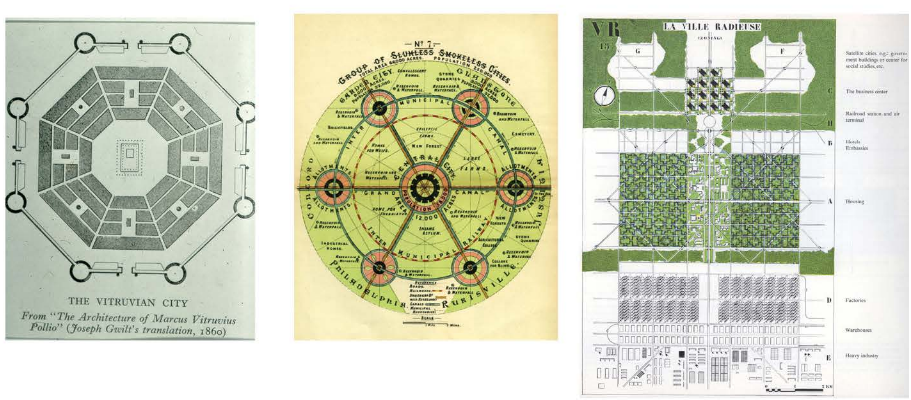


Sprawl or Suburban

Deformed or Organic

Figure 124 Sprawl and Deformed Grid Patterns

Reference: Munson's City. "Which street pattern represents your continent?" http://munsonscity.wordpress.com/tag/radial-grid/ (accessed July 24, 2014).



Vitruvian City Plan

Ebenezer Howard's Garden City

Le Corbusier's "Radiant Cities" (1935)

Figure 125 The Utopian Cities

Reference: SPUR. "Grand Reductions: 10 Diagrams That Changed City Planning." http://www.spur.org/publications/article/2012-11-09/grand-reductions-10-diagrams-changed-city-planning> (accessed July 17, 2014).

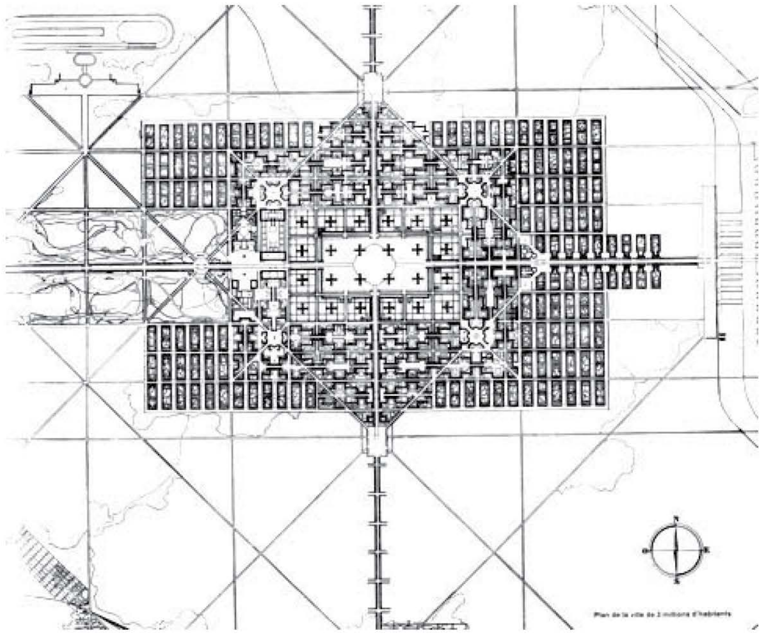


Figure 126 Corbusier City Plan

Reference: Wolf, Ross. “Corbu City Plan.” http://rosswolfe.files.wordpress.com/2011/04/23-corbu-city-plan.jpg (accessed July 18, 2014).

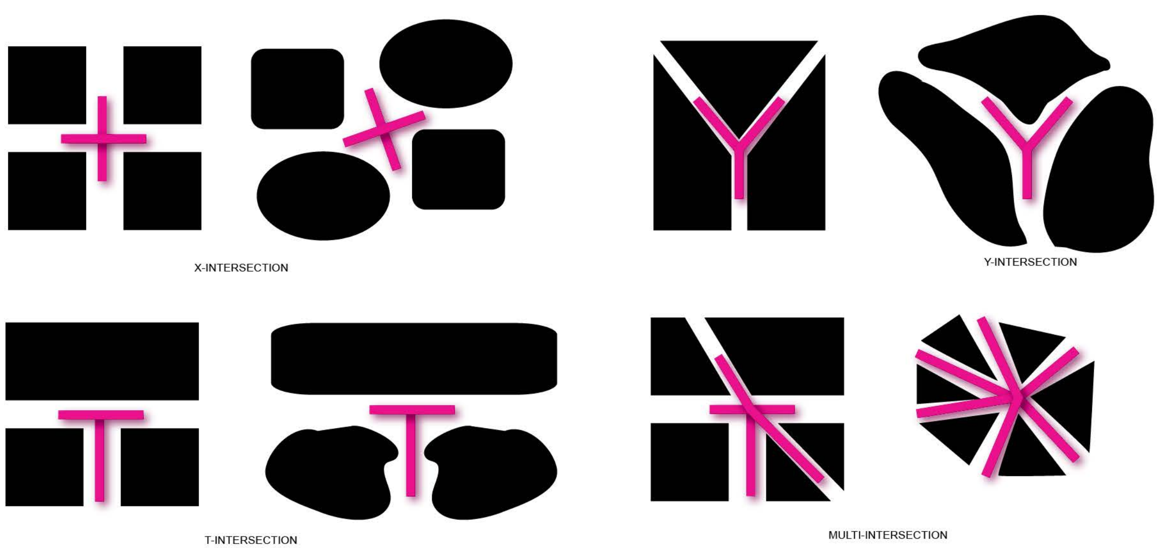


Figure 127 Intersection Types

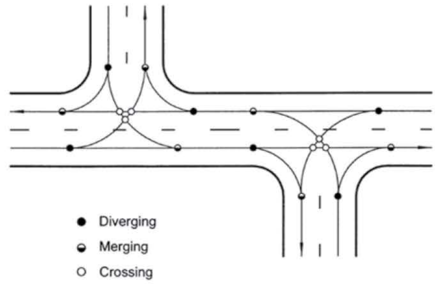


Figure 128 T-Intersection

Reference: Federal Highway Administration. http://www.fhwa.dot.gov/publications/research/safety/04091/images/fig075.gif (accessed July 24, 2014).

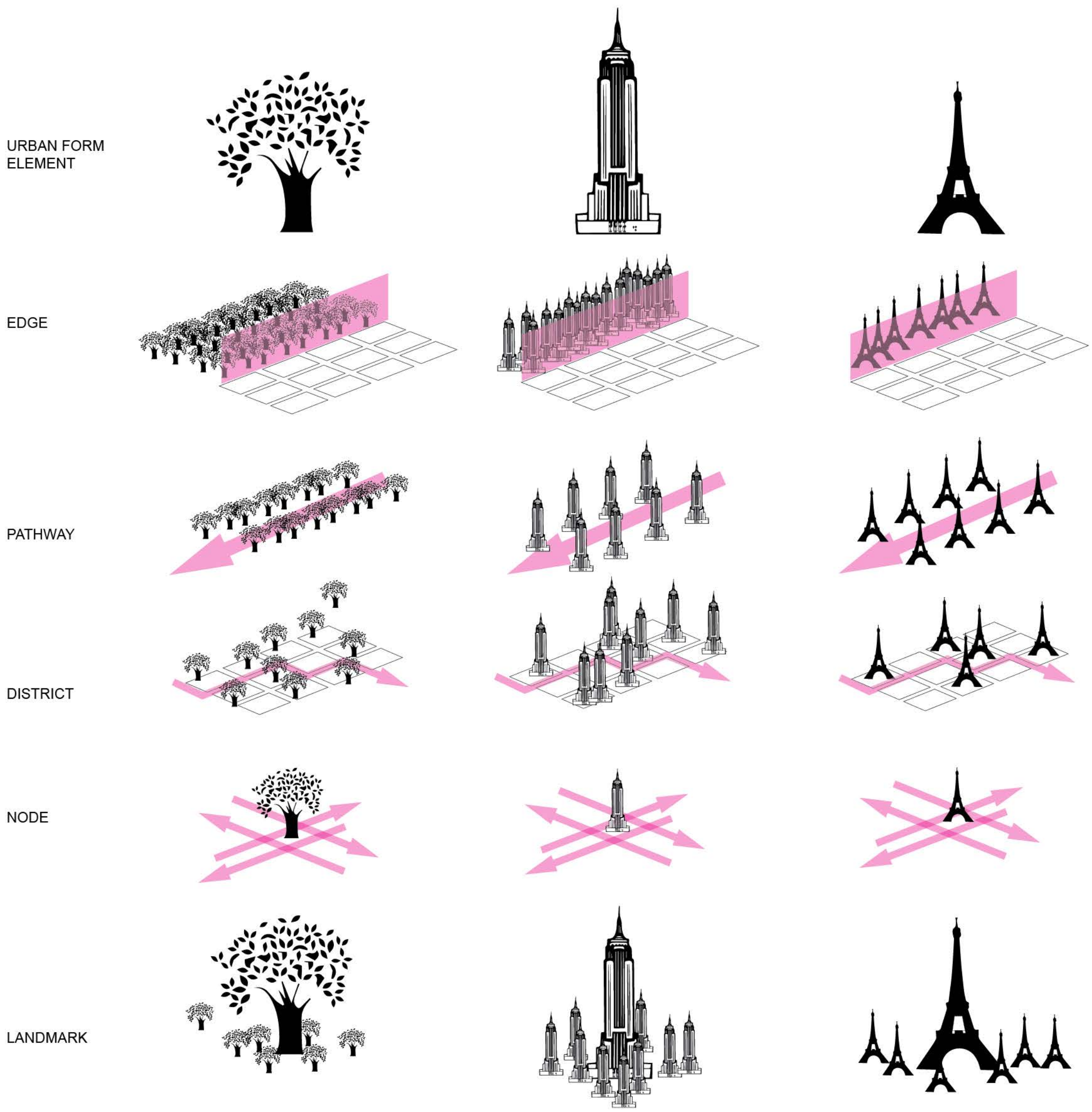


Figure 129 Urban Form Elements and Effects on Urban Form

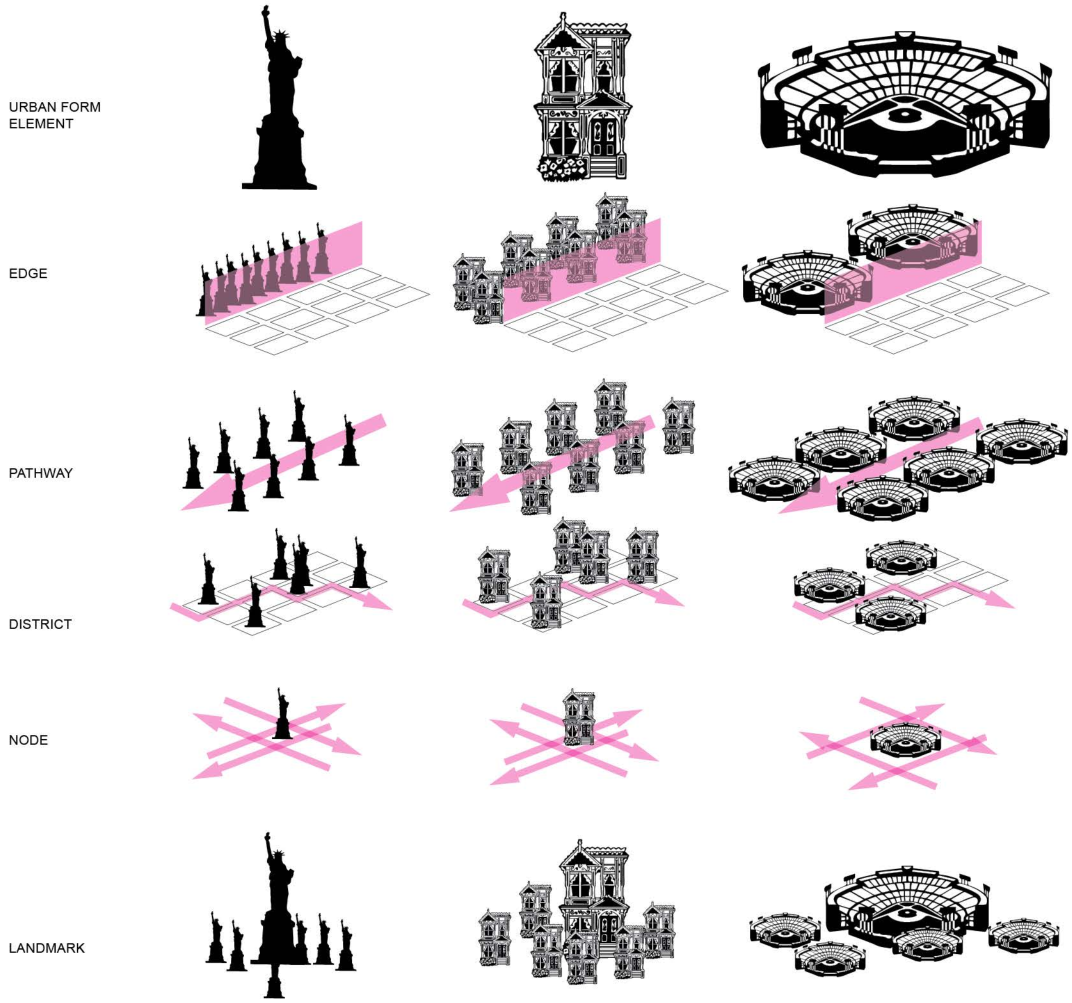


Figure 129 Urban Form Elements and Effects on Urban Form (Cont'd)

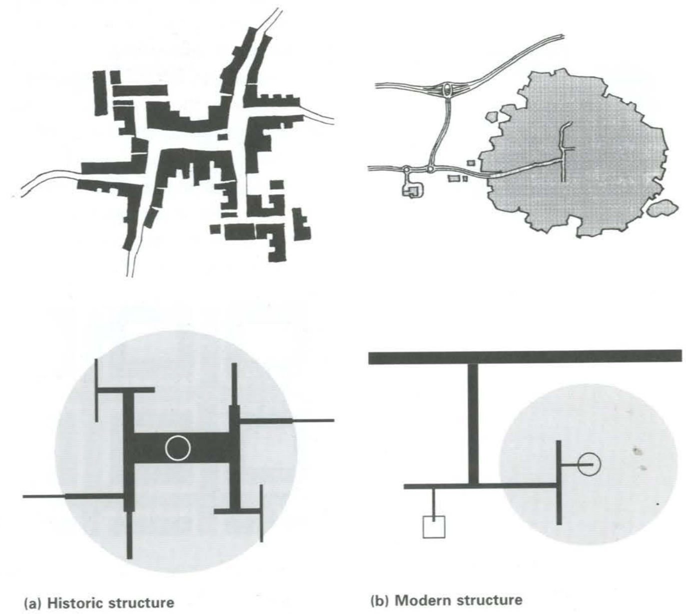


Figure 130 Historic Settlement Structures

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

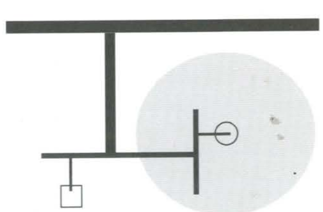


Figure 131 Sprawl and Dendritic Hierarchy Grid Patterns

Reference: Travel Studies. http://www.travel-studies.com/sites/default/files/images/sprawl.jpg (accessed July 24, 2014).

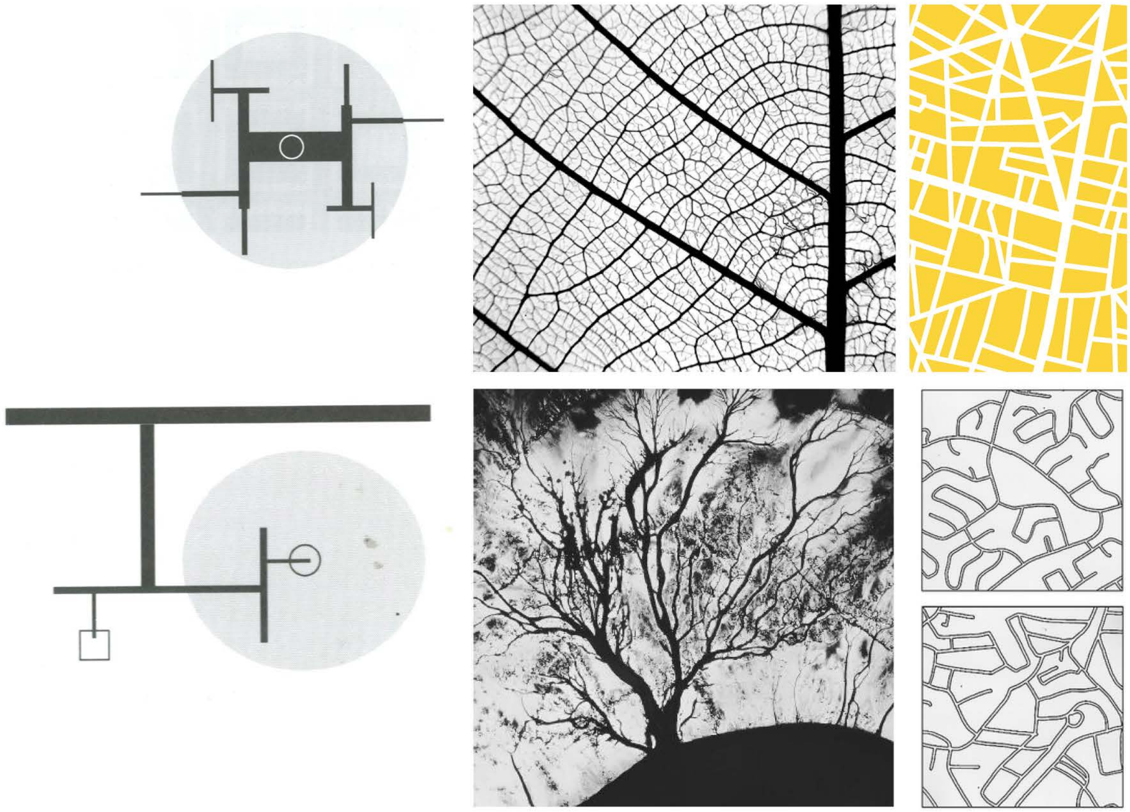


Figure 132 Vein Structures as Compared to Street and Grid Patterns

Reference: Culturing Science. “Leif Veins.” http://culturingscience.files.wordpress.com/2009/12/leafveins.jpg (accessed July 24, 2014); Science Clarified. River Branching. http://www.scienceclarified.com/everyday/images/scet_04_img0326.jpg. (accessed July 24, 2014); Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005; Farm5. Grids. http://farm5.static.flickr.com/4101/4894951340_bcabddded49_z.jpg (accessed July 24, 2014).

Figure 133 American Grid Comparison

Reference: Great American Grid. Website and Blog. http://www.thegreatamericangrid.com/wp-content/uploads/2013/01/Grid-Comparison.jpg (accessed July 14, 2014).

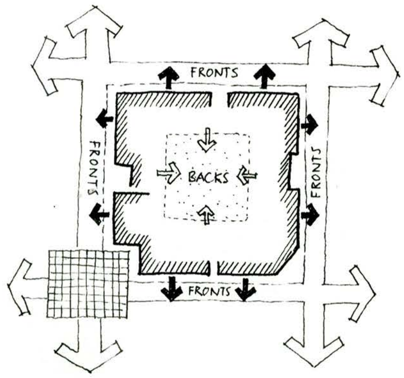


Figure 134 Basic Street Block Connectivity

Reference: Lewis, Sally. Front to Back: a Design Agenda for Urban Housing. Oxford: Elsevier, Architectural Press, 2005.

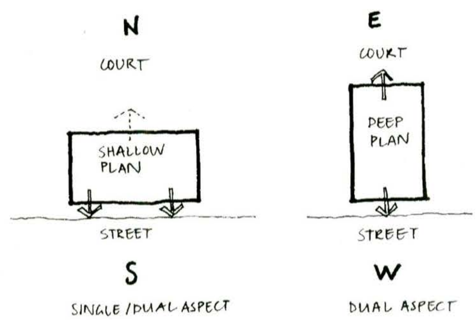


Figure 135 Deep or Wide Lots

Reference: Lewis, Sally. Front to Back: a Design Agenda for Urban Housing. Oxford: Elsevier, Architectural Press, 2005.

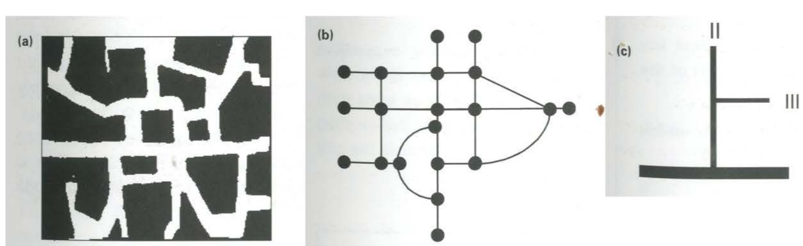


Figure 136 Grid Patterns

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

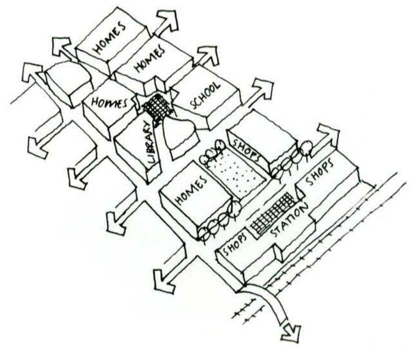


Figure 137 Basic Street Block Connectivity

Reference: Lewis, Sally. Front to Back: a Design Agenda for Urban Housing. Oxford: Elsevier, Architectural Press, 2005.

Table 4.1 **Examples of settlement pattern typologies**

Unwin (1920)	*Moholy-Nagy (1968)*
Irregular	1. Geomorphic
Regular	2. Concentric
1. Rectilinear	3. Orthogonal-connective
2. Circular	4. Orthogonal-modular
3. Diagonal	5. Clustered
4. Radiating lines	
Lynch (1981)	*Satoh (1998)*
1. Star (radial)	1. Warped grid
2. Satellite cities	2. Radial
3. Linear city	3. Horseback
4. Rectangular grid city	4. Whirlpool
5. Other grid (parallel, triangular, hexagonal)	5. Unique structures
6. Baroque axial network	
7. The lacework	*Frey (1999)*
8. The 'inward' city (e.g. medieval Islamic)	1. The core city
9. The nested city	2. The star city
10. Current imaginings (megaform, bubble, floating, underground, undersea, outer space)	3. The satellite city
	4. The galaxy of settlements
	5. The linear city
	6. The polycentric net, or regional city

Note: for more examples, see Appendix 4.

Figure 138 Street and Patterns.

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

Table 4.2 Examples of street pattern typologies

Urban design related	**Transport network related**
City design according to artistic principles 1. Rectangular 2. Radial 3. Triangular plus 'bastard offspring'	*Ministry of War Transport; also Traffic Planning and Engineering* 1. Gridiron 2. Linear 3. Radial
Town and country planning 1. Gridiron 2. Hexagonal 3. Radial 4. Spider's web	*Transport Technology and Network Structure* 1. Spinal or tree 2. Grid network 3. Delta network
Site planning 1. Grid 2. Radial (including branching) 3. Linear	*Road System Design* 1. Radial and circumferential 2. Grid 3. Hyperbolic grid
Good city form 1. Axial network 2. Capillary 3. Kidney 4. Radio-concentric 5. Rectangular grid	*Transport Network Analysis* 1. Path 2. Tree 3. Cycle
AIA guidance 1. Curvilinear 2. Diagonal 3. Discontinuous 4. Grid with diagonals 5. Organic 6. Orthogonal	*Traffic Engineering and Management* 1. Grid 2. Tributary

Note: for more examples, see Appendix 4.

Figure 139 Street and Patterns

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

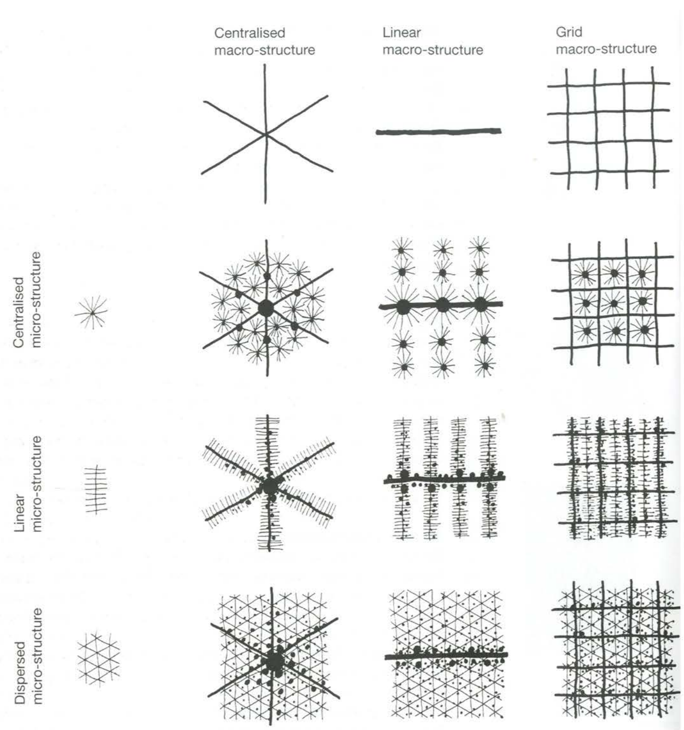
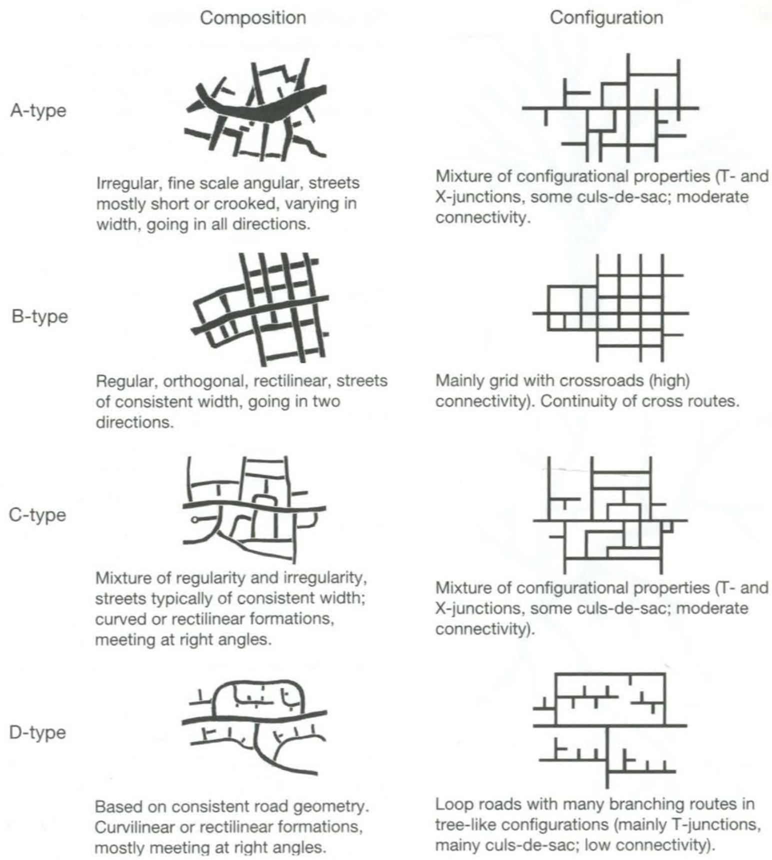
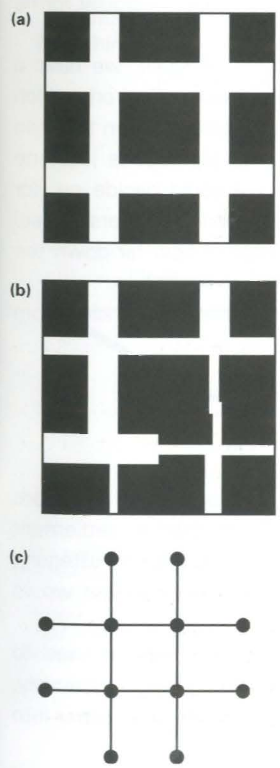


Figure 140 Structures and Pathways

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

4.10 • Compositional and configurational properties of ABCD types.





4.11 • Permeability and connectivity. Layout (a) has greater permeability than (b), but both have the same connectivity (c).

compositional property, referring to the extent to which a two-dimensional plan area is 'permeated' by accessible space – this relates to distance (circumlocution) and area (available for circulation). Connectivity may then be reserved for use as a configurational property, referring to the degree to which different links or routes connect up in a network.

Overall, it will be possible to use the distinction between composition and configuration in subsequent explorations of structure from now on. The immediate question here is: how can we use this distinction between composition and configuration to help arrange types of pattern in a general system of classification?

Figure 141 Street types and Gridlines from Feudal to Dendritic

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

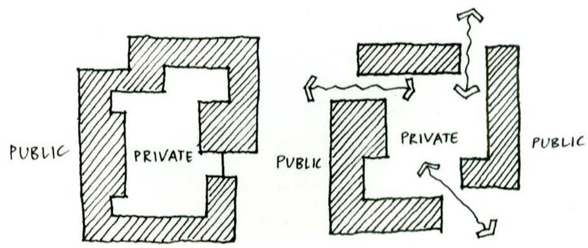


Figure 142 Public and Private and Enclosure

Reference: Lewis, Sally. Front to Back: a Design Agenda for Urban Housing. Oxford: Elsevier, Architectural Press, 2005.

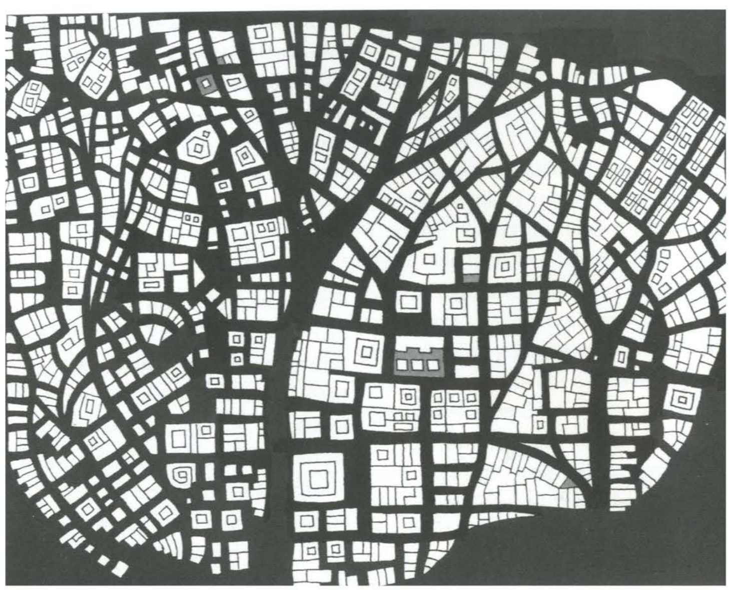


Figure 143 Blocks as Islands in Urban Form (Insulae)

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

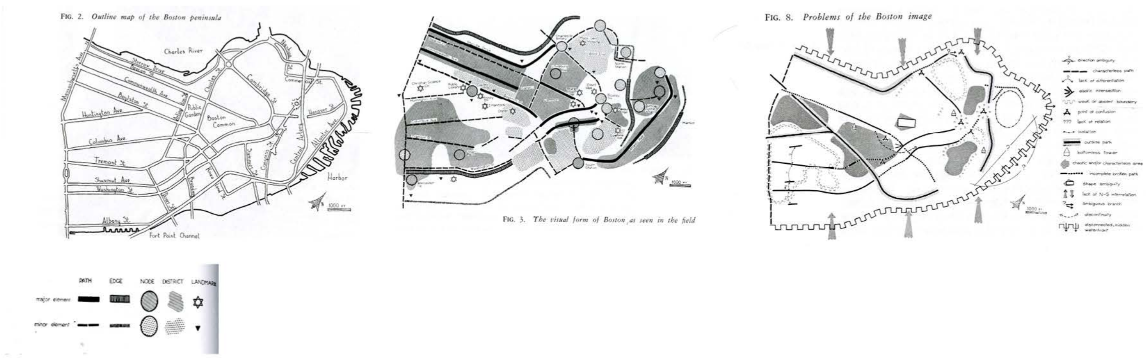


Figure 144 Imageability

Reference: Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960.

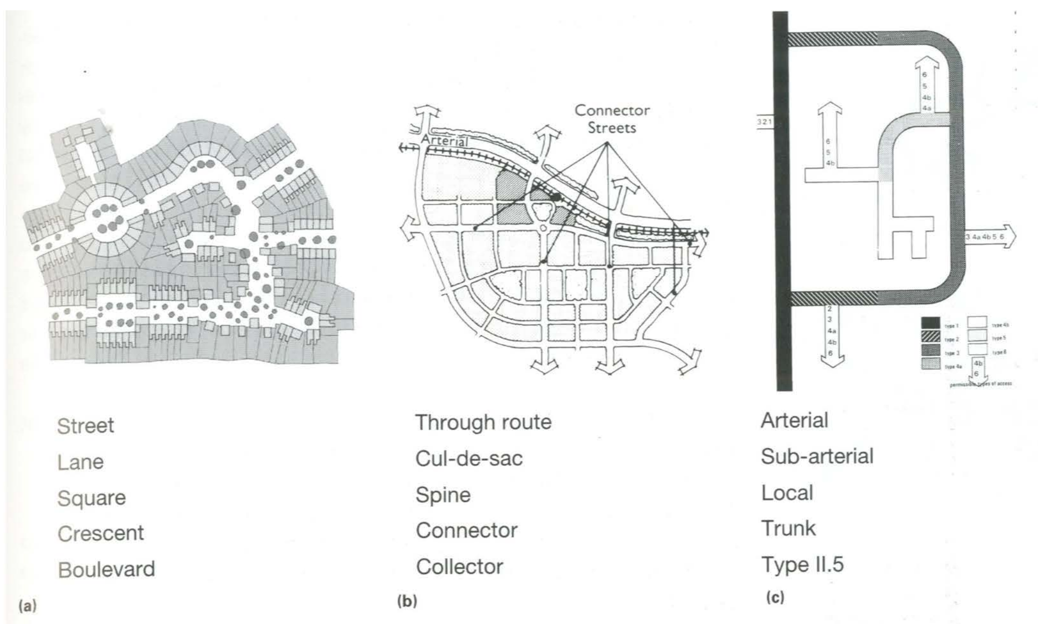


Figure 145 Connectivity and Grid

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

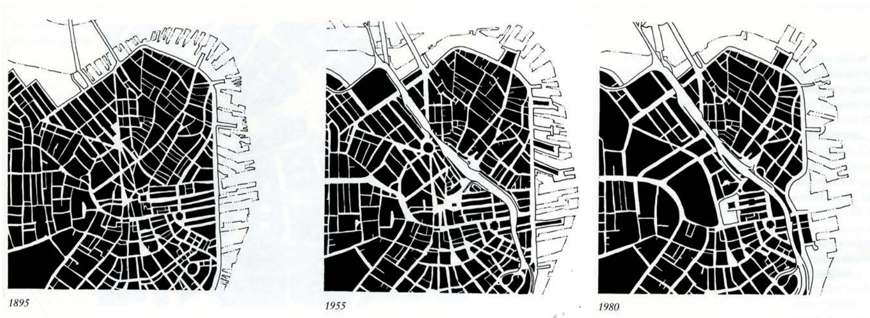
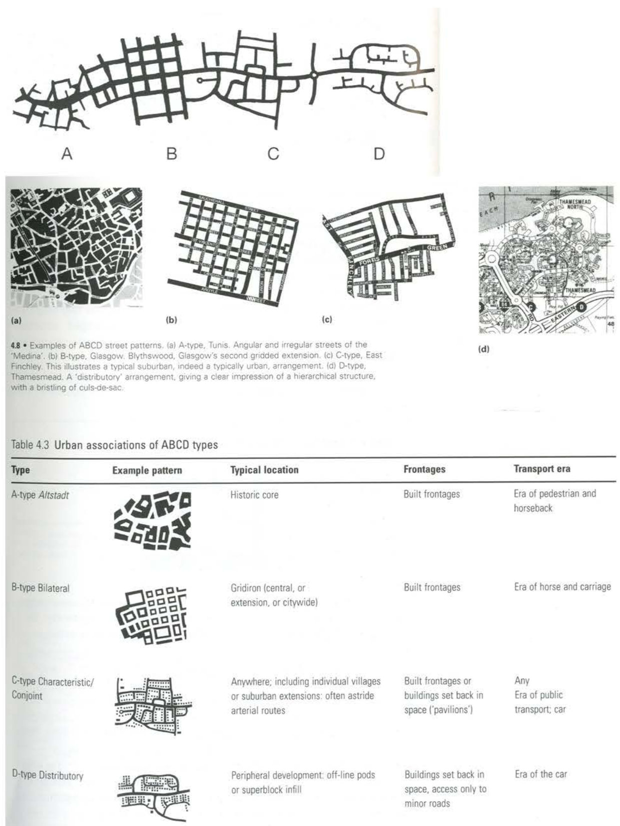


Figure 146 Boston Changes 1895, 1955 and 1980

Reference: Jacobs, Allan B. Great Streets. Cambridge, Massachusetts: The MIT Press, 1993.



4.8 • Examples of ABCD street patterns. (a) A-type, Tunis. Angular and irregular streets of the 'Medina'. (b) B-type, Glasgow. Blythswood, Glasgow's second gridded extension. (c) C-type, East Finchley. This illustrates a typical suburban, indeed a typically urban, arrangement. (d) D-type, Thamesmead. A 'distributory' arrangement, giving a clear impression of a hierarchical structure, with a bristling of culs-de-sac.

Table 4.3 Urban associations of ABCD types

Type	Example pattern	Typical location	Frontages	Transport era
A-type *Altstadt*		Historic core	Built frontages	Era of pedestrian and horseback
B-type Bilateral		Gridiron (central, or extension, or citywide)	Built frontages	Era of horse and carriage
C-type Characteristic/ Conjoint		Anywhere; including individual villages or suburban extensions: often astride arterial routes	Built frontages or buildings set back in space ('pavilions')	Any Era of public transport; car
D-type Distributory		Peripheral development: off-line pods or superblock infill	Buildings set back in space, access only to minor roads	Era of the car

Figure 147 Street types and Gridlines from Feudal to Dendritic

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

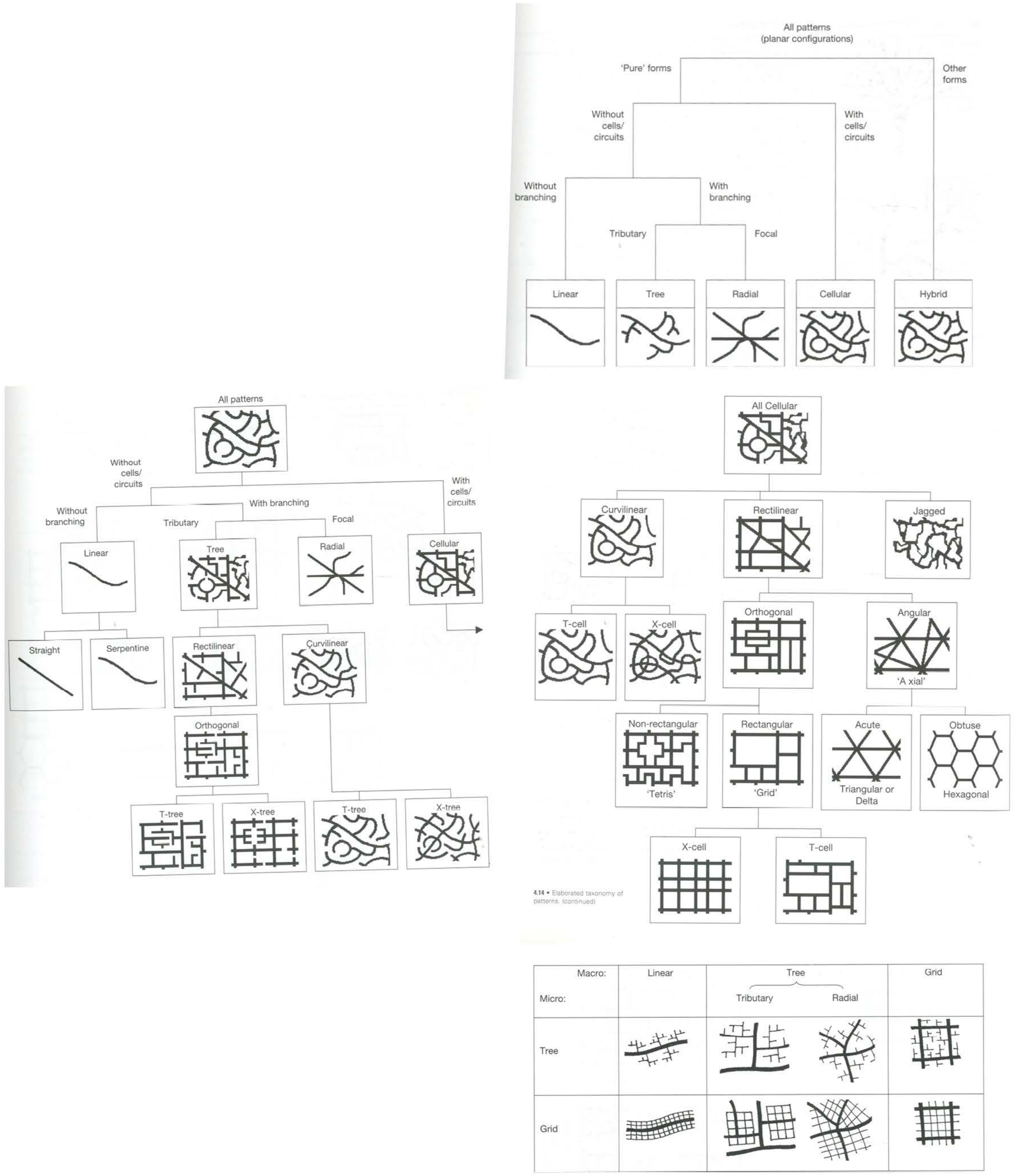


Figure 148 Patterns of Streets

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

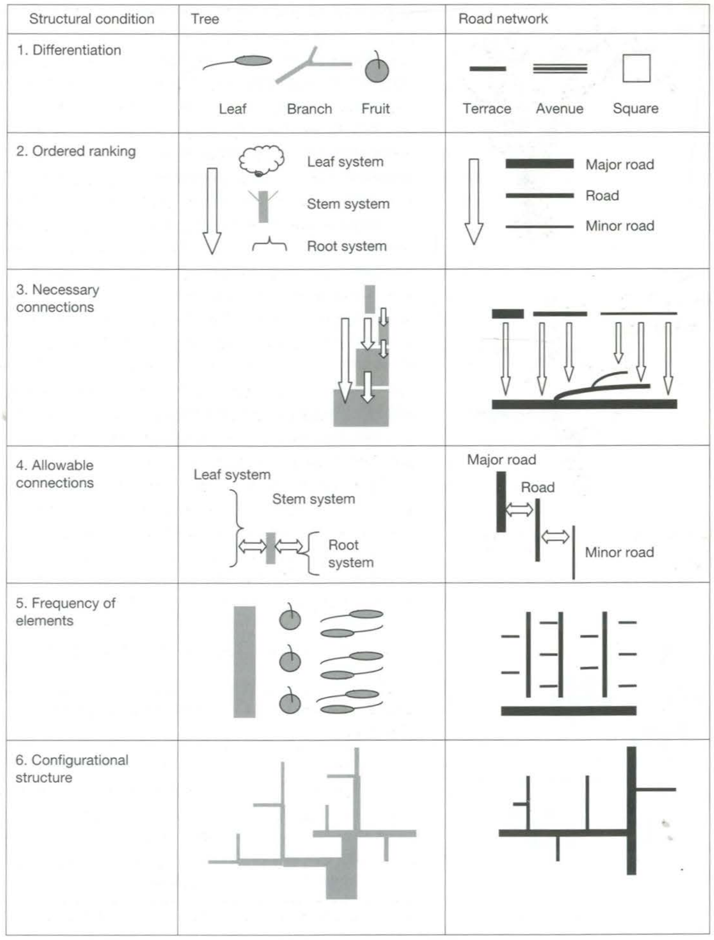


Figure 149 Connectivity and Grid

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

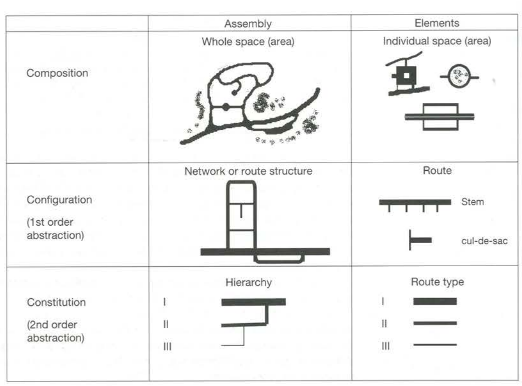


Figure 150 Composition, Configuration and Constitution

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

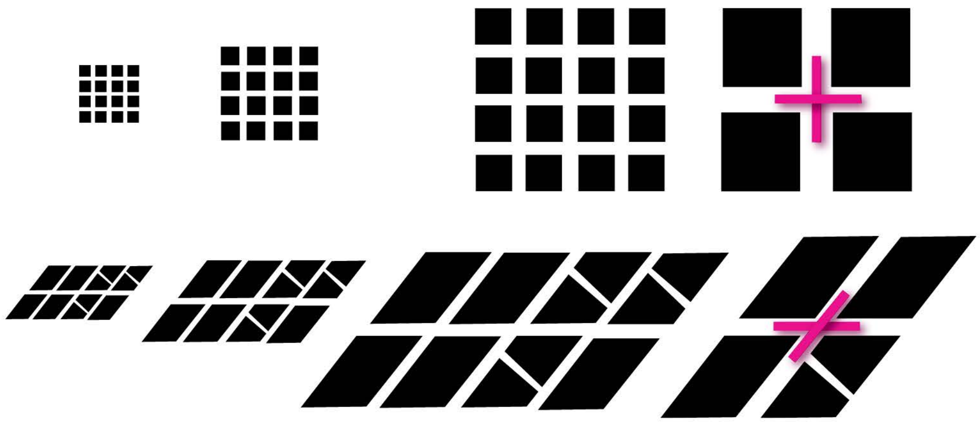


Figure 151 Intersection and the Grid

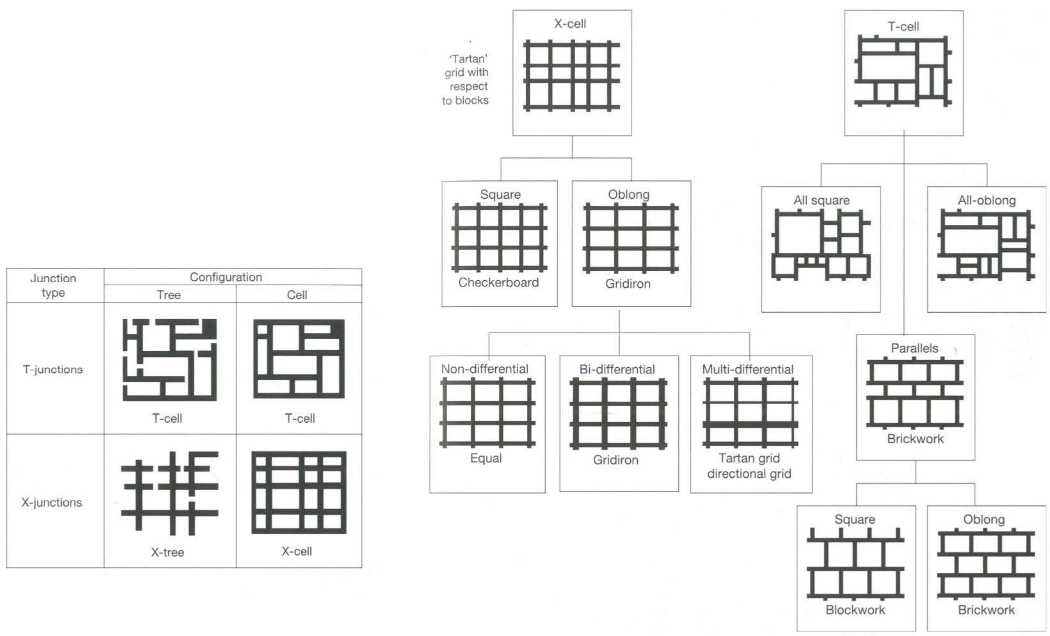


Figure 152 X or T-type cell patterns

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

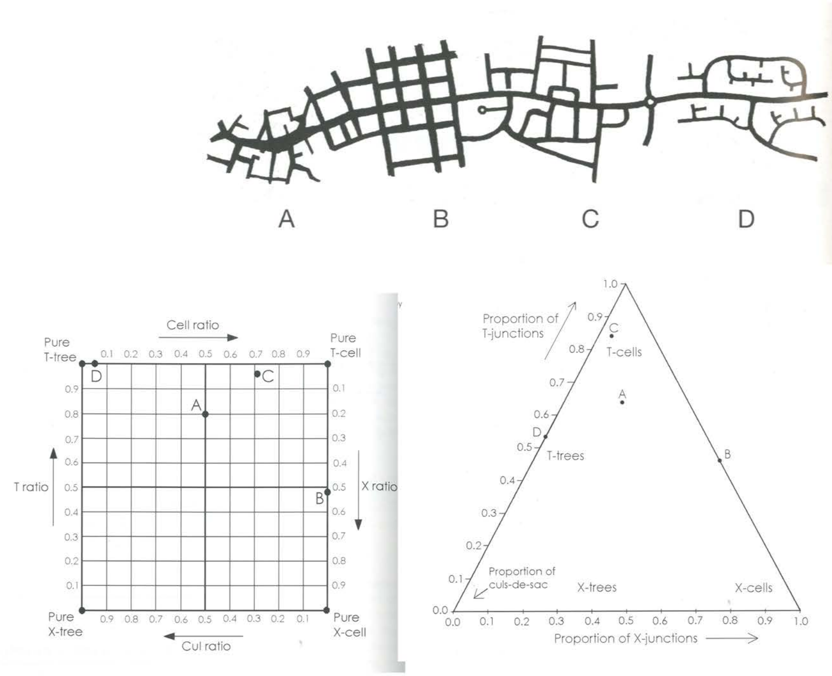


Figure 153 X or T-type cell patterns

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

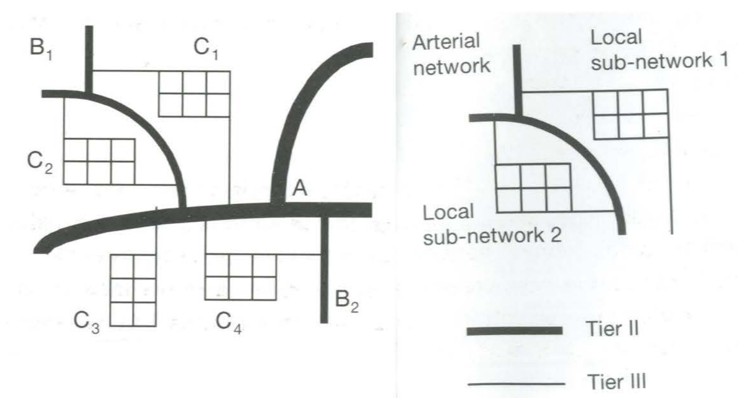


Figure 154 Arteriality of Urban Form

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

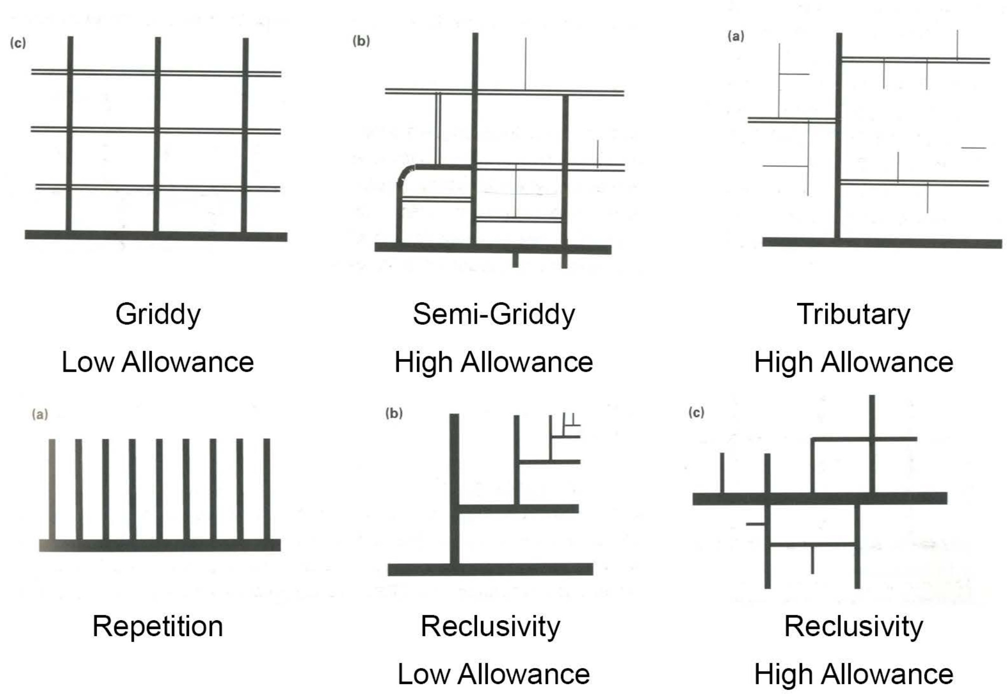


Figure 155 Connectivity and Grid

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

Table 6.2 **Relative connectivity values for example networks**

Informal description	Demonstrative networks	Relative connectivity	Actual or *prototype network	Relative connectivity
Regular and connective grids	Ewing-1	0.50	**Ciudad Lineal*	0.52
	Focal web	0.50	Glasgow Grid	0.50
	B-type	0.49	Tokyo Grid	0.48
	Ewing-2	0.47	Reykjavik Central	0.47
			Glasgow Southside	0.47
	Traditional	0.47	*Craig Plan	0.47
	Grid	0.46	Athens Inner	0.46
	Connector	0.46	Copenhagen Central	0.46
	Preferred	0.446	Dorchester Central	0.45
	Ewing-3	0.44	Sydney Inner	0.445
			Kentlands	0.44
			Hamilton	0.43
			Elmwood	0.43
			Bayswater	0.42
	Chaotic	0.42	Tunis Medina	0.42
			Bloomsbury	0.42
			Copenhagen Inner	0.42
Traditional grid-like structures			Cornhill	0.42
			Glasgow 1790	0.415
	Ewing-4	0.41	Shoreditch	0.41
			Kirkwall	0.41
	Characteristic	0.40	Babylon	0.39
			E.K. Village	0.39
Suburban 'grids' and cellular	A-type	0.39	St Andrews Central	0.39
	C-type	0.385	East Finchley	0.38
			Laguna West	0.38
			Tehran Inner	0.38
			Poundbury	0.37
	Layered loops	0.36		
			*Hilberseimer	0.36
Suburban	Ewing-5	0.35	E.K. Suburban 1	0.35
			Reykjavik Tributary 1	0.34
			Crawley Suburban	0.32
Suburban with significant			Reykjavik Tributary 2	0.315
tributary components			E.K. Suburban 2	0.31
			St Andrews Suburban	0.31
			Coventry Tributary	0.31
			Highworth Village	0.31
	Essex Trib.	0.275	*North Bucks New City	0.30
Tributaries and pure trees	Discouraged	0.275	E.K. Tributary	0.28
	D-type	0.265		
	Tributary	0.25	Thamesmead	0.26

Figure 156 Connectivity and Grid

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

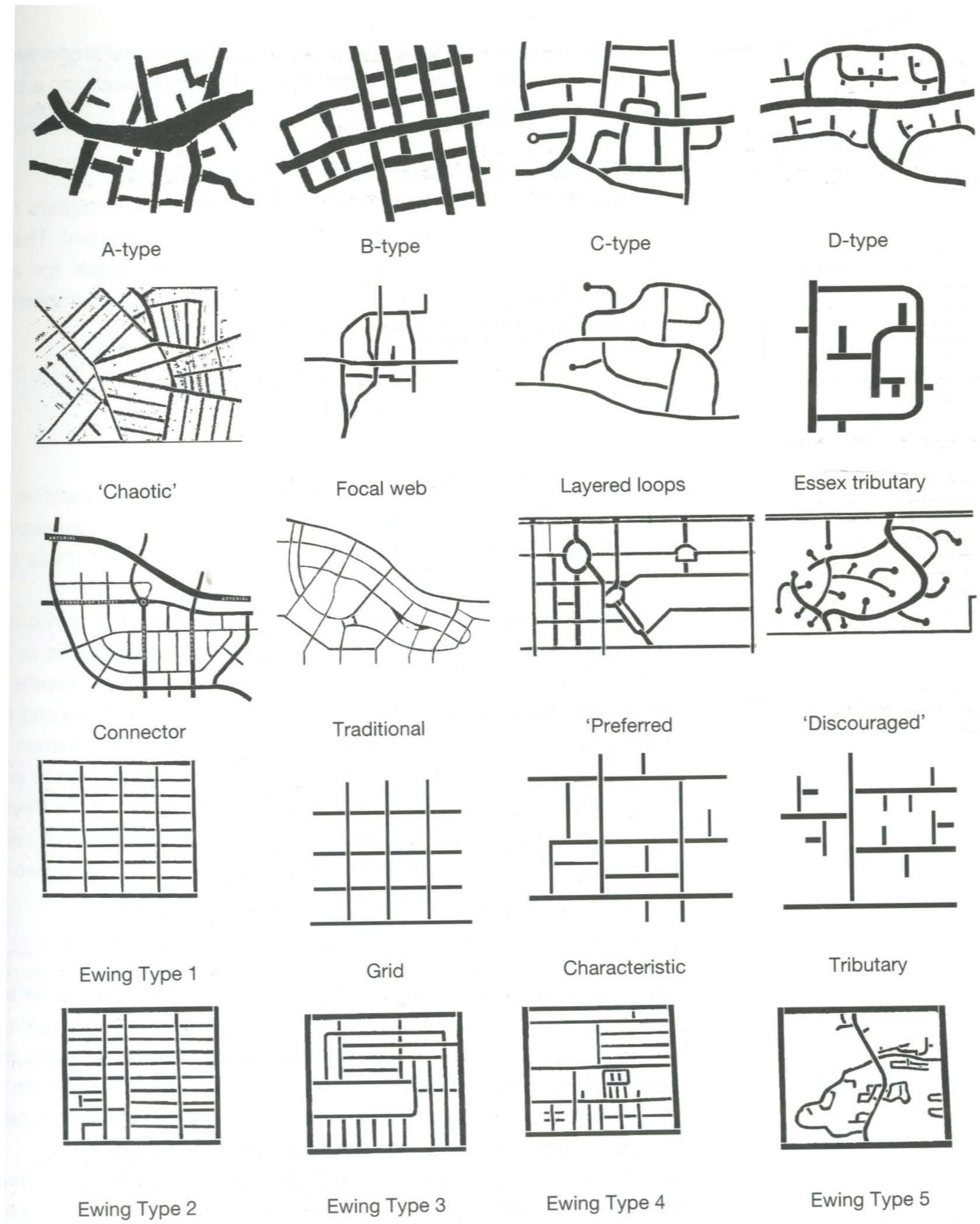


Figure 157 Grid Patterns and Street Networks

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

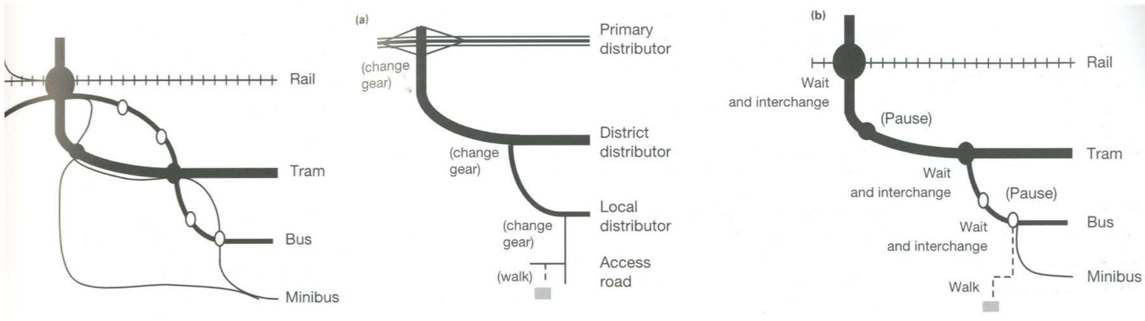


Figure 158 Hierarchy Comparisons of Dendritic and Other Grids

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

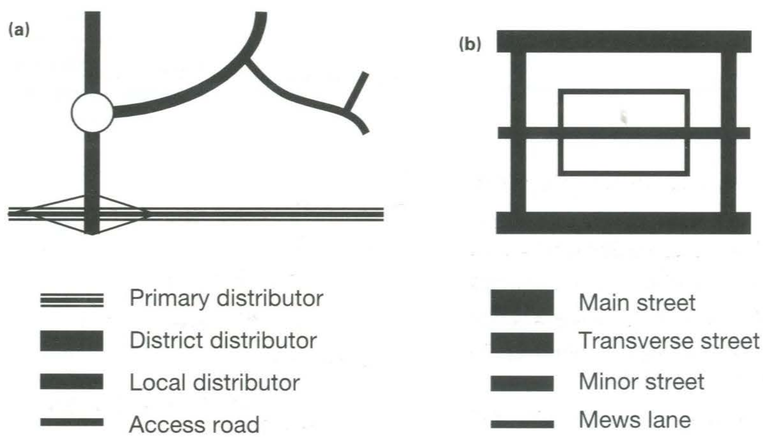


Figure 159 Hierarchy Comparison of Dendritic and Grid Plan

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

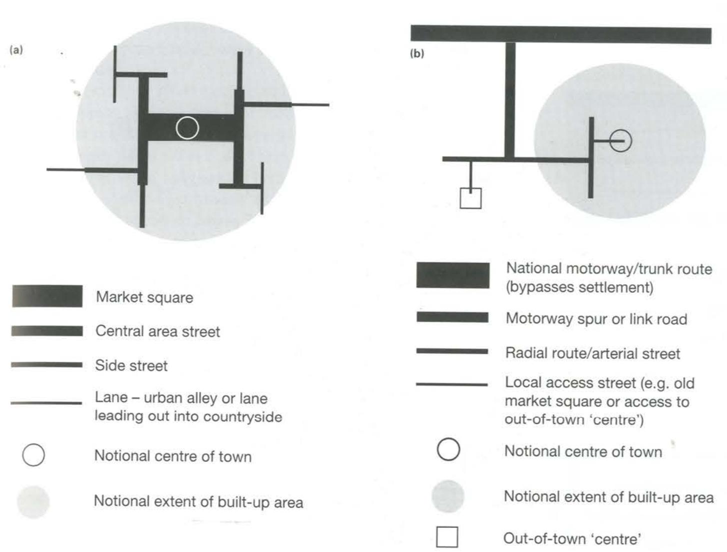


Figure 160 Different Types of Hierarchy

Reference: Marshall, Stephen. Streets and Patterns. London: Spon Press/Taylor and Francis Group, 2005.

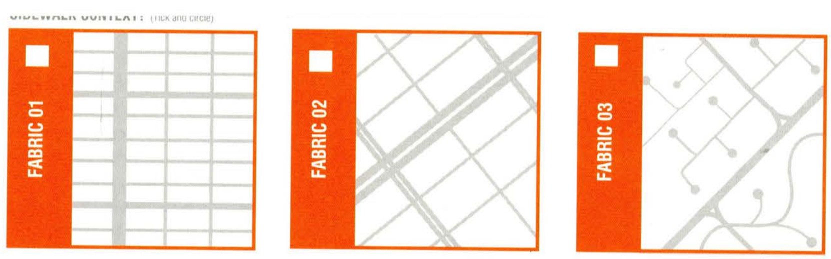


Figure 161 Street Grid Plan Matches Sidewalk Plan in NYC

Reference: New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013.

Figure 162 Sidewalk Ground, Road, Building, Canopy Sections

Reference: New York City Planning. Active Design: Shaping the Sidewalk Experience: Tool and Resources. New York: City of New York Planning, 2013.

Figure 163 Pedestrian Crossings in Pompeii

Reference: Places to Visit. Pedestrian Crossing. http://places-to-visit.info/media/var/images/2007/08/09/2004-08-21_10-43-58_s.jpg (accessed July 27, 2014); Wikipedia. "Pedestrian Crossing Pompeii." http://en.wikipedia.org/wiki/File:Pedestrian_Crossing_Pompei_August_2013.JPG (accessed July 27, 2014).

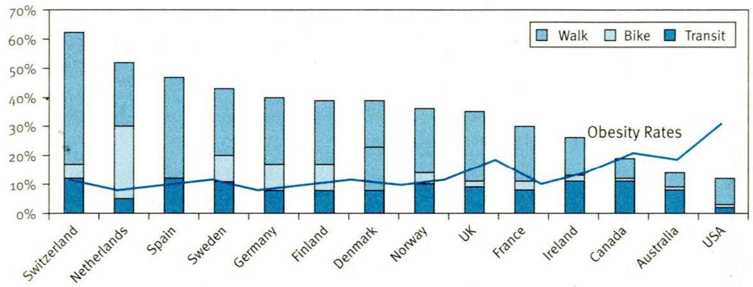


Figure 164 Obesity Rates related to Walkability

Reference: Tumlin, Jeffrey. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Holboken, New Jersey: Wiley: John Wiley Sons, Inc., 2012.

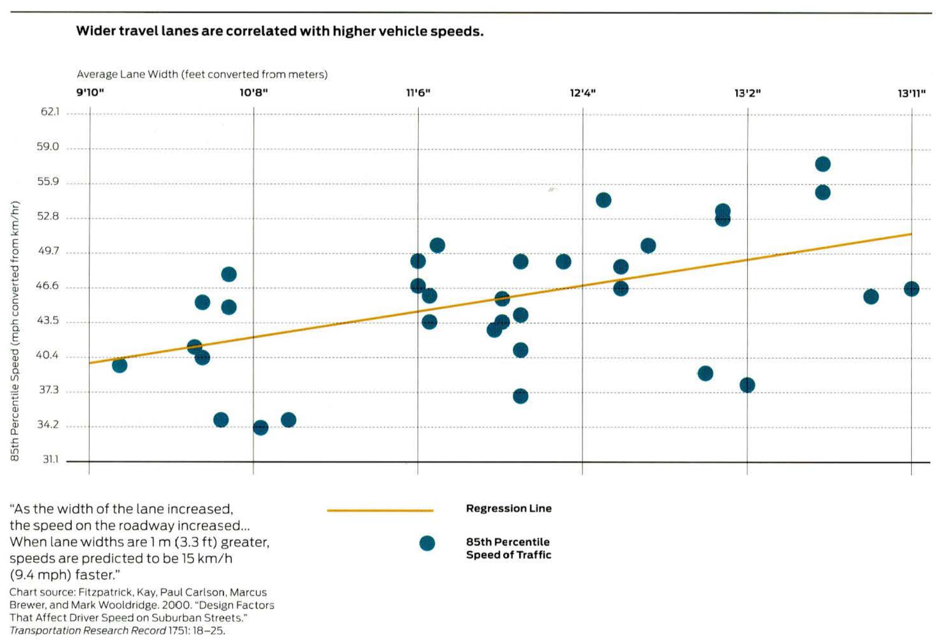


Figure 165 Wider Travel Lanes and Higher Vehicle Speeds

Reference: National Association of City Transportation Officials. Urban Street Design Guide. Washington: Island Press, 2013.

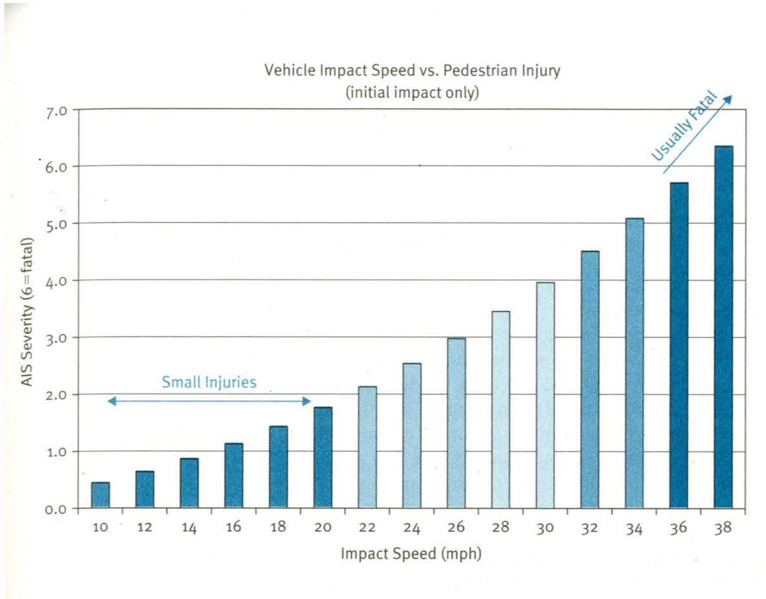


Figure 166 Vehicle speeds and pedestrian injuries.

Reference: Tumlin, Jeffrey. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Holboken, New Jersey: Wiley: John Wiley Sons, Inc., 2012.

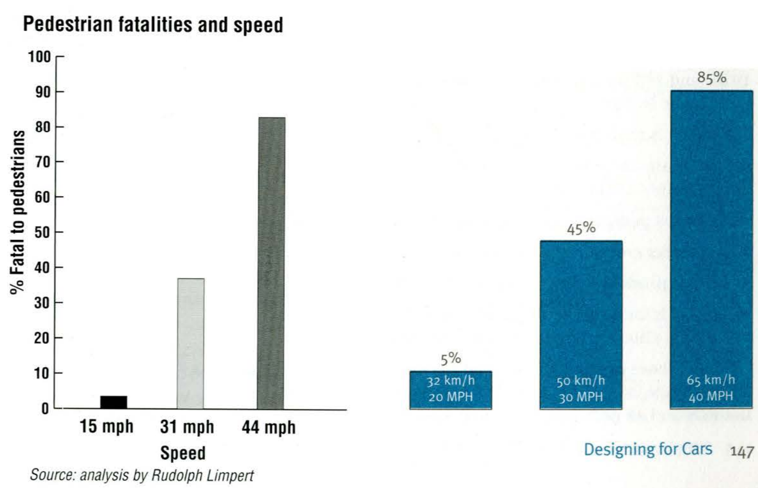


Figure 167 Vehicle speeds and pedestrian deaths.

Reference: Tumlin, Jeffrey. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Holboken, New Jersey: Wiley: John Wiley Sons, Inc., 2012; Steuteville, Robert and Philip Langdoc and Special Contributions. “New Urbanism Best Practices Guide.” Texas Tech University Department of Architecture at El Paso. http://www.depts.ttu.edu/elpaso/arch_3373/2.CNU%20best%20practices.pdf (accessed January 28, 2014).

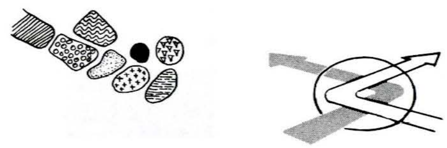


Figure 168 Nodes

Reference: Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960.

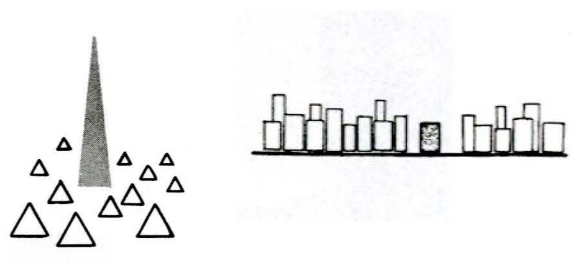


Figure 169 Landmarks

Reference: Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960.

Figure 170 Sixtus V actions.

Reference: Blackspaces. "Design by Essentials--Sixtus V's Plan for Rome." http://blackspaces.wordpress.com/2012/02/14/design-by-essentials-sixtus-vs-plan-for-rome/ (accessed July 17, 2014).

Figure 171 Sixtus V actions.

Reference: The Colosseum Net. “Sisto 20V.” http://www.the-colosseum.net/images/maps/1590%20Sisto%20V.jpg (accessed July 29, 2014).

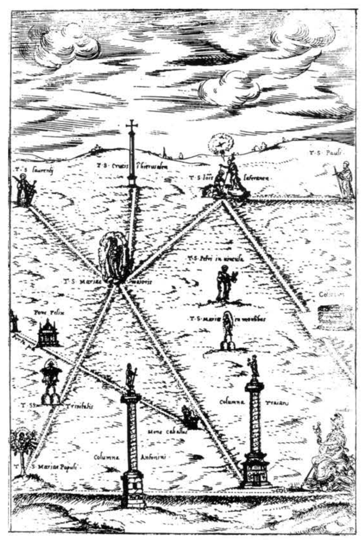


Figure 172 Bordino Engraving of Rome

Reference: IUAV Files Wordpress. “Bordino Schema Strade.” http://wave2014iuav.files.wordpress.com/2014/05/1-bordino_schema-strade-sistine1588.jpg?w=605&h=908 (accessed July 29, 2014).

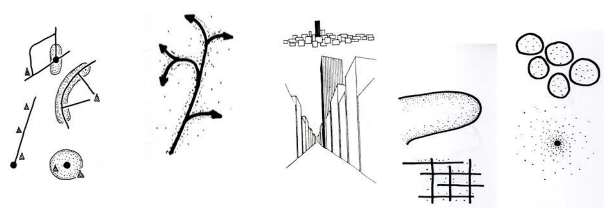


Figure 173 Urban Form Interaction

Reference: Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960.

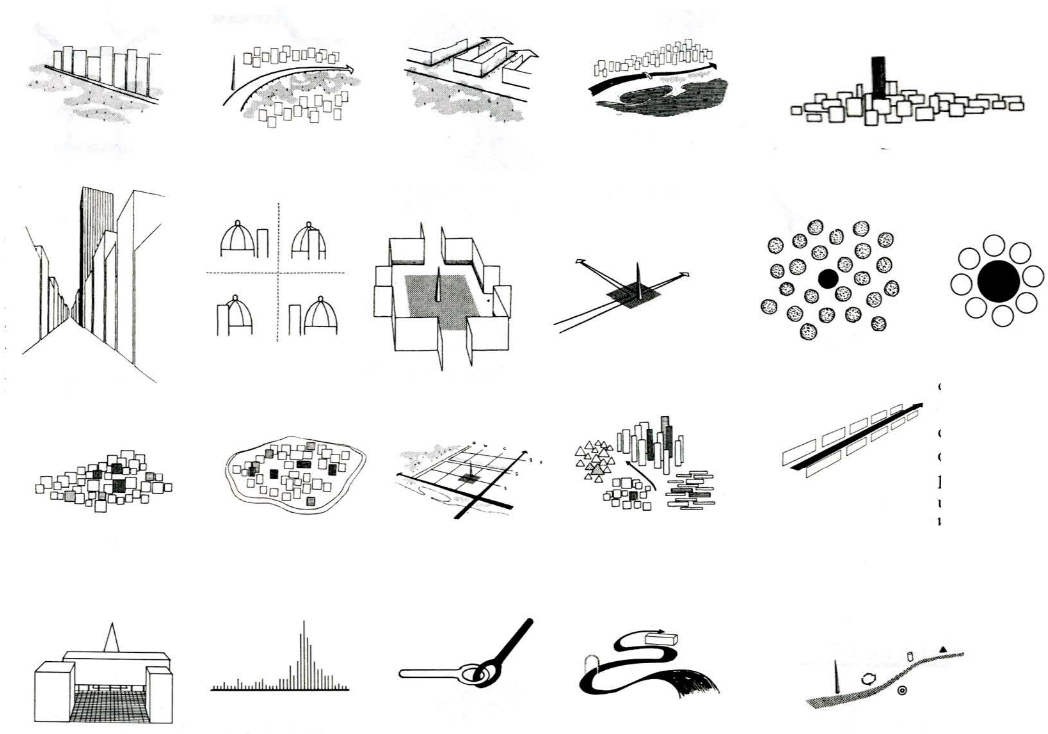


Figure 174 Malleability of Urban Form

Reference: Lynch, Kevin. The Image of the City. Cambridge, Massachusetts: MIT Press, 1960.

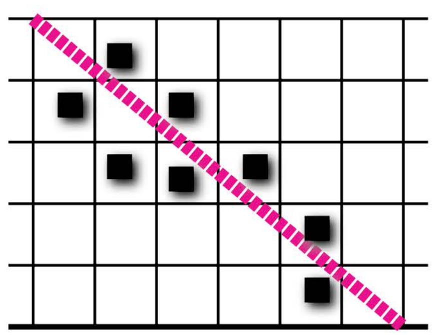


Figure 175 Edges that Seam

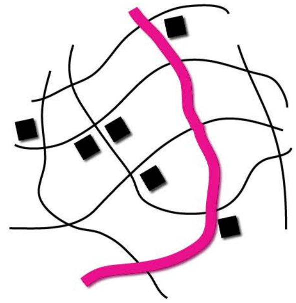


Figure 176 Organic Gridpatterns

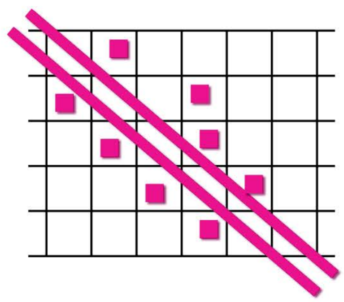


Figure 177 Edges that Divide

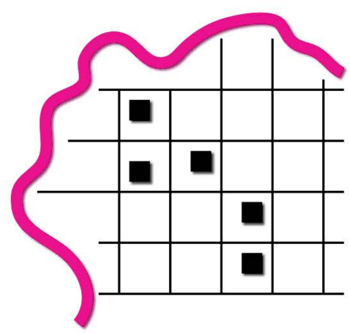


Figure 178 Natural Edges

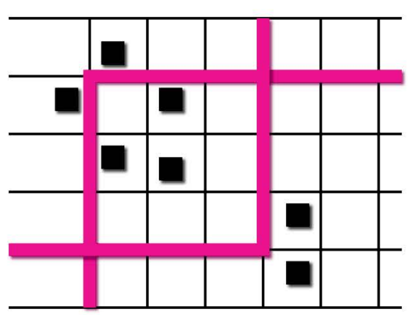


Figure 179 Orthogonal Girdpatterns

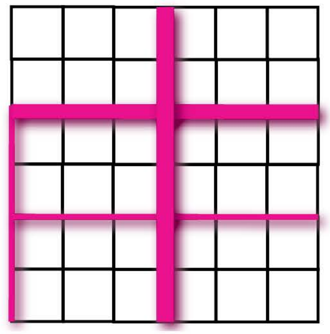


Figure 180 Hierarchical Girdpattern

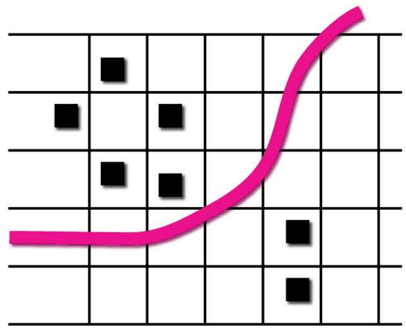


Figure 181 Organic Arterial Route

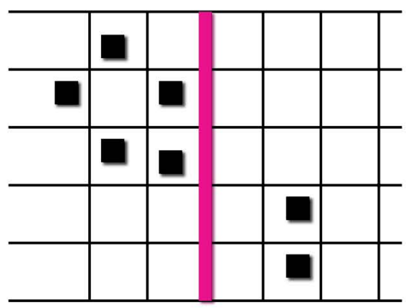


Figure 182 Gridline Arterial Route

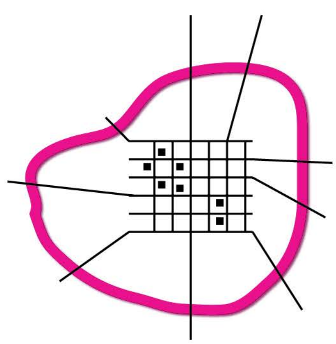


Figure 183 Encircling Gridpattern

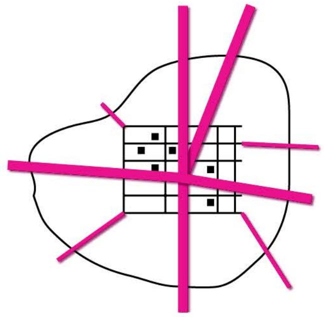


Figure 184 Radial Gridpattern

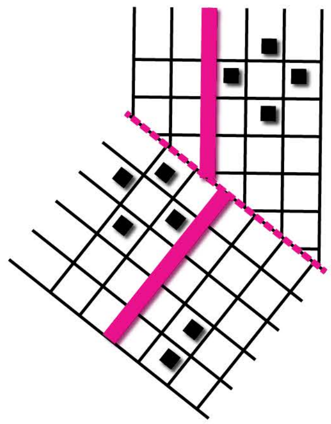


Figure 185 Gridpattern Shifts

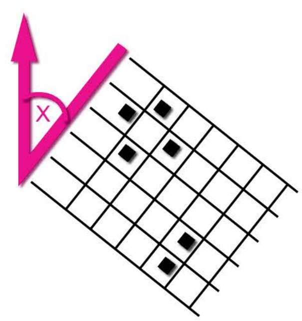


Figure 186 True North and Grid Angle

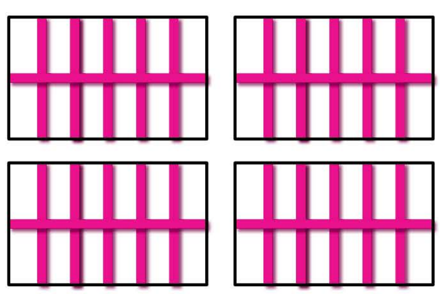


Figure 187 Non-Public Lot Side

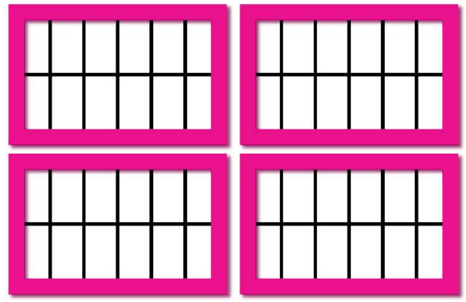


Figure 188 Public Lot Side

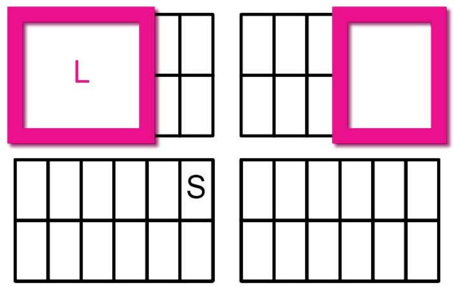


Figure 189 Large and Small Lots

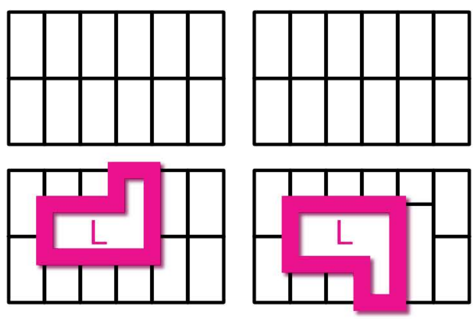


Figure 190 Flag Lot

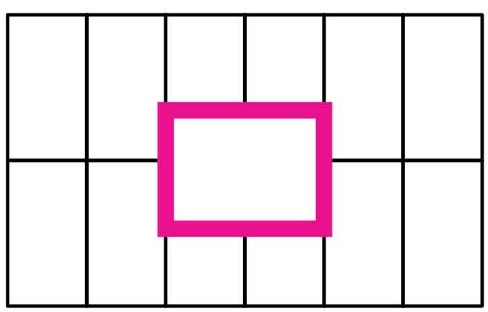


Figure 191 Internal Lot

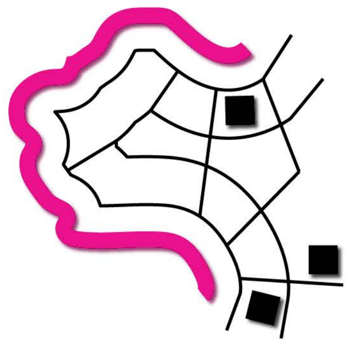


Figure 195 Patterns Caused by Topography

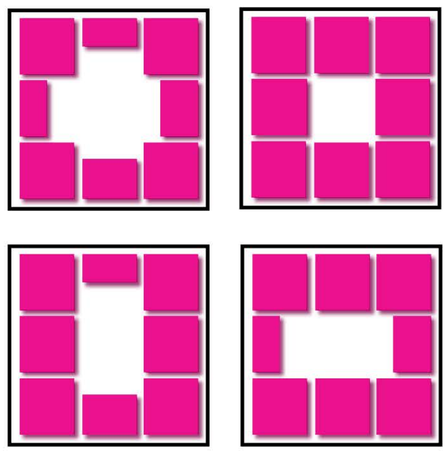


Figure 196 Perimeter Blocks

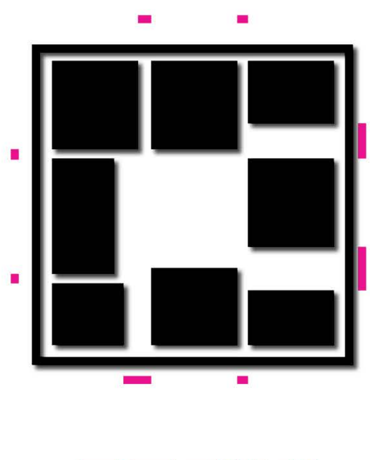


Figure 197 Breaks in Perimeter Block Openings

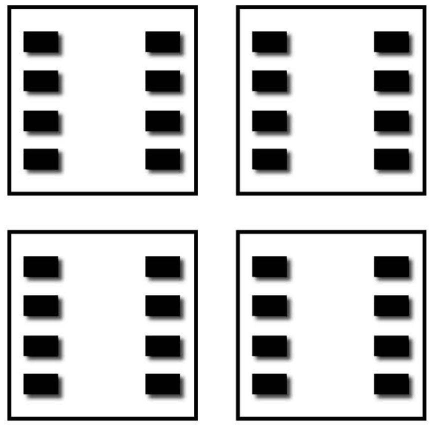


Figure 198 Non-Perimeter Blocks

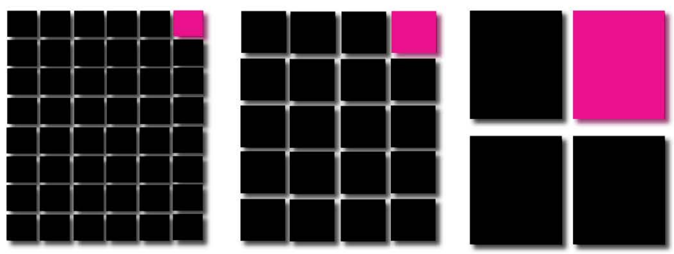


Figure 199 Different Block Densities

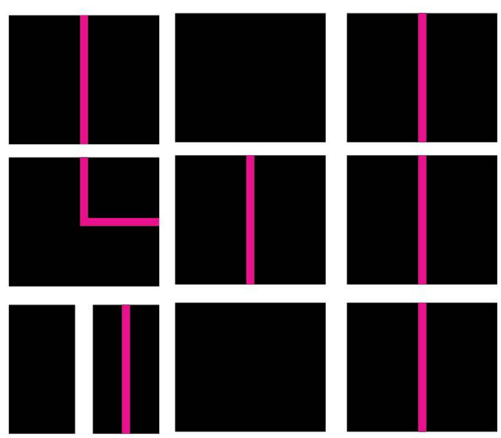


Figure 200 Block Alleys

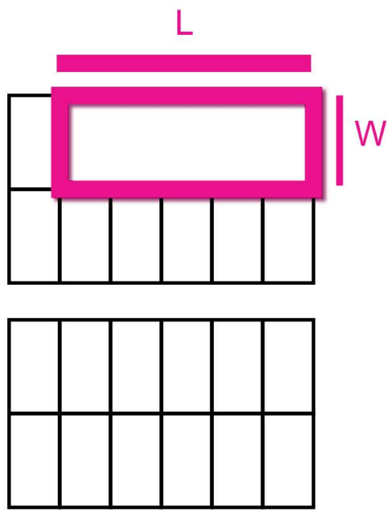


Figure 192 Longest Lot Length and Width

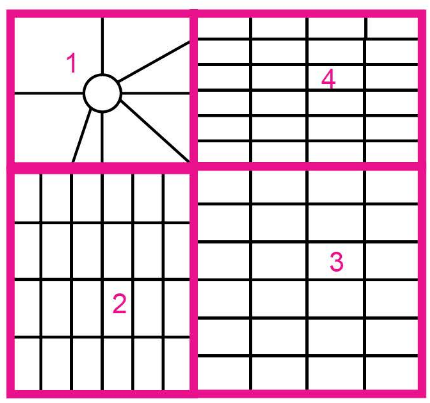


Figure 193 Numbers of Gridpatterns

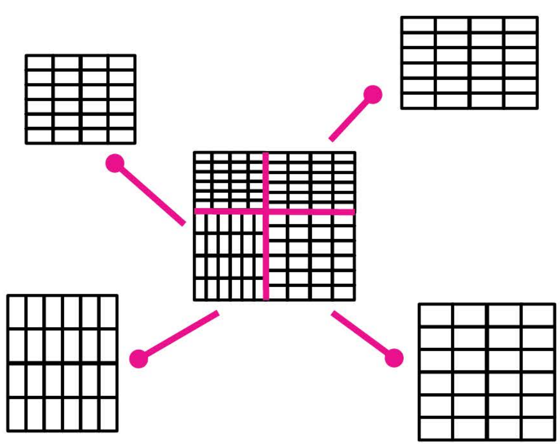


Figure 194 Block Groups

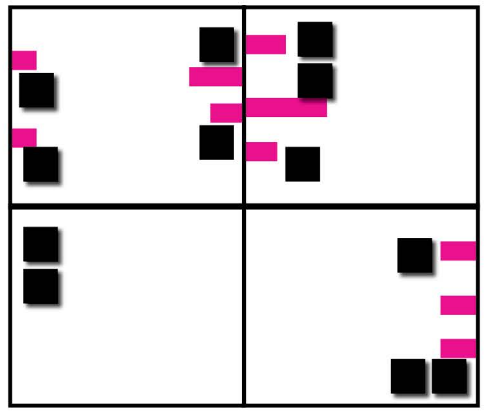


Figure 201 Block Driveways

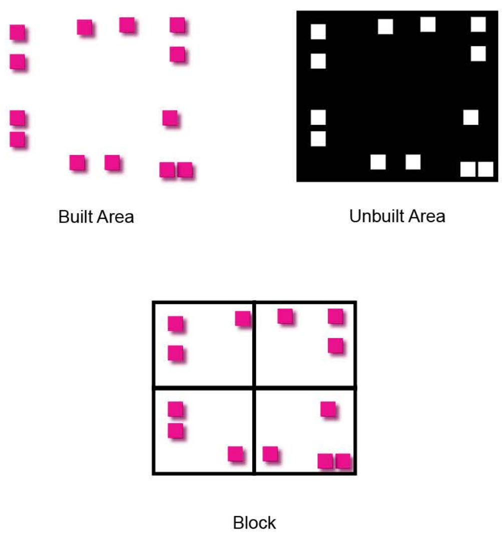


Figure 202 Built and Unbuilt Block Areas

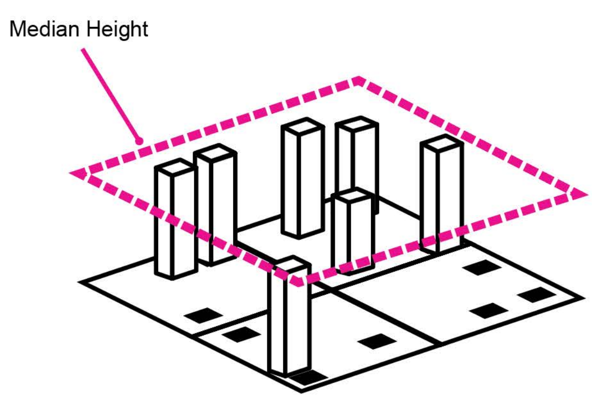


Figure 203 Average Vertical Block Height

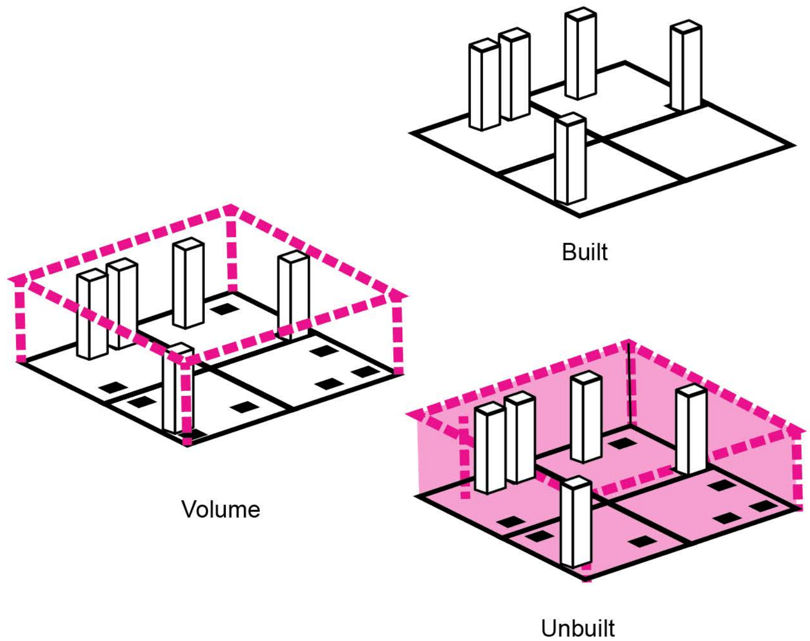


Figure 204 Built and Unbuilt Volume

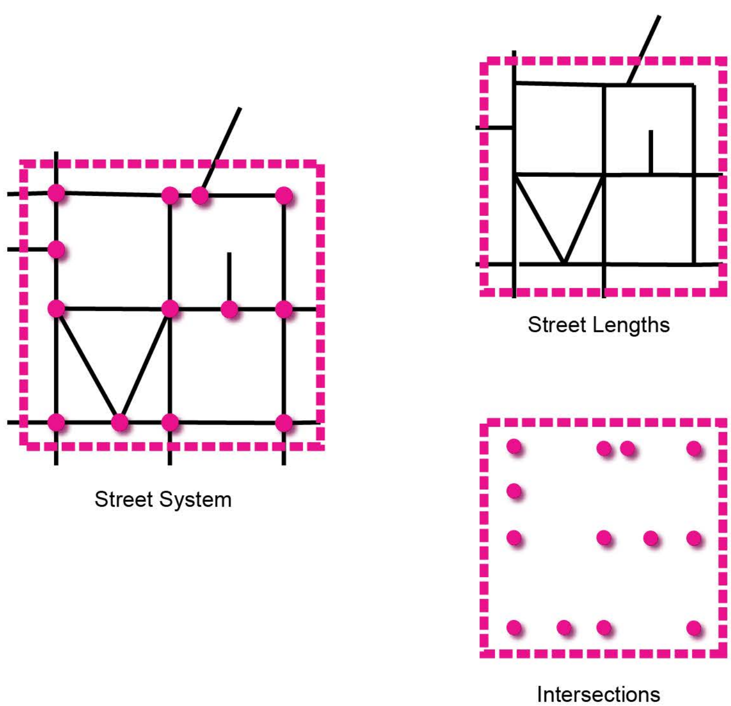


Figure 205 Street Lengths and Intersections

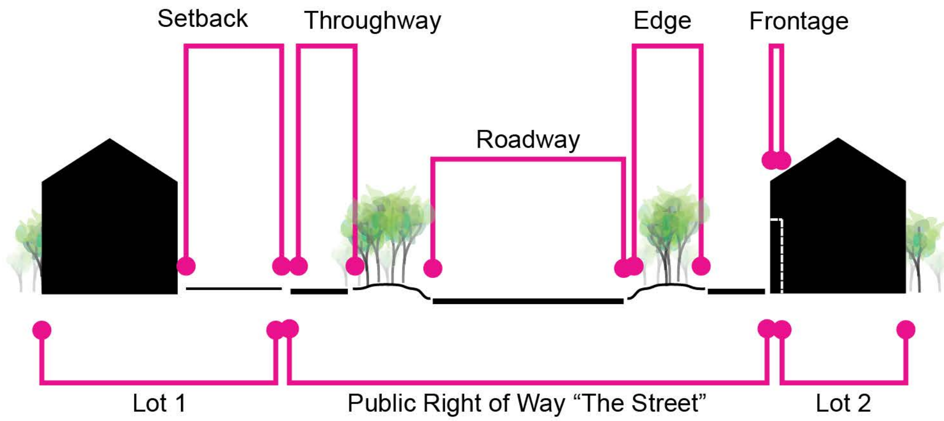


Figure 206 The Public Right of Way

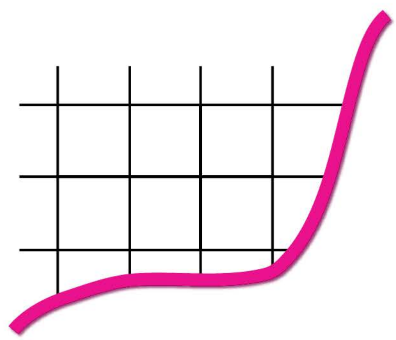


Figure 207 Serpentine Routes and Streets

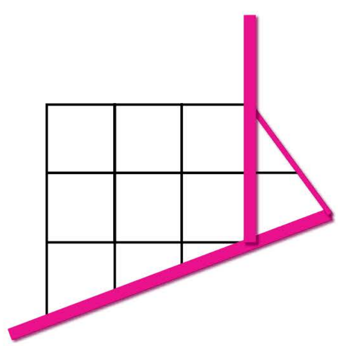


Figure 208 Diagonal or Radial Routes and Streets

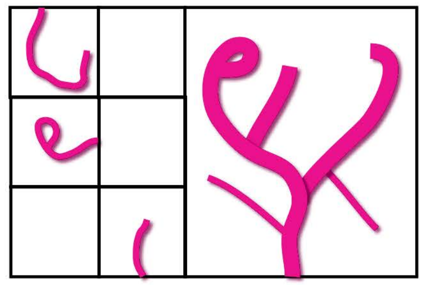


Figure 209 Dendritic Route and Streets

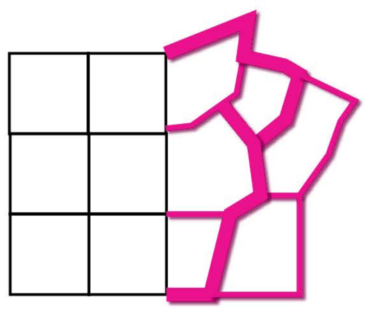


Figure 210 Accreted Routes and Streets

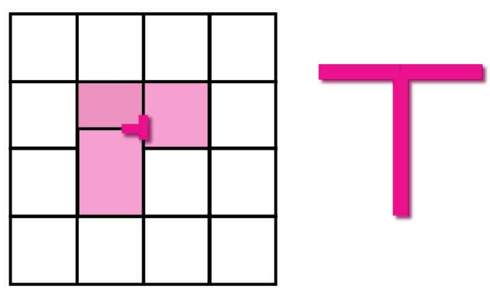


Figure 211 T-Cell Intersections and Blocks

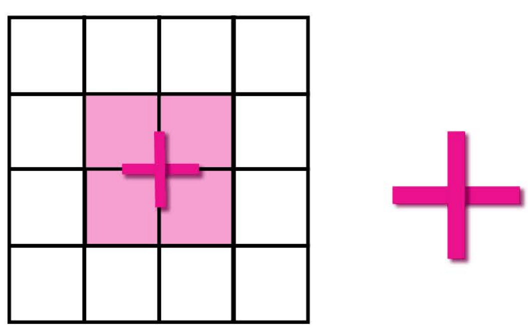


Figure 212 X-Cell Intersections and Blocks

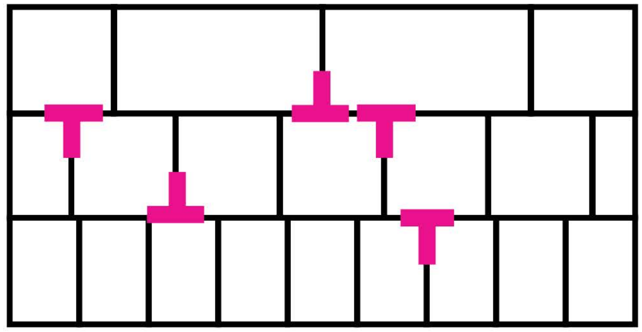


Figure 213 Block Brickwork and T-Intersections

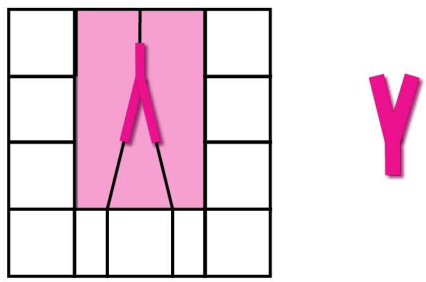


Figure 214 Y-Cell Intersections and Blocks

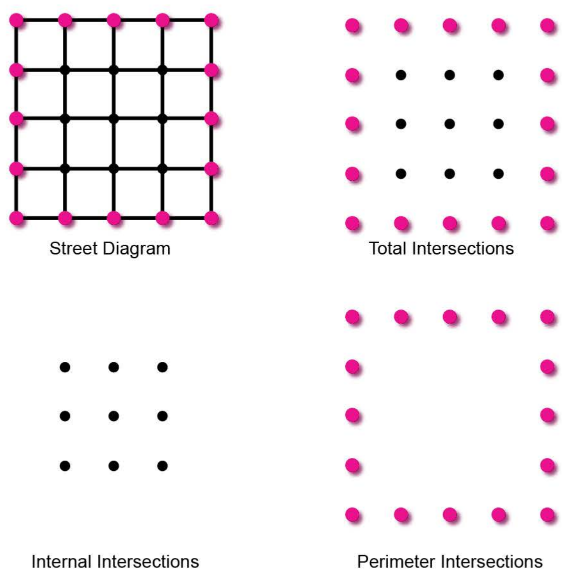


Figure 215 Total and Perimeter Intersections

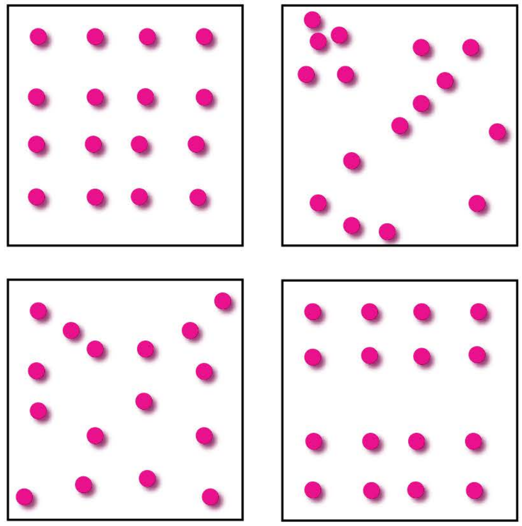


Figure 216 Intersections Per Square Mile

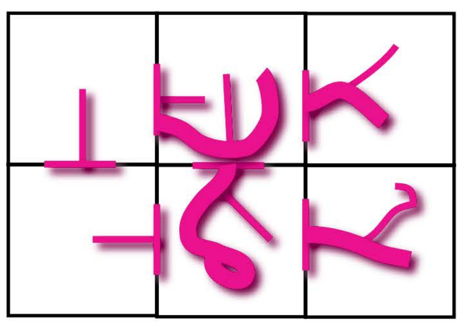


Figure 217 T- to Y-Intersections and Cul-de-Sacs

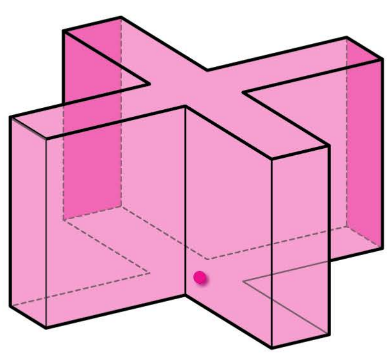


Figure 218 Intersection Volume

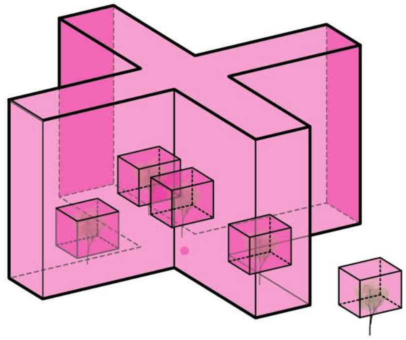


Figure 219 Intersection and Tree Volume

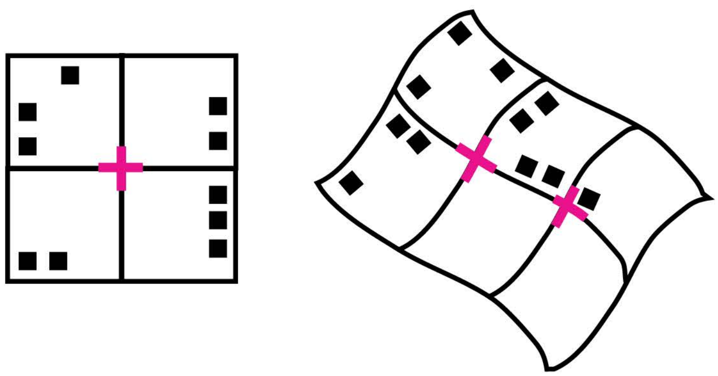


Figure 220 X-Intersections, Regularity of Cell

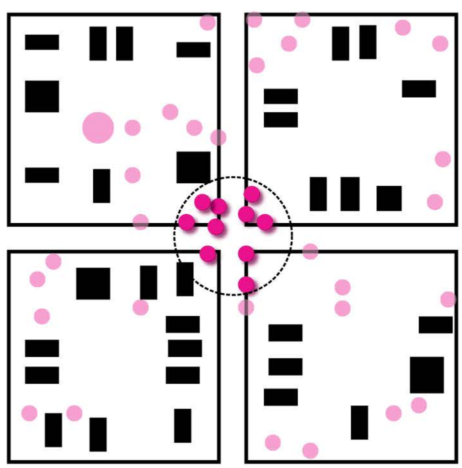


Figure 221 Trees Within 40 Feet of Intersections

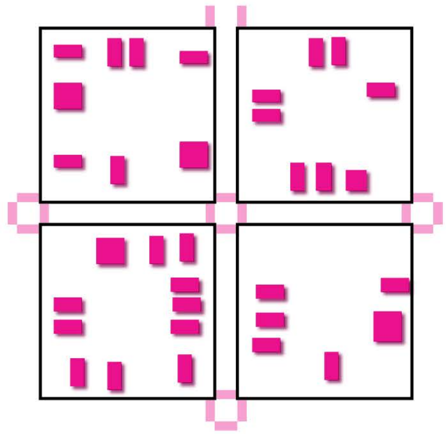


Figure 222 Crosswalks at Intersections

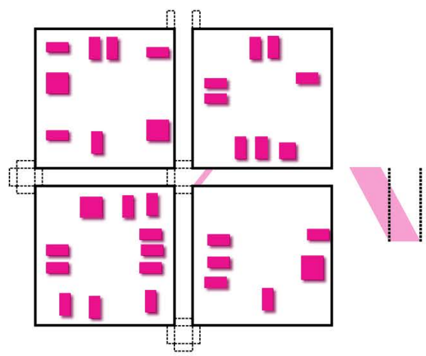


Figure 223 Angled Crosswalks at Intersections

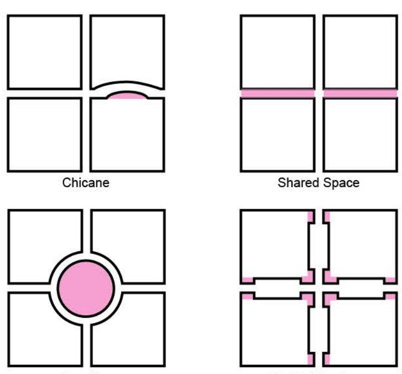


Figure 224 Safety Measures on Street Lengths

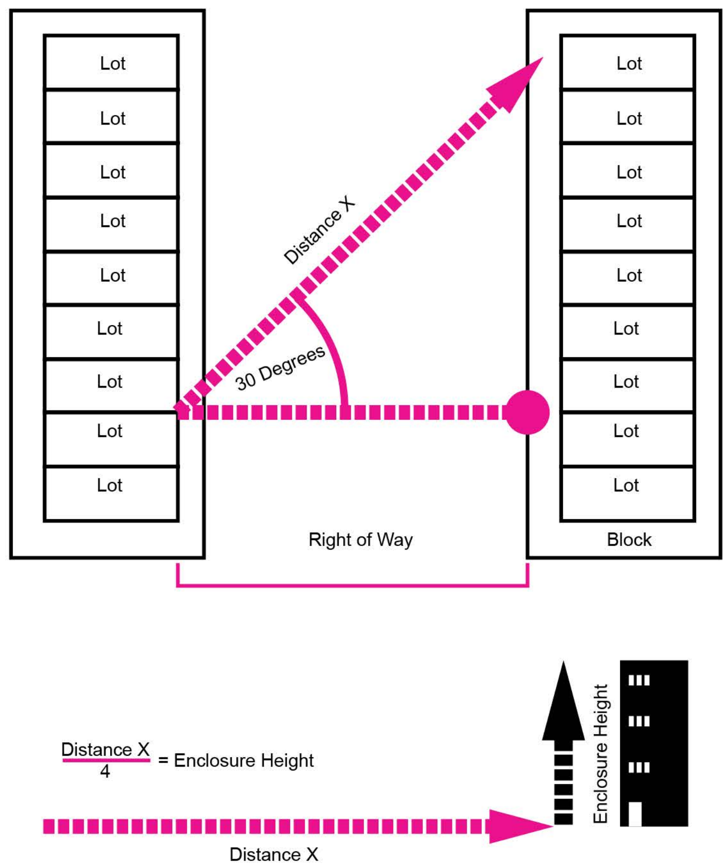


Figure 225 Mathematical Measure of Enclosure and Human Scale

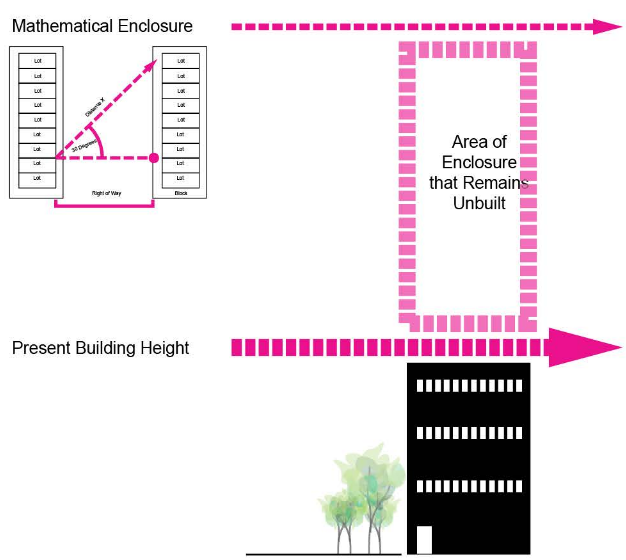


Figure 226 Enclosure Differential From Mathematical Enclosure

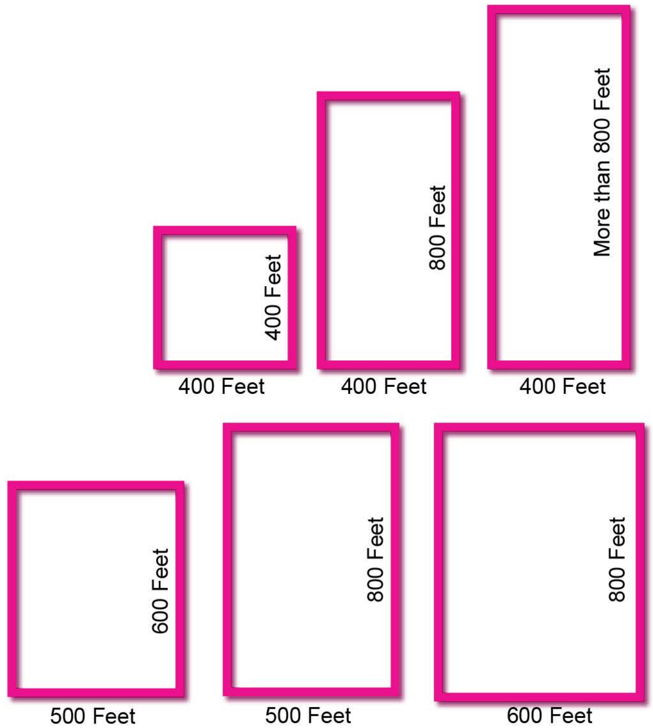


Figure 227 Block Length Pairings and Connections

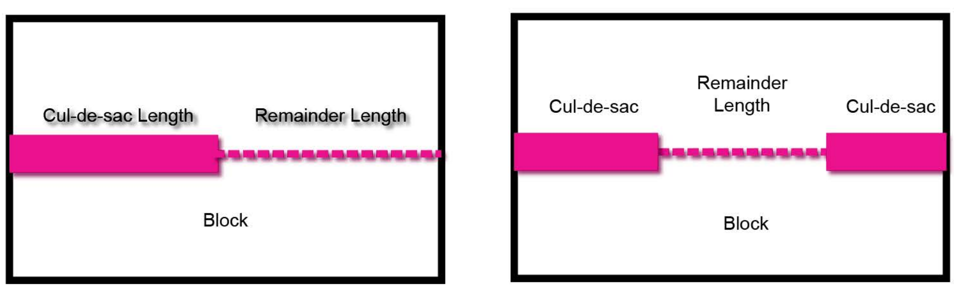


Figure 228 Cul-de-Sacs

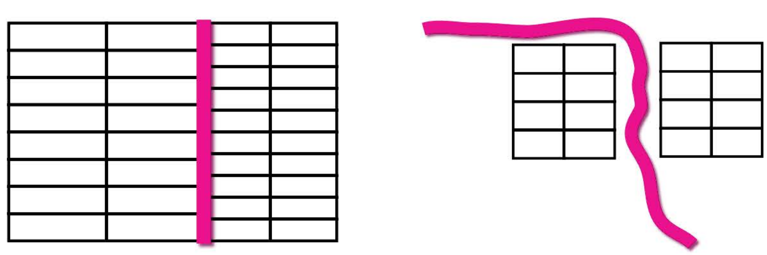


Figure 229 Strong Edges

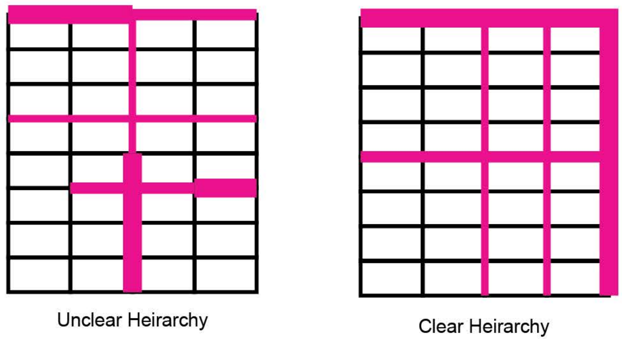


Figure 230 Legibility and Hierarchy

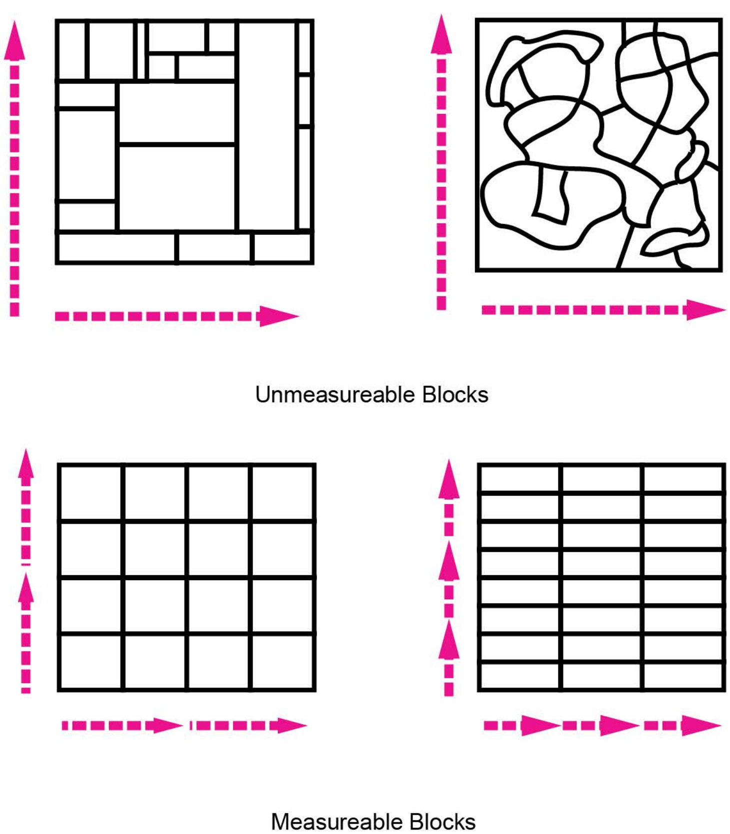


Figure 231 Measurability and Legibility

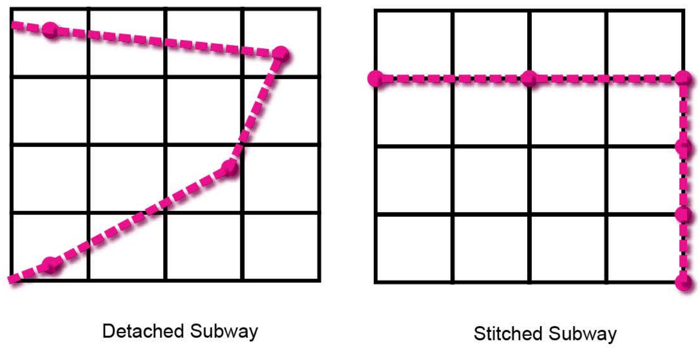


Figure 232 Detached and Stitched Subway

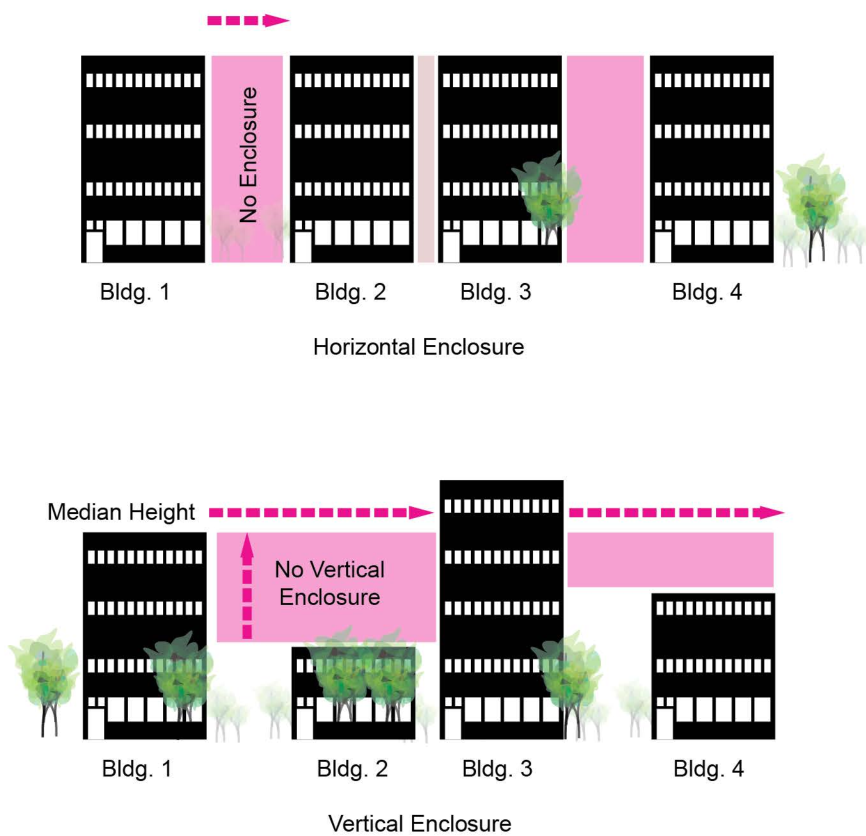


Figure 233 Vertical and Horizontal Enclosure

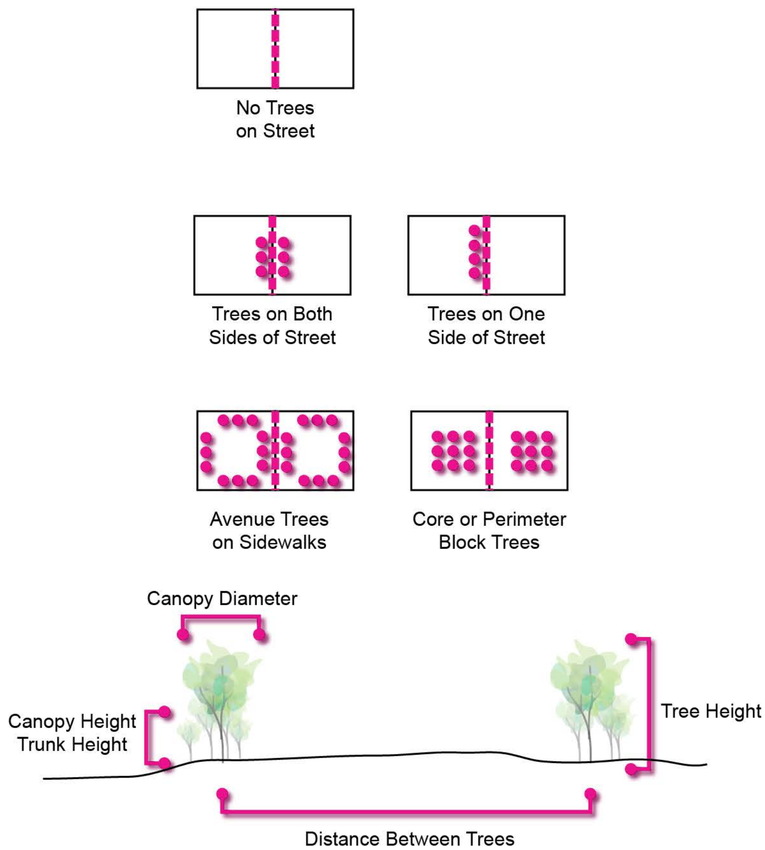


Figure 234 Trees in Urban Form

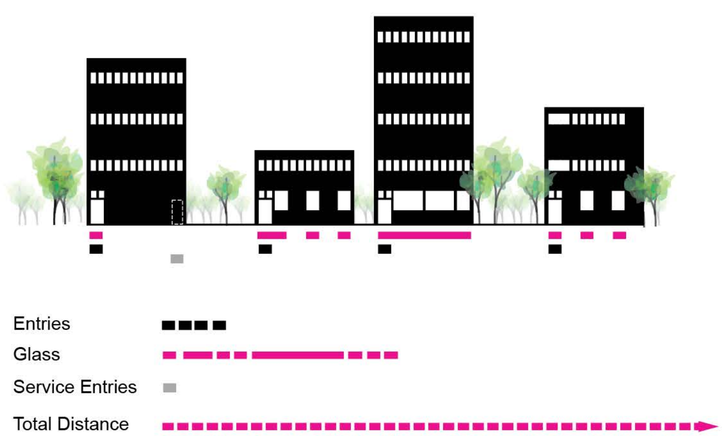


Figure 235 Transparency, Entries, Glass and Service Entries

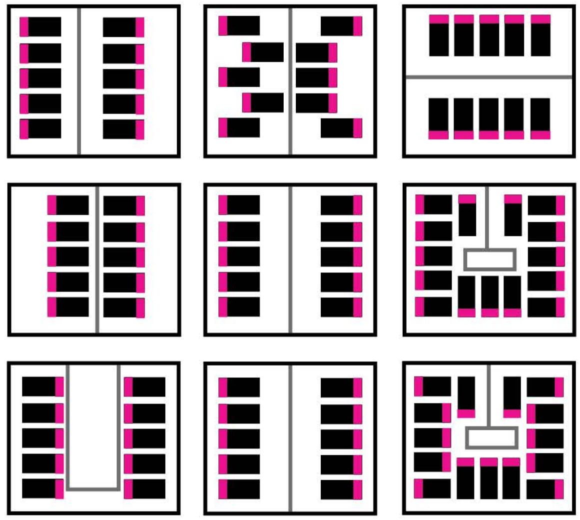


Figure 236 Fronts and Backs of Blocks

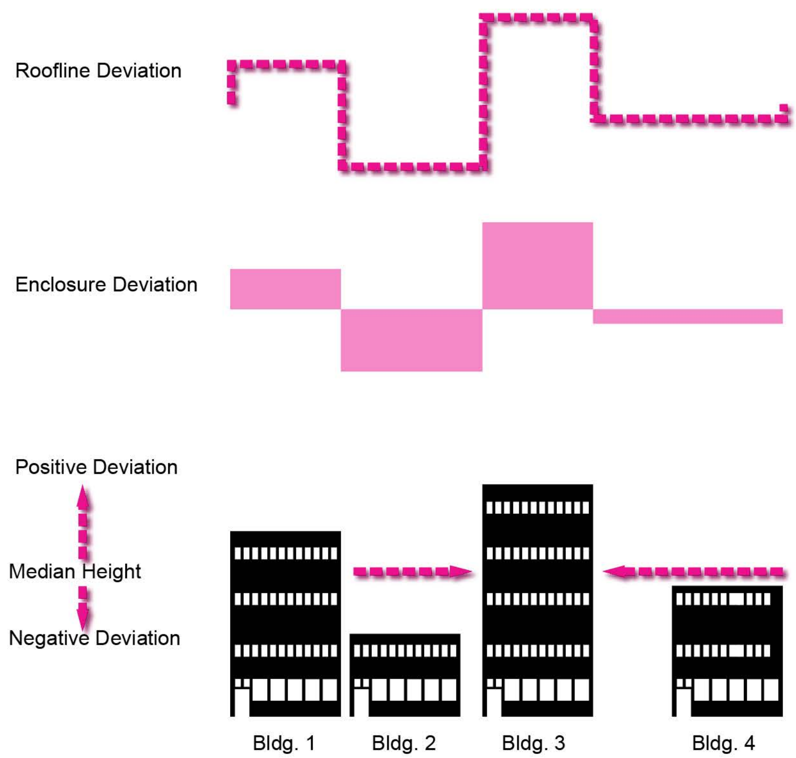


Figure 237 Vertical Deviations From Median Heights

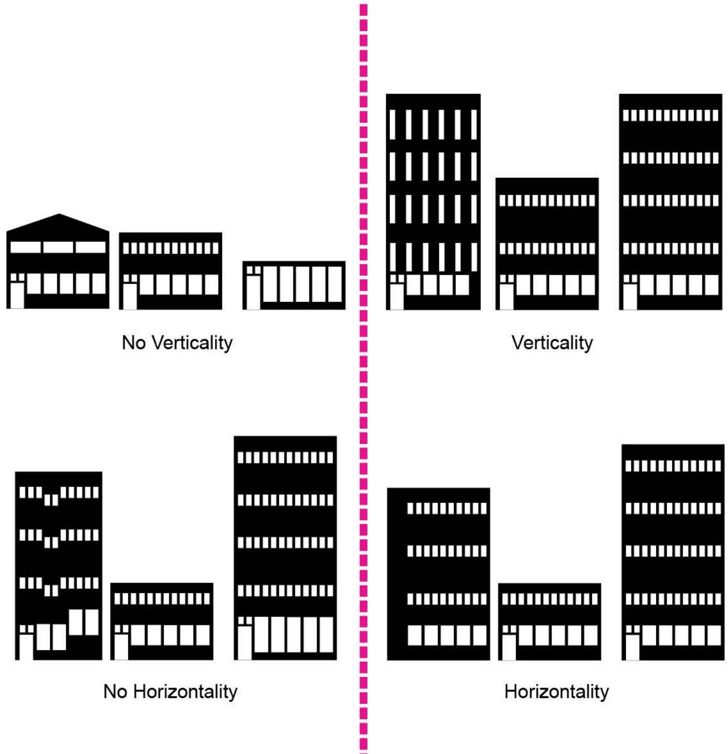


Figure 238 Vertical and Horizontality of Architectural Infill

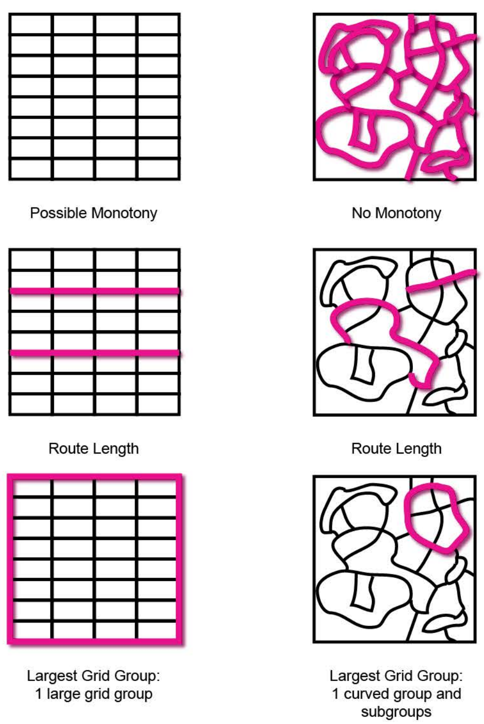


Figure 239 Monotony of Urban Form

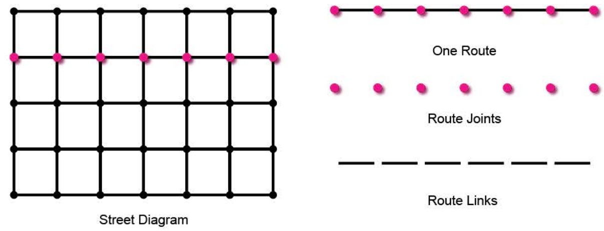


Figure 240 Route Analysis

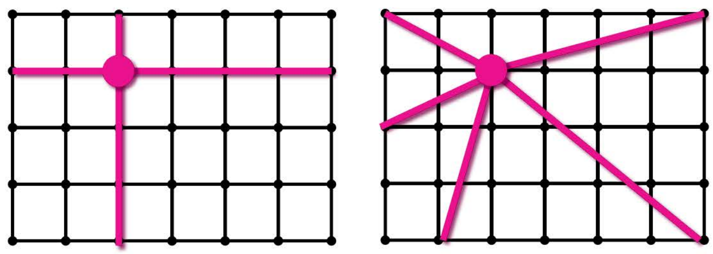


Figure 241 Nodes Among Intersections

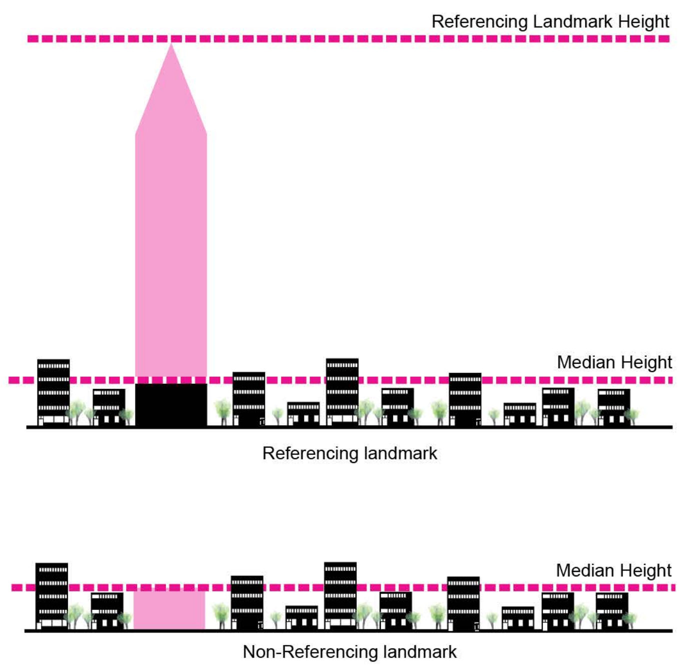
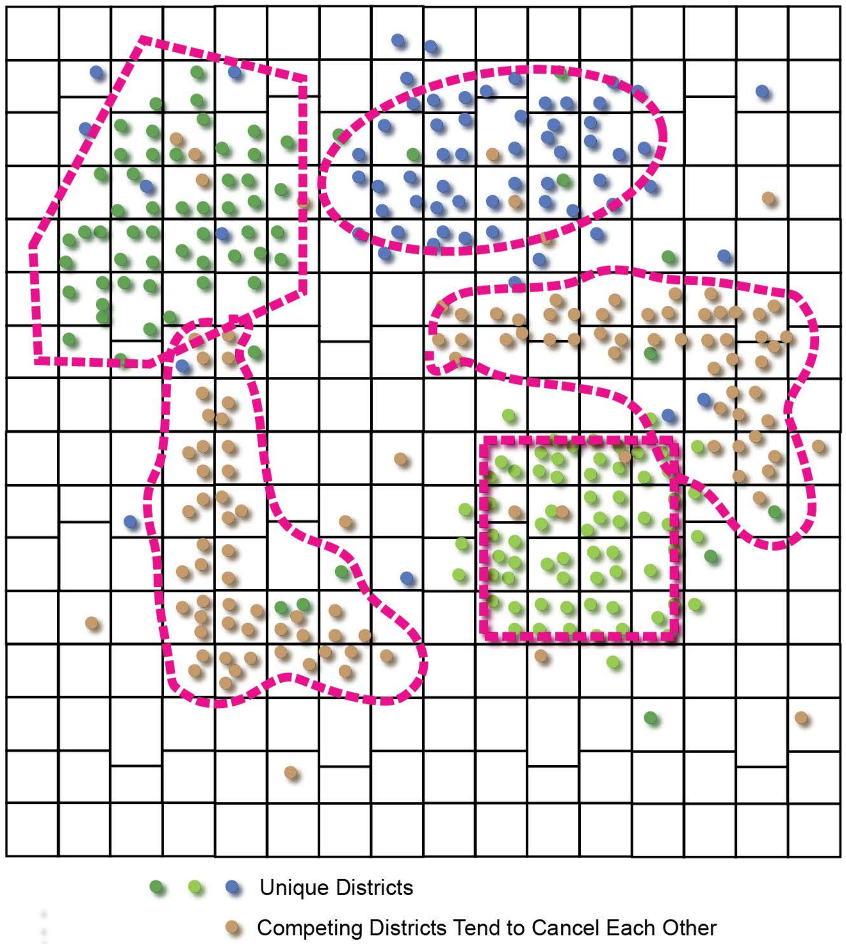


Figure 242 Landmarks



District Analysis is Based on the Line of Clumping or Density of Like or Similar Members. Where the members are 60-70% of total members, Districts Form.

Figure 243 District Analysis

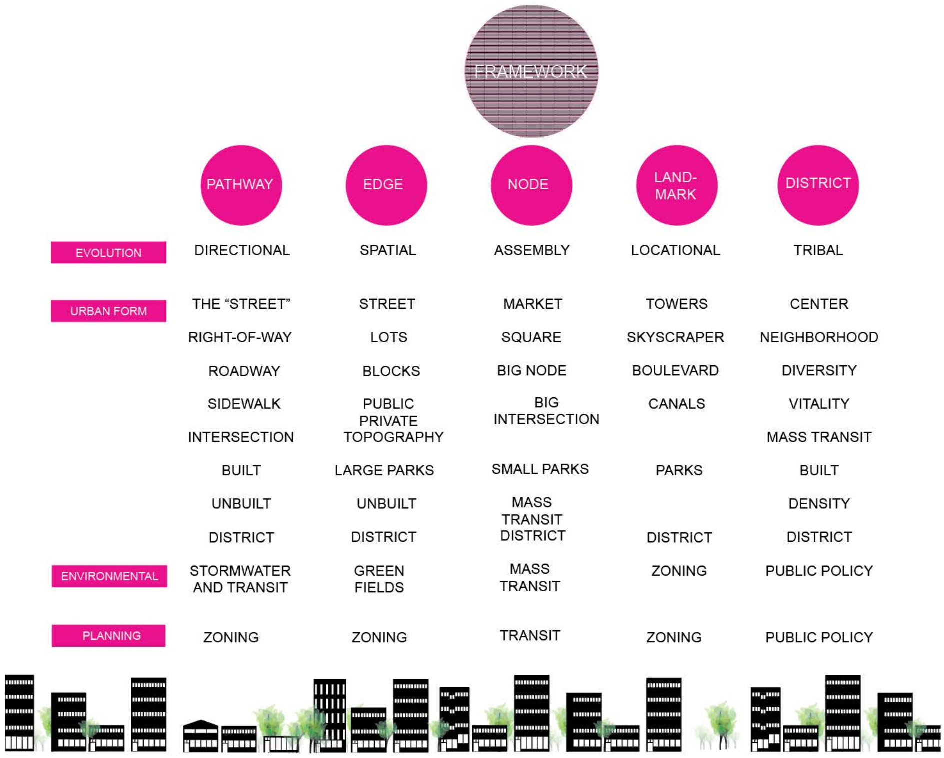


Figure 244 Framework and Urban Form

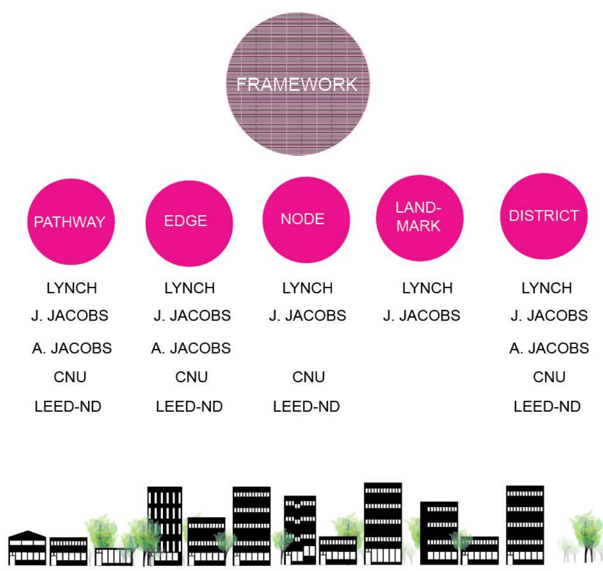


Figure 245 Framework and Theory

Figure 246 Original Site of Old Fourth Ward, Atlanta

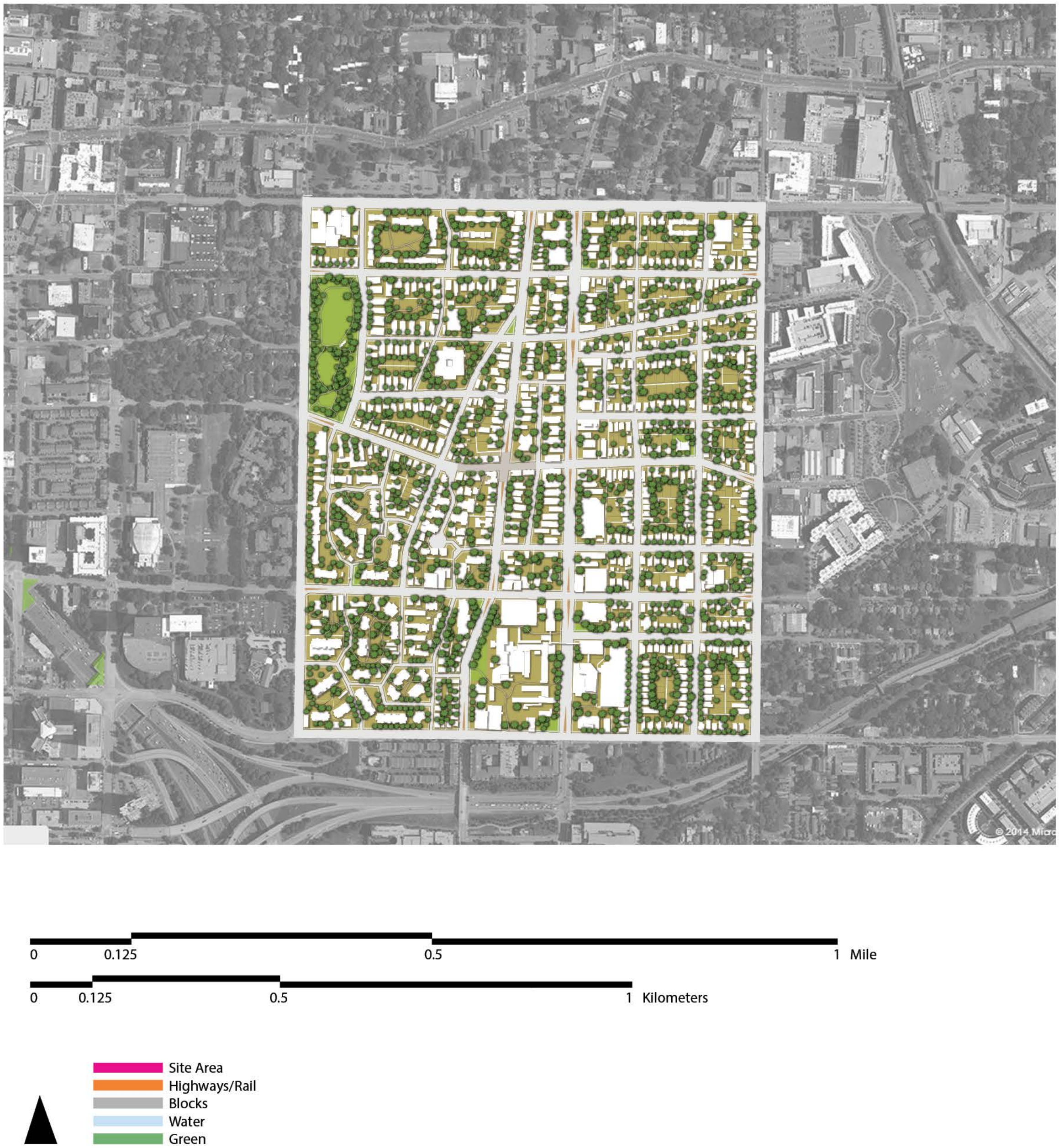


Figure 247 Revised Plan of Old Fourth Ward, Atlanta

Table 1 Data Set 1

	RESILIENCY MEAN	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	Urban Residential	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	SAN FRANCISCO	PORTLAND	NEW YORK	PARIS	AMSTERDAM	BARCELONA	ATLANTA
	This is the mean of Resiliency Between These Cities	Old Fourth Ward Current Conditions	Difference Between Old Fourth Ward and Resiliency Mean	Did the Old Fourth Ward Satisfy the Low or High Standard Deviation	Changed Figures to Old Fourth Ward Numbers	Revised Numbers, Old Fourth Ward	New Comparison With Median	Castro District	University Park	West Village	Republique - Bastille, 11 er. Arrondissement, Nation - Bercy 12 er. Arrondissement	Niew Pijp (Oud Zuid) [Discrepancies in Amsterdam data, fixed with approximations]	L'Antiga Esquerra de, La Nova Esquerra de, and Dereta de l'Eixample	Old Fourth Ward
	MEAN	ATLANTA	ATLANTA	ATLANTA	ATLANTA, GEORGIA	ATLANTA	ATLANTA	SAN FRANCISCO	PORTLAND	NEW YORK	PARIS	AMSTERDAM	BARCELONA	ATLANTA
URBAN FORM ANALYSIS								SF Block 8	PD Block 1	Block 1	Block 1	Block 1	Block 1	Block 1
GENERAL DEMOGRAPHIC:														
Demo: Population Density Per Square Mile	49,074.78	8,170.70	40,904.08	No	0.00	8,170.70	0.17	0.45	0.12	1.89	1.04	0.62	1.87	0.17
Demo: Density of Site Per Acre, Population	76.68	12.77	63.91	No	0.00	12.77	0.17	0.45	0.12	1.89	1.04	0.62	1.87	0.17
Demo: Population in Site Area	17,135.46	2,600.75	14,534.71	No	0.00	2,600.75	0.15	0.48	0.12	1.99	1.11	0.49	1.81	0.15
Demo: Creative Class Present, Yes = 1, No = 0	1.00	1.00	0.00	Yes	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Demo: Caucasians in Site Area, Population	10,227.23	919.24	9,308.00	Yes	0.00	919.24	0.09	0.67	0.17	2.16	0.00	0.00	0.00	0.09
Demo: Minorities in Site Area, Population	4,557.91	1,681.52	2,876.40	Yes	0.00	1,681.52	0.37	0.28	0.09	2.63	0.00	0.00	0.00	0.37
Demo: Hispanic Origin in Site Area, Population	2,208.39	97.27	2,111.13	Yes	0.00	97.27	0.04	0.31	0.07	2.62	0.00	0.00	0.00	0.04
Demo: Caucasian Percentage of Population [100% = 1.0]	0.77	0.35	0.41	No	0.00	0.35	0.46	1.10	1.05	0.85	0.00	0.00	0.00	0.46
Demo: Black Percentage of Population [100% = 1.00]	0.04	0.55	-0.51	No	0.00	0.55	14.05	0.35	0.71	1.94	0.00	0.00	0.00	14.05
Demo: Native American Percentage of Population [100% = 1]	0.01	0.03	-0.02	No	0.00	0.03	4.69	0.73	1.93	0.34	0.00	0.00	0.00	4.69
Demo: Asian Percentage of Population [100% = 1.0]	0.10	0.11	-0.01	Yes	0.00	0.11	1.11	0.83	0.54	1.63	0.00	0.00	0.00	1.11
Demo: Hispanic Percentage of Population [100% = 1.0]	0.11	0.04	0.07	No	0.00	0.04	0.34	0.76	0.71	1.54	0.00	0.00	0.00	0.34
Demo: Owner Occupied Units as Percentage of Population [100% = 1.0]	0.42	0.27	0.15	Yes	0.00	0.27	0.65	1.17	1.48	0.34	0.00	0.00	0.00	0.65
Demo: Rental Occupied Units as Percentage of Population [100% = 1.0]	0.58	0.73	-0.15	Yes	0.00	0.73	1.25	0.88	0.65	1.47	0.00	0.00	0.00	1.25
Demo: Use Car/Truck/Vehicle as Main Transportation as Percentage of Population [100% = 1.0]	0.40	0.69	-0.29	No	0.00	0.69	1.74	1.13	1.41	0.45	0.00	0.00	0.00	1.74
Demo: Use Mass Transit as Main Transportation as a Percentage of Population [100% = 1.0]	0.33	0.10	0.23	Yes	0.00	0.10	0.30	0.97	0.19	1.84	0.00	0.00	0.00	0.30
Demo: Use Bicycle as Main Transportation as a Percentage of Population [100% = 1.0]	0.05	0.03	0.03	Yes	0.00	0.03	0.52	0.80	1.62	0.59	0.00	0.00	0.00	0.52
Demo: Use Walking as Main Transportation as Percentage of Population [100% = 1.0]	0.17	0.11	0.06	Yes	0.00	0.11	0.65	0.40	1.24	1.36	0.00	0.00	0.00	0.65
Demo: Bachelors Degree or More as a Percentage of Population [100% = 1.0]	0.59	0.49	0.10	Yes	0.00	0.49	0.82	1.27	0.71	1.02	0.00	0.00	0.00	0.82
Demo: Foreign Born as a Percentage of Population [100% = 1.0]	0.16	0.10	0.06	Yes	0.00	0.10	0.61	0.90	0.53	1.56	0.00	0.00	0.00	0.61
Demo: Income, More than $40,000, as a Percentage of Population [100% = 1.0]	0.67	0.45	0.22	No	0.00	0.45	0.67	1.19	0.89	0.92	0.00	0.00	0.00	0.67
EDGE CONDITIONS, GENERAL:														
Edges: Number of Impermeable or Semi-Permeable Edges of Site [Site Edges Blocked by Permeable Edge, or Major Roadway, Park, University]	3.50	5.00	-1.50	No	-1.00	4.00	1.14	0.86	0.86	0.86	1.71	0.86	0.86	1.43
Edges: Do Impermeable Edges Cross District or Cut in Half [Yes=1, No=0]	0.33	1.00	-0.67	No	0.00	1.00	3.00	0.00	0.00	0.00	3.00	3.00	0.00	3.00
Edges: Pathways Routes that Seam [Ratio: Total Number / Length of Total]	16.00	6.00	10.00	No	25.00	31.00	1.94	1.13	0.94	0.69	0.56	1.06	1.63	0.38
Edges: Pathways Routes that Divide [Ratio: Total Number / Length of Total]	1.67	4.00	-2.33	No	-2.00	2.00	1.20	0.60	0.60	0.60	3.00	0.60	0.60	2.40
Edges: Natural Edges [How Many Natural Edges][Amster, includes canals although manmade]	0.50	0.00	0.50	Yes	0.00	0.00	0.00	2.00	0.00	0.00	0.00	4.00	0.00	0.00
Edges: Man-Made Edges Ratio [Ratio: How many man-made edges / Total Length of Edges]	0.02	0.00	0.02	Yes	0.00	0.00	0.00	1.94	0.00	0.00	0.00	4.06	0.00	0.00
Edges: Manmade Over Natural Ratio [Ratio: Manmade Length / Natural Length of Edges]	0.98	1.00	-0.02	Yes	-1.00	0.00	0.00	0.98	1.02	1.02	1.02	0.93	1.02	1.02
Edges: Organic Grid Shapes	0.00	2.00	-2.00	No	11.00	13.00								
Edges: Orthogonal Grid Shapes	53.83	24.00	29.83	No	28.00	52.00	0.97	0.98	1.00	0.74	1.39	0.69	1.19	0.45
Edges: Organic/Gridline Shape Ratio	0.00	0.08	-0.08	No	0.17	0.25								
Edges: Organic Arterial Routes	0.17	2.00	-1.83	No	9.00	11.00	66.00	6.00	0.00	0.00	0.00	0.00	0.00	12.00
Edges: Gridline Arterial Routes	3.17	3.00	0.17	Yes	15.00	18.00	5.68	0.95	0.32	0.95	1.89	0.95	0.95	0.95
Edges: Organic/Gridline Arterial Routes	0.06	0.67	-0.61	No	-0.06	0.61	11.00	6.00	0.00	0.00	0.00	0.00	0.00	12.00
Edges: Encircling Grids [Encircling City, Multi-Lane] Rings	0.00	0.00	0.00	Yes	0.00	0.00								
Edges: Radiometric/Diagonal Routes	1.50	1.00	0.50	Yes	1.00	2.00	1.33	0.00	0.00	0.00	4.00	0.00	2.00	0.67
Edges: Main Form of Area [Radiometric, Orthogonal, Ring, Linear, Branching, Dendritic, Sheet, Planed, Constellation, Node, Satellite, Accreted]														
Edges: General Degree Angle of Total Site [0/360 True north, 90 East, 180 South, 270 West]	143.73	0.64	143.09	No	-1.28	-0.64	0.00	1.22	0.19	0.20	1.12	1.09	2.18	0.00
Edges: Number of Grid Shifts [Blocks of Grids]	1.67	9.00	-7.33	No	-7.00	2.00	1.20	1.20	3.00	0.00	1.20	0.60	0.00	5.40
Edges: Total Site Boundary, Square Feet	15,498,429.62	15,768,998.78	-270,569.16	Yes	0.00	15,768,998.78	1.02	1.11	0.90	0.94	0.91	0.73	1.41	1.02
Edges: Total Site Boundary Area, Acres	355.79	362.01	-6.21	Yes	0.00	362.01	1.02	1.11	0.90	0.94	0.91	0.73	1.41	1.02
Edges: Total Site Boundary Area, Square Miles	0.56	0.57	-0.01	Yes	0.00	0.57	1.02	1.11	0.90	0.94	0.91	0.73	1.41	1.02
LOT (EDGE) CONDITIONS:														
Lots: Number of Lots [Barca: approximated by roof changes][Amster: approximated because of complex connections between lot connections intra-block]]	2,936.33	644.00	2,292.33	Yes	202.00	846.00	0.29	0.72	0.33	0.45	2.54	1.46	0.50	0.22
Lots, Total Area, Square Feet	9,640,364.46	9,083,313.57	557,050.89	Yes	-674,108.80	8,409,204.77	0.87	1.06	1.03	1.06	1.07	0.80	0.98	0.94
Lots: Total Lot Area, Acres	221.31	203.71	17.60	Yes	-8.10	195.61	0.88	1.06	1.03	1.06	1.07	0.80	0.98	0.92
Lots: Total Lot Area, Square Miles	0.35	0.32	0.03	Yes	-0.01	0.31	0.88	1.06	1.03	1.06	1.07	0.80	0.98	0.92
Lots: Total Perimeter of Lot, Linear Feet	653,799.81	297,771.64	356,028.17	No	45,372.76	343,144.40	0.52	1.09	0.60	0.74	1.86	0.98	0.73	0.46
Lots: Total Lot Area as a Percentage of Site [100% = 1.0]	0.64	0.56	0.08	Yes	-0.02	0.54	0.84	0.92	1.10	1.10	1.14	1.07	0.67	0.88
Lots: Average Area of Lot, Square Feet	5,395.43	14,104.52	-8,709.10	No	-4,164.57	9,939.96	1.84	0.90	1.89	1.42	0.26	0.33	1.20	2.61
Lots: Average Perimeter of Lot, Linear Feet	290.64	462.38	-171.74	No	-56.98	405.40	1.39	1.17	1.39	1.24	0.56	0.51	1.12	1.59
Lots: Compactness of Lot, Area/Perimeter Ratio	16.86	30.50	-13.65	No	-5.99	24.52	1.45	0.85	1.50	1.26	0.50	0.71	1.18	1.81
Lots: Lots on Block Average	42.97	19.52	23.46	Yes	-6.70	12.82	0.30	0.91	0.42	0.77	2.28	1.09	0.53	0.45
Lots: Average Length of Non-Public Lot Side [Amstel/NYC/Barca: private for both non-public and private length of lots][Paris: from ratio of 31 block data, internal lots very small]	70.35	105.75	-35.41	No	-31.49	74.26	1.06	0.95	1.51	1.19	0.28	1.01	1.06	1.50
Lots: Average Width of Public Lot Side [Paris; from survey of 31 block data]	56.94	105.93	-48.98	No	-57.09	48.84	0.86	0.66	1.69	1.22	0.70	0.44	1.29	1.86
Lot: Compactness of Lot, Average Lot Width/Average Lot Length Ratio	0.94	1.00	-0.06	Yes	-0.34	0.66	0.70	0.60	0.96	0.88	2.13	0.38	1.05	1.06
Lots: Number of Larger Lots in Site Area, over 10,000 Sq. Ft. [Amster: due to limited data, these are just "larger" block approximations rather than actual measurements]	68.50	507.00	-438.50	No	-356.00	151.00	2.20	0.63	0.57	1.87	0.50	1.45	0.99	7.40
Lots: Average of Lot Sides [Lengths and Widths]	77.05	105.67	-28.62	Yes	-18.69	86.98	1.13	1.06	1.44	1.17	0.13	1.22	0.97	1.37
Lots: Number of Flag Lots [Paris: the complex nature of the internal lots results in no accurate data or approximations]	4.80	13.00	-8.20	No	4.00	17.00	3.54	1.04	0.00	0.00	0.00	2.50	1.46	2.71
Lots: Lots with No-Public Side [Internal Lots]	761.83	4.00	757.83	Yes	-4.00	0.00	0.00	0.00	0.00	0.00	5.95	0.00	0.04	0.01
Lots: Flag/Total Lot Ratio	0.00	0.02	-0.02	No	0.00	0.02	12.09	1.43	0.00	0.00	0.00	1.68	2.89	12.15
Lots: Internal Lot/Total Lot Ratio	0.11	0.01	0.10	Yes	-0.01	0.00	0.00	0.00	0.00	0.01	5.77	0.00	0.22	0.06
Lots: Persons Per Lot Ratio	9.58	4.04	5.54	Yes	-0.96	3.07	0.32	0.40	0.23	2.67	0.27	0.20	2.23	0.42
Lots: Minorities Per Lot Ratio	3.34	2.61	0.73	Yes	-0.62	1.99	0.59	0.18	0.13	2.70	0.00	0.00	0.00	0.78
Lots: Longest Parcel Length [Not Including Public Park Lots]	566.25	1,952.00	-1,385.75	No	-1,034.29	917.71	1.62	0.19	0.60	1.45	1.74	0.56	1.46	3.45
BLOCKS (EDGES):														
Blocks: How Many Broader Patterns	2.33	1.00	1.33	Yes	1.00	2.00	0.86	0.86	2.14	0.43	0.86	1.29	0.43	0.43
Blocks: How Many Grid patterns as "Block Groups"	2.50	10.00	-7.50	No	-8.00	2.00	0.80	0.80	2.00	0.40	0.80	1.20	0.80	4.00
Blocks: Broad Patterns Caused by Topography/Natural Edge? Yes =1, No = 0	0.17	0.00	0.17	Yes	0.00	0.00	0.00	6.00	0.00	0.00	0.00	0.00	0.00	0.00
Blocks: Total Blocks in Site	63.33	33.00	30.33	No	33.00	66.00	1.04	0.85	0.85	0.63	1.20	1.45	1.01	0.52
Blocks: Total Block Square Feet	9,640,364.46	8,873,750.77	766,613.69	Yes	-352,824.00	8,520,926.76	0.88	1.06	1.03	1.06	1.07	0.80	0.98	0.92
Blocks: Total Block Area, Acres	221.31	203.71	17.60	Yes	-8.10	195.61	0.88	1.06	1.03	1.06	1.07	0.80	0.98	0.92
Blocks: Total Block Area, Square Miles	0.35	0.32	0.03	Yes	-0.01	0.31	0.88	1.06	1.03	1.06	1.07	0.80	0.98	0.92
Blocks: Total Block Buildable Square Feet	9,640,364.46	8,873,750.77	766,613.69	Yes	-352,824.00	8,520,926.76	0.88	1.06	1.03	1.06	1.07	0.80	0.98	0.92
Blocks: Total Block Area, Acres	221.31	203.71	17.60	Yes	-8.10	195.61	0.88	1.06	1.03	1.06	1.07	0.80	0.98	0.92
Blocks: Total Block Area, Square Miles	0.35	0.32	0.03	Yes	-0.01	0.31	0.88	1.06	1.03	1.06	1.07	0.80	0.98	0.92
Blocks: Number of Orthogonal/Polygon Block Shapes [Arguably Orthogonal even with small cures] [When Zero, Use of 0.1]	59.50	25.00	34.50	No	18.00	43.00	0.72	0.91	0.91	0.67	0.89	1.55	1.08	0.42
Blocks: Number of Organic or Non-Orthogonal Block Shapes [When Zero, Use of 0.1]	3.83	2.00	1.83	Yes	21.00	23.00	6.00	0.00	0.00	0.00	6.00	0.00	0.00	0.52
Blocks: Organic to Orthogonal Shape Ratio [1.0 = 100%]	0.07	0.08	-0.01	Yes	0.45	0.53	7.40	0.00	0.00	0.00	6.00	0.00	0.00	1.11
Blocks: Average Block Square Area, Square Feet	165,945.03	268,901.54	-102,956.51	No	-139,796.59	129,104.95	0.78	1.14	1.11	1.54	0.82	0.51	0.89	1.62
Blocks: Average Block Perimeter, Linear Feet	1,655.43	2,228.91	-573.48	No	-748.07	1,480.84	0.89	1.12	0.79	1.43	1.03	0.80	0.83	1.35
Blocks: Walkability Ratio [Perimeter Average/1,500 feet, where >1.00 is not walkable]	1.10	1.49	-0.38	No	-0.50	0.99	0.89	1.12	0.79	1.43	1.03	0.80	0.83	1.35
Blocks: Total Perimeter Linear Feet of Site	96,908.13	73,554.05	23,354.07	Yes	24,181.59	97,735.65	1.01	1.03	0.72	0.98	1.32	1.25	0.70	0.76
Blocks: Compactness of Blocks, Average Area/Average Perimeter Ratio	100.02	120.64	-20.62	Yes	-33.46	87.18	0.87	1.02	1.39	1.08	0.80	0.64	1.07	1.21
Blocks: Average Length of Block, Linear Feet	552.12	715.80	-163.69	Yes	-258.88	456.93	0.83	1.16	0.74	1.56	1.04	0.79	0.71	1.30
Blocks: Average Width of Block, Linear Feet	250.19	377.31	-127.13	No	-93.82	283.50	1.13	1.18	1.00	1.28	0.44	0.59	1.51	1.51
Blocks: Compactness of Lengths, Block Width/Block Length Ratio	0.49	0.53	-0.04	Yes	0.09	0.62	1.26	0.94	1.24	0.76	0.39	0.69	1.98	1.07
Blocks: Number of Block Types/Typologies/Grid Shifts	1.67	7.00	-5.33	No	-5.00	2.00	1.20	1.20	0.60	0.60	1.20	1.20	1.20	4.20
Blocks: Diversity of Block Type Per Square Mile	0.94	3.96	-3.02	No	-2.83	1.13	1.20	1.31	0.53	0.55	1.07	0.86	1.66	4.21
Blocks: Number of Blocks with 3 Sides/Lengths	3.17	1.00	2.17	Yes	0.00	1.00	0.32	0.00	0.00	0.00	4.42	0.63	0.95	0.32
Blocks: 3 Side Blocks / Total Block Ratio [1.0 = 100%]	0.04	0.03	0.01	Yes	-0.02	0.02	0.36	0.00	0.00	0.00	4.37	0.52	1.11	0.72

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Table 1 (continued)

	RESILIENCY MEAN	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	Urban Residential	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	SAN FRANCISCO	PORTLAND	NEW YORK	PARIS	AMSTERDAM	BARCELONA	ATLANTA
	This is the mean of Resiliency Between These Cities	Old Fourth Ward Current Conditions	Difference Between Old Fourth Ward and Resiliency Mean	Did the Old Fourth Ward Satisfy the Low or High Standard Deviation	Changed Figures to Old Fourth Ward Numbers	Revised Numbers, Old Fourth Ward	New Comparison With Median	Castro District	University Park	West Village	Republique - Bastille, 11 er. Arrondissement, Nation - Bercy 12 er. Arrondissement	Niew Pijp (Oud Zuid) [Discrepancies in Amsterdam data, fixed with approximations)	L'Antiga Esquerra de, La Nova Esquerra de, and Dereta de l'Eixample	Old Fourth Ward
	MEAN	ATLANTA	ATLANTA	ATLANTA	ATLANTA, GEORGIA	ATLANTA	ATLANTA	SAN FRANCISCO	PORTLAND	NEW YORK	PARIS	AMSTERDAM	BARCELONA	ATLANTA
Blocks: 4 Side Blocks	54.17	24.00	30.17	No	30.00	54.00	1.00	1.00	1.00	0.74	0.72	1.42	1.13	0.44
Blocks: 3 Side Blocks / Total Block Ratio [1.0 = 100%]	0.88	0.73	0.16	Yes	0.09	0.82	0.93	1.13	1.13	1.13	0.58	0.95	1.08	0.82
Blocks: Number of Organic Blocks	7.00	2.00	5.00	Yes	9.00	11.00	1.57	0.00	0.00	0.00	6.00	0.00	0.00	0.29
Blocks: Organic Block / Total Block Ratio [1.0 = 100%]	0.09	0.06	0.03	Yes	0.11	0.17	1.81	0.00	0.00	0.00	6.00	0.00	0.00	0.66
Blocks: Number of Dendritic Blocks	2.17	2.00	0.17	Yes	-2.00	0.00	0.00	0.00	0.00	0.92	4.62	0.46	0.00	0.92
Blocks: Dendritic Block / Total Block Ratio [1.0 = 100%]	0.03	0.06	-0.03	Yes	-0.06	0.00	0.00	0.00	0.00	1.56	4.10	0.34	0.00	1.89
Blocks: Number of Perimeter Blocks	41.00	0.00	41.00	No	0.00	0.00	0.00	1.05	0.00	0.71	0.59	2.17	1.49	0.00
Blocks: Perimeter Block / Total Block Ratio [1.0 = 100%][Generally, with 60% or more development on perimeter]	0.63	0.00	0.63	No	0.00	0.00	0.00	1.27	0.00	1.16	0.50	1.54	1.52	0.00
Blocks: Average Openings of Perimeter Blocks	1.46	0.00	1.46	No	0.00	0.00	0.00	1.38	0.00	1.80	2.25	0.38	0.19	0.00
Blocks: Number of Non-Perimeter Blocks	22.33	33.00	-10.67	Yes	33.00	66.00	2.96	0.49	2.42	0.49	2.33	0.13	0.13	1.48
Blocks: Non-Perimeter Blocks / Perimeter Blocks Ratio [1.0 = 100%]	0.58		0.58	Yes	0.00	[redacted]	0.00	0.44	0.00	0.66	3.76	0.06	0.09	0.00
Blocks: Block Density Ratio, Blocks Per Square Mile	34.53	18.67	15.86	No	18.67	37.33	1.08	0.97	0.79	0.60	1.11	1.08	1.45	0.54
Blocks: Block Angle to True North [0/360 True North, 90 East, 180 South, 270 West]	143.73	0.64	143.09	No	-1.28	-0.64	0.00	1.22	0.19	0.20	1.12	1.09	2.18	0.00
Blocks: Number of Alleys on Block [From Side-to-Side, Not Just an Entrance]	12.50	34.00	-21.50	No	33.00	67.00	5.36	0.08	4.08	0.00	0.88	0.56	0.40	2.72
Blocks: Alley Blocks / Total Block Ratio [100% = 1.0]	0.21	1.03	-0.82	No	-0.02	1.02	4.83	0.09	4.49	0.00	0.69	0.36	0.37	4.90
Blocks: Number of Blocks With Driveways [or Large Parking Lot]	12.00	32.00	-20.00	Yes	0.00	32.00	2.67	0.33	4.50	0.92	0.17	0.08	0.00	2.67
Blocks: Average Driveway Length into the Block [or Width of Parking Lot Perpendicular to Street]	79.76	137.41	-57.65	Yes	0.00	137.41	1.72	0.00	0.55	1.37	2.76	1.31	0.00	1.72
Blocks: Blocks with Driveways / Total Block Ratio [100% = 1.0]	0.23	0.97	-0.74	No	-0.48	0.48	2.10	0.32	4.33	1.19	0.11	0.05	0.00	4.20
Blocks: Block Total Buildable Area, Square Feet	9,565,991.80	8,873,750.77	692,241.03	Yes	-352,824.00	8,520,926.76	0.89	1.07	1.04	1.07	1.08	0.76	0.98	0.93
Blocks: Block Total Buildable Area, Acres	90.54		90.54	No	195.61	195.61	2.16	0.73	1.62	0.65	0.00	0.00	0.00	2.25
Blocks: Built Area, Square Feet	5,580,185.10	2,448,801.11	3,131,383.99	No	452,625.97	2,901,427.08	0.52	1.00	0.46	1.03	1.25	0.87	1.40	0.44
Blocks: Block Unbuilt Area, Square Feet	3,985,806.69	6,424,949.65	-2,439,142.96	No	-805,449.97	5,619,499.68	1.41	1.16	1.85	1.13	0.85	0.60	0.41	1.61
Blocks: Open Space Ratio, Built Block Area / Total Block Area	0.59	0.28	0.31	No	0.06	0.34	0.58	0.93	0.44	0.95	1.14	1.14	1.40	0.47
Blocks: Short Blocks, Total Blocks With 400 Foot or less lengths	42.00	7.00	35.00	No	38.00	45.00	1.07	1.29	0.86	0.95	0.43	1.00	1.48	0.17
Blocks: Average Vertical Height of Blocks [Architecture Infill] in Stories. [Barca: numbers approximated by intersection heights]	48.66	21.18	27.48	No	10.71	31.89	0.66	1.01	0.31	1.13	0.97	0.95	1.63	0.44
Blocks: Total Average Stories [Architectural Infill] of Blocks	4.06	1.77	2.29	No	0.89	2.66	0.66	1.01	0.31	1.13	0.97	0.95	1.63	0.44
Blocks: Average Height of Commercial Buildings [Barca, Amstel, Paris: Commercial mainly on first floor of total buildable lots]	23.63	22.58	1.04	Yes	-22.58	[redacted]	0.00	1.67	0.68	2.12	0.51	0.51	0.51	0.96
Blocks: Average Stories of Blocks in Commercial Areas [Barca, Amstel, Paris: Commercial mainly on first floor of total buildable lots]	1.97	1.88	0.09	Yes	-1.88	[redacted]	0.00	1.67	0.68	2.12	0.51	0.51	0.51	0.96
Blocks: Average Height of Residential Buildings [Amstel, Paris, Barce: Residential apartments are on floors 2+]	42.77	19.09	23.68	No	-19.09	[redacted]	0.00	1.16	0.35	1.29	0.83	0.80	1.57	0.45
Blocks: Average Stories of Residential Area	3.56	1.59	1.97	No	-1.59	0.00	0.00	1.16	0.35	1.29	0.83	0.80	1.57	0.45
Blocks, Volume, Building Footprint Ratio [Number: Area]	0.59	0.28	0.31	No	0.06	0.34	0.58	0.93	0.44	0.95	1.14	1.14	1.40	0.47
Blocks, Volume, Built Mass on Block, Cubic Feet	299,980,190.99	51,867,168.82	248,113,022.17	No	40,649,867.34	92,517,036.16	0.31	0.91	0.13	1.05	1.10	0.75	2.06	0.17
Blocks, Volume, Unbuilt Mass on Block, Cubic Feet	164,382,562.86	136,084,529.84	28,298,033.02	Yes	43,102,966.67	179,187,496.51	1.09	1.39	0.67	1.50	0.98	0.68	0.79	0.83
Blocks: Volume, Unbuilt Over Built Mass Ratio, Volume in Cubic Feet	0.95	2.62	-1.68	No	-0.69	1.94	2.04	0.88	3.04	0.83	0.51	0.52	0.22	2.77
Blocks: Total Number of Blocks with Non-Public Facing Lots][Paris: While lot data is available, the complexity of the Parisian arrangement is too leads to inaccessibility on this category]	4.40	5.00	-0.60	Yes	-5.00	0.00	0.00	0.68	0.23	0.00	0.00	0.23	3.86	1.14
Blocks: Total Blocks With Non-Public Facing Lots / Total Blocks Ratio	0.06	0.15	-0.09	Yes	-0.15	0.00	0.00	0.95	0.32	0.00	0.00	0.19	4.55	2.59
Blocks: Average Lots on Total Blocks, Total Lots / Total Blocks	42.97	19.52	23.46	Yes	-19.52	0.00	0.00	0.91	0.42	0.77	2.28	1.09	0.53	0.45
Block: Population Density Per Lot	311.50	78.81	232.69	Yes	-39.41	39.41	0.13	0.48	0.13	2.74	0.80	0.29	1.56	0.25
Block: Minority Population Density Per Lot	110.35	50.96	59.40	Yes	-25.48	25.48	0.23	0.21	0.07	2.72	0.00	0.00	0.00	0.46
Block: Built Area Square Feet Per Person	542.91	941.57	-398.66	No	174.04	1,115.61	2.05	1.26	2.23	0.31	0.68	1.07	0.46	1.73
"THE STREET" (PATHWAYS):														
Streets: Number of Street Lengths (Sections Between Intersections)	195.67	138.00	57.67	Yes	33.00	171.00	0.87	0.70	1.07	0.71	1.57	1.18	0.78	0.71
Streets: Average Street Length, Linear Feet	343.14	369.22	-26.08	Yes	-6.65	362.57	1.06	1.13	0.62	1.17	0.85	1.00	1.23	1.08
Streets: Longest Street Length, Linear Feet	879.03	1,276.35	-397.32	No	-317.77	958.58	1.09	0.79	0.75	0.91	1.59	1.41	0.54	1.45
Streets: Walkability Ratio of Average Street, Street Length / 400 Feet [100% = 1.0]	0.86	0.92	-0.07	Yes	-0.02	0.91	1.06	1.13	0.62	1.17	0.85	1.00	1.23	1.08
Streets: Walkability Ratio of Longest Street, Street Length / 400 Feet [100% = 1.0]	2.20	3.19	-0.99	No	-0.79	2.40	1.09	0.79	0.75	0.91	1.59	1.41	0.54	1.45
Streets: Number of Street 400 Feet or Under in Length, Linear Feet	128.17	86.00	42.17	Yes	9.00	95.00	0.74	0.71	1.51	0.73	1.76	1.16	0.13	0.67
Streets: Number of Streets Between 401-500 Linear Feet	36.17	24.00	12.17	Yes	25.00	49.00	1.35	0.14	0.14	0.08	0.77	1.13	3.73	0.66
Streets: Number of Streets Between 501-600 Linear Feet	12.83	14.00	-1.17	Yes	4.00	18.00	1.40	1.32	0.39	0.23	2.34	1.71	0.00	1.09
Streets: Number of Streets Above 601 Linear Feet	18.50	14.00	4.50	Yes	-5.00	9.00	0.49	1.24	0.27	2.16	1.30	1.03	0.00	0.76
Streets: Percentage of Streets Over or at 400 Feet [100% = 1.0]	0.37	0.38	0.00	Yes	0.07	0.44	1.19	0.88	0.19	0.88	0.71	0.95	2.37	1.01
Streets: Percentage of Streets Over 600 Linear Feet [100% = 1.0]	0.11	0.10	0.01	Yes	-0.05	0.05	0.49	1.58	0.22	2.69	0.73	0.77	0.00	0.95
Streets: Average Street Length at or Above 400 Linear Feet	600.13	580.83	19.30	Yes	-81.99	498.83	0.83	1.00	0.91	1.44	0.97	0.93	0.74	0.97
Streets: Walkability Ratio of Long Lengths: Street Lengths Over 400 Feet / 400 Feet [100% = 1.0]	1.50	1.45	0.05	Yes	-0.20	1.25	0.83	1.00	0.91	1.44	0.97	0.93	0.74	0.97
Streets: Number of Street Lengths Over 800 Linear Feet	9.50	7.00	2.50	Yes	-6.00	1.00	0.11	0.00	0.00	4.42	0.95	0.63	0.00	0.74
Streets: Number of Street Lengths Between 600 and 800 Linear Feet	9.33	7.00	2.33	Yes	1.00	8.00	0.86	2.46	0.54	0.00	1.61	1.39	0.00	0.75
Streets: Average Right-of-Way [lot-to-lot], Linear Feet	63.52	59.63	3.89	Yes	0.00	59.63	0.94	1.34	0.96	1.27	0.60	0.73	1.10	0.94
Streets: Average Roadway Width [curb-to-curb], Linear Feet	33.39	40.64	-7.25	No	0.00	40.64	1.22	1.11	0.96	1.02	0.99	0.87	1.06	1.22
Streets: Volume of the Public Street [Sans Trees], Cubic Feet	544,706.19	174,290.81	370,415.38	No	150,843.30	325,134.11	0.60	1.05	0.35	1.13	1.02	0.91	1.54	0.32
Streets, Mass Within Lanes Enclosed (Without Trees), Cubic Feet	303,989.96	118,782.64	185,207.32	No	102,802.69	221,585.33	0.73	0.82	0.33	0.85	1.59	1.02	1.40	0.39
STREETS BROAD SCOPE														
Streets: Large Serpentine or Curved Routes for 2 or more Street Lengths, number of street lengths [Amster: radial from center core, curved but mainly gridline]	3.83	8.00	-4.17	Yes	1.00	9.00	2.35	0.26	0.00	0.00	2.61	3.13	0.00	2.09
Streets: Large Radial or Diagonal Routes	0.83	4.00	-3.17	No	0.00	4.00	4.80	0.00	0.00	0.00	4.80	0.00	1.20	4.80
Streets, Dendritic Street Lengths	4.00	24.00	-20.00	No	-24.00	0.00	0.00	0.00	0.00	0.50	5.25	0.25	0.00	6.00
Streets, Dendritic Lengths to Total Street Lengths Ratio [100% = 1.0]	0.01	0.17	-0.16	No	-0.17	0.00	0.00	0.00	0.00	0.99	4.71	0.30	0.00	11.98
Streets: Accreted Street Lengths	32.17	0.00	32.17	Yes	0.00	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00
Streets: Hierarchical Grid pattern Street Lengths	158.67	110.00	48.67	Yes	3.00	113.00	0.71	0.86	1.32	0.86	0.56	1.45	0.95	0.69
STREETS AND BLOCKS [PATHWAYS AND EDGES]:														
Streets and Blocks: Number of T-Cell Blocks [Blocks With a T-Cell Intersection]	27.83	29.00	-1.17	Yes	18.00	47.00	1.69	0.50	0.65	0.47	1.76	2.37	0.25	1.04
Streets and Blocks: T-Cell Block to Total Block Ratio	0.40	0.88	-0.48	No	-0.17	0.71	1.79	0.65	0.84	0.82	1.62	1.80	0.27	2.21
Streets and Blocks: Number of X-Cell Blocks (Blocks With a X-Cell Intersection)	60.17	33.00	27.17	No	27.00	60.00	1.00	0.85	0.88	0.66	1.05	1.53	1.03	0.55
Streets and Blocks: X-Cell Block to Total Block Ratio	0.95	1.00	-0.05	Yes	-0.09	0.91	0.95	0.99	1.03	1.05	0.87	1.05	1.02	1.05
Streets and Blocks: X-Cells ACTUALLY Rectangular or Square [Mild Slanting Allowed but no Rhombus/Trapezoid cells]	32.33	11.00	21.33	No	15.00	26.00	0.80	1.30	1.64	1.18	0.68	1.21	0.00	0.34
Streets and Blocks: X-Cells NOT Rectangular or Square	27.83	22.00	5.83	Yes	12.00	34.00	1.22	0.32	0.00	0.07	1.47	1.90	2.23	0.79
Streets and Blocks: X-Cell Rectangularity Ratio	0.41	0.67	-0.26	Yes	-0.10	0.57	1.39	0.43	0.00	0.12	1.59	1.41	2.45	1.63
Streets and Blocks: Number of Y-Cell Blocks [Blocks With a Y-Cell Intersection]	3.00	3.00	0.00	Yes	13.00	16.00	5.33	0.33	0.00	0.00	4.33	0.33	1.00	1.00
Streets and Blocks: Y-Cells to Total Blocks Ratio	0.04	0.09	-0.05	Yes	0.15	0.24	5.88	0.45	0.00	0.00	4.15	0.26	1.14	2.21
Streets and Blocks: Brickwork Weave of T-Cells [Blocks Offset]	22.83	20.00	2.83	Yes	-5.00	15.00	0.66	0.79	0.79	0.00	3.33	1.09	0.00	0.88
Streets and Blocks Brickwork Ratio, T-Cell Blocks Offset to Total Blocks	0.32	0.61	-0.28	Yes	-0.38	0.23	0.70	1.03	1.03	0.00	3.10	0.84	0.00	1.88
Streets and Blocks: Average Number of Street Lengths per Block [Note, More Than One Block Uses 1 Street Length]	3.13	4.18	-1.05	No	-1.59	2.59	0.83	0.80	1.24	1.11	1.29	0.80	0.76	1.34
STREETS AND INTERSECTIONS ("SMALL NODE EFFECT"):														
Streets: Total Number of Intersections	104.83	73.00	31.83	Yes	24.00	97.00	0.93	0.72	0.73	0.57	1.81	1.33	0.83	0.70
Streets: Total Intersections Within Perimeter, Correcting For Overcount	66.33	48.00	18.33	Yes	27.00	75.00	1.13	0.56	0.66	0.45	2.10	1.39	0.84	0.72
Streets: Total Intersections at Perimeter of Site	38.50	25.00	13.50	No	-3.00	22.00	0.57	1.01	0.86	0.78	1.32	1.22	0.81	0.65
Streets: Total Intersections Per Square Mile	203.61	129.06	74.56	Yes	42.43	171.49	0.84	0.60	0.75	0.57	1.85	1.69	0.55	0.63
Streets: Total Intersections Per Square Mile to LEED Requirements of 90 Intersections Per Square Mile [100% = 1.0]	2.26	1.43	0.83	Yes	0.47	1.91	0.84	0.60	0.75	0.57	1.85	1.69	0.55	0.63
Streets: Connectivity, Total Intersections Compared to LEED 140 per square mile	1.45	0.92	0.53	Yes	0.30	1.22	0.84	0.60	0.75	0.57	1.85	1.69	0.55	0.63
Streets: Connectivity, Total Intersections Compared to 90 per square mile	2.26	1.43	0.83	Yes	0.47	1.91	0.84	0.60	0.75	0.57	1.85	1.69	0.55	0.63
Streets: Total X-Intersections of Street	60.17	39.00	21.17	No	9.00	48.00	0.80	0.81	1.05	0.88	0.61	1.33	1.31	0.65
Streets: Total T-Intersection of Streets [Amster: Includes T-Intersections that hit canal edge]	41.50	26.00	15.50	Yes	14.00	40.00	0.96	0.60	0.34	0.17	3.35	1.40	0.14	0.63
Streets: Total Y-Intersections	2.00	8.00	-6.00	No	1.00	9.00	4.50	0.50	0.00	0.00	5.00	0.50	0.00	4.00

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Table 1 (continued)

	RESILIENCY MEAN	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	Urban Residential	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	SAN FRANCISCO	PORTLAND	NEW YORK	PARIS	AMSTERDAM	BARCELONA	ATLANTA
	This is the mean of Resiliency Between These Cities	Old Fourth Ward Current Conditions	Difference Between Old Fourth Ward and Resiliency Mean	Did the Old Fourth Ward Satisfy the Low or High Standard Deviation	Changed Figures to Old Fourth Ward Numbers	Revised Numbers, Old Fourth Ward	New Comparison With Median	Castro District	University Park	West Village	Republique - Bastille, 11 er. Arrondissement, Nation - Bercy 12 er. Arrondissement	Niew Pijp (Oud Zuid) [Discrepancies in Amsterdam data, fixed with approximations]	L'Antiga Esquerra de, La Nova Esquerra de, and Dereta de l'Eixample	Old Fourth Ward
	MEAN	ATLANTA	ATLANTA	ATLANTA	ATLANTA, GEORGIA	ATLANTA	ATLANTA	SAN FRANCISCO	PORTLAND	NEW YORK	PARIS	AMSTERDAM	BARCELONA	ATLANTA
Streets: Total Multi-Intersections, Intersections with More than 4 Connecting Street Lengths	1.17	0.00	1.17	Yes	0.00	0.00	0.00	0.86	0.00	0.00	3.43	0.00	1.71	0.00
Streets: Intersections CHECK	0.00	0.00	0.00	Yes	0.00	0.00								
Streets: Rectilinear Ratio, Y-Intersections to X+T Intersections [0.0 = More Rectilinear, 1.0 = No Rectilinear]	0.01	0.12	-0.11	No	-0.02	0.10	7.91	1.05	0.00	0.00	4.39	0.56	0.00	9.52
Streets: Dendritic Street Ratio, Y-Intersections to Total Intersections [100 of Y-Intersections = 1.0]	0.01	0.11	-0.10	No	-0.02	0.09	7.63	1.08	0.00	0.00	4.33	0.59	0.00	9.01
Streets: Cul-de-sac/Dendritic Intersections With Street (T- or Y-Intersection)	4.67	13.00	-8.33	Yes	-13.00	0.00	0.00	0.00	0.00	0.43	4.71	0.21	0.64	2.79
Streets: Connectivity Street Length Ratio, Total Cul-de-sacs over Total Streets [100% = 1.0]	0.01	0.17	-0.16	No	-0.17	0.00	0.00	0.00	0.00	0.99	4.71	0.30	0.00	11.98
Streets: Cul-de-sac/Dendritic Intersections Within Perimeter Ratio (T- or Y-Intersection Pendulum Intersections Over Total Intersections)[Correction for Overcount]	0.95	0.73	0.22	No	0.27	1.00	1.05	1.05	1.05	0.98	0.88	1.04	0.99	0.77
Streets: Volume, Total Volume of Public Space at Intersection	6,534,146.24	2,037,990.32	4,496,155.92	No	2,485,091.38	4,523,081.70	0.69	1.05	0.26	1.01	1.20	1.31	1.17	0.30
Streets: Average Volume of Public Space at Intersection	46,012.27	15,791.21	30,221.05	Yes	10,584.18	26,375.40	0.57	1.40	0.28	1.44	0.52	0.62	1.73	0.38
Streets: Connectivity and Regularity of Grid [Intersections Within Boundary / Average Number of Lengths per Block]	21.55	11.48	10.08	Yes	17.47	28.95	1.34	0.68	0.53	0.40	1.60	1.70	1.09	0.53
Streets: Volume, Trees Within 40 feet of Intersection [Yes=1, No=1]	1.00	1.00	0.00	Yes	-1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Streets: Volume, Number of Trees within 40 feet of Intersection	179.00	106.00	73.00	Yes	-106.00	0.00	0.00	0.73	1.01	0.89	0.63	0.16	2.58	0.59
Streets: Volume, Total Volume of Trees Contained at Intersection, Cubic Feet [Using 20 feet diameter as norm]	563,850.00	333,900.00	229,950.00	Yes	-333,900.00	0.00	0.00	0.73	1.01	0.89	0.63	0.16	2.58	0.59
Streets: Volume, Average Tree Volume at Intersection	3,150.00	3,150.00	0.00	Yes	-3,150.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Streets: Volume, Trees as a Percentage of Total Intersection Volume [100% = 1.0]	0.11	0.16	-0.05	Yes	-0.16	0.00	0.00	0.50	2.82	0.63	0.37	0.09	1.58	1.42
STREETS, CROSSWALKS AND SAFETY														
Crosswalk: Total Crosswalks	62.67	35.00	27.67	Yes	21.00	56.00	0.89	0.56	0.14	0.96	2.51	0.45	1.39	0.56
Crosswalk: Average Length of Crosswalk	33.39	40.64	-7.25	No	0.00	40.64	1.22	1.11	0.96	1.02	0.99	0.87	1.06	1.22
Crosswalk: Average Width of Crosswalk	13.93	11.98	1.95	Yes	0.00	11.98	0.86	1.01	0.83	0.84	0.94	1.42	0.97	0.86
Crosswalk: Average Area of Intersection	461.07	486.85	-25.77	Yes	0.00	486.85	1.06	1.13	0.80	0.86	0.94	1.24	1.03	1.06
Crosswalk: Intersection has Displayed Crosswalks [With a Minimum of 20 crosswalk Intersections] [Yes=1, No=0]	0.83	1.00	-0.17	Yes	0.00	1.00	1.20	1.20	0.00	1.20	1.20	1.20	1.20	1.20
Crosswalk: Crosswalks at Intersections on all 4 Sides Average, Greater than Half [> .5] [Yes=1, No=0]	0.50	1.00	-0.50	Yes	0.00	1.00	2.00	0.00	0.00	2.00	2.00	0.00	2.00	2.00
Crosswalk: Crosswalk to Street Ratio [100% = 1.0]	0.32	0.25	0.07	Yes	0.07	0.33	1.01	0.80	0.13	1.34	1.58	0.38	1.77	0.79
Crosswalks: Average Number of Lanes at Crosswalk	2.92	3.14	-0.22	Yes	0.00	3.14	1.08	1.36	0.91	0.79	1.14	0.62	1.18	1.08
Crosswalks: Crosswalks with Angled Cross-Connections to Roadway [Barca, parallel to street, but an Y-Cell, so not perpendicular to cell]	12.33	13.00	-0.67	Yes	-13.00	0.00	0.00	0.73	0.08	0.73	3.65	0.49	0.32	1.05
Crosswalks: Total Crosswalks Perpendicular to Roadway	50.33	22.00	28.33	Yes	34.00	56.00	1.11	0.52	0.16	1.01	2.23	0.44	1.65	0.44
Crosswalk: Perpendicularity, Perpendicular Crosswalks to Total Crosswalks [100% = 1.0]	0.82	0.63	0.19	No	0.37	1.00	1.22	0.90	1.08	1.03	0.87	0.96	1.16	0.76
Crosswalk: Mass, Total Volume Contained in Crosswalks as Public Space, Cubic Feet	28,475.69	17,039.61	11,436.08	Yes	10,223.77	27,263.38	0.96	0.64	0.12	0.84	2.39	0.56	1.46	0.60
Crosswalk: Commercial Area Intersections [ATL: has a large commercial area that is really residential, otherwise 23][Amstel, Paris, Barca: most areas have 1st level commercial][Amstel: commercial zoned area of found data represented here]	36.67	41.00	-4.33	Yes	-9.00	32.00	0.87	0.27	0.25	0.14	2.67	0.30	2.37	1.12
Crosswalk: Commercial Intersections to total Intersections Ratio	0.32	0.56	-0.24	Yes	-0.23	0.33	1.03	0.41	0.36	0.26	1.61	0.25	3.11	1.75
Streets: Number of Chicanes in Streets [Paris section has some chicanes signage on the lane but none structural]	2.00	0.00	2.00	Yes	20.00	20.00	10.00	0.00	0.50	0.00	0.00	4.50	1.00	0.00
Streets: Number of Rounds in Streets [Atl: rounds are terminus of cul-de-sacs][Amster, Paris: no rounds in area, but large rounds outside of boundary]	0.33	3.00	-2.67	No	-3.00	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	9.00
Streets: Number of Curb/Street Intersections With Street Extensions [Not Signage but Built Form][Amster, almost every street has an extension for parking purposes, so this is approximate][Paris: The data is inconclusive and not accessible]	29.20	0.00	29.20	Yes	0.00	0.00	0.00	0.03	0.03	0.00	0.00	4.76	0.17	0.00
Streets: Number of Street Changes for Safety or Parking Reasons	26.67	3.00	23.67	Yes	-3.00	0.00	0.00	0.04	0.08	0.00	0.08	5.55	0.26	0.11
Streets: Intersections With Shared Space [Raised, Plaza, Shared, Woonerfs][Amstel, 4 streets and 4 curb extensions, not sure if they function as shared streets, but used here.]	3.00	0.00	3.00	Yes	4.00	4.00	1.33	0.33	0.00	1.33	0.00	2.67	1.67	0.00
Crosswalk, Ratio of Intersections as Shared Space [Shared Space Intersections / Total Intersections]	0.03	0.00	0.03	No	0.04	0.04	1.27	0.41	0.00	2.05	0.00	1.77	1.77	0.00
Streets: Number of Stairs on Street/Topological Issue	1.33	0.00	1.33	Yes	0.00	0.00	0.00	6.00	0.00	0.00	0.00	0.00	0.00	0.00
STREET, TYPOLOGY														
Streets: Number of Street Lengths Affected by Topography	0.67	0.00	0.67	Yes	0.00	0.00	0.00	6.00	0.00	0.00	0.00	0.00	0.00	0.00
Streets: Topography Ratio, Streets Affected by Topography to Total Streets	0.00	0.00	0.00	Yes	0.00	0.00	0.00	6.00	0.00	0.00	0.00	0.00	0.00	0.00
STREET, HEIRARCHY														
Streets: Number of Visible Hierarchies in the Routes or Street Grid	3.00	4.00	-1.00	No	-1.00	3.00	1.00	1.00	1.00	0.67	1.33	1.00	1.00	1.33
Streets: Street Lengths of Hierarchy that are Cul-de-Sacs [Paris: cul-de-sacs function as driveways and alleys, not as streets as in the U.S.]	4.67	13.00	-8.33	Yes	-13.00	0.00	0.00	0.00	0.00	0.43	4.71	0.21	0.64	2.79
Streets: Hierarchy, Number of Local Street Lengths	154.00	103.00	51.00	No	23.00	126.00	0.82	0.74	1.20	0.71	1.25	1.25	0.85	0.67
Streets: Hierarchy, Number of Arterial or Collector Street Lengths	41.67	35.00	6.67	Yes	10.00	45.00	1.08	0.53	0.58	0.70	2.76	0.94	0.50	0.84
Streets, Free Association or Order of Street Lengths [Small/Large to Large] [Yes=1/No=0]	1.00	1.00	0.00	Yes	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Streets: Required Association or Order/Hierarchy [Small to Bigger to Large only] [Yes=	0.00	0.00	0.00	Yes	1.00	1.00	0.00							
Streets: Are there Dendritic Ordering [Yes=1/No=0]	0.17	1.00	-0.83	No	-1.00	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	6.00
Streets: Are there Conjoining of Street Lengths [Yes=1/No=0]	0.83	1.00	-0.17	Yes	0.00	1.00	1.20	1.20	0.00	1.20	1.20	1.20	1.20	1.20
Streets: Are there Mosaic Patterns in Street Lengths? [Yes=1/No=0]	0.17	0.00	0.17	Yes	0.00	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00
Streets: Are there Serial Patterns in Street Lengths? [Yes=1/No=0]	0.83	1.00	-0.17	Yes	0.00	1.00	1.20	1.20	1.20	1.20	0.00	1.20	1.20	1.20
STREET, ELEMENTS														
Streets: More than 4 street furniture/elements per Commercial Area Street Length [Yes=1, No=0]	1.00	0.00	1.00	No	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Streets: More than 4 Public Seating Elements in Commercial Areas [Yes=1, No=0]	1.00	0.00	1.00	No	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Streets: Tree Elements, Average Number of Trees Per Street Length	10.80	7.33	3.47	Yes	3.73	11.06	1.02	1.28	0.56	1.23	0.53	0.58	1.82	0.68
STREET, ROADWAY														
Streets: Average Roadway Width, Linear Feet	33.39	40.64	-7.25	No	0.00	40.64	1.22	1.11	0.96	1.02	0.99	0.87	1.06	1.22
Streets: Average Lane Width, Linear Feet	9.66	11.49	-1.84	No	0.00	11.49	1.19	1.03	1.15	1.05	0.77	1.10	0.90	1.19
Streets: Average Number of Lanes per Roadway in Site Area	1.67	2.00	-0.33	Yes	0.00	2.00	1.20	1.20	1.20	1.20	0.60	0.60	1.20	1.20
Streets: Average Number of Lanes for Connector Street Lengths	2.83	4.00	-1.17	No	0.00	4.00	1.41	1.06	0.71	1.41	0.71	0.71	1.41	1.41
Streets: Average Right of Way for Connector Streets, Linear Feet	83.19	69.61	13.58	Yes	0.00	69.61	0.84	1.25	0.96	0.71	1.00	0.99	1.09	0.84
Streets: Average Number of Lanes for Arterial Street Lengths [New York: Arterials outside of site are generally 8 lanes, but inside site, these Arterial/Connector Streets are 4 lanes, mostly 1 direction][San Fran: Arterials Outside of District are 5/6 lanes]	3.83	6.00	-2.17	No	0.00	6.00	1.57	1.04	0.78	1.04	1.04	0.52	1.57	1.57
Streets: Average Right of Way for Arterial [Number: Average Width for Arterial]	111.29	95.58	15.71	Yes	0.00	95.58	0.86	1.24	0.72	0.63	1.12	0.84	1.45	0.86
Streets: Bicycle Lanes as Street Lengths [Devoted or Recognized Routes, Path, Lanes]	57.83		57.83	Yes	0.00	[redacted]	0.00	0.33	0.22	0.48	0.92	3.27	0.78	0.00
Streets: Average Bicycle Lane Width [Barca, has buffer for bicycle lane to make it a 'full local lane 4'+4']	5.69		5.69	No	0.00	[redacted]	0.00	1.03	1.06	0.92	0.52	0.95	1.53	0.00
Streets: Total Lots Within 1/4 Mile of Bicycle Network	2,764.41		2,764.41	No	0.00	[redacted]	0.00	0.47	0.33	0.48	2.64	1.55	0.53	0.00
Streets: Residential Lots Within 1/4 Mile of Bicycle Network	2,644.81		2,644.81	No	0.00	[redacted]	0.00	0.43	0.22	0.47	2.76	1.62	0.50	0.00
Streets: Total Commercial Lots Within 1/4 Mile of Bicycle Network	674.28		674.28	Yes	0.00	[redacted]	0.00	0.25	0.08	0.14	#VALUE!	2.55	1.98	0.00
Streets Multi-modal [Yes=1, No=0: Are Streets Multi-Modal]	1.00	0.00	1.00	No	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Streets: Volume, Total Public Street Volume Devoted to Lanes, Cubic Feet [Sans Trees][Note: Because of Problem of Double-count at Intersections, these lengths are one intersection length shorter for Volumes]	102,242,904.62	37,228,706.79	65,014,197.83	No	38,003,685.52	75,232,392.31	0.74	0.89	0.20	0.98	1.27	0.98	1.68	0.40
Streets: Volume, Average Public Street Length Volume Devoted to Lane, Cubic Feet [Sans Trees]	609,466.51	317,806.59	291,659.92	Yes	152,020.31	469,826.90	0.77	1.16	0.17	1.22	0.75	0.75	1.95	0.52
STREET, ENCLOSURE														
Streets: Building Heights [Atlanta, Paris: Approximated by stories], Vertical Feet	48.66	21.18	27.48	No	10.71	31.89	0.66	1.01	0.31	1.13	0.97	0.95	1.63	0.44
Streets: Building Height to Right of Way Ratio [100% = 1.0]	0.81	0.36	0.46	No	0.18	0.53	0.66	0.71	0.30	0.84	1.52	1.23	1.40	0.44
Streets: Building Height to Roadway Ratio [100% = 1.0]	1.45	0.52	0.93	No	0.26	0.78	0.54	0.92	0.32	1.12	0.98	1.10	1.55	0.36

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Table 1 (continued)

	RESILIENCY MEAN	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	Urban Residential	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	SAN FRANCISCO	PORTLAND	NEW YORK	PARIS	AMSTERDAM	BARCELONA	ATLANTA
	This is the mean of Resiliency Between These Cities	Old Fourth Ward Current Conditions	Difference Between Old Fourth Ward and Resiliency Mean	Did the Old Fourth Ward Satisfy the Low or High Standard Deviation	Changed Figures to Old Fourth Ward Numbers	Revised Numbers, Old Fourth Ward	New Comparison With Median	Castro District	University Park	West Village	Republique - Bastille, 11 er. Arrondissement, Nation - Bercy 12 er. Arrondissement	Niew Pijp (Oud Zuid) [Discrepancies in Amsterdam data, fixed with approximations)	L'Antiga Esquerra de, La Nova Esquerra de, and Dereta de l'Eixample	Old Fourth Ward
	MEAN	ATLANTA	ATLANTA	ATLANTA	ATLANTA, GEORGIA	ATLANTA	ATLANTA	SAN FRANCISCO	PORTLAND	NEW YORK	PARIS	AMSTERDAM	BARCELONA	ATLANTA
Streets: Enclosure Equation, Building Height Need to Create Mathematic Enclosure [Street Width/cos(30 deg))/4], Vertical Feet	102.95	96.64	6.31	Yes	0.00	96.64	0.94	1.34	0.96	1.27	0.60	0.73	1.10	0.94
Streets, Difference Between Mathematic Enclosure and Present Enclosure [Height needed for ACTUAL enclosure, given the right-of-way], Vertical Feet	54.29	75.46	-21.17	Yes	-10.71	64.76	1.19	1.64	1.54	1.39	0.27	0.53	0.62	1.39
Streets: Mathematical Enclosure Scale to Present Right of Way [100% = 1.0]	0.81	1.27	-0.46	No	-0.18	1.09	1.34	1.29	1.70	1.16	0.48	0.77	0.60	1.57
Building Height Ratio [1:1 ratio to street, 1:3 ratio of right of way]	0.81	0.36	0.46	No	0.18	0.53	0.66	0.71	0.30	0.84	1.52	1.23	1.40	0.44
STREET: PARINGS														
Streets, Lengths Paired at 0-400 Width by 0-400 Length, Linear Feet	19.67	5.00	14.67	Yes	24.00	29.00	1.47	0.25	1.88	0.00	0.86	2.14	0.86	0.25
Streets: Lengths Paired at 0-400 width by 400-800 Length, Linear Feet	28.67	15.00	13.67	Yes	14.00	29.00	1.01	1.64	0.59	0.00	0.77	1.43	1.57	0.52
Streets: Lengths Paired at 0-400 Width by 801-above Length, Linear Feet	7.33	29.00	-21.67	No	-22.00	7.00	0.95	0.14	0.00	4.91	0.27	0.55	0.14	3.95
Streets: Lengths Paired at 501-600 Width by 500-800 Length, Linear Feet	1.33	0.00	1.33	Yes	0.00	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00
Streets: Lengths Paired at 501-600 Width by 801-above Length, Linear Feet	1.17	1.00	0.17	Yes	-1.00	0.00	0.00	0.00	0.00	2.57	2.57	0.86	0.00	0.86
Streets: 601-above Width by 801-above Length, Linear Feet	1.00	3.00	-2.00	No	-2.00	1.00	1.00	0.00	0.00	1.00	4.00	0.00	1.00	3.00
STREET, DENDRITIC														
Streets: Number of Cul De Sac Lengths	4.00	24.00	-20.00	No	-24.00	0.00	0.00	0.00	0.00	0.50	5.25	0.25	0.00	6.00
Streets: Average Cul-de sac Length, Linear Feet	145.97	219.13	-73.15	Yes	-219.13	0.00	0.00	0.00	0.00	3.21	1.82	0.97	0.00	1.50
Streets: Average Cul-de sacs Distance to Nearest Intersection, Linear Feet	78.55	368.16	-289.61	No	-368.16	0.00	0.00	0.00	0.00	2.96	1.61	1.43	0.00	4.69
Streets, Average Cul-de-sac Remainder Distance to Complete Cross-Block Connectivity, Linear Feet	149.84	324.33	-174.49	Yes	-324.33	0.00	0.00	0.00	0.00	1.38	1.91	2.71	0.00	2.16
Streets: Total Land Area Needed to Complete Cul-de-sac Connectivity, Square Feet	46,956.46	464,148.18	-417,191.72	No	-464,148.18	0.00	0.00	0.00	0.00	0.71	4.89	0.40	0.00	9.88
Streets: Volume, Total Volume Taken from the Public Right of Way Because of Cul-de-sac	49,305.40	313,592.32	-264,286.92	No	-313,592.32	0.00	0.00	0.00	0.00	1.53	4.34	0.13	0.00	6.36
LEGIBILITY														
Legibility: Does the Grid plan have Strong Edges? [Yes=1, No=0]	1.00	1.00	0.00	Yes	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Legibility: Does the Grid plan have Regularized Streets? [Yes=1, No=0]	0.83	0.00	0.83	No	1.00	1.00	1.20	1.20	1.20	1.20	0.00	1.20	1.20	0.00
Legibility: Is there a clear hierarchy? [Yes=1, No=0]	1.00	0.00	1.00	No	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
MEASURABILITY														
Measurability: Does the Area have complete Measurability? [Yes=1, No=0]	0.83	0.00	0.83	No	0.00	0.00	0.00	1.20	1.20	1.20	0.00	1.20	1.20	0.00
Measurability: Is this regular enough for Measurability? [Yes=1, No=0]	0.83	0.00	0.83	No	1.00	1.00	1.20	1.20	1.20	1.20	0.00	1.20	1.20	0.00
Measurability: Some Regularity in East/West Direction? [Yes=1, No=0]	0.50	0.00	0.50	Yes	0.00	0.00	0.00	0.00	2.00	2.00	0.00	0.00	2.00	0.00
Measurability: Some Regularity in North/South Direction? [Yes=1, No=0]	0.50	0.00	0.50	Yes	1.00	1.00	2.00	0.00	0.00	2.00	0.00	2.00	2.00	0.00
Measurability: Are the Blocks Fairly the Same Size and Area? [Not absolutely same size] [Yes=1, No=0]	0.67	0.00	0.67	No	1.00	1.00	1.50	1.50	1.50	1.50	0.00	0.00	1.50	0.00
Measurability: The Median Size of the Block Length, Linear Feet.	552.12	715.80	-163.69	Yes	-258.88	456.93	0.83	1.16	0.74	1.56	1.04	0.79	0.71	1.30
Measurability: The Median Size of the Block Width, Linear Feet.	250.19	377.31	-127.13	No	-93.82	283.50	1.13	1.18	1.00	1.28	0.44	0.59	1.51	1.51
STREET, DETACHMENT OF SUBWAYS AND HIGHWAYS [FOR CITY, NOT JUST SAMPLE AREA]														
Detachment: Is there a relationship between the Subway and Street Nodes [Large Nodes and Intersections/Nodes]? [Yes=1, No=0]	1.00	1.00	0.00	Yes	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Detachment: Are Subways Stations on Major Streets, Landmarks, Pathways, Nodes? [Yes=1, No=0]	1.00	1.00	0.00	Yes	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Detachment: Is there a logical relationship between Subway/Train pattern and Urban Form? [Yes=1, No=0]	0.83	1.00	-0.17	Yes	0.00	1.00	1.20	1.20	1.20	1.20	1.20	1.20	0.00	1.20
Detachment: Total Street Lengths of Subway/Train in Study [If subway/train outside of area=1]	11.00	1.00	10.00	Yes	0.00	1.00	0.09	0.36	0.09	0.09	3.00	1.18	1.27	0.09
Detachment: How Many Street Lengths Does The Subway/Train Stitch To Urban Form [If Subway/Train Outside of area but stitched=1]	8.50	1.00	7.50	Yes	0.00	1.00	0.12	0.47	0.12	0.12	3.76	1.53	0.00	0.12
Detachment: Ratio of Detachment, Total Attached Lengths / Total Lengths of Subway in Site Area [If subway/train is outside of area=1/1 if attached, 0/1 if not attached]	0.83	1.00	-0.17	Yes	0.00	1.00	1.21	1.21	1.21	1.21	1.17	1.21	0.00	1.21
STREET, ARCHITECTURE INFILL														
Street: Total Density of Buildings/Building Groups in Site Areas [San Fran: GIS data has building group footprints][Portland, New York, Barcelona, Amstel, Paris: Building Footprints]	2,426.17	847.00	1,579.17	No	227.00	1,074.00	0.44	0.86	0.40	0.59	1.78	1.77	0.60	0.35
Street: Average Building/Building Groups Per Block	36.45	25.67	10.79	Yes	-15.40	10.27	0.28	1.06	0.50	0.98	1.56	1.28	0.63	0.70
Street: Multi-Family Apartments in Site [Estimates only by site of large apartments, not small apartments][San Francisco almost all buildings are multi-family but data inaccessible][San Fran/New York: Per Social Explorer]	6,429.50	187.00	6,242.50	Yes	0.00	187.00	0.03	0.02	0.00	3.76	0.00	0.00	0.22	0.03
Street: Average Multi-Family Apartments on Blocks	157.19	5.67	151.52	Yes	0.00	5.67	0.04	0.02	0.00	3.84	0.00	0.00	0.14	0.04
Street: Number of Single-Family Houses in Site [Most areas, data inaccessible][San Fran/New York: Per Social Explorer]	1,361.33	572.00	789.33	Yes	0.00	572.00	0.42	2.10	0.70	0.20	0.00	0.00	0.00	0.42
Street: Average Single-Family Buildings per Block	25.79	17.33	8.46	Yes	0.00	17.33	0.67	2.05	0.69	0.26	0.00	0.00	0.00	0.67
Street: Total Public Lots	3.00	1.00	2.00	No	0.00	1.00	0.33	1.67	0.67	0.67	0.00	0.00	1.00	0.33
Street: Average Public Buildings to Total Buildings [100% = 1.0]	0.06	0.03	0.03	No	-0.02	0.02	0.27	1.64	0.65	0.88	0.00	0.00	0.83	0.54
STREET, HORIZONTAL ENCLOSURE														
Street: Average Lot Width, Linear Feet	56.94	105.93	-48.98	No	-57.09	48.84	0.86	0.66	1.69	1.22	0.70	0.44	1.29	1.86
Street: Average Architectural Infill Width, Linear Feet	36.77	42.75	-5.98	Yes	43.77	86.53	2.35	1.02	0.96	1.71	0.40	0.75	1.16	1.16
Street: Horizontal Enclosure Ratio, Building Width to Lot Width [100% = 1.0]	0.72	0.40	0.32	Yes	1.37	1.77	2.46	1.39	0.51	1.26	0.51	1.53	0.80	0.56
Street: Total Length of Broken Perimeter, Linear Feet [NYC, Barca, San Fran, Paris and Amster: Most Unenclosed Area limited to less than 4 blocks]	12,979.31	46,020.92	-33,041.60	No	-21,485.75	24,535.17	1.89	0.46	2.73	0.84	1.32	0.18	0.46	3.55
Street: Total Length of Block Perimeter, Linear Feet	96,908.13	73,554.05	23,354.07	Yes	24,181.59	97,735.65	1.01	1.03	0.72	0.98	1.32	1.25	0.70	0.76
Street: Openness Ratio, Length of Broken Perimeter to Total Block Perimeter	0.15	0.63	-0.47	No	-0.37	0.25	1.63	0.38	3.30	0.75	0.87	0.13	0.57	4.05
Street: Architectural Width Ratio, Building Width to Right-of-Way [100% = 1.0]	0.57	0.72	-0.15	No	0.73	1.45	2.57	0.78	1.02	1.38	0.68	1.06	1.08	1.27
STREET, VERTICAL ENCLOSURE														
Street: Building Heights, Vertical Feet	48.66	21.18	27.48	No	10.71	31.89	0.66	1.01	0.31	1.13	0.97	0.95	1.63	0.44
Street: Total Significant Enclosures within Block Areas [Paris: These are Open Spaces Within Blocks Per Their Datasets, whereas others are visual determinations]	409.17	0.00	409.17	Yes	0.00	0.00	0.00	0.18	0.00	0.12	5.34	0.21	0.15	0.00
Street: Total Block Area With Possible Enclosures, Square Feet	8,213,615.01	0.00	8,213,615.01	No	0.00	0.00	0.00	1.24	0.00	1.03	1.25	0.88	1.59	0.00
Street: Total Enclosure Area, Square Feet	5,746,126.83		5,746,126.83	No	0.00	[redacted]	0.00	0.99	0.00	0.70	1.19	0.63	1.49	0.00
Street: Average Number of Enclosures Per Square Mile	209.61	0.00	209.61	Yes	0.00	0.00	0.00	0.22	0.00	0.12	5.26	0.17	0.23	0.00
Streets: Average Buildings on a Street Length	12.09	6.14	5.95	No	0.14	6.28	0.52	1.27	0.39	0.85	1.16	1.54	0.79	0.51
Street: Average Area of Enclosure Per Block, Square Feet	68,657.49		68,657.49	No	0.00	[redacted]	0.00	1.13	0.00	1.17	0.05	0.60	2.05	0.00
STREET, TRANSPARENCY TREES/TREE ENCLOSURE														
Trees: Total Number of Trees	1,864.67	1,012.00	852.67	No	879.00	1,891.00	1.01	1.01	0.68	0.99	0.94	0.78	1.60	0.54
Trees: Total Number in Public Right of Way in Avenue Way	1,328.83	453.00	875.83	No	631.00	1,084.00	0.82	0.87	0.69	1.04	0.87	0.35	2.18	0.34
Trees: Total Blocks With Perimeter Core Trees	49.33	18.00	31.33	No	46.00	64.00	1.30	0.87	1.09	1.01	0.63	1.76	0.63	0.36
Trees, Total Number of Trees in Perimeter Core	535.83	559.00	-23.17	Yes	248.00	807.00	1.51	1.35	0.68	0.85	1.12	1.84	0.16	1.04
Trees: Average Number of Trees in Perimeter Core Blocks	11.03	31.06	-20.03	No	-18.45	12.61	1.14	1.52	0.61	0.83	1.76	1.03	0.26	2.82
Trees: Average Trees in Perimeter Core over Total Blocks	8.58	16.94	-8.36	No	-4.71	12.23	1.43	1.56	0.78	1.33	0.92	1.25	0.16	1.97
Trees: Total Area on Street Covered by Trees (Assuming 20 foot Diameter of Tree Transparency, Square Feet	417,253.67	142,242.00	275,011.67	No	198,134.00	340,376.00	0.82	0.87	0.69	1.04	0.87	0.35	2.18	0.34
Trees: Total Street Lengths Without Trees on Either Side of Street Length	32.33	1.00	31.33	Yes	-1.00	0.00	0.00	0.00	0.40	0.03	5.20	0.37	0.00	0.03
Trees: Total Streets With Trees on ONLY One Side of Street Length [Paris: Satellite Pictures not helpful so data unavailable, Thus using "0" as default]	7.50	1.00	6.50	Yes	-1.00	0.00	0.00	1.87	2.00	2.13	0.00	0.00	0.00	0.13
Trees: Total Streets With Trees on Both Sides of Street Length	155.83	136.00	19.83	Yes	35.00	171.00	1.10	0.78	1.16	0.78	0.89	1.41	0.98	0.87
Tree: Total Number of Sidewalks With Tree Coverage [% of Sidewalk Covered by Trees, >40%]	0.89	0.99	-0.10	Yes	0.01	1.00	1.13	1.13	1.06	1.12	0.51	1.07	1.13	1.12
Trees: Average Distance Between Trees on Sidewalk, Linear feet	24.83	65.71	-40.88	No	-24.95	40.76	1.64	1.39	1.10	0.61	1.08	0.58	1.24	2.65

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Table 1 (continued)

	RESILIENCY MEAN	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	Urban Residential	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	SAN FRANCISCO	PORTLAND	NEW YORK	PARIS	AMSTERDAM	BARCELONA	ATLANTA
	This is the mean of Resiliency Between These Cities	Old Fourth Ward Current Conditions	Difference Between Old Fourth Ward and Resiliency Mean	Did the Old Fourth Ward Satisfy the Low or High Standard Deviation	Changed Figures to Old Fourth Ward Numbers	Revised Numbers, Old Fourth Ward	New Comparison With Median	Castro District	University Park	West Village	Republique - Bastille, 11 er. Arrondissement, Nation - Bercy 12 er. Arrondissement	Niew Pijp (Oud Zuid) [Discrepancies in Amsterdam data, fixed with approximations)	L'Antiga Esquerra de, La Nova Esquerra de, and Dereta de l'Eixample	Old Fourth Ward
	MEAN	ATLANTA	ATLANTA	ATLANTA	ATLANTA, GEORGIA	ATLANTA	ATLANTA	SAN FRANCISCO	PORTLAND	NEW YORK	PARIS	AMSTERDAM	BARCELONA	ATLANTA
Trees: Number of Trees on Sidewalk within 30 Feet of each other	1,004.79	40.00	964.79	No	375.00	415.00	0.41	0.61	0.64	1.31	0.85	0.43	2.16	0.04
Trees: Number of Trees on Sidewalk Between 30 and 50 feet of Each Other	178.00	151.00	27.00	Yes	284.00	435.00	2.44	2.07	1.20	0.26	1.40	0.06	0.00	0.85
Trees: Number of Trees on Sidewalk Within 40 [or Less] Feet of Each Other	1,090.02	343.00	747.02	No	352.00	695.00	0.64	0.41	0.75	1.23	0.98	0.41	2.23	0.31
Trees: Number of Trees on Sidewalk 50 Feet or more from each other	197.66	262.00	-64.34	Yes	-28.00	234.00	1.18	0.93	0.26	0.14	0.27	0.08	4.33	1.33
Trees: Trees Within 40 Feet of Intersection [Number of Trees in 40 Feet of Intersection]	179.00	106.00	73.00	Yes	-106.00	0.00	0.00	0.73	1.01	0.89	0.63	0.16	2.58	0.59
Trees: Trees on Sidewalk that are 15 to 25 Feet Apart from Each Other	434.62	17.00	417.62	Yes	199.00	216.00	0.50	0.21	0.84	0.38	0.28	0.20	4.09	0.04
Trees: Trees on Sidewalk that are 30 to 45 feet Apart from Each Other	330.73	102.00	228.73	Yes	266.00	368.00	1.11	0.73	0.60	0.08	2.57	0.03	1.99	0.31
Trees: Trees more than 40 feet apart from each other	238.81	110.00	128.81	Yes	279.00	389.00	1.63	3.01	0.41	0.19	0.37	0.09	1.93	0.46
STREETS, VISUAL TRANSPARENCY														
Transparency: Glass Transparency Within 20 Feet of Block Perimeter, Linear Feet [Approximation: 1 Connector/Arterial and 1 Residential/Local Route, or 2 block perimeter areas][NYC: large areas with limited glass, otherwise would be 61,874.23 Feet] [ATL: only 338 buildings within 20 feet of the block perimeter][Barca: estimated from two perimeter blocks, includes boarded-up openings][Amstel: averaged from two blocks][Paris and San Fran: averaged from 2 routes]	32,593.79	3,380.00	29,213.79	No	2,959.91	6,339.91	0.19	1.06	0.24	1.10	1.10	1.61	0.88	0.10
Transparency: Glass Transparency Ratio, Glass Linear Feet to Total Block Perimeter Linear Feet]	0.33	0.05	0.28	No	0.02	0.06	0.20	1.05	0.34	1.15	0.85	1.32	1.29	0.14
Transparency: First Level [60% of buildings have 60% transparency, 3-8 feet above grade]	0.55	0.08	0.47	No	0.03	0.11	0.20	1.05	0.34	1.15	0.85	1.32	1.29	0.14
					0.00									
STREETS, PHYSICAL TRANSPARENCY					0.00									
Physical: How Many Average Entries On Street Lengths [Both sides of Street]	24.18	12.28	11.90	No	0.29	12.56	0.52	1.27	0.39	0.85	1.16	1.54	0.79	0.51
Physical: Feet Between Each Entry [Only on one side of Street]	32.18	60.16	-27.97	No	-2.43	57.73	1.79	0.79	1.42	1.20	0.64	0.57	1.37	1.87
Physical: Satisfy LEED requirement of entry every 75 Feet? [1.0 LEED requirement]	2.65	1.25	1.41	No	0.05	1.30	0.49	1.11	0.62	0.73	1.36	1.54	0.64	0.47
Physical: Average Entry Width for Each Street Length [3.5 feet as average entry area]	72.54	36.83	35.71	No	0.86	37.68	0.52	1.27	0.39	0.85	1.16	1.54	0.79	0.51
Physical: Total Street Length Physical Transparency	14,557.00	5,082.00	9,475.00	No	1,362.00	6,444.00	0.44	0.86	0.40	0.59	1.78	1.77	0.60	0.35
Physical: Physical Transparency Ratio, Entry Transparency to Total Block Perimeter [100% = 1.0]	0.14	0.07	0.07	No	0.00	0.07	0.49	0.92	0.61	0.67	1.48	1.57	0.74	0.51
Physical: Average Front Service Entries Per Street [Estimated from 1 Connector/Arterial and 1 Residential/Local Route][San Fran: has the only area where service entries used as a large urban form]	1.15	0.00	1.15	Yes	0.00	0.00	0.00	5.97	0.02	0.01	0.00	0.00	0.00	0.00
Physical: Average Linear Feet of Service Entries per Street Length [Number: Average Number of Frontage Service Entries]	3.45	0.00	3.45	Yes	0.00	0.00	0.00	5.97	0.02	0.01	0.00	0.00	0.00	0.00
Physical. Total Physical Service Entry Transparency	469.35	0.00	469.35	Yes	0.00	0.00	0.00	5.97	0.03	0.01	0.00	0.00	0.00	0.00
Physical: Service Transparency Ratio, Total Service Entry Length / Total Perimeter of Block [100% = 1.0]	0.00	0.00	0.00	Yes	0.00	0.00	0.00	5.95	0.04	0.01	0.00	0.00	0.00	0.00
Physical: Total Physical Transparency Ratio, Service and Non-Service Entry Length to Total Block Perimeter Length. [100% = 1.0]	0.15	0.07	0.08	No	0.00	0.07	0.45	1.05	0.58	0.63	1.40	1.46	0.88	0.48
STREET: SIDEWALK														
[These numbers were exceptionally difficult to get. Most of these are approximations using Google Earth and GIS data]														
Sidewalk: Street Lengths With No Sidewalks	1.67	24.00	-22.33	No	-24.00	0.00	0.00	0.00	3.00	0.00	3.00	0.00	0.00	14.40
Sidewalk: Street Lengths With Sidewalk on One Side [or large portion of broken Sidewalk on a Street Length]	0.17	2.00	-1.83	No	-2.00	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	12.00
Sidewalk: Total Street Lengths With Sidewalk on Both Sides	193.83	112.00	81.83	No	59.00	171.00	0.88	0.70	1.05	0.72	1.55	1.19	0.78	0.58
Sidewalk: Sidewalk Ratio, Streets With Sidewalks on Both Sides to Total Street Lengths [100% = 1.0]	0.99	0.81	0.18	No	0.19	1.00	1.01	1.01	0.98	1.01	0.99	1.01	1.01	0.82
Sidewalk: Does the Street Meet with Recommendations of 90% of Streets have Sidewalks on Both Sides? [Yes > 1.0]	1.10	0.90	0.20	No	0.21	1.11	1.01	1.01	0.98	1.01	0.99	1.01	1.01	0.82
Sidewalk, Average Width of Sidewalk, Linear Feet	14.27	11.99	2.28	No	0.00	11.99	0.84	1.04	0.95	1.03	0.95	0.90	1.14	0.84
Sidewalk, Average Width of Throughway, Linear Feet	7.64	7.32	0.32	Yes	0.00	7.32	0.96	0.90	0.68	1.12	1.51	0.92	0.87	0.96
Sidewalk, Average Width of Edge/Extension, Linear Feet	6.29	4.67	1.62	Yes	0.00	4.67	0.74	0.95	1.33	0.97	0.32	0.91	1.53	0.74
Sidewalk, Average Width of Frontage, Linear Feet	0.40	0.00	0.40	Yes	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
Sidewalk: [There was no good data for this section, but it looked like all were below 2 feet in every city.]	2.00	2.00	0.00	Yes	0.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
STREETS, FRONTS AND BACKS														
Fronts: Number of Blocks With Distinct Front and Backs	63.33	33.00	30.33	No	33.00	66.00	1.04	0.85	0.85	0.63	1.20	1.45	1.01	0.52
Fronts: Building frontage on public realm, 90%, Sidewalk, within 1 foot of sidewalk [100% = 1.0]	0.78	0.05	0.73	No	-0.01	0.04	0.05	0.96	0.02	1.20	1.29	1.29	1.25	0.07
Fronts: Does this meet recommendation of 90% of buildings hitting sidewalk? [>1.0 Yes]	0.86	0.06	0.81	No	-0.01	0.05	0.05	0.96	0.02	1.20	1.29	1.29	1.25	0.07
Setback: Buildings With More than 10 feet Setback From the Public Sphere [Paris: Numbers inaccessible]	293.60	770.00	-476.40	No	-43.00	727.00	2.48	1.20	3.27	0.34	0.00	0.00	0.19	2.62
Setback: Average Setback of Buildings from Sidewalk, more than 10 feet away from sidewalk [Barca: This is the average of all buildings because of Perimeter block nature] [Paris: Numbers inaccessible]	5.44	40.27	-34.83	No	-5.85	34.43	6.33	0.52	2.72	1.55	0.00	0.00	0.21	7.40
Setback: Average Setback From Total Buildings/Sidewalk [Number: Average Setback of Building] [Paris: Numbers inaccessible]	4.15	36.61	-32.46	No	-11.48	25.13	6.05	0.86	3.50	0.36	0.00	0.00	0.28	8.82
Setback: Setback Ratio, Buildings With Setbacks over Total Buildings [Paris: Numbers inaccessible]	0.25	0.91	-0.66	No	-0.23	0.68	2.69	0.67	3.90	0.27	0.00	0.00	0.15	3.61
Setback [80% of buildings no more than 25 feet from property line] [Paris: Numbers inaccessible][>.80 = satisfies]	0.01	0.03	-0.02	No	-0.01	0.02	1.61	0.83	1.77	1.21	0.00	0.00	1.19	2.05
Setback [50% of buildings no more than 18 feet from property line] [Paris: Numbers inaccessible][>50% = satisfies]	0.01	0.02	-0.01	No	0.00	0.02	1.61	0.83	1.77	1.21	0.00	0.00	1.19	2.05
Setback [50% of buildings within 1 foot of sidewalks] [>50% = satisfies]	0.79	0.11	0.68	No	-0.02	0.08	0.11	1.08	0.02	1.18	1.27	1.27	1.17	0.13
Setback: Setback Ratio, Buildings Hitting the Sidewalk over Total Buildings	0.78	0.09	0.69	No	-0.02	0.07	0.09	1.06	0.02	1.19	1.28	1.28	1.17	0.12
STREETS, COMPLEMENTARITY														
Heights: Average Building Height [Number: Vertical Feet]	48.66	21.18	27.48	No	10.71	31.89	0.66	1.01	0.31	1.13	0.97	0.95	1.63	0.44
Heights: Total Buildings/Building Blocks in Lots	2,426.17	847.00	1,579.17	No	227.00	1,074.00	0.44	0.86	0.40	0.59	1.78	1.77	0.60	0.35
Height: Buildings/Building Blocks that Deviate from Mean Height by 1 Story [Barca/Amsterdam not accessible heights but all most buildings within 3 stories deviation]	693.00	202.00	491.00	Yes	350.00	552.00	0.80	0.90	0.01	1.35	1.73	0.00	0.00	0.29
Height: Buildings/Building Blocks that Deviate from Mean Height by 2 Story [Barca/Amsterdam not accessible heights but all most buildings within 3 stories deviation]	453.50	62.00	391.50	Yes	185.00	247.00	0.54	0.48	0.00	0.77	2.75	0.00	0.00	0.14
Height: Buildings on Block Average Deviation 3 or More Stories [Number: 3 or more Story Deviation][Barca not accessible heights but all most buildings within 3 stories deviation]	330.75	20.00	310.75	Yes	-20.00	0.00	0.00	0.33	0.00	0.28	3.40	0.00	0.00	0.06
Height: Total Buildings/Blog Group Deviations from Mean Height	1,477.25	284.00	1,193.25	Yes	515.00	799.00	0.54	0.64	0.01	0.93	2.42	0.00	0.00	0.19
Height: Complementarity Ratio: Total Buildings Deviation from Height Mean over Total Buildings [100% = 1.0]	0.56	0.34	0.23	Yes	0.41	0.74	1.32	0.81	0.01	1.70	1.47	0.00	0.00	0.59
Façade: Street Lengths Without Horizontality [Structural as Represented by the Façade][San Fran: Mainly Because of Hilly Terrain]	4.83	0.00	4.83	Yes	0.00	0.00	0.00	6.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 1 (continued)

	RESILIENCY MEAN	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	Urban Residential	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	SAN FRANCISCO	PORTLAND	NEW YORK	PARIS	AMSTERDAM	BARCELONA	ATLANTA
	This is the mean of Resiliency Between These Cities	Old Fourth Ward Current Conditions	Difference Between Old Fourth Ward and Resiliency Mean	Did the Old Fourth Ward Satisfy the Low or High Standard Deviation	Changed Figures to Old Fourth Ward Numbers	Revised Numbers, Old Fourth Ward	New Comparison With Median	Castro District	University Park	West Village	Republique - Bastille, 11 er. Arrondissement, Nation - Bercy 12 er. Arrondissement	Niew Pijp (Oud Zuid) [Discrepancies in Amsterdam data, fixed with approximations)	L'Antiga Esquerra de, La Nova Esquerra de, and Dereta de l'Eixample	Old Fourth Ward
	MEAN	ATLANTA	ATLANTA	ATLANTA	ATLANTA, GEORGIA	ATLANTA	ATLANTA	SAN FRANCISCO	PORTLAND	NEW YORK	PARIS	AMSTERDAM	BARCELONA	ATLANTA
Façade: Total Streets Which Have Horizontality [Number of Total Streets With Horizontality][Barca: Effectively complete Horizontality above 2 floors]	190.83	138.00	52.83	Yes	33.00	171.00	0.90	0.56	1.10	0.73	1.61	1.21	0.80	0.72
Façade, Streets Without Verticality [Number: Total Streets Without Verticality or Structural Slabs][Portland and Atlanta areas are not vertical but flat building typologies]	34.83	138.00	-103.17	No	33.00	171.00	4.91	0.00	6.00	0.00	0.00	0.00	0.00	3.96
Façade: Total Street Lengths With Verticality [Number of Total Streets With Verticality]	160.83	0.00	160.83	No	0.00	0.00	0.00	0.85	0.00	0.86	1.91	1.44	0.95	0.00
STREET, MONOTONY														
Monotony: Number of Repeating Grid Blocks	1.17	2.00	-0.83	No	1.00	3.00	2.57	1.71	1.71	0.86	0.00	0.86	0.86	1.71
Monotony: Longest Continual Route in Section, Linear Feet	4,080.56	3,661.87	418.69	Yes	-37.66	3,624.21	0.89	0.99	0.93	0.95	1.14	1.12	0.88	0.90
Monotony: Average Route Length, Linear Feet	2,192.08	1,755.50	436.59	Yes	-12.83	1,742.67	0.79	1.28	1.11	1.32	0.39	0.78	1.13	0.80
Monotony: Number of Grid Block Groups in Section [Paris, accumulated grid as one grid-type]	1.83	3.00	-1.17	Yes	-1.00	2.00	1.09	1.09	1.09	0.55	0.55	2.18	0.55	1.64
Monotony: Number of Blocks in Largest "Grid Block"	49.67	3.00	46.67	No	15.00	18.00	0.36	0.58	0.97	0.81	1.53	0.83	1.29	0.06
Monotony: Largest Grid Blocks / Total Blocks in Area [100% = 1.0]	0.81	0.09	0.72	No	0.18	0.27	0.34	0.66	1.09	1.23	1.23	0.55	1.23	0.11
Route Analysis: How Many Lengths of Routes in Site.	40.33	22.00	18.33	Yes	13.00	35.00	0.87	0.50	0.60	0.50	2.63	1.14	0.64	0.55
Route Analysis: Total Links of Routes to Total Streets	0.19	0.16	0.03	Yes	0.05	0.20	1.10	0.79	0.61	0.77	1.85	1.07	0.92	0.85
Route Analysis: Number of Intersections functioning as Joints in Commercial Routes [Barca: all roads have a commercial component][Amster: for commercial area as zoned alone][Paris: all streets have a commercial component, except for 4 intersection points]	53.17	4.00	49.17	Yes	32.00	36.00	0.68	0.15	0.13	0.36	3.57	0.23	1.56	0.08
Route Analysis: How Many Streets Function as Links to Commercial Route [Barca: all streets have a commercial component, except for 4 intersection points][Amster: For Commercial Area a zoned alone][Paris: all streets have a commercial component, except for 4 intersection points]	83.50	3.00	80.50	Yes	29.00	32.00	0.38	0.08	0.10	0.24	3.68	0.13	1.77	0.04
Route Analysis: Total Joints in Commercial Routes Over Total Intersections	0.43	0.05	0.37	Yes	0.32	0.37	0.87	0.25	0.21	0.74	2.35	0.20	2.24	0.13
Route Analysis: Total Links in Commercial Routes Over Total Street Lengths	0.38	0.02	0.35	Yes	0.17	0.19	0.50	0.14	0.10	0.38	2.66	0.13	2.59	0.06
NODES [MAJOR PLACEMAKING INTERSECTIONS]														
[Within 1/2 Mile of Site Nodes][Normal Intersections Classified Under Street for Connectivity Purposes]														
Nodes: Number of Intersections	104.83	73.00	31.83	Yes	-73.00		0.00	0.72	0.73	0.57	1.81	1.33	0.83	0.70
Nodes: Number of Nodes Within Site or 1/2 Mile of Site [If none in site][Multi-Modal Connections, Major Transition Points, etc.]	4.83	0.00	4.83	No	0.00		0.00	0.41	0.00	1.86	0.62	1.86	1.24	0.00
Nodes: Node to Intersection Ratio [100% = 1.0]	0.05	0.00	0.05	No	0.00		0.00	0.48	0.00	2.76	0.29	1.19	1.27	0.00
Nodes: Average Distance Between Major Nodes, Linear Feet	1,989.03	4,030.84	-2,041.81	No	-4,030.84		0.00	1.26	0.00	0.29	2.20	0.23	1.03	2.03
Nodes: Subway/Train Station at Nodes [Yes=1, No=0]	1.00	1.00	0.00	Yes	-1.00		0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Nodes: Landmarks at Nodes [Yes=1, No=0]	1.00	1.00	0.00	Yes	-1.00		0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Nodes: Commercial Area at Nodes [Yes=1, No=0]	1.00	1.00	0.00	Yes	-1.00		0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Nodes: How Many Squares in Area [or 1/2 mile of site][Barca, including Placas]	6.67	2.00	4.67	Yes	-2.00		0.00	0.15	0.15	0.75	3.00	1.20	0.75	0.30
Nodes: Average Area of Squares in Area [Number: Average Area of Squares]	100,483.68	20,070.21	80,413.47	No	-20,070.21		0.00	0.06	0.96	2.29	0.37	1.12	1.21	0.20
Nodes: Distance Between Squares in Area [From Site to Squares and Shortest Distance Between Prominent Squares in City]	2,843.30	3,430.41	-587.12	Yes	-3,430.41		0.00	2.15	1.72	1.31	0.20	0.09	0.52	1.21
Nodes: How Many Small Parks in Area [or 1/2 mile buffer]	9.17	6.00	3.17	Yes	-6.00		0.00	0.33	0.11	1.20	2.40	0.98	0.98	0.65
Nodes: Average Area of Small Parks in Area	109,823.15	129,714.65	-19,891.50	Yes	-129,714.65		0.00	0.89	1.75	1.15	0.24	1.68	0.29	1.18
Nodes: Distance Between Small Parks in Area [Or Distance From Small Park to Large Parks if No Smaller Park Available][Within 1/2 Mile]	2,133.75	776.89	1,356.86	No	-776.89		0.00	0.97	0.89	1.12	0.25	1.24	1.53	0.36
Nodes: Number of Large Parks in Area [Within 1/2 mile]	1.83	2.00	-0.17	Yes	-2.00		0.00	1.64	2.18	0.55	0.55	0.55	0.55	1.09
Nodes: Average Area of Large Parks [Within 1/2 mile]	3,009,733.39	3,461,620.93	-451,887.55	Yes	-3,461,620.93		0.00	0.53	0.66	2.40	1.71	0.49	0.21	1.15
Nodes: [Total Distance Between Large Parks][Major Parks Around Site, that Function as Edges]	5,687.41	451.52	5,235.88	No	-451.52		0.00	0.56	1.85	2.05	0.00	0.50	1.03	0.08
LANDMARKS, GENERAL														
Landmarks: Number of Referencing Landmarks [or within 1/2 mile if none in site][Tall Structures mainly][Amster: referencing landmarks are mainly canals and churches]	5.50	2.00	3.50	Yes	-2.00		0.00	0.18	0.18	2.36	1.64	0.73	0.91	0.36
Landmarks: Number of Non-Referencing Landmarks in Area [Barca, Paris: Placas/Squares and Churches used only]	12.50	0.00	12.50	No	0.00		0.00	0.64	0.24	0.80	2.16	0.48	1.68	0.00
Landmarks: Total Landmarks in Area	18.00	2.00	16.00	No	-2.00		0.00	0.50	0.22	1.28	2.00	0.56	1.44	0.11
Landmarks: Average Distance Between Landmarks in Area [Within 1/2 mile of Site]	1,538.41	1,956.79	-418.38	Yes	-1,956.79		0.00	0.73	2.16	0.87	0.39	1.75	0.10	1.27
Landmarks: Height of Tallest Landmarks, Vertical Feet	343.33	1,040.00	-696.67	No	-1,040.00		0.00	2.89	0.20	0.73	0.58	0.80	0.79	3.03
Landmarks: Number of Landmarks at Nodes/Terminate Pathways [Within 100 Feet of Landmark]	3.00	1.00	2.00	No	-1.00		0.00	1.33	0.00	1.00	1.00	1.00	1.67	0.33
Landmarks: Landmarks Not at Nodes or Do Not Terminate Pathways	15.00	1.00	14.00	No	-1.00		0.00	0.33	0.27	1.33	2.20	0.47	1.40	0.07
DISTRICTS, GENERAL														
Districts: Number of Planning Districts or Neighborhoods in Site Area? [Barca, 3 sub-districts within larger District][Paris, most in 11 er. Arr., bottom section in 12 er. Arr.]	1.33	1.00	0.33	Yes	-1.00		0.00	1.50	0.75	0.75	1.50	0.75	0.75	0.75
Districts: How Many Districts Are in The Site	1.17	2.00	-0.83	No	-2.00		0.00	1.71	1.71	0.86	0.00	0.86	0.86	1.71
District: How Many Planning Districts Divided By Grid Blocks	0.50	0.00	0.50	Yes	0.00		0.00	0.00	2.00	2.00	0.00	0.00	2.00	0.00
District: Ratio of Clump/Planning Correspondence	0.50	0.00	0.50	Yes	0.00		0.00	0.00	2.00	2.00	0.00	0.00	2.00	0.00
Districts: Number of Blocks in Largest District Area	52.17	33.00	19.17	No	-33.00		0.00	0.84	0.92	0.77	1.46	0.79	1.23	0.63
District: Number of Blocks in Second Largest District	6.50	0.00	6.50	Yes	0.00		0.00	1.54	0.92	0.00	0.00	3.54	0.00	0.00
District: Average Number of Nodes in District	4.83	0.00	4.83	No	0.00		0.00	0.41	0.00	1.86	0.62	1.86	1.24	0.00
District: Number Streets Lengths Edged by Large Park, Coastline, Railroad, Major Roadway, Canal	33.17	24.00	9.17	Yes	-24.00		0.00	0.12	0.09	0.72	3.08	1.18	0.81	0.72
District: How Many Perceived "Centers" of the District [Routes, Commercial Areas, Square, etc.]	2.00	0.00	2.00	No	0.00		0.00	0.50	0.50	1.00	1.50	1.00	1.50	0.00
District: How Many Lengths of Streets Perceived as Center of a District?	6.50	0.00	6.50	No	0.00		0.00	0.77	1.23	1.85	0.15	1.69	0.31	0.00
DISTRICT, DENSITY														
District: How Many Buildings Per Acre?	7.57	2.34	5.23	Yes	-2.34		0.00	0.69	0.40	0.57	1.76	2.19	0.38	0.31
District: How Many Single-Family Buildings Per Acre?	3.67	1.58	2.09	Yes	-1.58		0.00	1.97	0.81	0.22	0.00	0.00	0.00	0.43
District: How Many Multi-Family Apartments Per Acre?	24.31	0.52	23.79	Yes	-0.52		0.00	0.02	0.00	2.98	0.00	0.00	0.00	0.02
District: Number of Commercial Buildings on Ground Floor [Barca: first floor being mainly commercial/mixed/other and not residential][Paris: possible lots for commercial with a public side. The actual number is most likely less]	1,096.33	25.00	1,071.33	Yes	-25.00		0.00	0.10	0.02	0.45	2.65	1.57	1.21	0.02
District/How Many Commercial Buildings Per Acre?	3.35	0.07	3.28	Yes	-0.07		0.00	0.08	0.02	0.44	2.68	1.98	0.79	0.02
VITALITY (from Google Maps)														
Vitality: Banks in the Area [Or Within 1/2 mile if none in site]	13.50	7.00	6.50	Yes	-7.00		0.00	0.52	0.15	0.74	1.41	0.52	2.67	0.52
Vitality: Café/Coffee Houses in Area [or Within 1/2 Mile if none in site]	19.33	8.00	11.33	Yes	-8.00		0.00	0.57	0.00	1.66	1.29	1.24	1.24	0.41
Vitality: Restaurants in Area [or Within 1/2 mile if none in site][Paris site has more restaurants immediately outside of 1/2 mile site buffer]	63.50	15.00	48.50	No	-15.00		0.00	0.94	0.19	1.18	1.24	1.15	1.29	0.24
Vitality: 24 Hour Night Life? [Yes=1, No=0]	1.00	0.00	1.00	No	0.00		0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Vitality: Number of Libraries [Number of Libraries]	4.17	0.00	4.17	Yes	0.00		0.00	0.24	0.24	0.72	0.24	2.64	1.92	0.00
Vitality: Number of Schools [and 1 block away]	12.83	4.00	8.83	Yes	-4.00		0.00	0.70	0.39	0.47	2.73	0.70	1.01	0.31
Vitality: Number of Civic Centers [Not Markets or areas of congregation --> Squares, Parks, Nodes, etc.]	0.17	0.00	0.17	Yes	0.00		0.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00
DISTRICT, TOPOGRAPHY														
Topography: Important to Give Certain Views [Yes=1, No=0][San Fran, hills and mountains][Amster, canals][Paris, radial diagonals][Barca: Mountains]	0.83	0.00	0.83	No	0.00		0.00	1.20	0.00	1.20	1.20	1.20	1.20	0.00
Topography: Affecting Street Layout and Structure [Yes=1, No=0] [San Fran: Mainly Outside of Site Area]	0.17	0.00	0.17	Yes	0.00		0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00
Topography: Affecting House Placement? [Yes=1, No=0][Amster: Canals]	0.33	0.00	0.33	Yes	0.00		0.00	3.00	0.00	0.00	0.00	3.00	0.00	0.00
Topography: Hills or Mountains Affecting District [Yes=1, No=0]	0.17	0.00	0.17	Yes	0.00		0.00	6.00	0.00	0.00	0.00	0.00	0.00	0.00
Topography, Horizontality or Verticality of the Buildings [Yes=1, No=0]	0.17	0.00	0.17	Yes	0.00		0.00	6.00	0.00	0.00	0.00	0.00	0.00	0.00
Topography: Topography Ratio, Ratio of Topography Issues Above]	0.33	0.00	0.33	No	0.00		0.00	2.40	0.00	0.60	0.60	1.80	0.60	0.00
TEXTURE AND MATERIALS ON STREET														
Streetlights: Streetlamps in Commercial Area [Yes=1, No=0]	0.83	1.00	-0.17	Yes	-1.00		0.00	1.20	1.20	1.20	1.20	0.00	1.20	1.20

Table 1 (continued)

	RESILIENCY MEAN	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	Urban Residential	ATLANTA, OLD FOURTH WARD	ATLANTA, OLD FOURTH WARD	SAN FRANCISCO	PORTLAND	NEW YORK	PARIS	AMSTERDAM	BARCELONA	ATLANTA
	This is the mean of Resiliency Between These Cities	Old Fourth Ward Current Conditions	Difference Between Old Fourth Ward and Resiliency Mean	Did the Old Fourth Ward Satisfy the Low or High Standard Deviation	Changed Figures to Old Fourth Ward Numbers	Revised Numbers, Old Fourth Ward	New Comparison With Median	Castro District	University Park	West Village	Republique - Bastille, 11 er. Arrondissement, Nation - Bercy 12 er. Arrondissement	Niew Pijp (Oud Zuid) [Discrepancies in Amsterdam data, fixed with approximations)	L'Antiga Esquerra de, La Nova Esquerra de, and Dereta de l'Eixample	Old Fourth Ward
	MEAN	ATLANTA	ATLANTA	ATLANTA	ATLANTA, GEORGIA	ATLANTA	ATLANTA	SAN FRANCISCO	PORTLAND	NEW YORK	PARIS	AMSTERDAM	BARCELONA	ATLANTA
Streetlights: District Character of Streetlights [Yes=1, No=0] [Barca has some distinctive ones, but not spread out enough or the type to create a district feel][Paris has distinctive streetlights]	0.17	0.00	0.17	Yes	0.00		0.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00
Floorscape: Asphalt as Main Sidewalk Material					0.00									
Floorscape: Tiles, Stamped Concrete, as Main Sidewalk Material	25.33	0.00	25.33	Yes	0.00		0.00	0.00	0.00	0.00	0.00	0.00	6.00	0.00
Floorscape, Bricks, Stone or Bricks/Concrete as Main Sidewalk Material	38.67	26.00	12.67	Yes	-26.00		0.00	0.03	0.00	0.00	0.00	5.97	0.00	0.67
Floorscape, Concrete Only as Main Sidewalk Material	131.67	112.00	19.67	Yes	-112.00		0.00	1.03	1.59	1.06	2.33	0.00	0.00	0.85
Floorscape: Greenspace [Parklet][Not Small or Large Parks]	42.00	126.00	-84.00	No	-126.00		0.00	0.05	4.83	0.00	0.02	0.76	0.33	3.00
Crosswalks: Number of Crosswalks Painted Not Signed and Obvious	42.17	38.00	4.17	Yes	-38.00		0.00	0.97	1.61	0.00	0.78	2.63	0.00	0.90
Crosswalks; Number of Crosswalks Signed and Obvious	57.17	35.00	22.17	Yes	-35.00		0.00	0.61	0.16	1.05	2.17	0.49	1.52	0.61
Texture: Streets Lengths With Facades that Texture the Public Edge [Within 20 feet of block perimeter]	124.00	1.00	123.00	No	-1.00		0.00	1.10	0.08	1.12	2.48	0.00	1.23	0.01
Texture: Street Lengths that Do Not Texture the Public Edge	71.67	137.00	-65.33	Yes	-137.00		0.00	0.00	2.78	0.00	0.00	3.22	0.00	1.91
District Awnings: Approximate Number of Awnings within District [Barca, most Street Lengths have 1.5 or fewer awnings on average][Amster: 67 awnings in commercial district area on 2 streets, and 14 in other areas][Paris, approximation based on 4 main streets]	193.67	8.00	185.67	No	-8.00		0.00	0.32	0.06	2.45	1.57	0.42	1.18	0.04
Texture City: Material, Building Style, Building Height/Horizontality or Placement of Structures, Indicative of a District and sets area apart from other CITIES [Yes=1, No=0]	0.83	0.00	0.83	No	0.00		0.00	1.20	0.00	1.20	1.20	1.20	1.20	0.00
Texture District: Material, Building Style, Building Height/Horizontality or Placement of Structures, Indicative of a District and sets area apart from other DISTRICTS IN SAME CITY [Yes=1, No=0]	0.17	0.00	0.17	Yes	0.00		0.00	0.00	0.00	0.00	0.00	0.00	6.00	0.00
District Structural Style [Close windows, similar horizontality, verticality, height, balcony placements, etc.], Largest Group of Structural Style / Total Buildings in Area [Approximation][Paris: approximated by 2 routes, 3 styles that fit 1 main typology][Amsterdam: one main material and typology][New York: Urban Apartment with balcony style][San Fran: Victorian and Similar Thin Flat style][Barca: Eixample Perimeter Block style]	0.64	0.00	0.64	No	0.00		0.00	1.04	0.00	1.31	1.27	1.40	0.98	0.00
PARKING														
Parking: Average Number of Sides of Street Lengths that Have Parking [Barca, every street has either intersection or side parking, or both]	1.97	1.71	0.26	No	-1.71		0.00	0.98	1.01	1.01	1.01	0.96	1.01	0.87
Parking: Lots and Structures in Area [Amster, has one parking lot in the canal, maybe movable]	5.00	19.00	-14.00	No	-19.00		0.00	0.60	2.20	2.80	0.00	0.20	0.20	3.80
Parking: Lots in Area Under 2 acres	4.83	16.00	-11.17	No	-16.00		0.00	0.62	2.28	2.90	0.00	0.00	0.21	3.31
Parking: Lots in Area Over 2 Acres	0.17	3.00	-2.83	No	-3.00		0.00	0.00	0.00	0.00	0.00	6.00	0.00	18.00
Parking: Parking Structures in Area	0.67	1.00	-0.33	Yes	-1.00		0.00	0.00	0.00	4.50	0.00	0.00	1.50	1.50
DISTRICT, DIVERSE USE														
Use: Mixed Use/Industrial: [Barca, Paris, Amsterdam, effectively all lots are mixed-use but seemingly classified as Residential][ATL: Mixed-Use blocks placed in commercial + residential for calculation purposes, ATL had only mixed-use category of Site Areas]	0.00	0.00	0.00	Yes	0.00									
Use: Number of Blocks that are Commercial Only	0.50	3.00	-2.50	No	-3.00		0.00	0.00	0.00	6.00	0.00	0.00	0.00	6.00
Use: Number of Blocks That Are Commercial + Residential Only	46.17	9.00	37.17	No	-9.00		0.00	0.11	0.17	0.76	1.62	1.99	1.34	0.19
Use: Number of Blocks That Are Commercial + Mixed-Use + Public Only	0.67	1.00	-0.33	Yes	-1.00		0.00	4.50	0.00	0.00	1.50	0.00	0.00	1.50
Use: Number of Blocks That Are Residential + Mixed-Use Only	0.33	2.00	-1.67	No	-2.00		0.00	3.00	0.00	3.00	0.00	0.00	0.00	6.00
Use: Number of Blocks That Are Residential Only	15.00	18.00	-3.00	Yes	-18.00		0.00	3.00	3.00	0.00	0.00	0.00	0.00	1.20
Use: Number of Blocks That Are Public Only	0.67	0.00	0.67	Yes	0.00		0.00	0.00	1.50	1.50	0.00	0.00	3.00	0.00
Use: Number of Commercial Lots [ATL large number of commercial lots which are residential][Paris, Amsterdam, Barca, Only Lots Adjacent to Public Street, because of limited data]	807.67	104.00	703.67	Yes	-104.00		0.00	0.13	0.03	0.11	3.59	2.13	0.00	0.13
Use: Commercial Lots Area, Square Feet [Paris, Amsterdam, Barca, Only Lots Adjacent to Public Street, because of limited data]	1,429,142.17	3,542,809.89	-2,113,667.72	No	-3,542,809.89		0.00	0.39	0.21	0.53	2.85	1.97	0.05	2.48
Use: Commercial Lots Area, Acres	32.81	81.33	-48.52	No	-81.33		0.00	0.39	0.21	0.53	2.85	1.97	0.05	2.48
Use: Commercial Lots Area, Square Miles	0.05	0.13	-0.08	No	-0.13		0.00	0.39	0.21	0.53	2.85	1.97	0.05	2.48
Use: Number of Residential Lots [Barca residential lots classified as Mixed-use because first floor is commercial in this area]	2,138.50	547.00	1,591.50	No	-547.00		0.00	0.93	0.44	0.58	1.36	2.01	0.68	0.26
Use: Residential Lot Area, Square Feet	7,076,865.97	5,392,435.26	1,684,430.71	Yes	-5,392,435.26		0.00	1.33	0.71	1.22	0.58	1.09	1.08	0.76
Use: Residential Lot Area, Acres	162.46	123.79	38.67	Yes	-123.79		0.00	1.33	0.71	1.22	0.58	1.09	1.08	0.76
Use: Residential Lot Area, Square Miles	0.25	0.19	0.06	Yes	-0.19		0.00	1.33	0.71	1.22	0.58	1.09	1.08	0.76
Use: Public Lots	5.17	3.00	2.17	Yes	-3.00		0.00	1.16	0.19	0.39	3.48	0.39	0.39	0.58
Use: Public Lot Area, Square Feet [Paris, Amsterdam, Barca, Only Lots Adjacent to Public Street, because of limited data]	497,481.55	26,799.01	470,682.54	No	-26,799.01		0.00	0.50	0.34	1.67	0.37	0.99	2.13	0.05
Use: Public Lot Area, Acres	11.42	0.62	10.81	No	-0.62		0.00	0.50	0.34	1.67	0.37	0.99	2.13	0.05
Use: Public Lot Area, Square Miles	0.02	0.00	0.02	No	0.00		0.00	0.50	0.34	1.67	0.37	0.99	2.13	0.05
Use: Industrial Lots Numbers	0.00	3.00	-3.00	No	-3.00									
Use: Industrial Lots, Square Feet	0.00	127,132.00	-127,132.00	No	-127,132.00									
Use: Industrial Lots Area, Acres	0.00	2.92	-2.92	No	-2.92									
Use: Industrial Lots, Square Miles	0.00	0.00	0.00	No	0.00									

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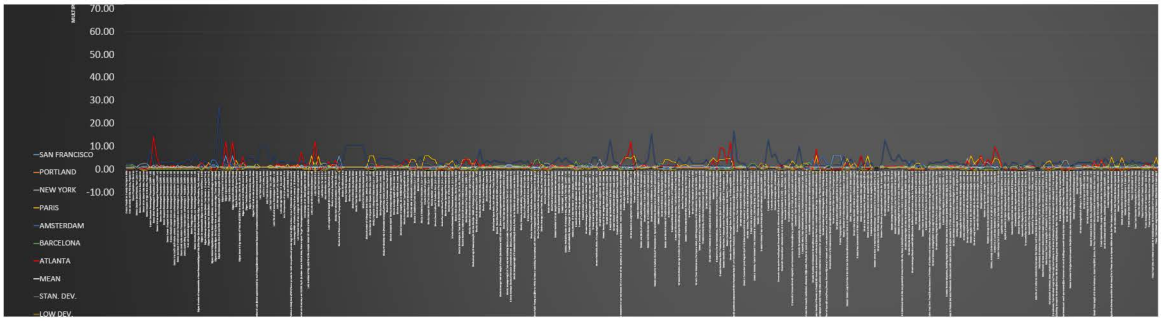
Table 2 Data Set 2

Total Chart of Urban Form With High and Low Standard Deviation



Total Chart of Urban Form Without High and Low Standard Deviation

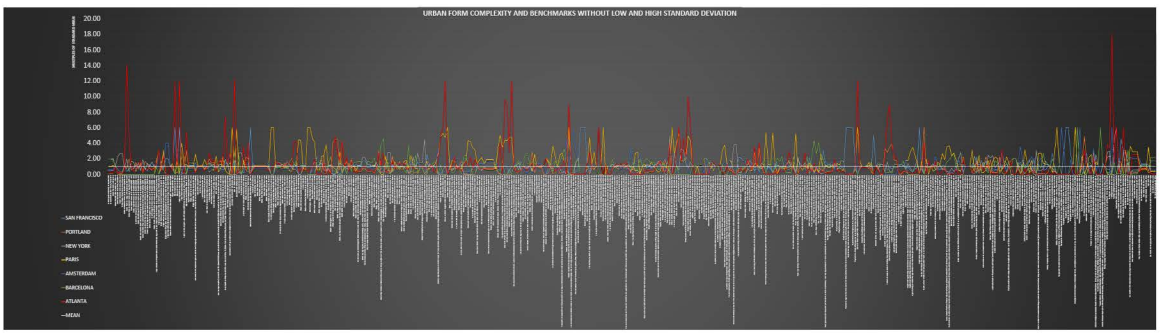
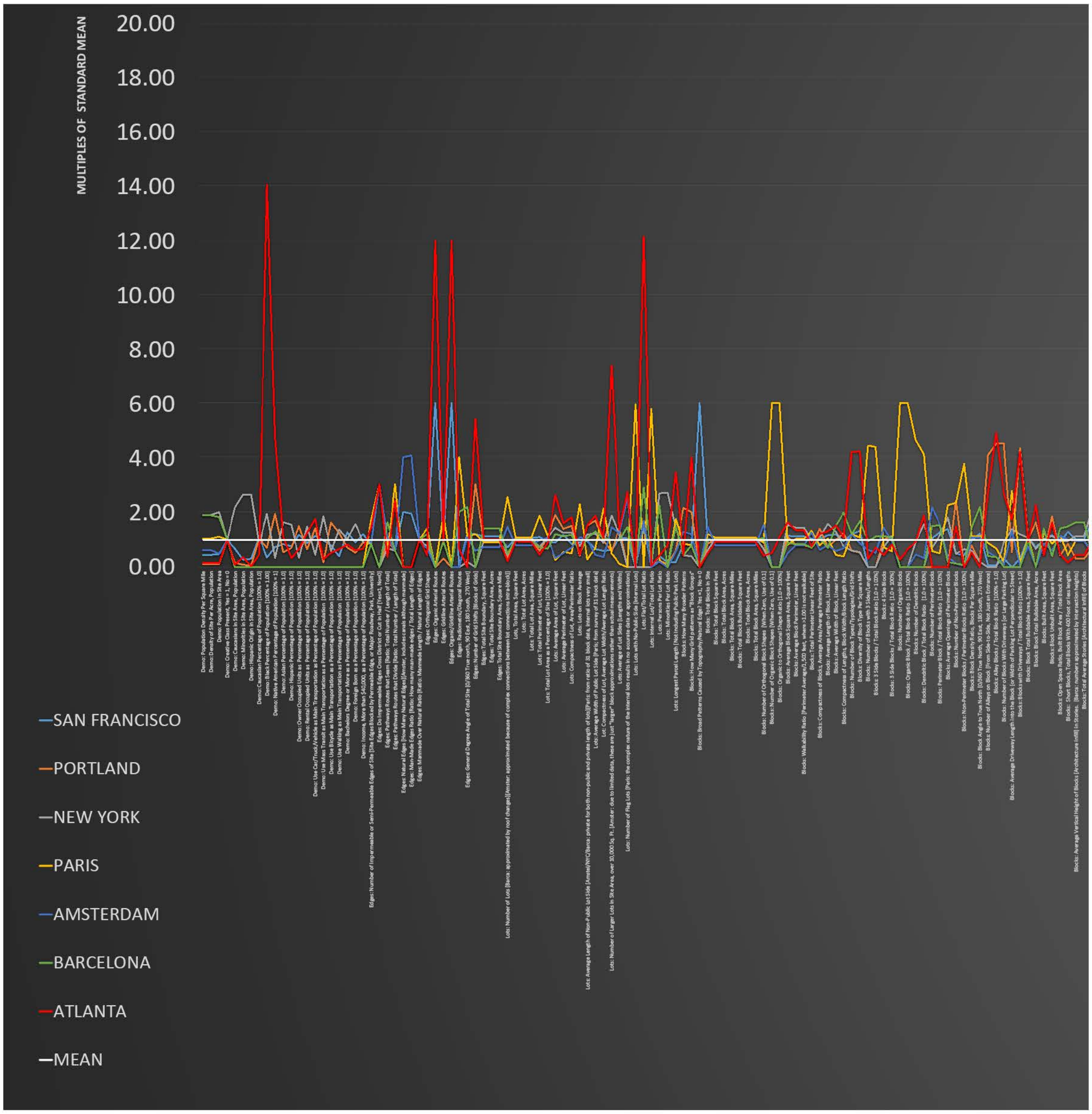


Table 2 (continued)



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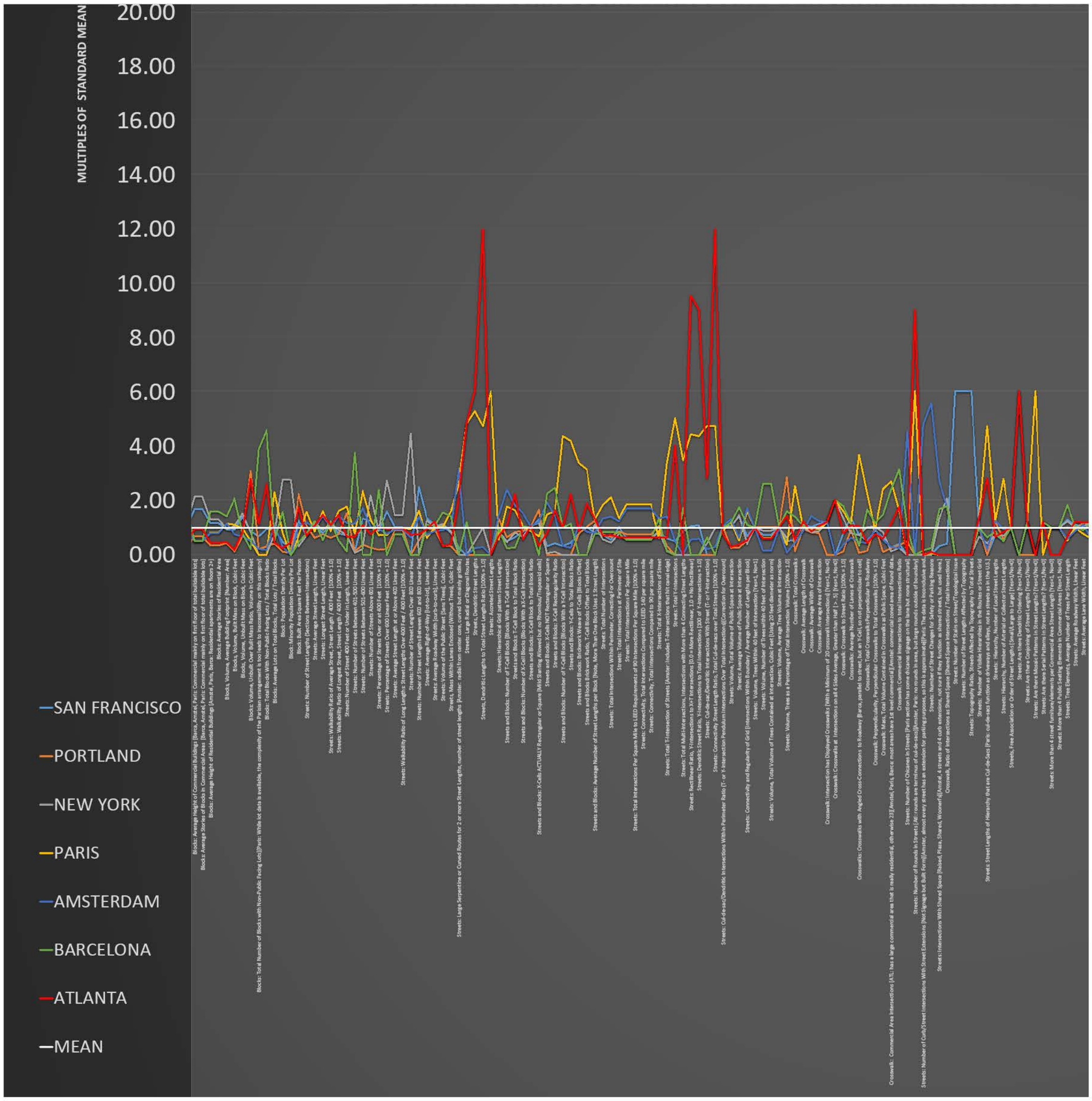

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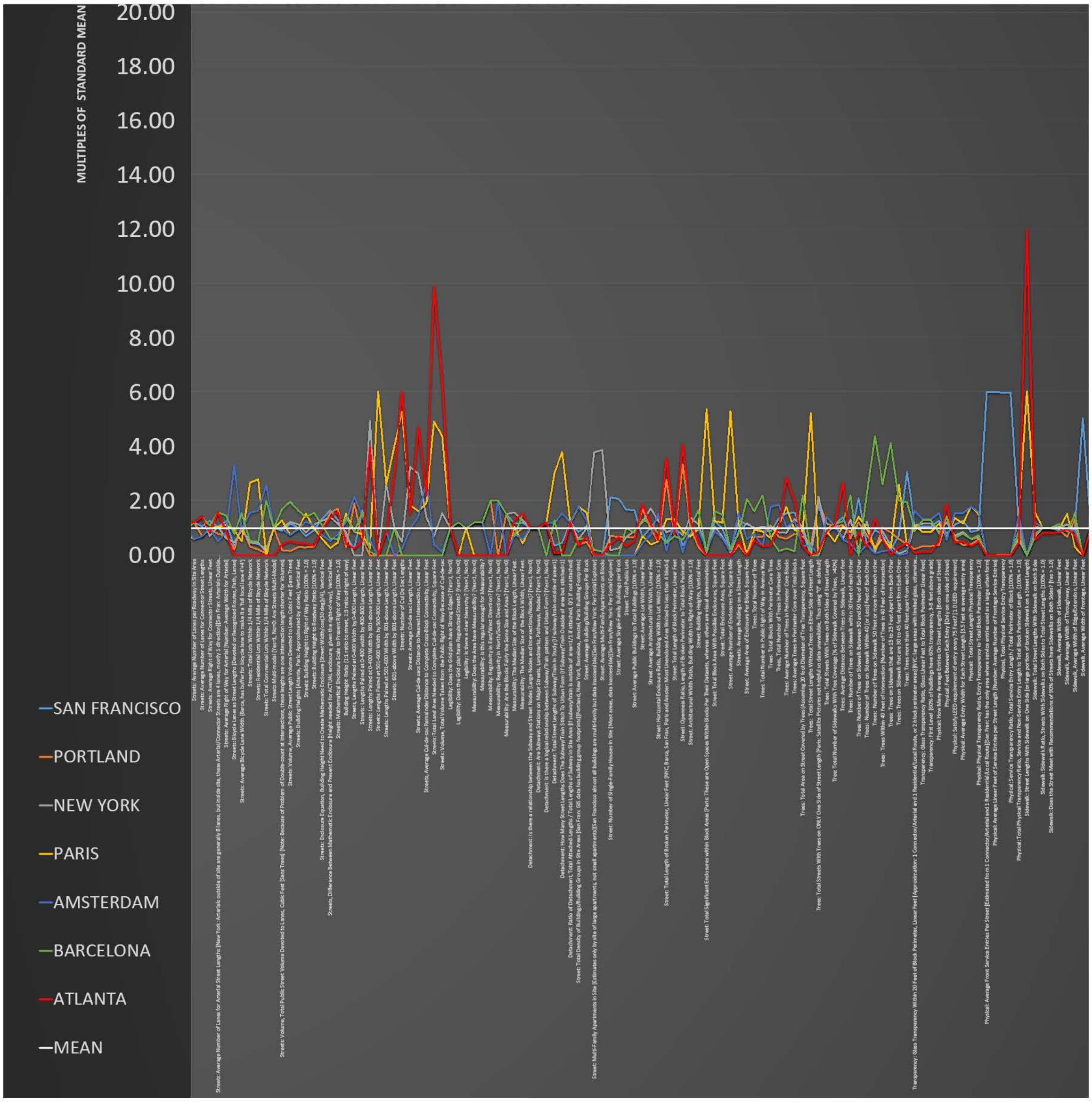

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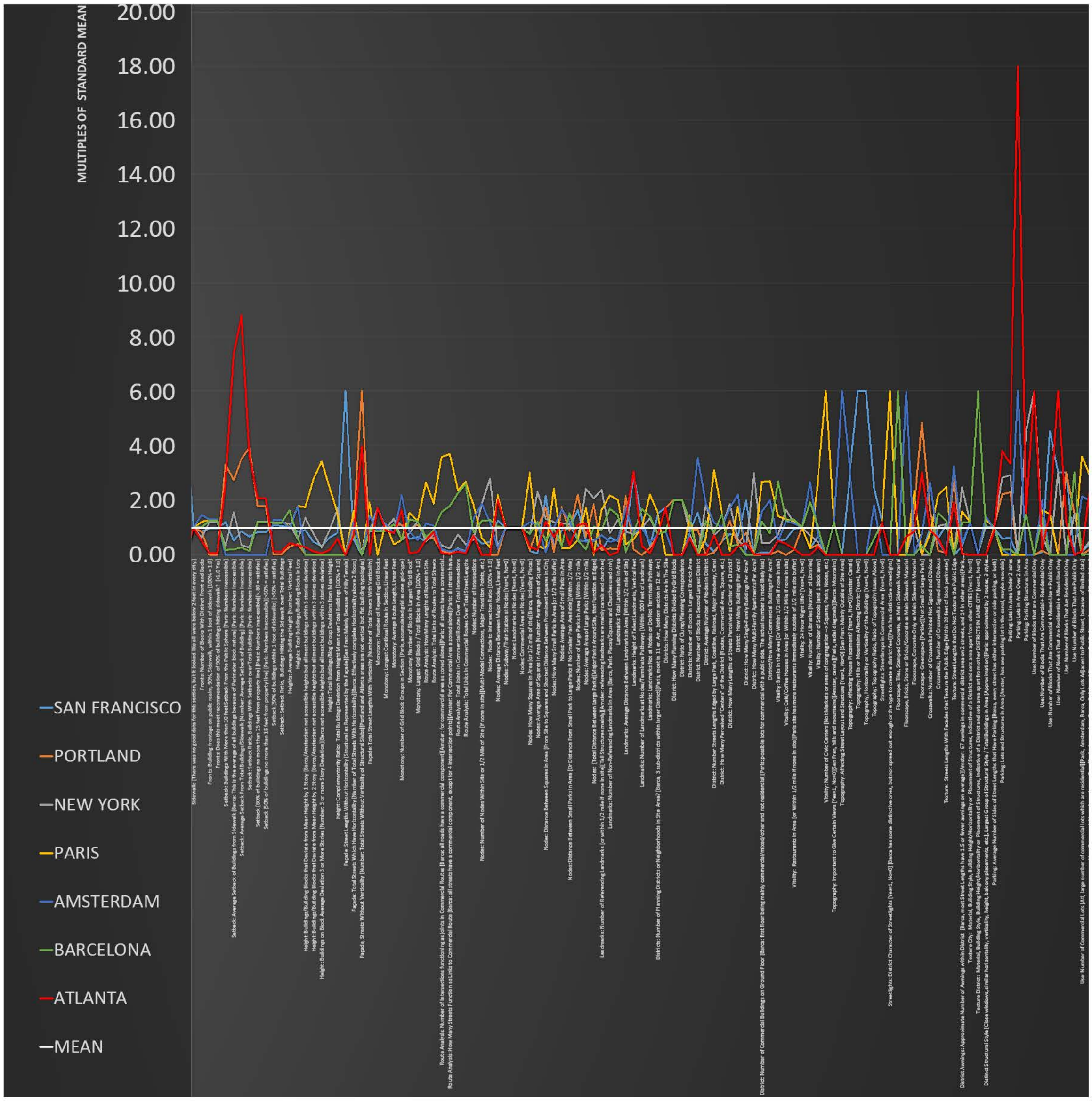

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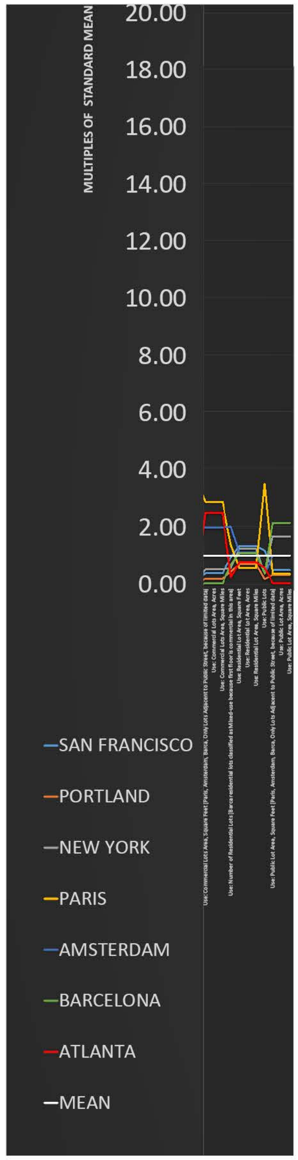
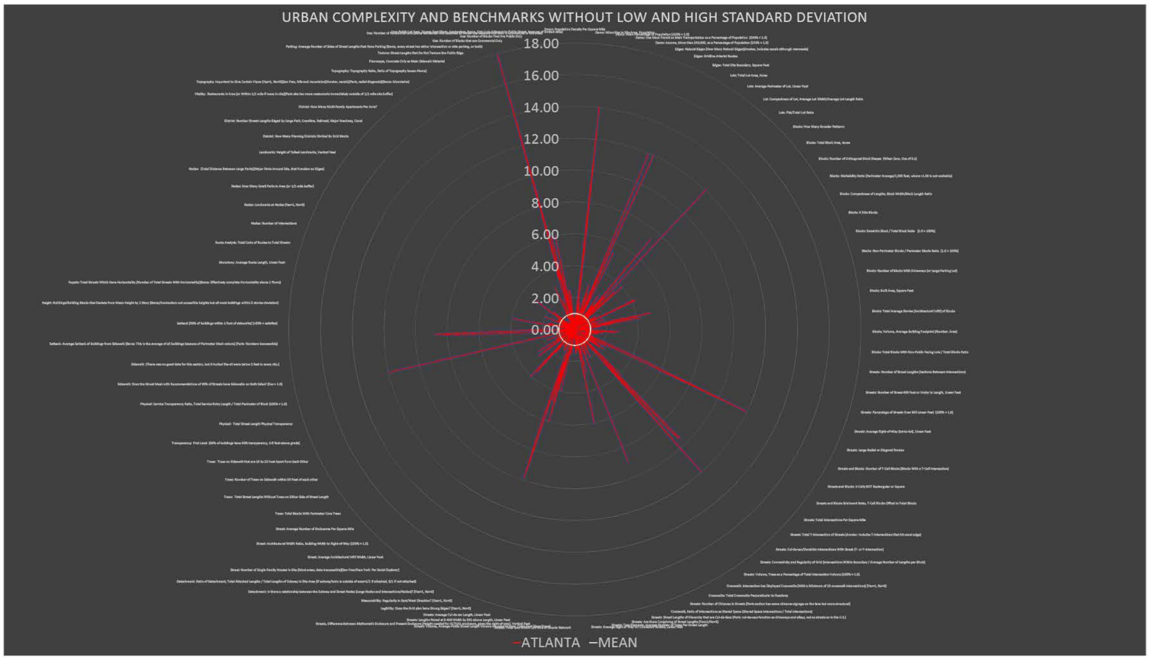
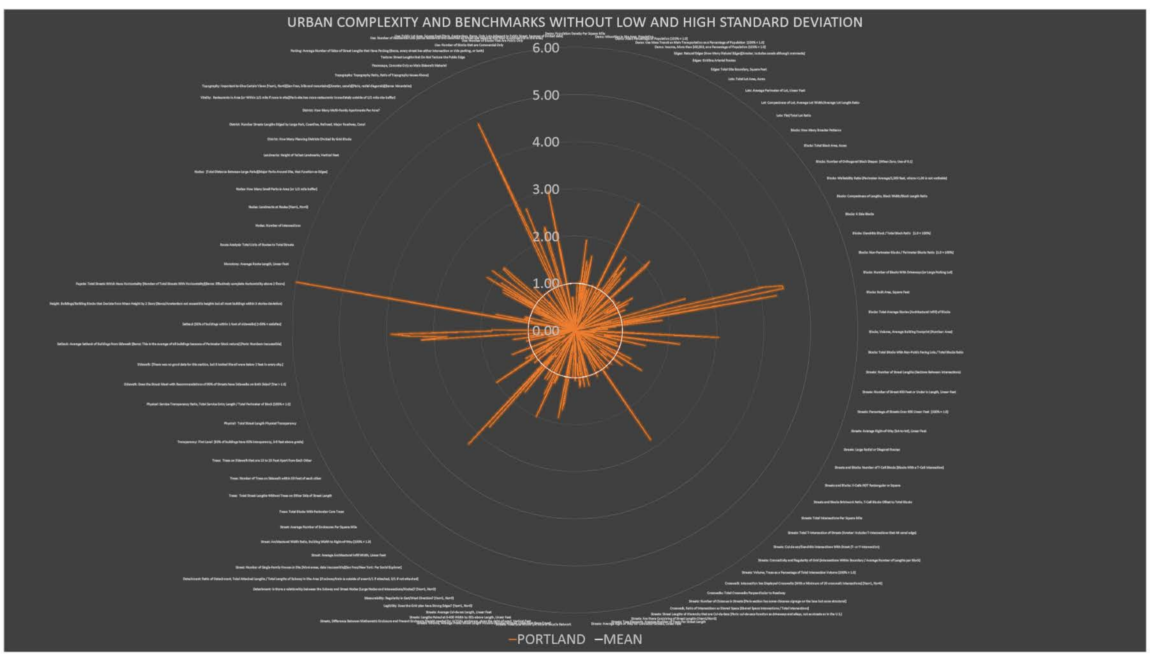


Table 3 Data Set 3: Individual City Charts





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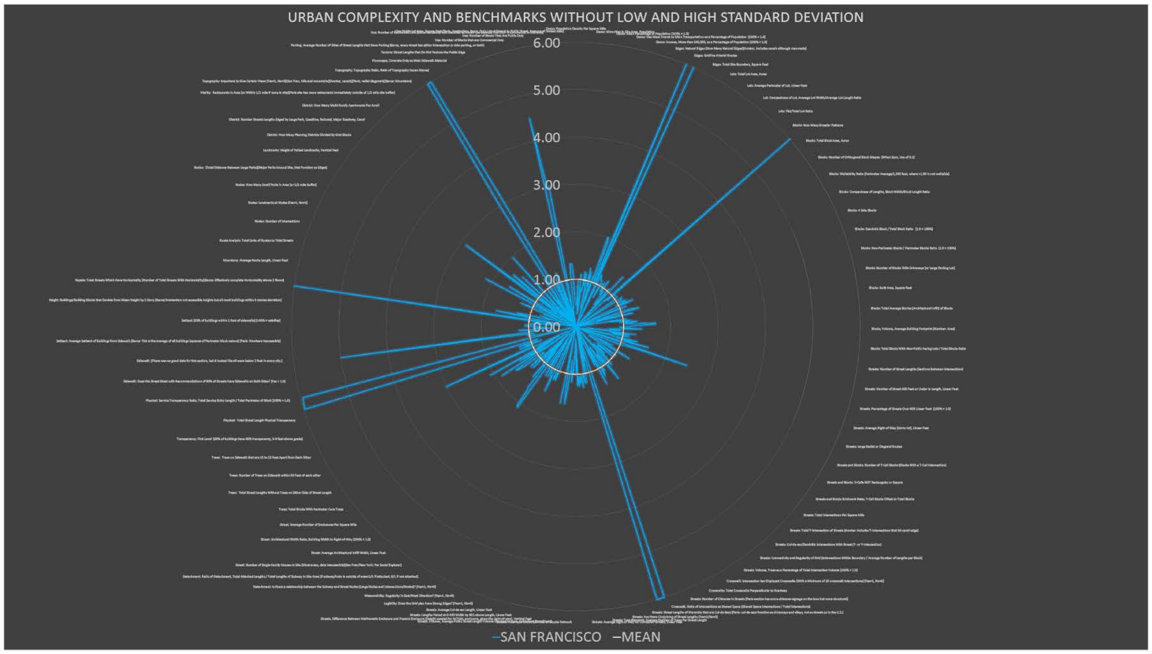

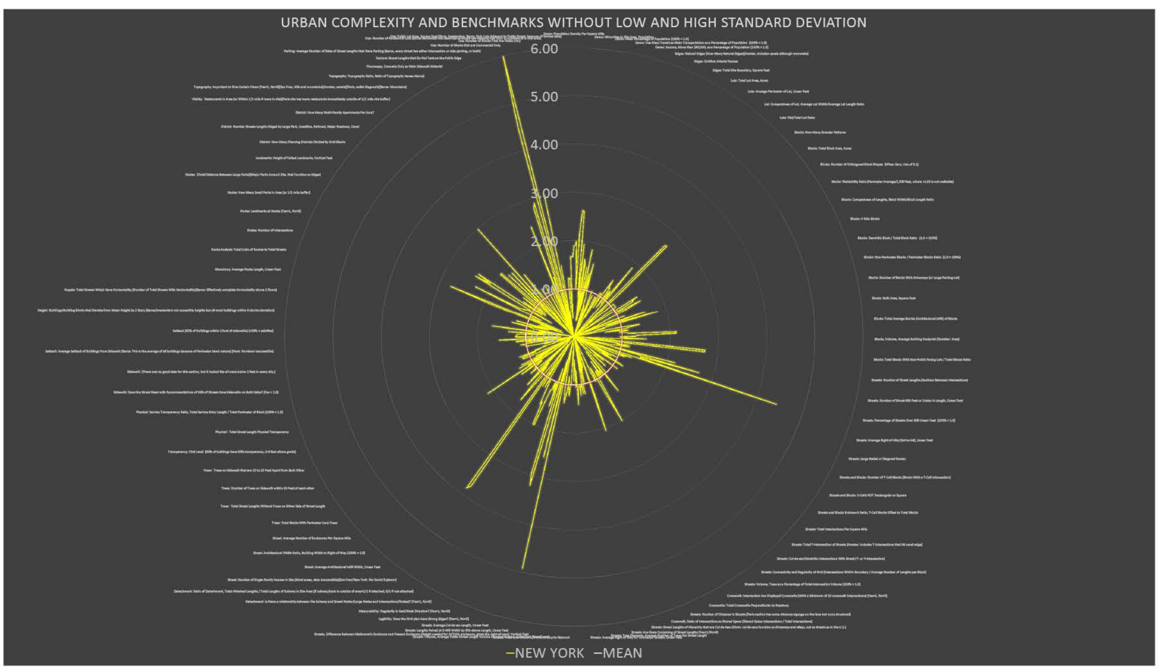

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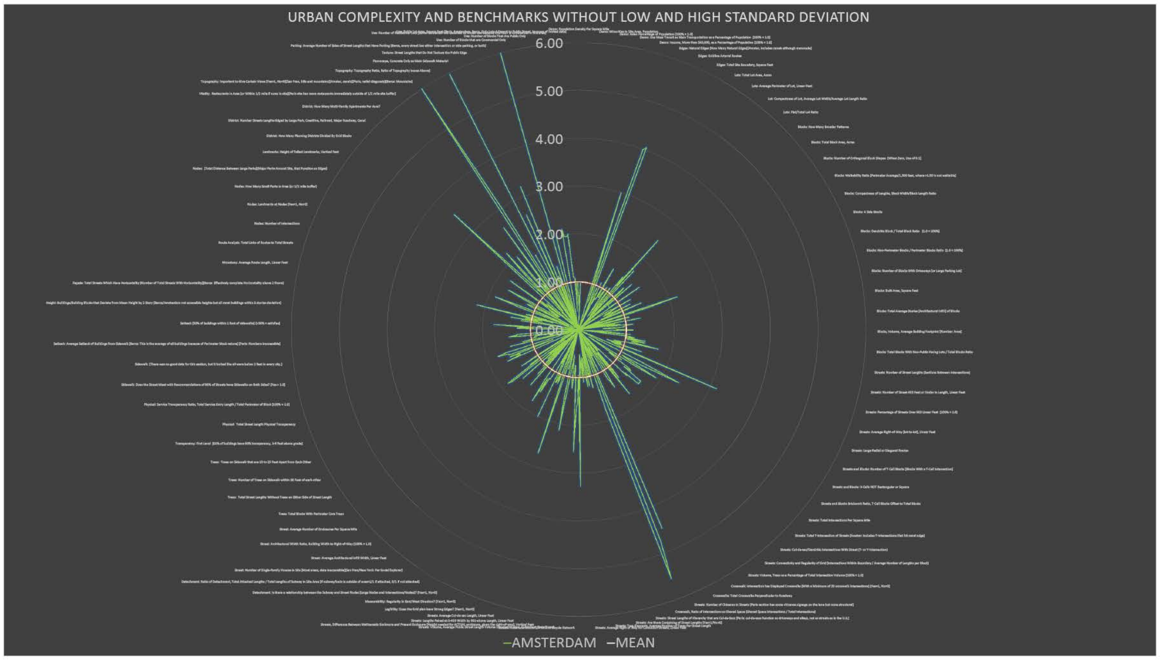

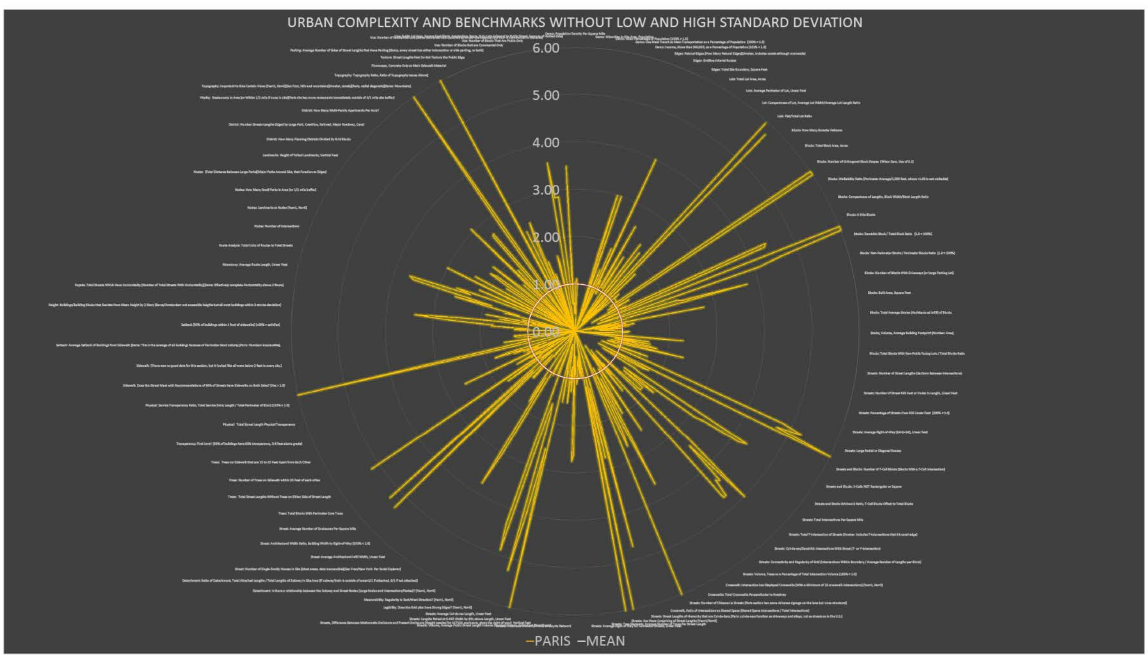

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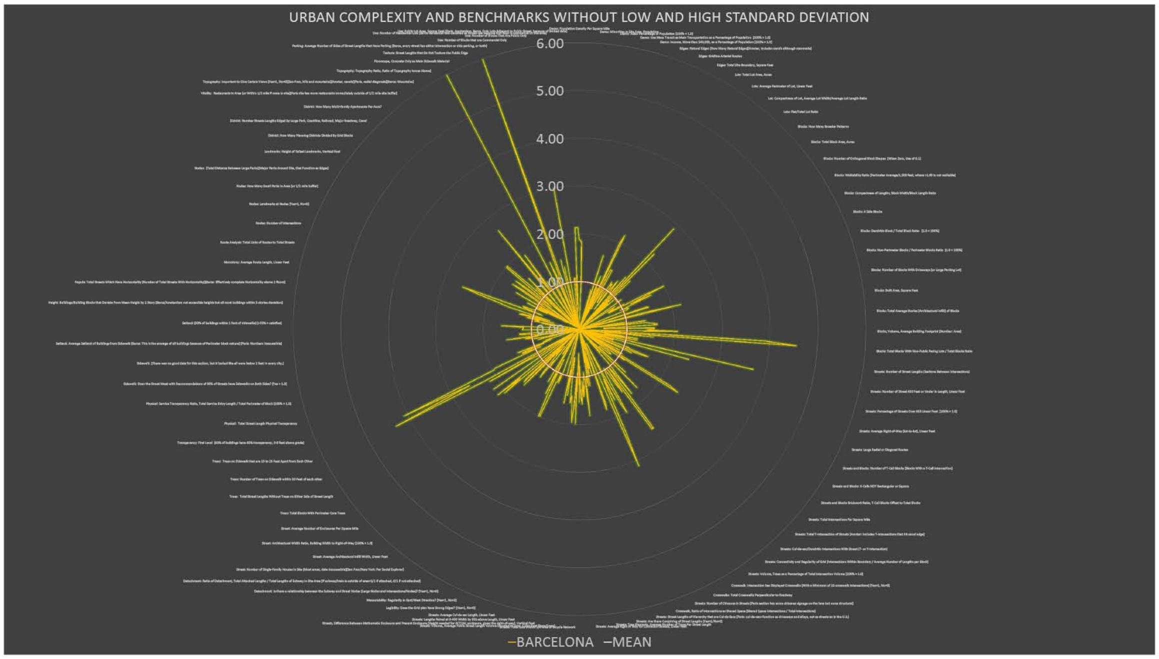
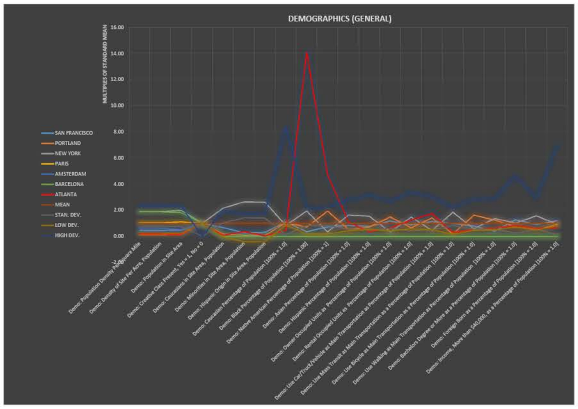
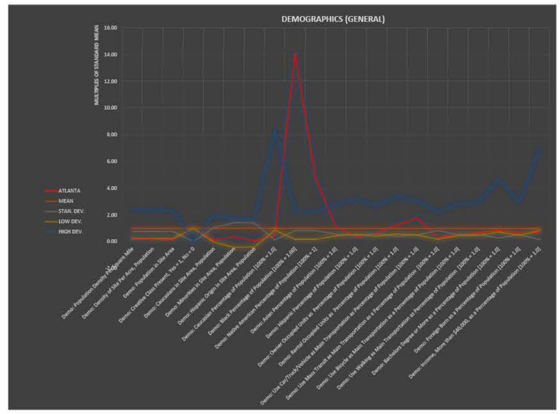
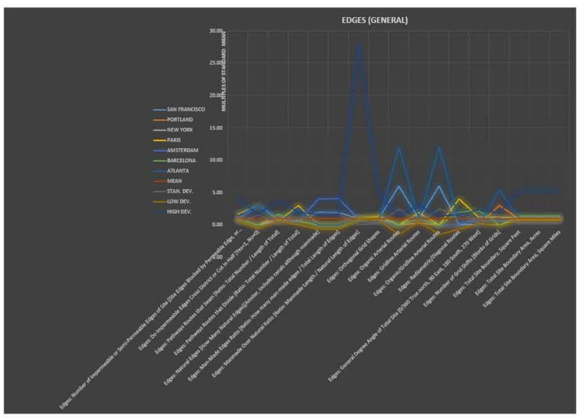
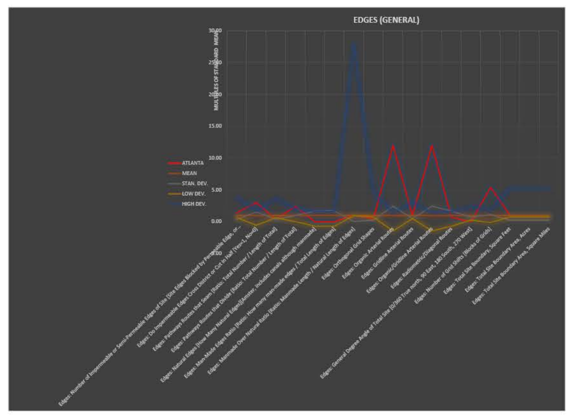


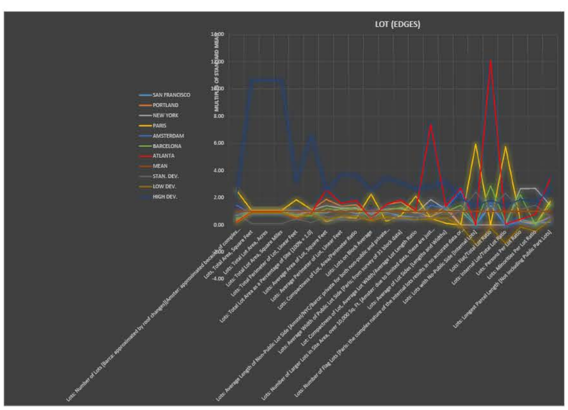
Table 4 Data Set 4: Individual Aspects of Urban Form

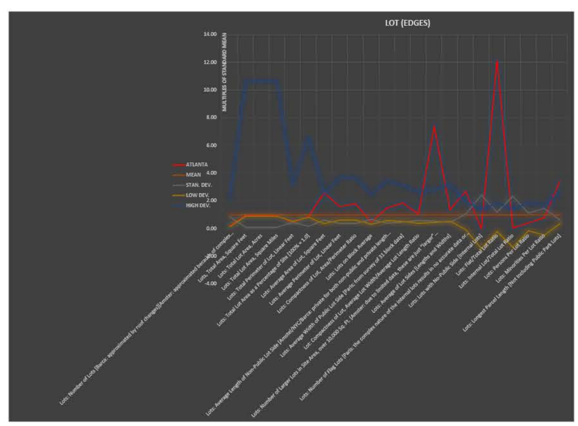












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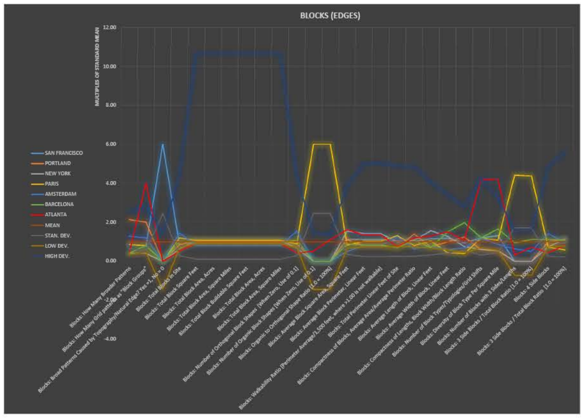

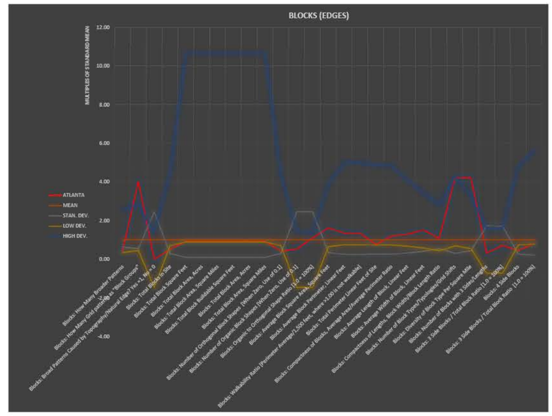

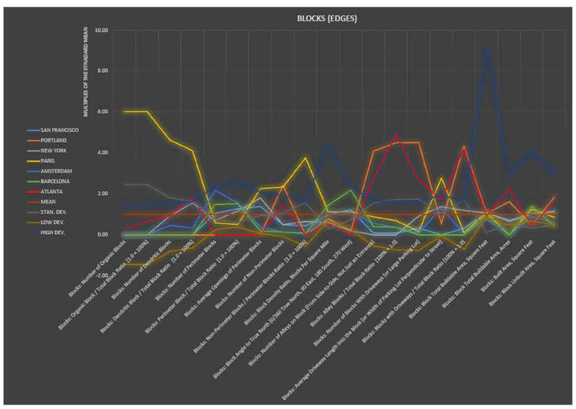

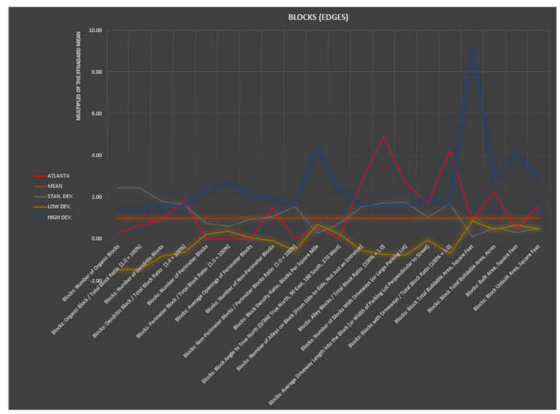

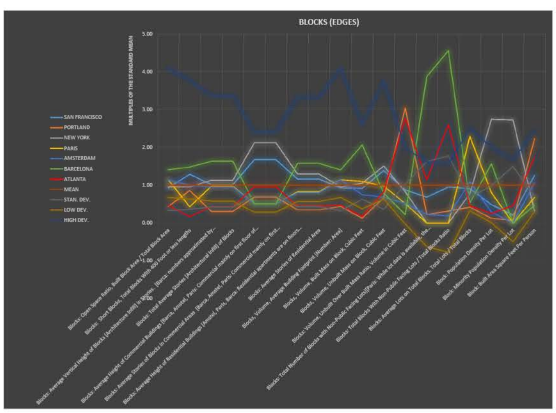

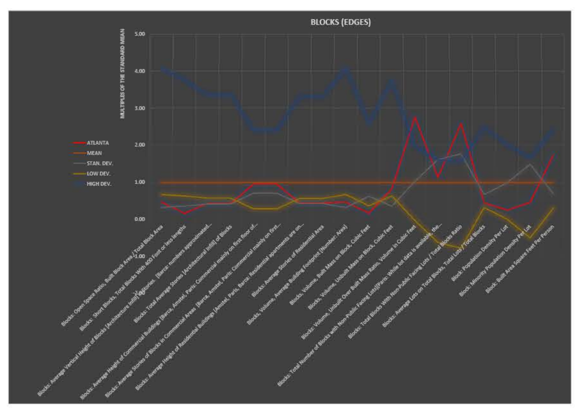

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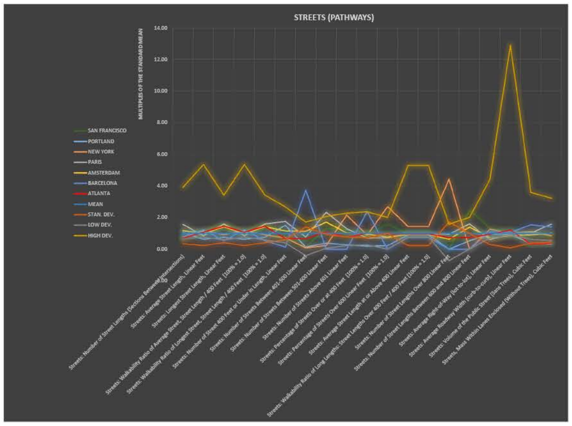

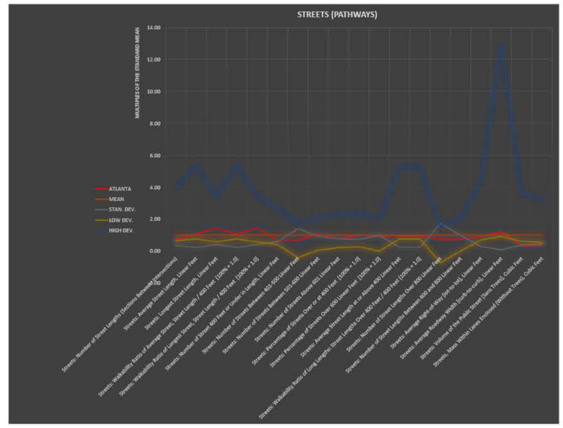

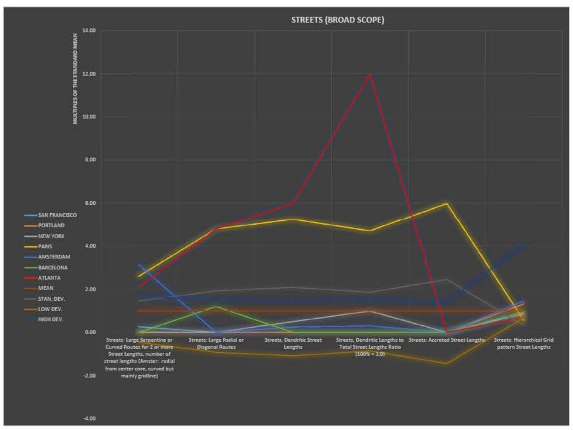

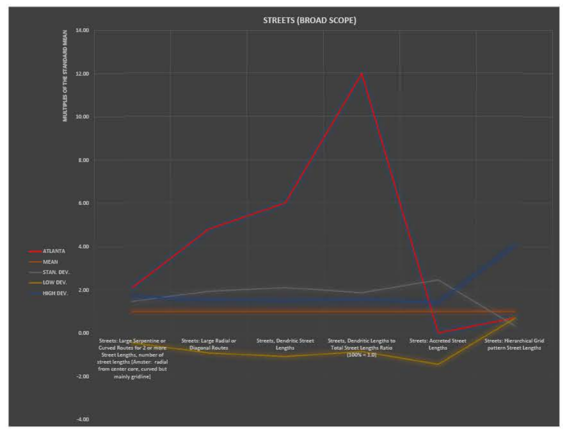

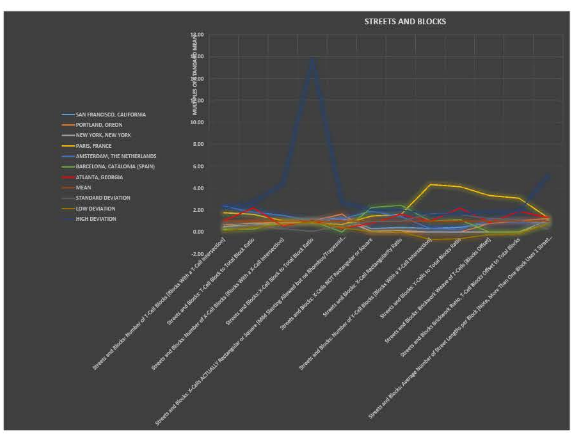

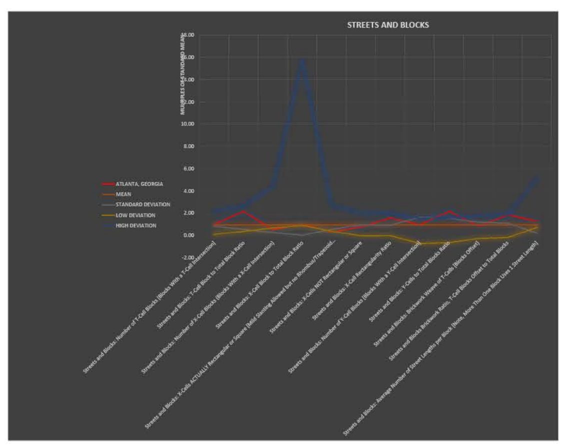

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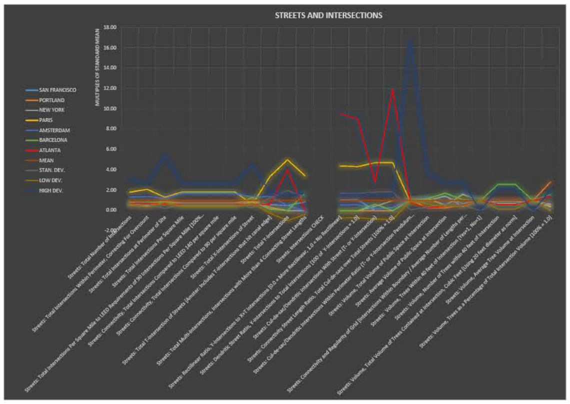

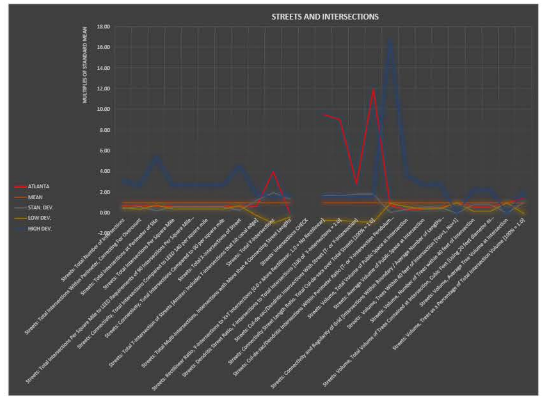

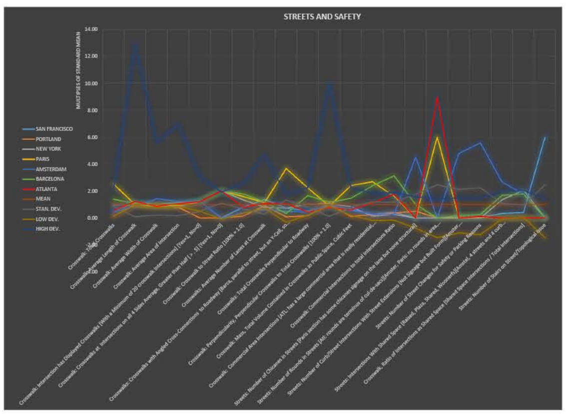

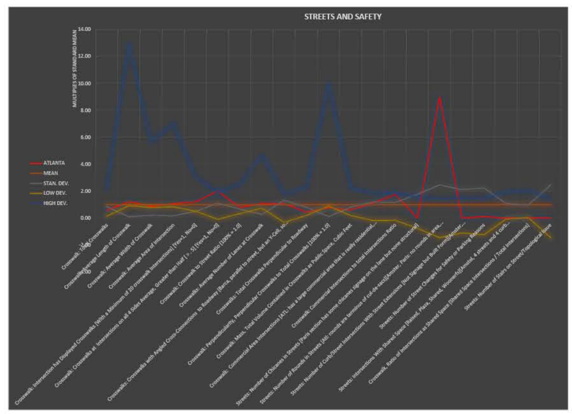

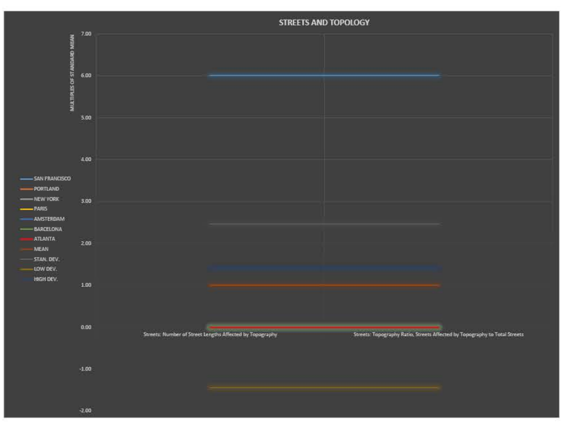

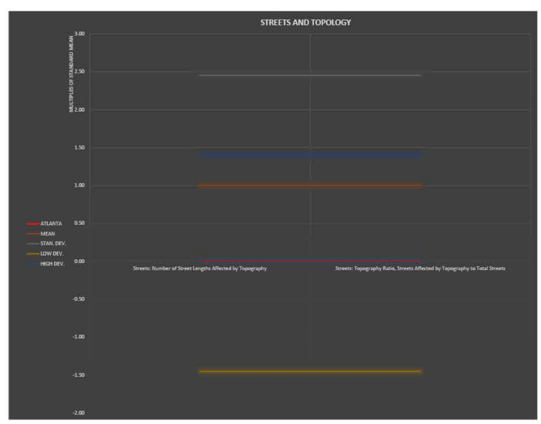

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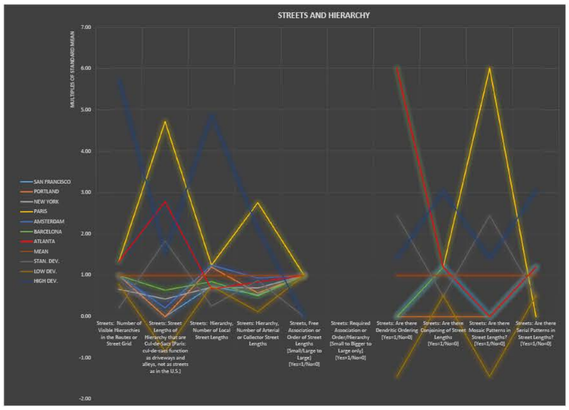

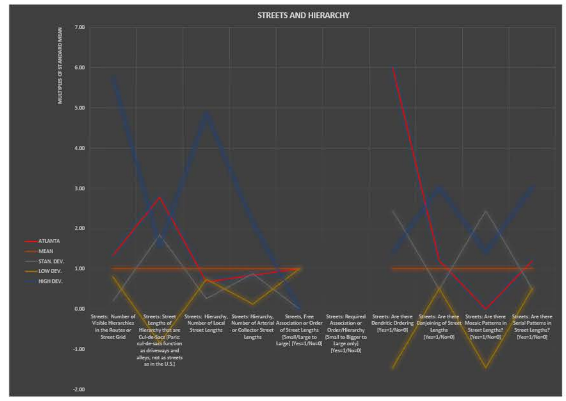

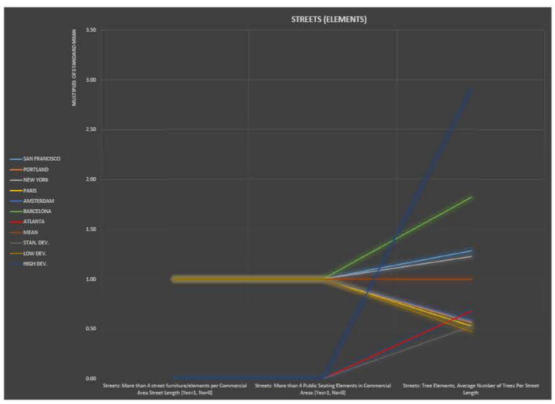

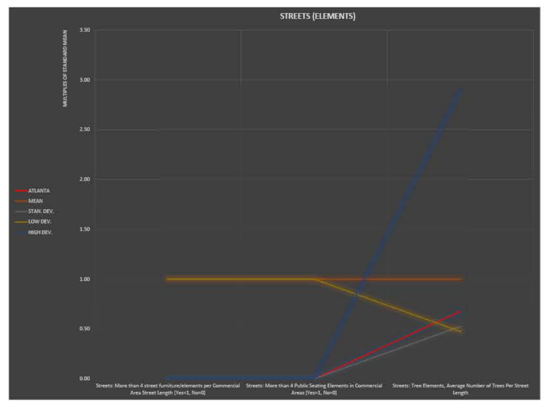

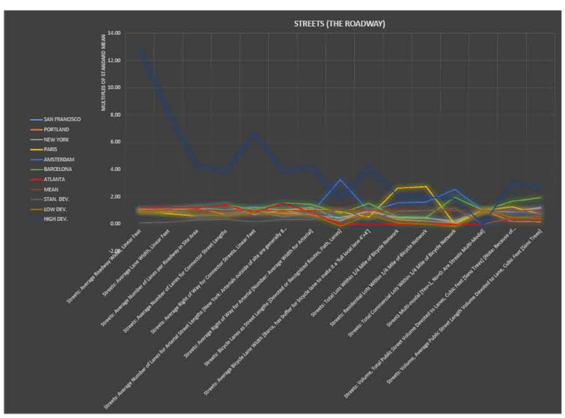

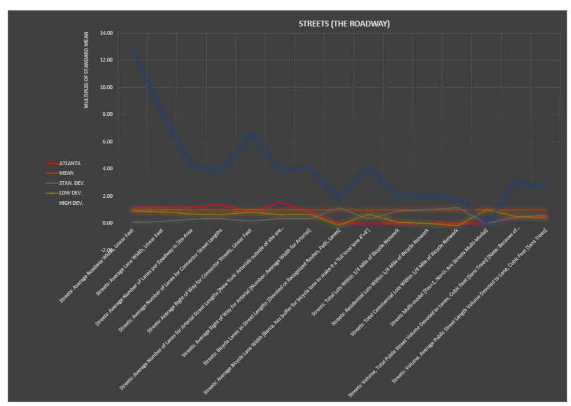

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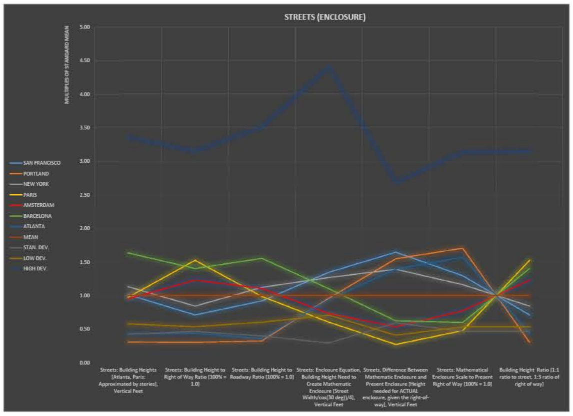

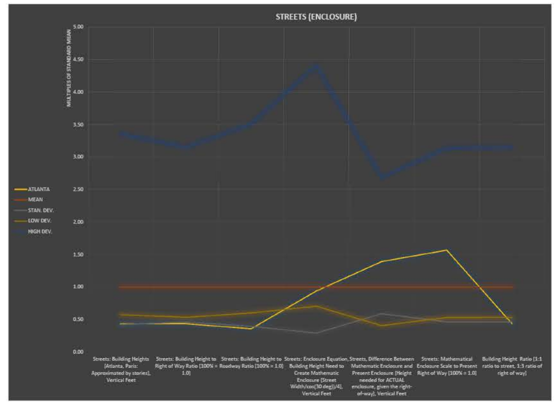

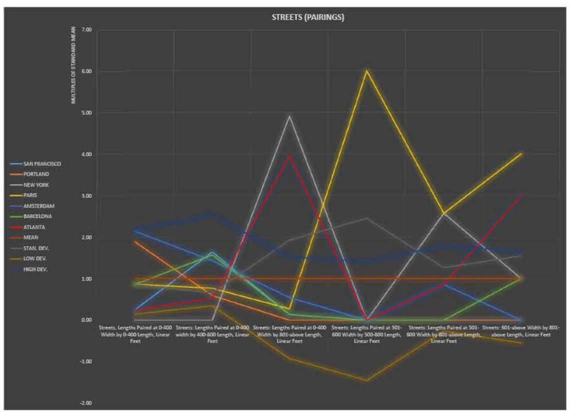

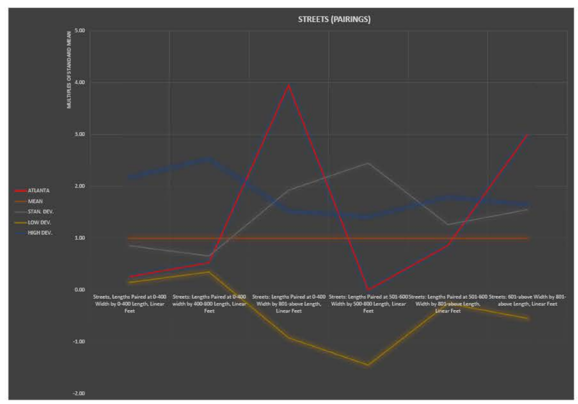

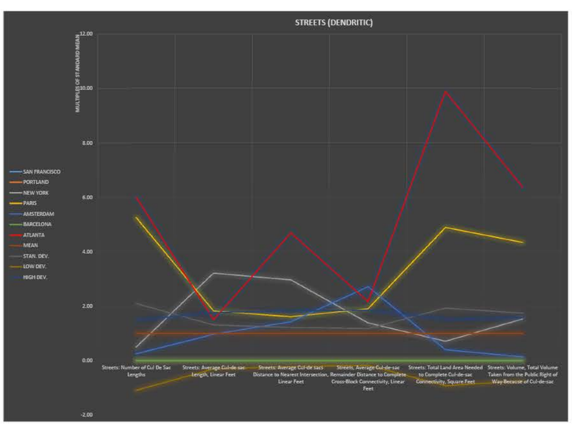

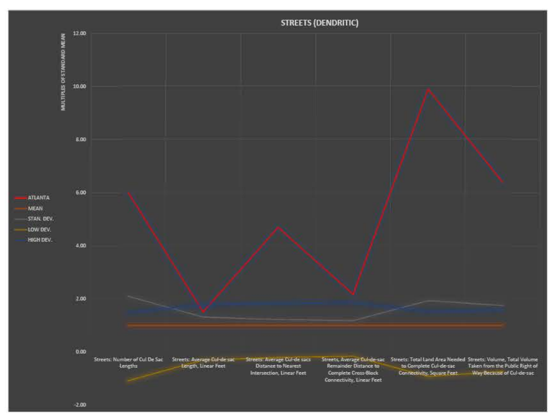

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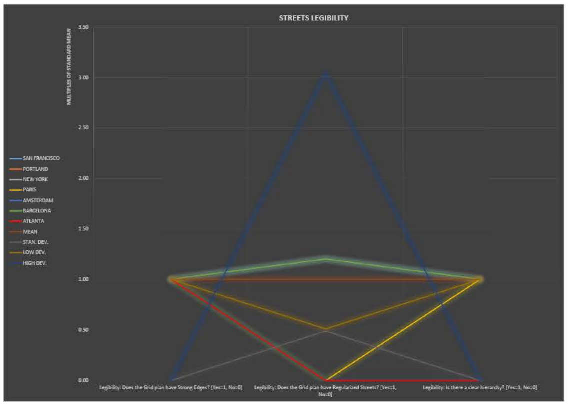

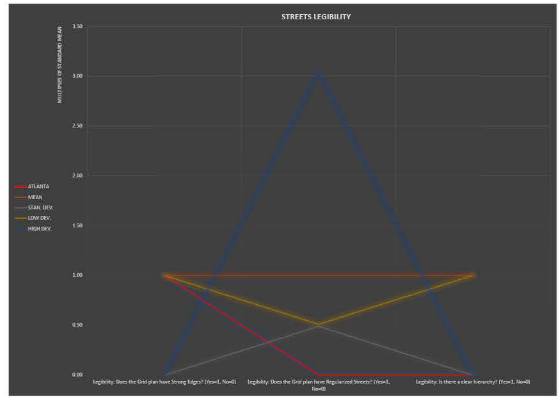

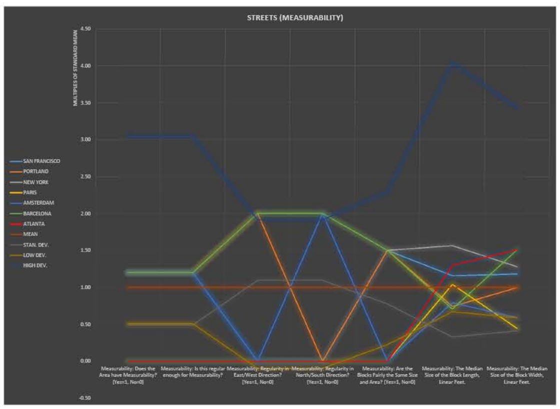

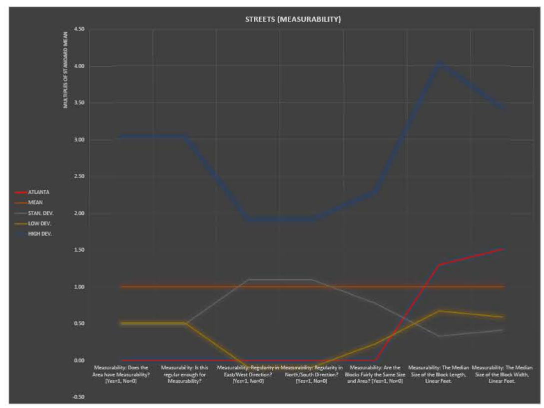

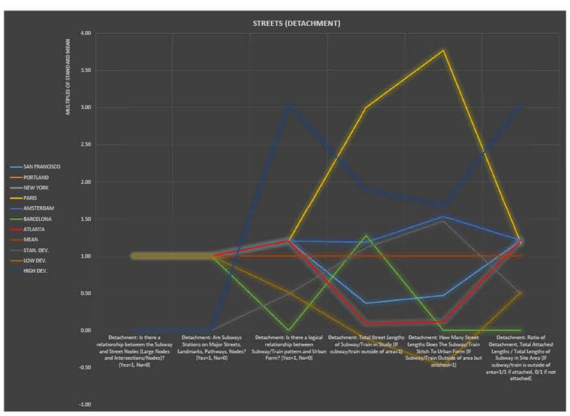

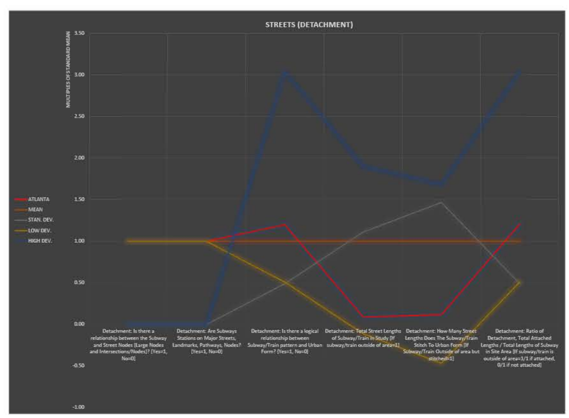

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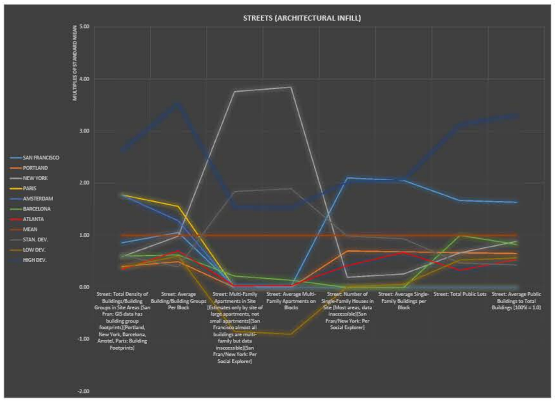

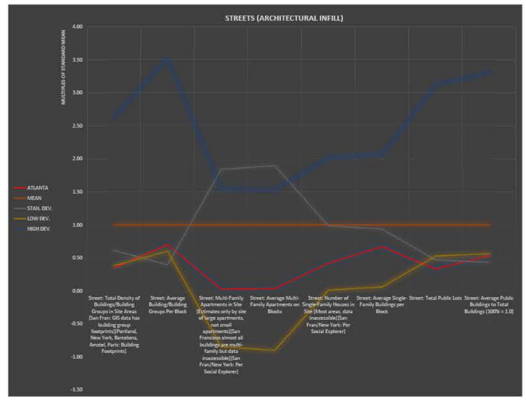

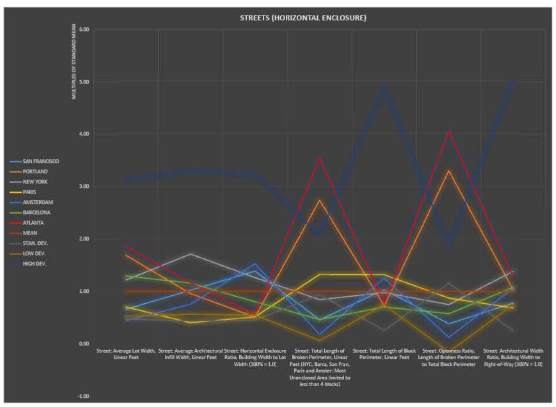

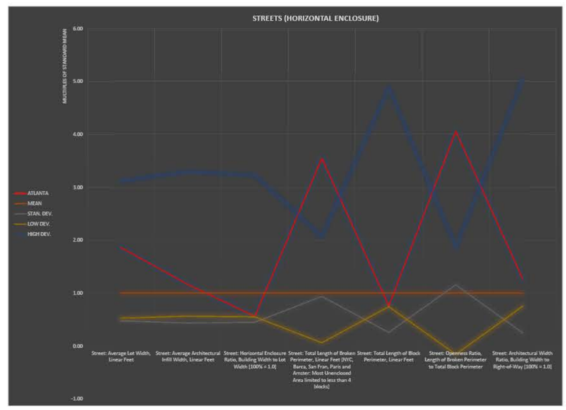

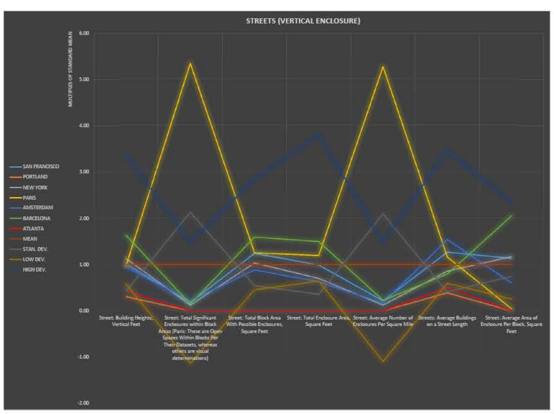

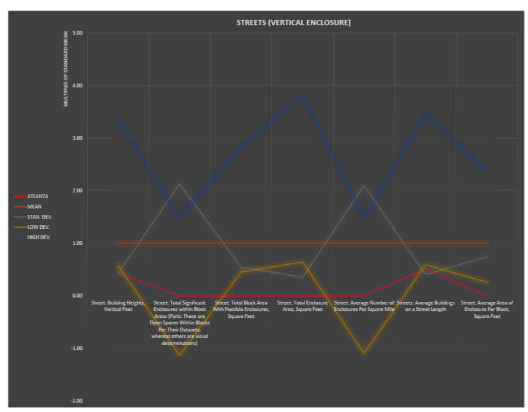

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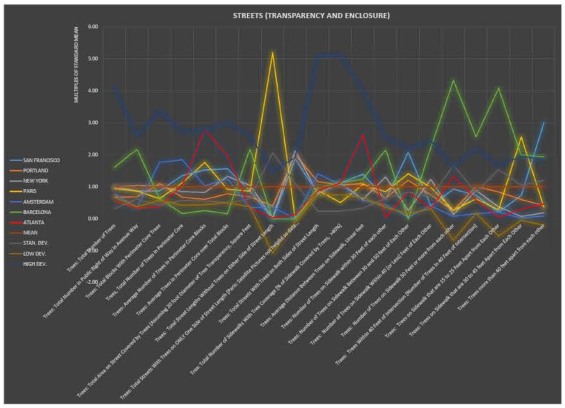

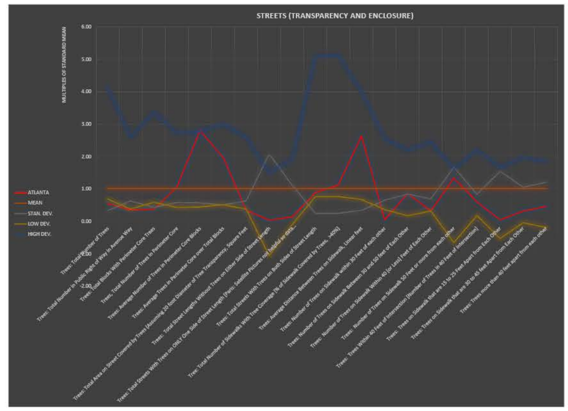

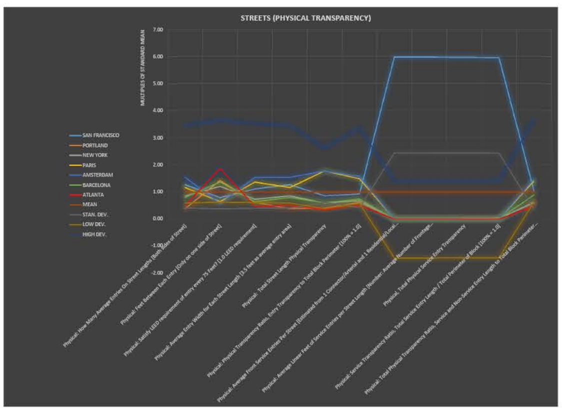

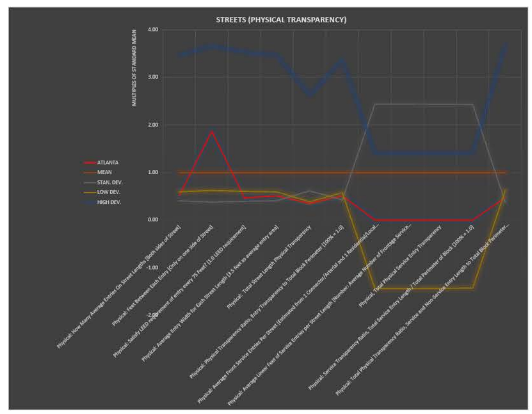

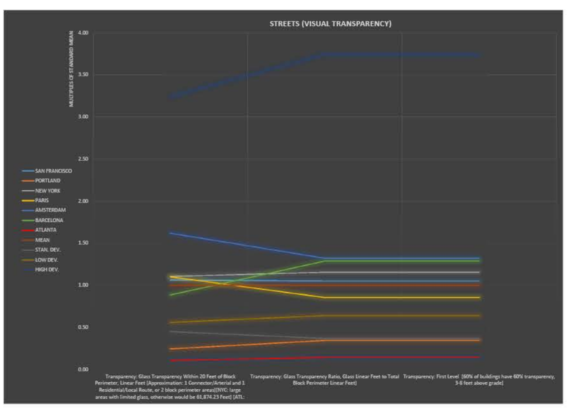

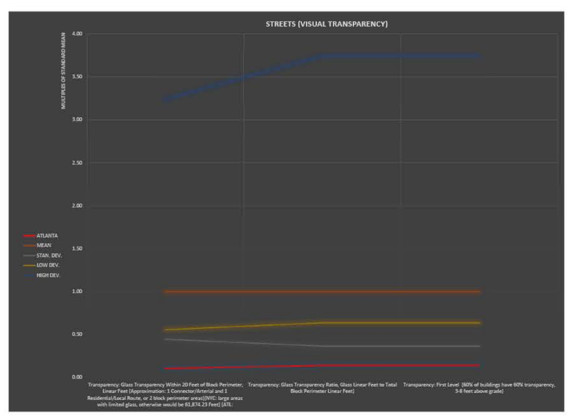

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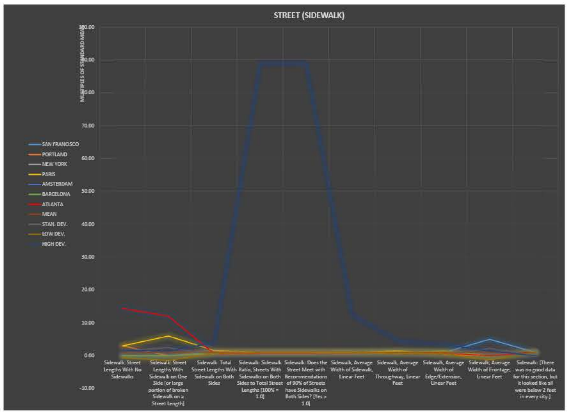

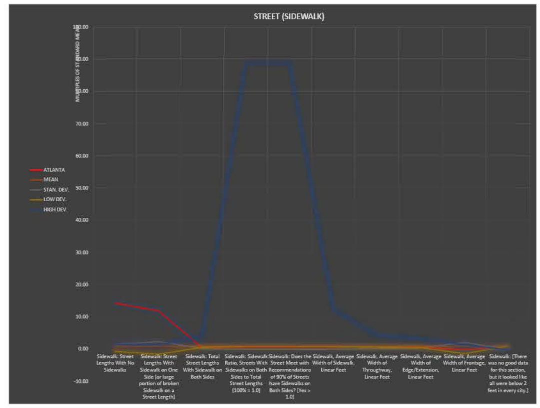

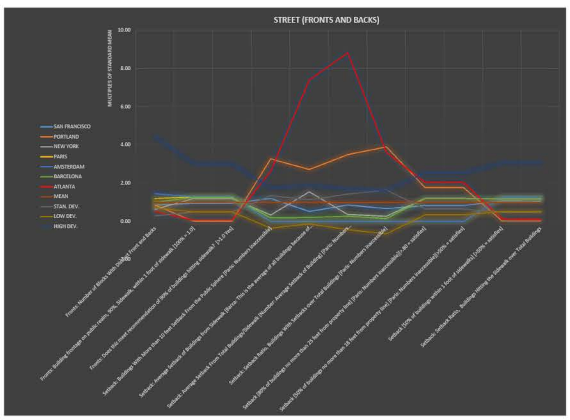

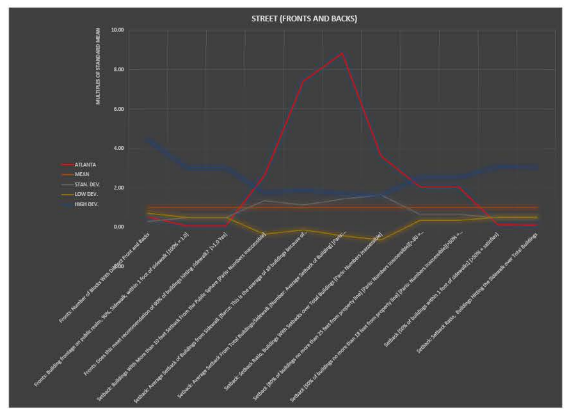

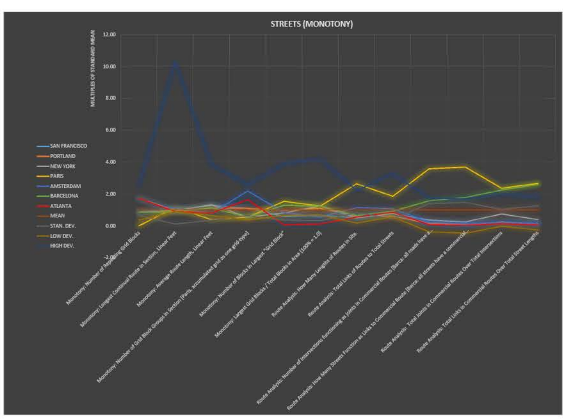

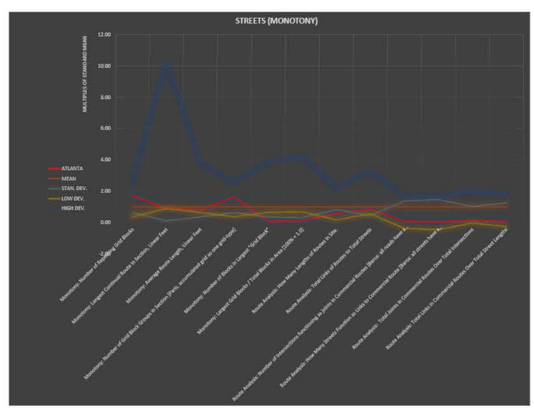

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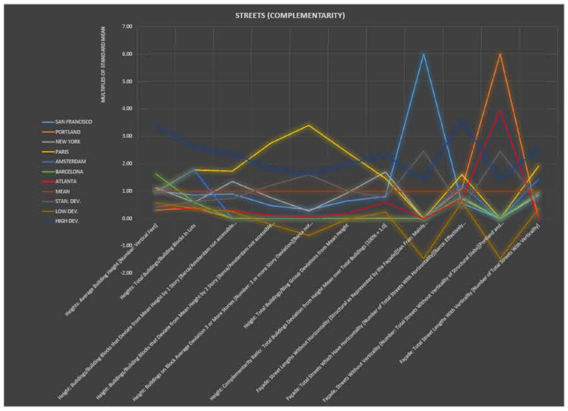

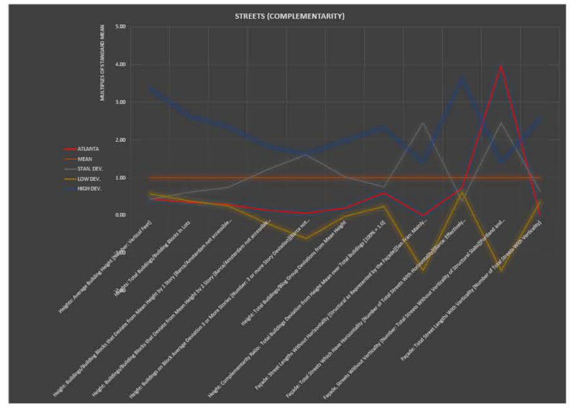

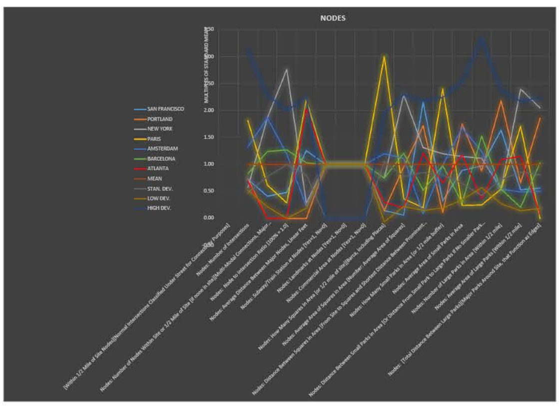

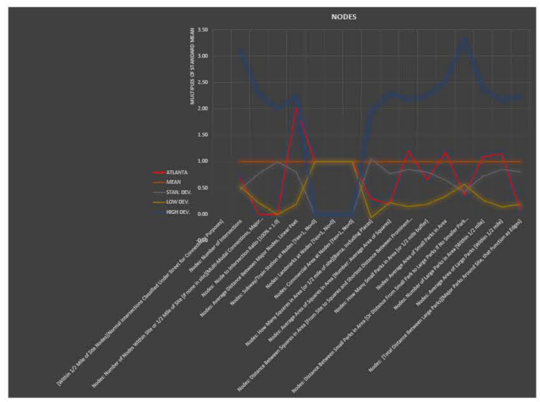

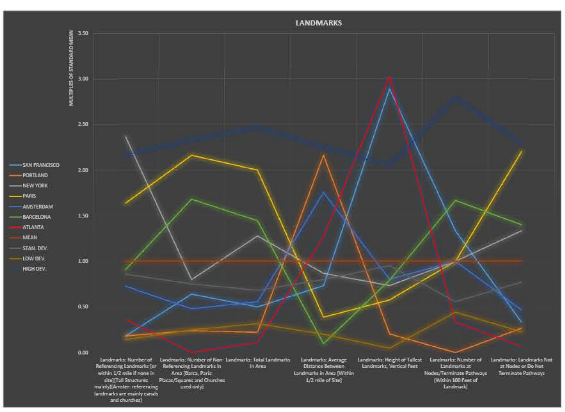

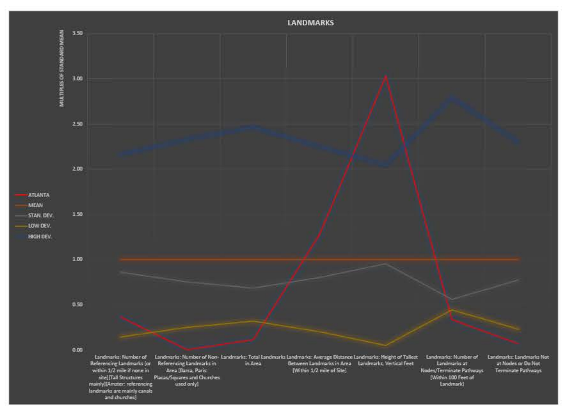

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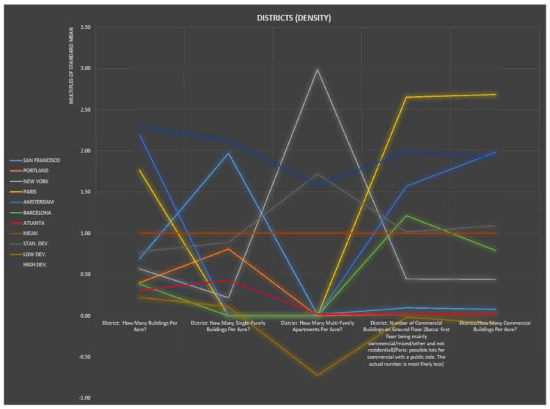

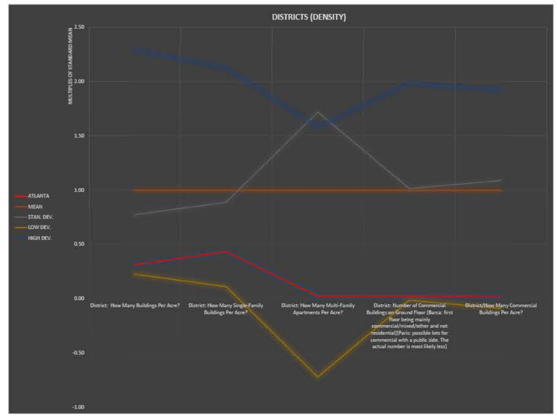

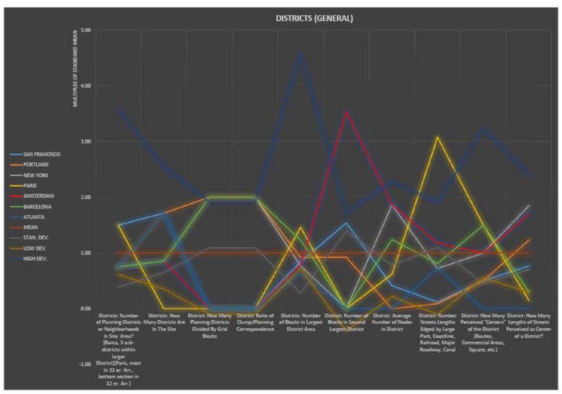

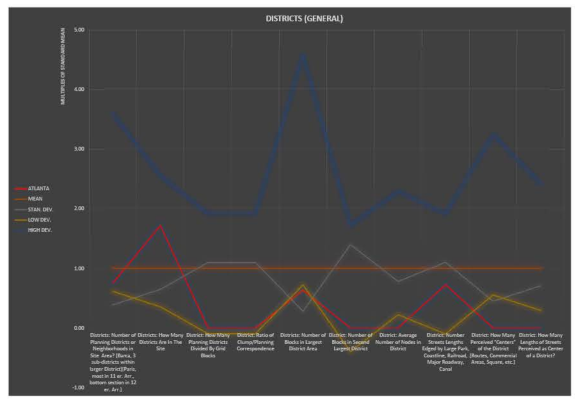

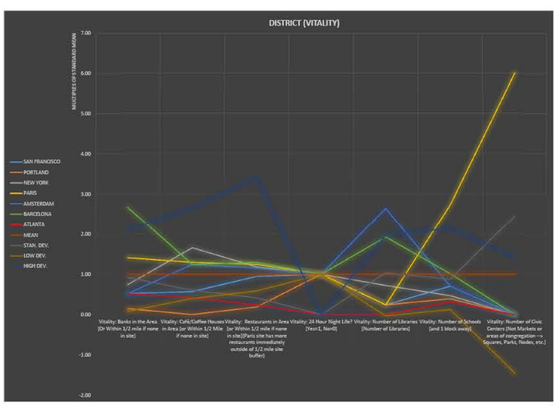

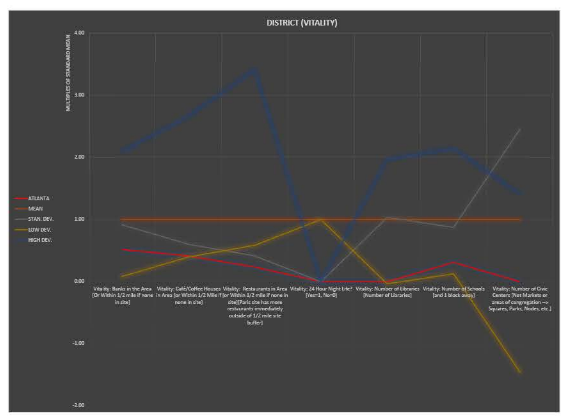

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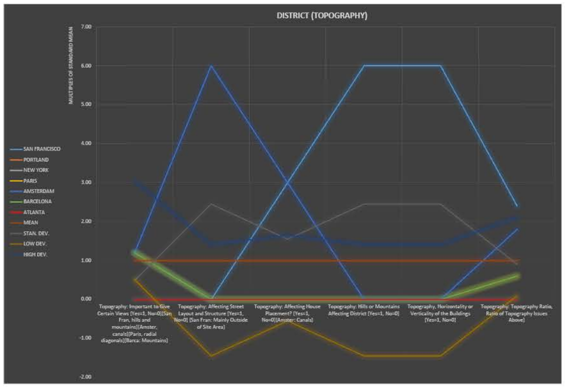

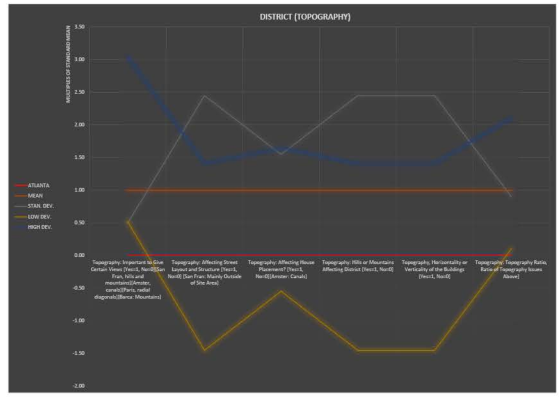

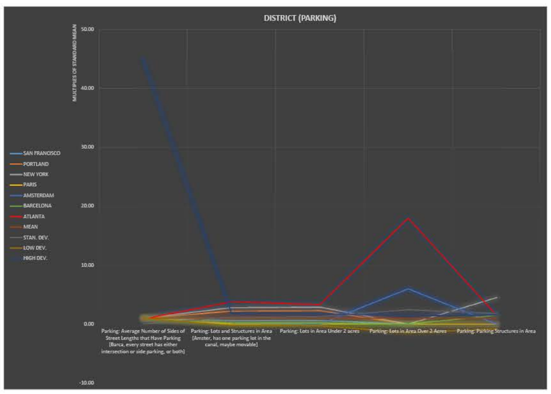

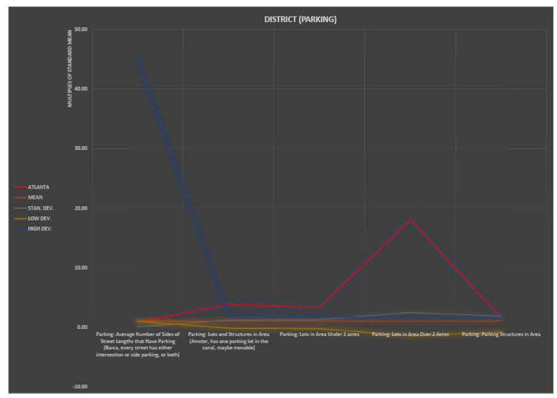

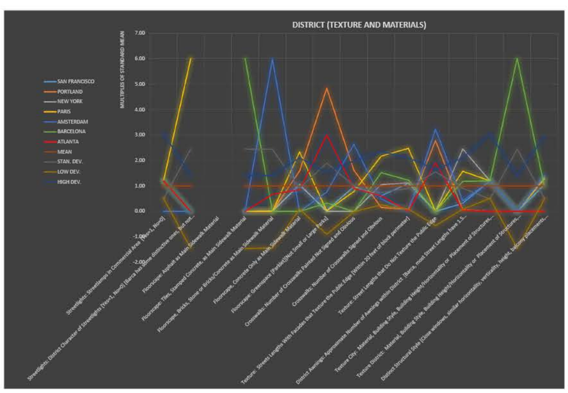

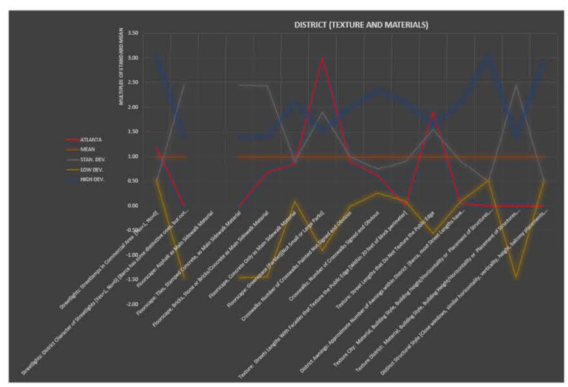

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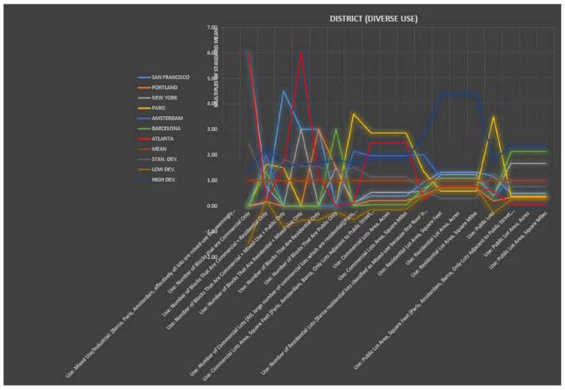

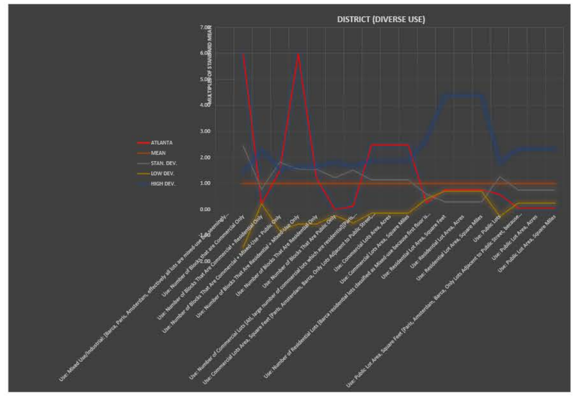

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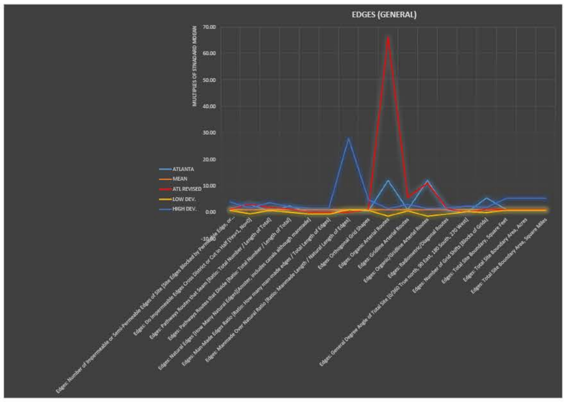

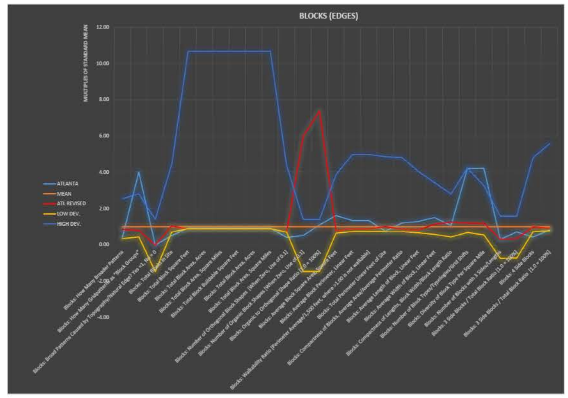

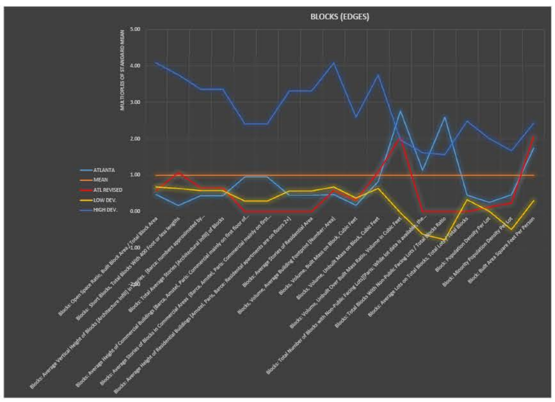

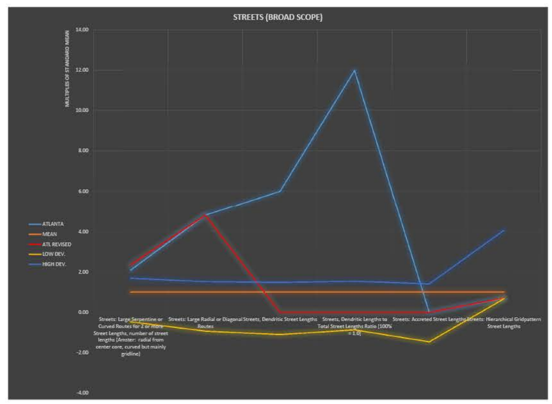

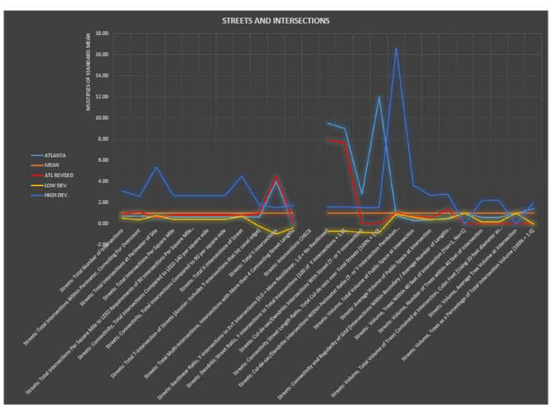

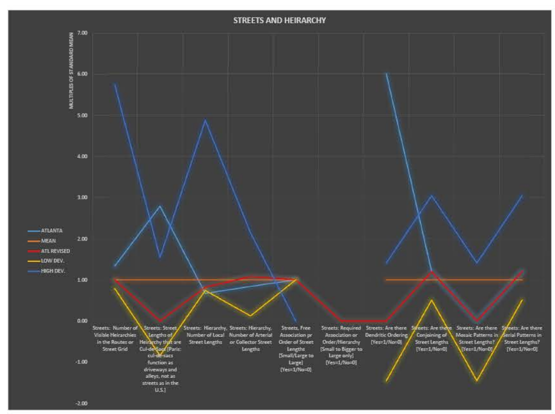

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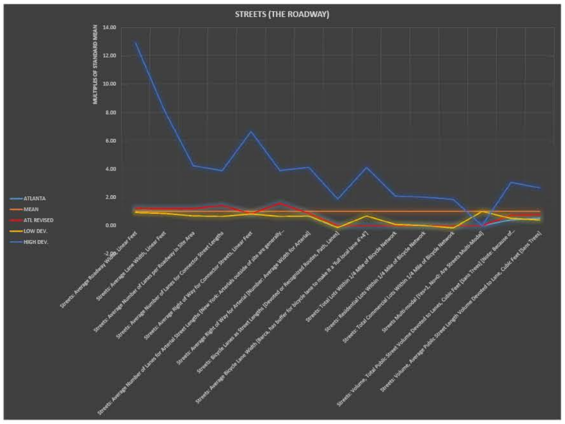

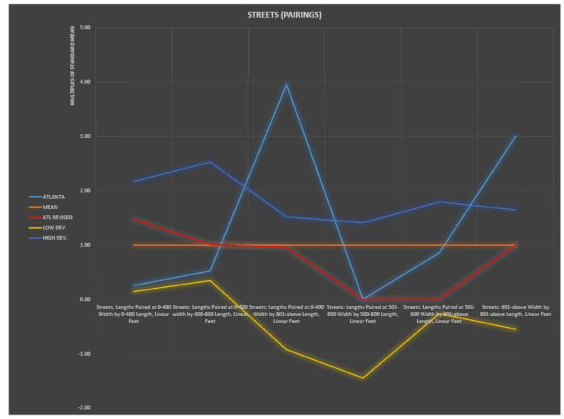

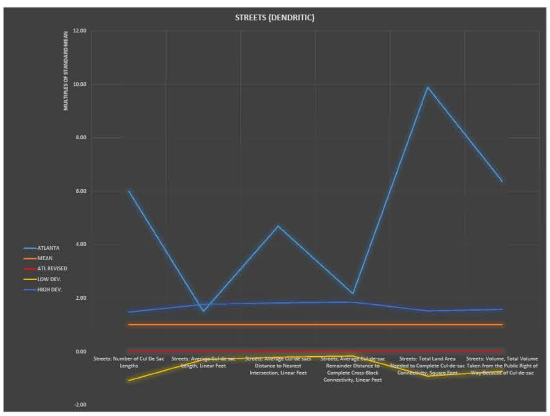

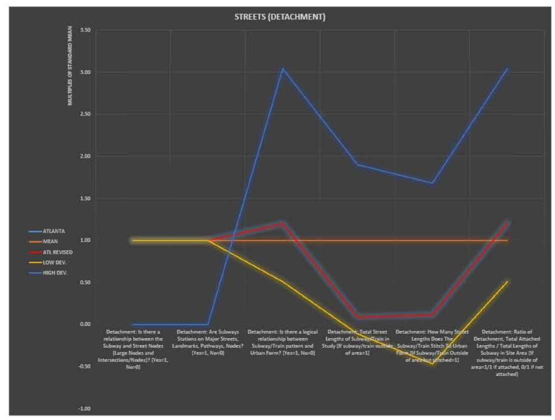

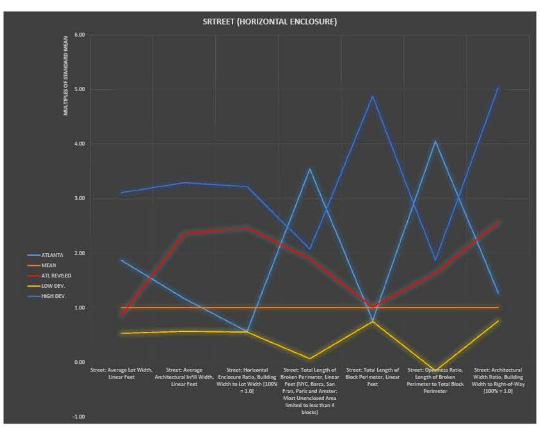

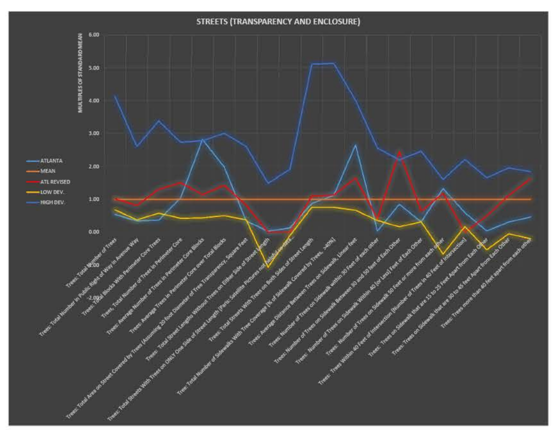

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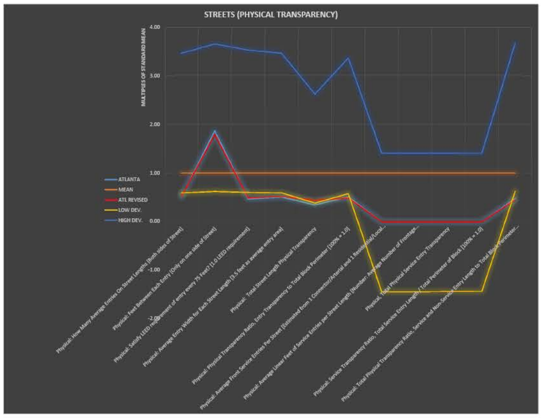

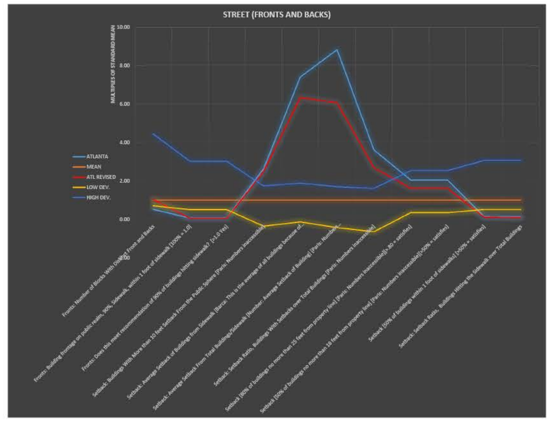

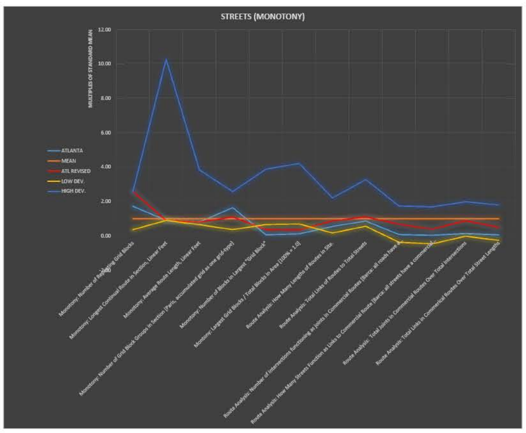

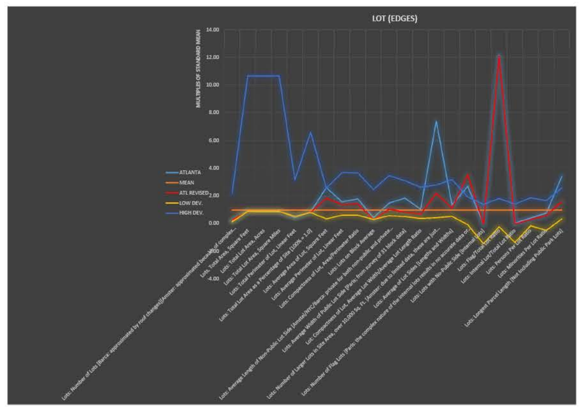

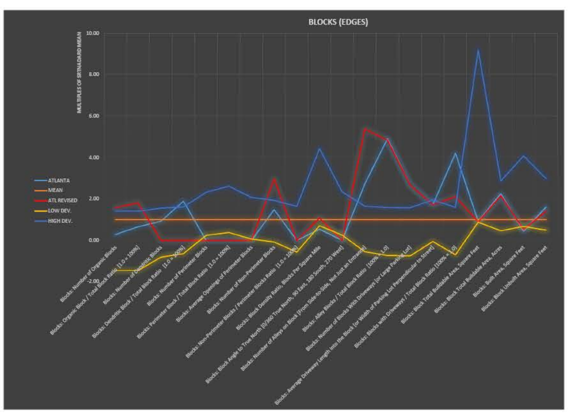

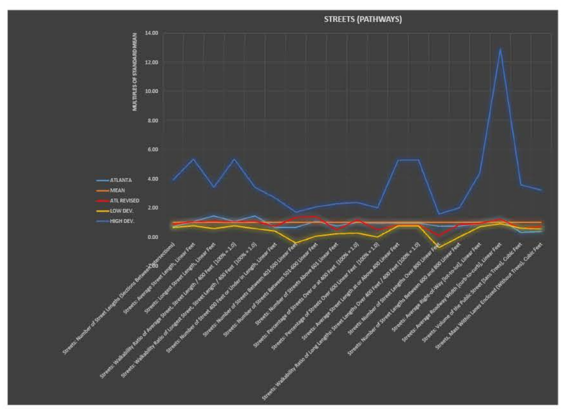

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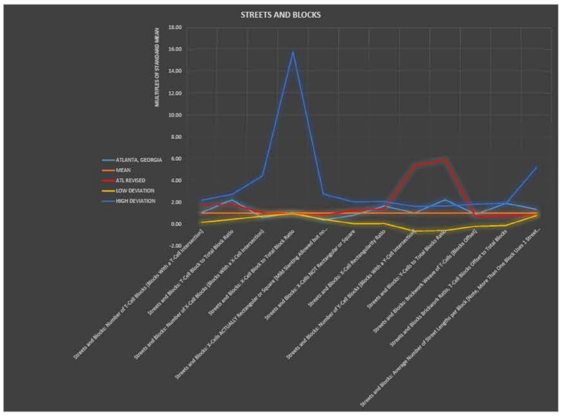

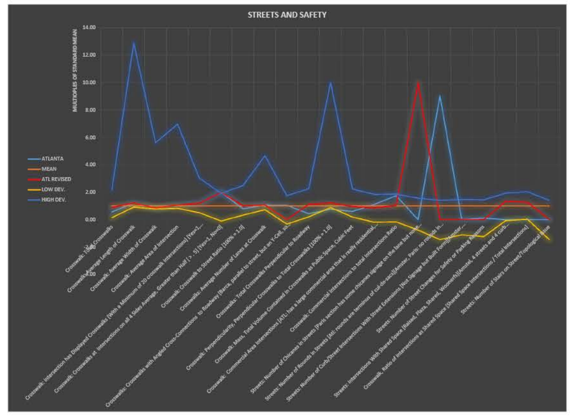

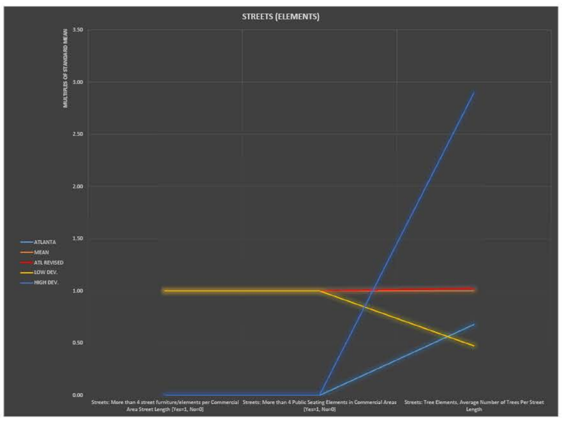

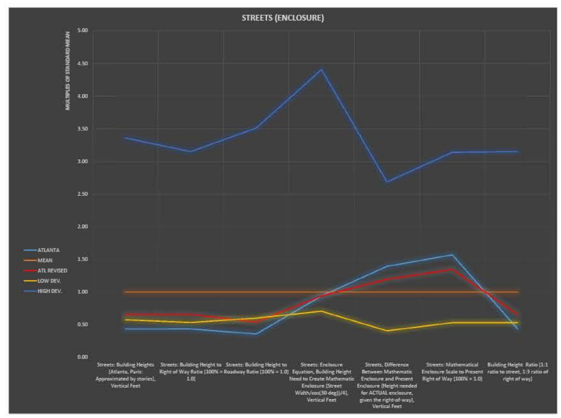

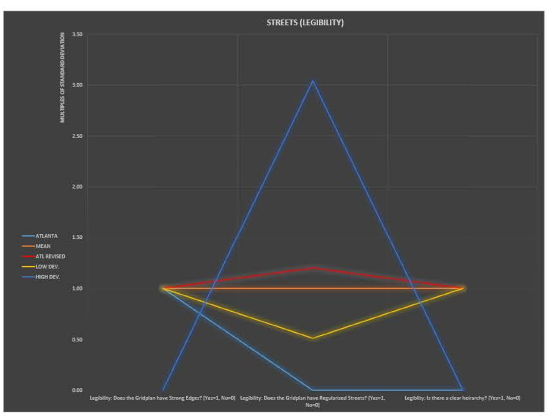

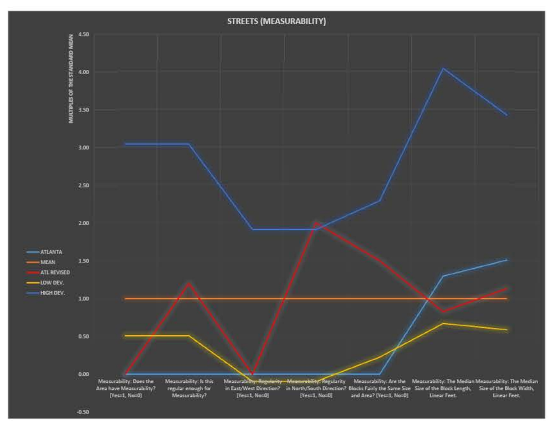

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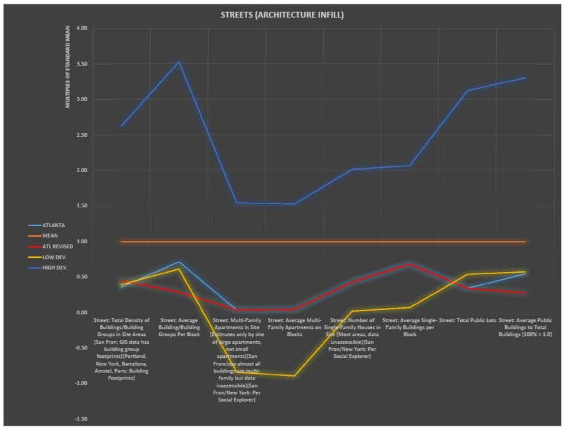

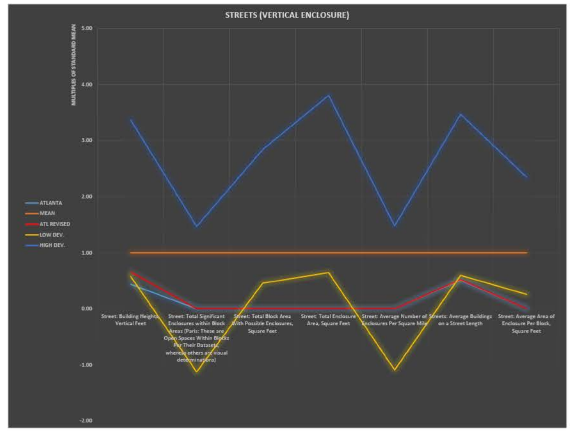

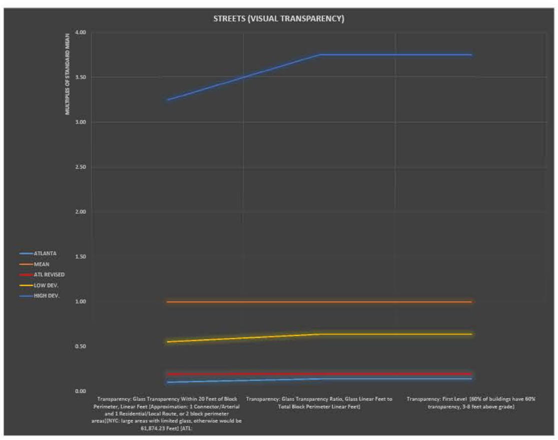

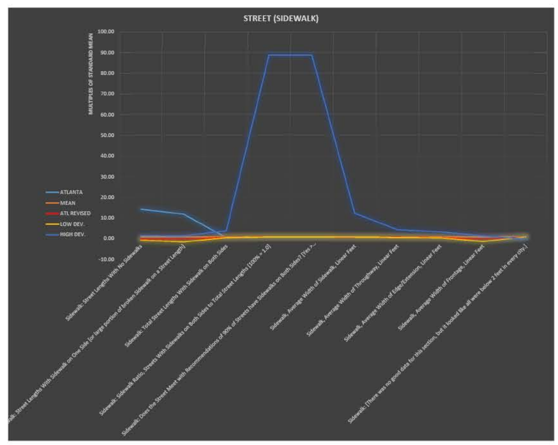

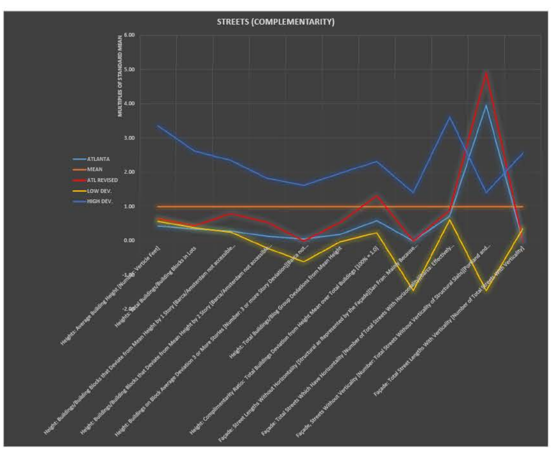

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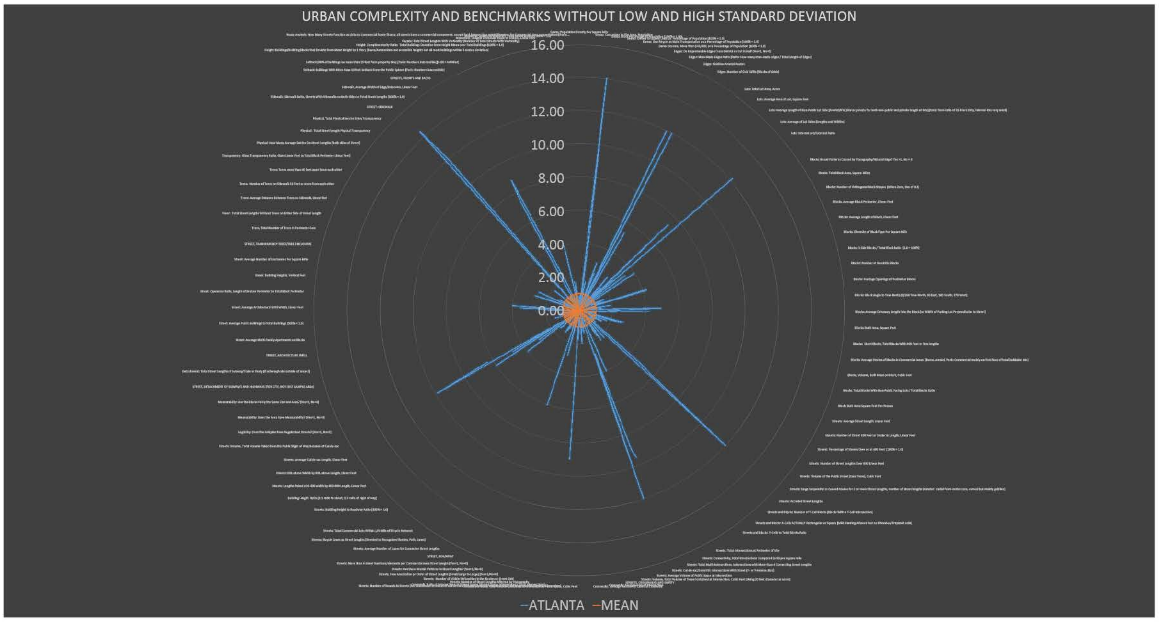

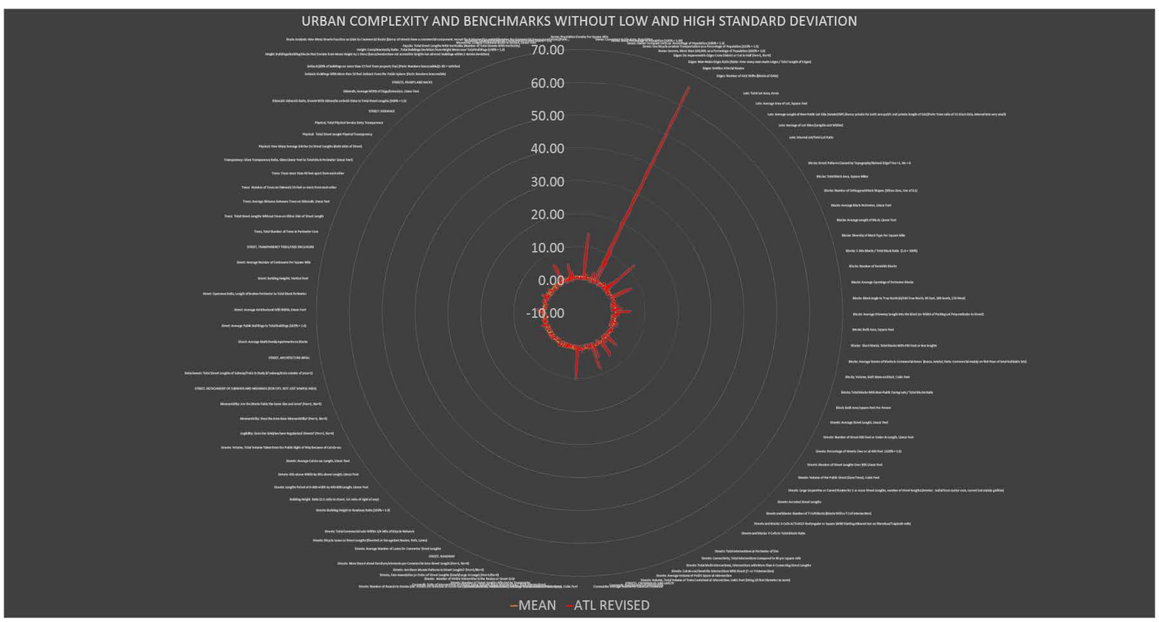

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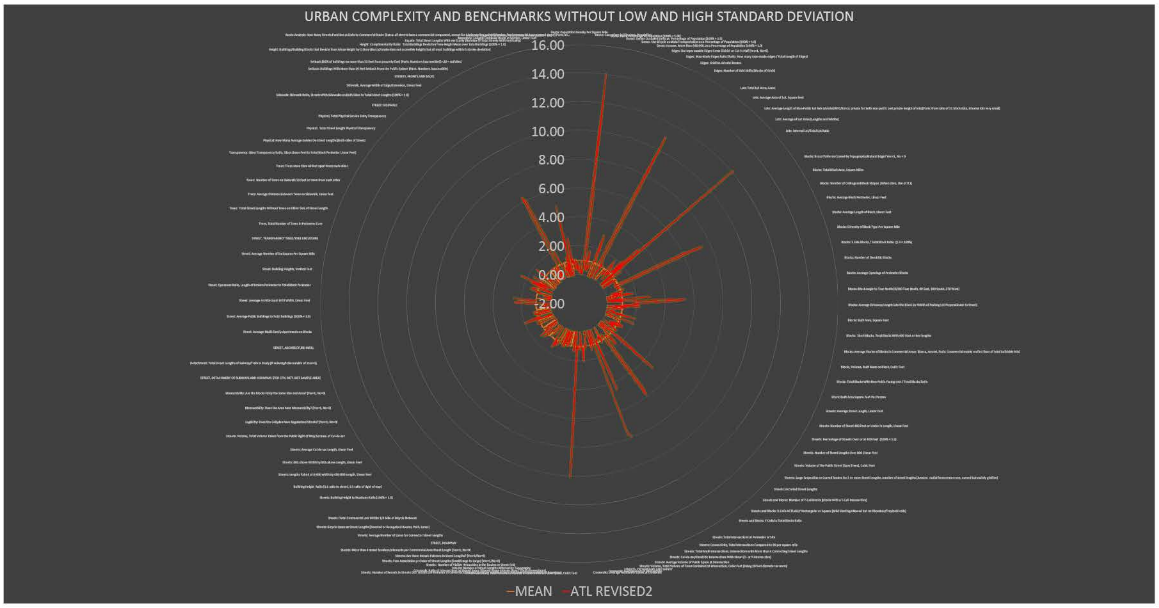

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