Design by the Rules

The Historical Underpinnings of Form-Based Codes

Emily Talen

Problem: Form-based codes (FBCs) affect the design of cities with rules about building form and location. They are of renewed interest to modern planners, but their history and that of coding reform generally are largely unexplored.

Purpose: This research traces the historical lineage of FBCs.

Methods: This work is based on archival research on historic codes regulating urban development. I also used secondary sources on coding history, both from the United States and abroad.

Results and conclusions: I describe examples from a long history of rules governing building form and placement, considering those intended to produce particular effects on urban form as direct antecedents of modern FBCs.

Takeaway for practice: Today's codes are more complex and difficult to implement than their predecessors. Modern FBCs require community participation and visioning to create consensus, whereas in previous historical periods such agreement was taken for granted and many aspects of urban form were dictated by technological and other constraints.

Keywords: form-based code, zoning, historical codes

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At the start of the 21st century, urban planning has rediscovered how to regulate the design of cities with rules about building form called *form-based codes*[1] (FBCs). The Form-Based Codes Institute (2008), a nonprofit group devoted to their advancement, provides the following definition:

> . . . a method of regulating development to achieve a specific urban form. Form-based codes create a predictable public realm primarily by controlling physical form, with a lesser focus on land use. . . . Form-based codes address the relationship between building facades and the public realm, the form and mass of buildings in relation to one another, and the scale and types of streets and blocks. . . . Not to be confused with design guidelines or general statements of policy, form-based codes are regulatory, not advisory. Form-based codes are drafted to achieve a community vision based on time-tested forms of urbanism.

FBCs constitute a significant departure from the way development has been regulated in the United States in the last century. Instead of concentrating on bulk and use, these codes focus on the dimensions and locations of buildings, streets, frontages, and other elements that constitute the physical design of place (Katz, 2004).

Many desirable urban places are the result of explicit rules. Urban historians tell us that beloved urban places like Boston's Back Bay and Edinburgh's New Town were not random accidents, but were the result of "a unified control of land and buildings" (Rybczynski, 1989). This leads to the question of whether American cities could regain a higher quality urbanism by utilizing a different kind of coding. Figure 1 is a page from the *SmartCode*, a model FBC developed by Duany Plater-Zyberk and Company, showing how building height, type and disposition can be regulated in addition to function.

SMARTCODE
Municipality

TABLE 15A. FORM-BASED CODE GRAPHICS - T4

T4
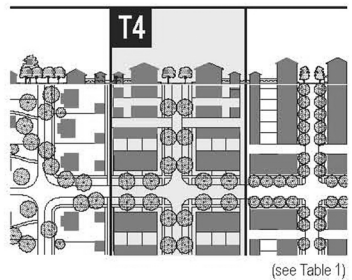
(see Table 1)

l. BUILDING FUNCTION (see Table 10 & Table 12)

Residential	limited use
Lodging	limited use
Office	limited use
Retail	limited use

k. BUILDING CONFIGURATION (see Table 8)

Principal Building	3 stories max, 2 min
Outbuilding	2 stories max.

f. LOT OCCUPATION (see Table 14f)

Lot Width	18 ft min 96 ft max
Lot Coverage	70% max

i. BUILDING DISPOSITION (see Table 9)

Edgeyard	permitted
Sideyard	permitted
Rearyard	permitted
Courtyard	not permitted

g. SETBACKS - PRINCIPAL BUILDING (see Table 14g)

(g.1) Front Setback Principal	6 ft. min. 18 ft. max.
(g.2) Front Setback Secondary	6 ft. min. 18 ft. max
(g.3) Side Setback	0 ft. min.
(g.4) Rear Setback	3 ft. min.*
Frontage Buildout	60% min at setback

h. SETBACKS - OUTBUILDING (see Table 14h)

(h.1) Front Setback	20 ft. min. + bldg. setback
(h.2) Side Setback	0 ft. min. or 3 ft at corner
(h.3) Rear Setback	3 ft. min

j. PRIVATE FRONTAGES (see Table 7)

Common Lawn	not permitted
Porch & Fence	permitted
Terrace or L.C.	permitted
Forecourt	permitted
Stoop	permitted
Shopfront & Awning	permitted
Gallery	permitted
Arcade	not permitted

Refer to Summary Table 14

**PARKING PROVISIONS**

| |
|---|
| See Table 10 & Table 11 |

*or 15 ft. from center line of alley

"N" stands for any Stories above those shown, up to the maximum. Refer to metrics for exact minimums and maximums

BUILDING CONFIGURATION
1. Building height shall be measured in number of Stories, excluding Attics and raised basements.
2. Stories may not exceed 14 feet in height from finished floor to finished ceiling, except for a first floor Commercial function which must be a minumum of 11 ft with a maximum of 25 ft.
3. Height shall be measured to the eave or roof deck as specified on Table 8.

Max. height   N / 2 / 1   Max. height   2 / 1
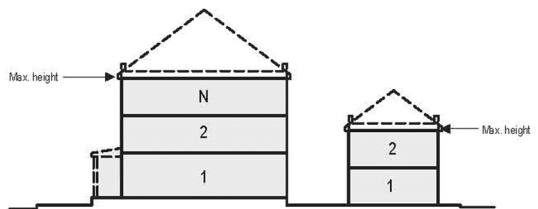
SETBACKS - PRINCIPAL BLDG
1. The Facades and Elevations of Principal Buildings shall be distanced from the Lot lines as shown.
2. Facades shall be built along the Principal Frontage to the minimum specified width in the table.

(g.2) (g.1) (g.4) (g.1) (g.4) (g.3)   Corner Lot Condition   Mid-Block Condition
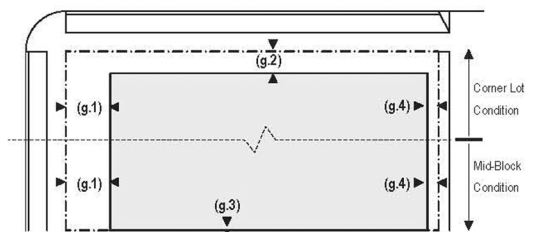
SETBACKS - OUTBUILDING
1. The Elevations of the Outbuilding shall be distanced from the Lot lines as shown.

(h.2) (h.1) (h.3) (h.1) (h.3) (h.2)   Corner Lot Condition   Mid-Block Condition
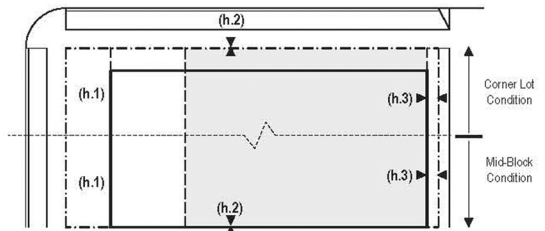
PARKING PLACEMENT
1. Uncovered parking spaces may be provided within the third Layer as shown in the diagram (see Table 17d).
2. Covered parking shall be provided within the third Layer as shown in the diagram (see Table 17d).
3. Trash containers shall be stored within the third Layer.

Secondary Frontage   Principal Frontage   1st Layer   2nd Layer 20 ft   3rd Layer
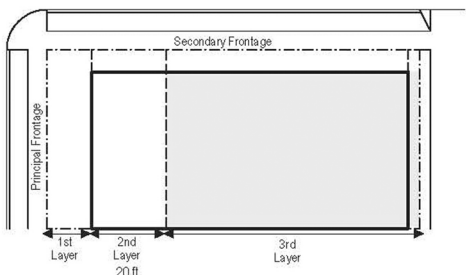
SMARTCODE VERSION 9.2

SC87

Figure 1. An example of a form-based code, showing regulation of building height, type, disposition, and function.

Source: Duany, Sorlien, & Wright, 2008. (© Duany Plater-Zyberk & Co., Image used with permission.)

In this article, I aim to understand the historical context of FBCs. Is their current popularity a return to historical approaches? What experience do we have with the regulation of urban form, and how does this current interest relate to it? By recounting the history of codes and putting the current popularity of FBCs in a broad historical context, I hope to reveal what is new and what is unchanged about the attempt to implement vision and design through coding. I also hope that this will support what seems to be a promising redirection of the way coding is done in the United States.

Defining Codes

In order to understand the history of FBCs we must define what they are as well as the source of their authority. However, development codes, which include FBCs, are extremely varied. They exist at a variety of scales and may apply to small-scale, incremental change at the parcel or individual building level, or to much larger issues and areas, such as layouts of entire towns. Carmona, Marshall, and Stevens (2006) uncovered 13 separate definitions for design code.

The authority to create and enforce a development code most often belongs to government, but under some circumstances could also be derived from the powers of religious leaders or be based on social and cultural customs. Though a modern code is normally legally enforceable, unlike a plan, the difference between the two is not as straightforward as it would seem. Idealized models of human settlement can sometimes act like codes. One example is Clarence Perry's neighborhood unit concept, which planning textbooks, government regulations, chambers of commerce, and social service agencies promoted after it was implemented at Radburn and Baldwin Hills Village, and which was widely accepted (Dahir, 1947; Patricios, 2002).

Some rules that are not intended as development codes have indirect effects on physical form nonetheless. For example, those that dictate the existence of particular facilities affect urban form, such as the requirement that every town in ancient Greece contain an agora. Napoleon I's 1807 law permitting towns to draw boundaries (Hall, 1997), England's 1847 Markets and Fairs Clauses Act regulating where markets and fairs could be located and how big they could be, and Britain's Public Health Act of 1875 requiring paved streets, street lighting, and better quality construction are all examples of how laws affected urban form indirectly. A law prohibiting unsanitary and fraudulent commercial practices in 15th-century England

required that cooks buy only from local common markets, and not "by waiting at the ends of the town or in the highway" (Coventry City Record Office, 1907/1421), likely affecting the form of places significantly.

Although it is sometimes difficult to distinguish FBCs from other types of rules, guidelines, standards, court cases, and legislation, all of which play important roles in city form, the historical trajectory traced in this article defines FBCs as having the following attributes:

- significant enforceability;
- the intent to prescribe the public realm, often by regulating private building; and
- the direct or indirect production of "time-tested forms of urbanism" (Form-Based Codes Institute, 2008).

With regard to the last criterion, the Form-Based Codes Institute (2006) advocates codes that shape the public realm "to invite pedestrian use and social interaction" and produce "walkable, identifiable neighborhoods that provide for daily needs." Such codes produce the streets, squares, and other public spaces that make up the public realm. Historically, they often did so by ensuring the production of a building wall that could adequately define the public realm, typically with a unified and consistent building frontage.

For this article, I consider the FBC lineage to include any code, law, or rule that meets these three criteria. Thus, I exclude modern design guidelines and design review processes because they tend to be advisory rather than regulatory. I exclude codes governing private building that does not impact the public realm (such as modern codes regulating the interiors of buildings) because they do not meet the second criterion. I exclude conventional zoning because it has little to do with prescribing "time-tested forms of urbanism," but produces urban form as a by-product of regulating something else, such as separation, property value, traffic flow, or perceived harmful effect. However, many of these excluded elements, like design review guidelines and conventional zoning, contributed to the evolution of today's FBCs, for example by breaking down legal and political barriers.

Only FBCs meet the three criteria directly, so that their intentions and effects are the same, but codes, laws and rules that meet one or more of these criteria indirectly may be part of the FBC lineage, though they are not FBCs themselves. Figure 2 illustrates this difference.

The history below is based on my reading of what FBCs are trying to achieve and what kinds of endeavors, historically, had a similar effect, even if not directly intended. Determining what is or is not part of the FBC

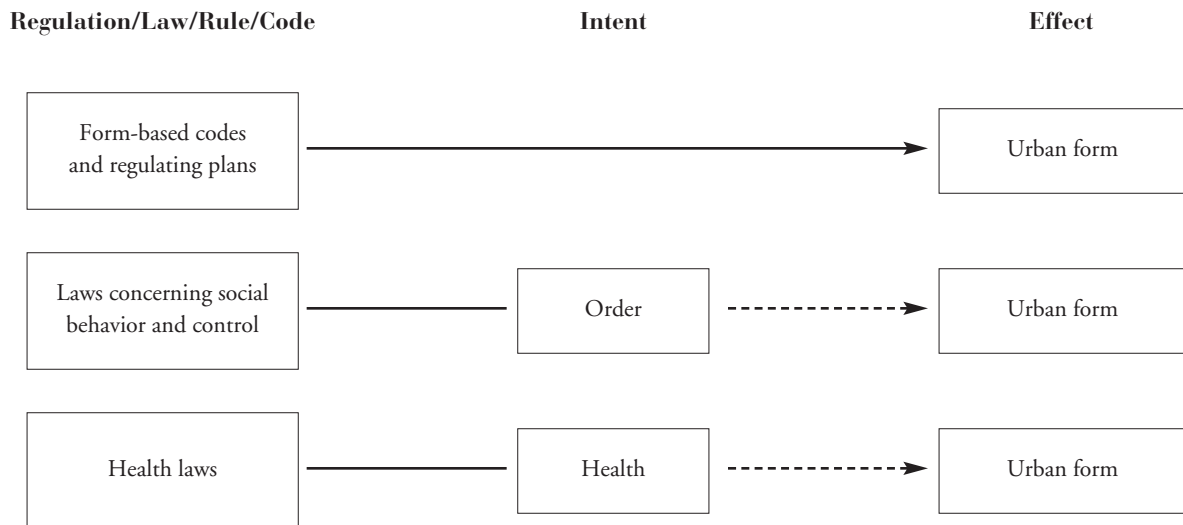| Regulation/Law/Rule/Code	Intent	Effect
Form-based codes and regulating plans		Urban form
Laws concerning social behavior and control	Order	Urban form
Health laws	Health	Urban form

Figure 2. Direct and indirect effects of rules and codes on urban form.

Note: Solid lines indicate direct influence, and dashed lines indicate indirect influence.

lineage is thus an important aspect of defining FBCs.

A Brief History of Codes

To organize the discussion, I divide the lineage of codes into five categories. The first, "big interests and main lines," is a title borrowed from Raymond Unwin's 1909 treatise *Town Planning in Practice* (p. 379), and concerns codes and laws affecting the larger urban realm. I then discuss regulations for streets, frontages, and buildings, all of which are significantly smaller in scale. A final category concerns generative codes, Islamic codes, and other types of rules based on customs and social laws rather than predetermined designs. These affect urban form through rules governing behavior, offering a significantly different approach to the coding of urban form, but one that has some connection to today's coding reform efforts.

Big Interests and Main Lines

The earliest written laws that affected city form include the code of Hammurabi from 2100 BC, which focused on ensuring quality building by exacting penalties if damage occurred (loss of life due to faulty construction was punishable by death). But other very early laws affected the form and pattern of the urban public realm on a large scale, especially the layout of streets and the placement of public buildings. Indian laws dating back 4,000 years established

rules for laying out towns, streets, and houses (Dutt, 1925). We know from the writings of Plato and Aristotle there were laws governing streets and public squares (agora) in Greece in the 4th century BC. Roman laws included specifications for street layouts in military installments, laws intended to avert harm to neighbors, and laws regulating the use of land in central parts of cities.

Rules for laying out and building towns are an obvious example of large-scale urban coding. The *Laws of the Indies* promulgated by the Spanish monarchy in its colonies in the 16th century dictated street arrangement and width and the location of important buildings. The planned city of Savannah, GA, founded by James Oglethorpe, had rules for streets, lots, and buildings, some of which were enforced through deed restrictions in the 18th century. Figure 3 shows a town plan from the 18th century.

The system put in place by surveyor-architect Daniel Stolpaert in Amsterdam in the 17th century is often offered as an example of successful coding on a large scale. Stolpaert made use of a *regulating plan* that dictated the locations of public buildings, streets, canals, and private residences. A corresponding ordinance established rules for building, including where the privies could be located, who paid for the streets, and rules about drainage. The ordinance was in effect for some 400 years, and Lewis Mumford called the plan and implementing ordinance "the final expression of a more thoroughgoing attention to the conditions of health and social life" (Mumford, 1961, p. 441).

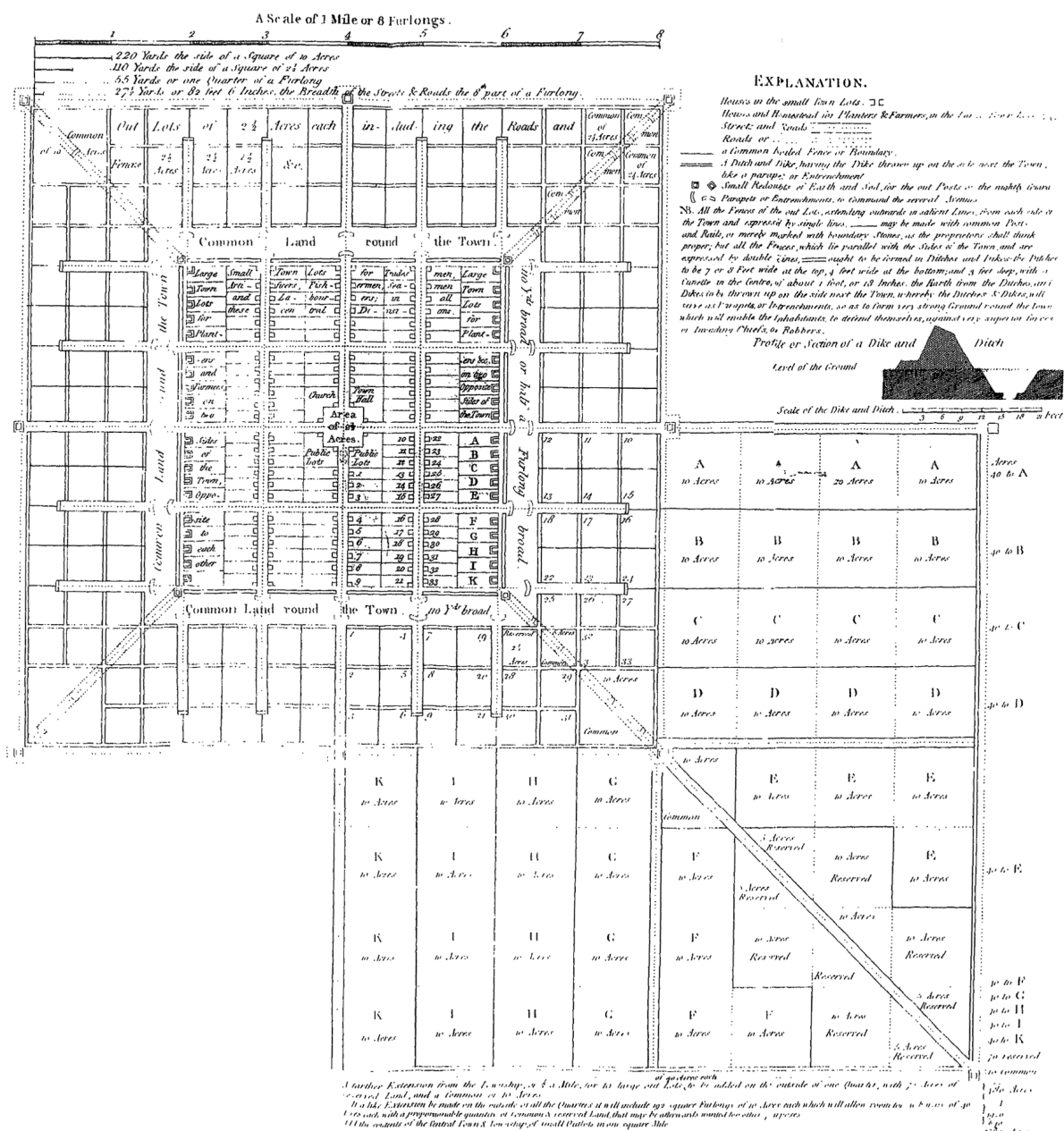Regulating plans pay close attention to the aesthetics of

Figure 3. An 18th-century plan for a one-square mile town.

Note: This plan, which would have functioned like a code, showed land use, including common land, and dimensions of streets and parcels.

Source: Sharp, 1794.

the public realm. In ancient Greece, the dimensions of streets, blocks, and public squares were made law in what Gallion and Eisner (1983) called "the final test of civic responsibility" (p. 23). In 13th-century Florence, laws intended mainly as aesthetic interventions compelled owners to give up property in order to enlarge public spaces (Girouard, 1985, p. 65). The 1865 regulating plan for Naples, Italy, laid down rules for rebuilding that were literally the "guiding blueprint" for 25 years (Kostof, 1992, p. 57).

Plans for new towns also clearly affect the form and

pattern of the urban public realm on a large scale. Rules guided the founding of Mormon towns, American railroad towns, British new towns, and the medieval *bastides*² in France (Reps, 2002), establishing building rules that produced particular urban forms. Regulating plans for Garden Cities and other kinds of complete planned communities established rules for development that included street layout, public space allocation, and building placement. Planned communities like Shaker Heights, OH, Chatham Village, PA, and Venice, FL, all have rules guiding the urban form of their developments in precise terms, and thus I consider them part of the FBC lineage.

The American landscape architect and early city planner John Nolen produced regulating plans that specified the exact locations and dimensions of public streets and buildings. Modern FBCs have emulated this practice. Figure 4 shows an example of one of Nolen's plans regulating the form of public space and surrounding buildings on the left, a plan that inspired the modern FBC-regulated new town in Huntersville, NC, of which an aerial photograph is also shown on the right.

Laws restricting where development could take place also had a significant, though indirect, effect on urban form at a large scale. One common theme was to prevent new development from spreading into previously undeveloped areas. In 16th-century England under Elizabeth I,

new buildings had to be built on top of old foundations (Larkham, 2001). The Prussian Building Land Act of 1875 prohibited construction on greenfields that lacked public utilities and infrastructure, which meant that German cities avoided the "squalid belts of privately owned shanties" that surrounded French cities (Kostof, 1992, p. 57). Germany enacted a law in the early 20th century that forbade building on "virgin plots" and restricted development to lots that had been built on prior to 1887 (Arntz, 2002). When U.S. historic preservation laws of the 20th century affect the public realm and the creation of urbanism they continue this same tradition.

Streets

Only the regulation of building height is more common than regulation of streets, especially street width. Given that streets make up the largest part of the public realm, how they have been regulated is particularly pertinent to the lineage of FBCs.³ The public realm of the streets has been most frequently regulated by controlling street width, which became "habitual" after the 17th century (Kostof, 1992, p. 205). In the 5th century BC, architect Hippodamus called for straight, wide streets in his plans for Greek cities. In Rome in 100 BC, a written law required a minimum street width of 15 feet (Southworth & Ben-Joseph, 2003). About the same time, Vitruvius' *Ten Books on*
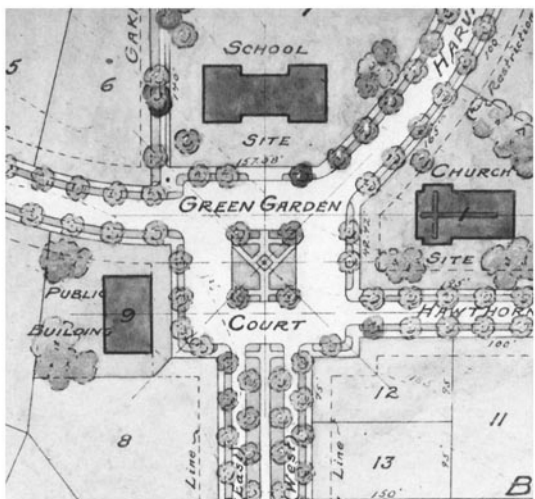
| Green Garden Terrace | | Vermillion |
| Erie, Pennsylvania | 0'   100' | Huntersville, North Carolina |

Figure 4. A portion of John Nolen's 1913 plan for Green Garden Terrace in Erie, PA, and an aerial photograph of a portion of Duany Plater-Zyberk and Company's plan for Vermillion in Huntersville, NC.

Sources: Left, University of Pennsylvania Library; right, retrieved December 1, 2008, from Google Earth. (Images courtesy of Thomas E. Low.)

Architecture (n.d.) laid down principles of street width and direction that would later influence Renaissance codes like the Laws of the Indies. In the 1st century, Vitruvius specified rules about siting new towns and laying out street directions to minimize wind. Figure 5 shows the names and directions of eight winds he identified. Often street standards were practical, such as the law in medieval Germany requiring streets to be the width needed for two carts to pass each other (Arntz, 2002). In Islamic towns around the Mediterranean basin, main streets were to be wide enough to allow two loaded beasts of burden to pass (Hakim, 1986).

Street width was frequently specified in order to make cities more open. Beginning in the 17th century, it was believed that wide streets helped ventilate the city and keep it healthy, according to the "miasma theory" that stagnant air caused disease (Girouard, 1985, p. 227). During the medieval period buildings sometimes encroached so far into the street that "it was literally possible to shake hands between opposite windows" (Morris, 1979, p. 73). After the great fire of London in 1666, the London Building Act of 1667 specified wider streets in part to keep fires from jumping across streets. In Dublin in the 18th century, a Wide Streets Commission made sure street widths remained between 75 and 100 feet. Girouard (1985) argues that since the widths being advocated in Dublin went well beyond what was needed to accommodate carriage traffic, the commission must have been motivated by visual as well as health reasons (p. 227).

Street widths were often regulated to accord with building height, but the location and importance of the street was also considered. The Roman emperor Augustus imposed a law that specified street widths ranging from 40 to 15 feet, depending on location relative to the central core. Immediately after the French Revolution, four categories of width were created based on streets' lengths and primary functions. In his original plan for Washington DC, L'Enfant specified that grand avenues like the one leading to the White House should be 160 feet wide, streets leading to public buildings or markets should be 130 feet wide, and all other streets should be 110 feet wide (Brown, 1900).

Rules about who was required to pay for the construction, drainage, and lighting of streets had an indirect effect on street width and urban form. In Paris in the 14th century, for example, households were required by law to clean the streets in front of their dwellings (Girouard, 1985). This had the effect of encouraging encroachment into the street, since residents felt a sense of entitlement in exchange for this responsibility, but it was also a motivation to keep streets narrow and to minimize frontage. On the other hand, where street width was firmly set and maintained
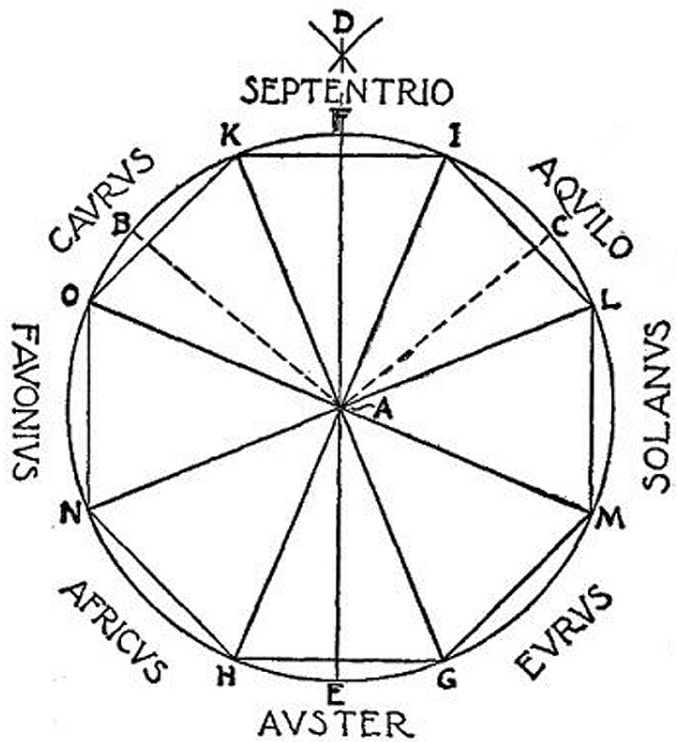

Figure 5. Names and directions of the eight winds Vitruvius identified.

Source: Vitruvius Pollio, n.d.

at private expense, as in 19th-century Germany, there was an incentive to maximize the value of abutting property by building taller buildings. In response to the 1875 Law of Building Lines which set street widths in Germany, developers of the Berlin Meitskaserne "filled every inch of property with huge buildings; . . . inhabitants had no benefit whatever of the light and air of the ample streets, as they breathed through narrow courtyards and less" (Kostof, 1992, p. 206).

Frederick Law Olmsted Sr. advanced an entirely different approach. He used parkways that included specifications for a flanking street system, alleys, blocks, and lots as "city-shaping devices" (Macdonald, 2005, p. 296). By the middle of the 20th century, regulations on streets in the United States were the exclusive province of traffic engineers focused almost solely on the flow of cars and the prevention of accidents. Codes for street design were therefore de facto consequences of manuals published by the Institute of Transportation Engineers (ITE; see, e.g., Hammond & Sorenson, 1941; ITE, 1964). This effectively ended consideration of the relationship between street width and urban form.

Frontage

Frontage is what defines the public realm. It includes both the public elements of curb, sidewalk, and tree, and regulations governing the private frontage of the building façade and its setback. Codes about how buildings were to meet the street were essentially rules prescribing the public realm. This recognition prompted William Penn to declare in the 17th century, "let the houses built be in a line, or upon a line, as much as may be" (Hazard, 1850, p. 530). Jefferson and L'Enfant also included rules about street frontage in their plans for laying out Washington DC in the late 1700s: "houses shall range even and stand just six feet in their own ground from the street" (Reps, 1965, p. 126). In some cities, the effects were lasting: In Winchester, England, building frontage rules remained unchanged from the 11th to the 20th centuries (Kostof, 1992).

Uniform frontage was required for centuries in Germany. The earliest German regulations concerning building setbacks were recorded in the 13th century, and Berlin regulated building location to ensure continuous façades as late as the early 20th century. Such codes aimed to form a deliberate frame around streets and squares, always distinguishing between public and private responsibilities for the public and private realms. Public space was ordered, but behind the building line regulation concerned itself only with fire safety and the rights of neighbors (Arntz, 2002).

At first, frontage regulations mostly ensured that buildings did not project too much into public space. In Amsterdam, 16th-century decrees regulated even the maximum size of front steps to ensure an accessible public realm. Dutch decrees also limited lean-tos, benches, and displays of goods on the street, suggesting problems keeping streets free of encumbrances (Wheelock & Seeff, 2000). In some cities in Italy in the 15th century, laws regulated building projections by zones, with more strict control on primary streets. In addition to setting maximum building heights, London's Rebuilding Act of 1667 prohibited building projections and required consistent setbacks and cornice lines. This created relatively uniform, flat-fronted buildings. A set of 18th-century Prussian laws allowed building freedom only if the building did not lead to "disfigurement of the towns or public squares" (*Allgemeine Landrecht*, 1794, quoted in Arntz, 2002, p. 7), a concern aimed at unsightly projections.

Arcades were an important mechanism for regulating frontage and ensuring a uniform, dignified public realm. The social and environmental value of requiring a covered public walkway was recognized in the Roman period, and in rules guiding city building in 6th-century Palestine (Hakim, 2001). In the 15th century, Alberti imagined how porticoes could promote social interaction and even play among youth (Alberti, 1988/1452). In Bern, Switzerland, arcades were precisely regulated by building codes, being required for the fronts of all houses on main streets as early as the 16th century (Braunfels, 1990). At the same time, the Laws of the Indies prescribed arcades around central plazas to encourage sociability and trading and provide protection from the elements.

Figure 6 shows a drawing from a 19th-century code regulating building height and setbacks in London. Such codes regulated building form based on street width, and had the effect of creating a uniform street frontage.

Buildings

Regulation of individual buildings has had a profound effect on urban form. Rob Krier (2003) identified 24 different ways in which buildings affect urban space, asserting that the failure to recognize these effects "shows a society in cultural crisis" (p. 329). Regulations about where buildings could be placed, their height, and the spacing between them all already existed in ancient Roman times. Restrictions on height were the most ubiquitous. In 15 BC, the Roman emperor Augustus imposed a law limiting the height of buildings to 66 feet (Southworth & Ben-Joseph, 2003) in an effort to keep the city more open. But in the 18th century, German cities imposed regulations on minimum height (Kostof, 1991, p. 200), and after World War II, residential buildings in German cities were required to be at least four stories high in an effort to make cities more urban and dense.

In the medieval period, codes regulated structure placement, height, and setback. The first building regulations in England are from 1189, and dealt with issues such as obstruction of views, blockage of light, party walls, and projections (Larkham, 2001). A famous book of German building regulations known as the *Sachsenspiegel,* formulated in the early 1200s, allowed construction of a three-story building without a judge's permission, but specified laws governing minimum distances between buildings, maximum heights, and rules about fencing property (Arntz, 2002). It also prohibited windows that overlooked a neighbor's yard and buildings that overhung streets.

Some codes varied building height rules according to urban location. One version of this practice was to connect building height and street type. London's Rebuilding Act of 1667, for example, specified three building heights based on type of street. Some differentiated between inner and outer parts of a town, as did 1891 building requirements in Frankfurt am Main, Germany.

Fire safety concerns were often the reason for restricting building materials and specifying windows and other features, but such requirements could also be imposed for
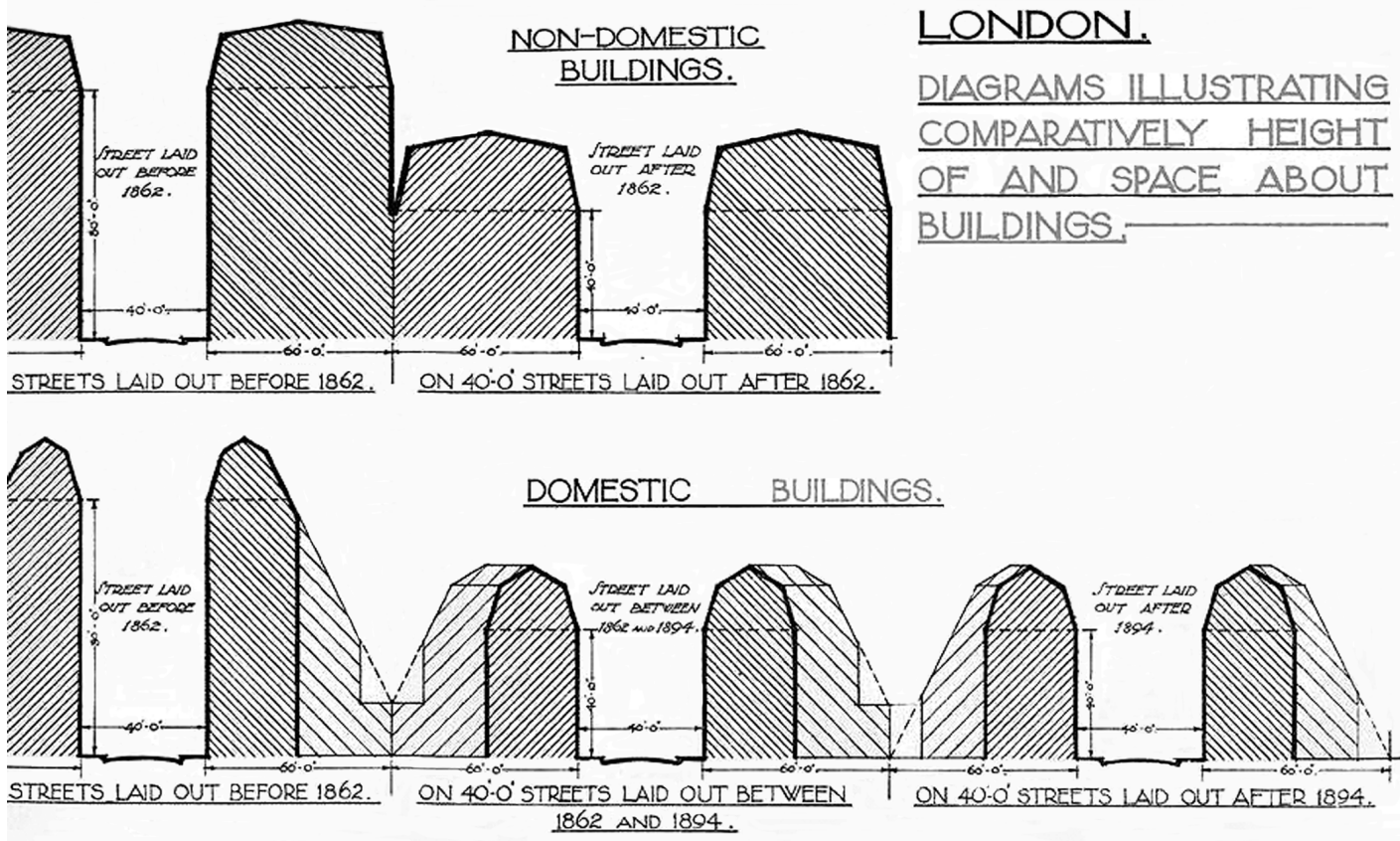
Figure 6. A 19th-century code regulating building height and setbacks in London.

Source: Forrest, 1925.

aesthetic reasons. A law from 1344 required that all buildings on the Piazza del Campo in Siena, Italy, have the same size windows, a ruling that was driven by a desire for visual harmony (Girouard, 1985). In Nuremburg, Germany, in the 15th century, codes stipulated how much ornamentation a building could have, how many oriel windows were permitted, and that buildings had to be lined up to create an "undeviating building line" (Kostof, 1992, p. 201). As early as 1607, French building regulations limited ornamentation (falling entablatures were a significant problem) and promoted a classically proportioned, flat building line. English law dictated in 1618 that windows had to be taller than they were wide and brick arches over windows were strongly encouraged (Ayers, 1998), while a Parisian law of 1882 gave exact dimensions "for every decorative element, including columns and pilasters, friezes, cornices, consoles and capitals" (Evenson, 1979, p. 149), clashing with 19th-century notions of artistic freedom.

Most American building codes that affected urban form did so indirectly, for example, limiting height or increasing setback as part of protecting health and welfare rather than out of a desire to create a particular urban form. The classic example is New York City's 1916 zoning resolution, which limited building mass at different heights (Ford, 1917). The intent was to prevent large buildings from blocking light and air on the streets below. This, coupled with owners' desires to maximize building volume in this desirable location, created a distinctive, stepped-back architecture.

Generative Codes

Generative codes have a less direct connection to current coding reform efforts. These are rules guiding construction decisions, rather than rules designed to achieve specific physical forms. They allow certain freedoms, but only within a framework of prohibitions focused on preventing damage to neighbors. They have been described as "a bottom-up system of self-regulation, and thus democratic in spirit" (Hakim, 2001, p. 22). Islamic codes are the clearest example, and the method is most prevalent in

Mediterranean cultures, although through Roman law such codes affected much of Europe. In fact, many historical rules dictating frontage, street width, and building height can be viewed as generative in the sense that one variable (like street width) generated the other (like allowable building height). In the United States, the idea of a generative code has been popularized by Christopher Alexander, whose work on the organic city-making process follows in the tradition of Jane Jacobs' process-oriented ideals (Alexander, Neis, Anninou, & King, 1987). This approach rejects predetermined forms and patterns in favor of "the stepwise process by which a form might emerge from the evolutionary actions of a group of collaborators" (Mehaffy, 2008, p. 57).

Traditionally, city building in the Mediterranean region has been guided by codes based on a widely shared set of values including respecting one's neighbor, acknowledging the inevitability of change, and respecting local customs (Hakim, 1986, 2008). The result is a low, compact urban form with abutting buildings, narrow streets, private courtyards, and connecting archways above the street. Rules that protected adjacent properties against negative effects, but allowed great latitude in property use, were codified as early as the 6th century by the Byzantine emperor, Justinian I, whose code had roots in even earlier laws of the ancient Near East (Hakim, 2001). Traditionally, local judges decided compliance with these codes one case at a time, aiming to rule equitably, and leading urban form to evolve "naturally," as a "self-regulating and adaptive system" (Hakim & Ahmed, 2006, p. 19). Figure 7 shows Granada, Spain, a city resulting from generative coding.

Islamic codes yield fine-grained urbanism and many courtyards. They are driven primarily by concern for privacy, prevention of damages, and decorum. Koranic laws that apply to buildings emphasize respect for proximate neighbors, privacy, and equity, and have a transparent effect on urban form because their origins and impacts are known (Davis, 1999). For example, a rule that doors on alleys should not face one another is motivated by the need for privacy rather than a specific aesthetic obligation. A rule that courtyards are to be symmetrical is motivated by the centrality of the courtyard in social life, not by an abstract notion of the beauty of classical proportions.

An example of generative coding in English common law known as the Doctrine of Ancient Lights came from the document whose title page is shown in Figure 8. It stated that a new building could not block the light from an ancient window, defined by William Blackstone (1768) as having "subsisted there time out of mind" (p. 134). This had the effect of limiting building heights. This doctrine survived in the United States until it was struck down in 1838 by a judge in upstate New York who declared that the practice would limit economic return and prevent the highest and best use of a piece of land (Davis, 1999).

The American Experience: From Zoning to Form-Based Codes

These European coding traditions did not take root in the United States, though there were some restrictions on building materials in the North American colonies as early as the 17th century, and a few colonial settlements were regulated by urban codes like the Laws of the Indies, as mentioned earlier. During the 18th and 19th centuries some American cities passed sanitation laws designed to protect public health and private investment and some well-known housing codes, such as New York's Tenement House Act of 1867, though the latter largely perpetuated the status quo. Planned communities had codes regulating form, but these were uncommon. As American urbanization increased in the second half of the 19th century, few development controls were specifically about form. Regulations establishing street widths, frontage, and building height were rare. Boston only regulated building height limits in 1903. This is not to say that urban form was unaffected by law, only that the effects were largely indirect. For example, the tenements in Chicago were three stories tall, while those in New York were six stories tall, because above these heights buildings were required to be fireproof (Williams, 1919).

The codes established by the late 19th century were quickly subsumed by zoning regulations in the early 20th century. By 1918, zoning had taken the country "by storm" (Kimball, cited in Simpson, 1985, p. 126). Herbert Hoover's enabling legislation pushed it even further, and by 1929 nearly 800 cities in the United States had zoning ordinances (Hubbard & Hubbard, 1929). Hoover was an engineer, and promoted zoning as a tidy and technically efficient approach to city building, largely without concern for its effects on urban form. Hoover's 1926 publication, *A Zoning Primer,* likened the unzoned city to "an undisciplined daughter making fudge in the parlor" (Advisory Committee on Zoning, 1926, p. 1).

Zoning was designed to remedy the negative externalities of the industrial city, stabilizing residential property values while keeping industrial areas efficient and functional. Thus began American planners' adaptation of German zoning laws from the 1890s to very different ends, maximizing separation and mobility (Scott, 1969; see also Logan, 1976). The New York zoning ordinance of 1916 was the first such comprehensive scheme, but the suggestion to separate the city into zones had been made earlier.
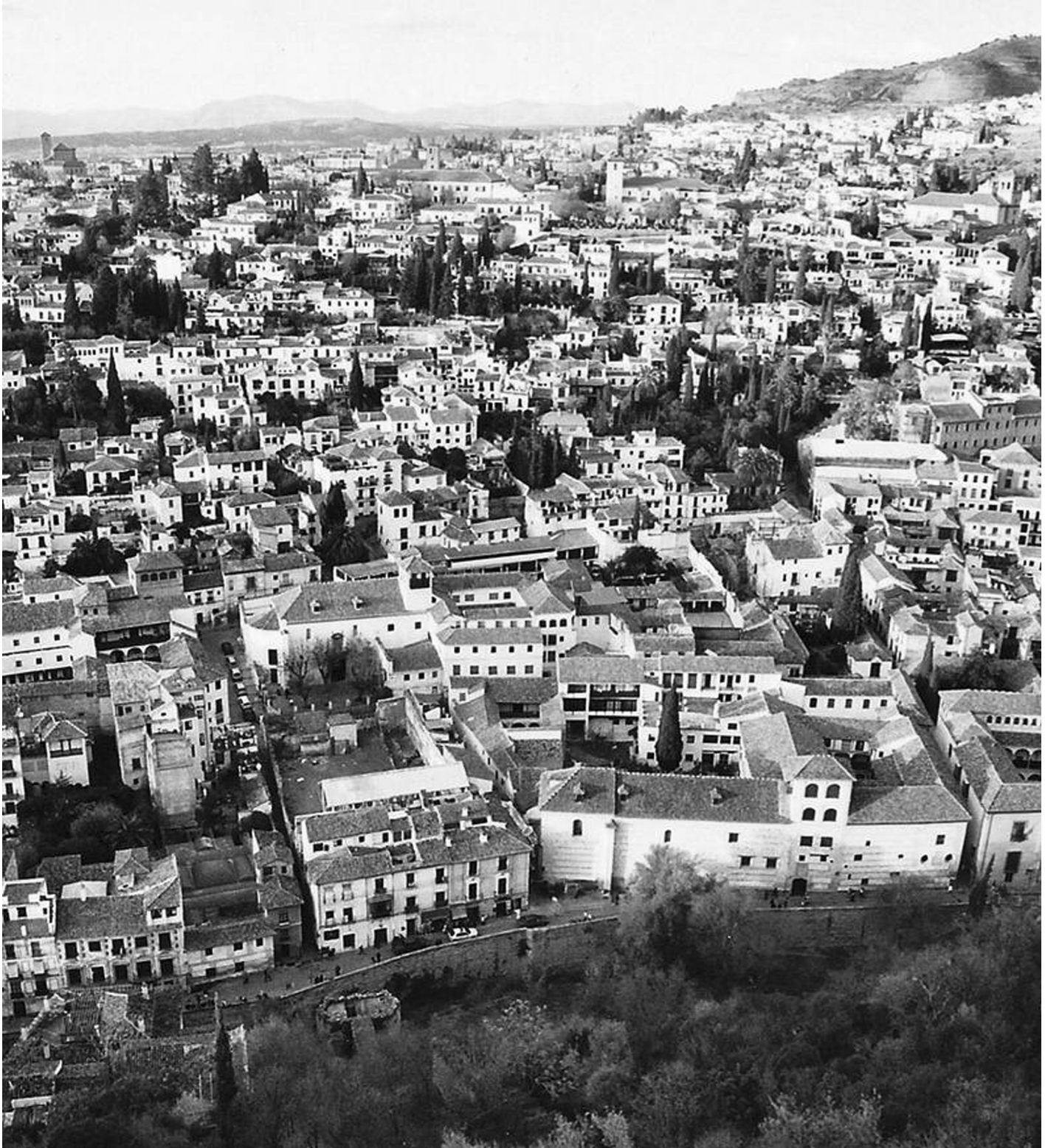
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Figure 7. Granada, Spain.

Source: Photo by Michael Mehaffy, published with permission.

THE STUDENT'S BLACKSTONE.

COMMENTARIES

ON

THE LAWS OF ENGLAND.

In Four Books.

BY SIR WILLIAM BLACKSTONE, KNT.,

ONE OF THE JUSTICES OF THE COURT OF COMMON PLEAS.

ABRIDGED

AND

ADAPTED TO THE PRESENT STATE OF THE LAW,

BY ROBERT MALCOLM KERR, LL.D.,

BARRISTER-AT-LAW.

NEW EDITION.

LONDON:
JOHN MURRAY, ALBEMARLE STREET.
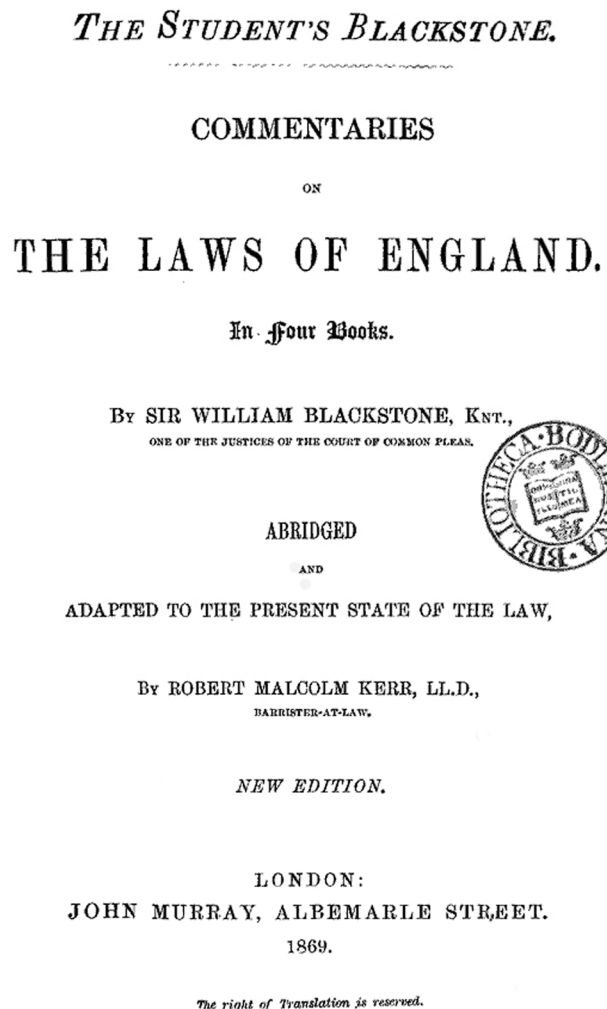1869.

The right of Translation is reserved.

Figure 8. The source of the Doctrine of Ancient Lights.

Decentralization and separation were emphasized at the First National Planning Conference in 1909, where Robert Anderson Pope argued for "wider dispersal of the laboring class" (Sies & Silver, 1996, p. 462). George Kessler's plan for Dallas in 1910 emphasized dividing the city into zones, "each devoted to its own particular purpose" (Scott, 1969, p. 124).

Later, FHA regulations on mortgage lending had a significant impact on urban form, setting standards for street widths, block lengths, and dwelling sizes (Federal Housing Administration [FHA], 1935). Suburban restrictive covenants imposed building rules designed to exclude (Fogelson, 2005). In *The Rise of the Community Builders: The American Real Estate Industry and Urban Land Planning,*

Weiss (1987) demonstrated that development was not simply unfettered sprawl, but was orderly, controlled, and designed. The community builders helped put in place the deed restrictions, zoning, subdivision regulations, and other land development controls that engendered the segregated pattern of postwar suburbanization.

The negative effects of such controls, particularly zoning, were recognized from the outset. In 1909, Raymond Unwin, the great British town planner, described the building regulations he was confronting as little more than "needless harassment and restriction of really good building" (p. 388). Clarence Perry (1939) lambasted zoning as inflexible and not able to invest a residential district with "attractiveness" (p. 114). The solution proposed at the time was not to reform existing codes, but to place greater reliance on professional expertise. Charles Robinson's 1901 city planning text included a chapter called "Centralized Control" that recommended putting every aspect of urban development in the hands of planners offering "the central viewpoint" who would "take, beyond the cavil of petty politics or local interest, the community standpoint" (p. 245). Thomas Adams (1935) echoed the same sentiment several decades later, noting that "the city planner must be guided by his own judgment rather than by any formulae" (p. 24). In Europe, Unwin (1909) proposed an approach allowing "something of that elastic character which belongs to natural restraints," (p. 387) and "a little give and take, a little averaging of one part with another" (p. 393). He proposed submitting individual cases to a referee.

Dissatisfaction with land use codes grew throughout the 20th century, leading to the current intense interest in coding reform. A number of authors have tried to understand how planning regulations came to be so widely despised (Ben-Joseph & Szold, 2004; Davis, 1999). Critics pointed out inefficiencies, social inequities, and added costs of conventional zoning codes (Dowall, 1984; Levine, 2005),[4] and noted that zoning was, "modified by bureaucracies, adapted to political exigencies, and otherwise thoroughly watered down for ease of application and administration" (Relph, 1987, pp. 74–75).

FBCs emerged as the antidote to conventional, use-based zoning, possessing the fundamental difference of being intended to affect urban pattern and form.[5] Duany and Plater-Zyberk's 1982 master-planned community of Seaside, FL, initiated the most recent wave of FBCs, specifying building use, height, permitted encroachments, and parking (see Krieger, 1991). Subsequently, the Congress for the New Urbanism advocated that codes focus on the visual harmony in the public realm; require continuous urban frontage to ensure a degree of uniformity; and be sensitive to context, factoring in spatial relationships to be

at least partly generative. Transect-based codes such as the SmartCode are a subset of FBCs in which regulations vary depending on the type location, ranging from rural preserve to urban core (Duany & Talen, 2002).

Assessment

I aim to assess current efforts at code reform, particularly FBCs, given the historical trajectory, first discussing differences and similarities and then assessing the future prospects of code reform in light of what preceded it.

Differences and Similarities

It is widely believed that today's codes are more heavy handed and exert a greater degree of control than previously seen. But laws regulating urban places have long been common. Regulations specifying building type, height, embellishment, window size, and setback already existed in medieval times. Citywide regulations often went even further, dictating appropriate dress and specifying curfews, for example. As Girouard (1985) summarized it: "The city government watched over the way people behaved, and made the appropriate regulations" (p. 73). Many of these rules were more proscriptive and generative than today's FBCs, though some proponents claim that FBCs could be generative, perhaps with "stepwise layout guides" (Mehaffy, 2008, p. 72).

Historic codes were not exclusively about achieving ideal physical configurations, as might be imagined, but have long sought to control land use. Islamic codes, for example, are rooted in principles governing the acceptable use of land. Ancient Romans enacted laws to keep industry out of certain areas (Ben-Joseph, 2005), and in the Middle Ages, noxious industries like tanning establishments were kept out of the city center. In 17th-century London, shops were not allowed on main public squares nor on the streets leading toward them. Regulations in Italy from the mid-16th century ordered that gaps between houses be filled in with buildings (Girouard, 1985). Ancient Rome, 17th-century London, and 19th-century Germany all had regulations meant to be applied differently to different parts of the city (i.e., zoning). Land use zoning in the early 20th century only expanded on these earlier coding traditions.

Codes have recognized the importance of aesthetics since the Renaissance. Girouard (1985) wrote that the medieval period had "only a few recorded instances of aesthetic awareness" (p. 76), but others have argued that regulations on such things as bridge ornamentation, street trees, the protection of admired buildings, and the cleanliness of canal banks in the 16th century were intended to protect the aesthetics of the public realm (Kistemaker, 2000). Although architectural style was often affected indirectly by codes created to prevent fires or protect public health, for example, the effects on aesthetics were also known in the early 18th century (Larkham, 2001). Royal proclamations in France in 1783–1784 introduced rules that made house height a function of street width, and forbade any roof greater than half the width of the house. Both rules were motivated by urban aesthetics and the desire to create scenic views. Baron von Haussmann's 1859 decree regulating building height and street width grew out of these and was "more an evolution than a revolution" (Cognot & Roux, 2002, p. 10).

Throughout history, urban codes imposed order and uniformity to protect public health and safety and property values, and at times to provide social control. Such uniformity was often superficial, masking great social and economic complexity, and sometimes disconnecting form from function. In the Baroque era, for example, strictly controlled building frontages concealed speculative development. Kostof (1991) points out that codes requiring uniform street frontage often accompanied other social controls. In St. Petersburg in the 18th century, codes required uniform streets and houses at the same time that Peter the Great required Western dress and shaved beards. Urban order was supposed to make people more civic-minded and, according to Catherine the Great, "more docile and polite" (cited in Kostof, 1991, p. 256).

Not all historic codes raised aesthetic quality. Before World War I, Dutch architect Berlage encouraged Amsterdam to require uniform block frontages, creating a "system of definite proportions" which many say yielded especially beautiful urban form (Banham, 1960, p. 142). But English law created oppressively uniform bye-law streets[6] more to reduce costs than to achieve visual harmony, like standardized terrace or row housing. Where requirements for uniform building frontage were intended to hide class distinctions, as was the case in the 19th century and later in Garden City design, uniformity of design may have seemed more legitimate.

It has always been important to balance uniformity, order, and control with flexibility and the ability to adapt to changing circumstances. Historically, codes often required case-by-case problem solving involving an intermediary. Disagreements over the implementation of Islamic codes, for example, were adjudicated by a local judge. In medieval London, building disputes were dealt with at quasigovernmental public meetings. A London proclamation in 1618 specified that "the beauty and uniformity of the work [was] to be agreed by the builders at the discretion of the Commissioners" (Ayers, 1998, p. 230). This was the

kind of flexible adjudication and generative process that planners like Unwin, Robinson, and Adams would have endorsed.

Codes have always been subject to change. In Rome, when tall buildings made narrow streets dark, Julius Caesar reduced allowable building heights. Widespread European support for wide streets was replaced in the 19th century by the view that wide streets were unhealthy, creating wind and dust (Kostof, 1992, p. 206). Rules also often applied to only a few aspects of urban form, with the rest left to change as desired. The codes of medieval cities, for example, required that some streets would be wide enough for clear passage, and protected the public square, but left the remainder of the city unconstrained.

Today's code reformers also specify a few simple rules while leaving everything else to adapt, innovate, and remain culturally distinctive within a coding framework. This approach existed almost from the beginning of American city planning. Early 20th-century planners like Frederick Law Olmsted Jr. wanted codes to be adaptable and responsive (Scott, 1969). Lewis Mumford said that because the Laws of the Indies followed the standard bastide pattern and prescribed exact dimensions (e.g., plazas were to be 400 by 600 feet), they produced towns that "looked backward, not forward" (Mumford, 1961, p. 330). Julian of Ascalon's 6th-century treatise, which modern writers say combined "a large measure of performance outcome and a small dose of prescribed rules" (Ben-Joseph, 2005; Hakim, 2001), would likely appeal to current code reformers.

Future Prospects

In the past, a code could produce a coherent visual framework for the city because it was supported by what Witold Rybczynski (1989) called "a collective wisdom and a shared consensus about what constituted good architectural manners." In *Urban Design in Western Europe*, Wolfgang Braunfels (1990) asked why "the most comprehensive and precise codes no longer suffice to maintain" an ordered urban framework previously achieved by just a few simple rules (p. 1). He did not blame this on architects and urban designers, but explained it as the result of political change, saying that cities are now too disparate and lack commonality among competing actors and interests.

For this reason, modern FBCs cannot simply resurrect past codes. Rather, they must substitute something for a consensus about urban form that no longer exists. Some earlier urban codes were the product of constraints, so that the uniform street width, frontage lines, and building heights they required were rarely disputed. But modern FBCs attempt to move development in a new direction, and what they require is not already in place. Absent

vernacular building traditions, or a clear memory of them, FBCs must break new ground.

Codes also require transparency and a shared, easily understood set of principles. When zoning codes are unresponsive to local conditions and do not explain the reasons for their requirements (why must a building be set back 15 feet?), they may prevent development that fails to comply with the letter of the law even though it satisfies the law's intent (Davis, 1999).

And code reform also requires shared ideals. Without these, a code becomes one element in a multitude of what Waller (1983) described as idiosyncratic "secular influences" dictating city form. Building cycles, the behavior of speculators and lenders, taxation, capital investments, and topography all have influence. While coding was previously supported by culture and technological limits, FBCs must now build consensus around what Ben-Joseph (2005) termed "place-based norms" (p. 24). Such norms may be dormant. Some planners have been accused of relying on conventional zoning codes precisely because design sensibilities and norms about place are missing.

That codes will have to be the substitute for place-based norms, or at least the mechanism through which they occur, is not a completely new viewpoint. Writing in 1909, Raymond Unwin said that town planning "and the powers conferred by legislation" were evidence that the "spirit of association" (p. 375) that may have once existed in feudal times was making a comeback. It was a matter of a new order taking the place of an old one, a solution to the problem of the individual in "helpless isolation of his freedom" (p. 375). Some decades later, the 1942 "Dedication of Principles" of the Building Officials Conference of America (BOCA) proclaimed commitment not only to better methods of construction and to relief "from the uncertainty and confusion of conflicting building laws and regulations," but to "the promotion of civic pride and community well-being" (BOCA International, Inc., 2002, p. 4).

Modern code reformers aim to help communities uncover shared attitudes toward urban form by engaging the public in the code-making process. Requiring meaningful public participation in the code-making process, as strongly urged by FBC advocates, is new. The new book *Form-Based Codes* (Parolek, Parolek, & Crawford, 2008) stresses the importance of public participation, calling for a community visioning process as a key source of code content.

Consensus will have to be balanced with flexibility. There is a continuing tension between infusing aesthetic goals into the planning process, and coding prescribed forms. One is about infiltrating a process with design sensibilities, the other about hardwiring a specific physical goal. One allows multiple interpretations, the other constrains

responses in order to achieve predetermined outcomes. This tension is an ongoing coding challenge.

One approach to resolving this dilemma is to code only the most essential elements. Codes can be all-controlling or they can stipulate a few key principles and, from there, "let it go" (Jacobs, 2002, p. 139). History provides ample evidence that a few simple rules can lead to desired urban forms while making adaptation less cumbersome. Mumford (1968) said that failure to adapt led to the "brilliantly sterile" urbanism of Le Corbusier and Mies van der Rohe (p. 162–163). Yet, code reformers must wonder whether it will be possible to guide urban form in desirable ways by focusing on small, incremental changes, given that big developers and large-scale developments often have the greatest influence.

Thus, there is ongoing disagreement over the degree to which incremental changes can or should be regulated. Jane Jacobs (1961) expressed "great wonder" at the intricate order that cities exhibited because of the countless freedoms available to urban dwellers (p. 391). Others have similarly extolled the virtues of loose controls. Richard Sennett, in *The Uses of Disorder* (1970), promoted an urban social life that is "disordered" and "unstable," because it causes residents to become more directly involved with the mitigation of neighborhood problems (p. 144). Absent land use laws, Sennett reasoned, residents would not rely on government to solve problems, but would take it upon themselves to effect change.

Urban planners generally disagree, and have not favored minimizing regulation. Unwin (1909) believed that any semblance of order or convenience in an unplanned place was due purely to chance (p. 2). As discussed earlier, the historic solution was to grant architects like Unwin great authority over the pattern and form of the built environment rather than to try to refine codes. Early 20th-century planners had little interest in regulating the small details of the built environment, and didn't think it could be done in any case. Writing in 1901, Robinson concluded, "Rules and suggestions can be based only on practical considerations. The rest must be in the designer's heart" (p. 126). While early planners promoted a theory of systematized planning (Birch, 1980), they failed to extend the system to physical design. As a result, urban form languished under a coding approach (zoning) that paid little attention to the quality of urban form. Modern code reformers, by contrast, believe they can use codes to achieve a better sense of place.

Conclusion

Current code reform is an interesting blend of old and new approaches. Codes have an illustrious history that reaches back at least 3,000 years, and much of what current code reformers are trying to do when they regulate urban dimensions like street width, building height, and frontage connects to that history.

Early 20th-century planners like Thomas Adams and Frederick Law Olmsted Jr. apparently had little confidence that using codes could achieve particular urban forms. Many prominent planners deplored the subordination of design to legal restrictions and thought attempting this was a chief weakness of planning. This view persisted even after it became clear in the 1930s that zoning codes were not producing good urban places. This way of thinking was in keeping with modernist sentiment. As Howard Davis (1999) summarized: "Modernism helped legitimize things that could be measured and tried to liberate the architect's individual creativity with respect to things that could not" (p. 201).

Today's codes must cope with complexity that was unknown in previous historical periods. Before the 20th century, urban form was limited by transportation, construction methods, and the need for defense, identity, and proximity to agricultural land. These constraints created urban form that today's FBCs emulate in many ways: uniform frontage, small blocks and lots, pedestrian orientation, and emphasis on the public realm. With the emergence of modernism, the consensus about what constituted time-tested urbanism no longer held. Technological constraints and the limitations imposed by premodern institutions gave way to a variety of technological and stylistic freedoms that produced a much different kind of urban form.

Modern FBCs aim to impose limits that are no longer dictated by technological and other constraints, but instead rely entirely on public consensus. Thus, today's codes must balance use, form, location, safety, and public process. This is unprecedented. And paradoxically, reformers are trying to simplify regulation at the same time, attempting to reverse trends evolving since the onset of modernism and conventional zoning. This is especially evident in the case of controls on land use, where zoning regulation has become a complicated set of prohibitions of all imaginable incompatibilities.

It is ironic that one century after the establishment of city planning as a profession, planners have reversed themselves on urban codes, one of their most fundamental tools. FBCs are an attempt to reverse the decentralization and separation advocated at the First National Planning Conference in 1909. Advocates of code reform can take comfort in the fact that their approach connects to a history that extends much further back than 1909. It is conventional zoning that has a decidedly weak historical record.

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Acknowledgments

Notes

1. FBCs are also sometimes known as *urban design codes* or *typological codes.*

2. *Bastides* were fortified new towns built mostly in France in the 13th and 14th centuries.

3. I do not consider modern traffic engineering regulations that focus on traffic flow rather than public space.

4. See Dowall (1984) on the effects of land use regulation; see Booth (1989), McMillen and McDonald (1990), and Natoli (1971) on the ineffectiveness of land use zoning; see Babcock on spatial impacts (1980); see Pogodzinski and Sass (1991) for the effect on the real estate market; see Talen and Knaap (2003) for counter-urban effects; see Pendall (1999) for the effect on low densities.

5. Two recent publications document implementing such reform: Steve Tracy's (2003) *Smart Growth Zoning Codes: A Resource Guide*, and the Congress for the New Urbanism's (2004) *Codifying New Urbanism: How to Reform Municipal Land Development Regulations.* See also http://www.formbasedcodes.org/ for information on code reform efforts.

6. The bye-law streets instituted in England following the public health acts of the mid 19th century were very long, straight, and excessively wide, with few cross streets and no street trees or other vegetation. They were fronted by long rows of identical, attached houses.

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