

## EXERCISE

## 2

## TRANSECTS

**Purpose:** To design a new zoning map based on the idea of an urban-to-rural transect

**Note:** This exercise uses four transect zones—T3 to T6—to show the complete range of transect zone variation as proposed in the SmartCode. It should be kept in mind, however, that this is a long-term, future-oriented perspective, as it is unlikely that Portage Park will contain true “urban core” conditions in the near term.

**BACKGROUND**

The design of a neighborhood is dramatically affected by zoning codes. Planners, who are generally the ones most associated with zoning and its administration, could exert a great deal of effect over the design of place by suggesting ways to overhaul existing, conventional zoning codes that tend to ignore their effect on design. Through innovative concepts like the urban-to-rural transect, which can be used as a basis for zoning, planners can have a major impact on design.

A “transect” can be used to organize the elements of urbanism—building, lot, land use, street, and all of the other physical aspects of the human habitat—in ways that preserve the integrity of different types of urban and rural environments (see Duany, Sorlien, and Wright, 2008). These environments vary along a continuum that ranges from less intensity (rural) to high intensity (urban). Adhering to this system of organization, each type of environment—whether urban, rural, or somewhere in between—is zoned in an effort to strengthen its particular character. The mixing of elements—a rural element in an urban environment and vice versa—is avoided.

Finding the proper integration of town (or city) and country (or nature) is a compelling subject. While it is possible to view the “man-made world” as “natural,” it is more likely to be viewed in striking contrast to the natural world. The transect offers a way to find the correct balance. It ties into a tradition of ecological planning that is more integrative than boundary-driven. Rather than stopping urban growth with physical barriers that underscore urban versus rural division, the transect seeks to connect and integrate the two realms along a continuum. Thus, the transect can be thought of as an environmentally conceived approach to urban design.

The transect’s approach to the integration of urban and rural is an update on the idea of regionally dispersed garden cities. The modification accommodates a more diverse range of development types, paying greater attention to the interconnections of

various urban elements at multiple points along the urban-to-rural gradient. This has the benefit of accommodating a greater range of development choices, infusing a greater sense of realism in the land development process. It also focuses on the need to work through existing development patterns. Rather than placing garden cities in a region, the transect seeks to position a more complex pattern of development types (known as “immersive” environments) in a regional framework. What is retained, however, is a clear focus on making sure that the integration of urban and rural places does not neutralize either one in the process.

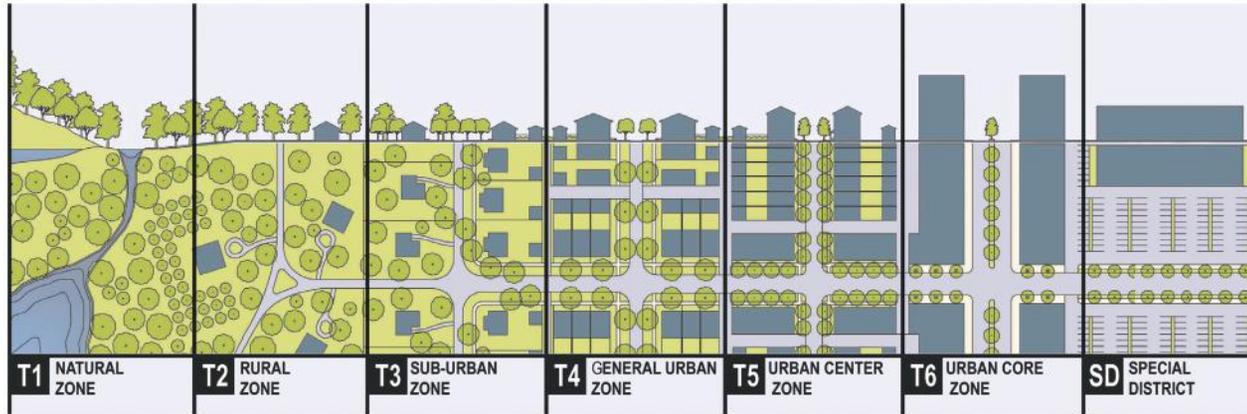
This is appealing because it provides a basis for specifying a range of human habitats—habitats that can be coded much like conventional zoning, but with a much different purpose and approach. In recent years, attempts have been made to operationalize the transect idea by adapting it to an actual code. Duany, Plater-Zyberk and Co.’s SmartCode is the best example. It is a coding system based on the transect that identifies six zones or levels of intensity:

1. Rural preserve (T1)
2. Rural reserve (T2)
3. Sub-urban (T3)
4. Urban general (T4)
5. Urban center (T5)
6. Urban core (T6)

A category called “special district” applies to large facilities like airports and college campuses. **Figures 2-1** and **2-2** list and illustrate the characteristics of these zones.

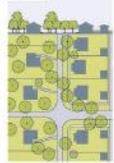
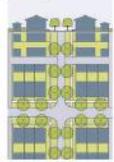
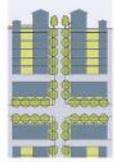
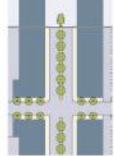
Every city and town has its own set of urban-to-rural environments. Some of these environments are immersive in that the elements within them conform to a given level of intensity. Other areas are mixtures of different levels of urban intensity (for example, a skyscraper sitting in a cornfield is an urban element in a rural context, something the transect discourages). This exercise demonstrates how the various elements of the built environment fit together (or don’t). It also shows how elements as basic as street widths

Figure 2-1



Transect zones: from rural to urban.

Figure 2-2

	<p><b>T-3 SUB-URBAN</b> T-3 Sub-Urban Zone consists of low density residential areas, adjacent to higher zones that some mixed use. Home occupations and outbuildings are allowed. Planting is naturalistic and setbacks are relatively deep. Blocks may be large and the roads irregular to accommodate natural conditions.</p>	<p><b>General Character:</b> Lawns, and landscaped yards surrounding detached single-family houses; pedestrians occasionally</p> <p><b>Building Placement:</b> Large and variable front and side yard Setbacks</p> <p><b>Frontage Types:</b> Porches, fences, naturalistic tree planting</p> <p><b>Typical Building Height:</b> 1- to 2-Story with some 3-Story</p> <p><b>Type of Civic Space:</b> Parks, Greenways</p>
	<p><b>T-4 GENERAL URBAN</b> T-4 General Urban Zone consists of a mixed use but primarily residential urban fabric. It may have a wide range of building types: single, sideyard, and rowhouses. Setbacks and landscaping are variable. Streets with curbs and sidewalks define medium-sized blocks.</p>	<p><b>General Character:</b> Mix of Houses, Townhouses &amp; small Apartment buildings, with scattered Commercial activity; balance between landscape and buildings; presence of pedestrians</p> <p><b>Building Placement:</b> Shallow to medium front and side yard Setbacks</p> <p><b>Frontage Types:</b> Porches, fences, Dooryards</p> <p><b>Typical Building Height:</b> 2- to 3-Story with a few taller Mixed Use buildings</p> <p><b>Type of Civic Space:</b> Squares, Greens</p>
	<p><b>T-5 URBAN CENTER</b> T-5 Urban Center Zone consists of higher density mixed use building that accommodate retail, offices, rowhouses and apartments. It has a tight network of streets, with wide sidewalks, steady street tree planting and buildings set close to the sidewalks.</p>	<p><b>General Character:</b> Shops mixed with Townhouses, larger Apartment houses, Offices, workplace, and Civic buildings; predominantly attached buildings; trees within the public right-of-way; substantial pedestrian activity</p> <p><b>Building Placement:</b> Shallow Setbacks or none; buildings oriented to street defining a street wall</p> <p><b>Frontage Types:</b> Stoops, Shopfronts, Galleries</p> <p><b>Typical Building Height:</b> 3- to 5-Story with some variation</p> <p><b>Type of Civic Space:</b> Parks, Plazas and Squares, median landscaping</p>
	<p><b>T-6 URBAN CORE</b> T-6 Urban Core Zone consists of the highest density and height, with the greatest variety of uses, and civic buildings of regional importance. It may have larger blocks; streets have steady street tree planting and buildings are set close to wide sidewalks. Typically only large towns and cities have an Urban Core Zone.</p>	<p><b>General Character:</b> Medium to high-Density Mixed Use buildings, entertainment, Civic and cultural uses. Attached buildings forming a continuous street wall; trees within the public right-of-way; highest pedestrian and transit activity</p> <p><b>Building Placement:</b> Shallow Setbacks or none; buildings oriented to street, defining a street wall</p> <p><b>Frontage Types:</b> Stoops, Dooryards, Forecourts, Shopfronts, Galleries, and Arcades</p> <p><b>Typical Building Height:</b> 4-plus Story with a few shorter buildings</p> <p><b>Type of Civic Space:</b> Parks, Plazas and Squares; median landscaping</p>

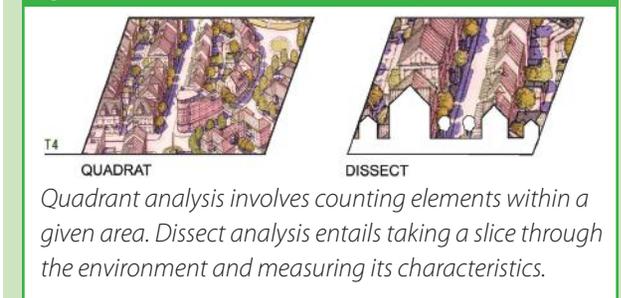
Each transect zone has a different set of specifications regarding form and use.

### The Synoptic Survey

The synoptic survey is typically used for environmental analysis to determine the characteristics of a given site by discovering the habitats (or “communities”) that it contains. The objective is to determine the values of each habitat in order to recommend the degree of protection and type of restoration each might require. Every functioning habitat is a symbiotic community of microclimate, minerals, humidity, flora, and fauna.

In environmental analysis, the synoptic survey is a systematic visual inspection that identifies typical habitats: a wetland here, an oak hammock there, a rocky outcrop there. The most representative locales are then analyzed in depth by means of the dissect

Figure 2-3



Quadrat analysis involves counting elements within a given area. Dissect analysis entails taking a slice through the environment and measuring its characteristics.

and the quadrat. The “dissect” is a simultaneous analysis of the conditions above and below ground, and involves borings to determine such items as the soil condition, water table, and archeology. The “quadrat” involves taking a normative area (say, 100 x 100 feet) where the component elements of flora and fauna are itemized and counted.

The concepts and methods that are used to analyze natural habitats—the synoptic survey, the transect, the dissect, and the quadrat—can be extended into urbanized areas. **Figure 2-3** shows some example dissect analyses for urban and natural environments. From SmartCode version 9 and Manual (Duany, Sorlien, and Wright, 2008), available at <http://smartcodecentral.com>.

and porch fronts can be used to code the character of a place. From visual inspection and mapped data, the ultimate goal is to derive a new zoning map based on the transect.

Some of the methodology used in this exercise is adapted from SmartCode version 9 and Manual (Duany, Sorlien, and Wright, 2008). Duany, Plater-Zyberk & Co. should be credited with the idea of applying the synoptic survey (a standard approach used in environmental analysis) to the human habitat. Further information about the transect and the SmartCode are available at <http://smartcodecentral.com>.

**ANALYSIS**

**Step 1: To get a baseline, carefully examine the existing zoning map of the area.**

The Chicago zoning map for Portage Park is shown in Figure 2-4. Note the many different zones, as well as their diverse sizes and shapes. There are many categories, each with its own set of rules for permitted use, densities, setback requirements, and other standards ([www.cityofchicago.org/zoning](http://www.cityofchicago.org/zoning)). Portage Park has 28 separate zoning categories. The transect approach to zoning greatly simplifies this complexity, using only four categories of built environment (and two others for natural, unbuilt lands).

**Step 2: Examine existing areas in terms of their transect qualities.**

Most urban, built-up areas the size of Portage Park will already have a range of existing transect zones, although the zones are not likely to be highly immersive in every case (where every element conforms to its location along the transect). To get a sense of this, examine the main dimensions and elements in each of four transect zones that are likely to exist, including both the elements on private lots and within the public right-of-way. Record the key elements that conform to the generic descriptions of each transect zone shown in Table 2-1. When taken together, the list of elements for each zone shown in Table 2-1

**Table 2-1**

**Transect Zone Descriptions for Portage Park\***

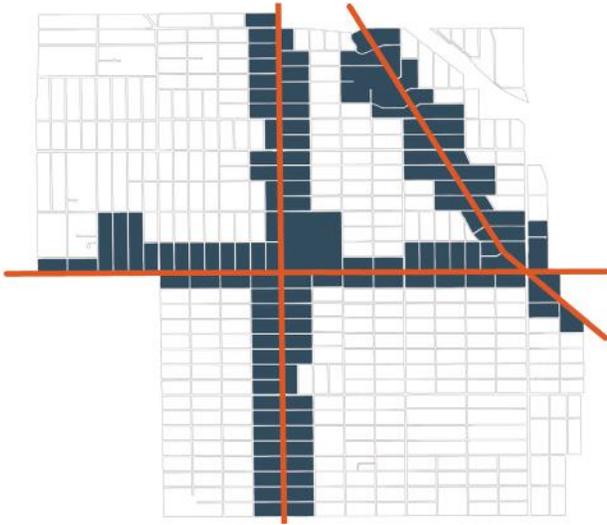
	T3	T4	T5	T6
Land uses and buildings	Houses	Houses, town houses, limited commercial	Town houses, apartments, hotels, office buildings	High- and medium-rise apartments, office buildings, hotels
Private frontage	Lawns, porches, fences	Porches, fences	Stoops, shopfronts	Stoops, forecourts, shopfront
Public frontage	Open swales, naturalistic tree planting	Raised curbs, narrow sidewalks	Raised curbs, wide sidewalks	Raised curbs, wide sidewalks
Thoroughfares	Roads	Streets, rear lanes	Boulevards, avenues, streets	Boulevards, avenues, streets
Open spaces	Parks, greens	Squares, playgrounds	Squares, plazas, playgrounds	Squares, plazas, playgrounds

\*Adapted from the generic description of each transect zone found in the SmartCode; includes elements most relevant to the Portage Park community.

**Figure 2-4**

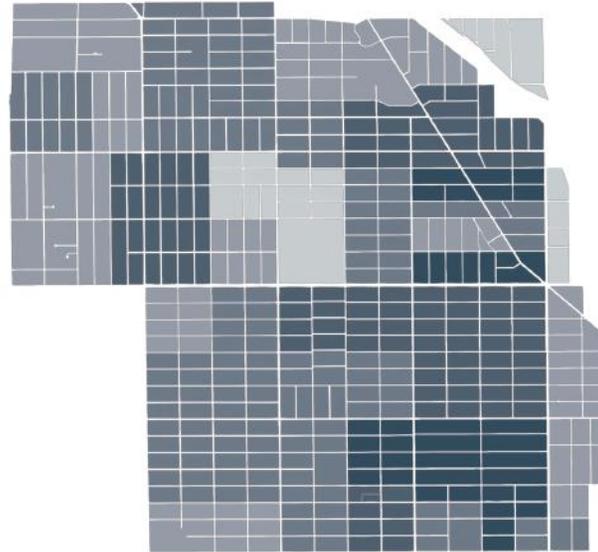


**Figure 2-5**



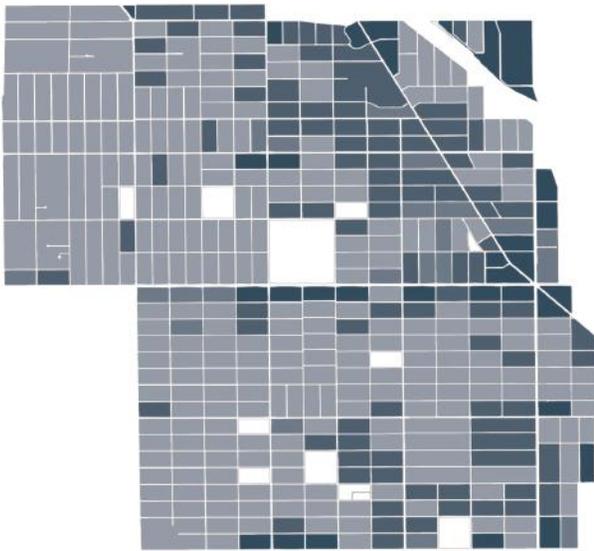
The first criterion for transect zone delineation: blocks near major thoroughfares.

**Figure 2-6**



The second criterion: population density by block (darker=denser.)

**Figure 2-7**



The third criterion: existing land-use intensity.

**Figure 2-8**



The proposed transect zones for Portage Park.

gives a good clue about the transect zone variation that exists in Portage Park.

**Step 3: Construct the layers that will be used to determine transect zone locations.**

To delineate transect zones, one approach is to use blocks as the unit of analysis and assign a particular transect character to each block. In the example below, three criteria are used:

1. Major streets and the blocks adjacent to them;
2. Density by block; and
3. Land-use intensity.

Figures 2-5, 2-6, and 2-7 show these three layers for Portage Park. Figure 2-5 shows the blocks that fall into two categories: blocks that are adjacent to a major street or boulevard in Portage Park, and blocks that are not. Figure 2-6 shows blocks that have been assigned a certain density level. Densities were determined based on census data at the block-group level. Based on the range of densities found in Portage Park, blocks were put into one of five density categories.

Figure 2-7, constituting land-use intensity, was determined using parcel data from the county tax assessor. One of four use categories was assigned to each parcel:

1. Single-family detached dwelling;
2. Residential apartment building, row house, or town house;
3. Mixed commercial/residential; or
4. Nonresidential (commercial or industrial).

Next, each block was assigned a level of land-use intensity based on the make-up of parcel-based land use for the block. Specifically, the following criteria were used:

- **Level 1:** Single-family dwellings constitute 50 percent or more of the parcels on the block.
- **Level 2:** Single-family dwellings constitute less than 50 percent; in addition, there are residential apartment buildings, row houses and town houses on the same block.
- **Level 3:** The percentage of parcels that are row

houses, town houses, or apartment buildings is greater than the median percentage for the area (in this case, greater than 23 percent).

- **Level 4:** The percentage of mixed commercial/residential, commercial, or industrial parcels exceeds 30.5 percent, comprising the top 40 percent of all blocks.

The three layers used here account for much, but not all, of transect zone variation. Other layers that could be used include:

- Private frontage (categorized by parcel)
- Public frontage (categorized by parcel)
- Open space categorization (see Figure 2-9)

These could be constructed as additional layers, where each parcel or block is assigned a value, and layers are then combined to derive the boundaries of each zone. Determining these values by block would most likely involve a combination of fieldwork and close aerial map inspection.

**DESIGN**

**Step 4: Create a new zoning map based on transect categories.**

Design intervention for this exercise consists of first producing a new zoning map, and then characterizing each of the zones in more detail. As noted above, the transect zoning map will be much simpler and have far fewer zones than the existing zoning map.

The final transect zoning map, shown in **Figure 2-8**, is a combination of the three layers derived in Step 3. Specifically, using residential density (units per acre), street type, and land-use intensity, Table 2-2 shows the combination of values for the layers that was used to assign each block to a transect zone category. For example, if a block was not on a major street, was in the lower 60 percent in terms of density, and had a land-use intensity of “Level 1” (single-family dwellings constituting 50 percent or more of the parcels on the block), then the block would be assigned a transect zone of T3.

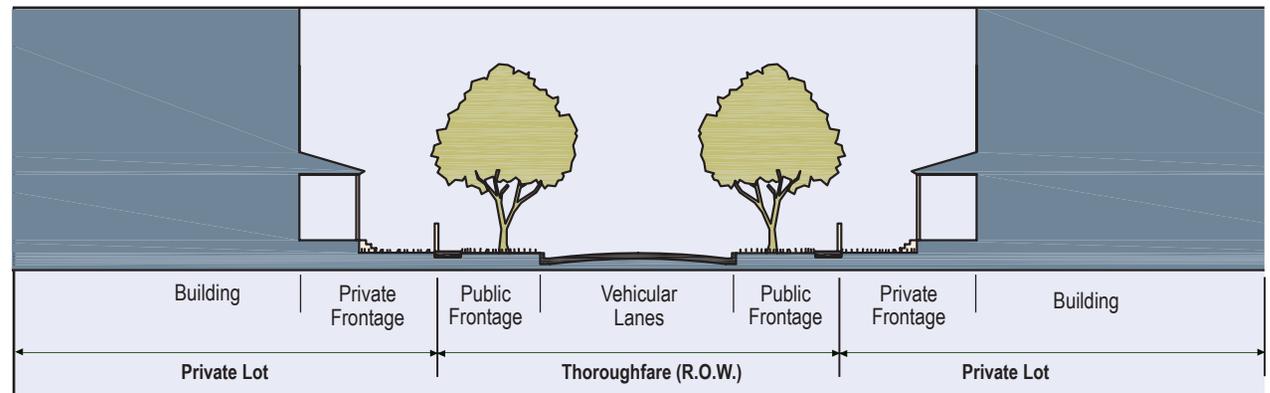
**Figure 2-9** is a three-dimensional view of one section of Portage Park, showing transect zone cat-

**Table 2-2**

**Rules for Transect Zone Assignment**

Street type	T3 Not on major street or boulevard	T4 Not on major street or boulevard	T5 May or may not be on major street or boulevard	T6 On major street or boulevard
Density	In lower 60% of density	In lower 60% of density	In lower 80% of density	In upper 20% of density
Land-use intensity	Level 1	Level 2 or Level 1 and T-zone < > 3	Level 3	Level 3 or 4

**Figure 2-9**



*Public versus private frontage. Source: SmartCode.*

Figure 2-10



Transect Zone	
<span style="display:inline-block; width:15px; height:15px; background-color:#f0e68c;"></span>	T3
<span style="display:inline-block; width:15px; height:15px; background-color:#e6d88c;"></span>	T4
<span style="display:inline-block; width:15px; height:15px; background-color:#d8c88c;"></span>	T5
<span style="display:inline-block; width:15px; height:15px; background-color:#c88c8c;"></span>	T6

*Transect zones and building form.*

egories in relation to building density and form. It indicates a high level of intensity around the park (T5), where there are some apartment buildings, while the highest level of intensity (T6) is reserved for the blocks along the main commercial corridor. The intensity level becomes higher as the commercial section becomes more pronounced (toward the right-hand side of the graphic). Other blocks lessen in intensity as they move away from the park and the commercial corridor.

Using the transect zones derived by overlaying these layers of information, fine-tune the boundaries of transect zones by looking more closely at the aerial maps and visiting selected areas.

#### **Step 5: Select four representative areas to examine in depth.**

Use the map (Figure 2-8) to select representative areas for the four built-up zones of the transect (T3, T4, T5, and T6). Visit the four areas selected and make a visual inspection. Verify that the areas are generally representative of the four transect zones; if not, consider fine tuning the map and selecting new representative areas.

At this point, if an actual code were to be calibrated, it would be necessary to take more detailed measurements of urban elements and characteristics. This would start with a recording of the urban dissect (a cross section) and then the urban quadrat (average measures) of each zone. For the dissect, the SmartCode recommends recording a cross section of the public realm (streets, sidewalks) and the private realm (frontages, buildings). The elements are photographed and sketched in cross section, and measurements are taken by using a tape measure or by counting steps. If unknown, building height can be approximated by measuring the length of a shadow of something with a known height (a person, for example), and applying the same ratio to the shadow of a building.

For the quadrat, the SmartCode recommends tak-

ing a four-acre area and recording the collective ratios or average measures for lot coverage (average size of buildings divided by average size of lots), average lot width, average lot length, number of parking spaces (on-street versus off-street), number of dwellings (units per acre), number of accessory units, and length of block perimeter.

### Step 6: Calibrate the transect zones.

The SmartCode provides a starting table (Table 14 in the SmartCode), which gives generalized, generic parameters for each transect zone. In a full-blown recoding effort, everything recorded in the quadrat and dissect measuring steps would be entered into this table, wherever appropriate.

A simplified version is shown in Table 2-3, which offers a description of each transect category in Portage Park. It was filled in by taking averages for characteristic zones.

If needed, it would also be useful to add district boundaries (for example, for hospitals, campuses, museum complexes, and industrial parks) as well as T1 preserve (protected land) and T2 reserve (future protected land) boundaries.

Note that transect zone delineation also involves a process of identifying areas that are in nonconformance with the new transect zones (for example, blocks that exceed the maximum targeted perimeter, densities that are too low, or lot widths that are too wide). Those areas can be identified as “transitional,” constituting places where the new transect zoning rules will allow them to evolve according to transect intensity and character rather than land use (as is conventionally the case). According to the theory of the transect, designing for this kind of evolution—based more on urban form than prescriptions about use and floor area ratio—will produce a more complex and satisfying urbanism.

**Table 2-3**

### Local Calibration of Transect Zone Characteristics

	T3	T4	T5	T6
Base residential density (units per acre gross)	4 units per acre gross	6 units per acre gross	8 units per acre gross	12 units per acre gross
Block size (max. block perimeter)	3,000 ft. max.	2,000 ft. max.	2,000 ft. max.	2,000 ft. max.
Thoroughfares required, permitted, or not permitted,	Commercial street not permitted	Roads* not permitted	Roads not permitted; alleys required	Roads not permitted; alleys required
Civic spaces required, permitted, or not permitted	Plazas not permitted	All permitted	All permitted	Greens not permitted
Lot width	30 ft. min., 100 ft. max.	18 ft. min., 100 ft. max.	18 ft. min., 100 ft. max.	18 ft. min., 100 ft. max.
Lot coverage	60% max.	70% max.	80% max.	90% max.
Front setback (max.)	14 ft. min.	18 ft. max.	12 ft. max.	12 ft. max.
Edgeyard building permitted/not permitted	Permitted	Permitted	Not permitted	Not permitted
Sideyard building permitted/not permitted	Not permitted	Permitted	Permitted	Not permitted
Building configuration (max. and min. no. of stories)	2 stories max.	3 stories max., 2 min.	5 stories max., 2 min.	8 stories max., 2 min.

\*“Roads” are a specific category of thoroughfare appropriate in lower intensity, less urban environments.