L E S S O N 7

# Using Land-Use Regulations to Encourage Non-Motorized Travel

## 7.1 Purpose

Land use and transportation have an extremely complex interrelationship. Often times, problems with the transportation system are blamed on faulty land-use policies and vice versa—problems with sprawling land uses are blamed on transportation policies. In fact, the problems typically do not have simple cause-and-effect solutions. This lesson takes a look at ways in which land-use regulations can be improved to support an intermodal transportation system that encourages access by walking, bicycling, and transit.

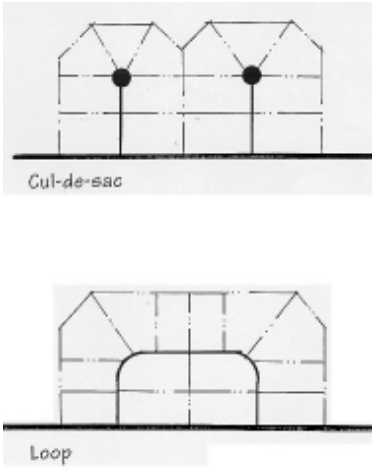
Most communities in the United States have land-use regulations that primarily support automobile access to local destinations. Substantial changes to zoning laws and subdivision regulations will be necessary in many communities in order to accomplish fundamental improvements to the transportation system. In addition to ordinances that require bicycle parking and sidewalks, even more basic changes are needed to automobile parking requirements, street design standards, allowable land-use densities, and transit-oriented developments.

Revising regulations that have been in place for many years can be a daunting task – either for planners who are trying to re-model a development ordinance or for engineers who are trying to change street design standards to accommodate bicycle and pedestrian travel. This chapter provides some examples of the types of provisions that are included in new policies on the State and local levels in order to accommodate and encourage bicycle and pedestrian travel.

## 7.2 Pedestrian-Oriented Land Use

One of the most important factors in a person's decision to walk or bike is the proximity of goods and services to homes and workplaces. A recent study

for the Federal Highway Administration confirms this: 33 percent of survey respondents cited distance as the primary reason for not walking. The most conducive land use for pedestrian activity is one with a higher density mix of housing, offices, and retail. Studies have also shown that more people walk in areas that are able to achieve higher densities of either housing or employment, despite lower densities of other uses such as retail. One study of the Puget Sound Region in Washington State defines high density as 50 to 75 employees per acre, or 9 to 18 residents per acre.




***Loops are preferred to cul-de-sacs. Source: Wilmapco, Mobility-Friendly Design Standards, Wilmington Area Planning Council, 1997.***

**Zoning and Subdivision Regulations**
Pedestrian and bicycle travel is often an afterthought in the development process. The results are impassable barriers to pedestrian travel, both within and between developments. The examples below show how local zoning ordinances can be amended to require more attention to the needs of pedestrians and bicyclists.

- **Subdivision Layout**
  Residential subdivision layout (including Planned Unit Developments) should provide safe, convenient, and direct bicycle and pedestrian access to nearby (within ¼ mile for walking and 2 miles for bicycling) and adjacent residential areas; bus stops; and neighborhood activity centers, such as schools, parks, commercial and industrial areas, and office parks.

- **Cul-de-Sacs**
  Cul-de-sacs have proven to be effective in restricting automobile through-traffic; however, they can also have the effect of restricting bicycle and pedestrian mobility unless public accessways are provided to connect the cul-de-sac with adjacent streets. Trail connections between cul-de-sacs and adjacent streets should be provided wherever possible to improve access for bicycles and pedestrians.

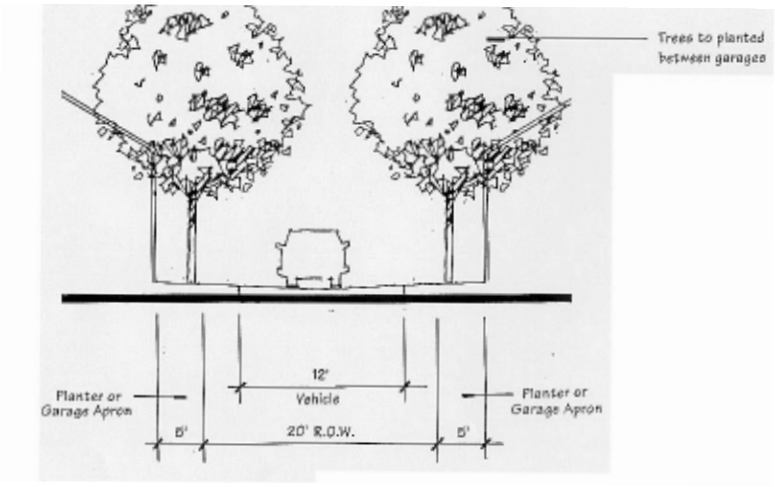
- **Future Extension of Streets**
  During subdivisions of properties, streets, bicycle paths, and sidewalks should be designed to connect to adjacent properties that are also likely to be subdivided in the future, so that a secondary system of roads and sidewalks develops over time. When subdivisions are built with only one outlet to a main thoroughfare, the result is heavy traffic congestion and difficult intersections for both motorists and pedestrians.

***Low-density single-use zoning creates trip distances that are too far to make walking a viable transportation option.***

- **Inclusion of Bicycle and Pedestrian Facilities in Piecemeal Development**
  This is intended to ensure that pedestrian and bicycle facilities are included in projects that occur in a piecemeal fashion. For projects in which only part of the land owned by the applicant is proposed for development, a sketch plan showing the tentative locations of streets, bicycle facilities, and public accessways should be submitted for the entirety of the land owned. "Stub-outs" should be constructed

for bicycle and pedestrian facilities on-site, and the next construction phase should be designed to connect to this network.

- **Internal Bicycle/Pedestrian Circulation for Commercial and Business Developments.**
  Adequate provisions should be made for bicycle and pedestrian circulation between buildings and related uses on development sites (the Americans With Disabilities Act (ADA) also contains regulations for on-site circulation).




***Typical alley: Ordinances should be modified to allow for rear-lot access.***

- **Lot Coverage**
  Zoning codes should be amended to raise the allowable lot coverage along bus routes to encourage intensification of uses and more efficient use of land in these areas.

- **Parking in High-Density Residential Developments**
  In some high-density residential areas, existing regulations require off-street parking, and at the same time, a reduced lot frontage. This results in homefronts that primarily consist of garage doors. Ordinances should be modified to allow for rear-lot access (alleyways) or other innovative solutions in these areas.

- **Parking Reductions**
  Parking codes should be modified to allow for a "reduced parking option" for developments that are located on bus routes and which provide facilities that encourage bicycling and walking. In general, shopping center parking lots should not be designed to handle volumes that occur only once or twice per year, but rather more typical volumes.

- **Compliance with design standards**
  Bicycle and pedestrian facilities should be designed to meet local and statewide design standards.

**Community Visioning**
Many communities throughout the country are conducting extensive revisions to their zoning and subdivision regulations in light of new planning techniques that improve transportation and community design.

New rules that would allow parking reductions and higher density developments are likely to be controversial. Public education for citizens and elected officials is essential in order to gain popular support for these new regulations.

The City of Portland, Oregon recently conducted an extensive revision of local zoning and subdivision regulations, using a successful technique that encouraged involvement from citizens and local elected officials. The city conducted a well-publicized Visual Preference Survey™, allowing local citizens to establish a vision for their ideal community environment by comparing photographs of different styles of urban, suburban, and rural development. When shown side-by-side, photographs of suburban strip development were rated far lower than those showing more compact, mixed-use districts. (*Picture This. . . The Results of Visual Preference Survey*, 1993)

**Development Review Process**
Land developers should be asked to submit a "Pedestrian and Bicycle Mobility Plan" early during the site plan review process. This plan should provide an inventory of all existing and proposed

land uses adjacent to the site, and illustrate a logical circulation plan for pedestrians and bicycles within the development and between adjacent land uses. The questions below can help design professionals create site plans that are sensitive to the needs of pedestrians.

**SITE PLAN CHECKLIST**

**Overall System**

- Does the plan meet ADA standards?
- Are utilitarian paths direct? Do they provide for connections to pedestrian magnets nearby? Can pedestrians take advantage of "shortcut paths" that encourage walking instead of driving?
- Does the pedestrian system consider the type and probable location of future development on adjacent or nearby parcels of land? Is there flexibility to provide direct connections to adjacent parcels; should that be desired in the future?
- Are building entrance areas convenient to the pedestrian? Are they clearly evident through either design features, topography, signing, or marking?
- Are walkways along the street buffered from traffic as much as possible?

**Safety and Security**

- Are crossings of wide expanses of parking lot held to a minimum?
- Are pathways generally visible from nearby buildings and free from dark, narrow passageways?
- Is adequate pedestrian-scale lighting provided for nighttime security?
- Are sight lines at intersections adequate for pedestrian visibility? Are pedestrians able to see on-coming traffic, given typical speeds?
- Do pathways lead to road crossing points with the least conflict?
- In general, are pedestrian/vehicle conflict points kept to a minimum?
- Are pedestrians given adequate time to cross the road at intersections?

## 7.3 Commercial Development Design Guidance

The physical layout of a development can often make the difference in a person's choice to walk between stores or to adjacent developments. Careful attention should be given to the location of buildings as well as the configuration of parking lots. Several provisions can ensure a better walking environment in commercial and office developments:

- **Building Setbacks**
  Buildings should not automatically be separated from the street by parking lots — this discourages pedestrian access and primarily serves those who arrive by automobile. A maximum setback requirement of 15 to 25 feet can help to encourage pedestrian activity. Parking, driving, and maneuvering areas should not be located between the main building entrance and the street. Parking lots should be located on the side and rear yards of the property whenever possible.

  For developments with multiple buildings, direct pedestrian access to public transit should be provided by clustering buildings near bus stops.

- **Building Orientation and Facades**
  Main building entrances should be oriented with the facade facing the street designated as a bus route. Entrances and paved walkways should lead directly to a bus stop. Visual stimulation is very important to pedestrians — long, blank walls with no openings onto the street discourage walking. Building facades should maintain continuity of design elements, such as windows, entries, storefronts, roof lines, materials, pedestrian spaces and amenities, and landscaping. Parking garages on streets with bus service should have ground-floor street frontage developed for office, retail, or other pedestrian-oriented uses.

- **On-Site Walkways**
  For developments with multiple buildings and/or outparcels, all building entrances on the site should be connected by walkways to encourage walking between buildings and to provide a safe means of travel for pedestrians. Sidewalks

between the building edge and parking lots should allow pedestrians safe and convenient access to building entrances without having to walk within driving aisles of parking lots.

- **Pedestrian Access Between Adjacent Developments**
  Sidewalks should connect uses on the development site to adjacent activity centers to encourage walking instead of driving between uses. Barriers such as fences or vegetation should not be placed so as to hinder access between developments.

- **Lighting**
  Pedestrian-scale lighting should be designed to light the walkway, thereby increasing pedestrian safety. Pedestrian lighting should be used in addition to lighting provided for motorists' safety. *Timesaver Standards for Landscape Architecture* (Harris and Dines, 1988) includes an excellent chapter on desirable lighting levels for pedestrian facilities, and specifies the following levels of illumination for sidewalks:

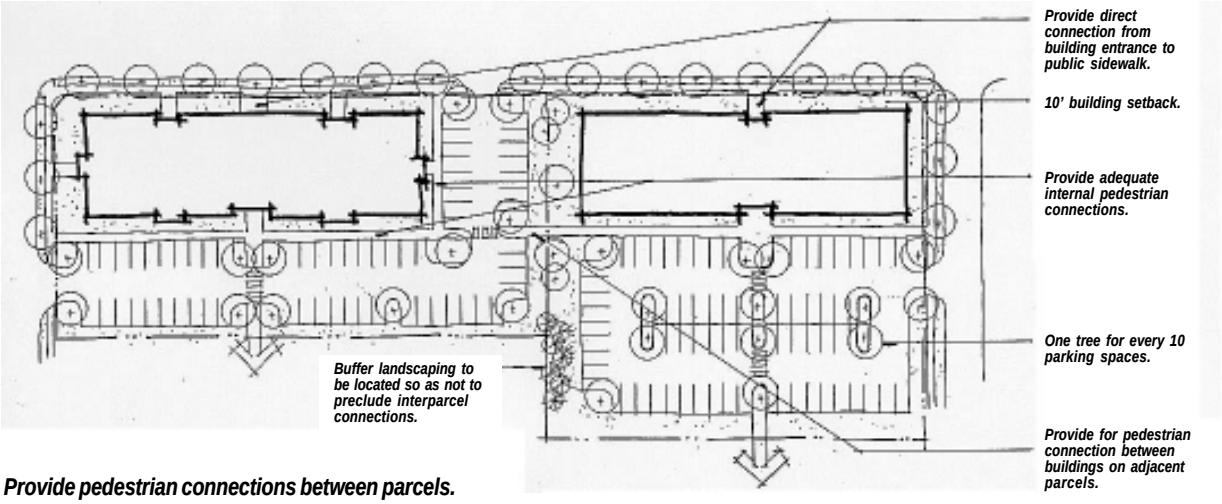
| ***Location of lighting*** | ***Lux (lx)*** | ***Footcandles (fc)*** |
|---|---|---|
| **Sidewalks** | | |
| **Along Roadsides:** | | |
| **Commercial areas** | **10** | **0.9** |
| **Intermediate areas** | **6** | **0.6** |
| **Residential areas** | **2** | **0.2** |
| **Sidewalks Distant From Roadsides:** | **5** | **0.5** |
| **Pedestrian Tunnels:** | **40** | **4.0** |

- **Improvements Between the Building and the Street**
  Design elements in the area between the building and the street are critical to successful pedestrian spaces. The streetscape should provide visual interest for the pedestrian. The area should be landscaped if project budgets allow.

- **Parking Lot Design**
  Parking lots with fifty or more spaces should be divided into separate areas with walkways and landscaped areas in between that are at least 10 feet in width. Pedestrian paths should be designed with minimal direct contact with traffic. Where pedestrian paths cross the traffic stream, raised speed tables that slow cars, while providing an elevated pedestrian walkway, should be provided. Additional recommendations for pedestrian-oriented parking lots:

a. Location
Keep parking on one or two sides of the shopping center, away from the side that will generate the most pedestrian access. This pedestrian access point could be an office park, outparcel shopping or restaurant, or a residential area.

b. Direct Pedestrian Paths
Provide a direct pedestrian path from parking lots and parking decks to the buildings they serve. Clearly delineate this path with striping, different paving materials, or by situating the path through the center of a series of strategically placed parking islands.




***Provide pedestrian connections between parcels.***

c. Use of Landscaping
Landscaping can be used to channel and organize the traffic flow in parking lots, as well as to provide pedestrian refuge areas. Avoid open parking lots that allow cars to move in any direction.

d. Bicycle Parking
Provision of bicycle parking at destinations is crucial–without it, bicycling becomes far less convenient. Bicycle parking ordinances can help to improve the situation (see Lesson 22 for a full description).

## 7.4 Guidance on Designing Residential Communities That Encourage Walking

Suburban neighborhood design can be modified to encourage bicycling and walking. It is not necessarily more expensive to build these communities; however, they require more careful design on the part of the developer. These types of pedestrian-friendly neighborhoods are worth the effort. Recent studies suggest that homes sell quickly in these communities. (See Lesson 6 for a more complete description of traditional neighborhood development.)

A pedestrian-oriented neighborhood should include the following aspects (list below is taken from the *ITE Journal*, January 1992 edition, pp. 17-18, "Neo-Traditional Neighborhood Design and Its Implications for Traffic Engineering"):

- Streets that are laid out in well-connected patterns on a pedestrian scale so that there are alternative automobile and pedestrian routes to every destination. A cul-de-sac pattern generally limits connectivity and is therefore discouraged.
- A well-designed street environment that encourages intermodal transportation. These streets should include pedestrian-scale lighting, trees, sidewalks, and buildings that are within close walking distance to the sidewalk.
- Residential and internal commercial streets should be relatively narrow in order to discourage high-speed automobile traffic.
- On-street parallel parking is recommended where it can be used as a buffer between pedestrians and motor traffic. Parked cars also serve to slow down the passing traffic, helping to balance the overall use of the street.
- Bicycles are considered an integral part of the transportation mode mix, and the design of the streets includes appropriate facilities for them.
- The buildings are generally limited in size, and building uses are often interspersed—that is, small houses, large houses, outbuildings, small apartment buildings, corner stores, restaurants, and offices are compatible in size and are placed in close proximity.
- In addition to streets, there are public open spaces, around which are larger shops and offices, as well as apartments.
- Larger communities should provide a neighborhood center (providing small-scale commercial and office uses) within a 5- minute walking distance (roughly a 0.25-mile radius) for the majority of residents in the neighborhood.

## 7.5 Street Design Standards

In New Castle County, Delaware, the regional planning agency and the Delaware Department of Transportation have teamed up to further define the precise design standards that should apply to local and collector streets. Following the references are the results of a study that was conducted in 1997-1998 to revise State design standards (see next page).

## 7.6 References

Text and graphics for this section were derived from the following sources:

American Planning Association, *Oregon Transportation Planning Rule*, 1993.

Birmingham Regional Planning Commission, *Walkable Communities in the Birmingham Area*, 1996.

*Madison (WI) City Code*, Madison, Wisconsin.

Wilmington (DE) Planning Council, *Mobility-Friendly Design Standards*, 1997.

For more information on this topic, refer to:

Town of Davidson, NC, *Davidson Land Plan*, (The Regulating Plan and Code), Oct. 1995.

Maryland Office of Planning, *Managing Maryland's Growth, Modeling Future Development on the Design Characteristics of Maryland's Traditional Settlements*, 1994.

# WILMAPCO - MOBILITY FRIENDLY DESIGN STANDARDS STUDY
# DELAWARE DESIGN / POLICY GUIDELINES FOR LOCAL & COLLECTOR STREETS

## Purpose of Study:

This study supports the long-range transportation goals of the Delaware Department of Transportation, Town of Middletown, New Castle County and WILMAPCO. These goals include increasing mobility and accessibility by providing people with a range of travel options. Transportation improvements should be integrated into the social fabric of communities to help create livable neighborhoods and provide an expanded network of connections within and between communities. Mobility friendly design standards support travel by pedestrian, bike and transit modes along with reduced vehicle speeds within communities. The goal is to provide an excellent transportation and land use system that is sustainable and provides access and mobility options.

## Street Design Criteria:

As part of this study, the consultant team is exploring opportunities to provide flexibility in neighborhood street design through reduced lane widths and other geometric design criteria. The benefits of this approach include:

- Safety: slow speeds and safe connections between travel modes.
- Traffic Calming: narrower streets with tighter curve radii result in cars driving slower.
- Enhanced Pedestrian Environment: less paving and slower moving traffic creates a more pedestrian and bicycle friendly environment, thus allowing short trips by walking or biking instead of by auto.
- Lower construction and maintenance costs.
- Reduced storm water runoff.

## Application:

DelDOT Blue Book (Rules and Regulations for Subdivision Streets - 1981)

- minor streets: less than 50 homes (less than 500 trips/day)
- minor collector streets: 50 to 300 homes (500 to 3,000 trips/day)

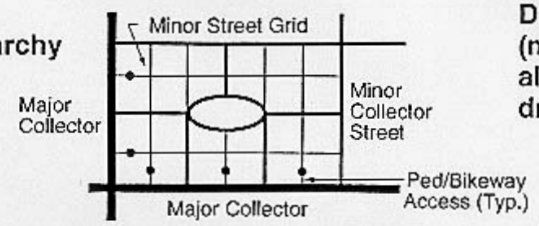
DELAWARE DEPARTMENT OF TRANSPORTATION

NEW CASTLE COUNTY

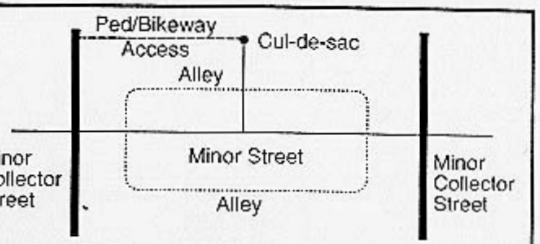
WILMAPCO

# Figure 7.1

**Plan Elements: (traditional hierarchy of subdivision street grid)**




**Detail Layout: (minor street with alleys for individual driveway access)**




| | DelDOT | AASHTO | ITE | ASCE | RECOMMENDED | COMMENTS |
|---|---|---|---|---|---|---|
| **✦ Network Design** (the conceptual approach to the hierarchy of functional layout of street systems) | | | | | | |
| Minor Streets Minor Collector Streets | Not specified | Reference FHWA; "Highway Functional Classification: Concepts, Criteria and Procedures" (1974) | Curvilinear designs with interconnections as direct as possible | Linear or curvilinear design/short distances to collectors | Short interconnected streets/direct routes/loops preferred to cul-de-sacs<br><br>Consider Network Connectivity Index of 1.4 as desired minimum target | The goal is to provide greater mobility options for pedestrians and bicyclists |
| **✦ Block Lengths** (distance along centerline of street between centerlines of connector cross streets) | | | | | | |
| Minor Streets Minor Collector Streets | Not specified | While not specified, spacing of minor arterial streets may vary from 1/8 to 1/2 mile in CBD and 2 to 3 miles in suburban fringes | Limited number of intersections | Minimum number of intersections | 200' to 500' (blocks longer than 500' require midblock crosswalks and pass-throughs based on walkability.) | |
| **✦ Design Speed** | (selected speed used to define geometric features; posted speed is typically 5 to 10 MPH below Design Speed.) Desirably, this speed reflects adjacent residential and commercial activity) | | | | | |
| Minor Streets | 25 mph | 20 to 30 mph | 20 mph (hilly)<br>25 mph (rolling)<br>30 mph (level) | 20 mph | 20 mph (desired operating speed is 20 mph) Require engineering study to support 20 mph-otherwise need to change statutes.) | Design speed and desired operating speed: 20 mph |
| Minor Collector Streets | 30 mph | 30 mph or greater | 25 mph (hilly)<br>30 mph (rolling)<br>35 mph (level) | 25 mph (hilly)<br>30 mph (rolling)<br>35 mph (level) | 25 mph (desired operating speed is 25 mph) | Design speed and desired operating speed: 25 mph |

# Figure 7.1 (continued)

**Plan Elements continued**

| | DelDOT | AASHTO | ITE | ASCE | RECOMMENDED | COMMENTS |
|---|---|---|---|---|---|---|
| **✦ Minimum Horizontal Curve Radius** (measured at centerline of street) | | | | | | |
| Minor Streets | 150' | 100' min.(desirably as large as possible) | 100' (hilly)<br>180' (rolling)<br>300' (level) | 100' to 150' (access street)<br>150' to 300' (subcollector) | 90' when curve is unsigned<br>45' when curve is signed as a traffic calming measure. | Additional engineering analysis to be conducted by DelDOT |
| Minor Collector Streets | 300' | | 180' (hilly)<br>300' (rolling)<br>480' (level) | 300' to 500' | 150' minimum<br>90' when curve is signed as a traffic calming measure | Vertical curve issues to receive further study by DelDOT |
| **✦ Intersection Design** (desirable configuration for intersections with collector / arterial streets) | | | | | | |
| Minor Streets | T-Intersection 90° | Type is primarily determined by the number of intersecting legs, the topography, the traffic pattern, and the desired type of operation | T-Intersections (4-way intersections also acceptable) | T-Intersections (4-way intersections and roundabouts are also acceptable) | T-Intersections or 4-way<br>Provide: Intersections with roundabout or other traffic calming measures | Consider permitting "L" curves, i.e. 90° turns for loop or U shaped roadways. Loops preferred to cul-de-sacs. Consider permitting 60° for local streets. Reference recently released ITE manual-Traditional Neighborhood Development - Street Design Guidelines, June 1997. |
| Minor Collector Streets | T-Intersection 90° | | | | Roundabouts or 2-way stops or 4-way stops | Roundabouts are appropriate for locations with heavy minor street delay, heavy turning traffic, intersections with unusual geometry, where major roads intersect at a "Y" or "T" junction, or where u-turns are necessary. They are inappropriate for locations where a signal interconnect system is necessary, or queuing from adjacent intersections would back up into the roundabout. |
| **✦ Minimum Curb Return** (radius of curb at street intersection ) | | | | | | |
| Minor Streets Minor Collector Streets | 25' | 15' minimum<br>25' desirable<br>30' (collector) | 20' (local-local)<br>25' (local-collector)<br>30' (collector-collector) | 15' to 20' (local-local)<br>25' to 30' (local-collector) | 10' (local-local)<br>15' (local-collector with parking lanes)<br>20' (collector-collector with parking lanes)<br>40' (local-collector without parking lanes)<br>40' (collector-collector without parking lanes) | 40' radius adds 9 seconds to pedestrian crossing (40' radius vs. 20' radius). Further consideration required regarding curb return radii / school buses. See page 2 of 10. |

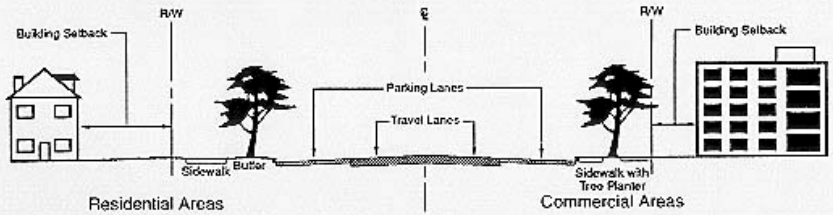
# Figure 7.1 (continued)

**Plan Elements continued**

| | DelDOT | AASHTO | ITE | ASCE | RECOMMENDED | COMMENTS |
|---|---|---|---|---|---|---|
| **✦ Maximum Cul-de-Sac Length** (measured along centerline of cul-de-sac from centerline of intersecting street) | | | | | | |
| Minor Streets Minor Collector Sts. | 500' to 1,000' (depending on density) | Not specified | 700' to 1,500' (depending on density) | 500' to 1,000' | 250' preferred to 500' maximum serving no more than 30 units with cut throughs provided at cul-de-sac heads for peds / bikes | |
| **✦ Minimum Driveway Spacing** (measured along centerline of street between centerlines of connecting driveways) | | | | | | |
| Minor Streets | 200' (narrower lots call for shared driveways) | Not specified, although desirably as far removed from intersections as practicable | | 50' (narrower lots call for rear access via alleys) | 50' (narrower lots call for alley access or shared driveways) | |
| Minor Collector Streets | 250' | | | | | |
| **✦ Minimum Driveway Width** (out to out dimension of paved surface) | | | | | | |
| Minor Streets MinorCollector Sts. | 12' standard (not minimum) | Not specified (but returns should not be less than 3' radius) | 10' minimum 18' (for 2-car garage on street) | | 8' to 16' (single-family) 18' (multi-family | |

# Figure 7.1 (continued)

**Typical Section Elements**




| | DelDOT | AASHTO | ITE | ASCE | RECOMMENDED | COMMENTS |
|---|---|---|---|---|---|---|
| **✦ ROW Width** (total width of publicly owned land available for transportation, drainage, landscaping, and utility accommodation uses) | | | | | | |
| Minor Streets | 50' (minor streets)<br>26' under special circumstances | 50' (with 26' roadway section)<br>66' (commercial areas with on-street parking) | 50' (low density)<br>60' (medium and high densities) | 24' (access street)<br>42' to 46' (subcollectors) | 42' or 49' = 20' or 27' roadway (no parking or one side) + 5' planting strip + 5' sidewalk + 9" top of curb<br>Traffic calmed environment - bicycles accommodated on shared facility. | 44' or 51' total ROW including 1' offset from back of sidewalk |
| Minor Collector Streets | 60' (minor collectors) | 40' to 60' | 70' (low & medium densitties)<br>80' (high density) | 52' to 56' | 51' or 58' = 29' or 35' roadway (parking one side or both sides) + 5' planting strip, 5' sidewalk, 9" top of curb. If frontage on local collector 10' planting strip required each side, increasing R.O.W. by 10'. Larger R.O.W. allowed if a boulevard type median is provided. Designated bicycle accommodations provided based on traffic volume, speed and road section - see FHWA publication used by DelDOT. A local and/or regional analysis should be prepared to identify the destinations that bicycle users may seek. | 53' or 60' total ROW including 1' offset from back of sidewalk |
| **✦ Pavement Width** (width of paved surface; curb face to curb face if curbs provided) | | | | | | |
| Minor Streets | 22' (minor streets) | 26' (OK for less when ROW is severely limited) | 20' to 28' (low density)<br>28' to 34' (medium density)<br>36' (high density) | 22' to 24' (local access street)<br>26' (subcollectors) | 18' roadways (2@9')<br>2' offsets to curb face (2@1')<br>20' total<br>---<br>18' roadways (2@9')<br>7' parking lanes<br>2' offsets to curb face (2@1')<br>27' total | |
| Minor Collector Streets | 32' (minor collectors) | | 24' to 36' (low and medium densities)<br>40' (high densities) | 36' | 20' roadways (2@10')<br>7' parking lane<br>2' offsets to curb face (2@1')<br>29' total<br>---<br>20' roadways (2@10')<br>14' parking lanes<br>2' offsets to curb face(2@1')<br>36' total | |

# Figure 7.1 (continued)

**Typical Section Elements continued**

| | DelDOT | AASHTO | ITE | ASCE | RECOMMENDED | COMMENTS |
|---|---|---|---|---|---|---|
| **✦ Lane Width** (width of travel and parking lanes; centerline and edge lines typically not painted) | | | | | | |
| Minor Streets | 11' (minor streets) | 10' (travel lanes - use 11' where feasible; minimum in residential areas 9')<br>7' (parking lanes - use 9' in commercial areas) | | 10' (travel lanes-without parking on both sides)<br>12' (travel lanes-with parking on both sides)<br>8' (parking lanes) | 9' travel lanes (min)<br>7' parking lanes | "Bulb-outs" at intersections encouraged<br>DelDOT to establish parking setback from intersections |
| Minor Collector Streets | 11'-4" with curb (minor collectors) | 10' (travel lanes)<br>7' (parking lanes - residential)<br>8' ( parking lanes - commercial) | | | 10' travel lanes (min)<br>7' parking lane (striped) | "Bulb-outs" at intersections encouraged<br>DelDOT to establish parking setback from intersections |
| **✦ Pavement Edge Treatment** (choices include barrier (i.e. vertical face) or mountable curbs, and no curbs) | | | | | | |
| Minor Streets | Mountable or barrier curbs (none at low densities i.e. 1/2 acre lot size & >100' frontage & >60' building setback) | Urban areas - curbs used extensively<br>Rural areas - exercise caution in use of curbs<br>Normally vertical curbs | None or roll-type curbs (low density)<br>Vertical curb (medium and high densities) | Vertical or roll-type curbs at higher densities | 8" vertical curbs (whenever sidewalk provided). Vertical curbs stop vehicles from parking on landscaped buffer strip | |
| Minor Collector Streets | | | | | 8" vertical curbs (plus ADA entrance) | |

# Figure 7.1 (continued)

**Typical Section Elements continued**

| | DelDOT | AASHTO | ITE | ASCE | RECOMMENDED | COMMENTS |
|---|---|---|---|---|---|---|
| **✦ Sidewalk Warrants** (i.e. when and where to provide paved surface for pedestrian conveyance) | | | | | | |
| Minor Streets | Not required by DelDOT-New Castle County requires on at least one side of all local streets with 10+ dwellings and densities of > 1 unit/acre and on both sides of minor collectors | Both sides in commercial areas, at least one side in residential areas. | Only at medium and high densities | Not required on access streets. One side of subcollectors. | 2 units or more / acre sidewalks both sides; less than 2 units/acre to 1 unit/acre sidewalks one side; greater than 1 acre lots - no side walks<br>All cul de sacs - sidewalks both sides | |
| Minor Collector Streets | Not required by DelDOT-New Castle County requires on at least one side of all local streets with 10+ dwellings and densities of > 1 unit/acre and on both sides of minor collectors | Both sides in commercial areas, at least one side in residential areas. | Both sides | Both sides | Both sides | |
| **✦ Sidewalk Widths** (width of paved surface) | | | | | | |
| Minor Streets Minor Collector Sts. | Not specified by DelDOT (New Castle County requires 5') | 4' (8' or more may be needed in commercial areas) | 4' to 6' | 4' minimum with planting strip<br>6' without planting strip | 5' (with buffer strip)<br>8' (without buffer strip)<br>(at least 40 sq. ft. per person at peak times) | |
| **✦ Planting Buffer / Utility Strip** (area between edge of pavement / curb and sidewalk or right of way line) | | | | | | |
| Minor Streets | Not specified | 12' (desirable) | 5' to 6' | 3' to 5' desirable | 5' minimum<br>Zero permitted for commercial uses with minimum 8' sidewalk | |
| Minor Collector Sts | | | 10' | 3' to 5' desirable | 10' minimum, if lots front on residential collector streets | |

# Figure 7.1 (continued)

**Typical Section Elements continued**

| | DelDOT | AASHTO | ITE | ASCE | RECOMMENDED | COMMENTS |
|---|---|---|---|---|---|---|
| ✦ **Alley Width** (width of paved surface) | | | | | | |
| Minor Streets | Not specified | 16' to 20' in residential areas | 20' (alleys allowed but discouraged) | 12' (pavement)<br>16' (right-of-way) (recommended when lot widths are less than 50' wide) | 12' (alleys or shared driveways are recommended when lot widths are less than 50')<br>12' paved width acceptable provided<br>20' open R.O.W. available<br>Encourage utility placement along alleys. | |
| ✦ **Tree / Obstacle Clearance** (distance from back of curb) | | | | | | |
| Minor Streets | Clear zone - 2' in urban areas with barrier curb | 1.5' | | 3' | 2.5' from back of curb to centerline of tree<br>One tree per 40 linear feet of right-of-way frontage.<br>2¼" - 3" caliper and DelDOT clear zone requirements. Mature height restrictions to be established based on species to avoid conflicts with overhead utilities. | |
| Minor Collector Streets | Clear zone - 2' in urban areas with barrier curb | 1.5' with vertial curbs (where no curbside parking)<br>2' with vertical curbs (where curbside parking) | | 3' | 2.5' from back of curb to centerline of tree<br>5.0' if access fronts on the collector street | |