

# AUDIT OF PAVEMENT STANDARDS IN THE UPPER SALUDA-REEDY WATERSHED

Mitigating the Impacts of Impervious Surfaces in Greenville and Pickens Counties, South Carolina



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<i>Curt Burgiss</i>	<i>County Engineer, Pickens County</i>
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*\*These individuals also participated in a half-day focus group that helped to refine this document. We are particularly grateful for their investment of time and expertise.*

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# INTRODUCTION

Upstate Forever retained The Lawrence Group to conduct an audit of paving requirements in the codes and ordinances of Greenville and Pickens counties, South Carolina and of the municipalities therein as part of the Saluda-Reedy Watershed Consortium's (SRWC) Low Impact Development Project. The goal of this assessment is to identify opportunities for introducing flexibility into the local regulations governing street width, parking ratios, sidewalk and driveway specifications, and other aspects of paving in the land development process. The ultimate intent is to reduce the amount of impervious cover generated by new development and redevelopment in these counties. This project is undertaken with two goals in mind: reducing the amount of stormwater runoff in the Saluda-Reedy watershed and surrounding watersheds, and minimizing the infrastructure costs associated with development.

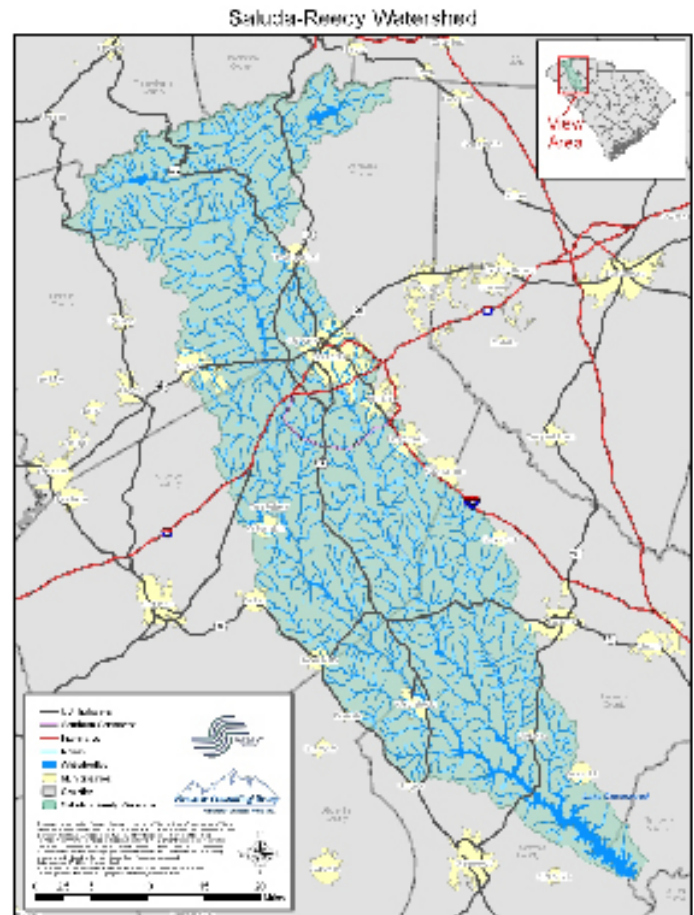
## State of the Saluda-Reedy Watershed

Non-point source pollution – sediment, nutrients and waste carried by stormwater – is now the chief threat to the Saluda and Reedy rivers. Non-point source pollution primarily results from poor land-use practices and unplanned growth, and consists mainly of erosion from construction sites and poor management of stormwater from developed areas. Non-point source pollution has the potential to undo all the gains in water quality achieved in the last thirty years. It will take a concerted effort by community leaders across the Upstate to effectively address the threats of non-point source pollution.

## Impacts of Impervious Cover on Water Quality and Quantity

According to a 2001 EPA report entitled *Our Built and Natural Environment*, many of the nation's waterways are suffering fates similar to the Saluda and Reedy Rivers: "Water quality...is degraded to a point where those water bodies can no longer support basic uses such as fishing and swimming, and cannot be relied upon as sources of clean drinking water" (p. 19). The report goes on to detail the impacts of land development on water quality and quantity, including:

- *Impervious cover increases the **volume and rate of stormwater runoff***
- *This increased runoff causes "**larger and more frequent incidents of local flooding**"*



- *Flooding in turn results in "**decreased [stream] stability,**"* which may affect the ability of streams and rivers to "dilute toxic spills"
- *The net result is "**increased costs for water treatment, accumulation of pollutants, and adverse effects**" on aquatic life*
- *In addition, these changes can lead to "**reduce[d] residential and municipal water supplies**" through groundwater recharge loss*

## Sources of Imperviousness

Imperviousness in new development has two primary sources: roofs of commercial, residential, and industrial structures; and surfaces related to transportation, specifically streets and parking areas. However, 60% to 70% of impervious cover is thought to be attributable to transportation-related infrastructure (Schueler). Therefore, the focus of this report is on transport-related imperviousness, and the report is broadly divided into categories related to street design, parking lot design, and driveways.

# INTRODUCTION (cont'd)

## REPORT METHODOLOGY

The basis for the Pavement Standards Audit is a detailed review of the various land development regulations and requirements related to paved surfaces – streets, parking lots, sidewalks, and driveways – for Pickens and Greenville Counties and the incorporated municipalities therein. The review includes the following communities:

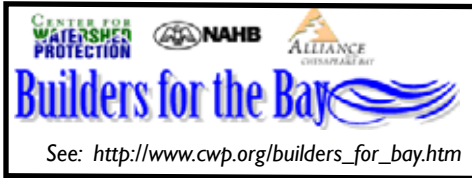
### Greenville County

- City of Fountain Inn
- City of Greenville
- City of Greer
- City of Mauldin
- City of Simpsonville
- City of Travelers Rest

### Pickens County

- City of Central
- City of Clemson
- City of Easley
- City of Liberty
- City of Pickens

For each locale, the review includes zoning and land development regulations and other development standards where applicable. The review is based on the “Code and Ordinance Worksheet” questionnaire from the Builders for the Bay program, a watershed protection effort in the Chesapeake Bay



See: [http://www.cwp.org/builders\\_for\\_bay.htm](http://www.cwp.org/builders_for_bay.htm)

area sponsored by the Center for Watershed Protection, the National Association of Home Builders, and the Chesapeake Bay Alliance.

## County Pavement Audits

The Greenville and Pickens County pavement audits consider ten major topic areas and more than 30 specific standards related to pavement requirements for each of the subject locales. Tables measuring each community against the various standards and comparing the various



The municipalities evaluated in this study, with the Saluda-Reedy watershed in the background

locales in each county are included in the Appendices. Points are assigned to each standard for the purpose of comparing existing regulatory requirements to model low impact development standards and to provide an objective basis for comparison among the communities in the audit. A total of 100 points is possible.

The major topic areas of the audit include:

- Street and right-of-way width
- Cul-de-sac design standards
- Street drainage standards
- Parking requirements
- Shared parking provisions
- Parking lot design and landscaping
- Sidewalk and driveway standards

Scores ranged from 28 (Liberty) to 61 (Greenville County). Greenville County communities tended to score higher than Pickens County communities, although the cities of Greenville and Fountain Inn were exceptions.

Total Pavement Audit Points (out of 100 possible)

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
61	34	33	51	49	47	45	49
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
31	34	43	38	28	31		

Source: Upstate Forever



Greenville, SC: Parking lots and streets are one of the largest sources of impervious cover.

# INTRODUCTION (cont'd)

## FOCUS GROUP

On January 25, 2006 a focus group meeting was held with representatives of various stakeholder interests in the study areas. The focus group participants were identified by staff from Upstate Forever and included:

- Chandra Dillard**, Member, Greenville City Council
- J.D. Martin**, President, Arbor Engineering, Greenville
- Tommy McDowell**, Fire Chief and Emergency Services Coordinator, City of Greenville
- Steve Navarro**, President, the Furman Company (commercial development)
- Jeff Randolph**, President, The Randolph Group (residential and mixed-use development)
- DeWitt Stone**, Chair, Pickens County Planning Commission
- Judy Wortkoetter**, County Engineer, Greenville County

The focus group process included a presentation by The Lawrence Group on initial findings from the audit process and potential changes to local pavement requirements. Comments from the focus group are listed below and organized by topic area. The bulleted items reflect comments by individuals and not necessarily the consensus of the group on a given issue.

## Focus Group Comments

### Streets

- Fire/emergency access is a key factor in determining minimum street widths. The requirements in Appendix D of the International Fire Code tend to make streets wider, and in the absence of other regulations, fire chiefs point to state codes. Local communities can provide alternatives to state fire codes via local ordinances, and this will be the key to success.
- Small radius curbs can be subject to run-over damage. One solution is mountable curbs, which allow for access while maintaining small radii.
- Gross right-of-way width is not in itself a major issue. The key is to focus on what is in that right-of-way – and on how much of the right-of-way is impervious.

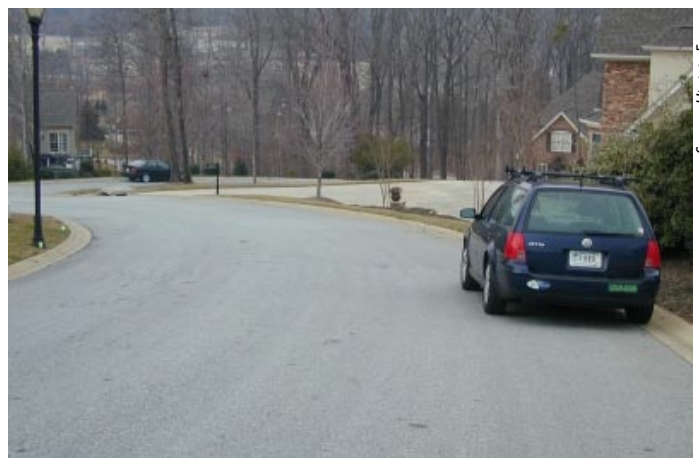
- “Off-street” on-street parking – that is, pervious parking areas outside of the paved area of a narrow street – is an interesting approach to reducing street width dramatically while still allowing for parking.

### Cul-de-Sacs

- There are many opportunities for reducing pavement by employing alternatives to standard cul-de-sacs. Hammerheads are one option that works for fire access, provided fire vehicles are willing to do three-point turns.
- Cul-de-sac islands also help, particularly if the cul-de-sac drains to the island. Greenville County would allow bio-retention cul-de-sac islands. However, islands can create problems for fire vehicle access, necessitating rolled curbs or offset islands. Therefore, the issue of islands in cul-de-sacs has to be closely coordinated with fire chiefs.

### Swales

- Swales are already being used in low-density development. They should be allowed by right if certain conditions are met.
- Greenville County would be in favor of swales if they were designed to The Center for Watershed Protection’s standards.
- It is important to consider disabled access when not using curb and gutter. A concrete strip (known as a flat curb) at the edge of asphalt is useful in this regard.



Greenville, SC: Focus group members cited streets in the Montebello development as an example of the use of narrow streets. This street is approximately 26 to 28 feet from face-of-curb to face-of-curb – narrow by Greenville County standards but still significantly wider than necessary.

Source: Upstate Forever



# INTRODUCTION (cont'd)

## Sidewalks and Street Trees

- Sidewalks are often required in places where they are not needed. Sidewalks should be focused on collector streets and on places where people really walk.
- Sidewalk standards are overly rigid. They should be based on street type rather than gross density.

## Parking Ratios

- Retailers often want more parking than minimums, and none want fewer than 5 spaces per 1000 square feet. Clients often see this as non-negotiable, which puts developers in a tough spot.
- The challenge is that, while developers don't want to pay for more pavement than they need, they don't want to constrain future uses by having too few parking spaces. Long-term value requires flexibility.
- One option is to require that some land be set aside as a reserve for additional parking if needed in the future.
- Shared parking is not as easy in Greenville County as ordinances imply.

## Parking Lot Landscaping

- Major developers in the area use curb and gutter on parking lot landscape islands; smaller ones will do whatever is cheapest.
- Soils are not very pervious in the Upstate, so pervious pavement requires special preparation.

## Cost Savings of Reduced Impervious Cover

- It would be very useful to track cost savings of changes as well as reduction in impervious cover. It would also be useful to work up specifics as to cost savings and impervious cover reduction up front. Perhaps a student group could model impervious cover and costs generated by various scenarios on particular sites.
- We need to be careful to ensure that reduced pavement – which is sometimes accompanied by increased density of housing – takes into account increased demand for emergency response.
- It's also important to think in terms of trade-offs as well as cost savings – that is, getting a better development for the money.

Source: Upstate Forever



Greenville, SC: An approximately 20-foot wide alley in the Montebello development – again, substantially wider than necessary.



# STREET DESIGN



Source: The Lawrence Group

***“Research and experience show that compact street layouts, narrower street widths, and alternative pavement edge treatments can minimize clearing and grading, reduce storm water runoff and protect water quality while providing ample access for emergency vehicles, residential vehicles, and parking.”***

*HUD, p. 81*

# STREET DESIGN: Street Width

## Residential Street Widths

What is the minimum pavement width for local streets?

Greenville County	Fountain Inn	Green-ville	Greenville (LUDO)	Greer	Mauldin	Simpson-ville	Travelers Rest
20-22	20-22	20-22	-	20-22	20-22	20-22	20-22
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
20-22	20-22	22-24	24	24	20-22		

By national standards, the minimum street widths required for low density residential development in

*“Considering the cost of paving a road averages \$15 per square yard, shaving even 4 feet from existing street widths can yield cost savings of more than \$35,000 per mile of residential street.”*

EPA 2005, 77

Greenville and Pickens counties are relatively narrow. The current minimum widths are more than adequate to allow for occasional on-street parking on low-volume, low-speed streets.

Based on accepted practices from around the Carolinas and the U.S., however, these

minimum street widths could be narrowed even further. Widths for such streets can be as narrow as 18 feet (including gutter, if required) based on the density of development, the type of street, and the need for on-street parking. To facilitate emergency access on the narrowest streets, communities may consider: restricting parking to one side; requiring staging areas every 200-300 feet with parking restrictions; allowing double driveways, and/or bulb-outs; and encouraging multiple points of access, including alleys (LGC, p. 24-38).



Source: The Lawrence Group

Mt. Pleasant, SC: An 18 foot wide street can accommodate parking on one side of the street. Streets as narrow as 22 to 24 feet wide can accommodate parking on both sides if parking is not frequent.

### Residential Street Width Standards from Around the United States

Minimum Width (ft)	Source
18 to 20	U.S. Fire Administration
24 (on-street parking) 16 (no on-street parking)	Baltimore County, MD
18 (minimum)	Virginia Fire Marshall
18 (parking one side) 24 (parking both sides)	Portland, OR

Source: Center for Watershed Protection, 1998 as cited in HUD

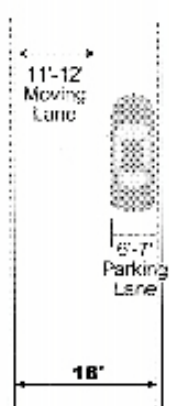
### Benefits of Narrow Streets

- Reduced costs for developers
- Additional land for development or open space
- Lower-speed, more pedestrian-friendly streets (narrower streets have fewer pedestrian accidents)

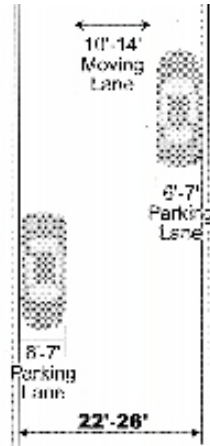
### Potential Trade-offs

- Complexity of coordination with emergency vehicles and other providers for adequate access
- Possible conflicts with Appendix D of the International Fire Code

Source: NAHB Residential Streets.



**Local**  
(Parking not expected or restricted to one side)



**Local**  
(Parking on both sides)



Source: Tom Low, DPZ

Huntersville, NC: A 20 foot wide street with parking on one side. This width does not compromise access by emergency responders or other large vehicles that need to use neighborhood streets.

# Street Width (cont'd)

## Cul-de-sac Street Widths

What is the minimum pavement width for cul-de-sac streets?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
-	-	28	-	-	-	-	-
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
-	-	22	-	-	-		

Cul-de-sac streets could be allowed to employ the narrowest possible cross-section width: as low as 16 to 18 feet wide. Cul-de-sac streets are by their nature low volume streets; the National Association of Home Builders' (NAHB) *Residential Streets* recommends that cul-de-sacs should not serve more than 20 to 25 houses (p. 36). As these streets serve low-density, single family houses – which are often required to provide sufficient off-street parking space on each individual lot – there is typically no need to require additional width on these streets for on-street parking.

some communities in the audit. As indicated above, one-side parking can easily be accommodated on streets as narrow as 18 feet, so this additional width requirement is unnecessary. Manufactured home park streets can be held to the same design standards as other residential streets and should not be expected to require more parking than other residential streets. Like other residential uses, manufactured housing is required to provide off-street parking spaces for residents.

## Alley Widths

What is the minimum pavement width for residential/commercial alleys?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
12/18	12/18	20	-	-	20	-	12/18
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
-	-	16/30	0/18	0/18	-		

Minimum widths for alleys in the audit communities, where specified or allowed, are generally narrow. The standards for the City of Greenville and Clemson's commercial alleys are exceptions. Greenville County provides ideal narrow alley dimensions. The NAHB's *Residential Streets* states that "12-foot pavement width with a 16-foot right-of-way will easily accommodate the widest of truck bodies (eight feet) with room to spare on both sides" (p. 28). The minimum width for residential alleys can even be as low as ten feet – a dimension that is used in many communities in the Carolinas and nationwide. When lot widths are 50 feet or less, alleys may provide less pavement than individual driveways. (See section on *Driveways, Setbacks, and Alleys* for further discussion of alleys.)

Source: Upstate Forever



Greenville County, SC: On a cul-de-sac street, pavement could be narrowed by 2 to 4 feet given low volumes and low on-street parking.

## Manufactured Home Park Street Widths

What is the minimum pavement width for manufactured home park streets?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
20*-28	20*-28	-	-	-	20	-	20*-28
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
20*	20*	-	-	-	20*		

\* does not include on-street parking

Like cul-de-sacs, manufactured home park streets are held to a higher standard than other residential streets in



Source: The Lawrence Group

Gaithersburg, MD: A 12 foot alley with trees and no curbs that serves houses on approximately 40 foot wide lots (10 dwelling units/acre).



# Street Width (cont'd)

## Collector Street Widths

What is the minimum collector street pavement width?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
24-26	24-26	32-34	-	24	24	24	24-26
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
-	-	28	28 or 40*	28 or 40*	-		

\* required when turn lanes provided

Specified collector street widths exhibit the widest variability across communities of any of the street types. A 32 to 34 foot (face-of-curb to face-of-curb) street will accommodate full-time on-street parking on both sides of the street and two travel lanes. However, “where

*The NAHB’s ‘Green Land Development’ cites a recommended 20 foot minimum width for collector streets where no on-street parking is allowed.*

houses do not front on the residential collector street and parking is not normally needed, two moving lanes of pavement are adequate” (NAHB 2001, p. 25). Thus, based on design, speed, and expected volume, collector streets could be as narrow as 20 to

22 feet. The NAHB’s “Green Land Development” cites a recommended 20 foot minimum width for collector streets where no on-street parking is allowed.

Other factors to consider in defining minimum widths for collector streets include the need for on-street bicycle accommodations such as bike lanes (minimum 4 feet of pavement in each direction) or wider lanes (typically 13-14 feet). All of these factors – the need for on-street parking, design speed, projected motor vehicle volumes, and the need for bicycle accommodations – should be considered in defining the widths for collector streets.



Source: Michael Rankin

Location unknown: 30 to 32 foot wide collector street with bike lanes.



Source: The Lawrence Group

Mt Pleasant, SC: 30 to 32 foot wide collector street with on-street parking.



Source: The Lawrence Group

Leland, NC: This collector street has infrequent on-street parking, too much pavement (34 feet plus) – and, consequently, a speeding problem.



# Street Width (cont'd)

## WHAT IS THE COST OF AN EXCESSIVELY WIDE STREET?

“Not only do excessive street widths affect the livability of a community, but they also give rise to additional costs that must be paid by homeowners. The figures cited here are for 2001 based on unit costs of contractor services for a project in northern California. For this project, a section of street 100 feet long would cost about \$9,500 to build to a width of 24 feet compared with \$13,500 for a 36-foot-wide street. Paving widths are 20 feet and 32 feet, respectively, with an additional two-foot gutter on each side. Moreover, in this area where lots sell for \$300,00 per acre, land costs exceed street construction costs, even for narrower streets. Total land and construction costs for a 100-foot section of a 36-foot-wide street amount to almost \$40,000 compared with \$26,000 for a narrower 24-foot-wide street” (HUD, p. 80).

Cost per 100 Feet of Street		
	24-foot street	36-foot street
5-inch asphalt paving/6-inch base	\$6,800	\$10,880
6-inch curb and gutter	\$1,265	\$1,265
4-inch sidewalk	\$1,400	\$1,400
<b>Total Construction Costs</b>	<b>\$9,465</b> (\$499,752 per mile)	<b>\$13,545</b> ( \$715, 176 per mile)
Land (at \$300,000 per acre)	\$16,800	\$25,200
<b>Total Cost</b>	<b>\$26,265</b> (\$1,386,792 per mile)	<b>\$38,745</b> (\$2,045,736 per mile)

Adapted from HUD, p. 80

While these costs do not correspond directly to the current cost of road building and land in the study area, the case study above does provide a rough estimate of cost savings that can be realized by reducing street widths. The primary potential savings are in the areas of paving and land costs. According to the EPA, “[if the] cost of paving a road averages \$15 per square yard, shaving even 4 feet from existing street widths can yield cost savings of more than \$35,000 per mile of residential street” (EPA 2005, p. 77). Local street standards in the audit communities can be narrowed by two to six feet depending on the circumstances, yielding significant savings in paving costs - not to mention land cost savings.



Greenville, SC: This street from the Montebello development is approximately 40 feet wide in the foreground, although it narrows to less than 30 feet as it goes up the hill. The amount of unused pavement in this example is quite dramatic, representing a missed cost saving opportunity for the developer of at least 8 to 10 feet for the widest section.

# STREET DESIGN: Curb Radii

Standards for minimum curb radii – the radius of the curb at an intersection of a street – provide another opportunity to reduce pervious area in new developments. The minimum curb radii specified for residential streets in the audit communities not only require more pavement than is necessary but also make the pedestrian environment less safe and comfortable. The American Association of State Highway & Transportation Officials (AASHTO) recommends curb radii of 10 to 25 feet depending on the type of street intersection (as cited in NAHB, 2001 and HUD, 2003). “Reducing the overall

*“Smaller, tighter radii can slow turning traffic and make the intersection safer for pedestrians while limiting the expanse of impervious surface.”*

HUD 2003

size and width of intersections can decrease the volume of stormwater runoff... The larger the curb radii, the larger the intersection... Smaller, tighter radii can slow turning traffic and make the intersection safer for pedestrians while limiting the expanse of impervious surface” (HUD, p. 83).

What are minimum curb radii for residential streets?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
25-40	25-40	30	-	30	-	30	25-40
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
-	-	-	-	-	-		



Celebration, FL: Small radius curb intersection.

## Recommended Minimum Curb Radii

Type of Intersection	Curb Radius (ft)
local/local	10 to 15 ft
local/collector	15 to 20 ft
collector/collector	15 to 25 ft

Source: AASHTO as cited in HUD, 2003

## Benefits of Small Curb Radii

- Reduced impervious surface
- Slower traffic turning speed
- Safer, more comfortable pedestrian intersections

## Potential Trade-offs

- Need for careful consideration of large vehicle turning requirements
- May require mountable curbs in some locations



Celebration, FL: Small radii with mountable curbing on a residential street.



A large truck successfully turning around a small radius curb.

# STREET DESIGN: Cul-de-Sac Design

The standards for cul-de-sacs in all of the audit communities provide significant opportunities to reduce impervious surface and development costs.

What is the minimum allowed cul-de-sac radius?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
40 *	40 *	41 *	-	40 *	40 *	40 *	40 *
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
40	40	35	40 *	40 *	40		

\* landscaped island allowed

## Benefits of Small Cul-de-Sacs

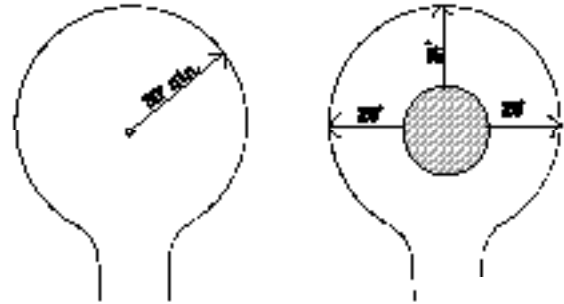
- Cul-de-sacs with a radius of 30 feet can reduce the paved area by almost 50% as compared to a cul-de-sac with a 40-foot radius (see graph below); allowing a landscaped island in the center of the cul-de-sac can reduce the impervious area even further.

*Cul-de-sacs with a radius of 30 feet can reduce the paved area by almost 50% as compared to a cul-de-sac with a 40-foot radius.*

Shueler, p. 144

## Potential Trade-offs:

- Reducing cul-de-sac radii from 40 to 30 feet may require larger service vehicles to back up to complete a turn; increasing the pavement width at the end of the cul-de-sac by offsetting the island can make turning easier (see above right)



*A 30' radius will accommodate most vehicles and reduce pavement*

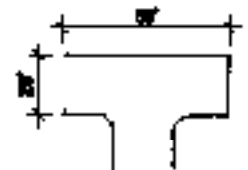
*An island can be placed to allow wider lanes in rear, making turning easier.*

Source: Metropolitan Council

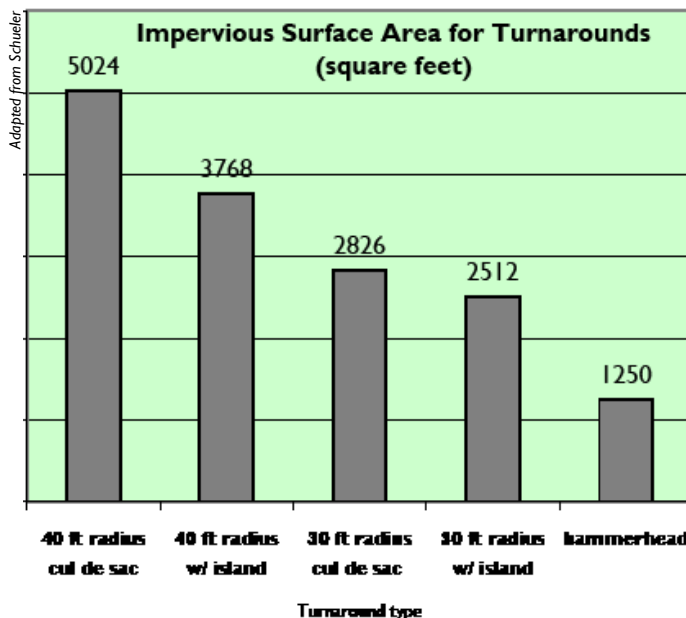
Other turn-around options can reduce impervious surface even further. These include “T” (also known as “hammerhead”) or “Y” turn-arounds. “A standard 60-foot by 20-foot T or Y turn-around yields a paved area only 43% as large as

the smallest (30-foot radius) circular turnaround” (HUD, 85). Very few of the audit communities encourage the use of such options. T and Y turn-arounds are allowed in most of the Greenville County ordinances, but require special permission.

NAHB’s Residential Streets suggests that such turn-arounds are most appropriate for dead-end streets with 10 or fewer homes (p. 34) and that streets with 5 or fewer houses may not need a turn-around at all (p. 32).



A “T” or hammerhead turn-around



*Cul-de-sac infiltration island accepts stormwater from surrounding pavement. Note flat curb.*

Source: Metropolitan Council



# STREET DESIGN: Vegetated Open Channels/Swales

Vegetated open channels or swales offer efficient and cost effective means of handling stormwater runoff from streets and can be a significant part of a development's overall storm drainage system, providing substantial cost savings as compared to typical curb and gutter and other conventional storm drainage infrastructure. Most of the ordinances in this audit allow for the use of open channels on some streets. However, only Pickens County provides guidance on where such drainage is appropriate (where density is not greater than 2 dwelling units per acre and where slopes are not "excessive").



Source: Upstate Forever

Greenville, SC: Grassed swale in an older large-lot neighborhood. The gentle slope of the swale on the right side of the street makes for an easily maintained area that can be mowed.

## Are open channels/swales allowed?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
yes	yes	no	no	yes	yes	yes	yes
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
yes	yes	no	no	no	yes		

In the book *Site Planning for Urban Stream Protection*

*"...the elimination of one mile of curb and gutter can decrease infrastructure and storm conveyance costs by approximately \$230,000."*

HUD, p. 31

– one of the most cited sources on watershed protection measures in new development – Tom Schueler argues that developers should have to show that a street is not appropriate for open channels before a plan is approved with curb and gutter (p. 153). He lists five factors that should be used in determining where open channels are not appropriate:

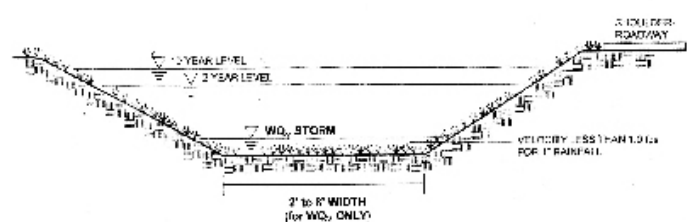
- Longitudinal slopes greater than 5%
- Computed runoff velocities for the two year design storm event in excess of 4 to 5 feet per second
- Local climate or soils that make it impossible to establish dense turf throughout the year
- Less than one foot between the water table and the proposed channel bottom
- Housing density exceeding 3 dwelling units per acre (though per the Metropolitan Council, open channels may be appropriate at up to 6-8 du/a)

## Benefits of Swales versus Curb and Gutter

- Reduced infrastructure costs compared to curbing and traditional gutter and stormwater inlets (see text box; assumes \$45 per linear foot for conventional stormwater infrastructure)
- Reduced stormwater detention capacity required, since swales provide some natural infiltration
- Swales can be mowed like a lawn (as compared to ditches, which need to be maintained with machinery)

## Potential Trade-offs

- If not designed correctly, effectiveness for storm water conveyance and retention may be lost
- Homeowners may fill in swales,
- May require wider right-of-ways if sidewalks are to be included in the street section
- Can appear less "tidy" than curb and gutter sections if not maintained properly
- Public works departments may prefer the ease of maintenance of curb and gutter sections



The cross-section of a grassed swale from the "Maryland 2000 Storm Water Design Manual." According to the Manual, "The side slopes shall be 3:1 or flatter; and the channel slope shall be less than or equal to 4.0%."

Source: Maryland Dept. of Environment



# STREET DESIGN: Planting Strips and Street Trees

Only five of the audit communities require any kind of planting strip, and where planting strips are required, it is specified to be only two to three feet wide. This dimension is barely practical for planting grass much less for planting street trees, which typically need a width of at least six to eight feet in order to thrive. The rest of the communities require no planting area at all between the sidewalk and the street. None of the regulatory documents reviewed for the audit require or even encourage street trees.

Are planting strips required, and what is the minimum width?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
2 ft	2 ft	none	none	none	none	none	2 ft
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
none	none	none	3 ft	3 ft	none		

Source: Upstate Forever



Greenville, SC: A two foot planting strip along a sidewalk is barely wide enough for grass, much less street trees.

### Benefits of Planting Strips

- Capture sheet flow from lots and sidewalks
- Provide potential location for underground utilities
- Help separate pedestrian area from travel lanes, which is especially important on collector streets

### Potential Trade-offs of Planting Strips

- Planting strips add to right-of-way width, which can add to grading/clearing area and cost of development

### Benefits of Street Trees

Street trees have many benefits, not the least of which is reduction of stormwater runoff and filtration of pollutants. According to the Center for Urban Forest Research, trees provide the following primary benefits:

- Increased soil water storage
- Interception of rainfall and reduction of erosion
- Increased soil capacity for holding rainwater

*A typical medium-sized tree can intercept as much as 2380 gallons of rainfall per year.*

(Center for Urban Forestry Research)

In addition, trees provide several other benefits to developers, homeowners, local governments, and the environment, including:

- Shade for parked cars and pedestrians
- Protection of pedestrians from moving cars
- Reduced ground-level ozone
- Improved aesthetics, (which contributes to economic value of homes and neighborhoods)
- Prolonged asphalt life, reducing the need to resurface (McPherson, et. al.)

### Potential Trade-offs of Street Trees

- Trees planted in public right-of-ways become the responsibility of local governments or HOAs
- Roots of certain trees can heave sidewalks and asphalt over time
- Trees planted in planting strips may affect the ability to use or to gain access to utilities buried in the same area



Source: The Lawrence Group

Mt. Pleasant, SC: Street trees in an eight foot planting strip.

# STREET DESIGN: Sidewalks

Sidewalks are another element of street infrastructure that can be modified to reduce stormwater runoff and promote infiltration. However, like roads, determining when to provide sidewalks should be based first and foremost on transportation needs (EPA, 2005 p. 78). Also, like other transportation infrastructure, sidewalk requirements should be based on the development context, including density, street type, and proximity to destinations. On certain streets, a sidewalk on one side of a street may suffice. Other streets may need sidewalks on both sides. Still other streets may not need any sidewalks at all. The key to reducing the impervious surface impact of sidewalks is ensuring that they are *not* placed in areas where they may not be warranted; that they provide safe, comfortable, and direct pedestrian connectivity; and, finally, that the width of the sidewalk is appropriate to the development context.

*The key to reducing the impervious surface impact of sidewalks is ensuring that they are not placed in areas where they may not be warranted by focusing on safe, comfortable, and direct pedestrian connectivity.*

streets may not need any sidewalks at all. The key to reducing the impervious surface impact of sidewalks is ensuring that they are *not* placed in areas where they may not be warranted; that they provide safe, comfortable, and direct pedestrian connectivity; and, finally, that the width of the sidewalk is appropriate to the development context.

## Sidewalk Requirements

Where are sidewalks required?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
1.5 mi. of schools	1.5 mi. of schools	> 2 dua	-	> 2 dua	1 mile of school	collectors only	1.5 mi. of school
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
1 mile of schools	1 mile of schools	based on street type	≥ 2 dua	≥ 2 dua	1 mile of schools		

(In all cases except Clemson, sidewalks are only required on one side of the street.)

In all of the communities in the audit, sidewalk requirements are “context sensitive” to one degree or another in that they base sidewalk requirements on housing density or proximity to schools. Only the City of Clemson requires sidewalks on all streets, but even their requirements allow for sidewalks on only one side for the lowest order residential streets (cul-de-sac and “residential access” streets with 25 or fewer houses).

In several of the audit communities, alternative

pedestrian networks – paths that serve destinations within neighborhoods but do not necessarily follow the street network – may be used as an alternative to sidewalks.

### Sidewalk Requirements Based on Street Type

The Clemson approach ties sidewalk requirements to the function of each street rather than to overall density (which may not reflect the differences among streets in a development). The requirements are based on street type – cul-de-sac, residential access, residential subcollector, and collector – which is related to traffic volume and the number of houses served by a given street.

Clemson Sidewalk Requirements

Street Type	# of Dwelling Units	Sidewalk Requirement
Cul-de-sac	5 or fewer	none
Cul-de-sac	25 SF/43 MF	one side
Access	25 SF/43 MF	one side
Sub-collector	62 SF or MF	both sides
Collector	125 +	both sides

### Sidewalk Requirements Based on Density

If development density is the desired basis for sidewalk requirements, additional threshold categories may need to be included to reflect the greater need for sidewalks at higher densities and in different land use contexts. The audit communities may want to apply a hybrid approach to sidewalk requirements that considers street function, density, and land use context, as well as proximity, connectivity, and access to key destinations (such as schools and commercial areas) so as to ensure that sidewalks are provided efficiently but not in excess.



Mt. Pleasant, SC: Pedestrian paths may supplement sidewalks or be used instead, as in this crushed-gravel walkway serving gang mailboxes

Source: The Lawrence Group

# Sidewalks (cont'd)

The following sidewalk guidelines are from a Federal Highway Administration study:

Street Type/density	Sidewalk Requirement
Arterials/collectors	both sides
Commercial areas:	both sides
> 4 dua:	both sides
1-4 dua:	one side
< 1 dua	none

Source: Ewing, R. Best Development Practices, p. 78

## Benefits of Sidewalk Requirements

- Street-type based requirements accurately reflect the transportation context of a sidewalk
- Density/land use-type requirements can work well in developments that are fairly uniform throughout

## Potential Trade-offs

- Neither type of requirement considers the proximity to key destinations or connectivity
- Typical requirements do not accurately provide for pedestrian connectivity in an area
- A hybrid approach to sidewalk requirements will be more complex to design and administer

## Sidewalk Width

Sidewalk width is another issue that should be approached based on development context. Appropriately sized sidewalks in appropriate contexts are better than sub-standard sidewalks throughout that are not as likely to be used. On streets where traffic volumes are low, pedestrians will walk in the street rather than walk on sidewalks that are too narrow. The communities in this audit allow four-foot wide sidewalks, but include no guidance for when wider dimensions should be used.

Five feet is the typical width needed for two adults to comfortably walk side by side. Both the Institute of Traffic Engineers and the Federal Highway Administration recommend five feet as a minimum width. Wider sidewalks are necessary in areas where higher volumes of pedestrian activity is expected, such as near schools, commercial centers, and other major destinations.



Source: Michael Rankin

A narrow sidewalk – 4 feet or less in this case – may not provide enough space for two adults to comfortably walk side by side.

While the notion of wider sidewalks appears to contradict the goal of reducing impervious surfaces, the provision of high quality pedestrian facilities that will actually attract and encourage pedestrian travel as a substitute for automobile trips is consistent with the goals of low impact development. Every motor vehicle trip that can be replaced with another mode of travel will ultimately have water quality benefits because fewer pollutants will end up in the local waterways and because less parking and street infrastructure will be required.

Sidewalks and pedestrian paths can also be paved with permeable materials to decrease the overall impervious cover in new development. “When properly maintained, alternative materials such as brick, compacted stone dust, and wood chips all accommodate safe passage of pedestrians and bicycles, and in most cases, still meet the American with Disabilities Act (ADA) requirements” (HUD, p. 92).

*The provision of high-quality pedestrian facilities that will encourage the replacement of some automobile trips is consistent with the goals of low impact development.*

# PARKING



***“There is no other kind of surface in a watershed that produces more runoff and delivers it faster than a parking lot. . . Given the prevalence of parking lots in our urban landscape and the environmental harm they cause, we need to fundamentally change the way that parking lots are sized and designed.”***

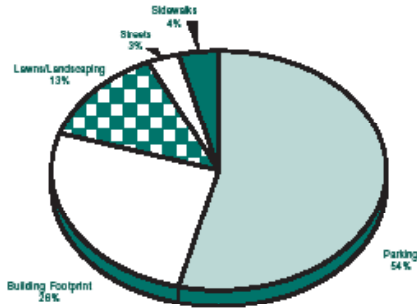
*Zielinski*



# PARKING: Parking Ratios

The amount of pavement created for parking is among the largest sources of impervious surface in urbanized and urbanizing areas. The parking areas of Pickens and Greenville Counties are no exception. There are numerous opportunities to reduce the environmental – and the fiscal – impact of parking areas, including: reducing parking requirements; facilitating and encouraging shared parking; changing parking lot design to minimize pavement and maximize pervious areas; and increasing the extent and functionality of parking lot landscaping.

**Site Coverage for Typical Commercial Development**  
(averages for Olympia, Washington)



Source: EPA, 2006

For typical commercial development, parking occupies more than half of development sites – sometimes as much as twice the amount of area devoted to buildings.

per thousand square feet in the draft City of Greenville LUDO to three per thousand in Greenville County up to six per thousand in Greer. This difference could result in parking lots two to three times as large in Greer as they would be in the City of Greenville or in Greenville County. In Pickens County, the requirements are more consistent across the board (between four and five spaces per thousand square feet), but even that range exhibits a 20 to 25 percent difference from one town to another. At the extreme, Central, Liberty, and Easley require up to ten spaces per thousand square feet for food stores.

*Four to four and a half spaces per 1000 square feet “provide for a surplus of parking spaces during all but 19 hours of the more than 3,000 hours per year during which a shopping center is open.”*

ULI/ICSC

Is it possible that parking utilization at shopping centers differs that dramatically (and that specifically) from one community to the next? More likely, the variation in requirements is simply a product of the wide variation in formulas and models used to determine parking needs, none of which are anything more than rough “guesstimates.”

### What are the minimum parking ratios for professional offices?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
3	5	3-3.5	2	6	5	5	6
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
3.3	5	4	2.9	5	3.3		

### What are the minimum parking ratios for shopping centers?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
3	5.5	3.3	2	4-6	5	5.5	4-5
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
4	5	5	5	5	4		

Note: All figures are in number of spaces per 1000 square feet of office/retail space.

The size of parking lots begins with minimum parking requirements that specify the number of parking spaces that must be provided based on the size of the building served. However, there is wide variation in the parking requirements for shopping centers across the two adjacent counties and even within each county. Shopping center minimum parking requirements range from two

Donald Shoup, a nationally respected economist and pre-eminent researcher on the topic of parking demand, has noted serious problems with such estimates.

First, the Institute of Transportation Engineers’ recommendations – one of the most commonly used sources – are based on a one-size-fits-all scenario that does not take into account the unique locational characteristics of businesses in the suburbs versus those in urban areas. In addition, these recommendations ignore the fact that a substantial portion of trips are sometimes made using a mode that does not require parking (such as mass transit or pedestrian travel).

Second, trip generation estimates are based on peak demand, which logically ought to be used to set *maximum* rather than minimum requirements. The Urban Land Institute (ULI) and the International Council of Shopping Centers (ICSC), for example, recommend 4 to 4.5 spaces per thousand square feet for shopping centers, depending on the size of the center. These

## Parking Ratios (cont'd)

numbers are based on *peak* demand at centers across the country (p. 3). According to their own analyses, the ULI/ICSC parking ratios “provide for a surplus of parking spaces during all but 19 hours of the more than 3,000 hours per year during which a shopping center is open” (p. 3).

Source: Upstate Forever



Greenville, SC: Unused parking at a recently constructed big-box store.

Shoup suggests leaving the issue of estimating parking demand to the people who have the most financial stake in the process: the people who own, manage and develop property.

*If cities de-require off-street parking, developers, property owners, and businesses can judge for themselves how much off-street parking they want to provide for their employees and customers. They will have every reason to make the right decision because they will pay for their own mistakes—and will prosper if they choose wisely. Urban planners who establish off-street parking requirements, in contrast, have no financial incentive to get things right [and, therefore, often over-estimate demand in an effort to play it safe]. . . Urban planners simply do not know how many parking spaces each business, apartment house, or church in each different location needs. . . (p. 497)*

The communities surveyed in this audit recognize this issue to a certain degree because the majority of them waive or reduce parking requirements in their downtowns. In these areas, planners and elected officials have decided to let businesses themselves decide how much parking to provide.

The City of Greenville’s draft *Land Use Development Ordinance* is a model in this regard. It sets parking

minimums that are generally below market standards as well as maximums to limit the overbuilding of parking areas. To use the shopping center example, the draft Greenville LUDO sets a minimum of two and a maximum of four spaces per thousand square feet of building for shopping centers. In most cases, the communities’ current established parking *minimums* would serve as appropriate parking maximums.

### **Benefits of Reduced Parking Requirements**

- Reduced impervious cover
- Increased development and/or open space potential
- Reduced infrastructure and maintenance costs
- Easier redevelopment of vacant structures that may not meet existing parking requirements

### **Potential Trade-offs**

- Some tenants may not provide enough parking resulting in spillover to adjacent businesses and neighborhoods
- Some businesses may provide excess parking even if minimums reduced; maximums may be needed also
- Marketability of property for future uses may be limited if flexibility in parking requirements is limited

### **Other Options for Reducing Parking Requirements**

- Reduce parking requirements in mixed-use, pedestrian-oriented, and/or transit-served areas; in certain districts, use parking maximums only
- Allow on-street parking to count towards minimum parking requirements, especially in non-residential, mixed-use, and multifamily developments
- Reduce parking requirements for residential uses designed for seniors, disabled, and low-income individuals
- Provide incentives for shared parking



Source: Upstate Forever

Greenville, SC: Unused parking at a drug store on a weekday afternoon during prime retail hours.

# PARKING: Shared Parking

Another way to reduce the extent of paved areas for parking is to allow shared parking across uses that have different parking needs at different times of day. For example, restaurants and theaters tend to need more parking at night. These types of uses can share parking with uses such as offices, which tend to have peak parking needs during the day. Every community in the audit (with the exception of Clemson) allows shared parking to some degree. The differences in the various communities’ regulations on shared parking have to do with the amount that may be shared. About half of the communities allow 100% of a complementary land use’s parking to be shared. The other half only allow 50% to be shared. While some sharing is better than none at all, this is another instance where the determination of how much parking may be shared might be better left up to the business owners and developers rather than the planners.

*Is shared parking allowed? What percent may be shared?*

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
yes; 100%	yes; 50%	yes; 100%	yes; 100%	yes; 50%	yes; 50%	yes; 50%	yes; 50%

Pickens County	Central	Clemson	Easley	Liberty	Pickens
yes; 50%	yes; 100%	no	yes; 100%	yes; 100%	yes; 50%

A very simple and straightforward regulation on shared parking is used by Central, Easley, and Liberty in Pickens County: “If activities sharing combined parking are not in operation at the same time, each parking space may be counted for each activity.” The draft Greenville LUDO offers a more complex but potentially more accurate method of calculating shared parking based on peak parking utilization rates at different times of the day.

While almost all of the audit communities allow shared parking, none of them encourage it through incentives. Incentives to utilize shared parking could include reducing minimum requirements, priority processing of permits, or other development incentives. For example, the City of Tualatin, Oregon provides a reduction in required parking of up to 25% if parking spaces are shared (EPA 2005, p. 69).

### Benefits of Shared Parking

- Reduced impervious cover
- Increased development and/or open space potential
- Reduced infrastructure and maintenance costs
- Easier infill development and redevelopment of vacant structures that may not meet existing parking requirements or have space for on-site parking

### Potential Trade-offs

- Ongoing maintenance may be problematic if parties do not share responsibilities as required
- Some tenants may be hesitant about sharing parking

### On-street parking as shared parking

On-street parking is one of the most widely available and most efficient ways to share parking, yet it is also one of the most underutilized parking resources. None of the audit communities require or encourage this form of parking. On-street parking can reduce the amount of parking that each individual developer has to provide on-site. It is also an effective and economical means of utilizing pavement resources and sharing parking among adjacent and complementary land uses:

*“Providing on-street parking makes use of an asset that is technically paid for and shared, and thus adds no additional cost to the developer or user.”*

*EPA, 2005*

*...supplying parking in a lot requires more impervious surface to provide drive aisles, entrances and ramps. On-street parking does not require this extra infrastructure, thus lowering the amount of land, and thus the cost, to provide parking (EPA, 2005, p. 68).*

On-street parking can be encouraged by allowing it to count towards parking requirements as mentioned above, or even by requiring it in appropriate locations. It is an especially useful tool on arterials or other streets that may have excess width and/or excess speeds, since on-street parking has been shown to reduce speed significantly.



# PARKING: Parking Lot Design

There are several aspects of parking lot design that can affect the size and the amount of pervious area devoted to parking. These include the dimensions of parking spaces and parking aisles, the use of pervious paving materials, and the utilization of landscaping for stormwater detention.

## Parking Stalls

What is the minimum allowed parking stall width?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
9	9	8.5	9	9	9	9	9

Pickens County	Central	Clemson	Easley	Liberty	Pickens
8.5-9	9	9	9	9	8.5-9

Parking stall widths in the audit communities are fairly consistent, with most requiring a minimum of nine feet – a reasonable dimension that will accommodate most private motor vehicles in a variety of parking contexts. However, this minimum dimension can be safely reduced by over 5% to 8.5 feet, especially when parking is expected to have lower turnover (such as parking for residents, students, and employees).

The Parking Consultants Council recommends the following minimum parking stall dimensions:

Typical Parking Characteristics	Stall width (ft)
Low turnover for employees, students, etc.	8.5
Low to moderate turnover visitor spaces (offices, regional center retail, long-term parking at airports, etc.)	8.5 to 8.75
Moderate to high turnover visitor parking: community retail, medical visitors, etc.	8.75 to 9.0

Source: Dimensions of Parking, 4th Edition

## Benefits of Smaller Parking Stalls

- Less land used up for parking
- Increased pervious areas and/or more built area
- Reduced infrastructure cost

## Potential Trade-offs

- Assigning various stall widths to different uses is more complex for regulation and enforcement than a one-size-fits all approach
- Parking lots may have to be redesigned if the usage pattern of a development changes

## Parking Modules

What is minimum allowed parking module width?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
64	-	61	60	60	64	60	64

Pickens County	Central	Clemson	Easley	Liberty	Pickens
60-64	64	60	64	64	60-64

Parking module width – the width of two parking rows plus the access/drive aisle – is another parking lot dimension that can be varied to reduce parking lot area and thus impervious cover related to parking. Most of the audit communities require a minimum of 64 feet for a 90 degree (vs. angle parking) module.

Sixty feet is a nationally accepted width for parking modules and is the minimum width recommended by the Urban Land Institute and the National Parking Association (2001, p. 46). A 60 foot parking module width represents a more than 6% reduction over a 64 foot width, space that can be devoted to increased landscaped/pervious areas and/or more development potential on a project site. One of the participants in the project focus

*Impervious cover in parking areas can be reduced by over 10 percent by decreasing the minimum dimensions required for parking stalls and parking drive aisles to nationally accepted standards.*

group who represents a local design and engineering firm suggested that parking modules can even be as narrow as 58 feet if vehicles are allowed to overhang into planted areas between parking rows using wheel stops and at-grade landscaping.

## Benefits of Smaller Parking Modules

- Parking areas can be smaller, thus reducing cost and potentially increasing development potential
- Space savings can be used for pervious areas

## Potential Trade-offs

- The 60 foot module is designed to accommodate vehicles up to 17 feet long, so longer vehicles will have to maneuver more carefully (the longest SUVs and pickups are 18 to 21 feet long)

# Parking Lot Design (cont'd)

## Pervious Pavement for Parking Areas

Are pervious paving materials allowed/required for parking areas?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
req'd for > 200% of min. parking	(not specified)	allowed	req'd for > 100% of min. parking	req'd for > 110% of min. parking	(not specified)	allowed	req'd for > 110% of min. parking
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
up to 25% allowed	allowed	allowed	no	no	up to 25% allowed		

When parking ratios and parking dimensions have been reduced as far as possible, pervious paving is another tool for mitigating the stormwater impact of paved parking areas. The majority of the audit communities allow and/or require pervious paving for parking areas. Greenville County and several of its municipalities require pervious pavement for parking provided in excess of the minimum parking requirements.

(Greenville County's requirement only applies to uses that provide more than twice the minimum parking required, a threshold that is rarely met.) In Pickens County, pervious pavement is generally allowed for parking areas but not required or encouraged through incentives.

*“Porous pavements’ ability to substitute for storm drains can make them 12 to 38 percent less expensive than conventional pavements.”*

*Ewing, p. 109*

The SC Department of Health and Environmental Control recommends the following criteria for using pervious pavement (p. 151):

- Not recommended on slopes greater than 5% and best with slopes as flat as possible
- Minimum setback from water supply wells: 100 feet
- Minimum setback from building foundations: 10 feet down gradient, 100 feet upgradient
- Not recommended where wind erosion supplies significant amounts of sediment
- Use on drainage areas less than 15 acres
- Minimum soil infiltration rate: 0.3-0.5 inches/hour

Given these criteria, the applicability of pervious pavement is somewhat limited in the Upstate, as our clay soils tend to be fairly impervious. Therefore, effective use of pervious pavement in our region will often require some excavation of native soil and replacement with a pervious substrate. Therefore, pervious pavement will be most viable in areas where land is expensive, as the value of land freed up by the detention function of pervious pavement can under such circumstances offset the extra cost of substrate preparation.



Source: Bomanite Corporation

*A parking lot with Grasscrete™ interlocking pavers. Bordered by a stream and with no option for piped drainage, this university parking lot has been draining naturally for 20 years.*

### Benefits of Pervious Pavement for Parking Areas

- Increased stormwater infiltration capacity, which reduces the cost and amount of conventional storm water infrastructure required on a site
- Provision of some pervious cover in urban sites where little or no pervious area exists

### Potential Trade-offs

- Requires more ongoing maintenance than conventional asphalt or concrete pavements
- May not be suitable in high-traffic or high-turnover areas
- May not be suitable with certain soil types, especially soils with high clay content
- May have higher up-front costs (up to 10% more) than conventional impervious pavements (Ewing, p. 109)

# PARKING: Parking Lot Landscaping

All but one of the Greenville County communities (but only two of the Pickens County communities) require parking lot landscaping. The circumstances under which landscaping is required and the amount specified vary greatly from community to community, with some

*A one acre asphalt parking lot produces sixteen times as much stormwater runoff in a one-inch rainstorm as a one acre meadow.*

*Scheuler*

communities requiring landscaping for all new parking lots and others mandating it only when parking lots exceed a certain size. These thresholds range from five spaces in the draft LUDO for the City of Greenville to 60 spaces for Greenville County

and Travelers Rest. (On average, about 300 square feet is required for each parking space and its attendant drive aisles. Therefore, a parking lot of 60 spaces is about 18,000 square feet, or 0.4 acre.)



Source: Upstate Forever

Greenville County, SC: Note the limited landscaping as well as grading away from landscaped areas

## Benefits of Parking Lot Landscaping

- Increased pervious areas in parking lots
- Reduction in the amount and cost of other stormwater infrastructure (if designed to capture stormwater)
- Increased attractiveness of developments, potentially increasing revenues
- Lower temperature for stormwater runoff due to shade
- Extend asphalt life and reduced maintenance and repaving costs
- Cooling relief for cars

### Under what conditions is parking lot landscaping required?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
new lots: 60+ spaces	none	new lots: 25+ spaces	new lots: 5+ spaces; expanded lots: > 10%	new lots: > 60 spaces; all expanded lots	all new lots	new lots: 15+ spaces; expanded lots: >50%	60 + spaces
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
none	none	all new, expanded, rebuilt lots	new lots: 20+ spaces	none	none		

### What is the amount of landscaping required?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
1 tree/15 spaces	none	1 landscape island/20 spaces	1 landscape island/15 spaces	no space > 90 ft. from a tree	1 tree/10 spaces	5% of vehicular area	1 tree/15 spaces
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
none	none	10% of area; 1 tree/40 ft	5% of lot	none	none		

The amount of landscaping that is required varies greatly from community to community as well. A 60 space parking lot, for example, would require anywhere from 0 to 6 trees depending on the Greenville County community in which it was built. In the two Pickens County communities where landscaping is required, it is based on a percentage of the parking area.

## Potential Trade-offs



Source: Upstate Forever

Greenville County, SC: While the landscaping in this lot provides some benefit, the curbed islands result in limited stormwater retention potential.



## Parking Lot Landscaping (cont'd)

- Adds additional costs for design, construction and maintenance (if designed to capture stormwater, these costs may be offset by a reduction in the amount of additional stormwater infrastructure required)
- If not maintained correctly, may reduce visibility into developments and create safety concerns
- Landscaping requirements may necessitate additional land or reduce development potential on a site
- Stormwater and other benefits are dependent on the type of landscaping provided; while large mature trees provide the most benefit in terms of shade and water retention, they are more expensive, and not all ordinances specify or require the most beneficial types of landscaping
- Parking lot landscaping that is fully curbed provides limited stormwater retention benefit



Source: The Lawrence Group

Wilmington, NC: Landscaped area in a mixed-use center that also serves as a storm water bio-retention catchment area.

### Bio-retention Areas in Parking Lots

None of the audit communities require or provide incentives for bio-retention areas in parking lots. At the same time, none of the audit communities require curbed landscaped areas. Uncurbed landscaped islands potentially provide for informal retention areas that can capture sheet flow of stormwater. However, according to a commercial developer that participated in the focus group, most area developers provide curbing around landscaped areas in any case.

### Benefits of Bio-retention Landscape Areas

- Capture stormwater runoff from paved areas
- Reduce stormwater infrastructure costs
- Require less maintenance and water than conventional landscaped areas, which may require irrigation
- Existing landscaped areas can be retrofitted as bio-retention areas (Metro Council, p. 3-182)

### Potential Trade-offs

- Adds additional costs for design and construction (though these costs may be offset by reduction in the amount of additional storm water infrastructure required)
- May require additional landscape maintenance in the initial years of operation
- Susceptible to clogging by sediment if pre-treatment is not part of initial design (Metro Council, p. 3-182)

Source: Unknown



Washington, DC: A bio-retention parking lot median. Note the notches in the curb that allow sheet flow run off to enter the retention area.

Source: Unknown



Landover, MD: A parking lot landscape island that was retrofitted as a rain garden. Note the area of the curbing that has been cut to allow sheet flow into the landscaped area.

# OTHER PAVED AREAS

***“Driveways can account for as much as 20 percent of the impervious cover in a typical residential subdivision.”***

**CWP**

***“By specifying narrower driveways, promoting permeable paving materials, and allowing two-track driveways or gravel and grass surfaces, communities can sharply reduce the typical 400 to 800 square feet of impervious cover created by each driveway.”***

**Kwon**

Source: The Lawrence Group



# SETBACKS, DRIVEWAYS & ALLEYS

Driveways can account for as much as 20 percent of the impervious cover in a typical residential subdivision (Center for Watershed Protection, as cited in HUD p. 91). There are several ways to reduce the amount of impervious surface created by driveways and to mitigate the stormwater impact of driveways. These include reducing required building setbacks, allowing and encouraging pervious driveway pavements, and other driveway alternatives such as shared driveways and alleys.

## Residential Setbacks

What are minimum setbacks for local streets/collector streets?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
30/40	30/40	25	-	20/30	20/40	15/30	20/30
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
30/40	15/40	25	20/40	15/35	30/40		

Driveways should provide at least 20 feet of length beyond the right of way so that parked cars do not hang into the public realm, especially where sidewalks are present. However, the front facades of houses (not including garages) can be as close as 10 to 15 feet from the right of way if driveways run between houses as in the photo at right. Houses fronting on collectors may need to be set back further, but if collector streets are designed to be low speed and do not carry excessive volumes,

*Driveways can account for as much as 20 percent of the impervious cover in a typical residential subdivision.*

*Center for Watershed Protection*

residential setbacks can be the same as on lower-level streets. Most of the communities in the audit require setbacks of 20 feet or more on local streets and up to 40 feet on collector streets.

## Benefits of Reduced Setbacks

- Allow for shorter driveways, which reduce impervious cover and costs
- Allow for shorter sidewalk lengths between house and street, which also reduce impervious cover and cost
- Create more intimate, pedestrian-friendly streets

- Allow more private area in rear yards for recreation
- If front facades (not including garages) are set back less than 20 feet, the appearance of “garage-dominated” streetscapes can be avoided
- Where no sidewalks are required, driveways can be even shorter

## Potential Trade-offs

- Shorter driveways may mean that cars and garages will be closer to the public realm of the sidewalk and street
- Double-stacked cars in a shorter driveway may result in cars hanging into the right of way and potentially over the sidewalk



Source: The Lawrence Group

*Mt. Pleasant, SC: A 10-foot setback makes for a short front walk, an intimate and pedestrian-friendly streetscape, and more private space in the rear yard. Note the grass strip in the driveway.*

## Pervious Driveway Alternatives

Are pervious pavements allowed/required for residential driveways?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
-	-	-	-	-	allowed	-	-
Pickens County	Central	Clemson	Easley	Liberty	Pickens		
-	-	allowed	-	-	-		

Pervious paving can reduce the stormwater impact of driveways by capturing water from the driveway (as well as from rooftops). Only two of the audit communities even mention pervious driveways. While none of the communities specifically prohibit pervious pavements, none require or encourage them as an option.



# DRIVEWAYS, SETBACKS, ALLEYS (cont'd)

Pervious surfaces for driveways can range from grass strips in the center of the driveway (known as “two-track” driveways) to gravel or stone. These options have varying levels of installation cost, maintenance cost, and permeability.

## Cost-Benefit Analysis of Various Pavement Options

Material	Initial Cost	Maintenance Cost	Water Quality Benefits
asphalt/concrete	medium	low	low
pervious concrete	high	high	high
porous asphalt	high	high	high
turf block	medium	high	high
brick	high	medium	medium
natural stone	high	medium	medium
two-track drive	medium	low	medium
concrete paver	medium	medium	medium
cobbles	low	medium	medium
gravel	low	medium	high
wood mulch	low	medium	high

Adapted from: Bay Area Storm Water Management Agencies Association as cited in HUD, p. 93.

## Benefits of Pervious Pavements for Driveways

- Reduce driveway and rooftop runoff, allowing more groundwater recharge
- Reduce runoff of pollutants such as motor oil
- Can be cheaper than conventional pavements
- Can provide visual interest and appeal

## Potential Trade-offs

- Pervious pavements require more ongoing maintenance than impervious ones

## Shared Driveways and Alleys

Are residential alleys permitted?

Greenville County	Fountain Inn	Greenville	Greenville (LUDO)	Greer	Mauldin	Simpsonville	Travelers Rest
yes	yes	-	-	-	no	no	yes

Pickens County	Central	Clemson	Easley	Liberty	Pickens
-	-	yes	no	no	-

Shared driveways and alleys create efficiencies in paved surfaces because they allow one paved area to serve more than one building. None of the audit communities specifically mention shared driveways, but none prohibit them either. They are not encouraged with incentives.



Simpsonville, SC: A shared driveway in the Redfearn development.

Source: Upstate Forever

Alleys are specifically mentioned in most of the audit communities. However, of the eight communities that regulate alleys, four do not permit them in residential development.

## Benefits of Shared Driveways and Alleys

- Provide efficiencies in land and infrastructure, allowing greater development potential, reduced costs, and reduced pervious surface
- When lots are 50 feet wide or less, alleys provide more buildable area per parcel and require no more paved area than individual driveways on each lot
- Alleys provide additional emergency access to lots

## Potential Trade-offs

- Communities may not want to accept alleys as public streets
- Some home buyers are leery of the shared easements required for private alleys or shared driveways



Vancouver, BC: An alley with grass median and pervious parking pads.

Source: Puget Sound Action Team

# APPENDIX A

## Greenville County Audit of Pavement Standards

**GREENVILLE COUNTY AUDIT OF PAVEMENT STANDARDS: SUMMARY**

Development Feature/Standard	GREENVILLE COUNTY		FOUNTAIN INN		GREENVILLE		GREENVILLE (draft LUDO)		GREER		MAULDIN		SIMPSONVILLE		TRAVELERS REST	
	Measure	Points	Measure	Points	Measure	Points	Measure	Points	Measure	Points	Measure	Points	Measure	Points	Measure	Points
<b>Street Width (17 points)</b>																
Minimum pavement width in low-density residential development (<22 = 2pts; <20 = 4pts)	20-22 ft	4	20-22 ft	4	20-22 ft	4	->	4	20-22 ft	4	20-22 ft	4	20-22 ft	4	20-22 ft	4
Cul-de-sac street minimum pavement width (<22 = 2 pts)	"	2	"	2	28 ft	0	->	0	"	2	"	2	"	2	"	2
Manufactured Home Park street minimum pavement width (<22 = 2pts)	20-28 ft	2	20-28 ft	2	-	0	->	0	-	0	20 ft	2	-	0	20-28 ft	2
Alley minimum pavement width (residential/commercial) (<15 = 3 pts; <20 = 1 pt)	12/18 ft	3	12/18 ft	3	20 ft	1	->	1	-	0	-	0	-	0	12/18 ft	3
Residential alleys permitted? (yes = 2 pts)	Yes	2	Yes	2	-	0	->	0	-	0	No	0	No	0	Yes	2
Collector street minimum pavement width (<24 = 3 pts)	24-26 ft	3	24-26 ft	3	32-34 ft	0	->	0	24 ft	3	24 ft	3	24ft	3	24-26 ft	3
Curb radii for residential streets (<20 = 1 pt; <15 = 3 pts)	25-40 ft	0	25-40 ft	0	30 ft	0	->	0	30 ft	0	-	0	30 ft	0	25-40 ft	0
<b>Right-of-Way Width (5 points)</b>																
Minimum ROW width for residential street? (<45 = 3pts; <50 = 1 pt)	40 ft	3	50 ft	1	50 ft	1	->	1	40-42 ft	3	40-42 ft	3	40-42 ft	3	50 ft	1
Utilities allowed under paved section of street? (yes = 2 pts)	-	0	-	0	Yes	1	->	1	-	0	-	0	-	0	-	0
<b>Cul-de-Sacs (9 points)</b>																
Minimum radius allowed for cul-de-sacs? (<35 = 3 pts)	40 ft	0	40 ft	0	41 ft	0	->	0	40 ft	0	40 ft	0	40 ft	0	40 ft	0
Can landscaped island be created within cul-de-sac? (yes = 3 pts)	Yes	3	Yes	3	ns	0	->	0	Yes	3	Yes	3	Yes	3	Yes	3
Are alternative turnarounds such as "hammerheads" allowed? (yes = 3 pts)	Yes	3	Yes	3	ns	0	->	0	No	0	Yes	3	No	0	Yes	3
<b>Vegetated Open Channels/Swales (4 points)</b>																
Are open channels/swales allowed for some residential streets? (yes = 3 pts)	Yes	3	Yes	3	No	0	->	0	Yes	3	Yes	3	Yes	3	Yes	3
Design criteria for swales (dry swales, biofilters, or grass)? (yes = 1 pt)	Yes	1	Yes	1	Yes	1	->	1	Yes	1	Yes	1	Yes	1	Yes	1
<b>Parking Ratios (18 points)</b>																
Minimum parking ratio for professional office building (per 1000 sf) (<3 = 4 pts; <4 = 2 pts; <5 = 1 pt)	3	4	5	0	3.3-5	2	2	4	6	0	5	0	5	0	6	0
Minimum parking ratio for shopping centers (per 1000 sf) (<3 = 4 pts; <4 = 2 pts; <5 = 1 pt)	3	4	5.5	0	3.3	2	2	4	4-6	1	5	0	5.5	0	4-5	1
Minimum parking ratio for multifamily dwellings (per unit)? (<2 = 3 pts)	1-2	3	2	0	2	0	1.5	3	2	0	2	0	2	0	2	0
Are parking requirements set as maximums? (yes = 4 pts)	No	0	No	0	No	0	min. & max.	4	No	0	No	0	No	0	No	0
Are parking requirements reduced/waived in CBD? (yes = 3 pts)	n/a	0	No	0	Yes	3	Yes	3	Yes	3	No	0	Yes	3	No	0
<b>Shared Parking (6 points)</b>																
Is shared parking allowed? (yes = 3 pts)	Yes	3	Yes	3	Yes	3	Yes	3	Yes	3	Yes	3	Yes	3	Yes	3
What percentage of parking may be shared? (100% = 3 pts; <100% = 1 pt)	100%	3	50%	1	100%	3	100%	3	50%	1	50%	1	50%	1	50%	1
<b>Parking Lot Design (8 points)</b>																
What is the minimum stall width for a standard parking space? (<9 = 1 pt)	9 ft	1	9 ft	1	8.5 ft	1	9 ft	1	9 ft	1	9 ft	1	9 ft	1	9 ft	1
Minimum width for 2 rows of parking and drive aisle? (<60 = 3 pts)	64 ft	0	-	0	61 ft	0	60 ft	3	60 ft	3	64 ft	0	60 ft	3	64 ft	0
Smaller dimensions allowed for compact cars? What % of spaces? (yes = 1 pt)	No	0	No	0	No	0	No	0	No	0	No	0	Yes; 20%	1	No	0
Are pervious materials allowed/required for parking areas? (req'd: 3 pts; allowed: 1 pt)	Required for > 200% of min.	3	-	0	Allowed	1	Required for > 100 % of min.	3	<= 25% allowed; req'd > 110% of min.	3	ns	0	100% allowed	1	100% allowed; req'd for > 110% of min.	3
<b>Parking Lot Landscaping (17 points)</b>																
Parking lot landscaping required? (yes = 3 pts)	Yes	3	No	0	Yes	3	Yes	3	Yes	3	Yes	3	Yes	3	Yes	3
Applicability of above (new lot and/or expanded lots) (all= 4pts; <= 15 spaces = 2 pts; >15 spaces = 1pt)	New lots of 60+ spaces	1	-	0	New; > 25 spaces	1	> 5 spaces (new); > 10% (expanded)	2	New lots >= 60 spaces; all expanded lots	1	All new lots	4	>=15 spaces (new); > 50% (expanded)	1	60 + spaces	1
Required planting areas (<= 1 tree /10 spaces = 4pts; <= 1/15 = 2 pts; >1/15 = 1pt)	1 tree/15 spaces	2	-	0	1 island/20 spaces	1	1 island/15 spaces	2	No space > 90' from tree	4	1 tree/10 spaces	4	5% of vehicular area	1	1 tree/15 spaces	2
Are planting areas required to be curbed? (no = 3 pts)	No	3	-	0	No	3	No	3	No	3	No	3	No	3	No	3
Bioretention or other stormwater practices required/ encouraged? (yes = 3 pts)	No	0	No	0	No	0	No	0	No	0	No	0	No	0	No	0
<b>Sidewalks and Planting Strips (9 points)</b>																
Are sidewalk requirements context sensitive? (yes = 1 pt)	Yes	1	Yes	1	Yes	1	->	1	Yes	1	Yes	1	Yes	1	Yes	1
Planting strip required between sidewalk and curb? (> 6 ft = 4 pts; < 6 ft = 2pts; <4 ft = 1pt)	Req'd; 2 ft	1	Req'd; 2 ft	1	No	0	->	0	No	0	No	0	No	0	Req'd; 2 ft	1
Are street trees required in the planting strip? (yes = 3 pts)	No	0	No	0	No	0	Optional	0	No	0	No	0	No	0	No	0
Can alternate pedestrian networks be substituted for sidewalks? (yes = 1 pt)	No	0	No	0	Yes	1	->	1	Yes	1	No	0	No	0	No	0
<b>Driveways (7 points)</b>																
Pervious paving material for residential driveways (required = 3 pts; allowed = 1 pt)	-	0	-	0	-	0	->	0	-	0	Allowed	1	-	0	-	0
Residential front setbacks (minimum) (< 20 = 4 pts; =20 = 2pts)	30/40 ft	0	30/40 ft	0	25 ft	0	->	0	20/30 ft	2	20/40 ft	2	15-30 ft	4	20/30 ft	2
<b>TOTAL POINTS (100 possible points)</b>		<b>61</b>		<b>34</b>		<b>33</b>		<b>51</b>		<b>49</b>		<b>47</b>		<b>45</b>		<b>49</b>

## Greenville County

Development Feature/Standard	Measure or Yes/No	Points	Comments
<b>Street Width (LDR Sec. 8.1)</b>			
Minimum pavement width in low-density residential development ( $\leq 22 = 2pts$ ; $\leq 20 = 4pts$ )	20-22 ft	4	Good minimum pavement widths; generally narrow. Minimum width could be as low as 16-18 feet. Minimum dimensions for private roads (LDR Sec. 8.1.C): 20 ft min. paved or unpaved surface.
Cul-de-sac street minimum pavement width ( $\leq 22 = 2pts$ )	"	2	No specific width specified for cul-de-sac streets
Manufactured Home Park street minimum pavement width ( $\leq 22 = 2pts$ )	20-28 ft	2	Manufactured Home Park streets require 28 feet for one side parking (LDR Sec. 9.4-2), which is too wide. Streets as narrow as 18 feet (pavement only) can accommodate one side parking.
Alley minimum pavement width (residential/commercial) ( $\leq 15 = 3pts$ ; $\leq 20 = 1pt$ )	12/18 ft	3	18 ft. minimum for two-way alleys; 12 ft for one-way.
Residential alleys permitted? ( <i>yes = 2 pts</i> )	Yes	2	However, must be approved on a case-by-case basis.
Collector street minimum pavement width ( $\leq 24 = 3pts$ )	24-26 ft	3	Good narrow dimensions, however, does not allow for on-street parking or bike lanes. Wider dimension could be narrowed to 24 ft if on-street parking or bike lanes are not provided for.
Curb radii for residential streets ( $\leq 20 = 1pt$ ; $\leq 15 = 3pts$ )	25-40 ft	0	Could be as low as 15-20 feet for low volume residential and collector streets. Allows narrower intersections and is better for pedestrian crossing and lowering vehicle turning speeds.
<b>Right-of-Way Width</b>			
Minimum ROW width for residential street? ( $\leq 45 = 3pts$ ; $\leq 50 = 1pt$ )	40 ft	3	Min. 40-50 ft utility easement for private roads (LDR Sec. 8.1.C)
Utilities allowed under paved section of street? ( <i>yes = 2 pts</i> )	-	0	
<b>Cul-de-Sacs (LDR Sec. 8.1.B.9)</b>			
Minimum radius allowed for cul-de-sacs? ( $\leq 35 = 3pts$ )	40 ft	0	
Can landscaped island be created within cul-de-sac? ( <i>yes = 3 pts</i> )	Yes	3	Islands not allowed with oval cul-de-sacs. 9.2.B Island Design Requirements: "all cul-de-sac islands shall be . . . under drained"
Are alternative turnarounds such as "hammerheads" allowed? ( <i>yes = 3 pts</i> )	Yes	3	Offset, oval, "T" turnarounds, and hammerheads allowed with approval of the County Engineer.
<b>Vegetated Open Channels/Swales</b>			
Are open channels/swales allowed for some residential streets? ( <i>yes = 3 pts</i> )	Yes	3	For "Rural," "Rural Transitional," and "Rural Mountainous" street types, swales are permitted as part of the typical cross-sections.
Design criteria for swales (dry swales, biofilters, or grass)? ( <i>yes = 1 pts</i> )	Yes	1	LDR Sec. 11.3.F, Open Channel Design
<b>Parking Ratios (ZO Sec. 12:2)</b>			
Minimum parking ratio for professional office building (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $\leq 5 = 1pt$ )	3	4	
Minimum parking ratio for shopping centers (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $\leq 5 = 1pt$ )	3	4	
Minimum parking ratio for multifamily dwellings (per unit)? ( $\leq 2 = 3pts$ )	1-2	3	1 space/1 BR unit; 1.5 spaces/2 BR unit; 2 spaces/3 BR+
Are parking requirements set as maximums? ( <i>yes = 4 pts</i> )	No	0	On street parking should be allowed to count towards minimums in all cases.
Are parking requirements reduced/waived in CBD? ( <i>yes = 3 pts</i> )	n/a	0	
<b>Shared Parking (ZO Sec. 12:2.2)</b>			
Is shared parking allowed? ( <i>yes = 3 pts</i> )	Yes	3	"Shared use of required non-residential parking spaces may occur where two or more uses on the same or separate sites are able to share the same parking spaces because their parking demands occur at different times."



Appendix A: Greenville County Audit of Pavement Standards

What percentage of parking may be shared? (100% = 3 pts; ≤ 100% = 1 pt)	100%	3	
<b>Parking Lot Design (ZO Sec. 12:2.5)</b>			
What is the minimum stall width for a standard parking space? (≤9 = 1 pt)	9 ft	1	
Minimum width for 2 rows of parking and drive aisle? (≤60 = 3 pts)	64 ft	0	
Smaller dimensions allowed for compact cars? What % of spaces? (yes = 1 pts)	No	0	
Are pervious materials allowed/required for parking areas? (req'd:3 pts; allowed: 1pt)	Required for > 200% of min.	3	Parking in excess of 200% of the minimum is required to have pervious paving. This threshold should be much lower (perhaps 125%) or is not likely to be used. Some incentive to use such treatments for all parking areas should be provided.
<b>Parking Lot Landscaping (ZO Sec. 12:4)</b>			
Parking lot landscaping required? (yes = 3 pts)	Yes	3	
Applicability of above (new lot and/or expanded lots) (all= 4pts; ≤ 15 spaces = 2 pts; >15 spaces = 1pt)	New lots of 60+ spaces	1	Only new lots of 60 or more spaces (>16K sf or almost 4/10 of an acre) are required to provide landscaping. This threshold should be lower (perhaps 25 spaces) and should include additions (of 12-25 or more spaces) to existing parking lots.
Required planting areas (≤1 tree /10 spaces = 4pts; ≤ 1/15 = 2 pts; >1/15 = 1pt)	1 tree/15 spaces	2	Also, "[No parking space shall be] located farther than 90 feet from the trunk of a shade tree."
Are planting areas required to be curbed? (no = 3 pts)	No	3	"All planting areas shall be protected from vehicular intrusion by the installation of curbing, wheel stops."
Bioretention or other stormwater practices required/ encouraged? (yes = 3 pts)	No	0	This issue is not specifically addressed in the ordinance. However, "curbs [and/or? the text does not make it clear] wheel stops" are required. If curbs are used, this would likely preclude bioretention.
<b>Sidewalks and Planting Strips (LDR Sec. 9.4)</b>			
Are sidewalk requirements context sensitive? (yes = 1 pt)	Yes	1	Sidewalks only required in residential areas within 1.5 miles of a school within zoned areas of County or as determined by Planning Commission based on various factors. "If it is determined that a sidewalk is necessary for the safety of the students, the subdivision developer shall construct a concrete sidewalk on one side of all residential streets in the proposed development."
Planting strip required between sidewalk and curb? (≥ 6 ft = 4 pts; < 6 ft = 2pts; <4 ft = 1pt)	Req'd: 2 ft	1	"Sidewalks shall have a 2' minimum grass strip."
Are street trees required in the planting strip? (yes = 3 pts)	No	0	
Can alternate pedestrian networks be substituted for sidewalks? (yes = 1 pt)	No	0	Not specified
<b>Driveways</b>			
Pervious paving material for residential driveways (required = 3 pts; allowed = 1 pt)	-	0	Not specifically mentioned, but not prohibited either. Should be encouraged with incentives.
Residential front setbacks (minimum) (< 20 = 4 pts; =20 = 2pts)	30/40 ft	0	(ZO Table 7.3) Consider reducing this setback to 20 ft for residential and collector street to promote shorter driveways. If done in conjunction with reducing building setbacks for primary facades to 10-15 feet, this would ensure that garages would remain behind primary residential facades.
<b>TOTAL POINTS (100 possible points)</b>		<b>61</b>	

## City of Fountain Inn

(currently uses G'ville County LDR's; revised LDR's were proposed for adoption in Jan. '06, but no changes to the standards below were considered)

Development Feature/Standard	Measure or Yes/No	Points	Comments
<b>Street Width (LDR Sec. 8.1)</b>			
Minimum pavement width in low-density residential development ( $\leq 22 = 2pts$ ; $\leq 20 = 4pts$ )	20-22 ft	4	Good minimum pavement widths; generally narrow. Minimum width could be as low as 16-18 feet. Minimum dimensions for private roads (LDR Sec. 8.1.C): 20 ft min. paved or unpaved surface.
Cul-de-sac street minimum pavement width ( $\leq 22 = 2pts$ )	"	2	Not specified
Manufactured Home Park street minimum pavement width ( $\leq 22 = 2pts$ )	20-28 ft	2	Manufactured Home Park streets require 28 feet for one side parking (LDR Sec. 9.4-2), which is too wide. Streets as narrow as 18 feet (pavement only) can accommodate one side parking.
Alley minimum pavement width (residential/commercial) ( $\leq 15 = 3pts$ ; $\leq 20 = 1pt$ )	12/18 ft	3	18 ft. minimum for two-way alleys; 12 ft for one-way.
Residential alleys permitted? ( <i>yes = 2pts</i> )	Yes	2	However, must be approved on a case-by-case basis.
Collector street minimum pavement width ( $\leq 24 = 3pts$ )	24-26 ft	3	Good narrow dimensions, however, does not allow for on-street parking or bike lanes. Wider dimension could be narrowed to 24 ft if on-street parking or bike lanes are not provided for.
Curb radii for residential streets ( $\leq 20 = 1pt$ ; $\leq 15 = 3pts$ )	25-40 ft	0	Could be as low as 15-20 feet for low volume residential and collector streets. Allows narrower intersections and is better for pedestrian crossing and lowering vehicle turning speeds.
<b>Right-of-Way Width</b>			
Minimum ROW width for residential street? ( $\leq 45 = 3pts$ ; $\leq 50 = 1pt$ )	50 ft	1	Min. 40-50 ft utility easement for private roads (LDR Sec. 8.1.C)
Utilities allowed under paved section of street? ( <i>yes = 2pts</i> )	-	0	Utilities provided for in utility easement on private roads (see above)
<b>Cul-de-Sacs (LDR Sec. 8.1.B.9)</b>			
Minimum radius allowed for cul-de-sacs? ( $\leq 35 = 3pts$ )	40 ft	0	
Can landscaped island be created within cul-de-sac? ( <i>yes = 3pts</i> )	Yes	3	Islands not allowed with oval cul-de-sacs.
Are alternative turnarounds such as "hammerheads" allowed? ( <i>yes = 3pts</i> )	Yes	3	Hammerhead, "Y" and "T" turnarounds proposed in draft LDR's
<b>Vegetated Open Channels/Swales</b>			
Are open channels/swales allowed for some residential streets? ( <i>yes = 3pts</i> )	Yes	3	For "Rural," "Rural Transitional," and "Rural Mountainous" street types, swales are permitted as part of the typical cross-sections.
Design criteria for swales (dry swales, biofilters, or grass)? ( <i>yes = 1pts</i> )	Yes	1	LDR Sec. 11.3.F, Open Channel Design
<b>Parking Ratios (ZO Sec. 7:9.6)</b>			
Minimum parking ratio for professional office building (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $\leq 5 = 1pt$ )	5	0	
Minimum parking ratio for shopping centers (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $\leq 5 = 1pt$ )	5.5	0	
Minimum parking ratio for multifamily dwellings (per unit)? ( $\leq 2 = 3pts$ )	2	0	
Are parking requirements set as maximums? ( <i>yes = 4pts</i> )	No	0	
Are parking requirements reduced/waived in CBD? ( <i>yes = 3pts</i> )	No	0	

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<b>Shared Parking (ZO Sec. 7:9.2)</b>			
Is shared parking allowed? (yes = 3 pts)	Yes	3	"... 1/2 of the parking space required for churches, theatres, or other uses whose peak attendance will be at night or on Sundays may be assigned to a use which will not be closed at night or on Sundays."
What percentage of parking may be shared? (100% = 3 pts; ≤ 100% = 1 pt)	50%	1	
<b>Parking Lot Design (ZO Sec. 7:9.5)</b>			
What is the minimum stall width for a standard parking space? (<9 = 1 pt)	9 ft	1	
Minimum width for 2 rows of parking and drive aisle? (<60 = 3 pts)	-	0	Not specified.
Smaller dimensions allowed for compact cars? What % of spaces? (yes = 1 pts)	No	0	
Are pervious materials allowed/required for parking areas? (req'd: 3 pts; allowed: 1 pt)	-	0	Not specified
<b>Parking Lot Landscaping</b>			
Parking lot landscaping required? (yes = 3 pts)	No	0	There are no landscaping standards for parking lots in the Zoning Ordinance.
Applicability of above (new lot and/or expanded lots) (all= 4pts; ≤ 15 spaces = 2 pts; >15 spaces = 1pt)	-	0	
Required planting areas (≤1 tree /10 spaces = 4pts; ≤ 1/15 = 2 pts; >1/15 = 1pt)	-	0	
Are planting areas required to be curbed? (no = 3 pts)	-	0	
Bioretention or other stormwater practices required/ encouraged? (yes = 3 pts)	No	0	This issue is not specifically addressed in the ordinance.
<b>Sidewalks and Planting Strips (LDR Sec. 9.4)</b>			
Are sidewalk requirements context sensitive? (yes = 1 pt)	Yes	1	Sidewalks only required in residential areas within 1.5 miles of a school within zoned areas of County or as determined by Planning Commission based on various factors. "If it is determined that a sidewalk is necessary for the safety of the students, the subdivision developer shall construct a concrete sidewalk on one side of all residential streets in the proposed development."
Planting strips required between sidewalk and curb? (≥ 6 ft = 4 pts; < 6 ft = 2pts; <4 ft = 1pt)	Req'd; 2 ft	1	"Sidewalks shall have a 2' minimum grass strip."
Are street trees required in the planting strip? (yes = 3 pts)	No	0	
Can alternate pedestrian networks be substituted for sidewalks? (yes = 1 pt)	No	0	Not specified
<b>Driveways</b>			
Pervious paving material for residential driveways (required = 3 pts; allowed = 1 pt)	-	0	Not specifically mentioned, but not prohibited either. Should be encouraged with incentives.
Residential front setbacks (minimum) (< 20 = 4 pts; =20 = 2pts)	30/40 ft	0	Consider reducing this setback to 20 ft for residential and collector street to promote shorter driveways. If done in conjunction with reducing building setbacks for primary facades to 10-15 feet, this would ensure that garages would remain behind primary residential facades.
<b>TOTAL POINTS (100 possible points)</b>		<b>34</b>	



## City of Greenville (Including proposed LUDO standards)

Development Feature/Standard	Existing Standards		Proposed LUDO Standards		Comments
	Measure or Yes/No	Points	Measure or Yes/No	Points	
<b>Street Width (LDR Sec. 19-52)</b>					
Minimum pavement width in low-density residential development ( $\leq 22 = 2pts$ ; $\leq 20 = 4pts$ )	20-22 ft	4	-	4	Minimum width could be as low as 16-18 feet. Streets as narrow as 18 feet (pavement only or 20-22 ft with curb and gutter) can accommodate one side parking.
Cul-de-sac street minimum pavement width ( $\leq 22 = 2pts$ )	28 ft	0	-	0	Could be narrowed to the dimensions of other residential streets or less. (20 ft private cul-de-sac streets are allowed per Sec. 19-55(f), although on-street parking is prohibited.)
Manufactured Home Park street minimum pavement width ( $\leq 22 = 2pts$ )	-	0	-	0	
Alley minimum pavement width (residential/commercial) ( $\leq 15 = 3pts$ ; $\leq 20 = 1pt$ )	20 ft	1	-	1	Could be as low as 10-12 feet of pavement for residential alleys
Residential alleys permitted? (yes = 2pts)	-	0	-	0	
Collector street minimum pavement width ( $\leq 24 = 3pts$ )	32-34 ft	0	-	0	Could be as low as 30 feet of pavement or 34 feet face-of-curb to face-of-curb with on street parking or even less when on-street parking is not expected.
Curb radii for residential streets ( $\leq 20 = 1pt$ ; $\leq 15 = 3pts$ )	30 ft	0	-	0	Could be as low as 15-20 feet for low volume residential and collector streets
<b>Right-of-Way Width (LDR Sec. 19-52)</b>					
Minimum ROW width for residential street? ( $\leq 45 = 3pts$ ; $\leq 50 = 1pt$ )	50 ft	1	-	1	Low density residential streets are allowed a 40 ft ROW with 10 ft of utility easement, which effectively yields a 50 ft ROW.
Utilities allowed under paved section of street? (yes = 2pts)	Yes	1	-	1	See LDR Sec. 19-100.
<b>Cul-de-Sacs (LDR Sec. 19-52)</b>					
Minimum radius allowed for cul-de-sacs? ( $\leq 35 = 3pts$ )	41 ft	0	->	0	
Can landscaped island be created within cul-de-sac? (yes = 3pts)	ns	0	->	0	Issue not specifically addressed.
Are alternative turnarounds such as "hammerheads" allowed? (yes = 3pts)	ns	0	->	0	Issue not specifically addressed.
<b>Vegetated Open Channels/Swales</b>					
Are open channels/swales allowed for some residential streets? (yes = 3pts)	No	0	->	0	See LDR Sec. 19-63(e): "Curb and gutter shall be installed on all streets, except where otherwise noted."
Design criteria for swales (dry swales, biofilters, or grass)? (yes = 1pts)	Yes	1	->	1	See LDR Sec. 19-67(c), 19-264 and 19-233; does not provide guidance as to where such are appropriate, but does imply that "drainage ditches" and "dry detention systems and swales" are an acceptable form of storm drainage infrastructure.
<b>Parking Ratios (ZO Sec. 50-198)</b>					
Minimum parking ratio for professional office building (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $\leq 5 = 1pt$ )	3.3-5	2	2	4	Draft LUDO also includes maximums (See LUDO Sec. 19-6.1)
Minimum parking ratio for shopping centers (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $\leq 5 = 1pt$ )	3.3	2	2	4	(See LUDO Sec. 19-6.1)
Minimum parking ratio for multifamily dwellings (per unit)? ( $\leq 2 = 3pts$ )	2	0	1.5	3	(See LUDO Sec. 19-6.1)
Are parking requirements set as maximums? (yes = 4pts)	No	0	min. & max.	4	Corridor Plan Overlay District: Number of parking spaces shall not exceed 125% of required (ZO Sec. 50-169(d)(3)).
Are parking requirements reduced/waived in CBD? (yes = 3pts)	Yes	3	Yes	3	(ZO Sec. 50-198(a): "Permanent off-street parking is required in all districts except the C-4 central business district zone." On street parking should be allowed to count towards minimums in all cases. This is specifically prohibited in ZO Sec. 50-198(f)(2), "Streets or Alleys. . .not to be used to meet requirements."

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<b>Parking Codes (ZO Sec. 50-198)</b>					
Is shared parking allowed? (yes = 3 pts)	Yes	3	Yes	3	The existing ZO is vague on this point: "Two or more uses may join together to obtain the required parking spaces." The draft LUDO has excellent standards for shared parking in Sec. 19-6.1.9
What percentage of parking may be shared? (100% = 3 pts; ≤ 100% = 1 pt)	100%	3	100%	3	
<b>Parking Lot Design (ZO Sec. 50-198(f))</b>					
What is the minimum stall width for a standard parking space? (≤ 9 = 1 pt)	8.5 ft	1	9 ft	1	Stall widths up to 10' are allowed in existing ZO, but there are no standards for when widths greater than 8.5 ft should be used.
Minimum width for 2 rows of parking and drive aisle? (≤ 60 = 3 pts)	61 ft	0	60 ft	3	Existing ZO: Driveway (aisle) width for 90 degree parking aisles with 8.5 ft spaces could be narrowed to 24 ft (currently required to be 25 ft).
Smaller dimensions allowed for compact cars? What % of spaces? (yes = 1 pts)	No	0	No	0	
Are pervious materials allowed/required for parking areas? (req'd: 3 pts; allowed: 1 pt)	Allowed	1	Required for > 100 % of min.	3	Requirement could be interpreted to allow pervious materials, but is not definitive on that point: "... paved with a suitable, all-weather, dust-preventative surface." (ZO Sec. 50-198(f)(1)). ZO amendment for Non-residential Design Standards includes provision that parking over 125% of minimum shall be constructed of pervious paving materials. Proposed LUDO requires pervious paving for all parking over the minimum (LUDO Sec. 19-6.1.6) and provides for waiving of paving requirement for up to 50% of parking areas for assembly uses.
<b>Parking Lot Landscaping (ZO Sec. 50-275)</b>					
Parking lot landscaping required? (yes = 3 pts)	Yes	3	Yes	3	
Applicability of above (new lot and/or expanded lots) (all= 4pts; ≤ 15 spaces = 2 pts; >15 spaces = 1pt)	New; > 25 spaces	1	> 5 spaces (new); > 10% (expanded)	2	In draft LUDO also applies to all reconstructed lots, including reconstruction of stormwater drainage (see Sec. 19-6.2).
Required planting areas (≤ 1 tree /10 spaces = 4pts; ≤ 1/15 = 2 pts; >1/15 = 1pt)	1 island/20 spaces	1	1 island/15 spaces	2	(see Sec. 19-6.2 in draft LUDO)
Are planting areas required to be curbed? (no = 3 pts)	No	3	No	3	"curbs, wheel stops, extra width in the buffer area, or other methods" are required.
Bioretention or other stormwater practices required/ encouraged? (yes = 3 pts)	No	0	No	0	This issue is not specifically addressed in the existing ZO or proposed LUDO. However, "curbs, wheel stops, extra width in the buffer area, or other methods" are required. If curbs are used, this would likely preclude bioretention. Incentives for using wheel stops only should be considered to allow sheet flow into planting areas.
<b>Sidewalks and Planting Strips (LDR Sec. 19-64)</b>					
Are sidewalk requirements context sensitive? (yes = 1 pt)	Yes	1	->	1	Sidewalks required (on one side) where development density exceeds 2 du/a.
Planting strip required between sidewalk and curb? (≥ 6 ft = 4 pts; < 6 ft = 2pts; < 4 ft = 1pt)	No	0	->	0	
Are street trees required in the planting strip? (yes = 3 pts)	No	0	Optional	0	LUDO Sec. 19-6.2.2: Street trees are required, but may be planted outside of the right-of-way
Can alternate pedestrian networks be substituted for sidewalks? (yes = 1 pt)	Yes	1	->	1	
<b>Driveways</b>					
Pervious paving material for residential driveways (required = 3 pts; allowed = 1 pt)	-	0	->	0	Not specifically mentioned, but not prohibited either. Should be encouraged with incentives.
Residential front setbacks (minimum) (< 20 = 4 pts; =20 = 2pts)	25 ft	0	->	0	Consider reducing this setback to 20 ft for residential and collector street to promote shorter driveways. If done in conjunction with reducing building setbacks for primary facades to 10-15 feet, this would ensure that garages would remain behind primary residential facades.
<b>TOTAL POINTS (100 possible points)</b>		<b>33</b>		<b>51</b>	

## City of Greer

Development Feature/Standard	Measure or Yes/No	Points	Comments
<b>Street Width (LDR Sec. 8.1)</b>			
Minimum pavement width in low-density residential development ( $\leq 22 = 2pts$ ; $\leq 20 = 4pts$ )	20-22 ft	4	
Cul-de-sac street minimum pavement width ( $\leq 22 = 2pts$ )	"	2	
Manufactured Home Park street minimum pavement width ( $\leq 22 = 2pts$ )	-	0	
Alley minimum pavement width (residential/commercial) ( $\leq 15 = 3pts$ ; $\leq 20 = 1pt$ )	-	0	
Residential alleys permitted? ( $yes = 2pts$ )	-	0	
Collector street minimum pavement width ( $\leq 24 = 3pts$ )	24 ft	3	Good narrow dimension.
Curb radii for residential streets ( $\leq 20 = 1pt$ ; $\leq 15 = 3pts$ )	30 ft	0	Could be as low as 15-20 feet for low volume residential and collector streets. Allows narrower intersections and is better for pedestrian crossing and lowering vehicle turning speeds.
<b>Right-of-Way Width</b>			
Minimum ROW width for residential street? ( $\leq 45 = 3pts$ ; $\leq 50 = 1pt$ )	40-42 ft	3	
Utilities allowed under paved section of street? ( $yes = 2pts$ )	-	0	
<b>Cul-de-Sacs (LDR Sec. 8.1.C.9)</b>			
Minimum radius allowed for cul-de-sacs? ( $\leq 35 = 3pts$ )	40 ft	0	
Can landscaped island be created within cul-de-sac? ( $yes = 3pts$ )	Yes	3	Islands not allowed with oval cul-de-sacs. Per Sec. 9.1.B.2. "all cul-de-sac islands shall be . . . under drained," which seems to preclude using the islands as bioretention islands.
Are alternative turnarounds such as "hammerheads" allowed? ( $yes = 3pts$ )	No	0	
<b>Vegetated Open Channels/Swales</b>			
Are open channels/swales allowed for some residential streets? ( $yes = 3pts$ )	Yes	3	Curbs are required for streets in the urban area only and are optional for industrial/commercial street types.
Design criteria for swales (dry swales, biofilters, or grass)? ( $yes = 1pts$ )	Yes	1	See LDR Sec. 10.1
<b>Parking Ratios (ZO Sec. 6:9.6)</b>			
Minimum parking ratio for professional office building (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $\leq 5 = 1pt$ )	6	0	
Minimum parking ratio for shopping centers (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $\leq 5 = 1pt$ )	4-6	1	Dependant on size of center; 6/1000 sf for centers less than 20K sf; 4/1000 sf for centers greater than 500K sf.
Minimum parking ratio for multifamily dwellings (per unit)? ( $\leq 2 = 3pts$ )	2	0	
Are parking requirements set as maximums? ( $yes = 4pts$ )	No	0	On street parking should be allowed to count towards minimums in all cases.
Are parking requirements reduced/waived in CBD? ( $yes = 3pts$ )	Yes	3	Residential parking may be reduced to 1 space per dwelling unit. Otherwise, other parking requirements apply. (see ZO 5:7.5-3)
<b>Shared Parking (ZO Sec. 12:2.2)</b>			
Is shared parking allowed? ( $yes = 3pts$ )	Yes	3	". . . 1/2 of the parking space required for churches, theatres, or other uses whose peak attendance will be at night or on Sundays may be assigned to a use which will not be closed at night or on Sundays."
What percentage of parking may be shared? ( $100% = 3pts$ ; $\leq 100% = 1pt$ )	50%	1	

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<b>Parking Lot Design (ZO Sec. 6:9.5)</b>			
What is the minimum stall width for a standard parking space? ( $\leq 9 = 1 pt$ )	9 ft	1	
Minimum width for 2 rows of parking and drive aisle? ( $\leq 60 = 3 pts$ )	60 ft	3	"The depth of [a parking] stall may be reduced to 18' where a grassed or landscaped median, with a minimum 2' width per row of parking stalls, has been provided for automobile overhang."
Smaller dimensions allowed for compact cars? What % of spaces? (yes = 1 pts)	No	0	
Are pervious materials allowed/required for parking areas? (req'd: 3 pts; allowed: 1 pt)	$\leq 25\%$ allowed; req'd $> 110\%$ of min.	3	ZO Sec. 6:9.10: For office and commercial buildings over 60,000 square feet "Up to 25% of the required parking areas may be constructed using grass over supporting plastic or concrete grids. . . Parking provided in excess of 110% of the minimum requirements. . . shall be constructed using grass over supporting plastic or concrete grids."
<b>Parking Lot Landscaping (ZO Sec. 6:9.11)</b>			
Parking lot landscaping required? (yes = 3 pts)	Yes	3	
Applicability of above (new lot and/or expanded lots) (all= 4pts; $\leq 15$ spaces = 2 pts; $> 15$ spaces = 1pt)	New lots $\geq 60$ spaces; all expanded lots	1	This threshold for new lots should be lower (perhaps 25 spaces or less). Minimum parking ratios may be reduced by up to 25% for existing parking lots that are required to provide landscaping. In the GIBC (Gateway International Business Center) Zoning District, "not more than two adjacent parking bays may be constructed without separation by a bay median [landscaped area of at least 8 feet in width]." There are also rigorous planting requirements for parking areas in this district. Good model for other areas.
Required planting areas ( $\leq 1$ tree / 10 spaces = 4pts; $\leq 1/15 = 2$ pts; $> 1/15 = 1$ pt)	No space $> 90'$ from tree	4	
Are planting areas required to be curbed? (no = 3 pts)	No	3	Curbs or wheel stops are allowed.
Bioretention or other stormwater practices required/ encouraged? (yes = 3 pts)	No	0	This issue is not specifically addressed in the ordinance. However, curbs or wheel stops are required. If curbs are used, this would likely preclude bioretention. If wheel stops are used, this could facilitate bioretention
<b>Sidewalks and Planting Strips (LDR Sec. 11.3)</b>			
Are sidewalk requirements context sensitive? (yes = 1 pt)	Yes	1	"... Sidewalks on one side of the street are required on all residential streets. . ." except where density is 2 du/a or less; or, "where alternative pedestrian systems are provided."
Planting strip required between sidewalk and curb? ( $\geq 6$ ft = 4 pts; $< 6$ ft = 2pts; $< 4$ ft = 1pt)	No	0	
Are street trees required in the planting strip? (yes = 3 pts)	No	0	
Can alternate pedestrian networks be substituted for sidewalks? (yes = 1 pt)	Yes	1	See above.
<b>Driveways</b>			
Pervious paving material for residential driveways (required = 3 pts; allowed = 1 pt)	-	0	Not specifically mentioned, but not prohibited either. Should be encouraged with incentives.
Residential front setbacks (minimum) ( $< 20 = 4$ pts; $= 20 = 2$ pts)	20/30 ft	2	(ZO 5:3.5) Consider reducing this setback to 20 ft for collector streets to promote shorter driveways. If done in conjunction with reducing building setbacks for primary facades to 10-15 feet, this would ensure that garages would remain behind primary residential facades.
<b>TOTAL POINTS (100 possible points)</b>		<b>49</b>	



## City of Mauldin

Development Feature/Standard	Measure or Yes/No	Points	Comments
<b>Street Width (LDR Sec. 8.1)</b>			
Minimum pavement width in low-density residential development ( $\leq 22 = 2pts$ ; $\leq 20 = 4pts$ )	20-22 ft	4	Minimum width could be as low as 16-18 feet. ZO Sec. 6:13.1: "All roads or drives within [single family attached or multifamily] development shall be no less than 24 feet in width. . ." These roads can be as narrow as 18-22 ft if no on-street parking is expected or allowed.
Cul-de-sac street minimum pavement width ( $\leq 22 = 2pts$ )	"	2	
Manufactured Home Park street minimum pavement width ( $\leq 22 = 2pts$ )	20 ft	2	
Alley minimum pavement width (residential/commercial) ( $\leq 15 = 3pts$ ; $\leq 20 = 1pt$ )	-	0	
Residential alleys permitted? ( <i>yes = 2 pts</i> )	No	0	LDR Sec. 11.1.F: "Except in unusual circumstances, no alleys shall be permitted." The Planning Commission may allow a service access for trucks, etc. "in areas of non-residential uses." Alleys should be allowed as they may result in less cumulative pervious surface than driveways. Can also result in narrower lot widths, which can reduce the length of blocks and therefore streets.
Collector street minimum pavement width ( $\leq 24 = 3pts$ )	24 ft	3	
Curb radii for residential streets ( $\leq 20 = 1pt$ ; $\leq 15 = 3pts$ )	-	0	
<b>Right-of-Way Width</b>			
Minimum ROW width for residential street? ( $\leq 45 = 3pts$ ; $\leq 50 = 1pt$ )	40-42 ft	3	50 ft for rural and transitional roadways without curb and gutter.
Utilities allowed under paved section of street? ( <i>yes = 2 pts</i> )	-	0	
<b>Cul-de-Sacs (LDR Sec. 8.1.B.9)</b>			
Minimum radius allowed for cul-de-sacs? ( $\leq 35 = 3pts$ )	40 ft	0	
Can landscaped island be created within cul-de-sac? ( <i>yes = 3 pts</i> )	Yes	3	Islands not allowed with oval cul-de-sacs.
Are alternative turnarounds such as "hammerheads" allowed? ( <i>yes = 3 pts</i> )	Yes	3	
<b>Vegetated Open Channels/Swales</b>			
Are open channels/swales allowed for some residential streets? ( <i>yes = 3 pts</i> )	Yes	3	Allowed for rural streets only
Design criteria for swales (dry swales, biofilters, or grass)? ( <i>yes = 1 pts</i> )	Yes	1	LDR Sec. 10.1.L, Storm Drainage – Open Channel
<b>Parking Ratios (ZO Sec. 6:9.6)</b>			
Minimum parking ratio for professional office building (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $\leq 5 = 1pt$ )	5	0	
Minimum parking ratio for shopping centers (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $\leq 5 = 1pt$ )	5	0	
Minimum parking ratio for multifamily dwellings (per unit)? ( $\leq 2 = 3pts$ )	2	0	
Are parking requirements set as maximums? ( <i>yes = 4 pts</i> )	No	0	On street parking should be allowed to count towards minimums in all cases.
Are parking requirements reduced/waived in CBD? ( <i>yes = 3 pts</i> )	No	0	
<b>Shared Parking (ZO Sec. 6:9)</b>			
Is shared parking allowed? ( <i>yes = 3 pts</i> )	Yes	3	". . . 1/2 of the parking space required for churches, theatres, or other uses whose peak attendance will be at night or on Sundays may be assigned to a use which will not be closed at night or on Sundays."

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What percentage of parking may be shared? (100% = 3 pts; ≤ 100% = 1 pt)	50%	1	
<b>Parking Lot Design (ZO Sec. 6:9.5)</b>			
What is the minimum stall width for a standard parking space? (<9 = 1 pt)	9 ft	1	
Minimum width for 2 rows of parking and drive aisle? (≤60 = 3 pts)	64 ft	0	60 feet is a perfectly adequate dimension for two rows of parking and drive aisle.
Smaller dimensions allowed for compact cars? What % of spaces? (yes = 1 pts)	No	0	
Are pervious materials allowed/required for parking areas? (req'd:3 pts; allowed: 1pt)	ns	0	Not specified, however the use of impervious surfaces for parking areas is not specifically required.
<b>Parking Lot Landscaping (ZO Sec. 6:17.4)</b>			
Parking lot landscaping required? (yes = 3 pts)	Yes	3	Trees are required, however no minimum area for tree islands is required.
Applicability of above (new lot and/or expanded lots) (all= 4pts; ≤ 15 spaces = 2 pts; >15 spaces = 1pt)	All new lots	4	
Required planting areas (≤1 tree/10 spaces = 4pts; ≤ 1/15 = 2 pts; >1/15 = 1pt)	1 tree/10 spaces	4	
Are planting areas required to be curbed? (no = 3 pts)	No	3	"curbs, curb stops, bollards, retaining walls, or other approved means" are required around trees
Bioretention or other stormwater practices required/ encouraged? (yes = 3 pts)	No	0	This issue is not specifically addressed in the existing ZO or proposed LUDO. However, "curbs, curb stops, bollards, retaining walls, or other approved means" are required around trees. If curbs are used, this would likely preclude bioretention. Incentives for using wheel stops or bollards only should be considered to allow sheet flow into planting areas.
<b>Sidewalks and Planting Strips (LDR Sec. 11.3)</b>			
Are sidewalk requirements context sensitive? (yes = 1 pt)	Yes	1	Sidewalks only required in residential areas within 1miles of a school as determined by Planning Commission and the Greenville County School district. Where required, sidewalks only required on one side of residential collector and sub-collector streets.
Planting strip required between sidewalk and curb? (≥ 6 ft = 4 pts; < 6 ft = 2pts; <4 ft = 1pt)	No	0	
Are street trees required in the planting strip? (yes = 3 pts)	No	0	
Can alternate pedestrian networks be substituted for sidewalks? (yes = 1 pt)	No	0	
<b>Driveways</b>			
Pervious paving material for residential driveways (required = 3 pts; allowed = 1 pt)	Allowed	1	LDR Sec. 10.4.A: Pervious pavement only required for driveways between the street and the right-of-way line.
Residential front setbacks (minimum) (< 20 = 4 pts; =20 = 2pts)	20/40 ft	2	Consider reducing this setback to 20 ft for residential collector streets also to promote shorter driveways. If done in conjunction with reducing building setbacks for primary facades to 10-15 feet, this would ensure that garages would remain behind primary residential facades.
<b>TOTAL POINTS (100 possible points)</b>		<b>47</b>	

## City of Simpsonville

Development Feature/Standard	Measure or Yes/No	Points	Comments
<b>Street Width (LDR Sec. 8.1)</b>			
Minimum pavement width in low-density residential development ( $\leq 22 = 2 pts$ ; $\leq 20 = 4 pts$ )	20-22 ft	4	Good minimum pavement widths; generally narrow. Minimum width could be as low as 16-18 feet. Minimum dimensions for private roads (LDR Sec. 8.1.C): 20 ft min. paved or unpaved surface.
Cul-de-sac street minimum pavement width ( $\leq 22 = 2 pts$ )	"	2	Not specified; same as local streets
Manufactured Home Park street minimum pavement width ( $\leq 22 = 2 pts$ )	-	0	Not specified
Alley minimum pavement width (residential/commercial) ( $\leq 15 = 3 pts$ ; $\leq 20 = 1 pt$ )	-	0	Not specified
Residential alleys permitted? ( $yes = 2 pts$ )	No	0	Not specified
Collector street minimum pavement width ( $\leq 24 = 3 pts$ )	24ft	3	Good narrow dimensions, however, does not provide for on-street parking. Could be as narrow as 20 ft face of curb to face of curb if no parking is allowed.
Curb radii for residential streets ( $\leq 20 = 1 pt$ ; $\leq 15 = 3 pts$ )	30 ft	0	Could be as low as 15-20 feet for low volume residential and collector streets. Allows narrower intersections and is better for pedestrian crossing and lowering vehicle turning speeds.
<b>Right-of-Way Width</b>			
Minimum ROW width for residential street? ( $\leq 45 = 3 pts$ ; $\leq 50 = 1 pt$ )	40-42 ft	3	
Utilities allowed under paved section of street? ( $yes = 2 pts$ )	-	0	
<b>Cul-de-Sacs (LDR Sec. 8.1.B.9)</b>			
Minimum radius allowed for cul-de-sacs? ( $\leq 35 = 3 pts$ )	40 ft	0	
Can landscaped island be created within cul-de-sac? ( $yes = 3 pts$ )	Yes	3	Pavement width around the islands is required to be 25 feet, which can effectively be as narrow as 20 feet. Islands not allowed with oval cul-de-sacs.
Are alternative turnarounds such as "hammerheads" allowed? ( $yes = 3 pts$ )	No	0	
<b>Vegetated Open Channels/Swales</b>			
Are open channels/swales allowed for some residential streets? ( $yes = 3 pts$ )	Yes	3	(See LDR Exhibit M; Open swales allowed for Rural streets and Industrial/Commercial streets.)
Design criteria for swales (dry swales, biofilters, or grass)? ( $yes = 1 pt$ )	Yes	1	LDR Sec. 10.1.L, Storm Drainage – Open Channel
<b>Parking Ratios (ZO Sec. 10:7.4)</b>			
Minimum parking ratio for professional office building (per 1000 sf) ( $\leq 3 = 4 pts$ ; $\leq 4 = 2 pts$ ; $\leq 5 = 1 pt$ )	5	0	
Minimum parking ratio for shopping centers (per 1000 sf) ( $\leq 3 = 4 pts$ ; $\leq 4 = 2 pts$ ; $\leq 5 = 1 pt$ )	5.5	0	
Minimum parking ratio for multifamily dwellings (per unit)? ( $\leq 2 = 3 pts$ )	2	0	
Are parking requirements set as maximums? ( $yes = 4 pts$ )	No	0	On street parking should be allowed to count towards minimums in all cases.
Are parking requirements reduced/waived in CBD? ( $yes = 3 pts$ )	Yes	3	"Off-street automobile storage and parking shall be provided on every lot. . . except in the C-1, Central Business District."
<b>Shared Parking (ZO Sec. 10:7)</b>			
Is shared parking allowed? ( $yes = 3 pts$ )	Yes	3	ZO Sec. 10:7.6: ". . . 1/2 of the parking space required for churches, theatres, or other uses whose peak attendance will be at night or on Sundays may be assigned to a use which will not be closed at night or on Sundays." Also, ZO Sec. 10:7.17 allows for additional uses to share up to 50% of the required parking.
What percentage of parking may be	50%	1	

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shared? (100% = 3 pts; < 100% = 1 pt)			
<b>Parking Lot Design (ZO Sec. 10:7)</b>			
What is the minimum stall width for a standard parking space? ( $\leq 9 = 1 pt$ )	9 ft	1	
Minimum width for 2 rows of parking and drive aisle? ( $\leq 60 = 3 pts$ )	60 ft	3	
Smaller dimensions allowed for compact cars? What % of spaces? (yes = 1 pts)	Yes; 20%	1	Up to 20% of spaces may be for compact cars
Are pervious materials allowed/required for parking areas? (req'd: 3 pts; allowed: 1 pt)	100% allowed	1	ZO Sec. 10:7.13: "All parking lots shall be surfaced with asphalt, concrete or porous paver blocks. . ."
<b>Parking Lot Landscaping (ZO Sec. 10:4.9)</b>			
Parking lot landscaping required? (yes = 3 pts)	Yes	3	
Applicability of above (new lot and/or expanded lots) (all= 4pts; $\leq 15 spaces = 2 pts$ ; $>15 spaces = 1pt$ )	$\geq 15 spaces$ (new); $> 50%$ (expanded)	1	
Required planting areas ( $\leq 1 tree /10 spaces = 4pts$ ; $\leq 1/15 = 2 pts$ ; $>1/15 = 1pt$ )	5% of vehicular area	1	Not required when building screens parking area from adjacent streets and residential uses.
Are planting areas required to be curbed? (no = 3 pts)	No	3	"curbing or wheel stops, or providing extra width in the interior planting area" are required around planting areas to prevent vehicular intrusion.
Bioretention or other stormwater practices required/ encouraged? (yes = 3 pts)	No	0	This issue is not specifically addressed in the ZO. However, "curbing or wheel stops, or providing extra width in the interior planting area" are required around planting areas to prevent vehicular intrusion. If curbs are used, this would likely preclude bioretention. Incentives for using wheel stops and/or extra width in planting areas should be considered to allow sheet flow into planting areas.
<b>Sidewalks and Planting Strips (ZO 10:9.3; LDR 11.3)</b>			
Are sidewalk requirements context sensitive? (yes = 1 pt)	Yes	1	Residential collector streets only. "Additional walkway locations [other than collector streets] may be required on one (1) side only, five feet in width." Also, "Pedestrian walkways in residential districts may be counted toward the open space requirements of that district." LDR 11.3: "Planning Commission. . .shall determine the need for providing sidewalks in residential areas within 1 mile of a school. . .If it is determined that a sidewalk is necessary. . .the subdivision developer shall construct a concrete sidewalk on one side of all residential collector and residential subcollector streets within the proposed development."
Planting strip required between sidewalk and curb? ( $\geq 6 ft = 4 pts$ ; $< 6 ft = 2pts$ ; $<4 ft = 1pt$ )	No	0	
Are street trees required in the planting strip? (yes = 3 pts)	No	0	
Can alternate pedestrian networks be substituted for sidewalks? (yes = 1 pt)	No	0	
<b>Driveways</b>			
Pervious paving material for residential driveways (required = 3 pts; allowed = 1 pt)	-	0	Not specifically mentioned, but not prohibited either. Should be encouraged with incentives.
Residential front setbacks (minimum) ( $< 20 = 4 pts$ ; $=20 = 2pts$ )	15-30 ft	4	(ZO Sec. 10.3) Consider reducing this setback to 20 ft or less for all residential streets to promote shorter driveways. If done in conjunction with reducing building setbacks for primary facades to 10-15 feet, this would ensure that garages would remain behind primary residential facades.
<b>TOTAL POINTS (100 possible points)</b>		<b>45</b>	

**Additional Notes:** Maximum impervious surface standards for non-residential zoning districts. Ranges from 80-100%, with most districts having a max. of 90%.



## City of Travelers Rest (uses Greenville County Land Development Regulations)

Development Feature/Standard	Measure or Yes/No	Points	Comments
<b>Street Width (LDR Sec. 8.1)</b>			
Minimum pavement width in low-density residential development ( $\leq 22 = 2pts$ ; $\leq 20 = 4pts$ )	20-22 ft	4	Good minimum pavement widths; generally narrow. Minimum width could be as low as 16-18 feet. Minimum dimensions for private roads (LDR Sec. 8.1.C): 20 ft min. paved or unpaved surface.
Cul-de-sac street minimum pavement width ( $\leq 22 = 2pts$ )	"	2	Not specified
Manufactured Home Park street minimum pavement width ( $\leq 22 = 2pts$ )	20-28 ft	2	Manufactured Home Park streets require 28 feet for one side parking (LDR Sec. 9.4-2), which is too wide. Streets as narrow as 18 feet (pavement only) can accommodate one side parking.
Alley minimum pavement width (residential/commercial) ( $\leq 15 = 3pts$ ; $\leq 20 = 1pt$ )	12/18 ft	3	18 ft. minimum for two-way alleys; 12 ft for one-way.
Residential alleys permitted? ( <i>yes = 2 pts</i> )	Yes	2	However, must be approved on a case-by-case basis.
Collector street minimum pavement width ( $\leq 24 = 3pts$ )	24-26 ft	3	Good narrow dimensions, however, does not allow for on-street parking or bike lanes. Wider dimension could be narrowed to 24 ft if on-street parking or bike lanes are not provided for.
Curb radii for residential streets ( $\leq 20 = 1pt$ ; $\leq 15 = 3pts$ )	25-40 ft	0	Could be as low as 15-20 feet for low volume residential and collector streets. Allows narrower intersections and is better for pedestrian crossing and lowering vehicle turning speeds.
<b>Right-of-Way Width</b>			
Minimum ROW width for residential street? ( $\leq 45 = 3pts$ ; $\leq 50 = 1pt$ )	50 ft	1	Min. 40-50 ft utility easement for private roads (LDR Sec. 8.1.C)
Utilities allowed under paved section of street? ( <i>yes = 2 pts</i> )	-	0	
<b>Cul-de-Sacs (LDR Sec. 8.1.B.9)</b>			
Minimum radius allowed for cul-de-sacs? ( $\leq 35 = 3pts$ )	40 ft	0	
Can landscaped island be created within cul-de-sac? ( <i>yes = 3 pts</i> )	Yes	3	Islands not allowed with oval cul-de-sacs. 9.2.B Island Design Requirements: "all cul-de-sac islands shall be . . . under drained"
Are alternative turnarounds such as "hammerheads" allowed? ( <i>yes = 3 pts</i> )	Yes	3	Offset, oval, "T" turnarounds, and hammerheads allowed with approval of the County Engineer.
<b>Vegetated Open Channels/Swales</b>			
Are open channels/swales allowed for some residential streets? ( <i>yes = 3 pts</i> )	Yes	3	For "Rural," "Rural Transitional," and "Rural Mountainous" street types, swales are permitted as part of the typical cross-sections.
Design criteria for swales (dry swales, biofilters, or grass)? ( <i>yes = 1 pts</i> )	Yes	1	LDR Sec. 11.3.F, Open Channel Design
<b>Parking Ratios (ZO Sec. 6:9.6)</b>			
Minimum parking ratio for professional office building (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $\leq 5 = 1pt$ )	6	0	
Minimum parking ratio for shopping centers (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $\leq 5 = 1pt$ )	4-5	1	Depends on square footage. Centers less than 20,000 sf are req'd to provide 5 spaces/1000 sf
Minimum parking ratio for multifamily dwellings (per unit)? ( $\leq 2 = 3pts$ )	2	0	
Are parking requirements set as maximums? ( <i>yes = 4 pts</i> )	No	0	
Are parking requirements reduced/waived in CBD? ( <i>yes = 3 pts</i> )	No	0	On street parking should be allowed to count towards minimums in all cases.
Minimum parking ratio for professional office building (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $\leq 5 = 1pt$ )	6	0	

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<b>Parking Codes (ZO Sec. 6:6)</b>			
Is shared parking allowed? (yes = 3 pts)	Yes	3	ZO Sec. 6:9.2: "...One half of the parking space required for churches, theatres, or other uses whose peak attendance will be at night or on Sundays may be assigned to a use which will be closed at night or on Sundays."
What percentage of parking may be shared? (100% = 3 pts; ≤ 100% = 1 pt)	50%	1	
<b>Parking Lot Design (ZO Sec. 6:9.5)</b>			
What is the minimum stall width for a standard parking space? (<9 = 1 pt)	9 ft	1	
Minimum width for 2 rows of parking and drive aisle? (<60 = 3 pts)	64 ft	0	
Smaller dimensions allowed for compact cars? What % of spaces? (yes = 1 pts)	No	0	
Are pervious materials allowed/required for parking areas? (req'd:3 pts; allowed: 1pt)	100% allowed; req'd for > 110% of min.	3	ZO Sec. 6:9.7: "Up to 100% of the required parking areas for office and commercial buildings over 60,000 square feet may be constructed using grass over supporting plastic or concrete grids. . .For office and commercial buildings over 60,000 sf, parking provided in excess of 110% of the minimum requirements shall be constructed using grass over supporting plastic or concrete grids."
<b>Parking Lot Landscaping (ZO Sec. 6:9.8)</b>			
Parking lot landscaping required? (yes = 3 pts)	Yes	3	ZO Sec. 5:10.5 (Scenic Overlay District): "...In parking lots with more than 40 spaces that are not screened from the roadway, a continuous landscape strip shall be provided in alternating rows."
Applicability of above (new lot and/or expanded lots) (all= 4pts; ≤ 15 spaces = 2 pts; >15 spaces = 1pt)	60 + spaces	1	
Required planting areas (≤1 tree /10 spaces = 4pts; ≤ 1/15 = 2 pts; >1/15 = 1pt)	1 tree/15 spaces	2	
Are planting areas required to be curbed? (no = 3 pts)	No	3	
Bioretention or other stormwater practices required/ encouraged? (yes = 3 pts)	No	0	
<b>Sidewalks (LDR Sec. 9.4)</b>			
Are sidewalk requirements context sensitive? (yes = 1 pt)	Yes	1	Sidewalks only required in residential areas within 1.5 miles of a school within zoned areas of County or as determined by Planning Commission based on various factors. "If it is determined that a sidewalk is necessary for the safety of the students, the subdivision developer shall construct a concrete sidewalk on one side of all residential streets in the proposed development."
Planting strip required between sidewalk and curb? (≥ 6 ft = 4 pts; < 6 ft = 2pts; <4 ft = 1pt)	Req'd; 2 ft	1	"Sidewalks shall have a 2' minimum grass strip."
Are street trees required in the planting strip? (yes = 3 pts)	No	0	
Can alternate pedestrian networks be substituted for sidewalks? (yes = 1 pt)	No	0	Not specified
<b>Driveways</b>			
Pervious paving material for residential driveways (required = 3 pts; allowed = 1 pt)	-	0	Not specifically mentioned, but not prohibited either. Should be encouraged with incentives.
Residential front setbacks (minimum) (< 20 = 4 pts; =20 = 2pts)	20/30 ft	2	(ZO 5:2.6) Consider reducing this setback to 20 ft or less for all residential and collector streets to promote shorter driveways. If done in conjunction with reducing building setbacks for primary facades to 10-15 feet, this would ensure that garages would remain behind primary residential facades.
<b>TOTAL POINTS</b> (100 possible points)		<b>49</b>	

# **APPENDIX B**

## **Pickens County Audit of Pavement Standards**

**PICKENS COUNTY AUDIT OF PAVEMENT STANDARDS: SUMMARY**

Development Feature/Standard	PICKENS COUNTY		CENTRAL		CLEMSON		EASLEY		LIBERTY		PICKENS (CITY)	
	Measure	Points	Measure	Points	Measure	Points	Measure	Points	Measure	Points	Measure	Points
<b>Street Width</b> (17 points)												
Minimum pavement width in low-density residential development ( $\leq 22 = 2pts$ ; $\leq 20 = 4pts$ )	20-22 ft	4	20-22 ft	4	22-24 ft	2	24 ft	0	24 ft	0	20-22 ft	4
Cul-de-sac street minimum pavement width ( $\leq 22 = 2pts$ )	"	2	"	2	22 ft	2	"	0	"	0	"	2
Manufactured Home Park street minimum pavement width ( $\leq 22 = 2pts$ )	20 ft	2	20 ft	2	-	0	-	0	-	0	20 ft	2
Alley minimum pavement width (residential/commercial) ( $\leq 15 = 3pts$ ; $\leq 20 = 1pt$ )	-	0	-	0	16ft /30 ft	1	0/18 ft	1	0/18 ft	1	-	0
Residential alleys permitted? (yes = 2 pts)	-	0	-	0	Yes	2	No	0	No	0	-	0
Collector street minimum pavement width ( $\leq 24 = 3pts$ )	-	0	-	0	28 ft	0	28 or 40 ft	0	28 or 40 ft	0	-	0
Curb radii for residential streets ( $\leq 20 = 1pt$ ; $\leq 15 = 3pts$ )	-	0	-	0	-	0	-	0	-	0	-	0
<b>Right-of-Way Width</b> (5 points)												
Minimum ROW width for residential street? ( $\leq 45 = 3pts$ ; $\leq 50 = 1pt$ )	50 ft	1	50 ft	1	50 ft	1	50 ft	1	50 ft	1	50 ft	1
Utilities allowed under paved section of street? (yes = 2 pts)	Yes	2	Yes	2	Yes	2	Yes	2	Yes	2	Yes	2
<b>Cul-de-Sacs</b> (9 points)												
Minimum radius allowed for cul-de-sacs? ( $\leq 35 = 3pts$ )	40 ft	0	40 ft	0	35 ft	3	40 ft	0	40 ft	0	40 ft	0
Can landscaped island be created within cul-de-sac? (yes = 3 pts)	No	0	No	0	-	0	Yes	3	Yes	3	No	0
Are alternative turnarounds such as "hammerheads" allowed? (yes = 3 pts)	No	0	No	0	Yes	3	No	0	No	0	No	0
<b>Vegetated Open Channels/Swales</b> (4 points)												
Are open channels/swales allowed for some residential streets? (yes = 3 pts)	Yes	3	Yes	3	No	0	No	0	No	0	Yes	3
Design criteria for swales (dry swales, biofilters, or grass)? (yes = 1 pt)	Yes	1	Yes	1	n/a	0	Yes	1	Yes	1	Yes	1
<b>Parking Ratios</b> (18 points)												
Minimum parking ratio for professional office building (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $<5 = 1pt$ )	3.3	2	5	0	4	2	2.9	4	5	0	3.3	2
Minimum parking ratio for shopping centers (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $<5 = 1pt$ )	4	2	5	0	5	0	5	0	5	0	4	2
Minimum parking ratio for multifamily dwellings (per unit)? ( $<2 = 3pts$ )	1.5 or 2	3	1.75 spaces	3	1.25-2.25+	3	1.75	3	1.75	3	1.5 or 2	3
Are parking requirements set as maximums? (yes = 4 pts)	No	0	No	0	No	0	No	0	No	0	No	0
Are parking requirements reduced/waived in CBD? (yes = 3 pts)	No	0	Yes	3	Yes	3	Yes	3	Yes	3	No	0
<b>Shared Parking</b> (6 points)												
Is shared parking allowed? (yes = 3 pts)	Yes	3	Yes	3	No	0	Yes	3	Yes	3	Yes	3
What percentage of parking may be shared? (100% = 3 pts; $\leq 100\% = 1pt$ )	up to 50%	1	100%	3	0%	0	100%	3	100%	3	up to 50%	1
<b>Parking Lot Design</b> (8 points)												
What is the minimum stall width for a standard parking space? ( $\leq 9 = 1pt$ )	8.5-9 ft	1	9 ft	1	9 ft	1	9 ft	1	9 ft	1	8.5-9 ft	1
Minimum width for 2 rows of parking and drive aisle? ( $\leq 60 = 3pts$ )	60-64 ft	1	64 ft	0	60 ft	3	64 ft	0	64 ft	0	60-64 ft	1
Smaller dimensions allowed for compact cars? What % of spaces? (yes = 1 pts)	Yes; 30%	1	No	0	Yes; 25%	1	No	0	No	0	Yes; 30%	1
Are pervious materials allowed/required for parking areas? (req'd: 3 pts; allowed: 1pt)	Allowed; $< 25\%$	1	Allowed	1	Allowed	1	No	0	No	0	Allowed; $< 25\%$	1
<b>Parking Lot Landscaping</b> (17 points)												
Parking lot landscaping required? (yes = 3 pts)	No	0	No	0	Yes	3	Yes	3	No	0	No	0
Applicability of above (new lot and/or expanded lots) (all= 4pts; $\leq 15 spaces = 2pts$ ; $>15 spaces = 1pt$ )	n/a	0	n/a	0	All new, expanded or rebuilt lots	4	New; $\geq 20 spaces$	1	n/a	0	n/a	0
Required planting areas ( $\leq 1 tree /10 spaces = 4pts$ ; $\leq 1/15 = 2pts$ ; $>1/15 = 1pt$ )	n/a	0	n/a	0	10% of area; 1 tree/40 feet	1	5% of lot	1	n/a	0	n/a	0
Are planting areas required to be curbed? (no = 3 pts)	n/a	0	n/a	0	No	3	No	3	n/a	0	n/a	0
Bioretention or other stormwater practices required/ encouraged? (yes = 3 pts)	No	0	No	0	No	0	No	0	No	0	No	0
<b>Sidewalks</b> (9 points)												
Are sidewalk requirements context sensitive? (yes = 1 pt)	Yes; only w/in 1 mile of schools	1	Yes; only w/in 1 mile of schools	1	Yes; based on street type	1	Yes; $\geq 2$ dua only	1	Yes; $\geq 2$ dua only	1	Yes; only w/in 1 mile of schools	1
Planting strips required between sidewalk and curb? ( $\geq 6 ft = 4pts$ ; $< 6 ft = 2pts$ ; $<4 ft = 1pt$ )	No	0	No	0	Optional; 3 ft	0	Req'd; 3 ft	1	Req'd; 3 ft	1	No	0
Are street trees required in the planting strip? (yes = 3 pts)	No	0	No	0	No	0	No	0	No	0	No	0
Can alternate pedestrian networks be substituted for sidewalks? (yes = 1 pt)	No	0	No	0	No	0	Yes	1	Yes	1	No	0
<b>Driveways</b> (7 points)												
Pervious paving material for residential driveways (required = 3 pts; allowed = 1 pts)	-	0	-	0	Allowed	1	-	0	-	0	-	0
Residential front setbacks (minimum) ( $< 20 = 4pts$ ; $=20 = 2pts$ )	30-40 ft	0	15-40 ft	4	25 ft	0	20-40 ft	2	15-35 ft	4	30-40 ft	0
<b>TOTAL POINTS</b> (100 possible points)		<b>31</b>		<b>34</b>		<b>43</b>		<b>38</b>		<b>28</b>		<b>31</b>



## Pickens County

(Section references are from the County Code of Ordinances. Also applies to City of Pickens.)

Development Feature/Standard	Measure or Yes/No	Points	Comments
<b>Street Width (Sec. 32-154)</b>			
Minimum pavement width in low-density residential development ( $\leq 22 = 2 pts$ ; $\leq 20 = 4 pts$ )	20-22 ft	4	Minimum width could be as low as 16-18 feet under certain conditions. Streets as narrow as 18 feet (pavement only or 20-22 ft with curb and gutter) can accommodate one side parking.
Cul-de-sac street minimum pavement width ( $\leq 22 = 2 pts$ )	"	2	Not specified
Manufactured Home Park street minimum pavement width ( $\leq 22 = 2 pts$ )	20 ft	2	Width does not include on-street parking (DS Sec. 4.6.9(b))
Alley minimum pavement width (residential/commercial) ( $\leq 15 = 3 pts$ ; $\leq 20 = 1 pt$ )	-	0	Not specified
Residential alleys permitted? ( <i>yes = 2 pts</i> )	-	0	Not specified
Collector street minimum pavement width ( $\leq 24 = 3 pts$ )	-	0	Not specified
Curb radii for residential streets ( $\leq 20 = 1 pt$ ; $\leq 15 = 3 pts$ )	-	0	Not specified
<b>Right-of-Way Width (Sec. 32-104)</b>			
Minimum ROW width for residential street? ( $\leq 45 = 3 pts$ ; $\leq 50 = 1 pt$ )	50 ft	1	
Utilities allowed under paved section of street? ( <i>yes = 2 pts</i> )	Yes	2	See LDR Sec. 19-100.
<b>Cul-de-Sacs (Sec. 32-105)</b>			
Minimum radius allowed for cul-de-sacs? ( $\leq 35 = 3 pts$ )	40 ft	0	
Can landscaped island be created within cul-de-sac? ( <i>yes = 3 pts</i> )	No	0	"Unpaved islands within the 40-foot paved radius or within oval cul-de-sacs are prohibited."
Are alternative turnarounds such as "hammerheads" allowed? ( <i>yes = 3 pts</i> )	No	0	
<b>Vegetated Open Channels/Swales</b>			
Are open channels/swales allowed for some residential streets? ( <i>yes = 3 pts</i> )	Yes	3	Sec. 32-106(c): "Open roadside ditches will not be permitted in high-density housing developments or on roadsides having excessive slopes. Five or more lots on either side of proposed roadway per 1/10 <sup>th</sup> mile is considered high density." This roughly approximates densities of 2 dwelling units per acre or greater.
Design criteria for swales (dry swales, biofilters, or grass)? ( <i>yes = 1 pt</i> )	Yes	1	
<b>Parking Ratios (Sec. 7.1)</b>			
Minimum parking ratio for professional office building (per 1000 sf) ( $\leq 3 = 4 pts$ ; $\leq 4 = 2 pts$ ; $< 5 = 1 pt$ )	3.3	2	
Minimum parking ratio for shopping centers (per 1000 sf) ( $\leq 3 = 4 pts$ ; $\leq 4 = 2 pts$ ; $< 5 = 1 pt$ )	4	2	
Minimum parking ratio for multifamily dwellings (per unit)? ( $< 2 = 3 pts$ )	1.5 or 2	3	1.5 spaces per one bedroom unit; 2 spaces for each two or more bedroom unit
Are parking requirements set as maximums? ( <i>yes = 4 pts</i> )	No	0	
Are parking requirements reduced/waived in CBD? ( <i>yes = 3 pts</i> )	No	0	
<b>Shared Parking (Sec. 7.7)</b>			
Is shared parking allowed? ( <i>yes = 3 pts</i> )	Yes	3	Shared parking is allowed, although not necessarily promoted in the ordinance language.

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What percentage of parking may be shared? (100% = 3 pts; ≤ 100% = 1 pt)	up to 50%	1	Only up to 50% of the parking for certain uses may be shared.
<b>Parking Lot Design (Sec. 7.6.6)</b>			
What is the minimum stall width for a standard parking space? (<9 = 1 pt)	8.5-9 ft	1	Only up to 30% of spaces may use the smaller dimensions.
Minimum width for 2 rows of parking and drive aisle? (≤60 = 3 pts)	60-64 ft	1	Only up to 30% of spaces may use the smaller dimensions.
Smaller dimensions allowed for compact cars? What % of spaces? (yes = 1 pts)	Yes; 30%	1	Only up to 30% of spaces may use the smaller dimensions.
Are pervious materials allowed/required for parking areas? (req'd: 3 pts; allowed: 1 pt)	Allowed; ≤ 25%	1	DS Sec. 7.2: "For shopping centers and other large facilities, up to 25 percent of the required parking spaces may be covered with permeable or porous surfaces, grass or field area, to be used as overflow parking." DS Sec. 7.6.4: Paving requirement only applies to facilities with 20 or more spaces. Paving requirement for rural churches, certain industrial uses and other uses not catering to the public may be waived.
<b>Parking Lot Landscaping</b>			
Parking lot landscaping required? (yes = 3 pts)	No	0	However, the percentage of pervious surface is limited in to 55% (residential)-80% (commercial, industrial), depending on the type of development. This provides some incentive to provide landscaped areas in parking lots. (See Sec. 4.8)
Applicability of above (new lot and/or expanded lots) (all= 4pts; ≤ 15 spaces = 2 pts; >15 spaces = 1pt)	n/a	0	
Required planting areas (≤1 tree /10 spaces = 4pts; ≤ 1/15 = 2 pts; >1/15 = 1pt)	n/a	0	
Are planting areas required to be curbed? (no = 3 pts)	n/a	0	
Bioretention or other stormwater practices required/ encouraged? (yes = 3 pts)	No	0	
<b>Sidewalks and Planting Strips (Sec. 5.13.1)</b>			
Are sidewalk requirements context sensitive? (yes = 1 pt)	Yes; only w/in 1 mile of schools	1	Sidewalks required (on one side only) within 1 mile of schools, as determined by the Planning Commission and School District.
Planting strips required between sidewalk and curb? (≥ 6 ft = 4 pts; < 6 ft = 2pts; <4 ft = 1pt)	No	0	
Are street trees required in the planting strip? (yes = 3 pts)	No	0	
Can alternate pedestrian networks be substituted for sidewalks? (yes = 1 pt)	No	0	Not specified
<b>Driveways</b>			
Pervious paving material for residential driveways (required = 3 pts; allowed = 1 pts)	-	0	Not specifically mentioned, but not prohibited either. Should be encouraged with incentives.
Residential front setbacks (minimum) (< 20 = 4 pts; =20 = 2pts)	30-40 ft	0	Consider reducing this setback to 20 ft or less for all residential and collector streets to promote shorter driveways. If done in conjunction with reducing building setbacks for primary facades to 10-15 feet, this would ensure that garages would remain behind primary residential facades.
<b>TOTAL POINTS (100 possible points)</b>		<b>31</b>	

**Additional notes:** Pickens County has "Minimum Impervious Surface Standards" (Sec. 4.8) for different land uses. Ranges from 55% for residential uses to 80% for industrial and commercial uses.

**City of Central** (Uses Pickens County LDRs; Section references are from Pickens Co. Code of Ordinances unless specified otherwise.)

<b>Development Feature/Standard</b>	<b>Measure or Yes/No</b>	<b>Points</b>	<b>Comments</b>
<b>Street Width (Sec. 32-154)</b>			
Minimum pavement width in low-density residential development ( $\leq 22 = 2 pts$ ; $\leq 20 = 4 pts$ )	20-22 ft	4	Minimum width could be as low as 16-18 feet under certain conditions. Streets as narrow as 18 feet (pavement only or 20-22 ft with curb and gutter) can accommodate one side parking.
Cul-de-sac street minimum pavement width ( $\leq 22 = 2 pts$ )	"	2	Not specified
Manufactured Home Park street minimum pavement width ( $\leq 22 = 2 pts$ )	20 ft	2	Width does not include on-street parking (DS Sec. 4.6.9(b))
Alley minimum pavement width (residential/commercial) ( $\leq 15 = 3 pts$ ; $\leq 20 = 1 pt$ )	-	0	Not specified
Residential alleys permitted? ( <i>yes</i> = 2 pts)	-	0	Not specified
Collector street minimum pavement width ( $\leq 24 = 3 pts$ )	-	0	Not specified
Curb radii for residential streets ( $\leq 20 = 1 pt$ ; $\leq 15 = 3 pts$ )	-	0	Not specified
<b>Right-of-Way Width (Sec. 32-104)</b>			
Minimum ROW width for residential street? ( $\leq 45 = 3 pts$ ; $\leq 50 = 1 pt$ )	50 ft	1	
Utilities allowed under paved section of street? ( <i>yes</i> = 2 pts)	Yes	2	See LDR Sec. 19-100.
<b>Cul-de-Sacs (Sec. 32-105)</b>			
Minimum radius allowed for cul-de-sacs? ( $\leq 35 = 3 pts$ )	40 ft	0	
Can landscaped island be created within cul-de-sac? ( <i>yes</i> = 3 pts)	No	0	"Unpaved islands within the 40-foot paved radius or within oval cul-de-sacs are prohibited."
Are alternative turnarounds such as "hammerheads" allowed? ( <i>yes</i> = 3 pts)	No	0	
<b>Vegetated Open Channels/Swales</b>			
Are open channels/swales allowed for some residential streets? ( <i>yes</i> = 3 pts)	Yes	3	Sec. 32-106(c): "Open roadside ditches will not be permitted in high-density housing developments or on roadsides having excessive slopes. Five or more lots on either side of proposed roadway per 1/10 <sup>th</sup> mile is considered high density." This roughly approximates densities of 2 dwelling units per acre or greater.
Design criteria for swales (dry swales, biofilters, or grass)? ( <i>yes</i> = 1 pt)	Yes	1	
<b>Parking Ratios (ZO Sec. 712)</b>			
Minimum parking ratio for professional office building (per 1000 sf) ( $\leq 3 = 4 pts$ ; $\leq 4 = 2 pts$ ; $\leq 5 = 1 pt$ )	5	0	
Minimum parking ratio for shopping centers (per 1000 sf) ( $\leq 3 = 4 pts$ ; $\leq 4 = 2 pts$ ; $\leq 5 = 1 pt$ )	5	0	However, food stores require 10 spaces /1000 sf.
Minimum parking ratio for multifamily dwellings (per unit)? ( $\leq 2 = 3 pts$ )	1.75 spaces	3	
Are parking requirements set as maximums? ( <i>yes</i> = 4 pts)	No	0	
Are parking requirements reduced/waived in CBD? ( <i>yes</i> = 3 pts)	Yes	3	See ZO Sec. 508.4: "Uses permitted in the CC Core Commercial Districts shall be required to meet all standards. . . except that all off-street parking and loading requirements shall be waived."

Appendix B: Pickens County Audit of Pavement Standards

<b>Shared Parking (ZO Sec. 715)</b>			
Is shared parking allowed? (yes = 3 pts)	Yes	3	"If activities sharing combined parking are not in operation at the same time, each parking space may be counted for each activity."
What percentage of parking may be shared? (100% = 3 pts; < 100% = 1 pt)	100%	3	
<b>Parking Lot Design (ZO Sec. 713)</b>			
What is the minimum stall width for a standard parking space? ( $\leq 9 = 1$ pt)	9 ft	1	
Minimum width for 2 rows of parking and drive aisle? ( $\leq 60 = 3$ pts)	64 ft	0	
Smaller dimensions allowed for compact cars? What % of spaces? (yes = 1 pts)	No	0	
Are pervious materials allowed/required for parking areas? (req'd: 3 pts; allowed: 1 pt)	Allowed	1	Only parking lots within NC, GC, and CC zoning districts are required to be paved.
<b>Parking Lot Landscaping</b>			
Parking lot landscaping required? (yes = 3 pts)	No	0	However, in the SC Hwy 93 and 18 Development Corridor Standards (ZO Sec. 303), parking lot landscaping is required: 10% of impervious surface area must be landscaped for when paved cover exceeds 10,000 sf. In addition, when parking lots exceed 100 spaces, the lot must be separated into smaller lots by 6 ft. landscaped areas.
Applicability of above (new lot and/or expanded lots) (all = 4 pts; $\leq 15$ spaces = 2 pts; $> 15$ spaces = 1 pt)	n/a	0	
Required planting areas ( $\leq 1$ tree / 10 spaces = 4 pts; $\leq 1/15 = 2$ pts; $> 1/15 = 1$ pt)	n/a	0	
Are planting areas required to be curbed? (no = 3 pts)	n/a	0	
Bioretention or other stormwater practices required/ encouraged? (yes = 3 pts)	No	0	
<b>Sidewalks and Planting Strips (Sec. 5.13.1)</b>			
Are sidewalk requirements context sensitive? (yes = 1 pt)	Yes; only w/in 1 mile of schools	1	Sidewalks required (on one side only) within 1 mile of schools, as determined by the Planning Commission and School District.
Planting strips required between sidewalk and curb? ( $\geq 6$ ft = 4 pts; $< 6$ ft = 2 pts; $< 4$ ft = 1 pt)	No	0	
Are street trees required in the planting strip? (yes = 3 pts)	No	0	
Can alternate pedestrian networks be substituted for sidewalks? (yes = 1 pt)	No	0	Not specified
<b>Driveways</b>			
Pervious paving material for residential driveways (required = 3 pts; allowed = 1 pt)	-	0	Not specifically mentioned, but not prohibited either. Should be encouraged with incentives.
Residential front setbacks (minimum) ( $< 20 = 4$ pts; $= 20 = 2$ pts)	15-40 ft	4	(ZO Article V) Consider reducing all setbacks to 20 ft or less for all residential and collector streets to promote shorter driveways. If done in conjunction with reducing building setbacks for primary facades to 10-15 feet, this would ensure that garages would remain behind primary residential facades.
<b>TOTAL POINTS (100 possible points)</b>		<b>34</b>	



## City of Clemson

Development Feature/Standard	Measure or Yes/No	Points	Comments
<b>Street Width (LDR Sec. 503)</b>			
Minimum pavement width in low-density residential development ( $\leq 22 = 2pts$ ; $\leq 20 = 4pts$ )	22-24 ft	2	Minimum width could be as low as 16-18 feet. Streets as narrow as 18 feet (pavement only or 20-22 ft with curb and gutter) can accommodate one side parking.
Cul-de-sac street minimum pavement width ( $\leq 22 = 2pts$ )	22 ft	2	Could be narrowed to the dimensions of other residential streets or less.
Manufactured Home Park street minimum pavement width ( $\leq 22 = 2pts$ )	-	0	not specified
Alley minimum pavement width (residential/commercial) ( $\leq 15 = 3pts$ ; $\leq 20 = 1pt$ )	16ft /30 ft	1	Alleys are required in commercial and industrial areas. Alleys could be as narrow as 10-12 feet of pavement for residential uses and 20 feet for non-residential/mixed uses
Residential alleys permitted? ( <i>yes = 2 pts</i> )	Yes	2	
Collector street minimum pavement width ( $\leq 24 = 3pts$ )	28 ft	0	Could be as low as 22-24 if on-street parking is not expected or allowed. Ordinance could provide options for various collector street cross-sections with/without parking on one or both sides.
Curb radii for residential streets ( $\leq 20 = 1pt$ ; $\leq 15 = 3pts$ )	-	0	Not specified.
<b>Right-of-Way Width (LDR Sec. 503)</b>			
Minimum ROW width for residential street? ( $\leq 45 = 3pts$ ; $\leq 50 = 1pt$ )	50 ft	1	
Utilities allowed under paved section of street? ( <i>yes = 2 pts</i> )	Yes	2	Per the provisions of Section 16-4 of the City's Code of Ordinances.
<b>Cul-de-Sacs (LDR Sec. 502(N))</b>			
Minimum radius allowed for cul-de-sacs? ( $\leq 35 = 3pts$ )	35 ft	3	
Can landscaped island be created within cul-de-sac? ( <i>yes = 3 pts</i> )	-	0	Not specified
Are alternative turnarounds such as "hammerheads" allowed? ( <i>yes = 3 pts</i> )	Yes	3	"T" or "Y" back out turn-arounds allowed only where topographic conditions do not allow a cul-de-sac
<b>Vegetated Open Channels/Swales</b>			
Are open channels/swales allowed for some residential streets? ( <i>yes = 3 pts</i> )	No	0	See LDR Sec. 503 and 504. Curb and gutter required for <u>all</u> roadways except alleys.
Design criteria for swales (dry swales, biofilters, or grass)? ( <i>yes = 1 pt</i> )	n/a	0	Curb and gutter required for all roadways as noted above.
<b>Parking Ratios (ZO Sec. 19-441)</b>			
Minimum parking ratio for professional office building (per 1000 sf) ( $\leq 3 = 4pts$ ; $< 4 = 2pts$ ; $< 5 = 1pt$ )	4	2	
Minimum parking ratio for shopping centers (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $< 5 = 1pt$ )	5	0	
Minimum parking ratio for multifamily dwellings (per unit)? ( $< 2 = 3pts$ )	1.25-2.25+	3	Studio/efficiency: 1.25/unit; one bedroom units: 1.75/unit; two or more bedroom units: 1 space/bedroom plus .25 space/unit for guest parking
Are parking requirements set as maximums? ( <i>yes = 4 pts</i> )	No	0	
Are parking requirements reduced/waived in CBD? ( <i>yes = 3 pts</i> )	Yes	3	ZO Sec. 19-309. C, General Commercial District: "Off-street parking is permitted separately and is not required except for residential use because of small lot sizes and intensity of development."
<b>Parking Codes</b>			
Is shared parking allowed? ( <i>yes = 3 pts</i> )	No	0	Shared parking does not appear to be permitted at all. (ZO Sec. 19-444(b)(2) states: "A cooperative location provides parking for two or more uses, and shall have combined parking spaces equal to the sum of required for the separate uses."

Appendix B: Pickens County Audit of Pavement Standards

What percentage of parking may be shared? (100% = 3 pts; ≤ 100% = 1 pt)	0%	0	
<b>Parking Lot Design (ZO Sec. 19-448)</b>			
What is the minimum stall width for a standard parking space? (≤9 = 1 pt)	9 ft	1	
Minimum width for 2 rows of parking and drive aisle? (≤60 = 3 pts)	60 ft	3	
Smaller dimensions allowed for compact cars? What % of spaces? (yes = 1 pts)	Yes; 25%	1	up to 25% of spaces <u>may</u> be 8 ft. x 18 ft.; not required.
Are pervious materials allowed/required for parking areas? (req'd: 3 pts; allowed: 1 pt)	Allowed	1	ZO Sec. 19-448(2): "Off-street parking shall be . . . surfaced with asphalt, concrete, bituminous, or other alternative paving material, including grass pavers, porous concrete, and other similar materials. . ."
<b>Parking Lot Landscaping (ZO Sec. 19-455)</b>			
Parking lot landscaping required? (yes = 3 pts)	Yes	3	"At least 10 percent of the vehicular use area shall be devoted to landscaping." ZO Sec. 19-450 allows for a credit towards minimum parking requirements when trees are preserved within the parking area. This is a provision that incents reduction of impervious surface and increased landscaped area.
Applicability of above (new lot and/or expanded lots) (all= 4pts; ≤ 15 spaces = 2 pts; >15 spaces = 1pt)	All new, expanded or rebuilt lots	4	
Required planting areas (≤1 tree /10 spaces = 4pts; ≤ 1/15 = 2 pts; >1/15 = 1pt)	10% of area; 1 tree/40 feet	1	ZO Sec. 19-455(d)(3): ". . . Any portion of the vehicular use area is within 40 feet of a planted or retained tree trunk."
Are planting areas required to be curbed? (no = 3 pts)	No	3	Only wheel stops (and not curbs) are required around landscaped areas or buffers
Bioretention or other stormwater practices required/ encouraged? (yes = 3 pts)	No	0	This issue is not specifically addressed in the existing ZO. However, only wheel stops (and not curbs) are required around landscaped areas or buffers, which means that these areas could easily be designed (either intentionally or unintentionally) to retain storm water.
<b>Sidewalks (LDR Sec. 503 &amp; 506)</b>			
Are sidewalk requirements context sensitive? (yes = 1 pt)	Yes; based on street type	1	Sidewalks required on both sides of residential sub-collectors and collectors and on one side of all cul-de-sac and residential access streets. They may be required on both sides of residential access streets and cul-de-sacs if so mandated by the Planning Commission (Sec. 505(D)3).
Planting strips required between sidewalk and curb? (≥ 6 ft = 4 pts; < 6 ft = 2pts; <4 ft = 1pt)	Optional; 3 ft	0	Optional. Sidewalk may be built at back of curb or 3 feet behind curb with grass strip.
Are street trees required in the planting strip? (yes = 3 pts)	No	0	
Can alternate pedestrian networks be substituted for sidewalks? (yes = 1 pt)	No	0	Not specified
<b>Driveways</b>			
Pervious paving material for residential driveways (required = 3 pts; allowed = 1 pts)	Allowed	1	ZO Sec. 19-447(4): "Off-street parking facilities may be surfaced with gravel, compacted stone, concrete, asphalt, brick, or paving stones."
Residential front setbacks (minimum) (< 20 = 4 pts; =20 = 2pts)	25 ft	0	Consider reducing this setback to 20 ft to promote shorter driveways. If done in conjunction with reducing building setbacks for primary facades to 10-15 feet, this would ensure that garages would remain behind primary residential facades.
<b>TOTAL POINTS (100 possible points)</b>		<b>43</b>	

## City of Easley

Development Feature/Standard	Measure or Yes/No	Points	Comments
<b>Street Width (LDR Sec.4.3)</b>			
Minimum pavement width in low-density residential development ( $\leq 22 = 2pts$ ; $\leq 20 = 4pts$ )	24 ft	0	LDR 4.3(3)(g): "All streets shall have a minimum turning radius of 30 feet."
Cul-de-sac street minimum pavement width ( $\leq 22 = 2pts$ )	"	0	Not specified
Manufactured Home Park street minimum pavement width ( $\leq 22 = 2pts$ )	-	0	Not specified
Alley minimum pavement width (residential/commercial) ( $\leq 15 = 3pts$ ; $\leq 20 = 1pt$ )	0/18 ft	1	
Residential alleys permitted? ( <i>yes</i> = 2 pts)	No	0	LDR Sec. 4.3(4)(a): "Alleys are not permitted in residential districts."
Collector street minimum pavement width ( $\leq 24 = 3pts$ )	28 or 40 ft	0	40 feet if turning lane provided. Could be as low as 22-24 if on-street parking is not expected or allowed. Ordinance could provide options for various collector street cross-sections with/without parking on one or both sides.
Curb radii for residential streets ( $\leq 20 = 1pt$ ; $\leq 15 = 3pts$ )	-	0	Not specified.
<b>Right-of-Way Width (LDR Sec. 4.3)</b>			
Minimum ROW width for residential street? ( $\leq 45 = 3pts$ ; $\leq 50 = 1pt$ )	50 ft	1	
Utilities allowed under paved section of street? ( <i>yes</i> = 2 pts)	Yes	2	See LDR Sec. 4.13: Utility Installations in Streets.
<b>Cul-de-Sacs (LDR Sec. 4.3(5))</b>			
Minimum radius allowed for cul-de-sacs? ( $\leq 35 = 3pts$ )	40 ft	0	
Can landscaped island be created within cul-de-sac? ( <i>yes</i> = 3 pts)	Yes	3	"If such an island is provided, the pavement width of the turn-around shall be a minimum of thirty (30) feet."
Are alternative turnarounds such as "hammerheads" allowed? ( <i>yes</i> = 3 pts)	No	0	
<b>Vegetated Open Channels/Swales</b>			
Are open channels/swales allowed for some residential streets? ( <i>yes</i> = 3 pts)	No	0	LDR Sec. 4.4(1)(a): "Curbs and gutter shall be required and installed along both sides of all streets."
Design criteria for swales (dry swales, biofilters, or grass)? ( <i>yes</i> = 1 pt)	Yes	1	LDR Sec. 4.6: Open Channels; not allowed for street drainage as per provision above.
<b>Parking Ratios (ZO Sec. 3.1)</b>			
Minimum parking ratio for professional office building (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $\leq 5 = 1pt$ )	2.9	4	
Minimum parking ratio for shopping centers (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $\leq 5 = 1pt$ )	5	0	10 spaces/1000 sf is required for grocery stores, which is an overly high number by a factor of at least 2.
Minimum parking ratio for multifamily dwellings (per unit)? ( $\leq 2 = 3pts$ )	1.75	3	
Are parking requirements set as maximums? ( <i>yes</i> = 4 pts)	No	0	
Are parking requirements reduced/waived in CBD? ( <i>yes</i> = 3 pts)	Yes	3	"Off-street automobile storage or parking spaces shall be required in all zoning districts except the CCD [Core Commercial District] where the use is non-residential."
<b>Shared Parking (ZO Sec. 3.1)</b>			
Is shared parking allowed? ( <i>yes</i> = 3 pts)	Yes	3	Allowed, but not promoted.
What percentage of parking may be shared? ( $100\% = 3pts$ ; $\leq 100\% = 1pt$ )	100%	3	ZO Sec. 3.1.04: "If activities sharing combined parking are not in operation at the same time, each parking space may be counted for each activity."

Appendix B: Pickens County Audit of Pavement Standards

<b>Parking Lot Design (ZO Sec. 3.1.01)</b>			
What is the minimum stall width for a standard parking space? ( $\leq 9 = 1 pt$ )	9 ft	1	
Minimum width for 2 rows of parking and drive aisle? ( $\leq 60 = 3 pts$ )	64 ft	0	60 ft is sufficient for this purpose.
Smaller dimensions allowed for compact cars? What % of spaces? (yes = 1 pts)	No	0	
Are pervious materials allowed/required for parking areas? (req'd: 3 pts; allowed: 1 pt)	No	0	ZO Sec. 3.1.08 "An off-street parking space is an impervious surfaced area. . ."
<b>Parking Lot Landscaping (ZO Sec. 3.1)</b>			
Parking lot landscaping required? (yes = 3 pts)	Yes	3	ZO Sec. 3.1.15: "At least 5 percent of the impervious service area shall be open and landscaped. . ."
Applicability of above (new lot and/or expanded lots) (all= 4pts; $\leq 15$ spaces = 2 pts; $>15$ spaces = 1pt)	New; $\geq 20$ spaces	1	
Required planting areas ( $\leq 1$ tree /10 spaces = 4pts; $\leq 1/15 = 2$ pts; $>1/15 = 1$ pt)	5% of lot	1	
Are planting areas required to be curbed? (no = 3 pts)	No	3	only wheel stops (and not curbs) are required around landscaped areas or buffers
Bioretention or other stormwater practices required/ encouraged? (yes = 3 pts)	No	0	This issue is not specifically addressed in the existing ZO. However, only wheel stops (and not curbs) are required around landscaped areas or buffers, which means that these areas could easily be designed (either intentionally or unintentionally) to retain storm water.
<b>Sidewalks (LDR Sec. 4.18)</b>			
Are sidewalk requirements context sensitive? (yes = 1 pt)	Yes; $\geq 2$ dua only	1	Sidewalks required on one side, except where densities are less than 2 dua or where "alternative pedestrian systems" are provided.
Planting strips required between sidewalk and curb? ( $\geq 6$ ft = 4 pts; $< 6$ ft = 2pts; $< 4$ ft = 1pt)	Req'd; 3 ft	1	Minimum 3 ft.
Are street trees required in the planting strip? (yes = 3 pts)	No	0	
Can alternate pedestrian networks be substituted for sidewalks? (yes = 1 pt)	Yes	1	See above.
<b>Driveways</b>			
Pervious paving material for residential driveways (required = 3 pts; allowed = 1 pts)	-	0	Not specified.
Residential front setbacks (minimum) ( $< 20 = 4$ pts; $=20 = 2$ pts)	20-40 ft	2	(ZO Sec. 2.6) Consider reducing this setback to 20 ft to promote shorter driveways. If done in conjunction with reducing building setbacks for primary facades to 10-15 feet, this would ensure that garages would remain behind primary residential facades.
<b>TOTAL POINTS (100 possible points)</b>		<b>38</b>	

**Additional Notes:** Easley also has maximum impervious surface ratios for each zoning district ranging from 0.35 in the lowest density residential district to 1.0 in the core commercial district.



## City of Liberty

Development Feature/Standard	Measure or Yes/No	Points	Comments
<b>Street Width (LDR Sec. 4.3(4))</b>			
Minimum pavement width in low-density residential development ( $\leq 22 = 2pts$ ; $\leq 20 = 4pts$ )	24 ft	0	Streets designs and descriptions are per Pickens County Road Ordinance. LDR 4.3(g): "All streets shall have a minimum turning radius of 30 feet."
Cul-de-sac street minimum pavement width ( $\leq 22 = 2pts$ )	"	0	Not specified.
Manufactured Home Park street minimum pavement width ( $\leq 22 = 2pts$ )	-	0	Not specified
Alley minimum pavement width (residential/commercial) ( $\leq 15 = 3pts$ ; $\leq 20 = 1pt$ )	0/18 ft	1	Commercial districts only.
Residential alleys permitted? ( $yes = 2pts$ )	No	0	LDR Sec. 4.3(1)(a): "Alleys are not permitted in residential districts."
Collector street minimum pavement width ( $\leq 24 = 3pts$ )	28 or 40 ft	0	Width depends on whether turn lane is provided or not.
Curb radii for residential streets ( $\leq 20 = 1pt$ ; $\leq 15 = 3pts$ )	-	0	Not specified. Should be as low as 15-20 feet for low volume residential and collector streets. Allows narrower intersections and is better for pedestrian crossing and lowering vehicle turning speeds.
<b>Right-of-Way Width</b>			
Minimum ROW width for residential street? ( $\leq 45 = 3pts$ ; $\leq 50 = 1pt$ )	50 ft	1	
Utilities allowed under paved section of street? ( $yes = 2pts$ )	Yes	2	LDR Section 4.13
<b>Cul-de-Sacs (LDR Sec. 4.3(2))</b>			
Minimum radius allowed for cul-de-sacs? ( $\leq 35 = 3pts$ )	40 ft	0	
Can landscaped island be created within cul-de-sac? ( $yes = 3pts$ )	Yes	3	However, "If such an island is provided, the pavement width of the turn-around shall be a minimum of thirty (30) feet."
Are alternative turnarounds such as "hammerheads" allowed? ( $yes = 3pts$ )	No	0	
<b>Vegetated Open Channels/Swales (LDR Sec. 4.4)</b>			
Are open channels/swales allowed for some residential streets? ( $yes = 3pts$ )	No	0	"Curb and gutter shall be required and installed on both sides of all streets."
Design criteria for swales (dry swales, biofilters, or grass)? ( $yes = 1pt$ )	Yes	1	Open swales allowed, but not allowed for street drainage.
<b>Parking Ratios (ZO Sec. 712)</b>			
Minimum parking ratio for professional office building (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $\leq 5 = 1pt$ )	5	0	
Minimum parking ratio for shopping centers (per 1000 sf) ( $\leq 3 = 4pts$ ; $\leq 4 = 2pts$ ; $\leq 5 = 1pt$ )	5	0	Not including food stores, which are required to provide 3-10 spaces/1000 sf, depending on the size of the store. (The smaller the store, the greater the parking ratio, in this case.)
Minimum parking ratio for multifamily dwellings (per unit)? ( $\leq 2 = 3pts$ )	1.75	3	1.5 parking spaces/unit for mobile homes in Mobile Home Parks (ZO Sec. 505)
Are parking requirements set as maximums? ( $yes = 4pts$ )	No	0	On street parking should be allowed to count towards minimums in all cases, except single family dwellings.
Are parking requirements reduced/waived in CBD? ( $yes = 3pts$ )	Yes	3	See ZO Sec. 509.5: ". . . All off-street parking and loading requirements shall be waived [in the CC Core Commercial districts]."
<b>Shared Parking (ZO Sec. 715)</b>			
Is shared parking allowed? ( $yes = 3pts$ )	Yes	3	"If activities sharing combined parking are not in operation at the same time, each parking space may be counted for each activity."
What percentage of parking may be shared? ( $100% = 3pts$ ; $\leq 100% = 1pt$ )	100%	3	This is a much better provision than the maximum 50% shared parking provision in many communities.

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<b>Parking Lot Design (ZO Sec. 713)</b>			
What is the minimum stall width for a standard parking space? ( $\leq 9 = 1 pt$ )	9 ft	1	
Minimum width for 2 rows of parking and drive aisle? ( $< 60 = 3 pts$ )	64 ft	0	60 feet is a perfectly adequate dimension for two rows of parking and drive aisle.
Smaller dimensions allowed for compact cars? What % of spaces? (yes = 1 pts)	No	0	
Are pervious materials allowed/required for parking areas? (req'd: 3 pts; allowed: 1 pt)	No	0	ZO Sec. 713.b: "All parking areas except those within Agricultural Districts shall be paved."
<b>Parking Lot Landscaping</b>			
Parking lot landscaping required? (yes = 3 pts)	No	0	
Applicability of above (new lot and/or expanded lots) (all = 4pts; $\leq 15$ spaces = 2 pts; $> 15$ spaces = 1 pt)	n/a	0	
Required planting areas ( $\leq 1$ tree / 10 spaces = 4pts; $\leq 1/15 = 2$ pts; $> 1/15 = 1$ pt)	n/a	0	
Are planting areas required to be curbed? (no = 3 pts)	n/a	0	
<b>Sidewalks (LDR Sec. 4.18)</b>			
Are sidewalk requirements context sensitive? (yes = 1 pt)	Yes; $\geq 2$ dua only	1	Sidewalks required on one side, except where densities are less than 2 dua or where "alternative pedestrian systems" are provided.
Planting strips required between sidewalk and curb? ( $\geq 6$ ft = 4 pts; $< 6$ ft = 2 pts; $< 4$ ft = 1 pt)	Req'd; 3 ft	1	Minimum 3 ft between sidewalk and back of curb.
Are street trees required in the planting strip? (yes = 3 pts)	No	0	
Can alternate pedestrian networks be substituted for sidewalks? (yes = 1 pt)	Yes	1	
<b>Driveways</b>			
Pervious paving material for residential driveways (required = 3 pts; allowed = 1 pts)	-	0	Not specified.
Residential front setbacks (minimum) ( $< 20 = 4$ pts; $= 20 = 2$ pts)	15-35 ft	4	Consider reducing this setback to 20 ft or less for residential and collector streets to promote shorter driveways. If done in conjunction with reducing building setbacks for primary facades to 10-15 feet, this would ensure that garages would remain behind primary residential facades.
<b>TOTAL POINTS (100 possible points)</b>		<b>31</b>	

**Additional Note:** Good policy language in LDR (Sec. 4.2(2)(e)) regarding stormwater issues: "The subdivision shall be laid out to avoid adversely affecting ground water and aquifer recharge; to reduce cut and fill; to avoid unnecessary impervious cover; to prevent flooding; . . ."

## RESOURCES/REFERENCES

- Center for Urban Forest Research (CUFR), "Fact Sheet #4: Control Stormwater Runoff with Trees." Davis, CA: Pacific Southwest Research Station, USDA Forest Service. July 2002. Accessed January 2006. [http://cufr.ucdavis.edu/products/CUFR\\_182\\_UFfactsheet4.pdf](http://cufr.ucdavis.edu/products/CUFR_182_UFfactsheet4.pdf)
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