5:3 LAND DEVELOPMENT DESIGN STANDARDS AND REQUIRED IMPROVEMENTS

5:3.1 Purpose

The purpose of design and improvement standards is to create functional and attractive land developments and to minimize adverse impacts. All land developments involving the subdivision of property shall meet the requirements of the Regulations for the Subdivision of Land and the Creation of Lots provisions of this Article, the applicable design standards and required improvements of this section, as well as all applicable special purpose district zoning requirements.

5:3.2 Site Design

5:3.2-1 Site Design, Generally

Site design shall take into consideration all existing local and regional plans, and shall be based on the site analysis. To the extent practicable, development shall be located:

A. to preserve any natural features on the site;
B. to avoid areas of environmental sensitivity;
C. to minimize negative impacts and alteration of natural features;
D. to avoid adversely affecting ground water and aquifer recharge;
E. to reduce cut and fill;
F. to avoid unnecessary impervious cover;
G. to prevent flooding;
H. to provide adequate access to lots and sites; and
I. to mitigate adverse effects of noise, odor, traffic, drainage, and utilities.

5:3.2-2 Site Analysis

A. **Development Site Characteristics** - An analysis shall be made of characteristics of the development site, such as
   1. geology and soil;
   2. topography;
   3. ecology;
   4. existing vegetation;
   5. structures;
   6. road networks;
   7. visual features; and
   8. past and present use of the site.

   A report of the site analysis shall be included with the major subdivision sketch plans, group development site plans, PDD site plans, and other development plans as applicable, that are submitted to the Planning and Zoning Commission for review.

B. **Site Analysis Components and Design Objectives** - The following table presents some key components of the site analysis with associated development design objectives:

Table 5-6 SITE ANALYSIS KEY COMPONENTS AND DESIGN OBJECTIVES	
Site Analysis Component	**Design Objective**
Slope and Contour Analysis	• Slopes of 0%-5% are prime buildable areas. • Avoid any development on slopes greater than 10% in areas with unsuitable soils. • Build roadways on ridges. • Delineate sensitive areas.
Hydrologic Analysis	• Avoid wetlands, floodplains, and ground water recharge areas. • Preserve natural drainage ways. • Delineate sensitive areas.
Soils Analysis	• Avoid soils unsuitable for development. • Locate stormwater controls in pervious soils (hydric soil group A and B). • Delineate sensitive areas.
Vegetation Analysis	• Avoid clear cutting as erosion control BMP. • Preserve significant trees and understory vegetation. • Delineate sensitive areas.

The layers of information from the above table can be overlaid on a common scale to create a composite inventory map to analyze the suitability of each portion of the site for the proposed development.

C. **Hydrologic Soil Groups** - Soils are classified by the Natural Resource Conservation Service into four hydrologic soil groups based on the soil's runoff potential. The four hydrologic soils groups are "A", "B", "C" and "D", where Group "A" generally has the smallest runoff potential and Group "D", the greatest. Details of this classification can be found in *Urban Hydrology for Small Watersheds* published by the Engineering Division of the Natural Resource Conservation Service, U.S. Department of Agriculture, Technical Release–55. The characteristics of each group are as follows:
   1. Group "A" is sand, loamy sand, or sandy loam types of soils. It has low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sands or gravels, and have a high rate of water transmission.
   2. Group "B" is silt loam or loam. It has a moderate infiltration rate when thoroughly wetted and consists chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures.
   3. Group "C" soils are sandy clay loam. They have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine structure.
   4. Group "D" soils are clay loam, silty clay loam, sandy clay, silty clay, or clay. This hydrologic soil group has the highest runoff potential. They have very low infiltration rates when thoroughly wetted, and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a clay pan or clay layer at or near the surface, and shallow soils over nearly impervious material.

5:3.3 Conservation Subdivision and Group Development Design

5:3.3-1 Conservation Design

Conservation design is a type of residential or commercial development where sixty (60) percent or more of the developable land area is designated as undivided permanent open space; thereby permanently protecting agriculturally, environmentally, or ecologically significant areas within the parcel. The remaining developable land is subdivided into buildable lots or utilized as a group development; typically with more density than would be found in a traditional development within the zoning district. Kershaw County encourages the use of conservation design on all suitable land in all development projects.

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5:3.3-2 Purpose

The use of conservation subdivision and group development design seeks to optimize land use in Kershaw County while maintaining a balance between the preservation of agriculturally, environmentally, and ecologically significant areas and allowing for reasonable and sustainable growth. New development shall avoid disturbance of areas or elements identified as "sensitive" or "significant." In seeking to achieve this and the goals defined in Kershaw County's Comprehensive Plan, the purpose of this Article shall be to:

A. Preserve the unique rural character of Kershaw County.
B. Preserve agriculturally significant lands.
C. Permit reasonable development that is in accordance with the principles of open space conservation.
D. Accommodate the development of sustainable communities while protecting and preserving areas of agricultural, environmental, and ecological significance.
E. Maintain separation of non-compatible land uses.
F. Preserve the scenic and natural character of the County.
G. Promote an interconnected network of open space that promotes livable, sustainable subdivision development and wildlife habitat and corridors.
H. Economize in the installation of infrastructure and the provision of public services.
I. Direct development away from wetlands, floodplains, areas of highly erodable topography, and soil types unsuitable for development.

To achieve these objectives, clustering is allowed on the developable portion of the land. Clustering is a subdivision and group development design method that concentrates development in specific areas on the proposed site. The purpose of clustering is to allow increased density on a portion of the parcel, while preserving the rest as permanent open space. The overall density of the entire development property remains comparable to a traditional development within the zoning district. The concept of clustering provides for flexibility in subdivision design that fits the natural characteristics of the land and permits more useable open space, the preservation of prime agricultural land, and land containing one or more sensitive areas. Refer to Table 3:5, Schedule of Lot Area, Yard, Setback, Height, Density, Floor Area, and Impervious Surface Requirements by District to see how residential clustering applies in conservation design areas in a specific zoning district. (Note that Table 3:5 is duplicated at the end of this section.) For commercial and other non-residential developments, increased density in the developed portion of the project can be accomplished utilizing zero lot line buildings.

5:3.3-3 Applicability

The Planning and Zoning Commission encourages the use of conservation subdivision and group development design where residential subdivisions, commercial subdivisions, and group developments are proposed on a parcel where fifty (50) percent or more of the parcel has been identified by the appropriate oversight agency as agriculturally, environmentally, or ecologically significant.

Those areas deemed to be of agricultural, environmental, or ecological significance, as defined below, shall, for the purposes of this Ordinance, be referred to as "significant." The specific characteristics of these areas are defined as follows:

A. **Agriculturally Significant Land** - Prime farmland soils as defined and delineated by the U.S. Department of Agriculture, and soils classified as “Soils of Statewide Importance” by the State Food and Agriculture Council comprised of the USDA State agency heads of the Natural Resource Conservation Service, the Farm Service Agency, and Rural Development.
B. **Erodable Lands** - Areas of incline, whether natural or man made, lacking sufficient vegetation to prevent instability, erosion, or downstream siltation. The key indicator for erodable lands is a slope of five (5) percent or greater. Areas with a five (5) percent slope or greater are subject to review by the USDA Natural Resources Conservation Service (NRCS). The NRCS will make the final determination regarding the area's erodability.
C. **Environmentally Significant Areas** - Any tract of land that contains one (1) or more of the following sensitive areas as defined by the SC Department of Natural Resources:
    1. Critical wildlife habitats - Areas containing elements vital to the survival of endangered or threatened species including, but not limited to, food sources and cover.
    2. Scenic natural areas.
D. **Flood Hazard Areas** - Areas at high risk of inundation by water as a result of a flood. Known areas of flood hazard are indicated on the Flood Insurance Rate Map for Kershaw County.
E. **Scenic Natural Areas** - Any area which contains a unique feature of the rural landscape including, but not limited to, large rock formations, hill crests, scenic rivers, mature tree stands, and/or any other feature deemed to be significant by the SC Department of Natural Resources or as demonstrated to the Kershaw County Planning and Zoning Commission.
F. **Stream Corridors** - The primary channel of a river or stream and any portions of the floodplain adjoining the channel that is reasonably required to carry and discharge its water. Refer to the water quality buffer regulations of this Article.
G. **Outstanding Natural Resource Waters** – Waters of high water quality as designated by the SC Department of Health and Environmental Control (SCDHEC) which are protected from any discharges.
H. **Wetlands** - An area saturated by surface water or ground water such that it supports the growth and existence of vegetation suited to such areas. The key indicator for wetlands is the presence of hydric soils. Hydric soils are soils susceptible to saturation by water, as defined by the USDA Natural Resources Conservation Service. Areas containing hydric soils will be subject to review by the USDA Natural Resources Conservation Service. The United States Army Corps of Engineers will make the final determination regarding the existence of a wetland.
I. **Old-Growth Forests** - An area containing contiguous wooded parcels of significant size, containing a rich diversity of native flora species in associations typical of pre-European settlement ecosystems, areas with rare, threatened, endangered, or special species, or with

ancient individuals, when in combination with understory species typical of pre-European settlement ecosystems.

5:3.3-4 Process

A qualified conservation design development shall consist of a parcel in which a minimum of sixty (60) percent of the parcel is designated as permanent open space. The portion of the parcel designated as permanent open space shall not be further subdivided and must be protected by a conservation easement held by the homeowners' association, local conservation commission, or land trust which is recorded with the Kershaw County Register of Deeds.

Kershaw County encourages the use of conservation design on all suitable land in all development projects. All landowners and developers are encouraged to work closely with the County Planning and Zoning Staff in the design and platting process.

The developer/applicant shall supply a completed application to the Kershaw County Planning and Zoning Department which includes a draft of the conservation easement for the portion of the property that will remain as permanent open space or agricultural land, and a fully dimensioned site plan, drawn to scale, which shall demonstrate, delineate, and label all of the following:

A. The site plan submittal shall include all sketch plan, planned development district, or group development site plan elements per the requirements of this Article.
B. The location and type of sensitive areas deemed to be of agricultural, environmental, or ecological significance, as defined in this section.
C. The location and type of all proposed areas to be preserved as open space or agricultural land, including areas of mitigation and preservation.
D. For areas of agricultural preservation, a buffer strip of at least seventy-five (75) feet must be delineated. When possible, existing woodlands should be used. If not, a variety of rapidly growing indigenous trees and shrubs should be planted thickly in the buffer strip.
E. Any other provisions not specifically required or excluded herein, as required by the zoning and land development provisions of this Ordinance and all other applicable County ordinances.
F. All elements of the site plan shall be readily evident upon site inspection.
G. Elements not readily evident shall be marked for identification upon site inspection.
H. Areas designated to remain as open space or agricultural land, or areas of conservation shall be marked for identification upon site inspection.
I. All construction contracts shall include language protecting sensitive areas, agricultural land, areas of conservation, and areas containing sensitive elements.

Upon receipt of the application, the review process for the conservation subdivisions and group developments shall be the same as outlined in the procedures for plat and land development approval of this Ordinance. Included with the final plat, the developer shall submit an agreement regarding the liability for and maintenance of the open space. In addition, the developer must include a conservation easement/open space covenant protecting the open space from any further development.

The homeowners' association, local conservation commission, or land trust shall administer the permanent open space, and is responsible for upkeep, insurance, and any other responsibilities associated with ownership and/or administration of the land. The terms and conditions of the conservation easement shall be approved by the Planning and Zoning Commission.

5:3.3-5 Compliance

Failure to comply with the requirements of the conservation subdivision and group development design shall be cause for a "Stop Work" order on applicable permits. New permits or "Resume Work" orders shall not be issued until all requirements of this Ordinance are met and the required fines are paid through the courts as provided for in the Administration article of this Ordinance.

Table 3-5 SCHEDULE OF LOT AREA, YARD, SETBACK, HEIGHT, DENSITY, FLOOR AREA, AND IMPERVIOUS SURFACE REQUIREMENTS BY DISTRICT FOR RESIDENTIAL USES - CONSERVATION DESIGN

Schedule of Lot Area, Yard, Setback, Height, Density, Floor Area, and Impervious Surface Requirements by District
RESIDENTIAL USES - CONSERVATION DESIGN

DISTRICT	AREA (SQ. FT.) (A)	STREET FRONTAGE WIDTH (FT.) (B)	SETBACKS (FT. FROM PROPERTY LINE) (C)			MAXIMUM BUILDING HEIGHT (FT.) (D)	MAXIMUM IMPERVIOUS SURFACE RATIO (E)	MAXIMUM DENSITY DEVELOPED AREA (F)	MAXIMUM DENSITY ENTIRE PROJECT AREA (F)
			FRONT	SIDE	REAR				
R-15 CD	6,000 (.13 acres)	50	25	5	.20	35	.60	7.26	2.9
R-10 CD	6,000 (.13 acre) single-family 8,000 (.18 acre) duplex	50	25	5	.20	35	.60	10.89	4.35
RD-1, RD-2 MRD-1 CD	10,890 (.25 acre)	50	25	25	.20	35	.60	4.0	1.6

NOTES
SQ. FT. = square feet; **FT.** = feet; **NA** = Not Applicable

(A) Conservation design development requires utilization of public sewer or community on-site sewage treatment and disposal systems and public water for these areas to apply.
(B) As measured on street frontage unless on cul-de-sacs or on curbs less than 90 degrees.
(C) Refer to yard and setback modification provisions of this Ordinance.
(D) Measurement from average elevation of finished grade within twenty (20) feet of the structure to the bottom of the eave. Refer to exceptions.
(E) Measured as a percent of total lot area. Impervious surface ratios in conservation design (CD) projects refer only to lots located in the developable area (maximum 40%) of the project.
(F) Measurement in units per gross acre. Density of conservation design developments expressed in density of the maximum 40% project site developable area and the overall density of the entire project site.

Example: RD-1, RD-2, MRD-1 Conservation Design 100 acre tract maximum 40% developable land and minimum 60% in land preservation
Density of 4 units per acre on maximum 40 acres – 4 units/acre x 40 acres = 160 Units
Density of 1.6 units per acre on entire 100 acres – 160 units ÷ 100 acres = 1.6 units per acre

5:3.4 Tree Protection

5:3.4-1 Findings and Intent

Kershaw County finds that:

A. Trees appreciably reduce the carbon dioxide content of the air and play a vital role in air purification and the reduction of global warming.
B. Trees filter dust and other airborne pollutants from the air.
C. Trees play a significant role in filtering and purifying stormwater passing through the ground to our drinking water aquifers.
D. Tree root systems stabilize the soil and are an effective component of soil conservation, erosion control, and flood control.
E. Trees provide valuable amenities to site development by providing shade, cooling the air and land, reducing noise levels and glare, and breaking the monotony of the built environment.
F. Trees have an important aesthetic impact on the desirability of land, and consequently increase property value.

Based on these findings, it is the intent of Kershaw County to protect certain existing trees and, under the circumstances set forth in this section, to require the planting of trees to replace certain existing trees that have been removed during certain activities related to site development.

5:3.4-2 Tree Protection Definitions

Caliper - The diameter of a trunk of a nursery-grown tree or immature tree that has been grown to be transplanted in a new location, measured at six (6) inches above the top of the root mass.

Diameter at Breast Height (DBH) - The standard measure of tree diameter for trees existing in place on a site. The tree trunk is measured four and a half (4½) feet above the ground. If the tree splits into multiple trunks below four and one half (4½) feet, the trunk is measured at its most narrow point beneath the split.

Forestry Activity - Forestry activity includes, but is not limited to, timber harvest, site preparation, controlled burning, tree planting, applications of fertilizers, herbicides, pesticides, weed control, animal damage control, fire control, insect and disease control, forest road construction, and any other generally accepted forestry practices.

Forest Management Plan - Forest management plan means a document or documents prepared or approved by a forester registered in this State that defines a landowner's forest management objectives and describes specific measures to be taken to achieve those objectives. A management plan shall include silvicultural practices, objectives, and measures to achieve them, that relate to a stand or potential stand of trees that may be utilized for timber products, watershed or wildlife protection, recreational uses, or for other purposes.

5:3.4-3 Existing Significant Trees

Because any healthy pine tree of twenty (20) inches or greater diameter at breast height (DBH) and all other tree species of eight (8) inches or greater DBH is a valuable natural resource by virtue of its age, size, and its contribution to the environment, all such trees meeting this measurement shall be referred to as "significant trees" and shall be protected to the extent practical and feasible.

5:3.4-4 Unlawful to Cut, Generally

Unless authorized by the terms of this section or approved by the Planning Official, no person shall cut down, remove, damage, or destroy any significant tree located within significant tree protection zones.

5:3.4-5 Significant Tree Protection Zones

All existing significant trees located within a significant tree protection area shall be flagged and shown on the required plat, site plan, and/or phased clearing plan for a building permit, grading permit, or land development permit. No more than the allowable percentage of significant trees located in these areas shall be felled and removed under the following regulations:

A. **Type "A" Significant Tree Protection Zone -** A fifteen (15) foot wide zone measured perpendicular to and continuing parallel to the front property line on any lot or tract where a minimum of seventy-five (75) percent of existing significant trees shall not be felled and removed. Where, owing to existing land use, lot sizes or configurations, topography, or circumstances peculiar to a given piece of property, more than twenty-five (25) percent of the significant trees to be preserved must be felled, two (2) trees measuring not less than two (2) inches caliper shall be planted for every significant tree removed in excess of twenty-five (25) percent of the total number of significant trees located in each protection area. To the extent possible, such trees shall be integrated into the required landscaping.

B. **Type "B" Significant Tree Protection Zone -** The area within the public right-of-way where no significant tree shall be removed unless prior approval is granted or approval requirements are waived by the Planning Official.

C. **Type "C" Significant Tree Protection Zone** - The area within the required side yard zoning district setback from the side property line where a minimum of fifty (50) percent of existing significant trees shall not be felled and removed. Where, owing to existing land use, lot sizes or configurations, topography, or circumstances peculiar to a given piece of property, more than fifty (50) percent of the significant trees to be preserved must be felled, two (2) trees measuring not less than two (2) inches caliper shall be planted for every significant tree removed in excess of fifty (50) percent of the total number of significant trees located in each protection area. To the extent possible, such trees shall be integrated into the required landscaping.

D. **Type "D" Significant Tree Protection Zone -** The area within the required rear yard zoning district setback from the rear property line where a minimum of fifty (50) percent of existing significant trees shall not be felled and removed. Where, owing to existing land use, lot sizes or configurations, topography, or circumstances peculiar to a given piece of property, more than fifty (50) percent of the significant trees to be preserved must be felled, two (2) trees measuring not less than two (2) inches caliper shall be planted for every significant tree removed in excess of fifty (50) percent of the total number of significant trees located in each protection area. To the extent possible, such trees shall be integrated into the required landscaping.

E. **Type "E" Significant Tree Protection Zone -** Any required buffer, open space, screening, or landscaped area. All significant trees located within these areas shall be utilized to the extent practicable to meet the tree planting requirements per the Buffering, Screening, Open Space, and Landscaping; and the Water Quality Buffer provisions of the Ordinance.

5:3.4-6 Exemption for the Removal of Existing Significant Trees

Removal of existing significant trees shall be prohibited prior to securing a grading, land development, and/or building permit. However, in the event that a tree poses a severe or imminent threat to public safety or property (e.g. in times of catastrophic events or when the tree is irreparably diseased or damaged), the Planning Official may waive the requirements of this section. Written and photographic documentation must later be submitted to the Planning Official, outlining the threat which initiated the removal. The Planning Official may require replacement of any trees which are removed where it is determined that the threat resulted from negligence.

5:3.4-7 Significant Trees Removed without Permits

A. **Significant Trees Removed in Violation of this Section** - Replacement trees shall be planted where significant trees have been removed or where removal is necessitated at any time due to acts of negligence, or where sites were cleared without a replacement schedule approved by the Planning Official. The Planning Official shall require a replacement plan to be submitted for approval. The replacement plan shall identify the number, species, caliper, and location of replacement trees according to a general guideline of the combined caliper of replacement trees is equal to or greater than the combined DBH of the trees removed in excess of the maximum percentage allowable. If the DBH inches of the removed trees cannot be determined, replacement shall be based on the stump diameter.
B. **Significant Trees Removed Due to Emergencies or Death and Disease of Trees** - Replacement trees will not be required, as determined by the Planning Official, where significant tree removal is necessitated by emergencies or death and disease of trees due to natural causes per the above-referenced exemption. However, replacement trees are encouraged.

5:3.4-8 Tree Fund

A. **Fee in Lieu of Replacement Trees** - In cases in which the developer determines that a site cannot substantially support any or all of the required number of replacement trees, the developer may submit a request to pay a mitigation fee to a County Tree Fund in lieu of planting the trees.
B. **Demonstration of Need for Mitigation Fee Payment** - The applicant must request, in writing, the payment of a mitigation fee in lieu of planting replacement trees. This request must be accompanied by demonstration of why on-site planting of replacement trees in not feasible. Approval of the request shall not be made solely to alleviate financial hardship or an inconvenience. The applicant shall demonstrate that there are unique site conditions such as size, shape, or topographic conditions that will prevent the planting of any or all of the required replacement trees on-site.
C. **Determination of Fee** - The mitigation fee shall be based on the current nursery retail market value of the required replacement trees plus installation costs. The applicant shall submit at least two (2) written quotes from local nurseries for required replacement tree and installation costs.
D. **Action of Planning Official** - Upon a determination that a strict compliance of the tree replacement regulations would impose a particular hardship, the Planning Official shall determine the mitigation fee based on a reasonable reduction in the cost of the average of the nursery quotes submitted.

E. **Establishment of County Tree Fund** - Kershaw County shall establish a separate accounting fund in which tree mitigation fees in lieu of on-site replacement planting shall be credited. The County shall maintain and keep financial records of such accounting fund (the Tree Fund) showing the revenues and disbursements from the fund. Any yield on the Tree Fund shall accrue in the fund and be used for purposes specified. Tree Fund records shall be open to public inspection in the same manner as other County financial records.

F. **Disbursement of Tree Fund** - Tree Fund monies shall be spent only on the planting of trees on County-owned and maintained property. The applicable department head shall submit a request for funds to the County Administrator. The request for funds shall include:
   1. Type and number of trees proposed to be planted.
   2. Proposed planting location.
   3. Total cost estimates from at least two (2) local nurseries. It must be specified if costs include installation and/or delivery or if installation and/or delivery will be done by Kershaw County personnel.

   If approved, the County Administrator will issue a not to exceed amount purchase order to be paid out of the Tree Fund.

5:3.4-9 Tree and Root Protection Prior to Development

A. Before development of the property, the owner shall be responsible for the erection of any and all tree and root protection fencing necessary to protect any existing or installed vegetation from damage both during and after construction. All significant trees, as well as other vegetation such as native species and perimeter landscaping that will be preserved during development shall be protected with a sturdy and visible fence before clearing and grading begins.

B. The location of tree protection fencing and method of construction shall be noted on the landscape plan. Tree protection fencing shall be installed and remain in place and in good condition until all development activities are completed. The tree protection fence shall be located one (1) foot from the tree trunk for each one (1) inch in tree DBH with a minimum distance of ten (10) feet required from the edge of the trunk. Tree protection fencing shall be constructed from any material substantial enough to prohibit and keep out vehicles, people, and all other activities associated with the development process. Examples include two-inch by four-inch (2"x4") wood posts and one-inch by four-inch (1"x4") wood rails, silt fencing, or orange safety fencing a minimum of four (4) feet in height on metal or wood posts.

C. No soil disturbance or compaction, stock piling of soil or other construction materials, vehicular traffic, or storage of heavy equipment is allowed in the tree and root protection area(s) of trees to be retained.

5:3.4-10 Forestry Activity

A. **Permitted Forestry Activity** - Forestry activities are permitted on all forestland parcels within unincorporated Kershaw County that are:
   1. Taxed on the basis of its present value as forestland under SC Code of Laws Section 12-43-220(d);
   2. Managed in accordance with a forest management plan that is prepared or approved by a South Carolina Registered Forester;

3. Certified under the Sustainable Forestry Initiative, the Forest Stewardship Council, the American Forest Foundations Tree Farm System, or any other nationally recognized forest certification system;
4. Subject to a legally binding conservation easement under which the owner limits the right to develop or subdivide the land; or
5. Managed and harvested in accordance with the best management practices established by the State Commission of Forestry pursuant to SC Code of Laws Section 48-36-30.

B. **Time Restrictions on Issuing Permits** -Kershaw County may deny a grading permit, building permit, or land development permit for a period of either:
   1. One year after the completion of a forestry activity if the activity results in the removal of all or substantially all of the trees that were protected under Kershaw County tree protection regulations governing development from the tract of land for which the permit or approval is sought.
   2. Five years after the completion of a timber harvest if the forestry activity (timber harvest) results in the removal of all or substantially all of the trees that were protected under Kershaw County regulations governing development from the tract of land for which the permit or approval is sought and the harvest was a willful violation of County regulations.

5:3.5 Phased Clearing

5:3.5-1 Clearing Plan

After receiving sketch plan or site plan approval from the Planning Official or Planning and Zoning Commission, as appropriate, and prior to commencing site work on a land development that has been approved for the site construction phase, the applicant shall submit a clearing plan for approval. The clearing plan shall include the following:

A. **Identify the project footprint**.
   1. Infrastructure:
      a. Roads and drainage.
      b. Stormwater facilities.
      c. Utilities.
      d. Other infrastructure.
   2. Site improvements:
      a. Parking lots.
      b. Driveways and walkways.
      c. Building and other structures.

B. **Identify all protected areas**.
   1. Natural open space.
   2. Buffers, yards, and other areas required to be landscaped.
   3. Shoreline buffers.
   4. Stream buffers.
   5. Significant tree protection zones.
   6. Identify location of any streets and associated facilities, utility mains and easements, and/or greenways and pedestrian paths approved by Kershaw County to encroach upon a protected area per the provisions of this Ordinance.

C. **Identify all significant trees (20" or greater DBH pine trees, 8" or greater DBH all other species) located within**:
   1. Site improvement areas.
   2. Protected areas.

5:3.5-2 Site Clearing Pre-Development Phase

Once the site layout has been determined through the site analysis process and sketch plan or site plan approval has been granted, logging for marketable timber using State (SC Forestry Commission) BMPs as required by this Ordinance, may be undertaken in the project footprint area. All significant trees located within site improvement and protected areas are to be left uncut. No stump removal, grubbing, clearing, or grading shall be allowed at this time.

5:3.5-3 Infrastructure Construction Phase

Once final approval for construction has been granted, the areas to receive site infrastructure such as roads and drainage, stormwater facilities, utilities, etc. may be cleared and graded in preparation for construction. The erosion prevention and sediment control plan and tree and root protection as provided for by the Ordinance shall be followed.

5:3.5-4 Building Phase

After issuance of the building permits or individual lot building permits in the case of a subdivision, the areas to receive the principal building and accessory structures may be cleared

and graded for construction. Erosion prevention and sediment control BMPs and tree and root protection during construction as provided for by this Ordinance shall be followed. Placement and location of parking lots, perimeter buffer areas, common open space areas, walkways and drives, screening, and other areas shall be designed to utilize and preserve as many significant trees as possible. Significant trees in tree protection areas shall be preserved per the Tree Protection provisions of this Ordinance.

The Planning Official, County Engineer, and Public Works Director shall prepare phased clearing guidance documents to assist the applicant in adhering to these regulations.

5:3.6 Water Quality Buffers

5:3.6-1 Basic Requirements for Water Quality Buffers

A. **Applicability** - The following water quality buffers apply to undeveloped parcels of land in existence as of the effective date of this Ordinance. Any subsequent development and/or subdivision of such parcels shall comply with the water quality buffer requirements of this section. Refer to the Lake Wateree Overlay District provisions in Article 3 of this Ordinance for special provisions pertaining to the Lake Wateree shoreline buffer requirements.

1. **Perennial Streams** - Any existing undeveloped parcel or subsequent subdivisions thereof that has any portion of its boundaries adjacent to a field verified perennial stream as displayed by solid blue lines on United States Geological Service (USGS) 7.5 quadrangle topographic maps shall incorporate a 100-foot natural buffer along the entire length of the stream's banks contained within or adjacent to the lot. The interior edge of the buffer shall duplicate the course and direction of the top of the bank of the stream. The distance of the interior edge of the buffer shall be measured horizontally, such that at any point along the interior edge, a horizontal line would be exactly 100 feet from a vertical line extending up from the top of the bank of the stream channel. Top of bank is defined as the uppermost limit of the active channel of a stream during "bank full" conditions, typically marked by a break in slope.
    a. **Exception: Perennial Streams on Individual Lots Under Three Acres** - Any existing undeveloped individual lot under three acres in size that is not part of a larger common development that has any portion of its boundaries adjacent to a field verified perennial stream as displayed by solid blue lines on United States Geological Service (USGS) 7.5 quadrangle topographic maps shall incorporate a fifty (50) foot natural buffer along the entire length of the stream's banks contained within or adjacent to the lot. The interior edge of the buffer shall duplicate the course and direction of the top of the bank of the stream. The distance of the interior edge of the buffer shall be measured horizontally, such that at any point along the interior edge, a horizontal line would be exactly fifty (50) feet from a vertical line extending up from the top of the bank of the stream channel. Top of bank is defined as the uppermost limit of the active channel of a stream during "bank full" conditions, typically marked by a break in slope.
2. **Intermittent Streams** - Any existing undeveloped parcel or subsequent subdivisions thereof that has any portion of its boundaries adjacent to a field verified intermittent stream as displayed by dashed blue lines on United States Geological Service (USGS) 7.5 quadrangle topographic maps shall incorporate a fifty (50) foot natural buffer along the entire length of the stream's banks contained within or adjacent to the lot. The interior edge of the buffer shall duplicate the course and direction of the top of the bank of the stream. The distance of the interior edge of the buffer shall be measured horizontally, such that at any point along the interior edge, a horizontal line would be exactly fifty (50) feet from a vertical line extending up from the top of the bank of the stream channel. Top of bank is defined as the uppermost limit of the active channel of a stream during "bank full" conditions, typically marked by a break in slope.
    a. **Exception: Intermittent Streams on Individual Lots Under Three Acres** - Any existing undeveloped individual lot under three acres in size that is not part of a larger common development that has any portion of its boundaries adjacent to a field

verified intermittent stream as displayed by dashed blue lines on United States Geological Service (USGS) 7.5 quadrangle topographic maps shall incorporate a twenty-five (25) foot natural buffer along the entire length of the stream's banks contained within or adjacent to the lot. The interior edge of the buffer shall duplicate the course and direction of the top of the bank of the stream. The distance of the interior edge of the buffer shall be measured horizontally, such that at any point along the interior edge, a horizontal line would be exactly twenty-five (25) feet from a vertical line extending up from the top of the bank of the stream channel. Top of bank is defined as the uppermost limit of the active channel of a stream during "bank full" conditions, typically marked by a break in slope.

3. **Shoreline Buffers** - Any existing undeveloped parcel or subsequent subdivisions thereof that has any portion of its boundaries adjacent to lakes and ponds with hydraulic connectivity to field verified perennial streams (stream leading into and out of pond/lake), shall have a fifty (50) foot buffer perpendicular to the shoreline as defined by the 100-year high water elevation. The distance of the interior edge of the buffer shall be measured horizontally, such that at any point along the interior edge, a horizontal line would be exactly fifty (50) feet from a vertical line extending up from the shoreline. Refer to the Lake Wateree Overlay District provisions in Article 3 of this Ordinance for special provisions pertaining to the Lake Wateree shoreline buffer requirements.
    a. **Exception: Shoreline Buffers on Individual Lots Under Three Acres** - Any existing undeveloped individual lot not part of a larger common development under three acres in size that has any portion of its boundaries adjacent to lakes and ponds with hydraulic connectivity to field verified perennial streams (stream leading into and out of pond/lake) shall have a twenty-five (25) foot buffer perpendicular to the shoreline as defined by the 100-year high water elevation. This exception does not apply to individual lots on Lake Wateree.
4. **Floodways and Wetlands Associated with Perennial and Intermittent Streams** - In areas where a floodway profile has been delineated along a perennial or intermittent stream on the FEMA Flood Map of Kershaw County, the stream buffer shall be the width of the floodway if the floodway is greater than the required buffer width. In areas where wetlands have been delineated by the U.S. Army Corps of Engineers along perennial or intermittent streams, the stream buffer shall be the delineated width of the wetlands if the wetlands are greater than the required buffer width.

B. **Exception to Required Buffer Width** – A study supporting an exception to the required buffer width may be submitted to the Planning and Zoning Commission for consideration providing that the study is conducted by a qualified Professional Engineer that includes the following factors:
1. The slope of the site from the highest elevation on the site to the surface elevation of the stream, lake, or pond.
2. Annual rainfall.
3. Site soil type.
4. Type of vegetation within the buffer.
5. Amount of impervious surfaces on-site (including rooftops).
6. Stream type.
7. Existing water quality.
8. Extent of development of the watershed.

9. Use of existent or proposed stormwater BMPs in conjunction with the buffer.
10. Other characteristics specific to the site and/or the watershed.

The study shall demonstrate that a proposed buffer width that is less than the required width can be established without sacrificing water quality protection as gauged by the following standards:

a. Erosion prevention and sediment control.
b. Nutrient, pesticide, and biocontaminant (fecal coliform) removal.
c. Stream temperature.

Under no circumstances shall an exception be allowed that will result in a reduction of more than forty (40) percent of the required buffer width.

5:3.6-2 Disturbance of Buffers

Installation of any new structures (including structure replacements), disturbance of the existing terrain, or removal of existing vegetation within the water quality buffer is prohibited except as provided herein. The installation of septic systems or any portion thereof is prohibited within water quality buffers. Repair to existing septic tanks is allowed providing repairs are conducted per the Protection of Water Quality Buffers During Site Development and Construction Activity provisions of this section. This prohibition includes any disturbance or removal of topsoil, trees, and other natural growth located in the buffers, for any purpose, subject to the express, limited exceptions listed below:

A. **General Exceptions** - The following exceptions are permitted within the buffers established herein without a permit, but only upon strict observance and compliance with the provisions stated below:
   1. **Tree Removal**
      a. Within the buffer, trees less than four (4) inches DBH may be removed, provided it is done using only manual labor and hand or chain saws, and not mechanical equipment.
      b. Additionally, any trees that are dead or have become diseased or damaged through natural processes may be removed in the same manner.
      c. No motorized vehicles or construction equipment other than chain saws or similar hand-operated machines are permitted within the buffer except as specifically provided in these regulations.
   2. **Underbrush Removal**
      a. Underbrush (defined as nuisance bushes, vines, and similar rank plant growth beneath the tree canopy) may be removed within the buffer, provided that such work is performed manually and without the use of vehicular or mechanical equipment or chemical applications.
      b. This activity may also include removal of any natural or man-made debris lying on or near the floor of the buffer.
   3. **Pruning and Trimming**
      a. Pruning and trimming of trees within the buffer is permitted, provided that pruning shall be limited to tree branches beginning at the ground and extending up the tree trunk no more than one half of the total height of the tree.
      b. Trimming or pruning may also be performed on any limbs or branches that are diseased or naturally damaged.
      c. No topping of trees is permitted within the buffer.

4. **Emergency Operations** - Activities associated with emergency operations such as hazardous materials removal, flood or fire control, evacuations, and storm damage clean up are exempt from these requirements. However, any such activity must be authorized by an appropriate government agency or conducted in accordance with prior emergency management regulations.

B. **Exceptions Requiring a Permit -** The following exceptions are permitted within required water quality buffers only after submission of an application for and issuance of a written permit or approval by the Planning Official:

1. **View Corridors** - Applications for view corridors will be considered only for the Wateree and Lynches Rivers, the larger navigable streams of Kershaw County, other streams with public access, and on lakes and ponds with public access and/or multiple shoreline ownership under the following conditions:
   a. Tree removal within stream buffers to allow for view corridors is allowed; provided that such removal shall not exceed fifteen (15) feet in width, and shall not constitute an area greater than one-fifth of the total buffer area required on each lot; or
   b. Alternatively, trees may be removed randomly for the purpose of improving the views of streams, provided that an amount not greater than one-tenth of the total DBH of all trees located in the buffer area of each lot is removed.
   c. Any tree removal shall be manually performed using hand or chain saws, and no other disturbance of the natural terrain is permitted.
   d. Any view corridor or open area created through the utilization of this provision shall be stabilized and improved with shrubs, low-growing trees, or other natural groundcover plantings.
2. **Access Corridors**
   a. **Tree Removal** - Tree removal within buffers is allowed in order to:
      1.) Provide a limited access corridor to the stream.
      2.) Install shoreline stabilization and water-dependent structures.
      3.) Remove large debris or previously existing nonconforming structures.
      4.) Install paths, boardwalks, or stairs to access water-dependent structures.
   b. **Standards**
      1.) This access corridor shall not exceed fifteen (15) feet in width and shall not constitute an area greater than one-fifth of the total buffer area required for each lot.
      2.) Vehicular equipment may be operated in an approved access corridor; provided that, to the furthest extent practicable, the equipment utilizes rubberized mini-track systems, and the natural terrain is disturbed only to the extent required to safely operate such equipment.
      3.) After such disturbance, the resulting terrain shall be stabilized and revegetated with shrubs, low-growing trees, and other natural groundcover plantings that closely match the existing terrain on either side of the access corridor.
      4.) When the access corridor provided in this section is used for the installation of paths, boardwalks, or stairs leading to the stream, such structures shall not exceed six (6) feet in width.
3. **Separation Between Corridors** - Applications for multiple view and access corridors will be considered under the following conditions:
   a. There shall be a minimum of 100 linear feet of buffer between corridors.

b. The combined area of all corridors cannot exceed twenty-five (25) percent of the total buffer area of each lot.

4. **Stream Bank Stabilization** - Buffers along the stream may be adjusted to accommodate stream bank stabilization, provided that all stabilization work is performed as follows:
   a. In general, shoreline stabilization shall not extend above a height of five (5) feet above the normal stream elevation level.
   b. When the stream bank of the property adjacent to stream is equal to or less than a height of five (5) feet, stream bank stabilization may be allowed to encroach into the buffer; provided, however, that when the bank exceeds a height of five (5) feet, additional stabilization may be required.
      1.) When additional stabilization is required, to the extent authorized by a permit, the bank of the stream may be graded at an acceptable slope back toward the interior of the lot, and the slope shall be stabilized with vegetative plantings or terraced retaining walls.
      2.) When such work is permitted and such grading is employed, the interior edge of the buffer must be adjusted inward by the same distance that the stabilization activity extends from the normal stream elevation level into the original buffer.
      3.) The length of such adjustment shall be equal to the length of a horizontal line extending from the interior edge of the stabilization to a vertical line extending from the top edge of the stream bank at normal stream elevation level.
5. **Stream Crossings and Utilities Easements** - Existing easements for public and private utility facilities, including transmission or conveyance lines, communication, sewer, water or gas lines, and erosion control or stormwater structures shall be exempt, provided that any land disturbance is conducted in compliance with the applicable land disturbance regulations and is restored as soon as possible. New proposed stream crossings and utility easements may be permitted provided:
   a. An analysis is submitted to the Planning Official demonstrating that no economically feasible alternative is available.
   b. The right-of-way shall be the minimum width needed to allow for maintenance access to the installation.
   c. The angle of crossing shall be as close to perpendicular to the stream or buffer as feasible in order to minimize clearing requirements.
   d. The minimum number of crossings should be used within each development, and no more than one (1) crossing is allowed for every 1,000 linear feet of buffer zone unless no feasible alternative can be demonstrated. Where feasible, the design of roadways and lots within a development should be aligned such that all streams are either to the rear or the side of individual lots.
   e. Roadways, where permitted through the required buffers, including clearing and grading required for their construction, shall be built in accordance with the street standards of this Ordinance for the property location, and dedicated for public use after completion. The dedication of such facilities to a homeowners' association that is legally chartered and registered with the SC Secretary of State shall be considered a public use for the purposes of this provision.
   f. Non-bisecting utility easements running perpendicular to a stream are allowed, and where feasible, shall be installed a minimum of twenty-five (25) feet from the top of

bank on perennial streams and a minimum of fifteen (15) feet from the top of bank of intermittent streams and shorelines.

g. Installation procedures for an approved utility easement buffer crossing or the installation of an approved utility easement within a segment of a buffer shall be conducted as follows:
   1.) A double row of silt fence (with metal posts and wire backing) or other sediment/erosion control device approved by the Stormwater Manager shall be installed along the area of disturbance prior to commencement of work.
   2.) Disturbed areas shall be seeded and mulched at the end of each workday.
   3.) Standard BMPs for work in live waterways shall be implemented.
   4.) All other applicable stormwater regulation requirements must be adhered to.

6. **Stream Re-Location** - Land disturbing activities for construction in, on, or under a stream, lake/pond, or other natural watercourse shall be planned and conducted to minimize the extent and duration of disturbance of the stream channel or lake/pond bed. Any proposed relocation of a stream must be demonstrated as an essential part of the proposed activity and that no practicable alternative is available. Pre-approval by the County must be granted prior to obtaining all other applicable Federal and State permits. Notwithstanding Federal and/or State permit requirements, the relocation shall be planned and executed to the extent practicable to minimize changes in the stream flow characteristics.

7. **Exceptions for Public Recreational Facilities**
   a. **Purpose** - The value of a stream or lake as a recreational resource is dependent upon the protection of its water quality. Because public recreational facilities such as swimming beaches, boat ramps, trails, picnic areas, bank fishing areas, and fishing docks require direct shoreline access and/or viewsheds, the following exceptions to the disturbance of buffers at such facilities are provided.
      1.) **Modification of Buffer Boundaries** - Activity areas of public recreational facilities that are strictly water and shoreline dependant (swimming beaches, boat launches, and bank fishing areas) may have the exterior (lakeside) boundary of the required buffer adjusted to follow the proposed perimeter of the activity area. In such cases, the distance of the interior edge of the buffer shall be measured horizontally, such that at any point along the interior edge, a horizontal line would be the exact required buffer width from a vertical line extending up from the perimeter of the activity area.
      2.) **Location of Facilities** - Public recreational facilities that are not water dependant (parking lots, bath houses, club houses, picnic shelters, etc.) shall be located behind the interior buffer boundaries.
      3.) **Access and View Corridors at Public Recreational Facilities**
         a.) **Access Corridors** - Corridors through the buffer shall be permitted to allow pedestrian access to water dependant shoreline activity areas. The number of access corridors shall be limited to those needed to provide adequate access between the activity areas and recreational facilities. Access corridors shall also be permitted to provide vehicular access to boat launches.
         b.) **View Corridors** - Water views are an important factor in the recreational experience for non-water dependant activities such as picnicking and walking. Recreational facilities master plans shall consider the placement of

facilities desiring viewsheds and the design of the viewshed to accommodate the water view without diminishing the water quality functionality of the buffer.

c.) **Trails** – Walking, hiking, and bicycle trails shall where feasible, be installed a minimum of twenty-five (25) feet from the top of bank on perennial streams and a minimum of fifteen (15) feet from the top of bank of intermittent streams and shorelines. Such trails shall not exceed six (6) feet in width.

4.) **Stormwater Management** - The public recreational facility master plan shall incorporate the following stormwater best management practices and stormwater pollution prevention measures:

a.) Access corridors and trails shall be designed such that there is positive drainage of the corridors into the buffer area and such that the corridors and trails do not function as a conduit for direct stormwater discharge into the lake/pond/stream. Corridor and trail drainage shall be designed to promote sheet flow to minimize channelization of runoff.

b.) Land development shall be planned in harmony with the natural runoff pattern and along the contours.

c.) Impervious surfaces shall be limited. Surface drainage shall be designed to promote sheet flow to minimize channelization of runoff.

d.) Chemicals such as fertilizers, pesticides, and herbicides shall be applied at appropriate rates and shall not be applied within 100 feet of unprotected shorelines.

e.) All trash receptacles shall be firmly secured from animal and weather disturbances and contact with stormwater.

5.) **Review and Approval of Public Recreational Facility Master Plans** - The recreational facility master plans shall be included in the group development submittal and review and shall be approved by the Planning and Zoning Commission per the submittal requirements and approval process provisions of this Ordinance.

C. **Approval Procedures for Permitted Activity**

1. Except as permitted under General Exceptions provisions section of this Article, no shoreline stabilization, tree removal, or land disturbance activity of any kind, including those permitted under the Exceptions Requiring a Permit provisions, shall be conducted in the buffer without a written permit or approval for such activity issued by the Kershaw County Planning and Zoning Department. The Planning Official shall submit the permit request to the Stormwater Manager and shall obtain the Manager's written approval prior to issuing the permit. In order to apply for approval, the parcel owner must supply the Planning and Zoning Department with three (3) copies of a survey prepared by a South Carolina-Registered Land Surveyor showing the following:
   a. The extent of any stream or shoreline buffer on the subject property shown by metes and bounds.
   b. The labeling of the stream and shoreline buffer.
   c. The location of any previously existing nonconforming structures located within the buffer.
   d. The location and size of any existing tree, four (4) inches DBH or greater, located in the buffer.

e. The location of the proposed activities for which approval is being requested.

2. The approval request shall be submitted in writing and shall include a detailed description of the permitted activity with any required supporting information needed to establish that the requested activity meets the requirements of this section. Requests with incomplete information to support the proposed activity will not be considered. Survey flagging shall clearly indicate the following:
   a. The location of the lake/pond shoreline and/or stream top of bank.
   b. The interior edge of the buffers.
   c. All trees four (4) inches DBH or greater.
   d. All trees proposed to be removed.
   e. All areas proposed to be disturbed on the subject property.

D. **Water Quality Buffer Plat Requirements** - Water quality buffers, where required by these regulations, shall be shown on all land development application site plans and on all final plats prepared for recording. When a subdivision of a property is proposed, the water quality buffer plats must be prepared and approved for the entire parcel prior to approval of the subdivision. The water quality buffer plat shall address the following items:
   1. The extent of any stream or shoreline buffer shall be shown on the subject property by metes and bounds.
   2. The stream and shoreline buffer shall be labeled.
   3. A note shall be provided to reference all buffers stating: "There shall be no clearing, grading, construction, or disturbance of vegetation except as permitted by the Kershaw County Planning Official."
   4. A note shall be provided to reference any protective covenants governing all buffer areas stating: "Any buffer shown on the plat is subject of protective covenants which may be found in the land records and which restrict disturbance and use of these areas."
   5. If a study supporting an exception to the required buffer width has been approved, a note must be provided stating, "Exception to required buffer width approved _____ (date)."
   6. If the buffer area will not be part of an individual lot, then ownership must be stated by identifying who is the responsible party.

E. **Enhancement of Buffers** - In areas in which the natural buffer has been disturbed or compromised, the buffer may be enhanced with additional plantings. When landscaping within the buffer is conducted as a means of enhancing the natural buffer, it shall be performed manually and without the use of vehicular or mechanical equipment to the greatest extent practicable, and stringent erosion prevention and sediment controls shall be utilized to protect the stream from siltation as a result of landscaping activities. Planting of native and adaptive species is encouraged. The planting of invasive species is not allowed. A list of native and adaptive species is available from the Planning and Zoning Department.

   Enhancement, restoration, and/or reestablishment of water quality buffers on land developed prior to the effective date of this Ordinance are strongly encouraged. For redevelopment projects on such parcels that will require a building and/or land development permit, water quality buffers are a preferred best management practice for erosion prevention, sediment control, and stormwater management. The Kershaw County Stormwater Manager may require the enhancement, restoration, and/or reestablishment of water quality buffers on any parcel of land, structure, or activity which is causing or contributing to pollution, including

non-point pollution of the waters of Kershaw County; erosion or sedimentation of stream channels; and/or degradation of aquatic or riparian habitat.

F. **Protection of Water Quality Buffers During Site Development and Construction Activity** - A water quality buffer plan ensuring the following safeguards shall be included in all required erosion prevention and sediment control plans, as applicable:
   1. Water quality buffers must be clearly identified on all stormwater management plans and construction drawings and must be marked with the statement "Water Quality Buffer. Do Not Disturb."
   2. Water quality buffers cannot be encroached upon or disturbed during project construction, unless in accordance the General Exceptions and the Exceptions Requiring a Permit provisions of this section or unless they are being established, restored, or enhanced in accordance with an approved buffer enhancement plan.
   3. Water quality buffers must be clearly marked with a warning barrier before construction activities begin. The marking shall be maintained until completion of construction activities. All contractors and others working on the construction site must be made aware of the existence of the buffer(s) and the restrictions on disturbing the buffer(s).
   4. All areas of the water quality buffer, including stream banks, must be left in their existing condition upon completion of construction activities. Should construction activities associated with development cause degradation to stream banks, all eroding, bare, or unstable stream banks shall be restored to existing conditions.
   5. If any trees are allowed to be removed, tree location shall be shown and a note shall be provided stating that the tree must be hand cleared.
   6. The locations of all signage must be clearly shown on plans.
   7. A narrative stating the extent of the buffer areas, including any allowed disturbance in the buffer areas, must be included with the plans.
   8. A double row of silt fence (with metal posts and wire backing) or other sediment/erosion control device approved by the Stormwater Manager shall be shown between the project boundary and the interior side of the applicable buffer area(s).
   9. The water quality buffer shall be shown and labeled on all land development application site plans and on all final plats prepared for recording.

5:3.7 Stormwater Management Standards

5:3.7-1 Definitions

Best Management Practices (BMPs) - Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices, as well as structural controls to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to prevent erosion, control runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Forebay - A forebay is a small pool or basin (typically about ten percent of the volume of the main pond area) that is placed upstream of the main pond area and below the inlets into the pond. The forebay is separated from the main pond area by barriers or baffles that may be constructed of earth, stones, rip-rap, gabions, or geotextiles. A forebay is designed to trap coarse particles that would otherwise accumulate in the main pond area. By catching the coarse particles, routine maintenance is then typically performed on the much smaller forebay, thereby greatly reducing the need to dredge the main pond. Depending on the number and location of the inlets into the pond, either one larger or several smaller forebays may be required. Also referred to as a sediment forebay.

Low Impact Development (LID) - A stormwater management and land development strategy applied at the parcel and subdivision scale that emphasizes conservation and use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely mimic pre-development hydrology. LID focuses on how water enters a site, is stored on-site, is used on-site, and leaves a site. Land development that incorporates LID practices minimizes impervious surface, protects and enhances native vegetation and soils, and manages stormwater at its source. The goal of LID is to prevent measurable harm to streams, lakes, wetlands, and other natural aquatic systems from commercial, residential, or industrial development sites while also promoting beneficial use (or reuse) of naturally occurring water on the development sites.

Municipal Separate Storm Sewer System (MS4) - Conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) which is owned or operated by a State, city, town, borough, county, parish, district, association, or other public body and is designed or used for collecting or conveying stormwater, which is not a combined sewer and is not part of a Publicly Owned Treatment Works (POTW). The term *MS4* typically refers to that public body whose conveyance system is further regulated by the National Pollution Discharge Elimination System (NPDES) as defined in the *Clean Water Act* and associated State NPDES General Permits for Storm Water Discharges.

Pond, Detention - A detention pond provides temporary storage of stormwater (e.g., twenty-four hours) to allow particles and associated pollutants to settle and has an outlet structure that allows the stormwater runoff to be discharged at or below the predevelopment runoff rate. Detention ponds do not have a permanent pool and are designed to drain completely dry after some minimum time (e.g., 72 hours). If the twenty-four hour, 100-year volume is exceeded either due to larger or consecutive storm events, the pond is designed to release the excess water via an emergency spillway. Also referred to as a dry pond, dry detention pond, extended detention pond, or extended detention basin.

Pond, Retention - A retention pond is a detention pond or shallow basin that is designed to impound stormwater runoff from up to a twenty-four hour, 100-year storm event and infiltrate the stormwater into the soil. Retention ponds do not have a permanent pool and are designed to drain completely dry after some minimum time (e.g., 72 hours). If the twenty-four hour, 100-year volume is exceeded either due to larger storm events, consecutive storm events, or changes in infiltration rates, the pond is designed to release the excess water via an emergency spillway. Also referred to as an infiltration basin or retention basin.

Pond, Wet - Wet ponds are detention ponds that are constructed to have a permanent pool of water throughout the year. Wet ponds treat incoming stormwater runoff by allowing particles and associated pollutants to settle, while biological activity takes up nutrients. During any given storm event, stormwater runoff enters the pond and replaces the "treated" water in the permanent pool that has been detained from the previous storm event. Like a dry detention pond, a wet pond also provides temporary storage of stormwater runoff from up to a twenty-four hour, 100-year storm event and has an outlet structure that allows the stormwater runoff to be discharged at or below the predevelopment runoff rate. In addition, if the twenty-four hour, 100-year volume is exceeded either due to larger or consecutive storm events, the pond is designed to release the excess water via an emergency spillway. Also referred to as a permanent pool detention pond, stormwater pond, wet detention pond, or wet extended detention pond.

5:3.7-2 General Storm Draining Design

A. **National Resources Conservation Service (NRCS) Methodology** - Kershaw County prefers the NRCS, formally the Soil Conservation Service (SCS), methodology for determining runoff and designing storm drainage systems. The Rational Methodology or any other reputable, established method may be used for determining peak flows, and sizing drainage channels and piping systems. In all calculations, coefficients should be consistent with other guidance in the standards specified herein. Kershaw County utilizes the NRCS Method to verify drainage calculations, and any significant discrepancy in quantities shall be resolved before construction is approved.

B. **No Negative Impact** - In areas where there are known drainage problems, no construction shall be allowed which will have an adverse impact on the peak runoff rate, timing, and/or volume until it is reasonably established that no negative impact will result.

C. **Required Storage and Release** - A combination of storage and regulated release of stormwater runoff shall be required for all developments located in areas where there are inadequate receiving systems, manmade or natural, to accommodate the projected runoff.

D. **Peak Release Rate** - The peak release rate of stormwater from any development utilizing detention ponds shall not exceed the stormwater runoff rate from the area in its pre-developed state for the design storm. The carrying capacity of the systems immediately downstream shall also be considered in determining the allowable release rate. In watersheds with recognized drainage problems, the allowable release rate and volume may be limited to less than the pre-developed rates.

E. **Wetlands Preservation and Conservation** - Kershaw County upholds the preservation and conservation of wetlands as a means of reducing adverse impacts from pollution, storm drainage, and sedimentation. Any proposed development involving delineated wetlands shall comply with all Federal, State, and local laws and regulations.

F. **Design Consistency** - Stormwater drainage systems shall be designed for consistency with general concerns and values of the Kershaw County standards addressed herein, the Kershaw

County Stormwater Management Ordinance (SWMO), as well as other Federal, State, and local laws and regulations. Kershaw County encourages the use of Low Impact Development (LID) practices, but reserves the right to review all applicable data, calculations, details plans, specifications, etc. associated with a particular plan or practice. All factors shall be taken into consideration including, but not limited to: Environmental benefits, maintenance costs, location, aesthetics, impacts on other property owners, etc. The County Engineer may grant variances to the standards which would otherwise be an impediment to implementing a LID stormwater management plan or practice that is determined to be potentially beneficial to Kershaw County. In making a determination of a variance, the County Engineer shall consult with the Public Works Director, Planning and Zoning Director, and/or other departments involved with the subject project.

5:3.7-3 Design Features

A. **Internal Drainage** - The internal storm drainage system shall be designed to accommodate the design storm. The roadway drainage system (pavement, curb, gutter, and/or any associated convenience system) shall be designed to accommodate a storm with a ten (10) year return frequency.
B. **External Drainage** - Any off-site stormwater runoff onto the proposed development shall be accommodated. Design parameters and coefficients used in all calculations for off-site stormwater shall be based on the projected build out of the basin. The design storm shall be dictated by these standards with due consideration given to the downstream system capacity.
C. **Building/Structure Drainage** - Where practicable, drainage from rooftops of existing or proposed buildings and/or structures should be directed across pervious areas and should not be piped directly to the storm drainage system. When this is not practical, piping rooftop runoff away from the building or structure and discharging to an on-site pervious area is acceptable. All other exceptions, including piping to off-site pervious areas to which legal easements are obtained, shall be reviewed on a case-by-case basis.

5:3.7-4 Design Storm Standards

A. **Minor Drainage Systems: 0 - <40 Acres** - All street drainage, curb and gutters, pipe systems, culverts, ditches, and channels which drain less than forty (40) acres shall be designed to accommodate flows resulting from a ten (10) year frequency storm. Minimum allowable pipe diameter shall be eighteen (18) inches. A drainage area map shall be supplied delineating all drainage areas.
B. **Intermediate Drainage Systems: 40 - <100 Acres** - All drainage systems draining at least forty (40) acres but less than 100 acres shall be designed to accommodate flows resulting from a twenty-five (25) year frequency storm. A drainage area map shall be supplied delineating all drainage areas.
C. **Major Drainage Systems: 100 - <300 Acres** - All drainage systems draining at least 100 acres but less than 300 acres shall be designed to accommodate flows resulting from a fifty (50) year frequency storm. Encroachment upon a major drainage channel and the adjacent overland flow is discouraged and shall be avoided as much as practicable. An easement shall be provided that is sufficient to accommodate the design flow. A drainage area map shall be supplied delineating all drainage areas.
D. **County or FEMA Flood Plains: 300 Acres or More** - All natural channels, creeks, or rivers which drain 300 acres or more, are classified as flood areas and shall be avoided as much as

practicable. All unavoidable improvements such as culverts or bridges along these channels shall be designed to accommodate flows resulting from a 100-year frequency storm. An easement shall be provided that is sufficient to accommodate the design flow. A drainage area map shall be supplied delineating all drainage areas.

E. **Flood Prevention** - All drainage systems, regardless of size or classification, shall be analyzed and revised as necessary to ensure that overflow of the system does not result in the likelihood of dwelling flooding, property damage, public access flooding, and/or interruption of utilities during a 100-year frequency storm event. All computations shall be based on the contributing basin being fully developed and shall be in compliance with the Kershaw County Flood Damage Prevention Ordinance.

5:3.7-5 Storm Drainage Calculations

A. **Hydrologic Calculations** - All hydrologic calculations shall be conducted using a volume based hydrograph method acceptable to the Public Works Director and/or County Engineer. The design storm shall be based on the applicable National Resources Conservation Service (NRCS) twenty-four (24) hour rainfall distribution with a five (5) minute burst duration time increment. The Rational or Modified Rational Method may be utilized for sizing individual culverts that are not part of a pipe system and does not have a contributing drainage area greater than twenty (20) acres. The storm duration for the Rational or Modified Rational Method shall be equal to the time of concentration of the contributing drainage area or a minimum of five (5) minutes, whichever is greater.

B. **Consideration of Entire Project** - Stormwater management requirements for a specific project shall be based on the entire project being developed. If the project is phased, the initial submittal shall control the area proposed in the initial phase and establish a procedure and obligation for the total site control.

C. **Stormwater Quality Control** - Stormwater quantity control is an integral part of overall stormwater management. In areas where there are known drainage problems or where the downstream channels, natural or manmade, are inadequate to accommodate the projected runoff, detention and/or retention ponds may be required to control the peak discharge rate and/or volume. The requirements for detention ponds, retention ponds, and/or downstream improvements shall be established by the Public Works Director and/or County Engineer. Kershaw County advocates the use of existing natural channels in their natural state, discourages practices that encroach into natural flood prone areas, and shall consider channel improvements and/or ponds as a last option.

D. **Discharge Velocities** - Discharge velocities shall be reduced to provide a non-erosive velocity flow (2.5 fps in sand soils, 5 fps in clay soils) from all structures. In channels, the velocity shall be equal to or less than the velocity of the ten (10) year, twenty-four (24) hour storm discharge in the receiving waterway prior to the land disturbance.

E. **Ponds** - All ponds that are not engineered as part of a stormwater management system that impede, encroach, or alter a major drainage channel or flood prone area shall be capable of accommodating stormwater from a 100-year storm event based on fully developed conditions in the watershed.

F. **Wetlands** - Where delineated wetlands are intended as a component of an overall stormwater management system, approval shall not be granted until all necessary Federal and State permits have been obtained.

G. **Vector Control** - All stormwater management and sediment control practices shall be designed, constructed, and maintained with consideration for the proper control of mosquitoes and other vectors.

H. **Drainage Calculations** - A complete set of drainage calculations is required with each engineering plan submittal. For more information on submittal requirements, refer to the applicable sections of this Article. If the site is located in an area that does not have an adequate downstream system, calculations shall be provided for pre-developed and post-developed conditions on the site. Based on the pre-developed and post-developed calculations, the increase in stormwater runoff can be determined. This increase should be handled in one of the following manners: detention and/or retention ponds as required, approvable downstream drainage improvements, and/or the obtainment of a stormwater discharge easement from an adjacent property owner whose land has the capacity to accommodate the projected runoff.

1. **Land Use Descriptions** - Land use descriptions for pre-developed conditions shall be based on the 2007 aerial photography on record with the Kershaw County Assessor's Office. Any exceptions to the apparent land use indicated in the aerial photography shall be reviewed on a case-by-case basis. The Public Works Director/County Engineer may revise the reference year for the aerial photography as deemed necessary.
2. **NRCS Urban Hydrology for Small Watersheds** - A complete set of instructions, sample calculations, and formats are provided in the NRCS *Urban Hydrology for Small Watersheds Technical Release Number 55* (TR-55). Use of these standard formats will expedite the engineering review process. If a different format is utilized, the following information, as a minimum, shall be provided for each drainage area to support the calculations:
   a. Size (in acres).
   b. Hydraulic Length (in feet).
   c. Average Slope (in percent).
   d. Curve Number (CN).
   e. Peak Rate Factor (PRF) - Shall provide calculations to support if different from 484.
   f. 24-Hour Rainfall Factor - Refer to IDF chart for project area.
3. **Calculation Software** - There are various acceptable storm drainage software programs available based on the NRCS Method. If a computer program is utilized, adequate information as listed above is required. A summary report of the data used which provides key values/factors/coefficients and output data used in sizing each part of the drainage system is also required.
4. **Rational Method** - In cases where the Rational Method is utilized, the drainage calculations and factors shall be arranged in a logical and systematic fashion so that the calculations for the entire development are easy to follow, and the contribution of each and every segment of the system is able to be isolated. As a minimum, the following information shall be provided for each area/sub-area:
   a. Size (in acres).
   b. Percent of area which is impervious.
   c. Hydraulic Length.
   d. Average Slope (in percent).
   e. Time of Concentration.
   f. Rainfall Intensity.

Note: Failure to provide the minimum required data will result in an increased review time, disapproval of the submittal, and/or delay of the review process until additional information is provided. Refer to Table 5-11 below.

Table 5-7 RANGES OF RATIONAL METHOD RUNOFF COEFFICIENTS ("C")	
Description of Area	**"C" Value**
Business:	
Downtown Areas	0.70-0.95
Neighborhood Areas	0.50-0.70
Residential:	
Single-Family Areas	0.30-0.50
Multi-Family Areas	0.40-0.75
Apartment	0.50-0.70
Industrial:	
Light Development	0.50-0.80
Heavy Development	0.60-0.90
Parks, Cemeteries	0.10-0.25
Unimproved Areas	0.10-0.30
Playground Areas	0.20-0.35
Character of Surface	**"C" Value**
Paved Streets and Areas	0.70-0.95
Drives and Walks	0.70-0.95
Roofs	0.75-0.95
Source: Design and Construction of Sanitary and Storm Sewers, American Society of Civil Engineers and the Water Pollution Control Federation, 1969.	

5. **Minimal Acceptable "C" Values** - The minimum acceptable values in Kershaw County are 0.25 for undeveloped sandy soils, 0.40 for undeveloped clay soils, 0.35 for residential in sandy soils, and 0.55 for residential in clay soils. For impervious surfaces, a minimum "C" value of 0.90 shall be used.
6. **Time of Concentration** - The time of concentration should be calculated using an acceptable method or formula such as the Upland Method or other accepted methodology. Once the time of concentration is known, the corresponding rainfall intensity can be determined using the following table:

Table 5-8 RAINFALL INTENSITY FOR KERSHAW COUNTY						
Time of Concentration (minutes)	**Frequency/Recurrence Intervals (years)**					
	2	**5**	**10**	**25**	**50**	**100**
5	5.39	6.32	7.04	8.09	8.94	9.79
10	4.77	5.57	6.18	7.07	7.79	8.49
15	4.28	4.98	5.51	6.28	6.90	7.50
20	3.88	4.50	4.97	5.65	6.20	6.72
30	3.27	3.77	4.16	4.71	5.14	5.56
40	2.82	3.25	3.57	4.03	4.40	4.75
50	2.48	2.85	3.13	3.53	3.84	4.15
60	2.21	2.54	2.78	3.14	3.41	3.68
90	1.66	1.91	2.09	2.35	2.56	2.75
120	1.33	1.53	1.67	1.88	2.04	2.20
Source: Rainfall intensities calculated using rainfall intensity values provided by SC Department of Transportation for Camden, SC.						

5:3.7-6 System Capacity

The capacity of closed storm drainage systems, open channels, culverts, and bridges shall be determined in accordance with accepted engineering practices. The Manning equation is the most commonly used method. Values for the Manning's roughness coefficient (n) can be found in various standard hydraulic texts. Values most frequently used in Kershaw County are 0.013 for reinforced concrete pipe (RCP), 0.024 for corrugated metal pipe (CMP), and 0.011 for PVC pipe. Values for open channels shall be selected from acceptable values as shown in a classic text such as *Open Channel Hydraulics* by Chow.

Any factor having a significant impact shall be considered. In the case of culverts, inlet and outlet control conditions shall be specifically taken into account.

5:3.7-7 Storm Drainage Pipes

A. **Staking of Drainage Lines** - Storm drainage lines shall be staked at each box or at intervals that would be sufficient to check alignment and grade. The use of lasers to enhance control of vertical and horizontal alignments is recommended.
B. **Minimum Diameter** - The minimum size storm drainage pipe shall be eighteen (18) inches in diameter.
C. **Slope** - The minimum allowable slope for storm drainage pipe shall be one-half of one percent (0.5 % or 0.005 ft/ft) and/or a minimum flow velocity of three (3) feet per second at all flow levels. Maximum allowable slope is twenty (20) percent. Any storm drainage pipe designed on a grade in excess of ten (10) percent shall require pipe anchors (thrust blocks) to prevent pipe separation.
D. **Side Property Drainage Ditches** - Side property line drainage ditches shall be piped to the rear property line or for a minimum distance of 150 feet, whichever is less. Drainage system discharge points shall be designed to prevent concentrated point discharges onto adjacent properties unless the adjacent property owner has granted a written stormwater point discharge easement. The discharge velocity shall be in compliance with these standards based on the soil type.
E. **Outlet Protection** - Outlet protection is required at all pipe outfalls and should consist of grouted rip-rap on non-woven geotextile filter cloth, turf reinforcement mats (TRM), semi-rigid polymer transition mats, articulated concrete blocks, and/or other approved structural measures. The design of outlet protections shall be based on the current revision of the SCDHEC *Stormwater Management BMP Handbook*, manufacturer recommendations, and/or similar design methods.
F. **Pipe Specification** - The type and class of storm drainage pipe, as well as the construction, shall be in accordance with SCDOT specifications. Reinforced concrete pipe (RCP) shall be required in all load bearing installations such as under roads. Any type of pipe other than RCP shall be considered on a case-by-case basis.
G. **Cover** - A minimum of one (l) foot of cover shall be provided for all storm drainage pipes.
H. **Pipe Crossing Under Pavement** - Storm drainage pipe shall be placed to minimize the length running under pavement. Where it is necessary for pipe to cross under the roadway, the horizontal pipe alignment shall be as near to a ninety (90) degree angle as practicable but in no case shall the angle be less than forty-five (45) degrees. All cross lines in the roadway shall be compacted in twelve (12) inch lifts to ninety-five (95) percent of a standard proctor density and the top twelve (12) inches shall be compacted to 100 percent of a standard proctor density.

I. **Roadway Embankments** - Any open-end storm drainage cross line shall extend out to the toe of the roadway embankment. In no case shall the end of the pipe be within the five (5) foot shoulder area.
J. **Alignment of Pipe Discharges** - Storm drainage pipe discharging into a ditch or channel shall be aligned such that the angle of intersection, measured from the centerlines of flow, is less than or equal to ninety (90) degrees. In order to prevent scour and erosion, rip-rap or other suitable outlet protection is required from the outlet point to the bottom of the channel and on the opposite channel bank.
K. **Discharges into Ponds** - Storm drainage pipes discharging into a pond or lake shall have the discharge invert above the normal pool level and outlet protection is required from the invert to the pool level.
L. **Required Maintenance Access** - A maintenance access point shall be provided within every 300 feet for eighteen (18) inch diameter pipes, every 400 feet for twenty-four (24) inch diameter pipes and every 500 feet for larger diameter pipes.

5:3.7-8 Headwalls

All exposed ends of pipes shall be protected by a flared end section or one of the following types of head walls:

A. Concrete headwalls or headwalls made of brick plastered with grout are preferred, and shall be required on pipes located in major drainage channels. A headwall constructed without wings is acceptable on pipes twenty-four (24) inches or less in diameter. Pipes greater than twenty-four (24) inches in diameter shall require winged headwalls.
B. A rip-rap headwall is acceptable for pipes twenty-four (24) inches or less in diameter in some situations and will be considered on a case-by-case basis. A rip-rap headwall requires the use of both non-woven geotextile filter fabric and cementitious grout.

5:3.7-9 Catch Basins, Drop Inlets, and Junction Boxes

A. **SCDOT Specifications** - Materials and specifications shall be in accordance with SCDOT specifications.
B. **Access Covers** - Yard inlet basins (Type 9) and junction boxes with concrete covers shall have a metal ring and cover cast within the top for access.
C. **Access Rungs** - When the depth of the catch basin or junction box exceeds four (4) feet in depth, measured from the top, rungs/steps shall be provided for ascent and descent (steps are to be ASTM-C-478 or equivalent).
D. **Inside Dimensions** - The inside dimensions at the top of the catch basin or junction box shall be three (3) feet by three (3) feet. The inside of the catch basin or junction box shall be plastered with grout.
E. **Pipe Protrusion** - All pipes entering or exiting the drainage structure shall not protrude more than four (4) inches.
F. **Modified Florida Catch Basins** - All roadway catch basins shall be modified Florida catch basins, Type I or Type II.
G. **Inlet Capacity** - For calculation purposes, the maximum capacity of roadway catch basin inlets shall be ten (10) cfs on a slope and twelve (12) cfs in a sump condition.
H. **Location of Catch Basins** - Catch basins should be located outside of curve radii. If this is not practicable, the catch basin shall be set back one (1) extra foot from the standard location.

The face of the catch basin shall be parallel with the chord of the curve radius by projecting lines from the sides of the catch basin box.

I. **Minimum Drop of Inlet and Outlet Inverts** - Each catch basin shall have a minimum drop of 0.2 feet from the invert in to the invert out.

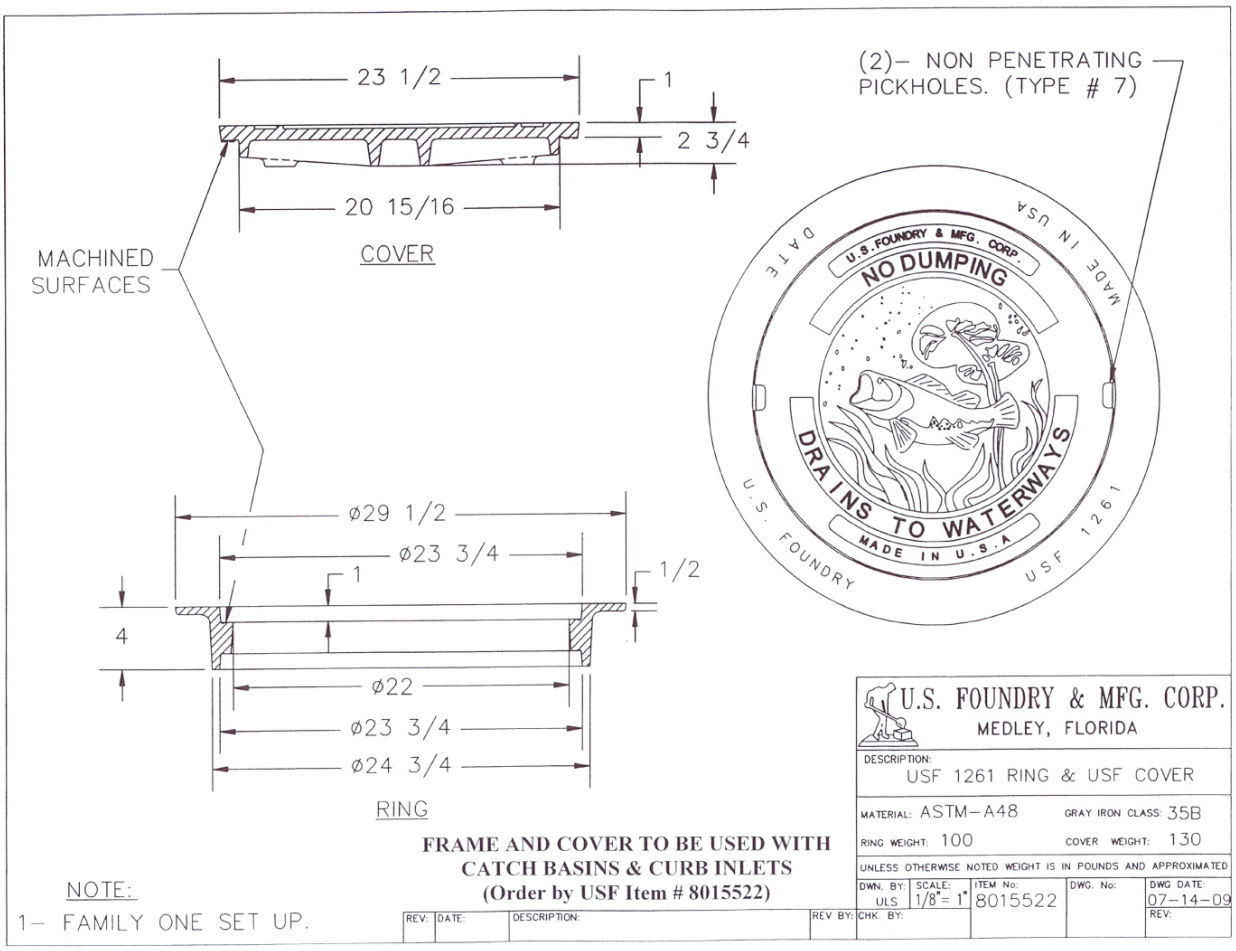
J. **Box Floors** - The floor of the boxes shall be concrete as shown on the typical detail contained herein. A formed trough is recommended to improve channel flow.

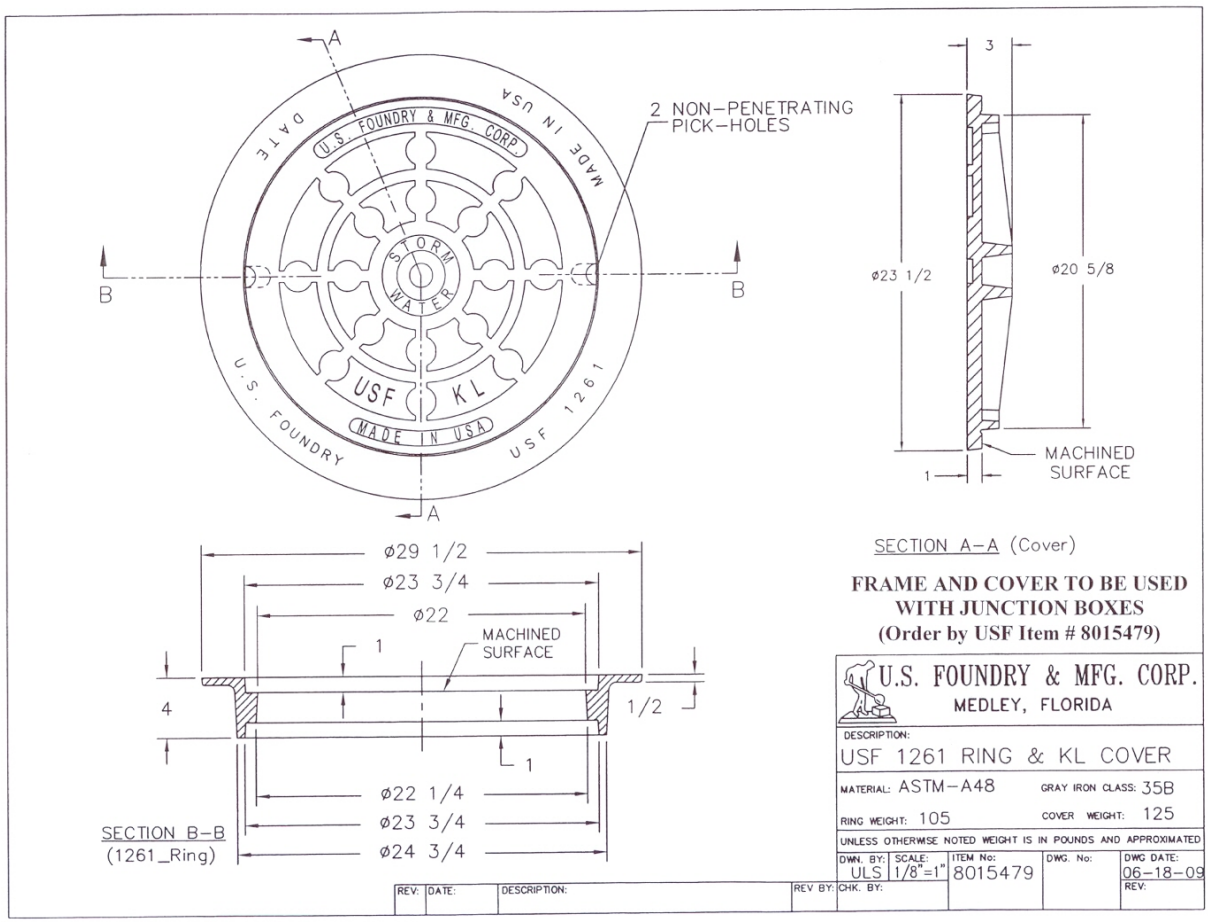
K. **Pipe Elevation** - The elevation at the crown of any inlet pipe into a box shall be at or above the crown of the outlet pipe.

L. **Staking** - All storm drainage structures shall be staked to ensure proper alignment with the roadway.

M. **Backfill** - All backfill material around catch basins shall be clean, select material and shall be compacted to ninety-five (95) percent of a standard proctor maximum density.

N. **Cast Labels** - All yard, curb, and/or drop inlets and catch basin manhole covers, grates, and/or frames shall be cast with the stormwater message, "No Dumping - Drains to Waterways," or similar approved message. In addition, all associated covers shall be shown in the USF Item #8015522 ring and cover detail, as illustrated below. Junction Box covers shall be cast with the message, "Storm Water," and shall be shown as in the USF Item # 8015479 ring and cover detail, as illustrated below. Equivalent frames and covers shall be reviewed on a case by case basis, and must be approved prior to construction.





5:3.7-10 Open Channels

A. **Open Channel Configuration** - All open channels shall be uniform in configuration and shall be stabilized in a manner approved by the Public Works Director and/or County Engineer.

B. **Mannings Equation** - The design of open channels shall be based on the Mannings equation. The flow velocities for the design storm shall be less than 2.5 fps in sand soils and 5 fps in clay soils. If the velocity exceeds these parameters, the channel surface shall be mechanically treated with rip-rap, concrete, etc.

C. **Design Grade** - The minimum design grade for open channels shall be 0.005 ft/ft.

5:3.7-11 Detention Ponds

A. **Detention Pond Design** - Detention ponds shall be designed utilizing a traditional reservoir routing procedure and analyzing a twenty-four (24) hour storm. The NRCS Method of calculations shall be required on all detention ponds. It shall be recognized that ponds deal primarily with volume and if the volume is handled correctly, the peak flow shall also be accommodated.

B. **Outlet Control Structures** - Outlet control structures shall be designed to limit the discharge rate to the pre-developed peak rate for each of the return storms up to and including the design storm. The design storm shall be dictated by the contributing watershed area.

C. **Multiple and Multi-Staged Outlets** - In most cases, multiple outlets or the use of a multi-staged outlet, such as a "V"-notched" weir, shall be required.
D. **Pond Dam Piping** - The smallest diameter pipe that can be installed through a pond dam is eighteen (18) inches. If the outlet control device is less than eighteen (18) inches in diameter, the required size pipe shall be stubbed into a concrete box and an eighteen (I8) inch pipe shall exit the box to the desired outfall point. This same principle can be applied toward providing emergency spillway capacity, even if larger diameter pipe sizes are designed. The top of the box can be utilized as an emergency overflow weir with the invert set so that the design storm is contained below this elevation.
E. **Emergency Spillway** - All detention ponds shall have an emergency spillway designed to safely pass the 100-year storm if the storage capacity is exceeded. The emergency spillway shall be mechanically stabilized to protect the integrity of the embankment. Large ponds shall be regulated by the State *Dams and Reservoirs Safety Act*.
F. **Freeboard** - All detention ponds in excess of one (1.0) acre-feet of storage capacity shall have a minimum of one (1.0) foot of freeboard above the design storm.
G. **Side Slopes** - Detention ponds shall have side slopes of three-to-one (3:1) or flatter, and require security fencing around the perimeter of the pond with a minimum twelve (12) foot wide access gate. Provisions shall be made for an access easement to the detention pond.
H. **Permanent Stormwater System Maintenance and Responsibility Agreement** - Prior to construction approval, the responsible party shall complete and submit a permanent stormwater system maintenance and responsibility agreement.
I. **Seepage Control** - Seepage control or anti-seep collars shall be provided for all outlet pipes.

5:3.7-12 Retention Ponds

A. **Minimum Design** - At a minimum, retention ponds shall be designed to provide the required storage capacity to accommodate the differential volume of runoff generated by the development, and shall have an emergency spillway capable of safely passing the 100-year storm.
B. **Where Required** - Generally, retention ponds are required in areas with no obvious discharge point; so the entire volume of the design storm shall be accommodated within the pond. Retention ponds do not have outlet structures and drain through infiltration into the soils. A design of a retention pond shall require soil borings, infiltration tests, and volume based calculations on a twenty-four (24) hour storm not using the pond bottom as a pervious area. Slope, security, and maintenance requirements are the same as for detention ponds.
C. **Pre- and Post- Construction Testing** - The design of a retention pond shall require soil borings, infiltration tests, and volume based calculations for the twenty-four (24) hour storm not using the pond bottom as a pervious area. Volume based calculations for all other storm events may use the pond bottom as previous area. Infiltration testing shall be required during pre-construction analysis and design and after construction of the pond.

   Typically, infiltration testing should be conducted in the field using a double-ring infiltrometer (per the latest versions of ASTM D3385). Infiltration tests should not be conducted in the rain, within twenty-four (24) hours of significant rain events (> 0.5 inches), or when the temperature is below freezing. For pre-construction (design) testing, infiltration test(s) should be performed in the same area and as close as practicable to the anticipated bottom elevation of the pond. After construction of the pond, infiltration test(s) shall be performed on the bottom of the pond to verify there have been no significant changes in

infiltration rates due to changes in soil strata or compaction during construction. A minimum of one (1) test per 10,000 square feet of pond bottom shall be required.

Note that infiltration testing should not be confused with percolation testing. Infiltration testing estimates the vertical movement of water through the bottom of the test area, whereas a percolation test allows water movement through both the bottom and sides of the test area. There are methods of converting percolation rates to infiltration rates, but these methods are not recommended and may only be used in the pre-construction stage.

5:3.7-13 Water Quality Ponds

A. **Where Required** - Water quality shall be guaranteed on those sites which contain five (5) acres or more of impervious area. In order to prevent discharge of pollutants, a permanent water quality pond shall be required. Permanent water quality ponds having a permanent wet pool shall be designed to store and release the first one (1) inch of runoff per impervious acre from the site over a twenty-four (24) hour period. The storage volume shall be designed to accommodate, at the minimum, one-half (½) inch of runoff from the entire site. Permanent water quality dry ponds not having a permanent wet pool shall be designed to release the first inch of runoff from the entire site over a twenty-four (24) hour period.
B. **Spillway Capacity** - The combined capacities of the principal and emergency spillway shall be sufficient to pass the peak rate of runoff for a 100-year, twenty-four (24) hour storm frequency.
C. **Location Restrictions** - No pond shall be constructed on a major drainage way or where the 100-year flood would inundate the basin.

5:3.7-14 Forebays

Any retention pond or wet pond (pond that has a permanent wet pool, whether for water quality, aesthetic, or site condition reasons) shall be required to have forebays. A forebay shall be required for all inlets to a retention pond or wet pond and shall be placed upstream of the main pool area. The forebay should be designed to trap the majority of the coarse fractions of any suspended solids in the storm drainage before it enters the main pool area. The forebay should be separated from the main wet pool area by barriers or baffles and may be constructed of earth, stones, riprap, gabions, geotextiles, and/or designed using manufactured treatment devices. The top of the forebay barrier can range from one (1) foot below the normal pool elevation up to an elevation above the permanent pool where it is its own distinct feature. General design criteria as employed for the design of temporary sediment traps should be considered in the design of the forebay area(s).

5:3.7-15 Subsurface Percolation Systems

A. **Test Data** - Subsurface percolation shall be designed on the basis of actual test data. Tests shall be consistent as to soils, elevations, locations, and water table depths with the system to which the test data will be applied.
B. **Clog Prevention and Cleaning** - Subsurface percolation systems shall be designed for prevention of clogging by fine material and for ease of cleaning with conventional pipe cleaning equipment. This requirement should include wrapping the perforated pipe and the infiltration trench with an appropriate fabric and providing sufficient cleanouts in the system.
C. **Overflow Outlets** - Subsurface percolation systems shall be designed with an overflow outlet in case the capacity of the system is exceeded.

5:3.7-16 Stagnant Water Conditions

All systems shall be designed and constructed to prevent stagnant water conditions.

5:3.7-17 Drainage Easements

A. **Storm Drainage Pipe Easements** - Storm drainage pipe easements shall provide adequate area for maintenance equipment to operate. Some typical easements are listed below:

Table 5-9 DRAINAGE EASEMENT WIDTH PER PIPE SIZE AND DEPTH		
Maximum Pipe Size	Maximum Depth to Invert	Width of Easement
18"	3.5'	20'
24"	5.0'	24'
36"	6.0'	30'
54"	7.0'	36'

Note: For depths greater than shown, add two (2) feet for each additional foot to the invert. For larger pipe sizes and/or multiple pipes, the easement width will be determined by the Public Works Director.

B. **Open Channels Easements** - The minimum easement width for an open channel/ditch is twenty-four (24) feet. For channels in excess of four (4) feet wide and/or four (4) deep, the easement width shall be increased by two (2) feet for each additional foot of width and/or depth or the width of the channel plus twenty (20) feet, whichever is wider.

C. **Detention Pond Easements** - An access easement of twenty (20) feet minimum shall be provided to the pond access gate. The entire pond and sufficient access on the top of the circumference of the pond shall be included as part of the drainage easement.

5:3.7-18 Hydric Soil Groups for Kershaw County

The Hydrologic Soil Groups in Kershaw County are listed in the *Soil Survey of Kershaw County* prepared by the United States Department of Agriculture, latest edition. For those soils that list a dual grouping (example B/D), the worst-case characteristics shall be used.

A. Group "A" is sand, loamy sand, or sandy loam types of soils. Such soils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sands or gravels, and have a high rate of water transmission.

B. Group "B" is silt loam or loam. Such soils have a moderate infiltration rate when thoroughly wetted and consist chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures.

C. Group "C" soils are sandy clay loam. Such soils have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine structure.

D. Group "D" soils are clay loam, silty clay loam, sandy clay, silty clay, or clay. This hydrologic soil group has the highest runoff potential. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a clay pan or clay layer at or near the surface, and shallow soils over nearly impervious material.

5:3.7-19 Erosion Prevention and Sediment Control Design

A. **Implementation** - Erosion prevention and sediment control measures shall be coordinated with the sequence of grading, development, and construction operations. The ultimate intent

of requiring erosion prevention measures is to prevent erosion from occurring at all, but if it should, additional sediment control measures shall be in place to control sediment on-site to prevent adverse impacts on the storm drainage system(s), adjacent property owners, and/or waters of Kershaw County. Control measures such as hydroseeding, berms, intercepting swales, terraces, and sediment traps shall be required prior to the start of each increment of the construction/development process. Erosion prevention and sediment control measures shall be in accordance with but, not limited to those depicted in the current version of the *South Carolina DHEC Storm Water Management BMP Handbook*. Kershaw County encourages the use of innovative erosion prevention and sediment control technologies and techniques, but reserves the right to approve these techniques on a case-by-case basis.

B. **Plan Requirements** - The erosion prevention and sediment control plan shall include, at a minimum, the following:
   1. **Construction Sequence** - A construction sequence listing the control measures to be installed prior to initiation of grading/construction operations.
   2. **Soil Description** - A general description of the predominant soil types on the site.
   3. **Calculations** - Calculations supporting the efficiency of the control measures.
   4. **Stabilization, Erosion Prevention, and Sediment Control Plan** - A plan for temporary and permanent vegetative stabilization and structural erosion prevention and sediment control measures to be used during all phases of clearing, grading, filling, construction, and permanent development.
   5. **Grading Plan** - A complete and adequate grading plan for borrow pits and material processing facilities where applicable, including restoration and re-vegetation measures.
   6. **Maintenance Program** - A description of the maintenance program for sediment control facilities including inspection programs, vegetative establishment of exposed soils, method and frequency of removal and disposal of solid waste material removed from control facilities, and disposition of temporary structural measures.
   7. **Vehicle Tracking Countermeasures** - Plans to minimize vehicle tracking of sediments from land disturbing activities onto paved public roads. It is recommended that a stabilized construction entrance of at least fifty (50) feet in length be placed at the entrance. If the construction entrance area is to be improved as a permanent paved entrance, the construction entrance shall be removed and replaced with clean stone prior to paving.
   8. **Vehicle Wash Down** - If any vehicle wash down is required on-site, it shall be performed in a designate area shown on the plans and located in an area that is not subject to surface water runoff, and more than fifty (50) feet away from a storm drain, open ditch, or receiving water. No detergents shall be used.
   9. **Silt Barriers or Check Dams** - Silt barriers or check dams shall be placed at outfalls and/or across drainage channels prior to initiation of grading/construction operations, and shall be maintained during the duration of the job. It is critical that the silt barrier be appropriately selected, properly installed, and adequately maintained during the course of the project. Under no circumstances shall straw or hay bales be used as a sediment control measure nor shall silt fence be used across areas of concentrated flows such as outfalls or drainage channels. Additional silt barriers shall be installed at the request of Kershaw County if it becomes evident that erosion is occurring and sedimentation of adjacent properties or streets is imminent.

10. **Stabilization Clause** - The plan shall list the SCDHEC fourteen (14) day stabilization clause.
11. **Inspections** - Inspection procedures shall require that all erosion prevention and sediment control devices be inspected at least once every seven (7) calendar days and after any storm event of greater than one-half (0.5) inches of precipitation during any twenty-four (24) hour period.
12. **Concrete Waste Management** - Any project involving poured-in-place concrete shall properly dispose of any waste material, whether disposal is on-site or off. At a minimum, concrete waste shall be disposed of at a location which is not subject to surface water runoff and is more than fifty (50) feet away from a storm drain, open ditch, or receiving water.

    Any project which may potentially involve the pouring of 100 cubic yards or more of concrete shall provide, on the plans, either a statement designating where the waste will be disposed off-site or the location and details of a designated on-site concrete washout area. For on-site disposal, the washout from concrete equipment shall be disposed of into the following:
    a. A pre-fabricated concrete washout box (which may be available from the local concrete supplier);
    b. a designated slurry pit area that will later be backfilled;
    c. an area where the concrete wash can harden, be broken up, and then disposed of as solid waste; and/or
    d. any other acceptable method of containment and disposal.
13. **Dumpsters** - Kershaw County recommends that all dumpsters be covered, water tight, and secured to minimize the risk of illegal dumping and the leaching of contaminated stormwater from the dumpster. Should maintenance be required, the solid waste handling company shall be contacted to replace or repair the dumpster. At no time shall dumpsters be washed out on-site. Note that, based on site conditions and/or proximity to existing or proposed stormwater conveyance system(s), Kershaw County may require all the aforementioned criteria to be included in the stormwater management plan for the site, and may require the installation of covers on existing dumpsters. In addition, the owner may be required to perform regularly scheduled inspections to ensure the dumpster is maintained in proper working order.

The above list is meant to draw attention to several critical areas of the plans, but by no means should this list be considered exhaustive. All submittals shall still comply with all other requirements of this Article, the Kershaw County Stormwater Management Ordinance, and/or other Federal, State, or local regulations particularly in those areas that are considered to be part of a Municipal Separate Storm Sewer System (MS4).

C. **Less than One Acre Disturbed Areas** - Projects that disturb less than one (1) acre and are not part of a larger common plan (LCP) for development or sale shall comply with the requirements as outlined in the SCDHEC *Small Project Requirements for Non-Coastal Counties.*

D. **Greater than One, but Less than Two Acres Disturbed Areas** - For land disturbing activities involving greater than one (1), but less than two (2) acres of actual land disturbance which are not part of a larger common plan of development or sale, the person responsible for the land disturbing activity shall submit a simplified stormwater management and

sediment control plan meeting the requirements of *Standards for Stormwater Management and Sediment Reduction* SCDHEC regulation, R.72-307H.

E. **Greater Than Two, but Less Than Five Acres Disturbed Areas** - For land disturbing activities involving more than two (2), but less than five (5) acres of actual land disturbance which are not part of a larger common plan of development or sale, a simplified permitting and approval process shall be used meeting the requirements of SCDHEC regulation R.72-307I. These activities are required to utilize best management practices (BMPs) to control erosion and sediment and to utilize appropriate measures to control the quantity of stormwater runoff.

F. **Greater Than Five Acres Disturbed Areas** - For land disturbing activities disturbing more than five (5) acres, the requirements of SCDHEC regulations R.72-305 and R.72-307 shall apply. However, the use of measures other than ponds to achieve water quality improvement are recommended on sites containing less than ten (10) disturbed acres.

G. **Ten Acres Disturbed Areas** - Water quality shall be guaranteed on those sites which disturb ten (10) acres or more. The stormwater runoff shall drain to a single outlet from land disturbing activities by using one of the following methods:
   1. The plan shall control runoff during the land disturbance by a sediment basin where sufficient space and other factors allow these controls to be maintained until the final inspection. The sediment basin shall be designed and constructed to accommodate the anticipated sediment loading from the land disturbance and to meet a removal efficiency of eighty (80) percent suspended solids or 0.5 ML/L peak settable solids concentration, whichever is less. The outfall device or system design shall take into account the total drainage area flowing through the disturbed area to be served by the basin; or,
   2. Other practices may be acceptable if they achieve an equivalent removal efficiency of eighty (80) percent for suspended solids or 0.5 ML/L peak settable solids concentration, whichever is less. The efficiency shall be calculated for disturbed conditions for the ten (10) year, twenty-four (24) hour storm event.

H. **Maintenance** - During construction, the developer shall perform any required maintenance in a timely manner.

I. **Soil Stockpile** - Soil and other materials shall not be temporarily or permanently stored in locations which would cause suffocation of root systems of trees to be preserved. Stockpiles expected to remain in place in excess of one (1) month shall have at least temporary vegetation established.

J. **Stilling Basins** - Stilling basins and other energy dissipaters shall be designed/patterned after the designs shown in the latest Federal Highway Administration Hydraulic Engineering publication, *Hydraulic Design of Energy Dissipaters for Culverts and Channels*.

K. **Treatment of Cuts and Fills**
   1. Cuts and/or fills shall be protected by adequate retaining walls when required for stability.
   2. Fill shall not be placed adjacent to a channel bank where it will create bank failure and reduce the capacity of the stream or result in deposition of sediment downstream.
   3. No fill is to be placed where it will slide or wash onto adjacent properties. No cut is to be created close enough to a property boundary to create erosion on adjacent properties.

L. **Establishment of Vegetation** - Vegetation on all disturbed areas shall be established at the earliest possible time and shall comply with the fourteen (14) day stabilization clause. Before final approval can be given for a development, a permanent stand of vegetation shall

be established or at the very least, a temporary stand of vegetation shall be established supported with a letter of guarantee from a reputable landscaping firm regarding an adequate stand of permanent vegetation. In some cases, it may be necessary to require a cash bond to ensure that a permanent stand of vegetation will be established.

M. **Seeding Schedule** - A seeding schedule shall be provided on the engineering plans. In all cases, the schedule shall include temporary vegetation, permanent vegetation, fertilizer, lime, and mulch. Actual types of seeds, rates of seeds, fertilizer, lime, and mulch may vary depending on the soil type. Application of water may be required during dry seasons to provide moisture for seeds to sprout and grow. The District Conservationist of the Kershaw County Soil Conservation Service may review any suggested mixtures when submitted. At a minimum, the following requirements must be met:
   1. On all vegetated swales or ditches with side slopes (cut or fill) steeper than three-to-one (3:1), four (4) to six (6) ounces per 1000 square feet of Weeping Love grass seed shall be added to any mixture. Swale and ditch bottoms shall be double seeded.
   2. All slopes steeper than three-to-one (3:1) shall be hydroseeded.
   3. Growth of ryegrass in early spring shall be suppressed to prevent it from choking out the permanent vegetation such as Bermuda or fescue.

5:3.7-20 Maintenance

A. **Maintenance During Construction** - The applicant/developer is responsible for maintenance of all completed stormwater management practices to ensure proper performance. Kershaw County shall ensure preventive maintenance through inspection of all stormwater management practices.

B. **Management Responsibility After Development** - Temporary and permanent erosion, sedimentation and stormwater management facilities, once installed and after final inspection has been completed, shall be maintained in one of the following manners:
   1. **Facilities Maintained by Owner** - The owner of the property on which work has been done pursuant to Kershaw County regulations, or any other person or agent in control of such property, shall maintain in good condition and shall promptly repair and restore all grade surfaces, walls, drains, dams and structures, vegetation, erosion prevention and sediment control measures, and other protective devices. Such repairs or restorations and maintenance shall be in accordance with the approved engineering plan.

      The facilities to be maintained by the owner shall provide adequate access to permit Kershaw County authorities to inspect and, if necessary, to take corrective action. If the owner or any other person or agent in control of such property fails to properly maintain the facilities for which they are responsible, Kershaw County shall issue written notice specifically describing the deficiency. If the corrections are not completed within ten (10) days from receipt of such notice, Kershaw County may have the deficiencies corrected at the responsible party's expense.
   2. **Facilities Maintained by Kershaw County** - All facilities to be maintained by Kershaw County shall be designed and constructed in accordance with the requirements of the standards herein, and all such facilities shall be dedicated to the County for maintenance by recordation after the County has accepted conveyance of such facilities by appropriate action of the County Council. Such conveyance shall include sufficient ingress-egress easements to permit the County to properly maintain such facilities.

5:3.7-21 As-Built Engineering Plans

Upon completion of any project involving infrastructure (roads, storm drainage systems with structures, closed pipes, ponds, etc.), and prior to final plat approval, Kershaw County requires the submittal of as-built engineering plans and calculations. As applicable, the following information shall be submitted on or with the as-built engineering plans:

A. **General**
   1. The subdivision name and the approved road names.
   2. The developer's name, address, and contact information.
   3. The engineer's and surveyor's name, address, and contact information.
   4. The contractor's name, address, and contact information.
   5. The scale of the engineering plans accompanied by a bar scale.
   6. Depiction of the locations and elevations of the benchmarks on the project.
   7. Depiction of any wetlands and/or designated waters of the state (WoS).

B. **Roadways**:
   1. A copy of the asphalt tickets.
   2. A copy of the rock tickets.
   3. A copy of the seeding tickets.
   4. Pavement widths on the plan view.
   5. A typical roadway cross-section.
   6. A detail of the roadway with base and surface thicknesses.
   7. A plan view of the roadway with centerline stationing and geometric data.
   8. Horizontal and vertical curve information.
   9. A profile of the roadway with centerline elevations.
   10. Right-of-way widths on the plan view. Metes and bounds for the right-of-way shall be provided.
   11. Utility elevations at all road crossings on the roadway profile.

C. **Storm Drainage Systems**:
   1. The location of all storm drainage structures and utilities.
   2. All storm drainage and utility easements.
   3. Storm drainage profile with all relevant elevations.
   4. Detention/retention pond information (stage-storage-discharge values).
   5. A drawing of the outlet structures and spillways with elevations and dimensions.
   6. Details of the storm drainage structures.

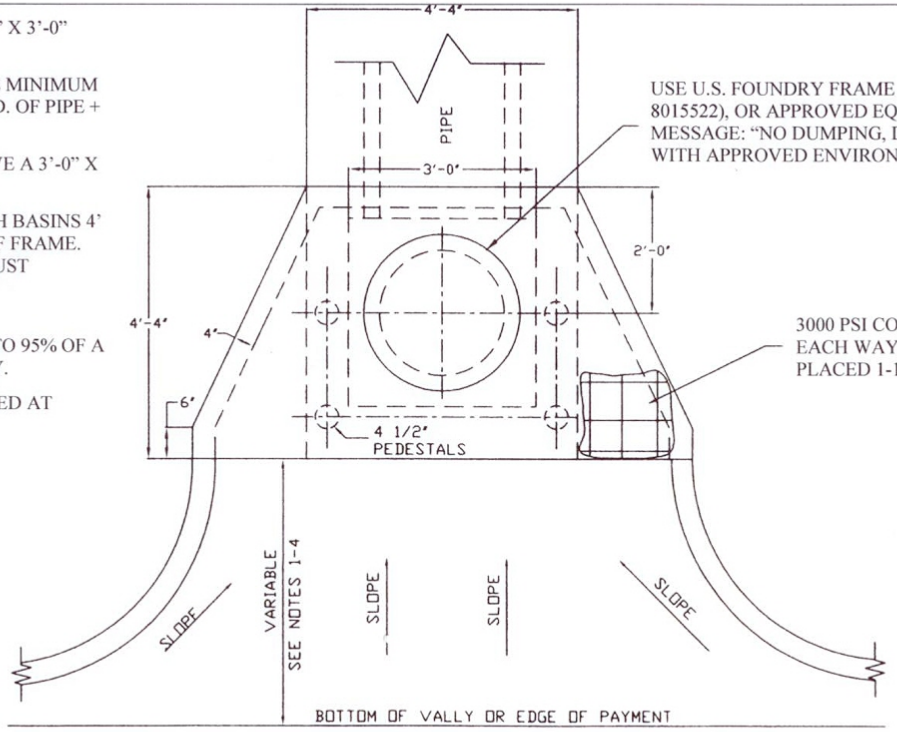
5:3.7-22 Standard Details

The standard details listed below can be located on the following pages:

A. Modified Florida Type I Catch Basin - Top View
B. Modified Florida Type II Catch Basin - Top View
C. Modified Florida Type I and II Catch Basin - Front View
D. Modified Florida Type I and II Catch Basin - Side View
E. Type 9 Inlet Plan and Section View
F. Junction Box Plan and Section View
G. Rip-Rap Headwall (Grouted)
H. Straight Headwall (24” Diameter Pipe or Less)
I. Typical Headwall (Pipes Over 24” Diameter)

NOTES:

- FOR 18"-24" I.D. PIPES, USE 3'-0" X 3'-0" BOX.
- FOR PIPES OVER 24" I.D., MAKE MINIMUM LENGTH & WIDTH OF C.B. = O.D. OF PIPE + 6" EACH SIDE.
- ALL CATCH BASINS MUST HAVE A 3'-0" X 3'-0" FINISHED OPENING.
- STEPS ARE REQURED IN CATCH BASINS 4' DEEP OR DEEPER FROM TOP OF FRAME. STEPS ARE TO BE 18" O.C. & MUST CONFORM TO ASTM-C-478 OR EQUIVALENT.
- COMPACT BACKFILL OF BOX TO 95% OF A STANDARD PROCTOR DENSITY.
- 4" PVC PIPE MUST BE INSTALLED AT SUBGRADE UNDER THROAT.



USE U.S. FOUNDRY FRAME &COVER (USF ITEM # 8015522), OR APPROVED EQUAL. INCLUDE COVER MESSAGE: "NO DUMPING, DRAINS TO WATERWAYS", WITH APPROVED ENVIRONMENTAL LOGO.

3000 PSI CONCRETE WITH #4 BARS AT 6" EACH WAY. ALL STEEL BARS SHALL BE PLACED 1-1/2" CLEAR FROM BOTTOM OF

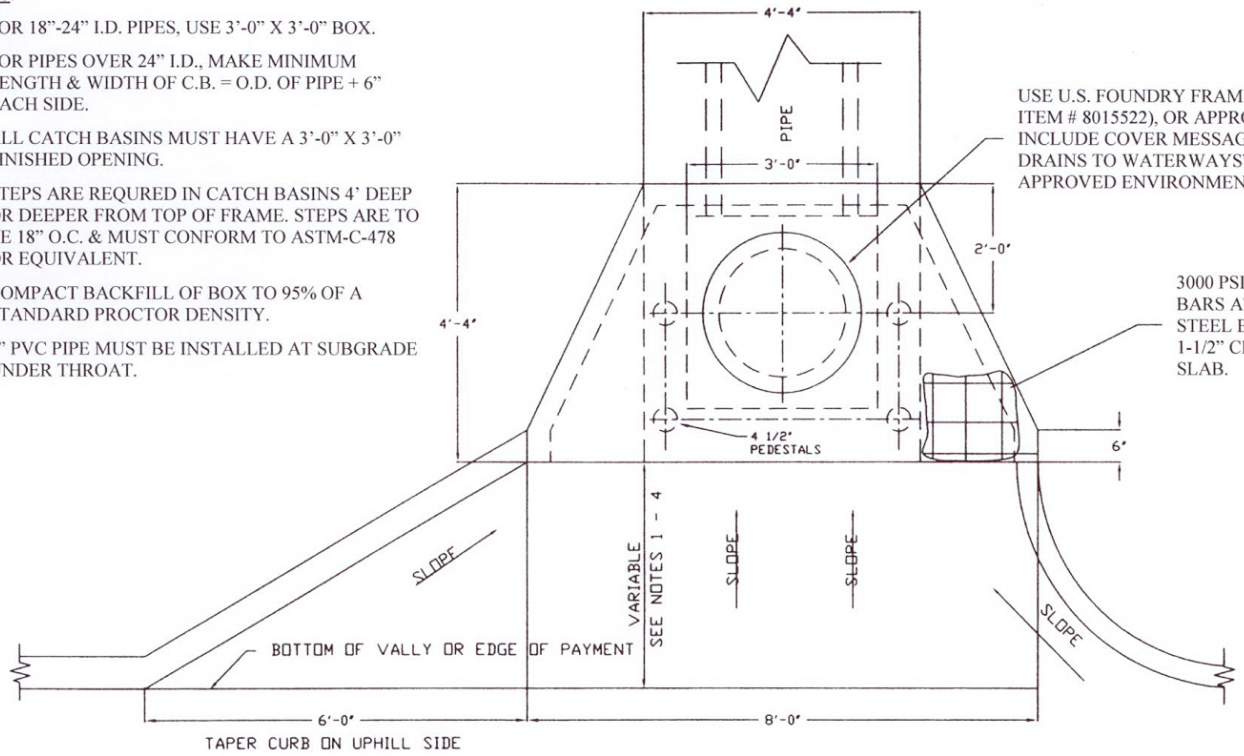
NOTES:

1) 1' MINIMUM & 3' MAXIMUM OFFSET FROM EDGE OF PAVEMENT (FLUSH WITH BARRIER CURB ROAD SECTION).
2) 3' MINIMUM & 5' MAXIMUM OFFSET FROM EDGE OF PAVEMENT ON ROLLED CURB ROAD SECTION.
3) 3' MINIMUM & 5' MAXIMUM OFFSET FROM VALLEY GUTTER ROAD SECTION.
4) ADD ONE (1) ADDITIONAL FOOT OF OFFSET IF CATCH BASIN IS LOCATED IN INTERSECTION RADIUS.

MODIFIED FLORIDA TYPE I CATCH BASIN - TOP VIEW
(NTS)

NOTES:

- FOR 18"-24" I.D. PIPES, USE 3'-0" X 3'-0" BOX.
- FOR PIPES OVER 24" I.D., MAKE MINIMUM LENGTH & WIDTH OF C.B. = O.D. OF PIPE + 6" EACH SIDE.
- ALL CATCH BASINS MUST HAVE A 3'-0" X 3'-0" FINISHED OPENING.
- STEPS ARE REQURED IN CATCH BASINS 4' DEEP OR DEEPER FROM TOP OF FRAME. STEPS ARE TO BE 18" O.C. & MUST CONFORM TO ASTM-C-478 OR EQUIVALENT.
- COMPACT BACKFILL OF BOX TO 95% OF A STANDARD PROCTOR DENSITY.
- 4" PVC PIPE MUST BE INSTALLED AT SUBGRADE UNDER THROAT.



USE U.S. FOUNDRY FRAME &COVER (USF ITEM # 8015522), OR APPROVED EQUAL. INCLUDE COVER MESSAGE: "NO DUMPING, DRAINS TO WATERWAYS", WITH APPROVED ENVIRONMENTAL LOGO.

3000 PSI CONCRETE WITH #4 BARS AT 6" EACH WAY. ALL STEEL BARS SHALL BE PLACED 1-1/2" CLEAR FROM BOTTOM OF SLAB.

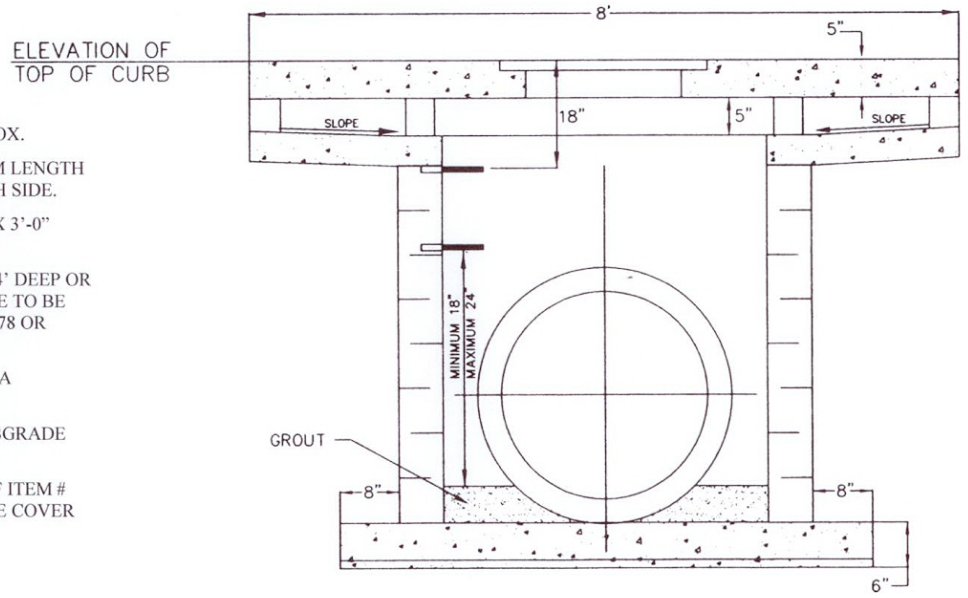
NOTES:

1) 1' MINIMUM & 3' MAXIMUM OFFSET FROM EDGE OF PAVEMENT (FLUSH WITH BARRIER CURB ROAD SECTION).
2) 3' MINIMUM & 5' MAXIMUM OFFSET FROM EDGE OF PAVEMENT ON ROLLED CURB ROAD SECTION.
3) 3' MINIMUM & 5' MAXIMUM OFFSET FROM VALLEY GUTTER ROAD SECTION.
4) TYPE II CATCH BASIN TO BE USED WHERE GUTTER SLOPE IS 5% OR GREATER.

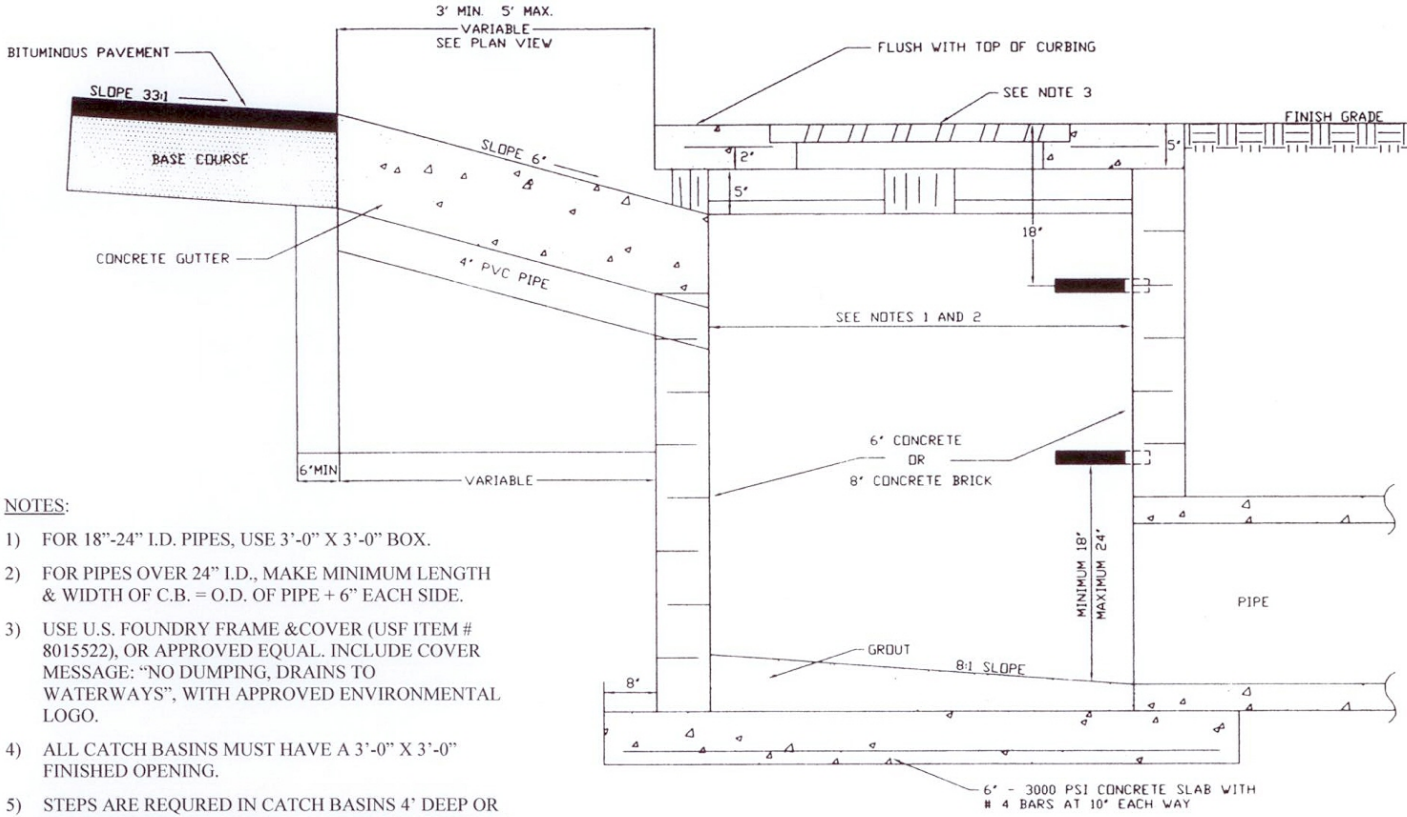
MODIFIED FLORIDA TYPE II CATCH BASIN - TOP VIEW
(NTS)

NOTES:

- FOR 18"-24" I.D. PIPES, USE 3'-0" X 3'-0" BOX.
- FOR PIPES OVER 24" I.D., MAKE MINIMUM LENGTH & WIDTH OF C.B. = O.D. OF PIPE + 6" EACH SIDE.
- ALL CATCH BASINS MUST HAVE A 3'-0" X 3'-0" FINISHED OPENING.
- STEPS ARE REQURED IN CATCH BASINS 4' DEEP OR DEEPER FROM TOP OF FRAME. STEPS ARE TO BE 18" O.C. & MUST CONFORM TO ASTM-C-478 OR EQUIVALENT.
- COMPACT BACKFILL OF BOX TO 95% OF A STANDARD PROCTOR DENSITY.
- 4" PVC PIPE MUST BE INSTALLED AT SUBGRADE UNDER THROAT.
- USE U.S. FOUNDRY FRAME &COVER (USF ITEM # 8015522), OR APPROVED EQUAL. INCLUDE COVER MESSAGE: "NO DUMPING, DRAINS TO WATERWAYS", WITH APPROVED ENVIRONMENTAL LOGO.



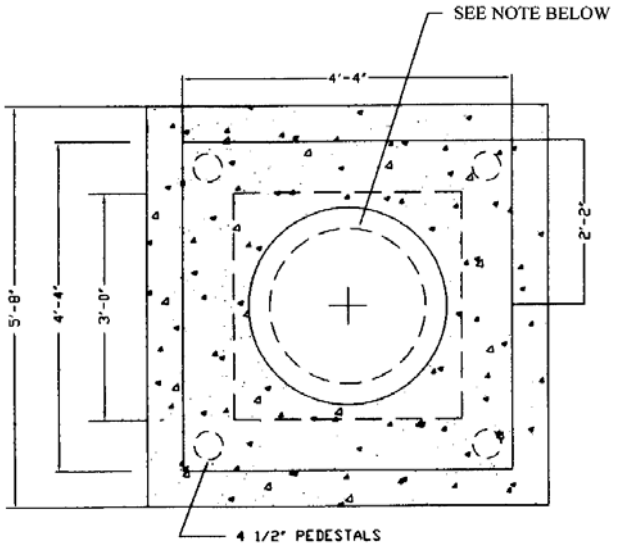
MODIFIED FLORIDA TYPE I & II
CATCH BASIN - FRONT VIEW
(NTS)



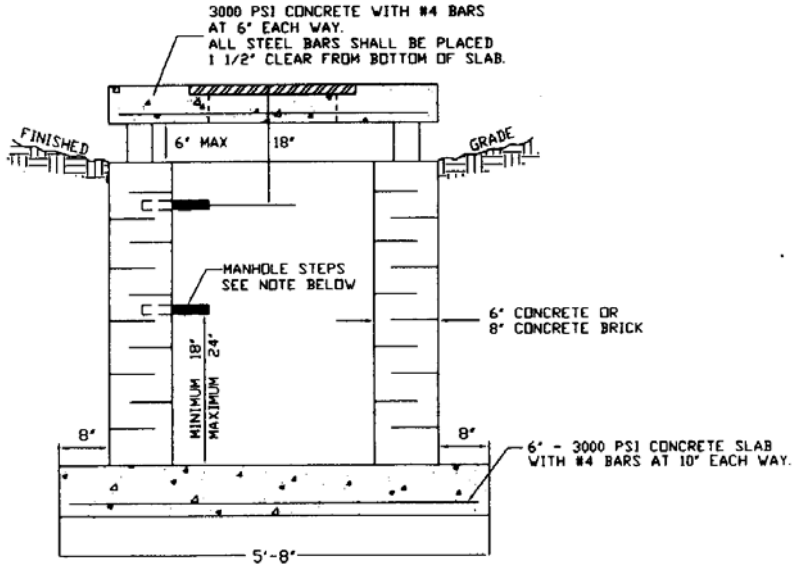
NOTES:

1) FOR 18"-24" I.D. PIPES, USE 3'-0" X 3'-0" BOX.
2) FOR PIPES OVER 24" I.D., MAKE MINIMUM LENGTH & WIDTH OF C.B. = O.D. OF PIPE + 6" EACH SIDE.
3) USE U.S. FOUNDRY FRAME &COVER (USF ITEM # 8015522), OR APPROVED EQUAL. INCLUDE COVER MESSAGE: "NO DUMPING, DRAINS TO WATERWAYS", WITH APPROVED ENVIRONMENTAL LOGO.
4) ALL CATCH BASINS MUST HAVE A 3'-0" X 3'-0" FINISHED OPENING.
5) STEPS ARE REQURED IN CATCH BASINS 4' DEEP OR DEEPER FROM TOP OF FRAME. STEPS ARE TO BE 18" O.C. & MUST CONFORM TO ASTM-C-478 OR EQUIVALENT.
6) COMPACT BACKFILL OF BOX TO 95% OF A STANDARD PROCTOR DENSITY.
7) 4" PVC PIPE MUST BE INSTALLED AT SUBGRADE UNDER THROAT.

MODIFIED FLORIDA TYPE I & II
CATCH BASIN - SIDE VIEW
(NTS)



PLAN VIEW

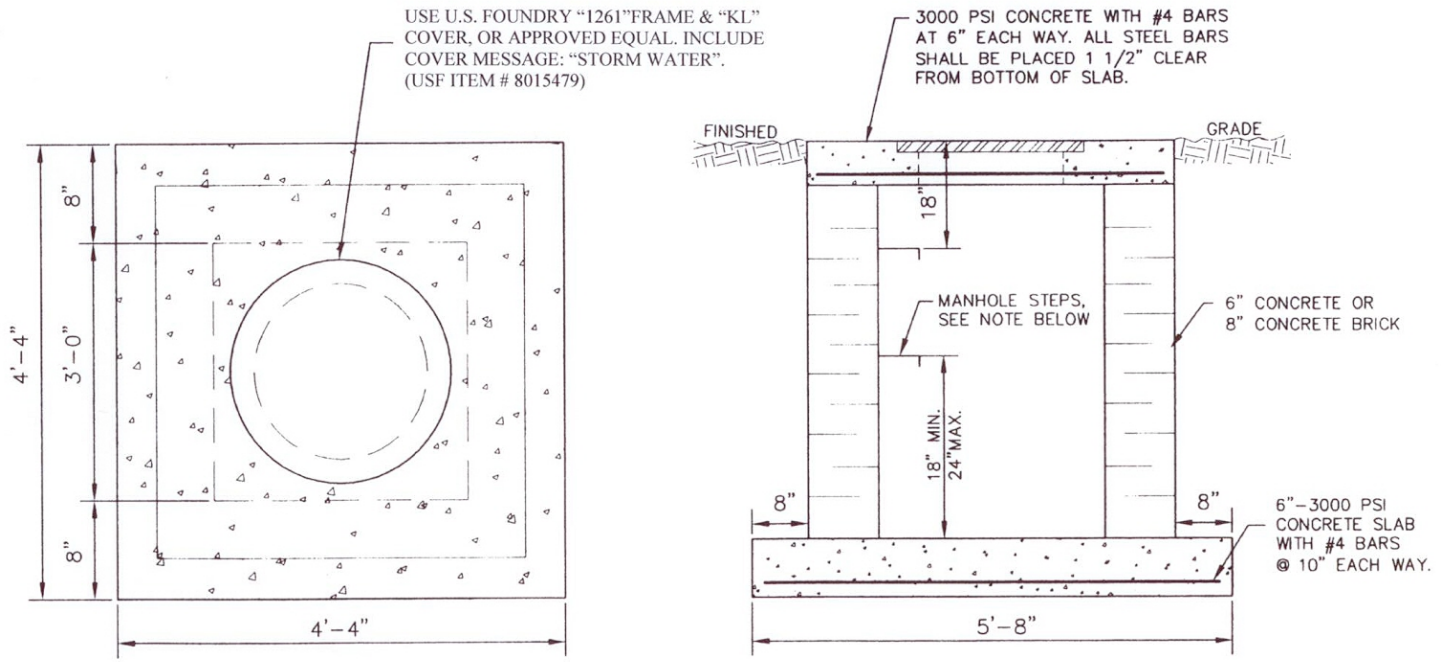


SECTION

NOTES:

- USE U.S. FOUNDRY "1261"FRAME & "OC" COVER, OR APPROVED EQUAL. INCLUDE COVER MESSAGE: "NO DUMPING, DRAINS TO WATERWAYS".
- STEPS ARE REQURED IN JUNCTION BOXES 4' DEEP OR DEEPER FROM TOP OF FRAME. STEPS ARE TO BE 18" O.C. & MUST CONFORM TO ASTM-C-478 OR EQUIVALENT.

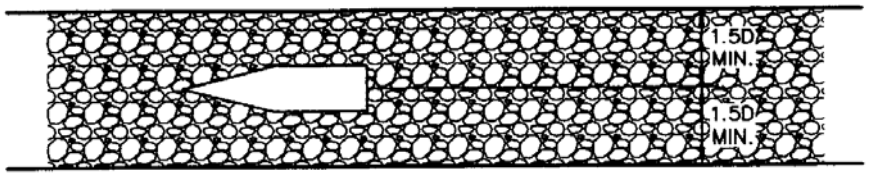
TYPE 9 INLET
PLAN & SECTION VIEW
(NTS)



NOTES:

- STEPS ARE REQURED IN JUNCTION BOXES 4' DEEP OR DEEPER FROM TOP OF FRAME. STEPS ARE TO BE 18" O.C. & MUST CONFORM TO ASTM-C-478 OR EQUIVALENT.

JUNCTION BOX
PLAN & SECTION VIEW
(NTS)



PLAN

NOTES:

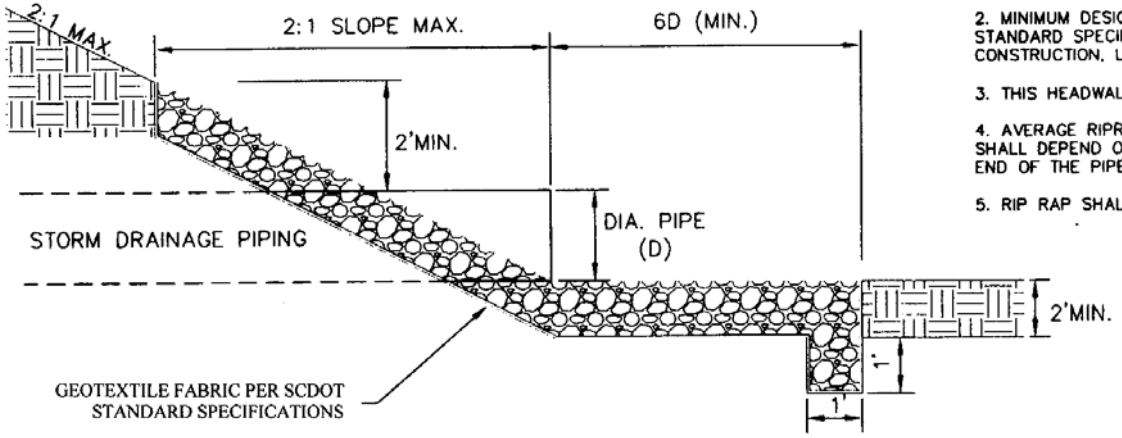
1. WHEN PIPE EMPTIES INTO A DITCH OR SWALE THE RIPRAP WILL TAKE THE SHAPE OF THE DITCH OR SWALE.

2. MINIMUM DESIGN SHOULD EQUAL SCDOT STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, LATEST EDITION, SECTION 804.

3. THIS HEADWALL FOR 24" PIPES OR LESS.

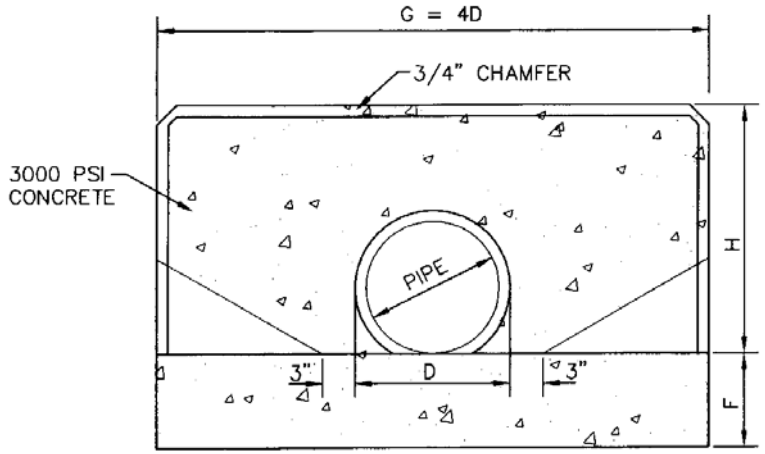
4. AVERAGE RIPRAP SIZE AND APRON LENGTH SHALL DEPEND ON THE VELOCITIES AT THE END OF THE PIPE.

5. RIP RAP SHALL BE GROUTED IN PLACE.

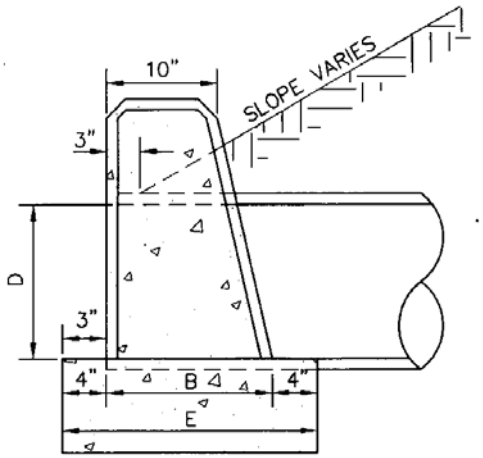


SECTION

RIP-RAP HEADWALL (GROUTED)
(NTS)



FRONT ELEVATION



SIDE ELEVATION

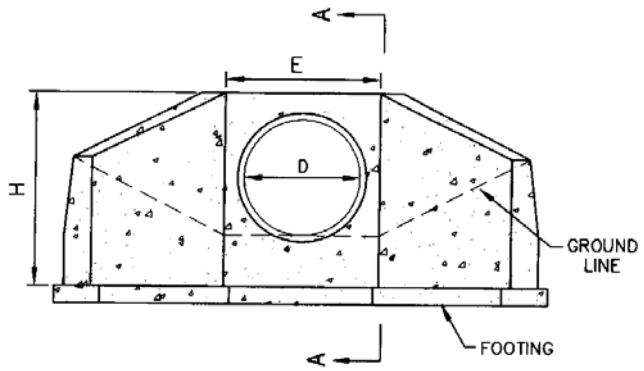
DIMENSIONS							QUANTITIES FOR ONE CONCRETE PIPE			
OPENING		WALL			FOOTING		CLASS "B" CONCRETE			
D	AREA SQ. FT.	* G	H	B	E	F	CUBIC FEET		TOTAL	
							WALL	FOOT	CU. FT.	CU. YD.
15"	1.2	5'-0"	2'-3"	1'-2"	1'-10"	1'-2"	9.0	10.7	19.7	0.73
18"	1.8	6'-0"	2'-6"	1'-3"	1'-11"	1'-3"	12.5	14.4	26.9	0.99
24"	3.1	8'-0"	3'-0"	1'-4"	2'-0"	1'-4"	20.2	21.3	41.5	1.54

* FOR EACH ADDITIONAL PIPE (15" TO 24") ADD 2'-0" + O.D. OF PIPE

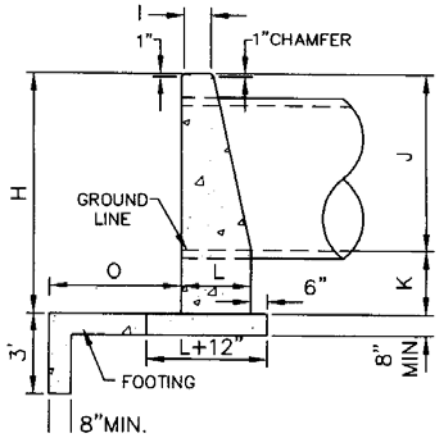
NOTES:

- 8" MASONRY CONSTRUCTION PLASTERED WITH GROUT MAY BE USED.
- WHEN DITCH PAVING IS SPECIFIED, RECESS SURFACE OF FOOTING TO ACCOMMODATE THICKNESS OF DITCH PAVING.

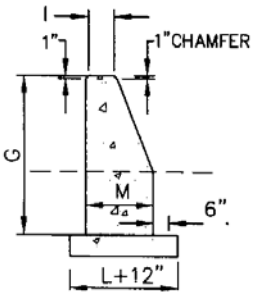
STRAIGHT HEADWALL
(24" DIAMETER PIPE OR LESS)
(NTS)



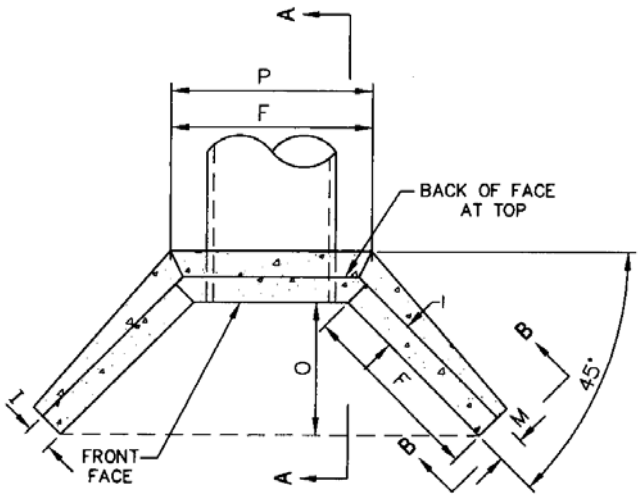
FRONT ELEVATION



SECTION "A-A"



SECTION "B-B"



PLAN VIEW

2 : 1 SLOPE												
D	E	F	G	H	I	J	K	L	M	N	O	P
30"	4'–0"	4'–3"	4'–0"	5'–6"	12"	3'–6"	24"	1'–6"	18"	2'–0"	3'–0"	5'–4"
36"	4'–6"	5'–0"	4'–3"	6'–0"	12"	4'–0"	24"	1'–8"	18"	2'–3"	3'–6"	5'–11"
42"	5'–0"	5'–9"	4'–6"	6'–6"	12"	4'–6"	24"	1'–10"	18"	2'–6"	4'–0"	6'–6"
48"	5'–6"	6'–6"	4'–9"	7'–0"	12"	5'–0"	24"	2'–0"	18"	2'–9"	4'–6"	7'–2"
54"	6'–0"	7'–3"	5'–0"	7'–6"	12"	5'–6"	24"	2'–2"	18"	3'–0"	5'–0"	7'–10"
60"	6'–6"	8'–0"	5'–3"	8'–0"	12"	6'–0"	24"	2'–4"	18"	3'–3"	5'–8"	8'–5"
72"	7'–6"	9'–6"	5'–9"	9'–10"	12"	7'–0"	24"	2'–8"	18"	3'–9"	6'–9"	9'–9"
84"	8'–6"	11'–0"	6'–3"	10'–0"	12"	8'–0"	24"	3'–0"	18"	4'–3"	7'–9"	11'–0"

NOTES:

- FOR EACH ADDITIONAL PIPE LINE, ADD 2'-0" (OR ONE-HALF DIAMETER OF PIPE, WHICHEVER IS GREATER) + O.D.
- ALL CONCRETE SHALL BE 3,000 PSI OR GREATER.

TYPICAL HEADWALL
(PIPES OVER 24" DIAMETER)
(NTS)

5:3.8 Street Standards

5:3.8-1 Definition of Street

Street - Any publicly or privately maintained thoroughfare (street, road, drive, avenue, circle, way, lane, boulevard, etc.) or space which has been dedicated, deeded, designed, or used for vehicular traffic that provides access to more than three (3) parcels of land. Streets constructed after the effective date of this Ordinance shall be constructed to all applicable Kershaw County engineering specifications. The words, *street* and *road* shall be used interchangeably in this section.

5:3.8-2 Street Classifications

Design standards for County-maintained roads shall be determined by the following classifications:

A. **Residential Local (RL) Streets** - Internal subdivision streets with usage largely restricted to local traffic. For purposes of this classification, a residential local (RL) shall be any residential road that is projected to receive no more than 2,000 average daily trips (ADT) per the most recent edition of the *Institute of Transportation Engineers (ITE) Trip Generation Manual* and the *ITE Trip Generation Handbook*.

B. **Residential Collector (RC) Streets** - Streets connecting residential development to major arterial roads. For purposes of this classification, the distinction between an RL and an RC classification shall be that a residential collector (RC) street shall be projected to receive in excess of 2000 average daily trips (ADT) per the most recent edition of the *Institute of Transportation Engineers (ITE) Trip Generation Manual* and the *ITE Trip Generation Handbook*.

C. **Light Commercial and Industrial (LC/I) Streets** - Collector roads connecting adjoining light commercial and light industrial development to major arterial roads. For purposes of this classification, a light commercial and industrial (LC/I) road shall be any primarily commercial and/or industrial road that is projected to receive 2,001-4,000 average daily trips (ADT) per the most recent edition of the *Institute of Transportation Engineers (ITE) Trip Generation Manual* and the *ITE Trip Generation Handbook*.

D. **Arterial Streets** - Major traffic routes within Kershaw County. In almost every case arterial and higher classifications such as interstate highways within Kershaw County are State and Federal highways. In the event that a County-maintained arterial road is proposed, the design standards for arterials and higher classification roads shall be approved by the County Engineer and Public Works Director on a case by case basis. The County Engineer will make the determination based on a complete soils report and the designed traffic load. For purposes of this classification, an arterial shall be any road that is projected to receive in excess of 4,000 average daily trips (ADT) per the most recent edition of the *Institute of Transportation Engineers (ITE) Trip Generation Manual* and the *ITE Trip Generation Handbook*.

5:3.8-3 General Design Criteria

The design criteria contained in this section applies to the construction of new streets which will be accepted into the Kershaw County road maintenance system and for approval of proposed private road design for new developments. All Kershaw County roads shall be designed and constructed equal to or better than the standards required by South Carolina Department of Transportation (SCDOT) specifications. A twenty (20) year roadway life is the design

requirement for Kershaw County. The design speed shall be thirty (30) mph for residential roadways and forty (40) mph for commercial roadways. In reviewing private road design for new development, the Planning Official, County Engineer, and/or Planning and Zoning Commission, as applicable, may consider alternate design standards in consideration of the following:

A. Limited use.
B. Site topographic or geophysical conditions.
C. Stormwater management.
D. The preservation of any natural features on the site.
E. The avoidance of areas of environmental sensitivity.
F. The minimizing of negative impacts and alteration of natural features.
G. The avoidance of adversely affecting ground water and aquifer recharge.
H. The reduction of cut and fill.
I. The avoidance of unnecessary impervious cover.
J. The prevention of flooding.
K. The taking into account of other site-specific design considerations.

5:3.8-4 Right-of-Way

A. **Proposed County Roads** - For residential local (RL) streets, the minimum right-of-way for a Kershaw County road is fifty (50) feet, which is sufficient for any RL and/or two (2) lane road with a pavement width equal to or less than thirty (30) feet which is not reasonably expected to require future widening. A uniform right-of-way width should be maintained on the outside edge of pavement around islands, cul-de-sacs, medians, and at intersections. On wider road sections or a higher order of road, a minimum sixty-six (66) foot right-of-way is required.
B. **Existing County Roads** - Any development encompassing an existing county road shall dedicate the standard right-of-way per this section in order to be approved. For developments located on only one (1) side of an existing county road, the required right-of-way, measured from the centerline of the existing road shall be dedicated to Kershaw County in order to be approved.

5:3.8-5 Required Street Improvements

A. **Creation of New Streets and Roads or the Extension of Streets or Roads** - All subdivisions involving the creation of a new street or road, and subdivisions involving the extension of an existing County-maintained dirt road, or the development of a new street/road accessing or tying into an existing County-maintained dirt road shall meet the minimum standards for street and road design as specified in this section.
B. **Responsibility and Cost of Improving Existing Access Roads** - Where improvements to an existing street or road are identified as being required in a traffic management plan per this Ordinance, the applicant/developer shall be required at his sole expense and as a condition of approval, to provide and install such improvements, including securing the additional right-of-way required in accordance with applicable provisions of this Ordinance. The County may assist the developer/owner by use of its power of imminent domain to secure the necessary right-of-way, should additional right-of-way be required.
C. **Encroachment Permits** - An encroachment permit, which controls the impacts of traffic, storm drainage, and sediment entering a public road right-of-way, shall be obtained from the

South Carolina Department of Transportation (SCDOT) and/or Kershaw County Department of Public Works (as applicable) before approval of construction of a project requiring an encroachment or use of the right-of-way. Encroachments include permanent access "curb cuts" with drainage and other improvements and non-routine maintenance within the right-of-way. Whereas Kershaw County accepts the application forms and documents submitted to the SCDOT Maintenance Engineer, it should be noted that in some situations Kershaw County requirements differ from SCDOT standard requirements for the location of drives and roads.

5:3.8-6 Road Construction Standards

A. **Design Thickness Requirements** - The design thickness requirements are dictated by the soil conditions on the proposed site. If the on-site soils are included on the list of unstable soils provided by the USDA Soil Conservation Service, the design thicknesses shall be more stringent than the standard design. The following table provides two sets of design criteria. The first value provides the standard design thickness in inch requirements. The second value provides the design thickness in inches for unstable soils. (Alternative thicknesses will be considered that provide an equivalent structural number).

Table 5-10 ROAD DESIGN THICKNESS REQUIREMENTS

	RL Thickness in Inches		RC & LC/I Thickness in Inches	
TYPE LAYER	**STANDARD**	**UNSTABLE SOIL**	**STANDARD**	**UNSTABLE SOIL**
Hot Plant Mix				
Surface	2.0	3.0	2.0	3.0
Macadam Base	6.0	6.0	8.0	9.0
Prepared Subgrade	12.0	12.0	12.0	12.0
Full Depth Paving				
AC Surface Course	1.0	1.25	1.25	1.5
AC Binder Course	1.5	2.0	2.0	1.5
AC Base Course	2.5	3.0	3.0	4.0
Prepared Subgrade	12.0	12.0	12.0	12.0

B. **Unsuitable Soils** - Soils unsuitable for road construction are as follows:

Table 5-11 SOILS UNSUITABLE FOR ROAD CONSTRUCTION .

Unstable Soils	Major Constraint to Road Construction
Canty	Low strength, wetness
Cartecay	Wetness, flooding
Chewacla	Low strength, wetness, flooding
Congaree	Flooding
Dororan	Flooding, ponding
Georgeville	Low strength
Grady	Low strength, wetness
Helena	Low strength, shrink-swell
Herndon	Low strength
Irdell	Low strength, shrink-swell

Table continued on following page.

Table 5-11 SOILS UNSUITABLE FOR ROAD CONSTRUCTION, Continued	
Unstable Soils	**Major Constraint to Road Construction**
Johnston	Ponding, flooding
Madison	Low strength
Nason	Low strength
Pacolet	Low strength
Pantego	Wetness
Persant	Low strength
Poindexter	Slope
Rains	Wetness
Rion	Slope
Summerton	Low strength
Toccoa	Flooding
Wehadkee	Wetness, flooding
Winnsboro	Low strength, shrink-swell
Source: USDA, Soil Conservation Service, *Soil Survey of Kershaw County Area, South Carolina,* 1989.	

C. **Verification of Thickness** - If there is any question about the actual thicknesses, the contractor shall provide one (1) core per 500 feet of road or a minimum of three (3), whichever is greater. If the actual thickness is less than approved, the substandard areas shall have an overlay of one (1) inch thickness of plant mix or the thickness shortfall plus one-half (0.5) inch, whichever is greater.

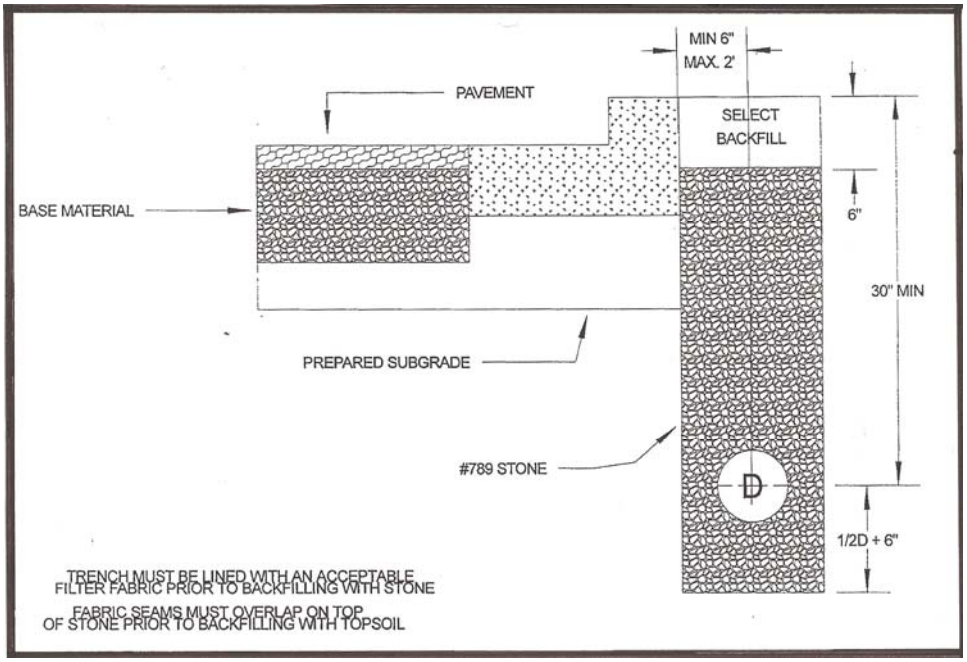
   Placement of the binder course shall immediately follow placement of the black base (within twenty-four [24] hours) and no traffic shall be permitted on the black base.

D. **Notes on Materials**
   1. Aggregate size cannot exceed one-half of the thickness of the individual asphalt course.
   2. All materials shall meet SCDOT specifications for quality and gradation.
   3. Triple surface treatment is not allowed.
   4. Sand clay is not approved for use as a roadway base course unless approved on a case by case basis based on analysis.
   5. Surface course shall consist of asphaltic concrete (Type I).

E. **Weather Restrictions** - Plant mix base and binder courses may be placed throughout the year as long as the road is properly prepared and the temperature restrictions utilized by the SCDOT are met. The Kershaw County Public Works Director must grant specific approval for placement of surface courses during the months of December, January, and February.

F. **Ground Water** - In conditions in which ground water is encountered or may be a potential detriment to the integrity of the road construction, the Public Works Director shall require measurements to mitigate the impact of ground water on the roadbed. Such measures may include, but are not limited to the installation of drainage ditches, the installation of underdrains, and increased thickness requirements for prepared subgrades.

G. **Underdrains** - Subsurface drainage shall be provided in areas having a high water table (particularly in cut areas) to intercept lateral and vertical movement of water which may have a detrimental impact on bearing strength, slope stability, or create an undesirable wet area.



Underdrain

H. **Compaction** - The prepared subgrade and base course shall be compacted to ninety-five (95) percent of a Modified Proctor (ASTM 1557) or 100 percent of a Standard Proctor (ASTM 698) maximum density. A minimum of one (1) proctor for the subgrade and one (1) for the base course shall be provided for each different source of material.
   1. **Subgrade** - The subgrade shall be prepared and compacted to a distance at least eighteen (18) inches beyond the back of curbing.
   2. **Base Course** - The base course shall be prepared and compacted to a distance at least six (6) inches beyond the back of curbing.

I. **Patching and Cuts of Paved Areas** -When patching or cutting of paved areas is required, areas shall be removed in a rectangular shape and, following the placement of approved material, shall be backfilled with macadam compacted in accordance with the compaction requirements of this section. A light coat of tack shall be applied around the edges of the cut out area, and a surface course of the appropriate thickness shall be applied.

J. **Slopes** - Slopes on cut areas and fill areas shall be no steeper than three to one (3:1).

K. **Staking** - The street right-of-way shall be staked at sufficient intervals to check alignment and grade of construction in accordance with the approved engineering plans. Each stake shall depict station number and cut or fill in formation. The minimum staking interval on both sides of the road shall be 100 feet. Curved areas shall require staking at fifty (50) foot intervals.

L. **Obstructions** - No manmade structure shall be placed within the Kershaw County right-of-way without prior written approval from the Public Works Director through the encroachment permit process. In no case may any structure be placed within five (5) feet of the back of curb or edge of pavement.

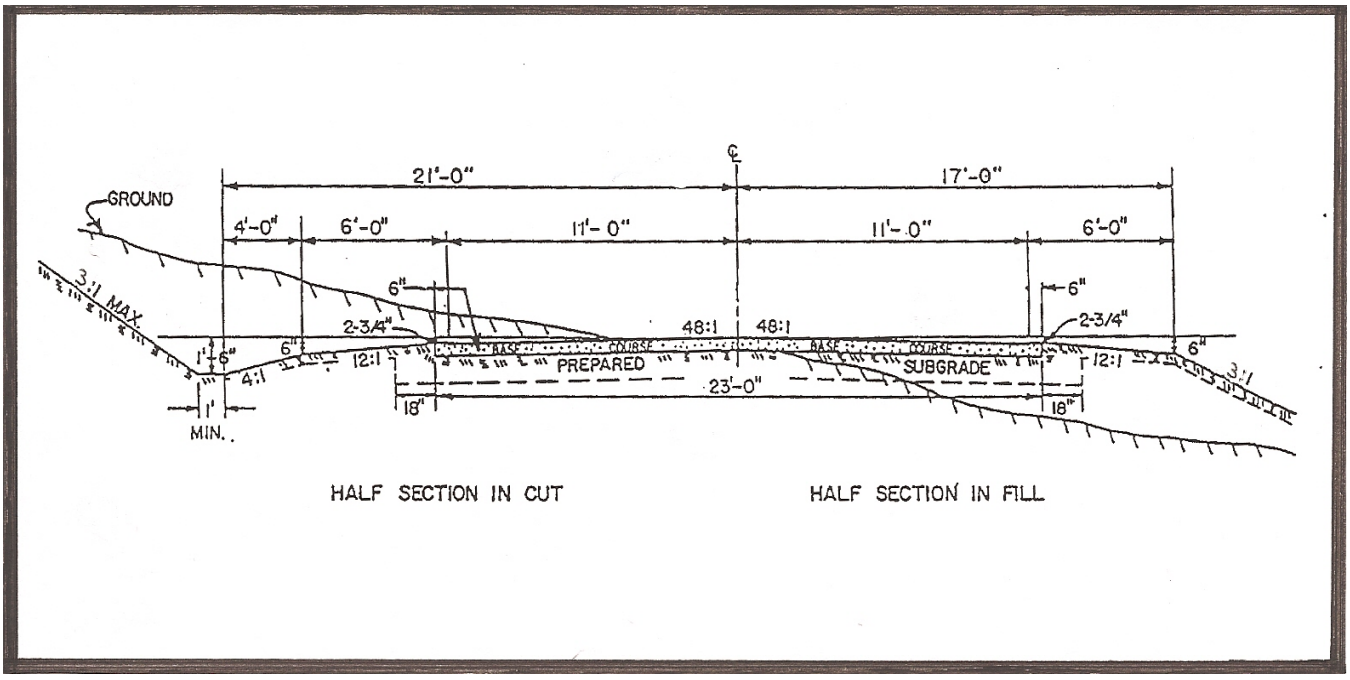
M. **Inspections** - Kershaw County personnel periodically and randomly inspect throughout Kershaw County's area of responsibility to ensure that no unauthorized development is occurring. After a development has been approved, County personnel will inspect the site as required to monitor progress, conduct quality control tests, and observe construction

procedures. All aspects of the development shall be constructed according to the approved land development plan and specifications. The project is subject to inspection at any time. The developer or his contractor shall notify the County Engineer prior to the installation of any storm drainage systems.

Although an inspector may be aware of the construction progress and arranges to be on-site when appropriate, there are certain stages of road construction which require approval prior to proceeding. A twenty-four (24) hour notice is required to ensure that an inspector will be on-site at the requested time. The stages are as follows:

1. The subgrade shall be approved by a Kershaw County inspector before any base material is placed on the subgrade. In "virgin-cut" areas, proof-rolling can normally be used to check the stability of the subgrade. In fill areas and questionable areas, compaction tests may be required.
2. Where curbing is proposed, a Kershaw County inspector must have approved the subgrade within the proposed curb area prior to placement of the curb.
3. The base material shall be approved by a Kershaw County inspector prior to application of the prime coat. The prime coat and the tack coat on the curb shall be approved prior to placement of the surface coat.
4. A Kershaw County inspector must be present on-site at the start of any paving/surfacing operation.

N. **Testing** - All required compaction and materials tests shall be performed at the expense of the developer and in the presence of the County Engineer or designee. With prior approval and notification, it is acceptable for the developer to use a professional soils engineer to run compaction tests and certify in writing that the County compaction requirements have been achieved. It is still required that a Kershaw County Inspector give a site approval before the construction process continues.



Dirt Road Section with Ditch - 50' Right-of-Way

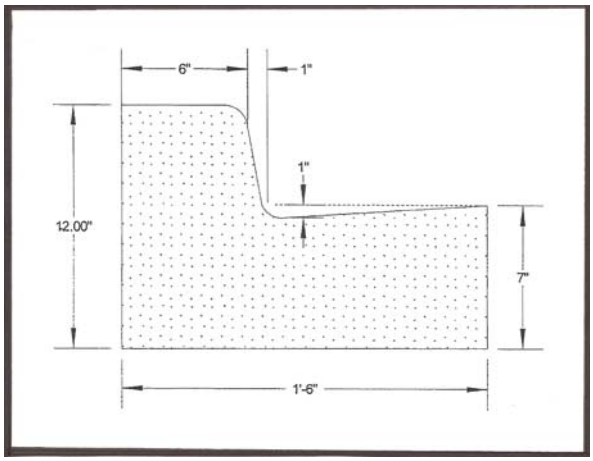
5:3.8-7 Road Design Standards

A. **Roadway Design Criteria**

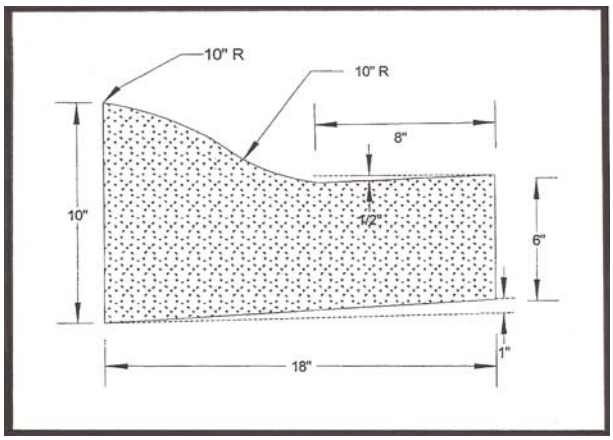
Table 5-12 ROADWAY DESIGN CRITERIA		
Item	**Residential Local**	**Residential Collector Light Commercial/Industrial**
Design Speed (mph)	30	40
Minimum Stopping Distance	200 feet	300 feet
Maximum Grade	15%	12%
Minimum Grade	0.5%	0.5%
Minimum Tangent Between Reversing Curves	50 feet	100 feet

B. **Width of Road by Curb Type**

Table 5-13 WIDTH OF ROAD BY CURB TYPE		
Type of Curb Allowed	**Residential Local**	**Residential Collector Light Commercial/Industrial**
With Barrier	25 feet	27 feet
With Rolled	25 feet	36 feet
With No Curb	22 feet	N/A



Barrier Curb Detail



Rolled Curb Detail

C. **Horizontal Curves** - A horizontal curve is required when the roadway alignment has a deflection angle equal to or exceeding ten (10) degrees. Minimum horizontal curve radii are listed below:

Table 5-14 HORIZONTAL CURVE RADII (in feet)		
Average Daily Trips	**Residential Local**	**Residential Collector Light Commercial Industrial**
2-250	110	175
251-500	150	200
501-750	175	225
751-1000	200	250
1001-2000	200	300
2001+	N/A	*
* To be determined by the Public Works Director on a case by case basis.		

A "three-quarter" cul-de-sac (blowout) can be utilized at sharp corners where the minimum horizontal curve radius cannot be achieved and/or there is no road intersection.

D. **Vertical Curves** - All changes in vertical grade, where the algebraic difference exceeds two (2) percent, shall require a vertical (crest/sag) curve. The minimum length of any vertical curve shall be 100 feet. The design shall be based on the AASHTO values below:

Table 5-15 VERTICAL CURVES		
Design Speed	**Sag "K" Value**	**Crest "K" Value**
30 mph	30	20
40 mph	50	50

E. **Superelevation -** RL roads customarily do not require superelevation. In cases where superelevation is utilized on RC/LC/I roadways, the maximum cross slope shall be 0.08 foot per foot. The required length of runoff for the design speed is listed below:

Table 5-16 SUPERELEVATION		
Superelevation Rate (Feet per Feet)	**Length of Runoff (ft.) for Design Speed of 30 mph**	**Length of Runoff (ft.) for Design Speed of 40 mph**
.02	100	125
.04	100	125
.06	110	125
.08	145	170

F. **Additional Design Criteria**

1. **Circulation System Design** - The street system shall be designed to permit the safe, efficient, and orderly movement of traffic; to facilitate pedestrian, bicycle, and other non-automotive transportation modes; to have a simple and logical pattern; to respect natural features and topography; to present an attractive streetscape; and to permit linkage of major collector streets and subdivisions.

2. **Layout and Alignment** - In order to promote the inter-connectivity of subdivision developments and to reduce the use of a major or collector streets for the movement from one subdivision to another, proposed streets shall be coordinated with the street system in the surrounding area and where possible, shall provide for the continuation of existing streets abutting the development.

   All streets shall be opened to the exterior property lines of the development unless permanently terminated by a vehicular turnaround or intersection with another street.
3. **Residential Local Streets** - Residential local streets shall be laid out so that their use by through traffic will be discouraged, but shall encourage use by local vehicular, pedestrian, and bicycle traffic.
4. **Alleys** - Alleys, where provided, shall have a pavement width of not less than eighteen (18) feet, a right-of-way width of not less than forty (40) feet, and shall meet all applicable Kershaw County engineering specifications. Kershaw County will not accept dedication of alleys into the County road system or enter into maintenance agreements for alleys. All alleys shall be privately maintained.
5. **Cul-de-Sacs** - Turnarounds shall be provided at the closed end of a street. The minimum right-of-way radius for a cul-de-sac is fifty (50) feet. If a uniform right-of-way cannot be maintained around the cul-de-sac, there shall be a smooth transition joining the different widths and a minimum of ten (10) feet shall be maintained beyond the edge of the road. Temporary dead-end streets which extend for a greater distance than the depth of one abutting lot shall be provided with a temporary turn-around. A landscape center island may be provided if accompanied by a permanent maintenance agreement acceptable to the County. If such island is provided, the design shall be in accordance with the engineering design standards of this section.
6. **Dead End Streets** - All dead end streets shall end in a cul-de-sac. Any dead end street which exceeds 1500 feet in length shall have an intermediate turnaround.
7. **Intermediate Turnarounds** - An intermediate turnaround (a half cul-de-sac providing an eighty (80) foot diameter of pavement) can be installed if a road intersection is not desired and the road length exceeds 1500 feet.
8. **Catch Basins** – Catch basins, when utilized, shall be located outside of intersection curve radii, except in extenuating circumstances. Catch basins generally will be located on the uphill side of an intersection in order to collect the runoff before it reaches the intersection.
9. **Water, Sewer, and Other Utilities** - Where it is necessary for utility lines to cross the roadway, the length of encroachment under the roadway shall be minimized. Utility lines should be placed at a ninety (90) degree angle with the road centerline, but in no case less than forty-five (45) degrees. All cross lines shall be compacted in accordance with this section. Where practicable, manholes shall be located outside of the pavement area. No valves or other structures shall be located within the pavement area.
10. **Street Access** - Each residential collector road shall have either at least two (2) access points to roads of equal or higher classification, or substantial improvement approved by the Public Works Director to accommodate the projected traffic flow. These substantial improvements may include acceleration lanes, deceleration lanes, stop lights, etc.
11. **Access Restrictions** - A residential collector shall provide no direct residential access if the twenty-seven (27) foot roadway is utilized. If residential access cannot be avoided, then the thirty-six (36) foot roadway with rolled curb shall be provided.

Major residential subdivisions, where proposed locations are adjacent to arterial streets, shall be denied direct access to the arterial street, and shall be separated from such streets by double frontage lots accessing onto reverse frontage roads. Elsewhere, the Planning and Zoning Commission may require marginal access streets, deep lots, or such other treatment as may be necessary for adequate protection of residential properties, and to afford the separation of through traffic from local residential or commercial traffic.

12. **Residential Reverse Frontage Lots** - Residential reverse frontage lots shall have a minimum rear yard of fifty (50) feet next to the arterial street, measured from the shortest distance of the proposed back building line to the street right-of-way. They shall also, within such rear yard and immediately adjacent to the right-of-way, have a non-access planting screen easement of at least thirty (30) feet in depth planted to Type "D" Buffer requirements per this Ordinance.
13. **Left Turn Lane** - A left turn lane shall be provided for any road with an ADT of 2000 or greater. A left turn lane may be required on roads with lesser ADT if demonstrated necessary by a traffic management plan. Turning lanes may be required on lesser ADT roads which access arterials and/or certain collector roadways. The turning lane shall have a minimum length of fifty (50) feet and a smooth transition to the typical road section.
14. **Concrete Keys** - A concrete key, twelve (12) inches wide and twelve (12) inches deep, shall be placed at the end of any pavement section expected to be extended or at the request of the Public Works Director or County Engineer.

5:3.8-8 Intersection Design

A. **General -** Distance between street intersections shall normally be sufficient to allow two (2) tiers of lots. In extenuating circumstances, where double frontage lots occur, the lots shall have access limited to the lesser classification road.

Table 5-17 INTERSECTION DESIGN

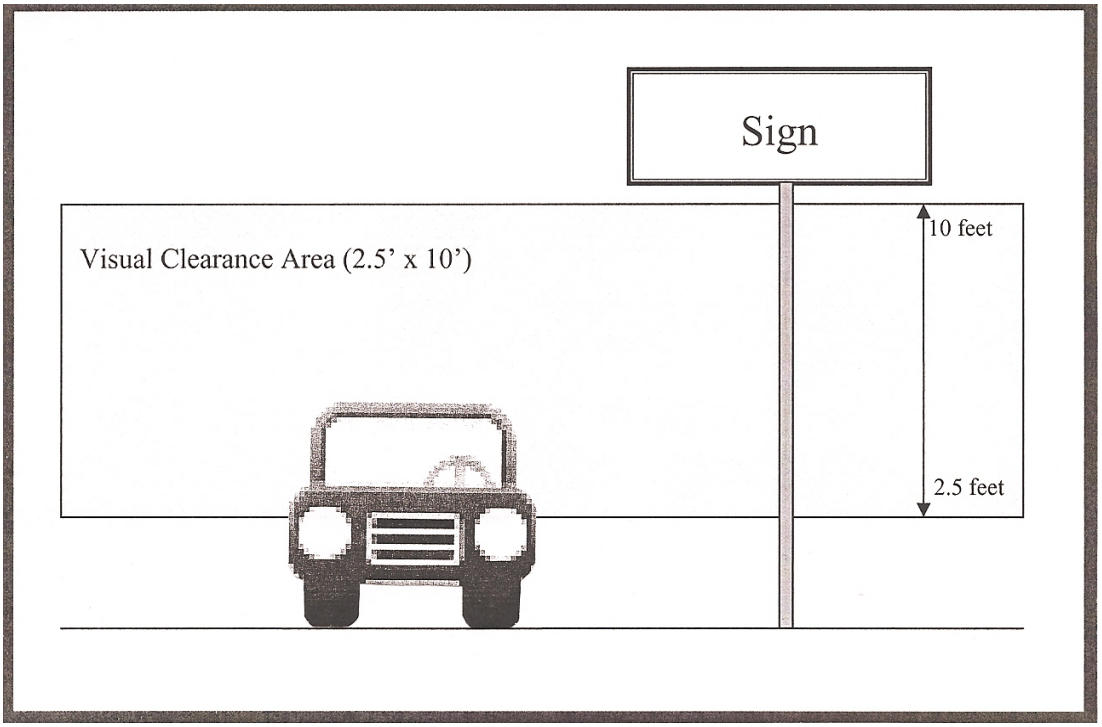
Item	Value
Minimum Angle of Intersection	75 degrees
Maximum Grade Approaching an Intersection	5%
Minimum Tangent Length (to end of pavement) Approaching an Intersection	RL: 50 feet RC: 100 feet LC/I: 100 feet
Minimum Return Radius (to end of pavement or back of curb)	RL to RL: 25 feet RL to RC/LC/I: 30 feet RC/LC/I to RC/LC/I: 50 feet Entering a cul-de-sac: 50 feet
Minimal Centerline Offset to Adjacent Intersection	RL to RL: 150 feet RL to RC/LC/I: 175 feet RC/LC/I to RC/LC/I: 200 feet
RL = Residential Local RC = Residential Collector LC = Light Commercial I = Industrial	

Drainage at Intersections - At intersections where there are no catch basins at each radius, the engineer shall provide an enlarged detail of the intersection and show spot elevations at critical

points. The provided information shall be sufficient to provide construction guidance and prove that positive drainage will be achieved.

B. **Visibility at Intersections** - Railroad, street, and driveway intersections shall be unobstructed for the vision of motorists, pedestrians, and other possible users. No plantings or vegetation shall be placed or maintained, and no sign, fence, building, wall, or other structure shall be located in a visual clearance area within an intersection site triangle or a driveway sight triangle as defined below. The Public Works Director shall make a determination of compliance with visibility at intersections, if required.

1. **Visual Clearance Area** - An area with a height of between two and one-half (2½) feet and ten (10) feet, measured from the upper edge of the curb or pavement, and located within an intersection or driveway sight triangle, where no sign, planting, fence, building, wall, or other structure shall be located. Exception: Poles and support structures less than twelve (12) inches in diameter may be permitted in such areas.

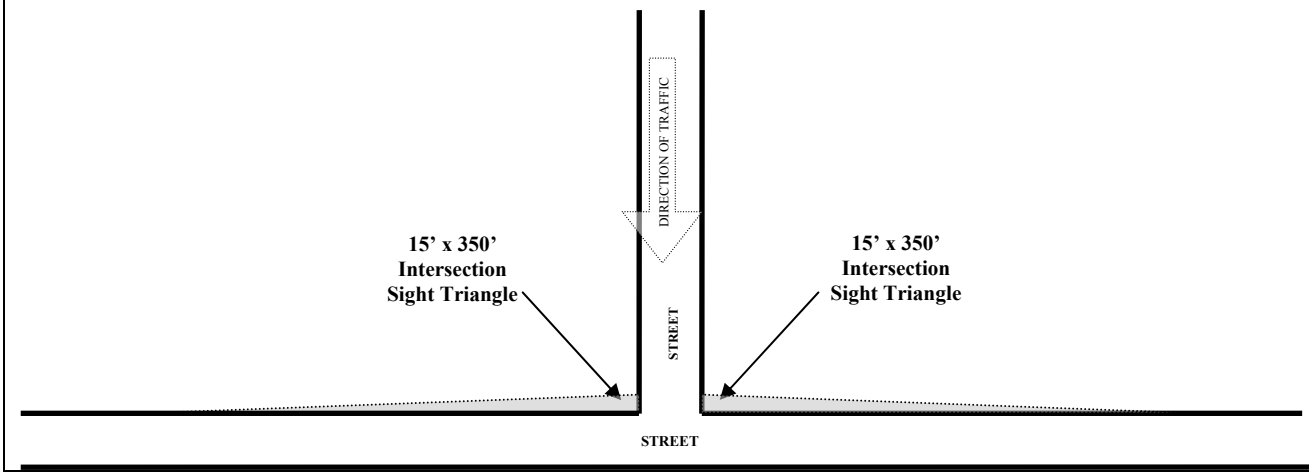


Visual Clearance Area

2. **Sight Triangle** - A triangular area, measured from the curb or edge of pavement, created by a line connecting points on the front and side for lines at a determined distance from the intersection of said lines or the extension of said lines. The following two types of sight triangles are used in this Ordinance:

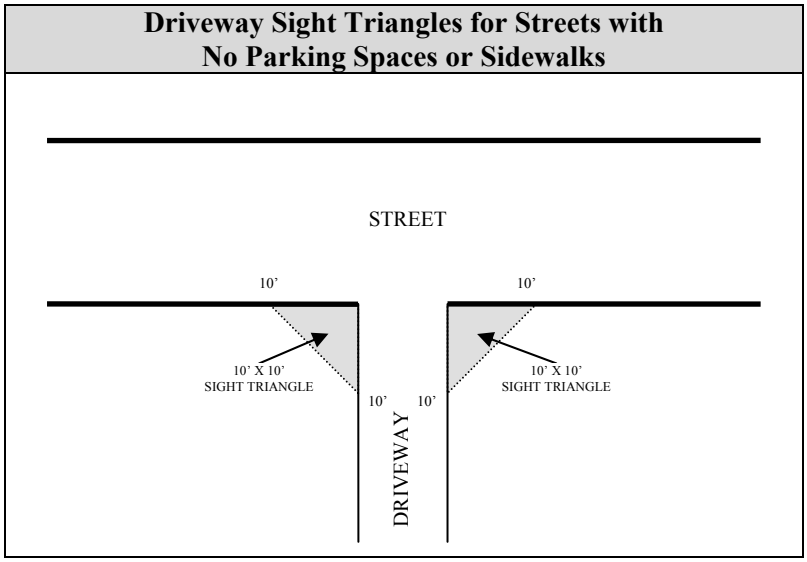
   a. **Intersection Sight Triangle** - A triangle established by multiplying the speed limit of the road which is being accessed by ten (10). The sight distance for a speed limit of 35 MPH would be 350 feet at the intersection. The resulting intersection sight distance triangle is determined by measuring from a point fifteen (15) feet from the edge of pavement of the road being accessed to the points providing the minimum intersection sight distance in each direction.

Intersection Sight Triangle for Road with 35 MPH Speed Limit

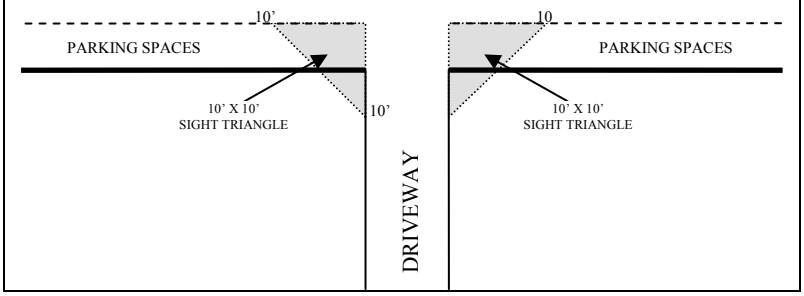


b. **Driveway Sight Triangle** - The driveway sight triangle is one that is measured ten (10) feet along the driveway and ten (10) feet along the edge of pavement. In the event that parking is allowed adjacent to the curb, ten (10) feet will be measured along the edge of the driveway and ten (10) feet along the edge of the lane of traffic. In the event that a driveway crosses a sidewalk, ten (10) feet will be measured along the driveway and ten (10) feet along the edge of the sidewalk. Refer to illustrations in the sign measurement provisions of this Ordinance.

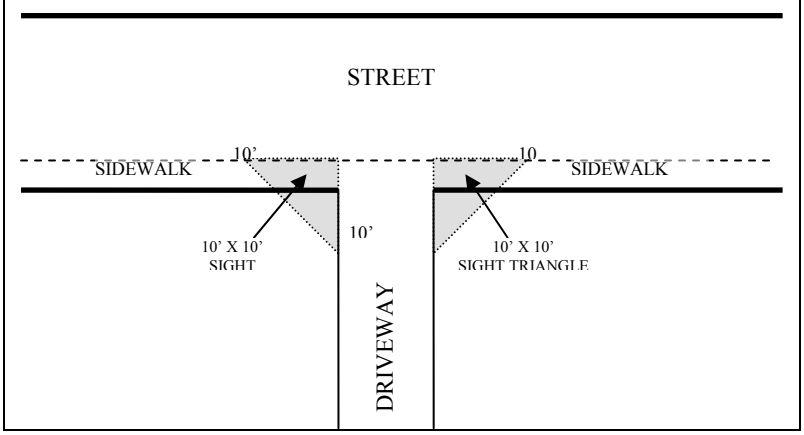
Driveway Sight Triangles for Streets with No Parking Spaces or Sidewalks



Driveway Sight Triangles for Streets with Parking Spaces



Driveway Sight Triangles for Streets with Sidewalks



C. **Additional Sight Criteria**

Table 5-18 ADDITIONAL SIGHT MEASUREMENTS	
Criteria	**Height Above Road Surface**
Height of Driver's Eye	3.5'
Stopping Sight Distance Object	0.5'
Intersection Site Distance Object	4.25'

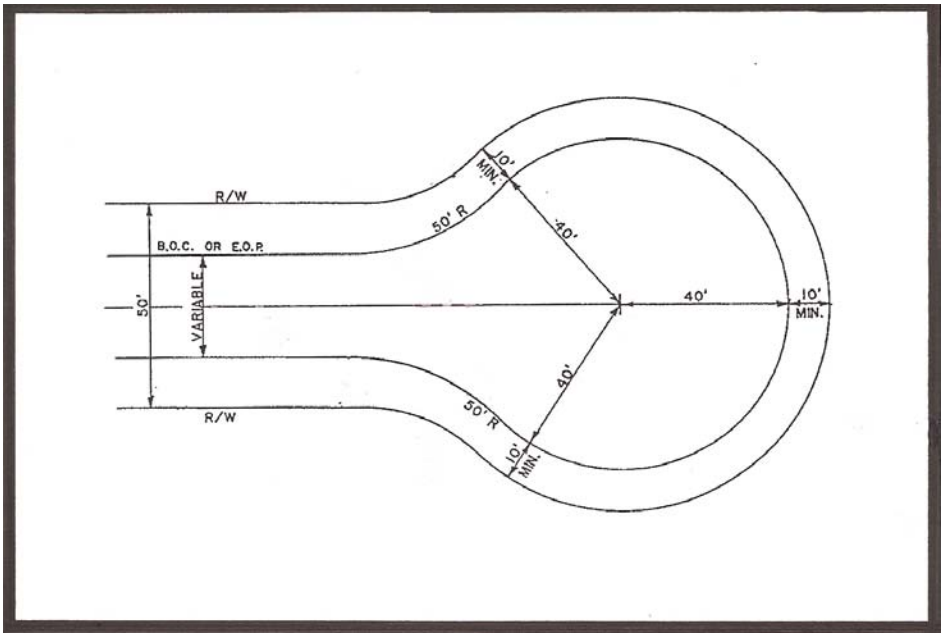
5:3.8-9 Road Entrance Islands and Medians

A. An entrance island shall not encroach on the existing road's right-of-way and shall be located a minimum of fifteen (15) feet from the edge of the pavement of the existing road.
B. The island shall end before the location of the first driveway for the planned lots on each side of the island.
C. There shall be a minimum width of fifteen (15) feet of roadway for one-way traffic on each side of the island, measured from back of curb to back of curb.

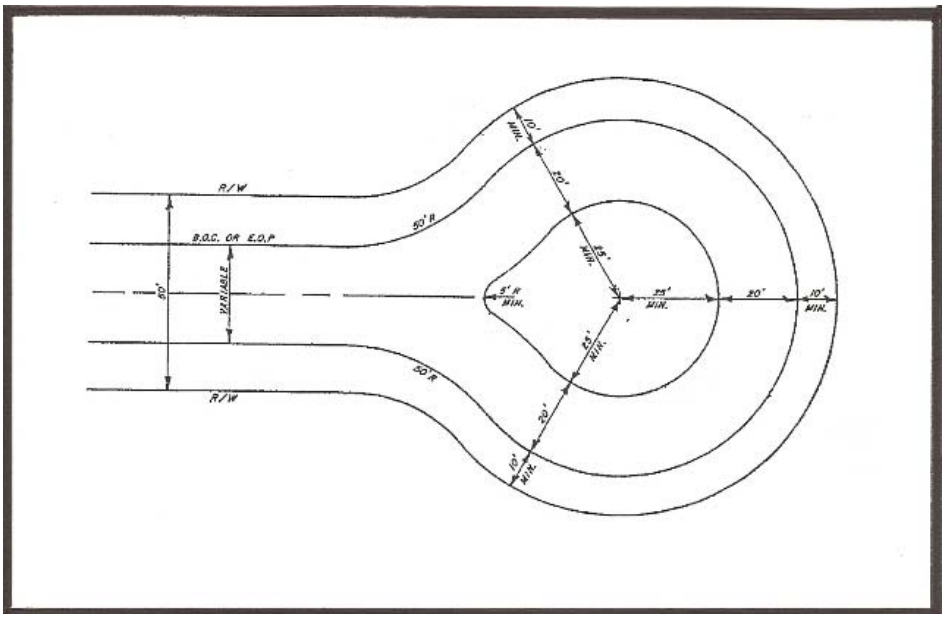
D. Any vegetation or structure located within the island shall not interfere with the sight distance requirements. Any plantings and/or structures within the island shall not be the perpetual maintenance responsibility of Kershaw County.
E. If deemed necessary by the Public Works Director, a marked warning area shall be installed a minimum of fifteen (15) feet in advance of the island on RC/LC/I roadways. The specifications for these marked warning areas shall be according to the current addition of the *South Carolina Manual on Uniform Traffic Control Devices.*
F. Within the island area, provisions shall be made to ensure positive drainage and/or infiltration. If irrigation or sprinkler systems are proposed, tile underdrains shall be required.
G. Where the Public Works Director has concerns relating to traffic flow, traffic control signs shall be required. The specifications for the traffic control signs will be according to the current addition of the *South Carolina Manual on Uniform Traffic Control Devices*.

5:3.8-10 Cul-de-Sac Islands

A. Any vegetation or structure located within the island shall not interfere with the sight distance requirements. Any plantings and/or structures within the island shall not be the perpetual maintenance responsibility of Kershaw County.
B. There shall be a minimum width of twenty (20) feet of roadway for one-way traffic around the perimeter of the island, measured from back of curb to back of curb.
C. Minimum inside curb radius shall be twenty-five (25) feet with a minimum radius of five (5) feet for the nose of the island. The minimum outside curb radius shall be forty-five (45) feet with a return radius of fifty (50) feet.
D. If deemed necessary by the Public Works Director, a marked warning area shall be installed a minimum of fifteen (15) feet in advance of the island on RC/LC/I roadways. The specifications for these marked warning areas shall be according to the current edition of the *South Carolina Manual on Uniform Traffic Control Devices.*
E. Horizontal and vertical alignment of the roadway shall be in accordance with the minimum stopping sight distance requirements as determined by the design speed.
F. Within the island area, provisions shall be made to ensure positive drainage and/or infiltration. If irrigation or sprinkler systems are proposed, tile underdrains shall be required.
G. Where the Public Works Director has concerns relating to traffic flow, traffic control signs shall be required. The specifications for the traffic control signs shall be according to the current addition of the *South Carolina Manual on Uniform Traffic Control Devices*. **Note**: A dead end traffic control sign shall not be required in circumstances where the end of the cul-de-sac is clearly visible from the intersection.



Cul-de-Sac Design Standards



Cul-de-Sac with an Island

5:3.8-11 Shoulders

Shoulders shall consist of stabilized turf or other material acceptable to the Public Works Director, and shall be prepared in compliance with Section 209 of the *Standards Specifications Manual* previously referenced.

5:3.8-12 Street Signs

A. Design and placement of traffic signs shall follow State regulations or the requirements specified in the *Manual of Uniform Traffic Control Devices for Streets and Highways*,

published by the U.S. Department of Transportation. Responsibility for the cost of the signs shall rest with the developer.

B. At least one street name sign shall be placed at each street intersection. Signs shall be installed under streetlights, and where possible, free of visual obstruction. The design of street name signs shall be uniform in size and color, and shall be subject to approval by the Public Works Director.

5:3.8-13 Street Names

The Kershaw County Planning and Zoning Commission devolves the responsibility of approval of new street names to of Kershaw County 911 Addressing. Proposed street names shall be substantially different in sound and spelling from existing streets in the County unless at a future date, plans call for a tie-in between the proposed street and an existing street. Where such streets are in obvious alignment with an existing street, it shall be given the same name as the existing street.

5:3.8-14 Blocks

A. **Residential**
   1. Block lengths shall be appropriate to topographic conditions and density to be served, but shall not exceed 1,000 feet in length, or be less than 300 feet in length.
   2. Blocks should be of sufficient width to allow for two tiers or lots of appropriate depth, except where reverse frontage lots are required along a major street, or where prevented by size, topographical conditions, or other inherent conditions of the property.

B. **Commercial and Industrial**
   1. Blocks intended for commercial or industrial development may vary from the standards of design detailed above in favor of dimensions more suitable to their prospective use; provided such blocks permit adequate traffic circulation.

5:3.8-15 As-Built Engineering Plans

Upon completion of any project involving infrastructure (roads, storm drainage systems with structures, closed pipes, ponds, etc.) and prior to final plat approval, Kershaw County requires the submittal of as-built engineering plans and calculations. As applicable, the following information shall be submitted on or with the as-built engineering plans:

A. **General**:
   1. The subdivision name and the approved road names.
   2. The developer's name, address, and contact information.
   3. The engineer's and surveyor's name, address, and contact information.
   4. The contractor's name, address, and contact information.
   5. The scale of the engineering plans accompanied by a bar scale.
   6. Depiction of the locations and elevations of the benchmarks on the project.
   7. Depiction of any wetlands and/or designated waters of the state (WoS).

B. **Roadways**:
   1. A copy of the asphalt tickets.
   2. A copy of the rock tickets.
   3. A copy of the seeding tickets.
   4. Pavement widths on the plan view.
   5. A typical roadway cross-section.

6. A detail of the roadway with base and surface thicknesses.
7. A plan view of the roadway with centerline stationing and geometric data.
8. Horizontal and vertical curve information.
9. A profile of the roadway with centerline elevations.
10. Right-of-way widths on the plan view. Metes and bounds for the right-of-way shall be provided.
11. Utility elevations at all road crossings on the roadway profile.

C. **Storm Drainage Systems**:

1. The location of all storm drainage structures and utilities.
2. All storm drainage and utility easements.
3. Storm drainage profile with all relevant elevations.
4. Detention/retention pond information (stage-storage-discharge values).
5. A drawing of the outlet structures and spillways with elevations and dimensions.
6. Details of the storm drainage structures.

5:3.9 Driveway Standards

5:3.9-1 Definition of Driveway

Driveway- A paved or unpaved area used for ingress or egress of vehicles, and allowing access from a street to a building, lot, structure, or facility that provides access to no more than three (3) parcels of land. Access to multiple parcel group developments is excluded from the three parcel restriction.

5:3.9-2 Driveway Width

The width in feet of a driveway approach shall be within the minimum and maximum limits as specified below, excluding detached single-family residential properties. Driveway approach widths shall be measured at the road right-of-way line and the width of any driveway shall not increase when crossing the right-of-way except at properly designated curb returns.

A. **One-Way Drives** - One-way drives shall have a minimum width of twelve (12) feet and shall not exceed a maximum width of eighteen (18) feet.
B. **Two-Way Drives** - Two-way drives shall have a minimum width of eighteen (18) feet and shall not exceed a maximum width of twenty-four (24) feet.

5:3.9-3 Number of Drives

A. Generally, one point of access to a given property will be allowed as long as it is situated in a safe location and in accordance with other provisions of this Ordinance. Additional access points, however, may be allowed if driveway spacing requirements can be met.
B. Driveways shall be limited to the number needed to provide adequate and reasonable access to a property. Factors such as alignment with opposing driveways and minimum spacing requirements will have a bearing on the number of driveways approved. A property with more than one (1) frontage may have the frontages considered separately.

5:3.9-4 Joint Use of Driveways/Connectivity

For commercial areas, where feasible, development plans shall require the establishment of a joint use access driveway serving two (2) or more abutting properties. Additionally, when a property is developed, the Planning Official or Planning and Zoning Commission, as applicable, may require connectivity with adjoining parking areas or may require that a driveway/parking area be designed for future connection with an abutting property. Joint use driveways for residential developments may be utilized to meet the driveway spacing standards.

5:3.9-5 Driveway Separation

All driveway approaches shall be allocated and spaced per SCDOT minimum spacing standards as outlined below.

A. **Driveway Spacing Requirements for County Roads**
   Access separation between driveways shall be measured from near edge to near edge of adjacent drives. Speed limits are as determined by SCDOT. Refer to the following table:

Table 5-19 COUNTY ROAD DRIVEWAY SPACING REQUIREMENTS	
Road Speed Limit (mph)	**Minimum Spacing (ft.) ≥ 2000 Average Daily Trips**
30 or less	160 feet
35	220 feet
40	275 feet
45	325 feet
≥ 50	400 feet

B. **Exceptions**

1. Internal residential access streets (residential local) in subdivision developments are exempt from these standards.
2. For individually developed single-family lots, the Planning Official or Planning and Zoning Commission, as applicable, may reduce the spacing requirements of this section if it can be demonstrated that a hardship exists and there is no opportunity to design a conforming access point.
3. Minimum spacing may be increased if right-turn deceleration lanes are provided.
4. A pair of one-way drives may be substituted only if the internal circulation on the site is compatible with the one-way driveways. Nowhere shall a distance of less than forty (40) feet between edges of one-way drives be permitted.
5. A replacement of a driveway not meeting the minimum spacing requirements is allowed if lost or disrupted due to a County road project.

5:3.10 Underground Wiring

5:3.10- 1 Where Required

All electric, telephone, television, or other communication lines (both main and service connections) servicing new major subdivisions shall be provided by underground wiring within easements or dedicated public rights-of-way, installed in accord with the prevailing standards and practices of the utility or other companies providing such services.

Lots that abut existing easements or public rights-of-way on existing streets and roads where overhead electric or telephone distribution supply lines and service connections have previously been installed may be supplied with electric and telephone service from those overhead lines, but should a road widening or an extension of service or other such condition occur as a result of development and necessitate the replacement or relocation of such utilities, such replacement or relocation shall be underground.

5:3.10-2 Exceptions

Where conditions are such that underground wiring is not practical, the Planning and Zoning Commission may make an exception, provided the placement and alignment of poles shall be designed to lessen the visual impact of overhead lines; that clearing swaths through treed areas shall be avoided by selective cutting and staggered alignment; that trees shall be planted in open areas and at key locations to minimize the view of poles and alignments; and that alignments shall follow rear lot lines and other alignments, as practical.

5:3.11 Gate Access Standards for Gated Communities

As of the effective date of this Ordinance, all new gated communities shall comply with the following regulations:

A. **Ingress/Egress Width** - The ingress/egress for fire service and emergency vehicles shall be at least twelve (12) feet in width.
B. **Distance Between Gate and Right-of-Way** - There shall be a minimum of forty (40) feet measured from the gate to the ultimate right-of-way so that fire trucks and emergency vehicles do not block the adjacent public right-of-way.
C. **Radio Transceiver Access Control** - All electrical vehicular gates shall be equipped with access control using a radio transceiver for public safety and authorized users. The transceiver will allow emergency vehicles to open the gate from a mobile or portable radio. Kershaw County authorizes Click2Enter, Inc. to provide this device. Any type of device from a company other than Click2Enter, Inc. shall be approved by the Kershaw County Fire Marshal.
D. **Fail-Open Device Required** - All electrical vehicular gates shall be provided with a fail-open device. Gates shall be in the open position during a power failure and shall remain so until power is restored.
E. **Switch Key Required** - In order for the appropriate personnel to enter in the event of an emergency, a switch key shall be installed to allow emergency personnel access through all vehicular gates. Kershaw County authorizes the Knox Company to provide this device. Any type of device from a company other than the Knox Company shall be approved by the Kershaw County Fire Marshall.
F. **Lock Box Required** - In order for the appropriate personnel to enter in the event of an emergency, an approved lock box shall be installed to allow emergency personnel access through all pedestrian gates. Kershaw County authorizes the Knox Company to provide this device. Any type of device from a company other than the Knox Company shall be approved by the Kershaw County Fire Marshall.
G. **Swing-Type Gates** - Swing-type vehicular gates shall be designed so that, when fully opened, they do not obstruct the path of travel for vehicles and pedestrians.
H. **Roll-Type Gates** - Roll-type gates shall not be designed in a manner that when open, would block vehicular or pedestrian paths of travel.
I. **Multiple Gates** - All gates within in any single development shall be operated in the same fashion.
J. **Notification of Activation or Deactivation** - Gate activation shall not be altered nor shall gates be placed out of service without prior notification to the Kershaw County Fire Service and Sheriff's Department.
K. **Failure to Comply** - Any existing or proposed community failing to meet the above listed requirements shall not be allowed gated entrances.

5:3.12 Utility Easements and Rights-of-Way

A. **Utility Easements** - Adequate areas of suitable size and location shall be allocated for utility easements. The location and size of such easements shall be coordinated with the public and private utilities involved.

Where provided along side or rear lot lines, utility easements shall be not less than twenty (20) feet in width. No vegetative screening or fencing required by the buffering, screening, open space, and landscaping regulations of this Ordinance shall be planted or installed inside utility and drainage easements, excluding overhead easements, without the consent of the Planning Official and the easement holder. If plantings or fences inside utility or drainage easement areas are allowed, these plantings and fences shall be maintained in accordance with the terms of consent and any applicable maintenance provisions of this section. Any tree planted within the right-of-way of overhead utility lines shall be a small-maturing tree of a mature height of no greater than fifteen (15) feet.

B. **Kershaw County Sewer Easements and Rights-of Way**

1. **Dedication of Right-of-Way** - The developer may dedicate sewer line rights-of-way to Kershaw County. The proposed locations of Kershaw County public sewer rights-of-way shall be approved by the Kershaw County Utility Director. Where provided along side or rear lot lines, utility easements shall be not less than twenty (20) feet in width. The sewer line right-of-way shall be shown on the construction plans, as built plans, and on the final plat. The sewer line and right-of-way shall be dedicated to Kershaw County through the Certification of Ownership and Dedication per the final plat submittal requirements of this Article and is repeated herein:

   a. **Certificate of Ownership and Dedication**

   It is hereby certified that I am (we are) the owner(s) of the property shown and described hereon and that I (we) hereby dedicate said streets; walks; parks; rights-of-way; sewer lines to include manholes and manhole castings, fittings and other components, and service lines to the right-of-way boundaries; and other sites to public use as specifically noted hereon. It being understood that I (we) hereby warrant said facilities and agree to bear any costs associated with correcting any defects in said facilities for a period of one (1) year from the date of final plat approval.

   _____ _____
   Date Owner

   _____ _____
   Date Owner

   b. **Use of Right-of-Way** - The right-of-way shall be for the exclusive use of Kershaw County. No vegetative screening or fencing required by the buffering, screening, open space, and landscaping regulations of this Ordinance shall be planted or installed inside the Kershaw County public sewer right-of-way without the consent of the Planning Official and the Utilities Director. The Planning and Zoning Commission or Planning Official, as applicable, may approve the installation of sidewalks, trails, and greenways as required in this Article within the Kershaw County

public sewer rights-of-way. All proposed sidewalks, trails, and greenways including any proposed hardscaping shall have approval from the Utilities Director prior to sketch plan or site plan submittal to the Planning Official or Planning and Zoning Commission, as applicable. However, the County reserves the right to dig up, remove, or destroy any buildings, fences, sidewalks, driveways, entranceways, and other structures allowed within the right-of-way for the purpose of maintaining, inspecting, and operating the sewer facilities. The County shall, in connection with such action, take reasonable precaution not to damage or move said structures, but shall not be held liable for damages.

2. **Sewer Line Easements** - The developer (grantor) may grant sewer line easements to Kershaw County. Where provided along side or rear lot lines, utility easements shall be not less than twenty (20) feet in width. Ownership of the easement shall remain with the property holder. However, no construction within the sewer easement, including buildings, fences, sidewalks, driveways, entranceways, and other structures shall be allowed within the boundaries of the easement without prior approval of the Utilities Director.

   The sewer facilities installed within the easement shall remain the property of Kershaw County. The County shall have the right to maintain, inspect, rebuild, remove, repair, improve, and relocate within the easement, and to make such changes, alterations, substitutions, additions to or extensions of its facilities, including the right to increase the size and number of pipes and manholes. However, the County shall, in connection with such action, take reasonable precaution not to damage or move the facilities of the easement grantor.

   All rights reserved to the grantor of the easement shall be subject at all times to the paramount right of the County to dig up, remove, or destroy any buildings, fences, sidewalks, driveways, entranceways, and other structures belonging to the grantor for the purpose of maintaining, inspecting, and operating the sewer facilities. Any shrubbery, fence, or other structure placed in the sewer easement shall be done at the risk of the property owner and the County shall not be held responsible for damages done to any structure, shrubbery, or fence resulting from the utility having to make excavations or openings in the utility easement.

   In addition to the grant of easement, the grantors shall grant to the County during the period of construction and during any subsequent period in which maintenance, inspection, repairs, or reconstruction of the sewer system may be necessary, the right of using land abutting the easement as may be necessary for the placement of materials excavated from the easement and to bring in lines and equipment. The County shall restore damages resulting from said uses of land abutting the easement.

   a. **Sewer Easement Certification -** The following certification, as applicable, shall be included on all construction plans and final plats submitted for approval:

      The Party of the First Part, hereinafter called "Grantor," does hereby grant, bargain, sell, release and convey unto Kershaw County, hereinafter called "Grantee," its successors and assigns, sewer lines and appurtenances incidental thereto including but not limited to pipes, manholes and fittings and other components comprising the sewer system as shown on hereon,

in fee simple, together with an exclusive easement, twenty (20) feet in width together with the right during the course of operation, construction, and/or maintenance to use such additional width as may be necessary on either side of the aforesaid right-of-way herein granted, for the purpose of operation, construction, and/or maintenance of said sewer lines and appurtenances through and under the lands hereon described, together with the right of ingress and egress across said property at all times, and the right to excavate and refill ditches and/or trenches, and the further right to remove trees, bushes, undergrowth, crops and/or other obstructions interfering with the operation, construction and/or maintenance of said sewer lines and appurtenances. The grantor hereby agrees that no construction (including, but not limited to, buildings, paving, pipe lines or other utilities) will be allowed within the limits of this easement without the prior approval of Kershaw County.

_____ Date _____Owner (Grantor)

_____ Date _____Owner (Grantor)

C. **Storm Drainage Pipe Easements**- Storm drainage pipe easements shall provide adequate area for maintenance equipment to operate. Some typical easements are listed below:

Table 5-20 DRAINAGE EASEMENT WIDTH PER PIPE SIZE AND DEPTH		
Maximum Pipe Size	**Maximum Depth to Invert**	**Width of Easement**
18”	3.5’	20’
24”	5.0’	24’
36”	6.0’	30’
54”	7.0’	36’

D. **Stormwater Open Channel Easements** - The minimum easement width for an open channel/ditch is twenty-four (24) feet. For channels in excess of four (4) feet in width and/or four (4) feet in depth, the easement width shall be increased by two (2) feet for each additional foot of width and/or depth or width of the channel plus twenty (20) feet, whichever is wider.

E. **Detention Pond Easements** - An access easement of twenty (20) feet minimum shall be provided to the pond access gate. The entire pond and sufficient access on the top of the circumference of the pond shall be included as part of the drainage easement.

5:3.12-1 Maintenance of Easements and Rights-of Way

A. **Maintenance of Easements** - Easements shall be maintained by the property owner(s) and may be used to satisfy yard requirements unless specifically accepted for public maintenance by the County or utility with lines in such easement.

Covenant restrictions placed in the deed of a lot which contains a utility easement shall stipulate that the County, municipal, or other utility provider with lines in such easement shall have full right of access.

B. **Maintenance of Kershaw County Sewer Rights-of-Way -** Public sewer right-of-way dedicated to Kershaw County shall be maintained by Kershaw County.

C. **Maintenance of Sewer Easements granted to Kershaw County -** The easement grantor shall grant to Kershaw County the right of maintenance of the easement and sewer facilities as stated above.

5:3.13 Surveys and Markings

All land developments within the jurisdiction of this Ordinance shall be surveyed, platted, and marked in accord with the *Minimum Standards Manual for the Practice of Land Surveying in South Carolina*, as promulgated by the Code of Laws of South Carolina, 1976, Title 40, Chapter 21. This Manual is hereby adopted by reference and is as much a part of this Ordinance as if contained herein.

5:3.14 Sidewalks and Paths

Sidewalks, paths, trails, and/or greenways designed to accommodate pedestrian, bicycle, and other non-automotive traffic shall be provided in all major residential subdivisions, major group developments, and Planned Development Districts. The system of sidewalks, paths, trails, greenways, or combination thereof shall be designed such that every lot in the development or building in a group development has access to the system. Connectivity of the system to nearby schools, businesses, institutions, and other facilities shall be provided as applicable and practicable. The proposed system design shall be approved by the Planning and Zoning Commission at the plan review per the provisions of this Ordinance.