
ARTICLE

3

DESIGN STANDARDS FOR SUBDIVISION REVIEW

SECTION 300

Introduction

The following design standards are intended to assist a developer or property owner in creating a subdivision and meeting the purposes of subdivision regulations. These standards are to be used in preparing a Preliminary Plat, Improvement Plan, Grading Plan, Final Plat and Conveyance Plat. The design standards generally conform to the "Goals and Objectives" section of the Boone County Comprehensive Plan.

The purpose of these standards is to establish minimum design and improvement standards which will be required as a pre-condition to development or in conjunction with development for lots, streets, utilities, and other physical elements of a subdivision or development. The developer's engineer (Kentucky Registered) shall design these aspects of the subdivision or development and the Boone County Planning Commission's Staff shall review them.

These design standards also present the opportunity for a developer or property owner to choose one of two types of residential subdivision layout within an existing zoning district as described in Section 302. These subdivision regulations continue to permit Conventional Subdivision layouts, however, are also designed to encourage Open Space Residential Subdivision layouts as an alternative. The developer or property owner has the option of following either a Conventional or a Open Space Residential Subdivision layout, however, it is recommended that this option be discussed with Planning Commission Staff before application to insure that the proposed subdivision meets the requirements for Open Space Residential Subdivision.

THE DESIGN AND CONSTRUCTION OF STREETS AND WATER, SANITARY SEWER, AND STORM WATER UTILITIES SHALL BE IN ACCORDANCE WITH THE CURRENT CITY/COUNTY STREET, STORMWATER AND SIDEWALK SPECIFICATIONS AND THE APPROPRIATE WATER AND SANITARY SEWER SPECIFICATIONS. A COPY OF THE CURRENT CITY/COUNTY STREET, STORM, AND SIDEWALK SPECIFICATIONS IS PART OF THIS DOCUMENT AND IS LOCATED IN THE REAR OF THIS DOCUMENT. REFERENCE TO THE CURRENT BOONE COUNTY, FLORENCE, WALTON, UNION, NORTHERN KENTUCKY WATER SERVICE DISTRICT, SANITATION DISTRICT #1, AND BULLOCK PEN WATER OR SANITARY SEWER SPECIFICATIONS IS AVAILABLE IN THE BOONE COUNTY PLANNING COMMISSION OFFICE

FOR PROPERTIES ADJOINING INCORPORATED AREAS SUCH AS WALTON, UNION AND FLORENCE, AND FOR PROPERTY BEING PROPOSED TO BE ANNEXED BY WALTON, UNION AND FLORENCE, IT IS HIGHLY RECOMMENDED THAT THE DEVELOPER OF A SUBDIVISION OR APPLICANT CONTACT THE CITIES OF WALTON, UNION OR FLORENCE TO DETERMINE THE PROPOSED PROJECT'S IMPACT ON CITY'S SANITARY SEWER, WATER AND STORM SEWER SYSTEM WHEN CONSIDERING DEVELOPMENT ON THEIR PARCEL.

SECTION 302

Open Space and Conventional Residential Subdivision Design

A. Subdivision Name

Subdivision names shall not duplicate or too closely approximate phonetically the name of any other subdivision or development in Boone County unless it is an extension or expansion of an existing subdivision. The name of a subdivision shall follow the same name during each subdivision review stage. Changes to subdivision names can only occur at the Preliminary Plat and Improvement Plan review stages upon Planning Commission approval. If an existing subdivision name is being proposed to change and the Final Plat for the subdivision and phase or section is recorded in the Clerk's office, the developer of the subdivision or applicant shall follow the revocation requirements as set forth in K.R.S. 100.285. The Boone County Planning Commission shall approve all subdivision names.

B. Open Space Residential Subdivision Design

Open Space Residential Subdivisions are permitted in accordance with Article 31 of the Boone County Zoning Regulations.

1. These regulations are intended to provide for the option of developing residentially zoned property in either a Conventional or Open Space manner. A Conventional Subdivision generally covers the entire buildable portion of a site with residential lots. These lots are equal to or greater than a required minimum size designed to approximate the maximum permitted development density under the zoning regulations. An Open Space Subdivision has the same overall gross density of total dwelling units per total acres and the same permitted uses under the existing zoning district, however lot dimension and setback requirements are less restrictive. This permits greater unit per acre net densities on portions of the site while containing the same maximum number of dwelling units as would be permitted under a Conventional Subdivision. The use of Open Space Subdivisions is not intended to allow increased density for undevelopable or unusable land. The remnant land not designated as building lots is required to be left undeveloped, and must serve the purpose of effective buffering, passive recreation, protection of significant vegetation, significant historic preservation or scenic qualities;

The intent of permitting Open Space Residential Subdivisions within the Subdivision and Zoning Regulations is to preserve open space in Boone County while allowing the developer to reduce site improvement costs. Flexibility in street and right-of-way width and sidewalk requirements for genuine Open Space Residential Subdivisions are addressed in this Article, while lot dimension and building setback requirements are addressed in the Boone County Zoning Regulations;

Instead of the conventional subdivision design process where an engineer is hired by the developer to prepare a plat and then meet with Planning Commission staff, a joint design process occurs where staff and the applicant work collaboratively to prepare an Open Space Subdivision design. This is achieved through a six-step process which includes meetings between the applicant and Planning Commission staff. The Open Space Subdivision design process is not required in any zoning district and is purely voluntary on the part of the property owner and/or developer. Certain design standards specified below are required for the

subdivision to be approved as an Open Space Subdivision. If these standards cannot be met, the proposed lots within the subdivision must meet minimum conventional lot sizes and other dimensional standards of the applicable zoning district(s) and be reviewed as a conventional subdivision.

The six-step design approach described below is to be used for Open Space Subdivision applications:

Step One - Identifying Primary Conservation Areas

This step consists of identifying the land that should be permanently protected. The developer performs a detailed site analysis in order to precisely locate features to be conserved. The developer first identifies all the constrained lands (wet, flood prone, and steep), called Primary Conservation Areas (see Figure 31.1). These include any areas within the Developmentally Sensitive Future Land Use Classification as described in the Boone County Comprehensive Plan text (existing slope of twenty percent or greater for a height of 20 meters or more). The extent of the Developmentally Sensitive area is determined by site analysis and not on the general Future Land Use map.

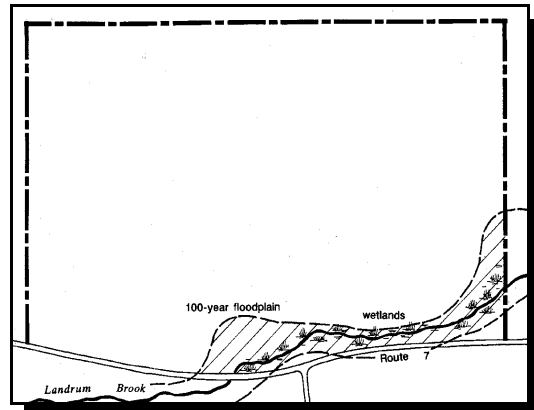


Fig. 31.1 - Primary Conservation Areas

Step Two - Identifying Secondary Conservation Areas

The developer then identifies Secondary Conservation Areas (Figure 31.2) which comprise noteworthy, amenity-forming features of the property; mature woodlands, greenways, trails, river and stream corridors, prime farmland, hedgerows and individual free-standing trees or tree groups, wildlife habitats and travel corridors, historic sites and structures, scenic viewsheds, etc.

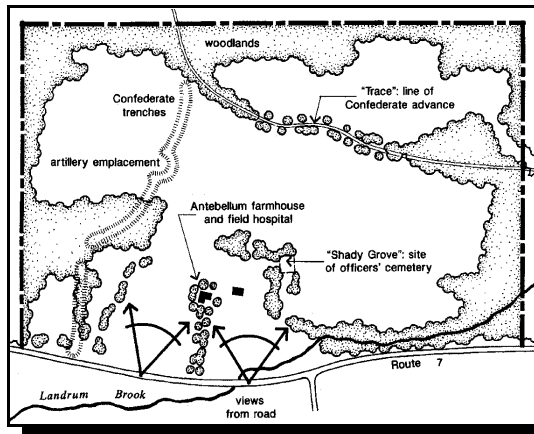


Fig. 31.2 - Secondary Conservation Areas

Step Three - Identifying Potential Development Areas

After "greenlining" these conservation elements, the remaining part of the property becomes the Potential Development Area (Figure 31.3).

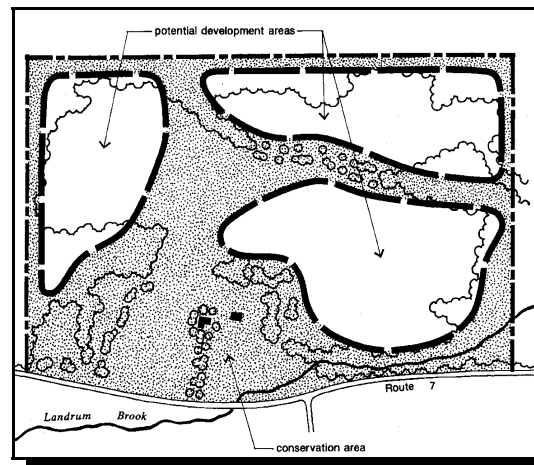


Fig. 31.3 - Potential Development Areas

Step Four - Locating Housing Sites

This step involves locating sites of individual houses within the Potential Development Area so that their views of the open space are maximized (Figure 31.4). The number of houses permitted is calculated by the gross site density permitted within the zoning districts for the entire site.

Step Five - Drawing In Streets

This step simply involves “connecting the dots” with streets and trail system (Figure 31.5).

Step Six - Drawing In Lot Lines

The final step consists of drawing in the lot lines (Figure 31.6).

2. Conventional Yield Plan: The product of the six-step process is greatly different than the conventional residential subdivision design for the same site (Figure 31.7);
3. Gross Density: Any residential subdivision shall be developed within the maximum permitted intensity of total dwelling units per total acreage as regulated in Table 31.1 of this Article for the affected zoning district(s). Open Space subdivision design may allow a developer to attain the full permitted density on a site under the existing zoning whereas normal site constraints and infrastructure needs typically result in a lower gross density potential for a conventional subdivision design;
4. Net Density: The maximum density of a portion of a Conventional or Open Space Residential Subdivision shall be governed by the minimum lot sizes permitted in the zoning district as described in Table 31.1 of this Article 17;
5. Minimum Size of Open Space Residential Subdivision: Open Space subdivisions shall incorporate a minimum of six contiguous lots which is consistent with the definition of a major division of land within these regulations.

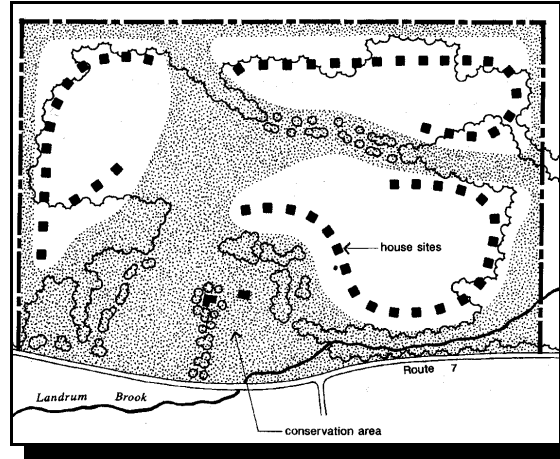


Fig. 31.4 - Locating Housing Sites

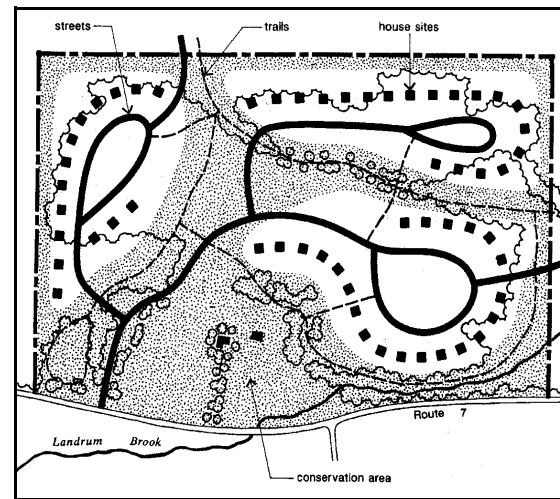


Fig. 31.5 - Drawing In Streets

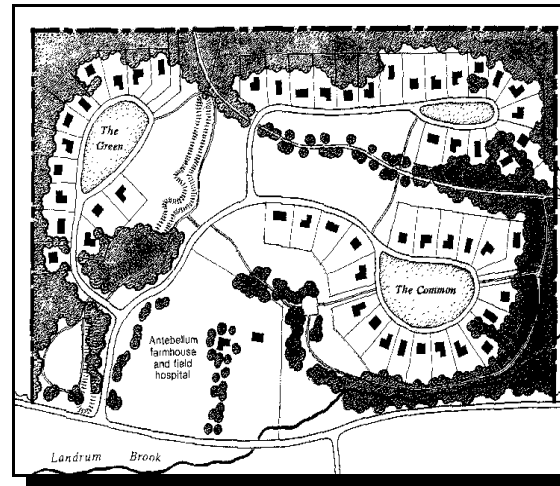


Fig. 31.6 - Drawing In Lot Lines

*Illustrations from Conservation Design For Subdivisions
by Randall Arendt (1996)*

6. The following standards must be met by an Open Space Subdivision design:

- Individual building lot frontage must be on the interior road network.
- Each residential dwelling unit shall have a view of functional open space from the front or rear of the unit.
- The development shall contain central, visible, and accessible open space.
- Open space must be connected throughout the development by sidewalk or path.
- Maintain view of open space from the existing main road into the site. The design shall buffer views of the dwelling units, particularly rear elevations, from the existing thoroughfare.

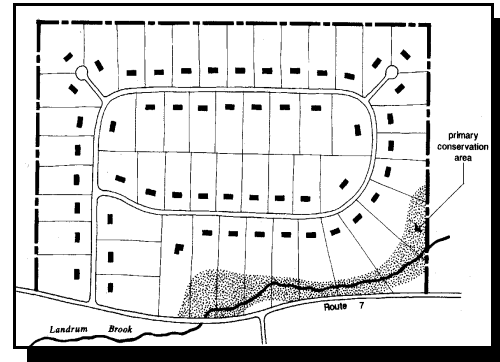


Fig. 31.7 - Conventional Zoning Yield Plan

- Provide entry treatment, including natural vegetation buffering as preferable to berming, along the property frontage.
- Adjacent to existing single family residential units, Open Space Subdivision building setbacks from the development boundary must mirror the required minimum setbacks of the existing adjacent zoning district.
- Wet stormwater retention areas may qualify for open space for the purposes of density calculation if properly designed to accommodate public recreation.
- To avoid developing mobile home parks in A-1 zoning districts where they are not permitted, mobile home lot sizes shall meet the existing minimum lot size of 5 acres.
- Sidewalks are required on one side of any street with residential lots fronting on it in both A-1 and A-2 zoning districts. In any other zone, a sidewalk is required on the side of the street where residential lots front onto it. Proper pedestrian crossings must be provided where sidewalks switch sides of a street. A path or trail can be substituted for a sidewalk requirement if demonstrated to serve the same function. Sidewalks, trails, and paths must meet all disabilities requirements and standards.
- Undevelopable or undesirable areas shall not constitute green space areas for an Open Space Subdivision if they do not serve such a function. It is the responsibility of the developer to prove that the green space areas can serve one of the required uses, and is not just an attempt to increase density by accounting for undevelopable or undesirable land.

7. Green Space Areas: All subdivisions are encouraged to provide non-development areas for the purpose of preserving open space. Open Space Subdivisions are required to provide a combination of Primary and Secondary green space that totals at least the minimum specified for the zoning district in Table 31.1 of the Boone County Zoning Regulations. Sites that contain more than one zoning district shall provide the total percentage of green space based on the pro-rated acreage in each zoning district, however, the physical location of the green space may be concentrated on any of the affected zoning districts. The proposed green space areas shall be treated as permanent open space, and can not be developed in the future. Green space areas shall be functional in terms of providing realistic areas that provide for passive recreation, scenic views, protection of significant vegetation, significant historic preservation, private cemeteries, or effective buffering. These areas can be used for pasture land, crops, and tree production. Related recreation structures and agricultural outbuildings are permitted in the green space area. They also can serve the septic leach area needs of an Open Space Subdivision upon review and approval of the appropriate regulating agency. Utility easements are permitted to be located within Secondary Conservation Areas, but not in Primary Conservation Areas. It is particularly important during Step 2 of the design process to make sure green space suits this objective and does not result in inaccessible, invisible perimeter strips that create maintenance issues. If the proposed development cannot meet the minimum percentage green space requirement in table 31.1 for Primary and Secondary

green space, pocket parks or stormwater retention/detention areas can qualify when designed as suitable public or HOA recreation space. At a minimum, pedestrian access to the green space areas, either private or public, shall be provided.

The green space portions of any subdivision shall be clearly designated during subdivision review, and referenced in a Certificate of Land Use Restriction filed at the Boone County Clerk's office. These areas cannot be developed when the site's maximum gross density is reached. They shall be protected from development by an appropriate restrictive covenant, scenic or conservation easement, or homeowner's agreement. The ownership and responsibility for continued maintenance of the open space areas is also required. These documents shall be submitted at the Final Plat review.

SECTION 305

Street Design

- A) Street Names - Proposed streets, which are in alignment with other existing streets, shall bear the names of existing streets unless separated by an intersecting collector or arterial street, or a legislative or fire district boundary. In no case shall the name of a proposed street duplicate an existing street name, irrespective of the use of the suffix street, road, lane, avenue, boulevard, way, place, or court, nor shall a proposed street name phonetically approximate the name of any existing or approved street name in Boone County. Proposed street names are added to a master list or index in order to reserve these names when the Preliminary Plat is approved. Street names on Improvement Plans and Final Plats shall follow the approved names listed on the Preliminary Plat unless approved through a subsequent review by the Zoning Administrator. If street names are changed in comparison with the approved Preliminary Plat, then a revised Plat shall be submitted within thirty days of the name changes reflecting the approved changes for the Planning Commission's and the appropriate legislative unit's files.

Street names on previously recorded plats can be changed but only if a subdivider or applicant formally requests it from the appropriate legislative body for a public street or from the Boone County Planning Commission for a private street. The Final Plat shall also be amended to reflect the new street name.

- B) Building/House Addresses - Building/House addresses shall be assigned by the appropriate House Numbering Coordinator once a final plat has been approved by the Planning Commission and upon an application for a Zoning Permit from the Planning Commission and a building permit from the Boone County Building Inspection Department. Temporary addresses may be assigned for permits issued prior to approval of a Final Plat pursuant to Section 200(b) of these regulations.
- C) Transportation Management Regulations - All subdivision proposals shall follow the requirements of Article 32 of the Boone County Zoning Regulations. Article 32 describes in detail Transportation Management Regulations, which include classification of roadways, minimum spacing of driveways, minimum corner clearance of driveways, minimum sight distances, maintaining capacity of roadways, design of access points (e.g. number, location, coordination, consolidation, and spacing), turning lanes, frontage roads, the review procedure and waiver of requirements.
- D) Street Lights - When required by the applicable legislative body, the subdivider or developer of the subdivision will provide street lighting poles, accessories, and the necessary easements

at the subdivider's expense and in accordance to the specifications of the applicable legislative body and appropriate utility company. In general, street lights shall be placed at strategic locations and distances to assure safe pedestrian and vehicular traffic. Distances between street lights will be based upon lot sizes and street configuration and the appropriate legislative body. The ownership and maintenance of street lights may be given to the appropriate legislative body only after inspection has occurred and such dedication has taken place through final plat approval by the legislative body or a similar agreement has been made between the subdivider or developer of the subdivision and the appropriate legislative body. Street lights are required by the City of Florence, City of Union, and City of Walton in all subdivisions.

In unincorporated Boone County, a subdivider or developer may provide the necessary easements for future street lights with private ownership and maintenance in accordance or agreement with the appropriate utility company.

E) Street or Road Classification - The developer or subdivider is encouraged to meet with the Commission Staff to determine the design requirements of proposed streets based upon the classification of road networks in the Boone County Comprehensive Plan. In addition, a property owner may be required to publicly dedicate land for street right-of-way in order to upgrade existing arterial, collector, subcollector, or local roads and bring them into conformance with the Comprehensive Plan road classification and street design specifications. (See Item I)

F) Public Right-of-Way Width - The minimum width of right-of-way for a public street, measured from lot line to lot line, shall be as follows (See Definitions Section for type of street):

| | Conventional Subdivision | Open Space Residential Subdivision |
|--|-----------------------------|--|
| 1. Major Arterial Streets | 80 feet | 80 feet |
| 2. Minor Arterial Streets | 80 feet | 80 feet |
| 3. Collector Streets | 60 feet | 60 feet |
| 3.a. Limited Access Collector Street . . . | 50 feet | 50 feet |
| 4. Sub-Collector Streets | 50 feet | 50 feet |
| 4.a. Limited Access Sub-Collector Street | 50 feet | 50 feet |
| 5. Local Streets | 50 feet | 50 feet |
| 6. Residential Condominium Street . . . | 26 feet | 26 feet |
| 7. Cul-de-sacs | 50 feet | 42 feet |
| 8. Alley | 30 feet | 30 feet |

NOTE: Generally, signs other than street signs and traffic control signs, walls, fences, sprinkler systems and other obstructions shall not be located in public street right-of-ways. Specific permission shall be granted by the appropriate legislative body in order for these obstructions to be placed in a public right-of-way. Additional right-of-way width will be required for limited access sub-collector streets and limited access collector streets when necessary to accommodate facilities such as utilities, turn lanes, bike lanes or paths, and amenities such as benches, bus stops, and street trees.

G) Additional Right-of-Way - Subdivisions or developments that adjoin existing City and County street rights-of-way shall dedicate additional right-of-way to meet a 50 foot minimum right-of-way width if it does not exist for local or sub-collector streets and a 60 foot minimum right-of-way if it does not exist for collector or arterial streets, or for State street rights-of-way. The entire right-of-way shall be provided where any part of the subdivision or development is on both sides of the existing street; and one half of the right-of-way shall be provided, as measured from the centerline for subdivisions or developments that is located only on one side of the existing street.

H) Pavement Width - No public street shall be constructed except in conformance with the minimum pavement widths as follows: (See Definitions Section for type of street)

| | Conventional Subdivision | Open Space Residential Subdivision |
|--|-----------------------------|--|
| 1. Major Arterial Streets | 48 feet* | 48 feet* |
| 2. Minor Arterial Streets | 36 feet* | 36 feet* |
| 3. Collector Streets | 30 feet* | 24 feet* |
| 3.a. Limited Access Collector Street . . . | 24 feet* | 24 feet* |
| 4. Sub-Collector Streets | 28 feet | 24 feet* |
| 4.a. Limited Access Sub-Collector Street | 24 feet* | 24 feet* |
| 5. Local Streets | 25 feet** | 25 feet** |
| 6. Residential Condominium Street . . . | 24 feet | 24 feet |
| 7.a. Cul-de-sacs | 25 feet** | 22 feet* |
| 7.b. Cul-de-sacs in residential subdivisions when average lot size is one acre or larger | 22 feet* | 20 feet* |
| 8. Alley | 20 feet*** | 20 feet*** |

* No parking permitted and no driveway access to the collector, sub-collector street, or limited access street.

** No parking permitted on one side of street.

*** No parking permitted on either side of an alley.

I) Street Grades - Grades of both public and private streets in proposed subdivisions or developments shall not be greater than as follows: (See Definitions Section for type of street.) Grades shall not be less than one and one-half percent (1.5%) on any street.

| | |
|--|------------|
| 1. Major Arterial Streets | 7 percent |
| 2. Minor Arterial Streets | 7 percent |
| 3. Collector Streets | 10 percent |
| 3.a. Limited Access Collector Street . . . | 10 percent |
| 4. Sub-Collector Streets | 10 percent |
| 4.a. Limited Access Sub-Collector Street | 10 percent |
| 5. Local Streets | 12 percent |
| 6. Residential Condominium Street . . . | 12 percent |
| 7. Cul-de Sacs | 12 percent |

8. Alley 12 percent

These maximum grades may be modified by the Commission where extreme topographic conditions exist or in the interest of good site planning.

- J) Horizontal Curves - Central angles of horizontal curves shall be kept to a minimum unless there is sufficient radius length to minimize the severity of the curve. At no time shall the radius of the centerline of a proposed street be less than two hundred feet (200') for collector streets, and one hundred feet (100') for local streets, except at intersections or divided roadways.

The tangent distance between horizontal curves of proposed street centerlines shall not be less than one hundred feet (100') for any arterial and any collector streets.

- K) Vertical Curves - Any change in grade of proposed streets shall be transitioned by a vertical curve. The minimum length for a vertical curve shall be thirty (30) times the absolute value of the algebraic difference of the grades (in percent) of the two tangents for crest curves and thirty five (35) times the absolute value for sag curves in sub-collector and collector streets. The minimum length for a vertical curve shall be ten (10) times the absolute value of the algebraic difference of the grades (in percent) of the two tangents in local streets, cul-de-sacs, and alleys.

- L) Intersections - The two centerlines of proposed streets at their intersection shall be as nearly to a right angle as possible and that angle at no time shall be less than eighty (80) degrees. For residential subdivisions, the radius of the curve at the intersection of the two right-of-way lines shall not be less than twenty feet (20'), and for the intersection of the two pavement edges, the radius curve shall not be less than twenty-five (25) feet.

For industrial and commercial subdivisions, the radius of the curve at the intersection of the two right-of-way lines shall not be less than forty feet (40'), and for the intersection of two pavement edges, the radius curve shall not be less than forty-five feet (45'). The Boone County Planning Commission may, in certain situations, increase the minimum radii based upon existing road conditions and traffic patterns. (See Street and Storm Drainage Construction Specifications.)

There shall be no greater than four basic street legs at any proposed intersection unless the intersection is divided. Merging lanes, deceleration lanes, "Y" intersections, etc. are considered as being parts of one street leg or approach.

Proposed intersections with existing streets shall not be closer than one hundred and twenty five feet (125') to an intersection of two existing streets as measured from intersection point to intersection point.

- M) Cul-de-Sacs Streets - Proposed cul-de-sac streets designed to have a permanently closed end shall not be more than twelve hundred feet (1200') long for industrial, commercial or Conventional Residential Subdivisions, as measured from the intersection of the centerlines of the cul-de-sac and the intersecting street (from station 0+00 of the cul-de-sac street).

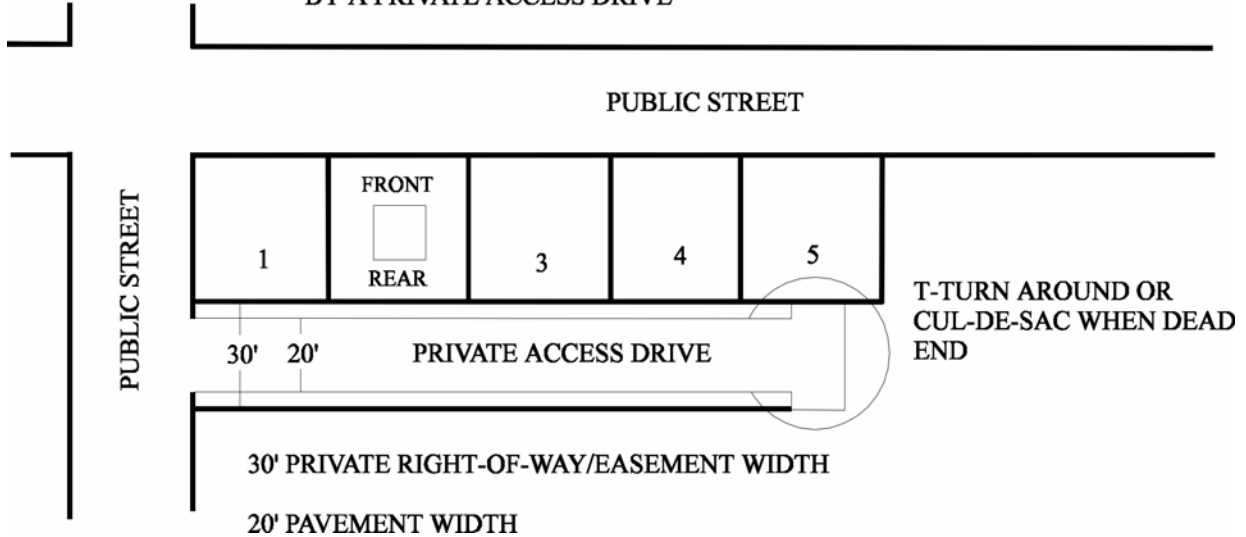
Residential subdivision with cul-de-sacs more than nine hundred feet (900') from an intersection shall be built with a radius equal to a commercial/industrial design.

- N) Temporary Dead-End Streets and Street Connections to Adjoining Tracts or Areas - Dead-end streets of a temporary nature and street connections with adjoining undeveloped tracts shall be required by the Commission. Reasons for this include the layout of the subdivision, the staging of development, the opportunity for reasonable access alternatives to adjoining tracts, the necessity of providing through connections between collector or arterial streets, to distribute traffic patterns by providing alternative routes, and to provide convenient and efficient access for emergency vehicles, street maintenance, school buses, postal delivery, and other essential services. The street connection with adjoining property shall be constructed upon Final Plat recording of seventy five percent (75%) of the subdivision lots as approved on the Preliminary Plat, or if a contributing street in the subdivision is within 300 feet of the connection to the adjoining property.

The Commission shall consider the following criteria for requiring street connections to adjoining property:

1. The adjoining land must be compatible with the subject development as determined by the current zoning and/or the Future Land Use Map as specified in the current Comprehensive Plan.
2. Street connections to adjoining properties will not be required if significant grading (as determined by the County Engineer or applicable City Engineer) and/or the construction of a bridge would be necessary to make such connections.
3. Future desired transportation patterns as described by the current Comprehensive Plan and special funding projects recommended in the Transportation Plan shall be considered. The Planning Commission may require a subdivision to include or extend a Limited Access Residential Street in areas that are recommended as Suburban Residential density or greater on the adopted Future Land Use Map without existing or committed through-streets subject to no individual lot access. The Boone County Comprehensive Plan, adopted Transportation Plan or Thoroughfare Plan, and planned street connections between properties shall be considered in determining this requirement. This provision is intended to avoid subdivision streets with direct lot frontage serving as connections between traffic generating development areas and the major street network.
4. Subdivisions required to provide subcollector or collector streets (as described in the street classification table in Article 5) shall be required to provide for connection of such streets to other collector or arterial streets or connection to adjoining lands.
5. The Planning Commission may require the connection of local streets to adjoining tracts or areas in order to prevent the local street from becoming a cul-de-sac street which exceeds the maximum length permitted for a cul-de-sac street.
6. Proposed connections to the existing street system will be consistent with the existing conditions and the design of adjoining streets.

**A MAXIMUM OF 5 LOTS CAN BE SERVED
BY A PRIVATE ACCESS DRIVE**



7. All temporary dead-end streets that will continue onto adjoining property or connect with another roadway will have a sign posted at the temporary dead end that informs the public of the planned street connection.
8. All temporary dead-end streets will be terminated with a temporary turn-around. Storm water flow at a temporary dead-end shall be managed in accordance with the requirements stated herein.

O) Private Streets or Roads - Private streets or roads are permitted only in following zoning districts:

Agriculture (A-1)
Agricultural Estate (A-2)
Recreation (R)

Residential Zoning Districts as part of an Open Space Residential Subdivision
Planned Development (PD)

Private streets may only consist of cul-de-sacs or local streets. The use of private streets are allowed in all Planned Development (PD) overlay zones, but must be approved by the Planning Commission as part of the Concept Development Plan. Similarly, private streets are permitted in Open Space Residential Subdivisions, but must be approved by the Planning Commission as part of the Preliminary Plat. In A-1, A-2 and R zones, all private streets must be centered within a right-of-way; this right-of-way must be at least thirty (30) feet in width, or at least 10 feet greater than the pavement width of the private road, whichever is greater. The right-of-way in the Agricultural Zoning Districts shall consist of a deeded access easement and maintenance agreement tied to each lot.

Newly proposed private streets in the A-1, A-2, and R zones may serve no more than five (5) buildable lots. There is no limitation on the number of permissible buildable lots that may be subdivided on private roads that were existing as of March 4, 1998. The surfacing

for a newly proposed private street in the A-1, A-2, and R zones shall consist minimally of tar and chip pavement, and the minimum pavement width shall be at least 18 feet. Any newly proposed private street in the A-1, A-2, and R zones that will dead end shall terminate with a T turn-around or a cul-de-sac. Street names for private streets shall be proposed and approved through the Preliminary Plat process. Signage for private streets shall be installed in accordance with the policies of the applicable legislative body prior to Final Plat approval.

P) Private Access Driveway - Private access driveways shall conform to the same pavement width, right-of-way width, and construction standards as set forth in these regulations for publicly dedicated alleys. A private access driveway that dead ends shall terminate with a T turn-around or a cul-de-sac. Such driveway shall be owned and maintained by one or more private property owners and shall only serve a maximum of five lots. The easement or right-of-way for a private access driveway shall be indicated on the Final Plat. A copy of a Homeowners Association Agreement to maintain the drive shall be submitted to the Boone County Planning Commission at Final Plat Review. (See example on page 3.11). All private access driveways, including driveways within flag lot panhandles, shall be located at a minimum five (5) feet from the adjoining property lines.

Q) Sidewalks - All proposed residential, commercial, industrial and office subdivisions or developments in the City of Florence, City of Walton, or City of Union shall have sidewalks on each side of all proposed public streets. In unincorporated Boone County, sidewalks shall be constructed according to the standards as follows:

Residential Subdivisions - Sidewalks shall be provided in residential subdivisions with an average density of greater than one dwelling unit per acre according to the following:

| | | |
|------|--------------------------------------|--|
| 1. | Collector Streets | Sidewalks Both Sides |
| 1.a. | Limited Access Collector Streets | Sidewalks Both Sides |
| 2. | Sub-Collector Streets | Sidewalks Both Sides |
| 2.b. | Limited Access Sub-Collector Streets | Sidewalks Both Sides |
| 3. | Local Streets | Sidewalks Both Sides |
| 4. | Residential Condo Street | Sidewalks Both Sides |
| 5. | Cul-de-Sacs | Sidewalk One Side |
| 6. | Alley | No Sidewalks Permitted within Min. 30' R/W; Sidewalk Permitted On One Side When R/W is Increased to 40' |

Sidewalks shall only be required on one side of the street when the overall average density is between one dwelling unit per acre and one dwelling unit per two acres*. For residential subdivisions with an overall average density of one dwelling unit per two or more acres, no sidewalks are required.

Commercial and Office Subdivisions - Sidewalks shall be provided on both sides of all streets.

Industrial Subdivisions - Sidewalks shall be provided on one side of each street*.

*When provided on one side of a street, sidewalks shall be constructed on the water main side of the street, unless approved by the Commission's engineer.

Sidewalks shall be constructed of Portland cement concrete on compacted subgrade and

have a minimum depth of four inches (4"), except at driveways, the minimum depth shall be five inches (5") in residential zones. In commercial or industrial zones, driveways shall have the same depth as the road leading to the parking area. Sidewalks shall be located four feet (4') from the curb or the edge of the pavement and shall be at least four feet (4') in width along local streets and cul-de-sacs; and located five feet (5') from the curb or edge of pavement and five feet (5') in width when located along any other type of street. At intersections and pedestrian cross-walks, wheelchair ramps shall be installed (see City/County Street Specifications for location and design of sidewalks).

Sidewalks shall be installed by the developer of the subdivision or the builder of each structure and shall be subject to inspection by the appropriate legislative body. If after two years since the approval of the Final Plat by the Boone County Planning Commission and the plat is recorded in the Boone County Clerk's office, the developer shall be responsible to install the sidewalk for each section or phase of a subdivision that has been recorded. Finally, the design and location of sidewalks in a Planned Development may vary in accordance with an approved Concept Development Plan.

R) Combination Bicycle/Pedestrian Paths - A path for joint use by bicycles and pedestrians may be provided within public street rights-of-way in accordance with the following standards:

1. Combination bicycle/pedestrian paths shall be provided only on subcollector or collector (including limited access streets), or arterial streets that: have no vehicular access points for individual lots; and, that connect between other subcollector or collector (including limited access streets) and/or arterial streets, or connect between another subcollector, collector, or arterial street and a public facility such as a school, park, library, etc.
2. A combination bicycle/pedestrian path shall be provided on one side of the street. Where combination bicycle/pedestrian paths are provided, sidewalks are not required on the other side of the street as per Section 305.Q.
3. Combination bicycle/pedestrian paths must be at least ten feet (10') wide and shall be paved in accordance with the requirements of the appropriate legislative body. At intersections and pedestrian cross-walks, wheelchair ramps shall be installed (see City/County Street Specifications for location and design of sidewalks).
4. Traffic control signage or signage for safety purposes shall be installed along the path in accordance with the requirements of the appropriate legislative body.

S) Street Paving and Street Signage - Street paving for proposed subdivisions or developments shall be carried out in conformance with the current City/County street specifications and the provisions stated in this document. Street signage installation, maintenance and replacement shall be the responsibility of the appropriate legislative body.

T) Street Trees - Street trees, when provided, shall be installed in accordance with the current City/County street specifications, and shall not be located in a manner that would conflict with either underground or overhead utility lines, easements, or street signs. No trees shall be located within one hundred feet (100') of an intersection. Except in the City of Florence, the minimum width of street rights-of-way which are planned to include street trees shall be increased a minimum of 10 feet above the minimum requirements stated in Section 305.F

"Public Right-of-Way Width." The spacing and arrangement of street trees shall be subject to approval by the Planning Commission's staff. Street tree species shall be subject to approval by the Planning Commission's staff.

- U) Safety-Traffic Calming - In certain situations, traffic calming measures or improvements can be incorporated into street design in order to assure traffic and pedestrian safety. Such measures shall be approved by the appropriate legislative unit. Maintenance of such a measure shall be identified on the Improvement Plan and Final Plat. If such measures are included in the proposed street design, the specifications for these measures shall be submitted by an applicant as part of the Improvement Plan Review. Such measures are defined by the Institute of Transportation Engineers (ITE), the Federal Highway Administration (FHWA) and the American Planning Association (APA). These measures include but are not limited to the following: traffic circles, roundabouts, raised crosswalks and intersections, speed humps, lane closures, diagonal diverters, median barriers, forced turn islands, textured pavement, rotaries, chokers, neckdowns, etc. Further, such measures may be constructed by the owner of the street at a later date if traffic/pedestrian safety becomes a significant issue or when an existing street is rebuilt.

SECTION 310

Blocks

Intersecting streets which determine block length and width shall be provided at such intervals which include existing street patterns, topography, and requirements for safe and convenient vehicular and pedestrian circulation.

Blocks of proposed subdivisions or developments shall not be less than two hundred and forty feet (240') nor more than twelve hundred feet (1200') in length.

SECTION 315

Lot Arrangement and Sizes

The size, shape, and arrangement of lots in proposed subdivisions or developments shall be such as set forward in the current Boone County Zoning Regulations and these subdivision regulations. Rectangular shaped lots shall be encouraged in all commercial, industrial and residential zones. Extremely irregularly shaped lots shall be avoided. Consideration of additional lot depth should be made when lots adjoin railroads, major utility easements, commercial or industrial areas, or other conflicting land uses.

Side lot lines shall be as close to right angles with the street centerline as possible, or radial to curve street centerlines. Lot lines not at right angles with the street centerline, and lot lines intersecting with curved right-of-ways shall have a reference tie to the tangent line of that centerline curve. Lot lines of a subdivision, should display an organized and uniform development pattern.

- a) Lot Size - The minimum size of a lot in a proposed subdivision or development depends on the current zoning district that said subdivision or development or section thereof lies in. The minimum size for the respective zone is contained in the current Boone County Zoning Regulations.
- b) Land Adjoining Arterial and Collector Streets - The subdivision of new lots on land with a minimum lot size of less than 80,000 square feet, which adjoin arterial and collector streets shall be platted in a manner which necessitates vehicular access to be provided from a secondary street, alley, or private access driveway and not arterial or collector streets. A plat note shall be provided on the record plat which states that vehicular access is prohibited from the arterial or collector street in question.

- c) Irregular Lots - Irregular lots which include corner lots, double frontage lots, flag lots and lots that have irregular shape and size because of topography or vegetation shall conform to the minimum requirements of the applicable zoning ordinance. Corner lots shall have the minimum lot frontage required by the applicable zone on both streets. Driveways on corner lots shall be located at the building line farthest from the intersection. Double frontage lots shall be avoided except where essential to provide separation of a residential development from arterial streets or to overcome specific disadvantages of topography and orientation. Double frontage lots shall be restricted to one driveway in residential subdivisions, and shall be large enough to accommodate a building and required site improvements, and meet all required setbacks.
- d) Flag Lots - Flag lots shall only be permitted in those locations where because of geometric, topographic, or other natural features, it would be impractical to extend a public street. Flag lots shall have a panhandle extending to a publicly dedicated street for the purpose of access, and shall have two conforming lots adjoining the flag lot (see examples on following pages).

Flag lots in agricultural and residential subdivisions shall meet the following standards:

Single flag lots shall have twenty feet (20') of frontage on a publicly dedicated street. In the case of two contiguous flag lots, there shall be thirty feet (30') of frontage on a publicly dedicated street with a common driveway. With two contiguous flag lots, a deeded 15 foot (15') strip of land for each lot is required with a common unobstructed access easement for a shared driveway to the public street.

Flag lots in commercial and industrial subdivisions shall meet the following standards:

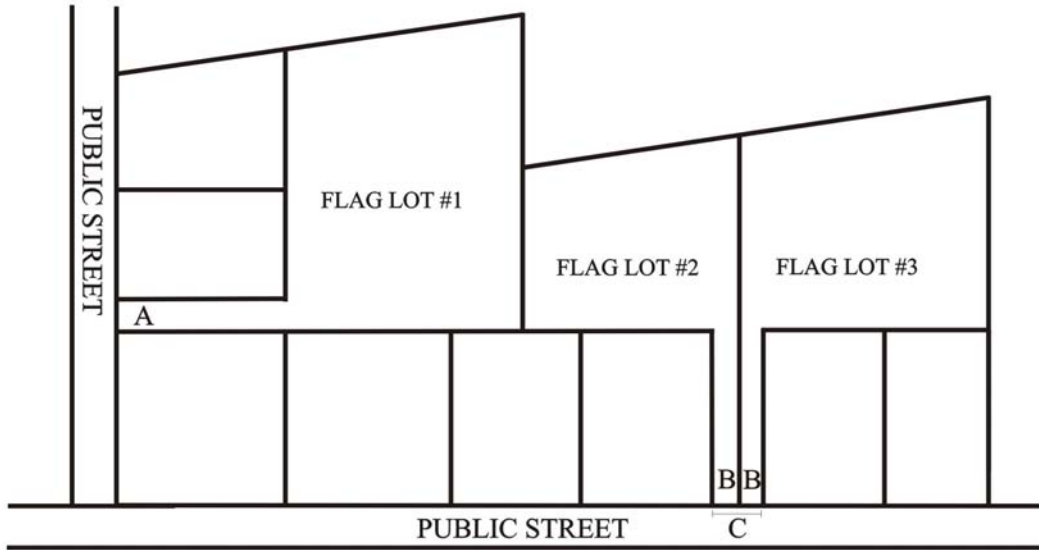
Flag lots shall have a minimum of thirty feet (30') of frontage and a maximum of fifty feet (50') of frontage on a publicly dedicated street. In the case of two contiguous flag lots, there shall be a minimum of thirty feet (30') of frontage and a maximum of fifty feet (50') of frontage, for both lots combined, on a publicly dedicated street with a common driveway. With two contiguous flag lots, a deeded strip of land that is at least 15 feet (15') wide, but not greater than twenty five feet (25') in width, is required for each lot with a common unobstructed access easement for a shared driveway to the public street.

PROPER USE OF FLAG LOTS

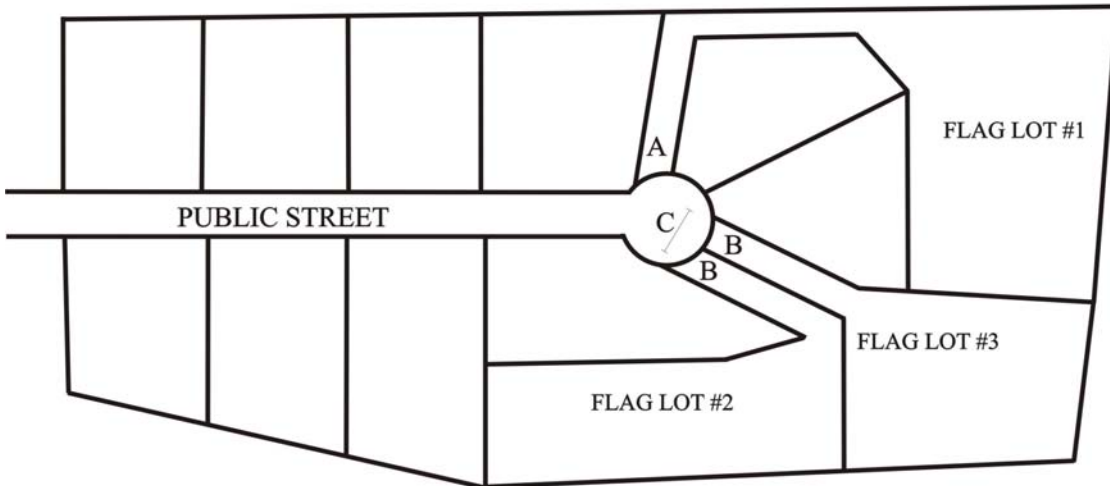
| <u>TYPE OF SUBDIVISION</u> | <u>A</u> | <u>B</u> | <u>C</u> |
|----------------------------|--------------------|--------------------|--------------------|
| AGRICULTURAL/RESIDENTIAL | 20' | 15' | 30' |
| COMMERCIAL/INDUSTRIAL | 30' MIN 50' MAX | 15' MIN 25' MAX | 30' MIN 50' MAX |

** PAN HANDLE LENGTH PER SECTION 315.d*

EXAMPLE 1

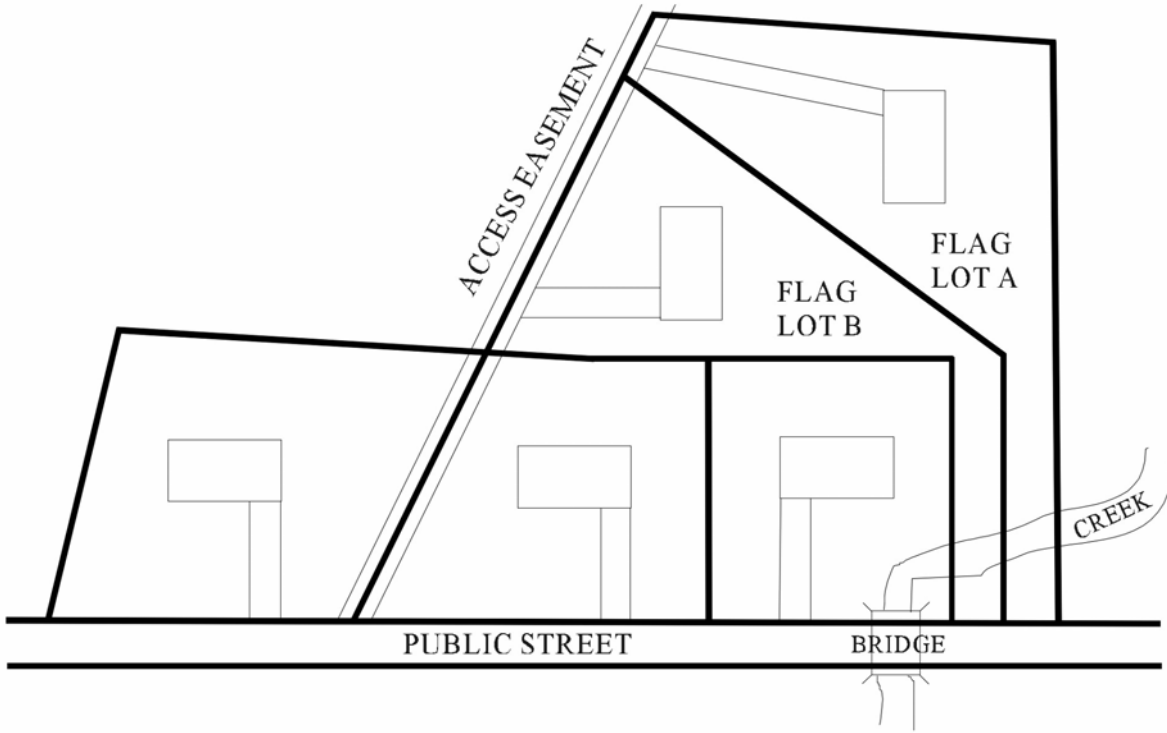


EXAMPLE 2

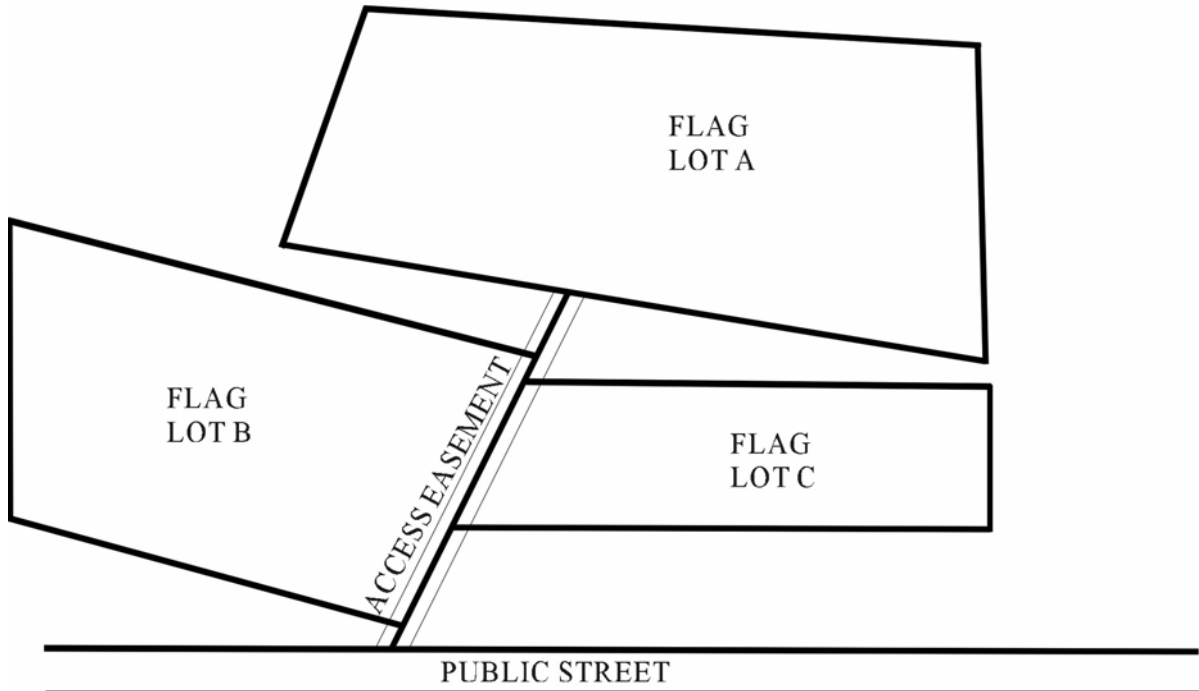


IMPROPER USE OF A FLAG LOT

EXAMPLE 1



EXMAPLE 2



All flag lots shall meet the following standards:

Flag lots shall have a panhandle for a minimum distance (length) of two (2) times the minimum lot frontage required by the applicable zone with a maximum required length of one hundred fifty feet (150') from a publicly dedicated street, except in Open Space Residential Subdivisions and for designated patio house lots where there is no minimum required panhandle length. In no case shall more than two flag lots be contiguous to each other at the publicly dedicated street. The maximum number of flag lots permitted for each phase of a subdivision (Improvement Plan submittal) shall not exceed fifteen percent (15%). A driveway must be located within the panhandle of the deeded property for a flag lot, except in the A-1 zone where the driveway may be located within an access easement across one intervening lot between the street or road and the flag lot provided: A.) the access easement is at least twenty feet (20') wide; B.) the access easement serves no more than two lots in addition to the one intervening lot on which it is located; and C.) an appropriate agreement to assure the perpetual maintenance of the driveway shall be filed with the record plat or access easement declaration. Also, the driveway for a flag lot shall be located at a minimum of five (5') feet from each lot line, unless approved by the Boone County Planning Commission. For two contiguous flag lots with a common driveway, a joint access easement shall be shown across the entire width of both panhandles containing the common driveway on the Final Plat. On the proceeding pages are two examples of the proper use of a flag lot and two examples of the improper use of a flag lot. Flag lots are not permitted in the City of Walton.

- e) Lot Frontage - All lots in a subdivision shall have the minimum frontage on a public or private street as stated for their respective zone under the current Boone County Zoning Regulations.
- f) Cemeteries - An applicant, property owner or developer has the option either to (1) preserve an existing private family cemetery and develop around it or (2) relocate an existing cemetery. In relocating a private family cemetery, an applicant, property owner or developer shall be required to follow applicable local and state laws. In preserving a cemetery, while at the same time developing a parcel, an applicant, property owner or developer has the following options:
 - 1. Transfer the existing cemetery as part of a buildable lot. Ownership and maintenance of the cemetery would be transferred to the individual lot owner.
 - 2. Make the existing cemetery a separate lot. Ownership and maintenance of the cemetery would be transferred by written agreement to either a subdivision Homeowners Association, the developer of the subdivision, a local legislative unit, or a historical organization.

If a private family cemetery exists on a parcel of land and the exact location of grave sites is not determined, a developer or property owner is advised to follow the procedures and guidelines stated in the Boone County Cemetery Preservation Plan (pgs. 23-26). Specifically, these requirements shall be followed if a developer or property owner wishes to preserve an existing cemetery, while at the same time subdivide their property. These regulations mentioned below apply only to private family cemeteries and not to active cemeteries where grave sites are clearly identified by Staff. Any waiver of these regulations is permitted under the authority of the Zoning Administrator.

1. No construction or disturbance of any type shall occur within thirty feet (30') of an existing private family cemetery regardless of adjoining property lines or land ownership. This thirty foot (30') building limitation is also required regardless of whether the cemetery is part of a building lot and is being conveyed as a separate lot. Also, this setback limitation may result in combining lots or making larger lots in the area where the cemetery is located. The 30 foot limitation is in the form of an exclusive cemetery easement. Cemetery boundaries shall be determined by an applicant's Kentucky Registered archaeologist. The Boone County Historic Preservation Review Board shall review the work and information of the registered archaeologist. The professional archaeologist shall be responsible for determining the approximate boundaries of the cemeteries and providing information on the history of the cemetery. The Boone County Historic Preservation Review Board will be responsible for monitoring the field work of the archaeologist and reviewing the final report. Maps included in the final report must (1) portray the location and orientation of graves within the cemetery and (2) depict the location and orientation of the cemetery relative to the site and at least three nearby recognized landmarks such as public roads or benchmarks visible on a USGS map.
2. Existing cemetery fences and walls shall be maintained and repaired for security reasons, prior to any other site work or disturbance.
3. If a cemetery exists and a property owner or developer wishes to build on the lot where the cemetery is located, or if proposed to be a separate lot the property owner or developer is required to erect a new permanent fence (if one does not exist) surrounding the cemetery. The new permanent fence shall be made of a material which is compatible to the material of the proposed house (e.g. stone fence, brick fence and wooden picket fence) and should also fit in with the character of the existing cemetery and surrounding residences or buildings. If a portion of an original fence or wall remains, and it is a compatible material (as above, and including cast iron fencing), the permanent fence or wall shall be properly repaired using the same material. If the existing fence is an inappropriate material (e.g. chain link fence, barbed wire fence, or farm fence), it should be replaced with a new fence made of an appropriate material. Although the permanent fence must be erected as soon as practical, a temporary fence (e.g., orange snow fencing, wire fence) must be erected and maintained at all times during site development and construction before the permanent fence or wall is constructed.
4. Weeds shall be removed from a cemetery on a routine basis during both site development and after construction is completed.
5. Grass shall be mowed on a routine basis.
6. All ironwork and stonework shall be inspected for damage. Repairs shall be made by the owner of the property.
7. Other planting or foliage shall be pruned and be generally left in its natural state.
8. All other debris or trash shall be removed from the cemetery during both site development and after construction is completed.

9. A statement by the property owner, applicant or developer shall be made on the site plan or subdivision plan regarding permanent cemetery ownership and maintenance.
10. A Certificate of Land Use Restriction and a deed restriction shall be recorded in the Boone County Clerk's office acknowledging the location, size, ownership and maintenance a cemetery. This information shall also be recorded on a Final Plat for a subdivision if not yet recorded.
11. Public access shall be provided to the existing cemetery with a minimum 5 foot recorded ingress-egress pedestrian access easement. Also, public and private streets shall be designed or located to provide access to an existing cemetery.
12. Under KRS 381.755, only the Boone County Fiscal Court has the authority to issue an order or resolution authorizing the relocation of a cemetery in Boone County. As such, an applicant is not required to appear before the Boone County Historic Preservation Review Board. However with cemetery relocation or the relocation of graves, the Boone County Historic Preservation Review Board shall be notified in writing by the property owner or developer by supplying to the Board copies of all State and local applications and permits during the relocation procedure.

SECTION 320

Water and Sanitary Sewer, Private Utilities and Property Used for Public Purposes

The following shall be the minimum standards for utilities (with the exception of storm water drainage; See section 325). These standards are minimum requirements and more stringent local, county, state, or federal regulations may apply. In general, water and sanitary sewer service should be designed to tie into a public system. It is recommended that utility construction doesn't occur until permission has been granted by the appropriate utility company or organization.

- a) Water Systems and Fire Hydrants - Connection into either an existing or planned public water supply system shall be required if the system is sufficient or can be expanded in order to provide an adequate amount of water to a proposed subdivision. Where appropriate water supply lines shall be designed to loop back to existing or proposed systems. Fire hydrants shall be provided in all subdivisions where public water systems are provided. Fire hydrants should be located with a maximum spacing of 500 feet, as measured along the street right-of-way. Fire hydrants should be located no further than 250 feet from any building site, as determined by the applicable setbacks set forth by the Boone County Zoning Regulations if the specific building footprint is unknown at the time of platting, with the exception that additional hydrants are not required to serve a flag lot if a hydrant is located within 100 feet of the vehicular entrance to the flag lot. Where existing public water mains that have existing fire hydrants are to serve a proposed subdivision and no public water main construction is necessary, no additional fire hydrants are required. In Clustered Residential Subdivisions, additional fire hydrants may be required by the Planning Commission due to restricted roadway width and density of development, including those that utilize existing public water mains with existing fire hydrants. Fire hydrants shall be designed and constructed in accordance with the Boone County Street, Storm and Sidewalk Specifications and the appropriate water district specifications. Public water supply systems shall be designed and constructed in accordance with the Boone County Street, Storm and Sidewalk Specifications. Individual on-site water supply systems (wells and cisterns) shall be constructed in accordance with the current Standards and Specifications of the state or local health department/district.
- b) Sanitary Sewer Systems - Connection into either an existing or planned public sanitary

sewer system shall be required if the system is sufficient or can be expanded in order to accommodate the additional flow from the proposed subdivision. Sanitary sewer systems shall be designed and constructed in accordance with the Boone County Street, Storm and Sidewalk Specifications. Private lateral lines may only occupy the lot it is serving, except where approved by the appropriate utility. Where package sewage treatment plants are proposed, the sewage collection system shall be designed for ultimate connection to the public system. Individual septic tank systems and package treatment plants shall be constructed in accordance with the current standards and specification of the state and local health department/district. No sanitary sewage treatment plant for any subdivision shall be located nearer than two hundred (200') feet to any residence. In calculating this distance, the applicant can specify the location of any residence to be constructed on lots affected by the treatment plant or the Commission shall calculate this distance based upon the minimum set back and side yard requirements of the particular zone district.

- c) Private Utilities - Private utilities such as electric, telephone, natural gas, and cable television shall be placed underground, in the street right-of-way, or within platted easements, and must be constructed per applicable standards and specifications, which includes inspections by the appropriate legislative units, permit requirements and compaction requirements. In addition, a fifteen foot (15') wide utility easement shall be provided along all public street rights-of-way, with the exception of alley rights-of-way.
- d) Property Used for Public Purposes - In the development of large subdivisions, the Boone County Planning Commission or appropriate legislative body may investigate the impact of such development on existing parks, open space, schools, public facilities, streets, and other public uses. If it is determined that the proposed development severely impacts the community, the appropriate legislative body may negotiate with the subdivider, developer, or owner of the proposed subdivision to acquire property for potential public dedication and future public use either through donation, contract purchase, or lease arrangement. The acquired property may then be used for public purposes by serving the subdivision residents only or both the subdivision and neighboring populations.

SECTION 325

Storm Water Management, Drainage and Residential Lot Grading

Storm sewer systems are designed to collect and convey storm water runoff from street inlets, runoff control structures, and other locations where the accumulation of storm water is unsafe. No storm sewer shall be permitted to run into a sanitary sewer system within a proposed subdivision. In general, the cumulative amount of storm water runoff discharged from the boundary of the subdivision should be equal in terms of pre-development and post-development. Storm water runoff from a site or subdivision shall not adversely impact natural drainage from an uphill drainage basin or to a downhill drainage basin or adjacent properties. The property owner shall be responsible for storm water drainage facilities located on private property where runoff will be principally collected within that property and be minimally discharged over a larger area before the storm water naturally drains on adjacent properties. For isolated areas of the subdivision, where increased runoff may leave the boundary, downstream conditions must be considered to ensure that the increased runoff will not adversely impact existing drainage patterns.

Storm Water and Erosion Control rules and regulations in Boone County is broken into regions. These regions are the Storm Water District of the Sanitation District No. 1; the City of Florence; and Unincorporated Boone County including the City of Walton. All subdivision development within Boone County must be designed and constructed per the Boone County Subdivision Regulations.

Any subdivision development within one of the above regions, must also comply with the rules and regulations of the governing body responsible for that region. When an individual rule or regulation is in conflict, the most restrictive rule shall apply. The developer must determine which region the proposed development is a part, and design and construct the storm sewer system per the applicable regulations.

All publicly maintained storm sewer systems shall be designed for peak flows calculated on the ten year (10 yr.) storm frequency. Overflows shall be designed on the one hundred year (100 yr.) storm frequency. No living area shall be affected by the one hundred year (100 yr.) storm. Safety swales shall be designed to carry all runoff away from any residential structure.

Basic Design Criteria for a Storm Drainage System

A) Degree of Protection Required- The storm drainage system shall be adequate to handle the runoff from storms having various frequencies of occurrence for various degrees of site development, in accord with the following general categories:

- | | | |
|----|--|--------------------|
| 1. | Conservation, agricultural and low density residential (2 acre lots or larger) | 10 year frequency |
| 2. | All other residential and commercial | 10 year frequency |
| 3. | Industrial areas | 10 year frequency |
| 4. | For concentrated high value areas | 10 year frequency |
| 5. | For flood control facilities | 100 year frequency |

The runoff computed from these storm frequencies shall be from the area within the subdivision and all other areas draining thereto.

B) Determination of Quantity of Runoff for Design of Storm Water Collection System-

. Each portion of the storm water drainage collection system shall be capable of handling the peak flow of runoff. For drainage areas less than one hundred (100) acres, either the "Rational Method" or Soil Conservation Service (SCS) Method may be used. For areas greater than one hundred (100) acres, either the "Soil Conservation Service (SCS) Method" or the "Regional Method" of the Kentucky Transportation Cabinet, Bureau of Highways shall be used:

1. "Rational Method" where $Q = CiA$

Q = peak runoff quantity in cubic feet per second;

C = runoff coefficient varying with perviousness and other characteristics of the drainage area;

I = average intensity of precipitation in inches per hour, varying with frequency of storm occurrence, duration or concentration time, and area of the tributary watershed;

A = area in acres of the tributary watershed.

- A. Runoff Coefficients: The runoff coefficient is the portion of the precipitation, expressed as a decimal, that will reach a given storm water facility. Each lot within a subdivision contributes runoff from the roof, driveway, sidewalk and street.

Generally, the smaller the lot width, the less impervious area. As the lot increases in width so does the impervious area. Weighted coefficients shall be used with the impervious areas C = 0.95 and all other areas C = 0.40

| Table 2 - Rational Method Runoff Coefficients for Composite Analysis | | |
|---|---------------------------------------|--------------------------------------|
| Land Use Description | Average Percent Imperviousness | Runoff Coefficient (C) |
| Natural and Undisturbed Areas | Varies | 0.40 |
| Single Family Residential Average Lot Size/Width | Varies (See Below for Value) | 0.43 - 0.76 (See Below for Value) |
| 3 acres/300 feet | 6 | 0.43 |
| 2 acres/200 feet | 7 | 0.44 |
| 1 acre/100 feet | 12 | 0.47 |
| ½ acre/100 feet | 23 | 0.53 |
| 12,500 sq. ft./80 feet | 34 | 0.59 |
| 9,000 sq. ft./70 feet | 42 | 0.63 |
| 7,500 sq. ft./60 feet | 44 | 0.64 |
| 6,000 sq. ft./50 feet | 48 | 0.66 |
| <6,000 sq. ft./<50 feet | 65 | 0.76 |
| Industrial | 72 | 0.80 |
| Multi-Family Residential | 75 | 0.81 |
| Commercial/Office | 85 | 0.87 |
| Impervious Areas Including; Pavement, Roofs, Drives, Sidewalks, etc. | 100 | 0.95 |

- B. Intensity of Precipitation: The "point" values of average precipitation intensity in inches per hour, for Northern Kentucky can be determined from Exhibit No. 4-904 Kentucky Bureau of Highways "Rainfall Intensity-Duration-Frequency Curves." For any given storm duration (concentration time of runoff) the curves show the average precipitation intensity of storms having 2, 5, 10, 25, 50, and 100 year frequencies or the precipitation intensity can be calculated by using the following formula and constants developed by the Kentucky Transportation Cabinet:

$$I_{RI} = B / (T_c + D)^E$$

| Return Interval (RI) | B | D | E |
|----------------------|----------|---------|--------|
| 2 | 34.5848 | 6.9000 | 0.7899 |
| 5 | 54.0284 | 9.5000 | 0.8211 |
| 10 | 65.6903 | 10.6000 | 0.8262 |
| 25 | 87.9368 | 12.4000 | 0.8499 |
| 50 | 100.0737 | 13.0000 | 0.8553 |
| 100 | 114.6446 | 13.8000 | 0.8614 |

- C. The time of concentration is the time associated with the travel of runoff from an outer point that best represents the shape of the contributing areas. Runoff from a drainage area usually reached a peak at the time when the entire area is contributing, in which case the time of concentration is the time for a drop of water to flow from the most remote point in the watershed to the point of interest. Runoff may reach a peak prior to the time the entire drainage area is contributing. Sound engineering judgement should be used to determine the time of concentration. The time of concentration to any point in a storm drainage system is a combination of the sheet flow (overland), the shallow concentrated flow and the channel flow, which includes storm sewers. The minimum time of concentration for any area shall be 6 minutes.

The Soil Conservation Service TR-55 method for calculating the time of concentration shall be used.

At no time shall the Time of Concentration be greater than 30 minutes for design of storm inlets.

2. The Soil Conservation Service (SCS) Method may be used to calculate the peak discharge rates; develop runoff hydrographs for basins and subbasins; determine runoff volumes; and provide inflow information to determine the required storage volume for detention and retention basins. The SCS Method is the preferred method for performing hydrologic analysis. The SCS Method will utilize the formulas, constants and data in the current manual from the U.S. Natural Resources Conservation Service. The Soil Conservation Service utilizes a 24-hour storm duration, which is considered to be acceptable for Northern Kentucky. When the Soil Conservation Service methods are used, the Type II rainfall distribution shall be used.

For detailed information, the user is referred to the following Soil Conservation Service publications:

1. NEH-4: "Hydrology," Section 4, National Engineering Handbook;
2. TR-20: Computer Program for Project Formulation, Hydrology;

3. TR-55: Urban Hydrology for Small Watersheds;
4. TP-149: A Method for Estimating Volume and Rate of Runoff in Small Watersheds.

3. The Regional Method of the Kentucky Transportation Cabinet, Bureau of Highways (Regional Method) may be used to calculate the peak discharge rates when required by regulatory agencies such as the Kentucky Division of Water. The Regional Method will utilize the formulas, constants and data from the current Manual of Instruction of Drainage and Design, Kentucky Transportation Cabinet, Bureau of Highways.

C) Storm water system facilities.

1. Flow times in sewers or conduits to the point of design may be determined from the hydraulic properties of the sewers upstream of that point, assuming average flow-full velocity at the proposed sewer slopes.

2. Pipe Capacities- Public storm sewer pipes shall be designed to carry peak flows as determined by the methods previously described. At the design storm the drainage system shall be designed as open channel (non-surcharged) flow. Sizes shall be determined by Manning's formula using a range of roughness coefficients ($n=0.009-0.024$). For roughness coefficients see Street, Storm, and Sidewalk Specifications.

3. Minimum Pipe Size- The minimum diameter for public storm sewer pipe shall be fifteen inches (15") for inlet headwalls and twelve inches (12") for systems with a catchbasin at the initial point.

4. Minimum and Maximum Velocities- Velocities in public storm sewer pipes, when flowing full at average peak flows, shall not be less than two feet (2.0') per second and not greater than forty feet (40') per second.

5. Pipe Grades - The sewer pipe shall be laid on gradients so that the velocity (flowing full) shall be kept within the foregoing stated minimum and maximum unless other special provisions are made. Storm sewer pipe shall be laid on gradients so that the velocity (flowing full) shall be kept within the foregoing stated minimum and maximum, unless other special provisions are made. Sewers on twenty percent (20%) slopes or greater shall be anchored securely with concrete anchors or equal, spaced as follows:

1. Not over thirty six feet (36') center to center on grades twenty percent(20%) and up to thirty five percent (35%);

2. Not over twenty four feet (24') center to center on grades thirty five percent (35%) and up to fifty percent (50%); and

3. Not over sixteen feet (16') center to center on grades fifty percent (50%) and over.

6. Hydraulic Grades- To ensure against surface ponding or street flooding due to surcharging, the hydraulic grade line (HGL) of the design storm in any pipe may not be higher than the top of pipe for the ten year (10 yr.) design storm; and one foot (1') below the inlet or manhole for the twenty five year (25 yr.) check storm.

Design of all public storm sewer appurtenances shall consider the balance of energy plus

the loss due to entrance in all structures having a critical change in horizontal or vertical alignment. In no case shall the difference in invert elevations be less than the result of equal crowns when a smaller pipe empties into a larger one. In no case shall storm sewer pipe sizes be reduced unless the upstream pipe is an approved underground detention structure.

7. Manholes (Junction Boxes)- Manholes shall be constructed in accord with Standard Construction Drawings as shown in the current city/county street specifications. Drop manholes may be required to reduce the slope of any sewer line. Pipes shall not extend more than two inches (2") into the side of the manhole, and the invert of the outlet pipe shall be at the bottom.

8. Inlets (Catch Basins)-

Capacity: The capacity of the grate on the inlet should not be less than the quantity of flow tributary to the inlet. Inlets at low points or sags should have extra capacity as a safeguard for street flooding from flows overtopping the street curb. A safety swale designed for the 100 year storm shall be placed at all low points or sags. Curb openings on combination inlets should be used for overflows in the event that the grate is clogged. Special inlets may be required for streets with steep gradients to provide the extra capacity such situations require. Pipes shall not extend more than two inches (2") into the side of the manhole, and the invert of the outlet pipe shall be at the bottom.

Type: Combination type inlets (single or double) shall be used and installed in accord with "Standard Construction Drawings" as shown in the current city/county street specifications. Any catch basin not placed on a lot line or within three feet of a driveway shall use a roll type grate as shown in the Street Specifications, and capacity calculations must be based on the type of inlet. Curb inlets and gutters shall accommodate the flow from a storm with an intensity of four (4) inches per hour.

Location: Inlet spacing shall be based upon gutter and inlet capacity, street slope and contributing drainage area. The spacing of inlets should ensure that street drainage generated along continuous grades or in sags will not damage and flood private properties or residential basements. For the design storm, no more than 5 cfs shall enter any grade inlet; no more than 8 cfs shall enter any sump inlet; and no more than 2.5 cfs is permitted to flow in side yards between houses.

- A. Along continuous grades (less than 2 percent) - 400 feet maximum;
- B. Along continuous grades (2 percent and over) - 600 feet maximum;
- C. At sag locations (draining less than 2 percent grades) - 400 feet maximum between inlets or from a high point;
- D. At sag locations (draining 2 percent and over grades) -600 feet maximum between inlets or from a high point.

Special consideration should be given to storm drainage entering cul-de-sacs. Additional inlets shall be required when drainage areas and/or street slopes are excessive. In addition to an inlet provided at the low point within the cul-de-sac two (2) additional inlets shall be required along each curb prior to the entrance of the cul-de-sac in accord with the following criteria:

- A. For street slopes less than eight (8) percent and draining more than 400 feet

of pavement; and

- B. For all street slopes more than eight (8) percent and draining more than 300 feet of pavement.

9. Intersections - Storm water runoff crossing the intersection of a street shall be kept to a minimum.
10. Outfalls - When a storm sewer system outfalls into a flood plain of any major water course, the outfall must not be subject to frequent floods or backwaters. Standard headwalls and/or headwalls with wingwalls shall be constructed for all outfalls. To minimize adverse impacts on receiving channels one of the following conditions must be met: (1) the outlet velocity at a headwall or outfall of a paved channel shall be less than or equal to the natural velocity of the receiving channel or stream for the design storm; (2) structurally lined aprons or other acceptable flow spreading or energy dissipating devices shall be installed at the outlet to reduce the velocity; (3) the receiving channel shall be lined as per Article 3, Section 325 - Basic Design Criteria for Storm Water Drainage Channels, Water Courses, and Erosion Control, of these regulations for a sufficient distance to protect against erosion.

When a storm sewer or paved channel outlets onto a slope without a defined drainage channel, either a channel shall be graded and properly protected down to its convergence with the natural channel, or the outlet flow shall be dispersed on the slope using acceptable flow spreading or energy dissipating devices. Storm sewers or paved channels that outlet at or near defined drainage channels, shall be designed to outlet at as near to parallel to the channel as practical.

The outlet velocities of all headwalls shall be included in the drainage calculations. The invert of the first storm sewer appurtenance upstream of the outfall structure shall be above the elevation of the calculated one hundred (100) year flood plain. The calculated one hundred 100 year flood plain for all channels with a drainage area of more than fifty (50) acres within the project shall be shown on the Improvement Plan.

11. Culverts and Bridges - Culverts and bridges shall be designed in accordance with the methods given in the "Manual of Location and Design" published by the Kentucky Department of Highways; except that storm water quantities to be handled by the culverts and bridges shall be determined on the basis described in these standards. The allowable headwater (AHW) shall not be greater than $^{HW}/_D = 2.0$.
12. Headwalls - Standard headwalls for pipe sizes twelve (12) thru twenty-four (24) inch and headwalls including wingwalls and aprons for pipes larger than twenty-four (24) inch, shall be constructed at the outfall of all storm sewers in accord with "Standard Construction Drawings" as shown in the current city/county specifications.

NOTE - All inlet headwalls shall have a warning sign that states:

**DANGER
HIGH WATER**

All signs shall be a minimum of 4 inches in height and 8 inches in length and be made of a reflective material.

13. Other Drainage Improvement Measures - Other drainage improvement measures may be undertaken to provide the necessary hydraulic characteristics required for adequate

drainage. These other measures include stream bed clearing, removal or obstructions, stabilization of banks or areas to eliminate erosion, widening, deepening or realignment of streams, construction of ponds behind dams, or other measures for adequate drainage.

14. Sub-Surface Springs - While constructing developments, sub-surface springs may be disturbed. In these cases, it is the responsibility of the developer to adequately address the removal of the water from the surface. This would include installing a pipe network to transfer water to a storm water structure or natural stream. Discharge of this type of water shall not be onto the lot directed toward the street, or on any part of the lot that will pond water. It is the responsibility of the developer to correct any problems with sub-surface springs up to three (3) years after recording of the Final Plat.
15. Specifications for Construction and Materials - See *Street and Storm Drainage Construction Specifications*.

Basic Design Criteria for Storm Water Drainage Channels, Water Courses, and Erosion Control

Open channels provide many advantages in the management and control of storm water runoff. Such channels provide for natural infiltration of storm water into ground water supply and extend the Time of Concentration (T_c) helping to maintain the runoff rate nearer to that which existed prior to development. The objective of open channel flow design is: (a) to determine a channel slope and size that will have sufficient capacity to prevent undue flooding damage during the anticipated peak runoff period; and (b) to determine the degree of protection based on stream velocity to prevent erosion in the drainage channel. Existing drainage channels, which will remain undisturbed, shall not be required to be reconstructed unless additional capacity and erosion control is required.

- A) Degree of Protection - Storm water drainage channels and water courses shall be adequate to handle runoff from storms of the frequencies of occurrence shown for the degrees of site development as follows:
 1. For all subdivisions and developments twenty five year (25 yr.) frequency.
 2. For main flood control channels - one hundred year (100 yr.) frequency. The runoff computed from these storms shall be that from the area within the subdivision and from all other areas considered as fully developed in accord with development planned in the County's Comprehensive Plan.
- B) Determination of Quantity of Runoff - Each portion of the storm water system of drainage channels and water courses shall be capable of handling the peak flows as determined by the proper method previously described in Section 1.
- C) Drainage Channel -Capacities- Drainage channels shall be designed to carry peak flows as determined by the methods previously described. Channel cross-section areas shall be determined by Manning's formula, using a value of n from the following chart.

Drainage Channel Manning's n Values

| | |
|-----------------------|-------|
| Concrete | 0.013 |
| Earth (non-vegetated) | 0.022 |
| Rip-Rap | 0.035 |
| Rock Cuts | 0.035 |

| | |
|-------------------------|-------|
| Grass-mowed short | 0.05 |
| Grass-tall stand | 0.10 |
| Natural Channel: | |
| -Clean and Straight | 0.030 |
| -Stones and Some Weeds* | 0.035 |
| -Gravel and Rock | 0.040 |
| -Weedy and Winding | 0.06 |
| -Dense Weeds & Brush | 0.10 |

*this is typical for a natural intermittent stream

When open drainage channels require various lining types to attain ultimate design capacity, the earth sections of the drainage channel and its structure shall be designed and constructed to the ultimate design required.

D) Erosion Control for Drainage Channels - Runoff flows in open channels may cause accelerated erosion. Such erosion can be controlled by limiting velocities, changing the channel lining, and reshaping the channel to spread the flow of runoff. Methods of controlling erosion in open channels include the following:

1. Sown grass covers, seeded degradable turf reinforcing mats;
2. sod
3. permanent turf reinforcing mats;
4. aggregate channel lining (minimum KDOT Type II channel lining, underlain with filter fabric
5. aggregate filled gabion baskets or mattresses (underlain with filter fabric);
6. interlocking concrete blocks or cabled mattress (underlain with filter fabric);
7. reinforced concrete or precast paving (of at least 4" thickness);
8. energy dissipators.

*Alternate methods of channel erosion control will be considered on an individual case basis. Note that the methods above are generally listed (and numbered) in order of increasing erosion protection ability. The design requirements below indicate the minimum level of protection. Any method listed above with a higher erosion protection ability than the minimums stated below will be acceptable.

1. Design velocity should generally be greater than 1.5fps to avoid excessive deposition of sediments. When flattened slopes are unavoidable, method (7) should be used to accelerate runoff.
2. Design velocity between one-half (1.5) and five (5) feet per second:
Method (1) shall be used. the bottom and sides of the earth channel shall be seeded, mulched and fertilized to an elevation of three (3) feet above the design water surface, or three (3) feet beyond the top of the channel bank. Seeding shall be a perennial or annual mixture of grass seeds applied at a rate of 75 pounds per acre. Acceptable whole fertilizer shall be applied at a rate of 75 pounds per one thousand square feet. Where seeding is required and the soil is not capable of supporting vegetation (such as sandy soil or clay types), appropriate action shall be

taken to bring the soil to an acceptable condition which will support the growth of seed. A degradable turf reinforcing mat is recommended to help stabilize the soil until the grass has become fully established.

3. Design velocity between one-half (1.5) and five (5) feet per second:
Method (2) or (3) shall be used. the bottom and sides of the earth channel shall be sodded and pegged to remain in place, or a permanent turf reinforcing mat shall be installed and seeded. Where seeding or sodding is required and the soil is not capable of supporting vegetation (such as sandy soil or clay types), appropriate action shall be taken to bring the soil to an acceptable condition which will support the growth of seed or sod.
4. Design velocity between nine (9) and fourteen (14) feet per second:
Method (3) or (4) shall be used.
5. Design velocity between fourteen (14) and twenty (20) feet per second:
Method (4) or (5) shall be used.
6. design velocity greater than twenty (20) feet per second:
Method (5) or greater shall be used.

A method greater than the required minimum may also be necessary at bends, changes in alignment, junctions with other ditches, and at other locations where erosion is more likely to occur. Design velocity at the downstream end of a protected channel shall be equal to or less than the natural velocity in the receiving channel. Energy dissipation may be necessary to reduce the velocity prior to reintroduction into a receiving channel.

- E) Drainage Channel or Water Course Relocations- In order to minimize hillside slippage near relocated drainage channels or water courses due to drainage channel depth or character of the earth in the drainage channel fill and side slopes, precautions shall be taken to compact the fill and side slopes, provision of under drainage, bank protection or reinforcing or other measures. Additional easement width shall be provided at such possible slide areas.
- F) Erosion Control - All subdivision developments shall have a Best Management Practices (BMP) document prepared and submitted with the Improvement Plan. This document shall meet the minimum requirements as stated in the current "Kentucky Best Management Practices For Construction Activities" prepared by The Kentucky Division of Water (KDOW). Three (3) copies of the document shall be submitted and a copy shall be on site at all times. A copy of the 401 Water Quality Certification Nationwide Permit application shall be submitted with the Improvement Plan. All graded areas are to be maintained at all times to prevent erosion and excessive runoff. Several methods used to prevent soil erosion during development are included in the current city/county street specifications. Drainage swales, silt checks, temporary, sedimentation basins, rock check dams, etc., are to be used and maintained during the grading operation. All collected sedimentation shall be removed from the detention site. All slopes and graded areas are to be seeded after the grading of that area has been completed.

Additional erosion control measures to prevent erosion and excessive runoff may be

required if necessary.

- G) Mud and Debris - Until all lot and street improvements in the subdivision have been completed, the subdivider shall take such measures as are necessary to prevent erosion of graded surfaces, and to prevent the deposit of soil and debris from graded surfaces onto public streets, into drainage channels or sewers, or onto adjoining land. All public streets shall be kept clear of mud and debris per local ordinances.
- H) Specifications for Construction and Materials - In all other respects, the design, materials, and construction shall be as specified in Sections 206, 212, 601, 610, 703, 710 of the current State of Kentucky Standard Specifications for Road and Bridge Construction and in accord with "Standard Construction Drawings" shown in the current city/county street specifications.
- I) Equipment on Streets - Any equipment on any existing pavements shall be per local ordinances.

Basic Design Criteria for Stormwater Runoff Control Facilities

These regulations affect all subdivision and developments:

- A) General- In order to minimize runoff damage to downstream properties, sediment pollution of public and private waters and hydraulic overloading of existing drainage facilities, the storm water runoff from a subdivision after development shall not exceed the pre-development discharge from that subdivision calculated by using a undeveloped runoff coefficient $c=0.40$. Detention shall be provided for all subdivisions and developments. The detention facility may be designed for each individual lot in commercial or industrial zones, but regional basins are encouraged to be provided throughout the subdivision or development. All basins within residential zones must be regional. Such facilities shall be designed so that no standing water will remain in detention basins during dry weather, or the design of retention ponds that will not allow standing water to stagnate and present health hazards. In certain cases, other non-basin detention/retention techniques such as underground vault storage and ponding water on parking lots may be utilized when approved by the commission. Individual site storm water management shall be reviewed under the current Boone County Zoning Regulations. The amount of water to be detained shall be determined by the method described in the following paragraphs using the design criteria as referenced in Table 1 and Figures 3, 4, and 5.

Storm Water Control Facility Volume Calculations
Estimated Runoff by:

An accepted method that generates an inflow/outflow hydrograph such as the Soil Conservation Service (SCS) method or Modified Rational Method (MRM) as detailed in the Street and Storm Drainage Specifications. It is recommended that these methods are used through a computer program. All documentation shall be submitted for review by the Planning Commission Staff.

- B) Pre-Development - Calculations - Calculate the subdivision or development site runoff

based on a 2, 10 and 50 year storm frequency. The entire acreage contributing to the runoff, shall be included in the calculations.

- C) Post-Development Runoff Calculations - Calculate the proposed ultimate development runoff based on a 2, 10 50 and 100 year storm frequency curve. The entire acreage contributing to the runoff shall be included in the calculations.
- D) Storage Requirement - The amount of detention/retention required for a subdivision or development shall be the amount determined from the inflow/outflow hydrograph as previously outlined based on the fifty year (50 yr.) storm frequency. If the Modified Rational Method is used, the storm duration used shall be the one that produces the maximum storage.
- E) Discharge from Detention Basin - The discharge from the detention/retention basin shall be controlled by a multi-stage release outlet structure and not be greater than a pre-developed runoff rate based on a 2, 10 and 50 year storm frequency at that particular point where the discharge occurs. The routing of an emergency spillway shall be shown based on the one hundred year (100 yr.) storm frequency. Trash racks may be required to be installed on the low flow outlet in detention basins to prevent clogging.

Detention Basins/Retention Ponds - Standards and Specifications

- A) Definition and Scope- These standards apply to permanent and temporary storm water runoff, sediment and debris basins formed by an embankment, or excavation. These standards are limited to the installation of basins on sites where:
 - 1. Failure of the structure will not result in loss of life, damage to homes, or interruption of use or service of public utilities.
 - 2. Drainage area does not exceed two hundred acres (200).
 - 3. The water surface at the crest of the emergency spillway does not exceed five (5) acres.
 - 4. All detention basins that shall be designed and built with side-slopes no greater than 3:1 (three feet horizontal per one foot vertical), paved channel bottoms and proper outlet structures to insure no standing water during dry periods.
 - 5. All retention ponds shall have dams that conform to the current Design Criteria For Dams and Associated Structures, Kentucky Division of Water. In cases when the top of the dam is also a publicly dedicated street right-of-way, the developer shall have a geotechnical report prepared with recommendation on the design and construction of the dam.

- NOTES:
- a. All computations to be prepared by a Kentucky Licensed Professional Engineer. .
 - b. All detention areas and methods to be approved by the engineer for the city or county. In the event the city or county does not have an engineer, the approval will be by the engineer for the Planning

Commission.

- c. Fencing may be required when the location of the detention area is not easily observed or in the opinion of the inspector a safety problem would exist.
- d. All sedimentation must be removed from all detention basins/retention ponds prior to acceptance by proper legislative body.

Residential Lot Grading and Drainage

A) Lot Grading - Lot grading shall be accomplished as follows: Within the limits of the public right-of-way adjacent to street pavements, all final grading for grass strip, sidewalk, and yards to the building structure, shall comply with minimum and maximum grades in accord with typical sections for streets as shown in the current city/county street specifications. For lots that drain toward the street, the areas between the right-of-way line and the curb shall be graded so that water drains to the street at a minimum grade of 1 inch per foot (approximately 8 percent) except where sidewalks are required (see Typical Sections). All grading behind the street shall be done in a fashion that does not allow ponding of water adjacent to the paved street. For lots that drain away from the street, the area between the right-of-way line and the curb shall be graded so that water drains away from the street at a minimum grade of ½ inch per foot (approximately 4 percent) except where sidewalks are required (see Typical Sections). Lot areas outside of the limits of the building structure shall be graded per the detail in the current Boone County Street, Storm, and Sidewalk Specifications.

Temporary Driveway: All residential lots shall have a single point access and a temporary driveway of crushed stone with fabric placed in the location of the permanent driveway. The temporary driveway shall be constructed after completion of foundation. It shall be a minimum of three inches (3") in depth with a separation fabric and a minimum of ten feet (10') in width. All construction traffic to the site must utilize the temporary driveway and shall not drive on any other portion of the lot without prior approval of the city/county inspector.

Top Soil: If grading results in the stripping of top soil, top soil shall be uniformly spread over the lots as grading is finished. Temporary silt barriers should be installed around stock-piled top soil for erosion and sediment control.

Trees: As many trees as can be reasonably utilized in the final development plan shall be retained and the grading adjusted to the existing grade of the trees where practicable.

B) Swales - Swales carry surface runoff from roofs, yards, and other areas to the rear of lots or along common property lines to streets or other drainage areas to prevent ponding of water near building structures or other portions of the lot. Surface drainage swales shall have a minimum grade of two (2) percent and shall be constructed so that the surface water will drain onto a street, storm inlet, or natural drainage area. Swales for handling lot drainage shall be constructed as a part of final lot grading and be seeded and mulched or sodded as soon as possible to prevent erosion.

C) Roof and Subsurface Drains - Roof downspouts, footing or foundation drains shall be

discharged onto the same parcel of land from which the water is generated. Roof downspouts shall be directed toward drainage areas which direct water away from the building structure. The outlet shall be no farther than twelve (12) feet from the building line, and no closer than two (2) feet to the property lines and twenty (20) feet to the right-of-way line. All subsurface drains shall be constructed toward the rear of the lot or connected into the storm sewer system with the approval and inspection by city or county officials. No subsurface drain shall outlet nearer than two feet (2') to a property line. Outlets for roof drains shall have erosion control in place at the outlet areas to minimize erosion on site.

Maintenance of Retention/Detention Areas

In all commercial and industrial developments the owner of each lot and/or the developer shall be responsible for properly maintaining each retention/ detention areas in order for such facility to function according its design and purpose. Maintenance for the detention/retention areas shall be noted on the Improvement Plan, including access roads. . In residential subdivisions, all Detention Basins shall be deeded to the appropriate legislative body and the area shall be shown and labeled as a Lot on the Final Plat. The deed shall be prepared by the developer and transferred to the appropriate legislative body after recording of the Final Plat. For any Retention ponds, only the appropriate easements around inlets structures and outlet structures, and a retention easement over the area of the fifty year (50 yr.) storm event shall be dedicated to the appropriate legislative body. The area of the pond or lake shall be owned and maintained by the adjoining residents. This shall include maintaining the shoreline and removing sedimentation, and shall be included in the Subdivision's Restricted Covenants.

SECTION 330

Soil Erosion and Slope Control

The developer of a proposed subdivision or development shall be required to submit to the Commission a detailed plan for erosion and/or sedimentation control. The plan shall contain proposed methods for slope stabilization, erosion control and water pollution abatement and shall be reviewed by the Commission. The Commission shall require that such a plan or part thereof be submitted with the Improvement Plan and Grading Plan.

- a) Prior Grading or Disturbed Site - No Improvement Plan and/or Grading Plan may be approved where the site has been graded, stripped, excavated, devegetated or otherwise disturbed so that slipping, erosion and/or water pollution has or may reasonably be expected to occur until such conditions are corrected to the satisfaction of the Commission.
- b) Soil Survey - The current "Soil Survey of Boone, Campbell and Kenton Counties, Kentucky" issued by the United States Department of Agriculture, Soil Conservation Service in cooperation with the Kentucky Agricultural Experiment Station is hereby made a part of these regulations and will be used for informational and reference purposes.
- c) Erosion Control Measures - Per the current *Kentucky Best Management Practices For Construction Activities* the following shall be followed:
 1. All exposed and graded land will be covered by mulch, permanent seeding, or temporary seeding, or a combination of seeding and mulch (hay, straw, or other natural fiber - spread for a 75% or greater ground coverage) within 45 days of exposure. Seeding rates, dates, and materials may be obtained from the local Natural Resources Conservation Field Office.

2. All exposed and graded land with grades of 8% (an average of 8 feet of fall per 100 feet of length) will be mulched at 75% or greater coverage.
3. Sediment basins (debris basins, desilting basins, or silt traps) shall be properly designed according to runoff and sedimentation load calculations and installed during initial grading at locations which will provide the best protection from off-site damages. A multi-purpose basin used for a silt trap then converted to a detention/retention basin is encouraged if properly designed and located. This combination structure will need to be dredged periodically during construction activities and after stabilization in order to provide adequate storage.
4. Concentrated flow areas, including storm sewer entrances, will need proper water control barriers to slow the runoff for rill and gully erosion control. These barriers will be a series of pegged straw bales or properly installed silt fence and rock rip-rap where needed.
5. Site perimeter silt fence or straw bale barriers shall be installed where bare land overflow is greater than a ratio of 2% slope per 400 feet of slope length (i.e., 4%:200, 8%:100, etc.). These perimeter barriers will be installed at all toe slopes of land 8% or greater in slope and above grade overfalls (at the upper edges of grades) along site perimeters.
6. Individual building sites will need erosion control barriers (silt fence or straw bales) below all bare land sloping into established paved streets and storm sewer systems. Bale barriers are recommended for individual house site perimeters and storm sewer entrances.
7. Individual building sites will be seeded (temporary or permanent) and mulched within 45 days of disturbance where land is void of grass vegetation.
8. In areas designated by the Land Use Element of the Boone County Comprehensive Plan as Developmentally Sensitive, the applicant, property owner, or developer is encouraged to use the Hillside Development Guidelines in Section 3162 of the Boone County Zoning Regulations in order to minimize soil erosion and to assure slope stability (compliance with these guidelines is mandatory under certain circumstances as outlined in Section 3162).