

## **LAND USE DEVELOPMENT STANDARDS AND POLICIES**

Recommended standards and policies for future land use development and related infrastructure are discussed in this section of the Comprehensive Plan. Development standards, applied in conjunction with related policies, serve as actions to be taken to achieve Christian County's goals and objectives for future development.

### **Residential Development Standards**

The primary urban development pattern in Christian County is very low density, single-family residential use. This residential development density pattern has resulted from not only a lifestyle choice for rural living, but also from lot size needed for on-site sewage disposal systems. Unless plans are instituted to establish a countywide public sewer system(s), sewage disposal requirements will continue to be a primary determinant of residential density patterns in the County. Although there are residential developments in the County with lot sizes less than one acre, minimum subdivision lot sizes are generally in the range of 1-5 acres. For the purposes of the future land use plan recommendations, the following density standards are used:

- Very Low Density Residential    1 dwelling unit per 5+ acres
- Low Density Residential            1 dwelling unit per 1-4 acres
- Moderate Density Residential    Up to 4 dwelling units per acre

**Policy 1: All residential development must be served with an approved system of sewage disposal.**

This standard is essential to ensuring maintenance of groundwater quality. In all cases, residential development using individual septic disposal systems must adhere to the County's on-site sewage disposal regulations.

**Policy 2: Moderate and high density residential development should locate adjacent to primary streets and should bear a reasonable relationship to surrounding development.**

High-density residential development should locate on or near arterial streets due to increased traffic levels that would be generated from such a development. High density residential development should be designed so that traffic is not routed through low density residential areas. Moderate density residential should locate on or near collector streets where possible.

**Policy 3: Discourage the location of residential development in areas with environmental constraints.**

Intensive development in flood prone areas and near sinkholes can result in flood damage, drainage problems and groundwater pollution. Development in these areas should be permitted only if it can be demonstrated that measures for flood proofing and drainage can be instituted to minimize or eliminate potential environmental problems and potential damage to development.

Sinkholes are part of the natural drainage system as well as an open conduit to the underground water supply. Filling in and development of sinkholes should not be permitted. Residential development in areas of sinkhole occurrence should be designed to incorporate sinkholes into a permanent open space and natural drainage system.

**Policy 4: Residential development in areas with slopes greater than 12% should be limited to very low density residential uses.**

Development of land areas with slopes greater than 12% poses significant environmental concerns as well as increased development costs. Stripping of rugged slopes for development purposes can result in serious erosion and sedimentation problems. Furthermore, the costs of individual site development and public infrastructure (roads) will be greater in areas of steep slope.

Most of the steep slopes are located in the heavily forested, central and southern sections of the County. Only very low density residential development should be permitted on steep slopes in order to minimize environmental damage and to maintain the maximum natural vegetative cover.

**Policy 5: Where land use conflicts are unavoidable due to existing development patterns, minimize future conflicts by encouraging the use of vegetative buffers, screening and gradual changes in land use intensity.**

Gradual changes in land use intensity are preferred to abrupt changes, which can have negative impacts on maintenance of the integrity of residential neighborhoods. For example, moderate density residential is a preferred land use buffer between low density residential and higher density residential development. Also, higher density residential can serve as a buffer between lower density residential uses and non-residential uses. It is recommended that very low density residential development serve as buffer around working agricultural areas, particularly in the western panhandle section of the County.

Buffers can also be provided through fencing and vegetative screening. While fencing is a standard technique used to buffer residential from non-residential development, the benefits of fencing buffers is limited by fencing maintenance, replacement costs and aesthetic quality.

Natural elements, such as trees, berms, parks and open space are also used as buffers. Planted buffers offer several advantages over fencing buffers:

1. Reduces noise intensity (trees absorb sound).

2. Shields different land uses or nuisances from view.
3. Reduces air pollution and dust (trees absorb carbon dioxide and produce oxygen).
4. Creates a more aesthetically pleasing environment, which can help to stabilize and improve property values.

The degree and type of buffering desirable between differing land uses is dependent on the intensity of the proposed development and the degree of incompatibility with adjacent land uses. Also, the nature of potential nuisances that may result should influence the type of desired buffer.

For example, a planted buffer yard between a low density residential development and a commercial use should require more intensive plantings, using a combination of deciduous and coniferous trees to create a more solid vegetative screen. If the degree of incompatibility between adjacent land uses is less intense, the numbers and types of vegetative screening may be reduced.

It is recommended that the County incorporate buffer yard requirements in its land development regulations. Buffer yard standards should include a range of screening options, in order to encourage the most appropriate buffer yard design for individual properties and to provide a degree of flexibility to the development community. Buffer yard standards should also require that maintenance be the responsibility of the developer or property owner.

**Policy 6: Prohibit residential development in areas developed and planned for commercial and industrial use.**

Intensive commercial and industrial activity can create nuisances for residential areas, including noise, vibration, glare and increased traffic levels. Conversely, the introduction of residential development into a commercial or industrial zone can negatively impact on the ability of these non-residential uses to operate under normal standards. Commercial and industrial areas should be provided a level of protection from potential nuisance complaints. Commercial and industrial traffic should not be routed through residential areas.

**Policy 7: Allow for flexible development techniques, such as planned unit developments and cluster housing, in areas that have suitable environmental characteristics and infrastructure.**

Planned unit developments (PUD) and cluster housing developments combine elements of traditional subdivision and zoning regulations to allow for flexibility in developments that are designed and constructed as a single unit. The lot-by-lot approach to development is replaced by a design plan for the entire area which may include variations on lot size, setbacks and permitted uses on various sections of the land parcel. Planned unit development regulations typically require a greater level of design review and control, including elements such as the specified location of structures on lots, locations of streets and driveway access points, locations and degree of landscaping and common open space or recreation areas and specific permitted uses.

Cluster housing represents the simplest form of planned unit development. In this form, the developer would be permitted to cluster houses closer together on one part of the tract (as opposed to traditional minimum lot size requirements) in order to create common open space on the balance of the tract. This technique would not allow for an increase in density over what would be allowed under traditional zoning requirements.

More complex planned unit developments may allow for a planned mix of low, moderate and higher density residential uses, and may also incorporate specific commercial uses in approved locations. The planned unit development concept can benefit both the County and the developer, especially in the development of large tracts that require special attention to minimize potential adverse impacts on the environment or adjacent land uses. Additional benefits of the planned unit development approach can include reduced costs due to less acreage in utilities, streets and lot sizes. Furthermore, environmentally sensitive areas can be protected from development and usable open space can be designed to maintain the aesthetic appeal of rural, country life.

Christian County should incorporate planned unit development regulations in its land development codes. However, the use of flexible lot sizes in any planned unit development must meet the County's standards for on-site sewage disposal in all cases.

**Policy 8: Ensure the availability of adequate public services, streets, water and sewerage to preserve the viability of residential neighborhoods.**

This policy should apply to all residential subdivision development in Christian County, including mobile home parks. Development should not be permitted if adequate levels of community services and infrastructure are not available or cannot be provided during development or within a reasonable time.

**Policy 9: The County should consider the adoption of nuisance abatement controls to maintain the integrity and viability of residential areas.**

Proper maintenance of residential areas should be encouraged through abatement regulations governing the removal of nuisances such as weeds, trash, and junk vehicles. Such nuisances are not only potential health and safety hazards, but may also result in declining property values and neighborhood instability due to undesirable images and aesthetics.

## **Commercial Development Standards**

Most commercial development in Christian County is presently clustered along limited access highways and primary and secondary arterials, with the greatest concentration of development in the northern portion of the County. Most such activities are in the category of freestanding convenience services, small strip shopping centers and highway-oriented commercial uses.

As urbanization proceeds, additional commercial development will be warranted to serve the growing population. It is recommended that commercial development be encouraged to locate in clustered developments along major roads and that commercial development should be designed to be compatible with surrounding land uses.

**Policy 1: Ensure sufficient and convenient locations for commercial uses that are compatible with surrounding land uses, well-designed and accessible to all population groups.**

**Policy 2: Encourage commercial and office uses to locate in clustered or compact development sites along major streets (arterials and collectors).**

**Policy 3: Locate Neighborhood Commercial Centers (30,000-100,000 sq. ft. gross floor area) near the intersections of primary and secondary arterials.**

Neighborhood commercial centers may also be permitted at the intersection of an arterial and collector if the collector meets recommended standards for right-of-way and pavement widths. Traffic from neighborhood commercial centers should be directed onto the arterial and/or collector system and should not flow through adjacent residential subdivisions.

**Policy 4: Community Commercial Centers (100,000-250,000 sq. ft. gross floor area) and larger regional commercial centers should locate near the intersections of primary arterials and/or limited access highways.**

Community and regional centers generate traffic volumes that can result in significant congestion on local streets. Such commercial development should be permitted only if the existing street system is designed to accepted standards or can be upgraded to standards at the time of development. These commercial centers should also be designed so that there is no direct through traffic access into residential areas.

**Policy 5: Convenience commercial uses or commercial serving small areas should locate near the intersections of arterials and collectors or at the intersections of two collectors. Orientation towards the primary street is preferable.**

Convenience commercial development should generally be limited to only a few uses that primarily serve adjacent residential areas. Examples of convenience commercial include convenience grocery/gasoline service stores, beauty/barber shops and dry cleaners.

**Policy 6: Strip commercial development along the major street system should be discouraged.**

Strip commercial refers to the development pattern of individual commercial activities on separate lots along the frontage of major streets. Strip commercial developments generally have no planned relationship between uses and do not share a common internal circulation system, ingress or egress points, utilities or signage. Extensive strip commercial developments are also characterized by frequent driveway cuts which can result in traffic congestion, particularly on streets carrying a high volume of traffic.

In order to maintain the functional integrity of the arterial and collector road system, strip commercial patterns should be discouraged. Rather, commercial and office uses should be encouraged to locate in clustered development areas and should share common access points and internal circulation where possible.

**Policy 7: Spot commercial development in residential areas should be discouraged.**

Mid-block or mid-neighborhood development of single commercial/office uses should not be permitted. Commercial and office uses can generate significant traffic levels that are not normally desired in residential subdivisions. Encroachment by incompatible non-residential uses can undermine the stability of residential neighborhoods and negatively affect property values.

**Policy 8: Office uses should locate near the intersections of major streets (arterials and collectors).**

Where possible, office uses should be encouraged to locate in planned centers where utilities and internal circulation systems can be shared with other existing or planned uses. Office uses which may generate higher traffic volumes, such as medical facilities, should take access from a major street and traffic should be discouraged from flowing through adjacent residential areas.

**Policy 9: Office developments should be encouraged as a land use buffer between residential developments and more intensive commercial land uses.**

**Policy 10: No commercial or office development should be permitted that will exceed the existing and planned traffic volume capacity of the street system.**

Such development should be approved only if the existing street system has adequate capacity for the expected increase in traffic volume or can be upgraded to standards at the time of development.

**Policy 11: All commercial and office development must meet State regulations governing water systems and sewage disposal.**

**Policy 12: All commercial and office development must receive EPA approved NPDES permits for stormwater discharge prior to final development approval by the County.**

**Policy 13: Vegetative buffering or other screening between commercial uses and residential uses should be encouraged.**

See Residential Development Standards, Policy #5 for discussion on buffering techniques.

**Policy 14: Commercial and office development should be discouraged from locating in flood prone or other environmentally sensitive areas.**

**Policy 15: All commercial and office uses should be required to provide adequate off-street parking to serve patrons.**

TABLE 13-1

## COMMERCIAL DEVELOPMENT LOCATION STANDARDS \*

	Neighborhood Convenience	Neighborhood Center	Community Center	Highway Commerce
Service	Surrounding Neighborhood	1/2 -3/4 mi. radius	2 mile radius	Varies
Population Served	Surrounding Neighborhood	4,000	4,000- 35,000	Varies
Leading Tenant	Convenience store, drug store, dry cleaners	Supermarket, drugstore	Variety store, dept. store, or discount	Varies
Gross Leasable Area	N/A	30,000- 100,000 sq. ft.	100,000- 250,000 sq. ft	Varies
Public or Package Sewer	Required	Required	Required	Required
Public or Private Water System	Required	Required	Required	Required
Drainage	Meet storm water runoff regulations	Meet storm water runoff regulations	Meet storm water runoff regulations	Meet storm water runoff regulations
Street Types	Arterial or intersection of arterial and collector	Secondary arterial intersection	Primary arterial intersection	Arterial
Flood Prone	Not Permitted	Not Permitted	Not Permitted	Not Permitted

\* Recommended locational standards

## **Industrial Development Standards**

Industrial activity in Christian County is predominantly located along the County's limited access highways (Highways 160 and 65) and in scattered locations along other primary and secondary arterials. Future industrial development is limited by the lack of public sewer systems with industrial hookup capacities in the unincorporated portions of the County. It is anticipated that most future industrial activity will locate adjacent to existing municipal sewer systems.

**Policy 1: Encourage the location of industrial uses in industrial parks or near existing industrial uses.**

Some large industrial activities have specific needs for free-standing, large lot sites. However, most modern industry is often better served by locating in industrial parks that have adequate provision of infrastructure and offer greater compatibility with surrounding, similar uses.

Industrial parks are characterized by:

1. Access via two or more arterials.
2. Utilities are on-site and normally provided by the developer.
3. Adequately sized internal circulation system.
4. Design control over lot sizes, lot coverage and setbacks.
5. Compatible support industries and activities.

**Policy 2: Industrial activities should locate on major streets (limited access highways and arterials).**

Traffic from industrial uses should take direct access from at least one arterial or from a frontage road if located adjacent to a limited access highway. Industrial traffic should not be permitted to flow through residential neighborhoods.

**Policy 3: Discourage the location of residential uses in areas developed and planned for industrial activity.**

**Policy 4: Preserve prime industrial land for industrial and related service activities.**

Industries generally have specific locational requirements that include minimal slope (1-6%), have convenient access to major streets or rail transportation, are away from sinkholes and flood prone areas and can be served by utilities. In order to ensure an adequate supply of prime industrial development sites in Christian County for expansion of existing industry or new industrial development, only related commercial and office activity should be allowed to develop in prime industrial areas. For example, activities that supply industrial production needs or that cater to the needs of industrial employees should be permitted in industrial areas. Other non-related commercial or office uses should be discouraged.

**Policy 3: All industry must have adequate provisions for disposal of sewage and solid wastes and must meet the NPDES permit system requirements for stormwater discharge prior to approval by the County.**

**Policy 4: Discourage the location of industry which may negatively effect the environment or which involves hazardous or offensive materials.**

Industries that handle gases, flammable liquids, corrosives and toxins, or those that create odor, noise, smoke, dust and vibrations should not locate near residential areas. Such industries should be permitted only if adequate measures can be taken through site design and buffering to mitigate potential off-site impacts on surrounding land uses.

**Policy 5: Industries which involve outdoor production or storage of materials should be buffered or screened from adjacent residential development.**

All industrial uses should be buffered from residential areas where possible by utilizing vegetative or structural screening or through the location of commercial uses as a transitional buffer.

The intensity of industrial activity and degree of nuisance potential should dictate the level of buffering required.

## **TRANSPORTATION PLAN**

Christian County's transportation system is not only a key determinant of land development patterns, but also a major and on-going infrastructure expenditure. Existing conditions of the County's major road network have been discussed in Chapter 10. The Transportation Plan presents policy statements and standards for maintenance of the existing road system and development of future major roads in the County.

### **Policy 1: Establish and enforce a major street hierarchy classification and function system.**

In the process of moving people and goods to, from and throughout Christian County, the County's private and public roads function as components of an overall circulation system. The function of each road within the overall circulation system is defined by the volume of traffic carried, relationship to other roads, the location, the level of access provided and road user characteristics.

The street functional classification system defines and categorizes the various road components of the circulation system, with each level of the functional system having particular design requirements (i.e., right-of-way, widths, pavement, speeds) and associated land use relationships. The street functional classification system is noted on the following page.

- Limited Access Highway:** These streets are intended to move high volume, moderate to high speed traffic through a region. Limited access is usually provided at some grade crossings with signals or through a system of interchanges. Direct access and service to adjoining properties is limited.  
(Example: U.S. Highway 65)
- Primary Arterial:** Arterials are primarily intended to provide for movement of high volume, moderate to high speed traffic through a community and to major activity nodes. For most arterials, access to abutting property is subordinate to traffic movement. Direct access to abutting property should be allowed only if the traffic-carrying capacity of the arterial is not diminished.  
(Example: U.S. Highway 160)
- Secondary Arterial:** Secondary arterials compliment the primary arterial system and are intended to move moderate volume, moderate speed traffic. Access to abutting properties is a secondary function and access is partially controlled.  
(Example: MO. Highway 14)
- Collector:** Collectors provide for both traffic movement and access to abutting properties. Collectors feed traffic from local residential, commercial and industrial areas into the arterial street system and are typically designed for low to moderate volume, lower speed traffic.  
(Example: State lettered highways and County roads)
- Local:** Local streets function primarily to provide access to abutting property. These streets are designed for low volume, low speed traffic and short trip lengths. Use of local streets by through traffic is discouraged.  
(Example: Subdivision roads)

In actuality, not every street and road in Christian County fits neatly into this functional classification system. Some streets designed as locals and collectors actually function as higher arterials due to the level of access provided and land development patterns that have occurred over the years. Furthermore, many of the major streets developed years ago throughout the County are

designed below accepted standards for modern traffic levels. Highway 14 is a good example of a road designed to collector standards but functioning as an arterial.

The existing major street system in Christian County (highways, arterials and collectors) is comprised of the U.S. highways, Missouri highways and County roads. U.S. Highways 160, 65 and 60, limited access highways, also function as the primary arterials throughout Christian County. Highway 65 carries the greatest volumes of traffic through the County and with programmed improvements, will provide a four lane linkage with Interstate 44 to the north and the Branson area to the south. U.S. Highway 160 also functions as a primary arterial north-south route through the central portion of the County. As noted, MO Highway 14 functions as a primary arterial, providing the only continuous east-west route through the County.

Other State highways (numbered and lettered) serve as secondary arterials throughout the County. These include Highway 125 which links Garrison, Chadwick and Sparta in the eastern section of the County. Highway 176 in the southwestern portion of the County provides an east-west linkage between U.S. Highways 160 and 65. These as well as State numbered highways, such as Highways T, UU, H are the principal routes through the more rural areas of eastern Christian County. Secondary arterials serving the western and more heavily urbanized, northcentral portion of the County include Missouri Highways P, N, ZZ, CC, NN, U and W. All of these State lettered and numbered highways are part of the federal aid secondary highway system (FAS).

Existing collector routes throughout Christian County include other State lettered highways which generally serve as linkages to the federal aid primary and secondary highway system and County roads.

**Policy 2: Require all new roads to be developed to minimum acceptable standards based on the street functional classification system. This includes dedication of adequate right-of-way and minimum construction/design standards.**

One of the more critical infrastructure problems facing Christian County is the lack of adequate right-of-way along many of the County's primary roads for construction to modern design and traffic capacity standards. Securing adequate right-of-way through the land development process will be an essential public cost control measure for new road construction and potential improvements to the existing primary road network in the County.

Table 14-1 summarizes recommended design standards for the functional street classification system in Christian County. It is recommended that these design standards be incorporated into the land development controls for Christian County.

**Policy 3: Maintain major street alignments by preventing development in corridors planned as rights-of-way for existing and future roads.**

Construction of new major streets and upgrade improvements of existing streets quite often requires a lengthy process of planning, design, securing funding, acquiring right-of-way and actual construction. Often, major street improvements are made in response to already occurring development. The County needs to ensure that rights-of-way for future road improvements are preserved prior to actual construction. Several techniques exist for protecting future rights-of-way, including the land subdivision process, fee simple purchase and less than fee simple purchase. These techniques are discussed below:

TABLE 14-1

RECOMMENDED DESIGN STANDARDS FOR ROADS

TYPE OF STREET	SERVICE FUNCTION		NORMAL SPACING	LANES	WIDTH		PARKING
	Movement	Access			Right-of-Way	Paving	
Limited Access Highway	Primary	Limited		4 *	130'	76'	None
Primary Arterial	Primary	Secondary	1 - 2 miles	4 *	90'	68'	None
Secondary Arterial	Equal	Secondary	1/2 - 1 mile	2	80'	44'	None
Collector Residential Commercial Industrial	Equal Equal	Equal Equal	1/4 - 1/2 mile 1/4 - 1/2 mile	2 2 *	60' 60'	36' 44' 48'	None None
Local - Urban Local - Rural	Secondary Secondary	Primary Primary	300' - 1/4 mile varies	2 2	50' 50'	30' 30'	One Side None

\* Turning lane at major intersections

## **Land Subdivision Process**

The most commonly used technique for acquiring land for arterial, collector and local streets is through required public dedication of right-of-way during the subdivision approval process. Dedication is used for securing land for widening of existing streets in partially developed areas as well as for new street construction. This procedure is not useful in acquiring right-of-way on tracts of land already subdivided and developed. As development occurs, the County should consistently require the dedication of appropriate right-of-way along existing and future street alignments in order to minimize the cost of purchasing additional right-of-way for future road improvements.

## **Fee Simple Purchase**

The most effective method of preserving future street alignments from development pressures is through fee simple purchase of right-of-way. This procedure is very costly, however, and funds are typically not available for fee simple purchase until right before construction begins. For this reason, advance fee simple purchase of right-of-way should be restricted to those cases where land cannot be secured through dedication and the right-of-way alignment is subject to immediate development pressure.

## **Less Than Fee Simple Purchase**

Another technique, which can be used to secure right-of-way, is less than fee simple purchase of development rights. Through this technique, the landowner is provided some compensation for not developing that land needed for future right-of-way. However, less than fee simple purchase of development rights on land under immediate development pressure can often be as expensive as actual purchase of fee simple.

**Policy 4: Land uses and intensity of development should be consistent with the street classification system and capacity of adjoining roads.**

The classification of the road and the road's capacity level should be a primary criterion in land use location decisions. Higher intensity land uses, which generate higher volumes of traffic, should be located along or near arterials. If warranted, on-site and/or off-site traffic improvements should be required of the developer.

A basic traffic analysis should be required for all major proposed development (i.e., subdivisions, commercial and industrial development). The analysis should include determination of the number of vehicle trips generated by the proposed development and the impact of existing and projected trip generation on the road system. If the traffic analysis indicates that a proposed development will result in traffic generation that exceeds the capacity of the road system, two options are recommended:

1. If the proposed development exceeds the existing street capacity, but is within the planned street capacity, the development should be delayed until the street system is upgraded. The development should be permitted to proceed only if the planned improvements will be provided within a reasonable time period. As an alternative, the developer should be afforded the option of constructing the needed improvements at his/her own expense.
2. If the proposed development exceeds the existing street capacity and the planned street capacity, the development should be prohibited.

**Policy 5: Development should assume a proportionate share of the cost of off-site traffic improvements needed as a result of the development.**

Development should normally bear the costs of off-site transportation improvements if such improvements are needed as a result of the development. If the transportation improvements are needed regardless of any additional development, then the public should assume responsibility for

the improvements. Financial responsibility for provision of off-site transportation improvements should be proportioned on the following basis:

1. **Right-of-Way.** The costs of provision of right-of-way should be required of the developer in all cases. Acquisition of right-of-way on land already subdivided or developed is the responsibility of the public.
2. **Pavement-New and Existing Roads.** The developer should be required to upgrade pavement widths to designated standards when development occurs along existing roads. If the street is a local or collector street, the developer should bear the costs of the upgrade. If the street is an arterial, the developer should bear the cost of upgrades to collector status. Upgrading from collector to arterial status should be the responsibility of the public. If other adjoining property owners will benefit from the improvements, the cost of upgrading to collector status should be shared with adjacent property owners on a proportionate basis.

This same proportionate responsibility should also apply for the development of new roads.

3. **Left Turn Lanes.** Left turn lanes should be mandated at all signalized intersections on primary roads. Also, left turn lanes should be required at other intersections with a minimum of 100 vehicles per peak hour turning across oncoming traffic of at least 400 vehicles per peak hour. If the need for a left turn lane at a public road intersection is the direct result of a development, the developer should bear the cost.
4. **Right Turn Lanes.** Right turn lanes should be provided at intersections of primary arterials and at other locations with a minimum of 100 vehicles turning per peak hour. The developer should bear the cost if the need for the turning lane results from the development.
5. **Signalization.** Traffic signals are typically warranted at intersections when the average daily traffic on all streets reaches street design capacity standards. Signals may also be required due to high incidence of traffic accidents resulting from poor road visibility or other road design features. Generally it is the public's responsibility for provision of signals. If a proposed development is solely responsible for the need for traffic signals, the developer should bear the responsibility.

It should be noted that the majority of the primary arterials and collectors in Christian County are roads under the authority of the Missouri Highway and Transportation Department (MHTD). The requirements for turn lanes and traffic signals on such roads must also meet the standards of the State. Any proposed development that may necessitate off-site traffic

improvements along a State highway should be evaluated by the MHTD prior to development approval at the County level.

**Policy 6: The location and frequency of access to arterial and collector streets should be controlled in order to maintain a reasonable traffic flow speed and to reduce traffic conflicts and accidents.**

The provision of access to the major road system in Christian County should be regulated on the basis of the type of proposed land use and the functional classification of the street. As noted previously, local streets are intended to provide direct property access and access points are therefore frequent. Collectors are intended to provide access while moving traffic to the arterial road network. In order to meet both these functions, direct access to collector streets should be somewhat limited. Arterials are intended to move traffic; property access is secondary function of arterials and access should be more highly restricted. As indicated, most of the County's arterial and collector roads are State highways and are subject to minimum access controls established by the State. Where not in conflict with existing State requirements, the following access control standards are recommended for the County's road system. Again, these recommended standards are optimal, and because of existing land development patterns, cannot always be achieved. However, future development should be designed to meet these access control standards where possible.

1. **All Streets and Roads.** All existing land parcels of record must be provided at least one driveway access to a public street, regardless of any higher access control standards that may be established.
2. **Local Streets.** The frequency of driveway cuts for access to local streets is limited only by the front footage of lots.
3. **Collector Streets.** Access to collector streets is typically controlled by design and construction standards. However, since most collectors are State highways, minimum state standards should apply which permit access points every 100 feet. Residential developments of less than five lots and dwelling units should not be allowed individual direct access to a collector.

4. **Secondary Arterials.** Unless State standards specify otherwise, one driveway access should be allowed for every 200 feet of frontage along a secondary arterial. Land tracts with less than 200 feet frontage should be encouraged to share a common access or to take access from a collector or local street. Residential developments of less than 10 lots and dwelling units should not be allowed individual access to a secondary arterial unless it is the only access possible. Subdivision development should be encouraged to take access from intersecting collector and local streets.
5. **Primary Arterials.** One driveway access should be permitted for every 300 feet of frontage unless prohibited by State requirements. Because the County's primary arterials are also limited access highways, development of frontage roads for access is encouraged. Again, residential developments of less than 10 dwelling units should not be permitted direct access to primary arterials unless it is the only possible access.
6. **Limited Access Highways.** Direct property access to limited access highways should be permitted only if it is the only access possible. Properties should take access from a frontage road, arterial, collector or local street.

**Policy 7: The County's major street system should be designed to promote continuity and efficiency of traffic movement while limiting through traffic incursions into residential areas.**

Intense land uses, which generate higher traffic volumes, such as commercial development, should be located on major roads in order to minimize traffic through neighborhood areas. Where possible, subdivision roads should be designed to limit through traffic. In urbanizing areas of the County, subdivision design should follow the neighborhood unit concept. This design concept utilizes arterials as the neighborhood's external boundaries. The alignment of the local and collector internal circulation system should discourage through traffic. Figure 14-1 provides a graphic illustration of the neighborhood unit concept.

FIGURE 14-1  
NEIGHBORHOOD UNIT CONCEPT

**Policy 8: Encourage appropriate street design through the subdivision review and approval process.**

Where possible, dead-end streets should be discouraged. Such streets present difficulties for movement of emergency vehicles. Dead-end streets should be allowed only on a temporary basis as may be required by the development of a subdivision in stages. When adjacent land is subdivided, the new street system should be aligned to eliminate dead-end streets. All new subdivision design should bear a reasonable relationship to the existing street network on adjacent developments in order to assure reasonable access to all properties and to maintain the functional classification of the street system.

**Policy 9: Minimum road construction and design standards should be adopted by all entities responsible for road development and maintenance in Christian County.**

The County and the various special road districts should agree to uniform minimum standards for road construction and design, including agreement on the functional classification of the road system. This will help to ensure that all future development in the County is subject to the same minimum acceptable standards and is in conformance with the County's Transportation Plan.

**Policy 10: All streets should be constructed to required standards and should conform to the policies of the Transportation Plan.**

The recommended Major Street Plan for Christian County is shown on Figure 14-2. This plan includes the functional classification designation of existing major streets in the County, programmed improvements and other proposed improvements to the major circulation system.

**Policy 11: Give high priority to the upgrading of substandard arterial and collector streets and the programming of new major streets in the County.**

As development proceeds in Christian County, existing streets and roads that are at design capacity or that are not designed at appropriate standards for modern traffic volumes will result in maintenance, operational and safety problems. This concern is particularly critical in the more rapidly urbanizing, northern portion of the County which already exhibits traffic congestion problems along certain primary roads (ie. MO. Highway 14).

The County should work closely with the Missouri Highway and Transportation Department to program road improvements on the basis of anticipated development levels and patterns. Improvements for major roads should be defined in a capital improvements program on an on-going basis. Due to the often extensive costs involved for upgrading existing roads, a priority system for major street improvements should be established, utilizing the following criteria:

1. Existing and projected traffic volumes
2. Structural conditions of road
3. Surface width

## MAJOR STREET PLAN

4. Incidence of accidents
5. Traffic volume and road design capacity ratios
6. Travel speeds
7. Degree of land development pressures
8. Degree of need for relieving traffic congestion

Christian County's most immediate transportation needs are generally focused in the northern and central portion of the County where development pressures are most intense. The following sub-section outlines programmed improvements to state maintained highways and bridges in Christian County and other recommended transportation system priorities.

### **Programmed and Recommended Transportation Improvements**

Programmed improvements to state maintained highways in Christian County include adding lanes to Highway 65 along a 17.3-mile distance between I-44 and Business 65 south of Ozark and upgrading Highway 65 to four lanes from Route F to the Arkansas state line. Highway 160 is also programmed for the construction of a new two-lane between Spokane and the Reeds Spring junction. The Highway 160 improvements and the four-lane upgrade on Highway 65 south of Ozark are scheduled to begin construction within the next five years. The addition of lanes on Highway 65 north of Ozark is scheduled within the next 15 years.

Highway 14 is also programmed for improvements within the next 15 years. This includes improvements along a 7.7-mile stretch from west of Highway 160 to Route NN near Ozark and from Business Highway 65 to Route W in Ozark.

Only two bridge improvements are scheduled by the State over the next 15 years. Improvements for the bridge on Highway P near Wilson's Creek National Battlefield are in the bid approval stage. Improvements to the bridge on Highway F, southwest of Ozark, are currently on the unfunded program list.

One of the more significant future road improvements for Christian County that is currently in the preliminary need determination and design stage is proposed Route 465. This proposed route would provide a freeway linkage loop between I-44 near Republic, running south of Highway 14 and hooking up with Highway 65 at Route F in Ozark. If actually constructed, this freeway loop would have significant impact on development patterns in the northern portion of Christian County. Greater levels of urban development can be expected to follow which may necessitate changes in land development policies and provision of other infrastructure services. The County should closely monitor this project during the planning stages to minimize potential conflicts with adjacent development patterns.

Other recommended transportation priorities for Christian County include focusing attention on securing adequate rights-of-way along all roads through the land subdivision process. Secondly, the County and the special road districts should work together to establish plans and a priority system for hard surface paving of public roads throughout the County. The County should also work with the MHTD on related transportation needs, including signalization and speed controls on various routes and bridge improvements.

## **FUTURE LAND USE**

Future land use is one of the most important elements of the Comprehensive Plan for Christian County and should serve as the principle guide for growth, development and preservation decisions and actions affecting the future of Christian County over the next decade. The Future Land Use element is closely related to and supported by other recommended policies of the Plan, including policies, on transportation, the environment, community facilities and utilities. Future land use and development pattern recommendations contained in this chapter are shown on the Generalized Future Land Use Map (Figure 15-1).

Existing land use patterns, which have developed over the past several decades and environmental characteristics serve as the basic starting point for the framework of future, land use in Christian County. The County's transportation system and availability of utility infrastructure (water and sewage disposal) are also key locational factors influencing not only types of recommended development but also the density of development throughout the County.

### **Methodology**

The Generalized Future Land Use Map displays the anticipated land use patterns that would best encourage responsible growth within the parameters of existing development and infrastructure patterns, environmental constraints and resource management concerns. This land use pattern seeks to reinforce and support the County's goals, including but not limited to:

1. Allowing for growth while preserving the best features of rural life.
2. Maintaining and protecting the natural environment, including the groundwater supply.
3. Promoting compatibility of land uses which allows for the coexistence of urban growth and agricultural uses.

The factors of existing land use, existing and proposed transportation, community facilities, utilities, environmental constraints (i.e. sinkholes, floodplains) and environmentally sensitive areas, and goals and objectives were taken into consideration to arrive at the recommended land use for individual sections of land in Christian County (square mile areas). Factors, such as drainageways, floodplains, sinkholes and soils were mapped in a series of overlays to determine areas of environmental constraints and areas suitable for agricultural production. Allocation of land areas for specific types of urban land uses, such as residential, commercial and industrial, were then based on a combination of the existing development patterns, land development location standards and population projections to ensure adequate acreage to meet anticipated population growth and related development needs.

Maintaining the quality of the groundwater supply is a primary factor controlling the proposed density levels in Christian County. As most of the unincorporated portions of the County utilize individual, on-site sewage disposal systems, low-density development patterns are recommended in these areas.

### **General Development Pattern**

The future land use pattern shown on Figure 15-1 reflects continuity in focusing future urban development in the current growth corridor area along Highways 160, 65 and 14, extending from the Greene County line on the north to south of the cities of Nixa and Ozark. This area is anticipated to form the core urbanizing area of Christian County over the next decade. Areas of prime farmland soils and which are predominantly used for agriculture, including the panhandle section of the County west of the James River and the northeastern section of the County, are proposed to remain in agricultural uses with compatible, very low density urban development.

Generally, the southern portion of the County is shown in forestry and very low density development uses, taking into account the existing road system, rugged topography, septic tank disposal requirements and substantial acreage not available for development (Mark Twain National Forest and Busiek State Park). More intensive urban development in this area is not recommended due to the constraints of inadequate road paving and rights-of-way for urban traffic levels and the potential for significant environmental damage (including erosion and siltation of streams) resulting from removal of vegetative cover on rugged slopes.

It should be noted that the Generalized Future Land Use Map depicts general land development patterns only. It is not a zoning map and should not be used alone to determine appropriate land uses for individual pieces of property. This map is a tool to be used in conjunction with the other elements of the Comprehensive Plan, such as goals and objectives, the County's land development controls and specific characteristics of a site to determine the appropriate development pattern for that site.

### **Residential Land Use Patterns**

Figure 15-1 depicts three density patterns of residential uses in the unincorporated portions of Christian County. These include Very Low Density (1 dwelling unit per 5 or more acres), Low Density (1 dwelling unit per 1-4 acres) and Moderate Density (Up to 4 dwelling units per acre). There are very few instances where current residential development densities in the unincorporated areas of Christian County exceed the recommended moderate density standards.

At present, over 97% of residential uses are either single family or mobile homes on individual ownership lots. It is anticipated that single family will continue to be the predominant residential use, with duplex development and mobile home parks comprising most of the balance of residential uses.

Moderate density and low-density residential uses are recommended to locate in close proximity to already urbanized areas in the Nixa-Ozark growth corridor area. Residential uses developed at these densities will require either hookup to nearby municipal sewer systems or package sewage treatment systems. Moderate density residential is also recommended as a land use buffer between commercial areas and lower density residential uses.

It is quite possible that densities greater than 4 dwelling units per acre may be appropriate and acceptable on certain sites within the urban growth area. However, any such proposal should be evaluated individually, taking into consideration the factors of sewage disposal, water supply and potential for annexation by an incorporated community with existing zoning and other land development requirements.

Very low-density residential development is proposed to locate outside of the urban growth area and/or wherever individual septic tank systems must be used. Furthermore, only very low density residential uses are recommended in areas with slopes greater than 12%, in order to reduce the potential of deforestation, soil erosion, sedimentation and the higher costs of providing for upgraded transportation infrastructure. Very low-density residential uses are also recommended as a preferred land use buffer between working farms and more intensive urban development.

Based on the rural residential density standard of one dwelling unit per 5 acres and population projections for the unincorporated portion of the County, a minimum of approximately 15,000 acres of land will be needed to accommodate new residential development by the year 2000 and 35,000 acres by the year 2020. This residential acreage need is based on the projection that 60% of the population growth will occur in the unincorporated areas (see Appendix E for space allocation formulas).

## **Commercial Land Use Patterns**

Most future commercial activity is recommended to locate adjacent to or nearby the County's primary road system (arterials and collectors) in the urban growth area. Future commercial activity is clustered near existing commercial development and at intersections of major roads (i.e. along Highway 160, 65, 14). Due to the availability of municipal water and sewer, it is expected that most future commercial activity will locate in or in close proximity to the cities. Approximately 300 additional acres of commercial land will be required in unincorporated Christian County by the year 2010, 500 acres by the year 2020. Figure 15-1 indicates a greater acreage of new commercial space in order to accommodate reasonable choice.

## **Industrial Land Use Patterns**

Most current industrial activity is located in or adjacent to the cities, with the largest concentration of activity along Highways 160 and 65 near Nixa and Ozark. Future industrial activity is recommended to locate in these areas due to the proximity to municipal water and sewer. In addition to utility concerns, other locational factors considered in the allocation of space for industrial uses include relatively flat topography and convenient access to major roads.

Due to the specific locational requirements for industrial activity, it is recommended that appropriate space be allocated for industrial growth for at least a 30 year period. Based on the population projections for the County, approximately 300 acres of land for industrial activities should be provided. It should be noted that not all anticipated future commercial and industrial growth will occur in the unincorporated portions of the County, regardless of the population growth expected in these areas. A percentage of such growth can be expected to occur in the municipalities due to availability of water, sewer and already existing industrial parks.

## **Agricultural Land Use Patterns**

Existing land use, infrastructure patterns and soil type were the principle factors used to arrive at recommendations for preservation of agricultural uses in Christian County. The County's prime farmland soils (see Figure 6-7) are generally located in the northern portion of the County and in the relatively flat, southwestern section of the County (west of Highway 160). While many of the prime farmland soils have already been converted to urban development in the Nixa-Ozark area, significant acreage of working farmland still remain in the western panhandle section, the northeast and in the southwest parts of the County. These areas are recommended primarily for continued agricultural uses. In the panhandle section, the James River serves as a natural boundary between future urbanization and agricultural uses.

Development occurring in these areas is recommended to be limited to very low-density residential development so as to minimize potential conflicts and incompatibility of urban uses with agricultural activity.

Commercial activities that service or are supportive of the agricultural base in these areas may be warranted at certain locations. Such commercial activity should be located on major roads and should be reviewed on an individual basis for compatibility with surrounding development patterns and needs.

## **Summary Comments**

As noted, the recommended future land use pattern for Christian County to the year 2010 is intended to focus growth in the urbanizing core area in the north and central sections of the County. It is further intended to discourage urban levels of development in sensitive environmental areas

and in areas with inadequate levels of infrastructure (roads, water and sewer) to accommodate such growth.

Not all land shown for urban development on Figure 15-1 will actually develop over the coming decade. Constraints to development, such as site-specific environmental limitations, ownership patterns and configuration of land parcels will limit potential development in some areas. Furthermore, not all land can be expected to develop at the density levels shown on the Generalized Future Land Use Map. The potential availability of municipal water and sewerage services may allow for density levels greater than those recommended in the Plan. Evaluation of development proposals should take into consideration the availability and capacity of the infrastructure system, along with surrounding development patterns, to determine whether increased density levels are appropriate for a particular development.



## GENERALIZED FUTURE LAND USE

## **IMPLEMENTATION STRATEGIES AND PRIORITIES**

Implementing the Comprehensive Plan is an integral element of the planning process for Christian County. Although the Plan outlines recommendations and strategies for the future development of the County and should be viewed as the official document guiding public and private land development decisions and actions, the Plan is advisory only. Success of the Plan will be measured by the degree to which the Plan is put to use. Implementation of the Plan will depend on a combination of regulatory controls and voluntary programs and actions on the part of both the public and private sectors.

The implementation phase will be especially critical as this is the first comprehensive planning effort undertaken by Christian County. Since the County is "starting from scratch", there are virtually no regulatory ordinances or voluntary programs in effect to facilitate implementation. The only significant exception is the recent adoption of regulations for individual sewage disposal systems. Initiating the basic tools needed for implementation of the recommendations and policies guiding future land development decisions is the most fundamental and strategic planning priority for the County.

While a number of the goals and related policies in the Comprehensive Plan are long term and on going in nature, there are a number of strategic actions or priorities, which should be the focus of continued planning efforts over the next five years. Table 16-1 summarizes recommended priorities and strategies for implementation of the Christian County Comprehensive Plan between 1992 and 1997. These priorities include both actions needed to establish the basic framework for implementation as well as key land development concerns noted in the various sections of the Comprehensive Plan.

Approximate target dates for completion of implementation strategies, along with identification of entities responsible for implementation, are also noted in Table 16-1. More than one entity may be responsible for initiating and carrying out a particular strategy. In these cases, the primary responsible entities are noted.

Due to the County's rapid rate of growth, the goals and objectives of the Comprehensive Plan and the strategic priorities should be reviewed and updated in approximately five years. This action is recommended to determine whether the Plan still reflects public desires and community needs and whether the development recommendations of the Plan are still appropriate.

TABLE 16-1

IMPLEMENTATION PRIORITIES, 1992-1997

Action	Responsible Entity	Target Period	Benefits
Adopt Christian County Comprehensive Plan	Planning & Zoning Commission	1992	Provide a tool to guide development
Establish a County Planning Dept. & allocate funds for staff & operations	County Commission	1992	Provide for implementation of the Plan, land development codes & on-going planning efforts
Adopt land development codes regulating land use & subdivision & subdivision	County Commission	1992	Promote orderly growth & resource use, protect the integrity of existing development  ensure minimum standards for public infrastructure
Work with other interested counties to seek changes to state law that would permit adoption of building codes in third class counties	County Commission	1993-1994	Provide uniform standards for builders & ensure minimum level of construction quality in the County
Seek revisions of DNR regulations to allow for local review & permit approval of on-site sewage disposal systems in subdivisions of more than 14 dwelling units	County Health Dept.	1992-1993	Eliminate duplication of efforts, reduce development costs and place regulatory control at the County level

TABLE 16-1 (cont)

IMPLEMENTATION PRIORITIES, 1992-1997

Action	Responsible Entity	Target Period	Benefits
Discourage development in environmentally sensitive areas. Protect sinkholes and flood prone areas from development. Allow only low-density development in floodplain areas	County Planning Dept. Planning & Zoning Comm.	1992-1997	Preserve the environment, protect the groundwater supply and reduce the cost of flood damage & floodplain management
Require all development to be consistent with the Transportation Plan, including enforcement of right-of-way and pavement width standards	County Planning Dept.	1992-1993	Ensure adequate transportation infrastructure to meet modern traffic demands
Develop a five-year capital improvements program for upgrading & maintenance of the County's major road system	County Commission Special Road Districts	1993-1994	Provide for adequate revenue to keep pace with transportation needs
Conduct a study to determine the costs/benefits of hard surface paving of County roads & the possible consolidation of road maintenance responsibilities at the County level	County Commission Special Road Districts County Planning Dept.	1994-1995	Provide for improved surface roads throughout the County & economies of scale by reducing duplication of efforts, staff, equipment & maintenance costs

TABLE 16-1 (cont)

IMPLEMENTATION PRIORITIES, 1992-1997

<i>Action</i>	<i>Responsible Entity</i>	<i>Target Period</i>	<i>Benefits</i>
Develop communications between the County & cities on long-range planning for Municipalities expansion of municipal sewer facilities	County Commission County Planning Dept.	1993-1997	Ensure adequate sanitary sewerage facilities in potential city annexation areas as growth proceeds
Require development & infrastructure in close proximity to cities to be compatible with city development patterns and codes	County Planning Dept.	1992-1997	Provide for uniform development standards that are consistent with municipal planning efforts
Coordinate solid waste management planning efforts	County Commission Municipalities	1993-1994	Development of comprehensive solid waste management plan & reduction of the waste stream
Investigate methods for reducing illegal roadside trash dumping	County Planning Dept.	1993-1995	Create a cleaner & safer environment
Develop a public education program on solid waste & household hazardous waste practices	County Planning Dept. County Health Dept.	1993-1995	Increase public awareness. Create a cleaner & safer environment.
Develop detailed mapping & identification of sinkholes & other environmental constraints	County Planning Dept. U.S. Geological Survey	1995-1997	Provide environmental database to better protect groundwater and to preserve environmentally sensitive areas
Develop brochures, hand books or citizens guides to planning	County Planning Dept.	1993-1995	Provide a better understanding of the planning process & regulatory controls



## EXPONENTIAL RATE OF CHANGE MODEL

$$P_n = p_0 e^{rn} \quad \text{and} \quad r = \frac{\frac{P_n}{P_0} - 1}{n \log_{10} e}$$

$P_n$  = last available figure on total population

$P_0$  = initial population

$e$  = a constant,  $e = (2.71828)$

$r$  = rate of change

$n$  = years between measurements

$$P_{2000} = 54,285 \times 2.71828^{[.0428034(10)]}$$

$$P_{2000} = 54,285 \times 2.71828^{428034}$$

$$P_{2000} = 54,285 \times 1.53471154$$

$$P_{2000} = 83,312$$

$$P_{2010} = 54,285 \times 2.71828^{[.0428034(20)]}$$

$$P_{2010} = 54,285 \times 2.71828^{856068}$$

$$P_{2010} = 54,285 \times 2.3538862$$

$$P_{2010} = 127,780$$

## APPENDIX B

### SOIL SERIES GENERAL CHARACTERISTICS

Bardley series (member of mapping unit 25D, Ocie-Bardley-Gatewood complex) uplands.

Slopes range from 2 to 14 percent. Permeability is moderate. Surface runoff is medium to rapid, and available water capacity is low. The surface texture is cherty silt loam. Most areas are in woodland, with some areas used for hay and pasture.

Bolivar series (mapping unit 23B, Bolivar fine sandy loam)

The Bolivar series consists of moderately deep, well-drained soils on ridgetops on uplands. Slopes range from 2 to 14 percent. Permeability is moderate. Surface runoff is medium, and available water capacity is low. Most areas have been cleared and are used for hay and pasture. A few areas are used for row crops or are in woodland. This series is considered prime farmland.

Captina series (member of mapping unit 8B, Captina-Needleye silt loams)

The Captina soils are deep, very gently sloping and well-drained soils on uplands and ridges. Captina soils are found on the top and sides of ridges. These soils have a fragipan with slow to moderate permeability. Surface runoff is medium. The soils are suited for row and small grain crops and for trees.

Cedargap series (mapping unit 93A, Cedargap cherty silt loam; member of mapping unit 92A, Cedargap-Secesh silt loams)

The Cedargap series consists of deep, well-drained soils in flood plains of small streams. Slopes range from 0 to 3 percent. Permeability is moderately rapid. Surface runoff is low, and available water capacity is moderate. Most areas are in hay and pasture, with a few areas in row crops or woodland. This series is considered prime farmland.

Clarksville series (mapping unit 45D, 45E, 45F, and 45G, Clarksville very silt loam; member of mapping unit 35D, Doniphan-Clarksville complex)

The Clarksville series consists of deep, somewhat excessively-drained soils on ridgetops and side slopes of ridges on uplands. Slopes range from 2 to 60 percent. Permeability is moderately rapid. Surface runoff is rapid, and available water capacity is low. Most areas are in woodland, with a few areas in pasture and hay in regions of less slope.

Creldon series (mapping unit 6B, Creldon silt loam)

The Creldon series consists of deep, moderately well-drained soils that have a fragipan. These soils are on broad ridgetops on uplands. Slope ranges from 1 to 4 percent. Permeability is moderate above the fragipan and low in the fragipan. Surface runoff is medium, and available water capacity is moderate. Most areas are used for hay and pasture, with some areas used for row crops. This series is considered prime farmland.

Doniphan series (member of mapping unit 35D, Doniphan-Clarksville cherty silt loams)

The Doniphan series consists of deep, well-drained soils on ridgetops on uplands. Slopes range from 2 to 14 percent. Permeability is moderate. Surface runoff is medium to rapid, and available water capacity is low. Most areas are in pasture and woodland, with a few areas in row crops.

Gasconade series (mapping unit 83G, Gasconade Rock Outcrop complex)

These soils are shallow, strongly sloping to very steep and are excessively drained. Located on broken side slopes and upland areas, these soils exhibit moderately slow permeability and rapid surface runoff. The soils are poorly suited for trees or building development.

Gatewood series (member of mapping units 24F, Gatewood-Ocie-Rock complex; and 25D, Ocie-Bardley-Gatewood complex)

The Gatewood series consists of moderately deep, moderately well-drained soils on uplands. Slopes range from 9 to 65 percent. Permeability is moderately slow. Surface runoff is rapid, and available water capacity is low. The surface texture is cherty silt loam. Most areas are in woodland, with some areas used for hay and pasture.

Goss series (mapping units 43C and 43D, Goss cherty silt loam)

The Goss series consists of deep, well-drained soils on ridgetops and side slopes on uplands. Slopes range from 2 to 20 percent. Permeability is moderate. Surface runoff is medium to rapid, and available water capacity is low. Most areas have been cleared and are used for hay and pasture. A few areas are in woodland, and a few areas on the lesser slopes are in row crops.

Huntington series (mapping unit 55A, Huntington silt loam)

The Huntington series consists of deep, well-drained soils on flood plains. Slopes range from 0 to 3 percent. These soils are subject to occasional flooding. Permeability is moderate.

Surface runoff is medium and available water capacity is very high. Most areas are used for hay and pasture, with some areas used for row crops. This series is considered prime farmland.

Needleye series (member of mapping unit 8B, Captina-Needleye silt loam)

The Needleye series consists of deep, moderately well-drained soils that have a fragipan. Needleye series soils are found in depressed areas on the top of broad ridges on uplands. Slopes range from 1 to 3 percent. Permeability is slow in the fragipan. Surface runoff is medium, and available water capacity is medium. Most areas are cleared and used for hay and pasture, with a few areas in row crops and a few areas in woodlands. This series is considered prime farmland.

Ocie series (mapping unit 22C, Ocie cherty silt loam; and member of mapping units 24F, Gatewood-Ocie-Rock outcrop and 25D, Ocie-Bardley-Gatewood complex)

The Ocie series consists of deep, moderately well-drained soils on uplands. Slopes range from 2 to 35 percent. Permeability is moderate in the upper part of the profile and slow in the lower part. Surface runoff is medium and available water capacity is low. Most areas are in woodland, with some areas in hay and pasture.

Peridge series (mapping unit 21B, Peridge silt loam)

The Peridge series consists of deep, well-drained soils on high stream terrace and on uplands around the heads and sides of drainageways. Slopes range from 2 to 5 percent. Permeability is moderate. Surface runoff is medium to high, and available water capacity is high. Most areas are used for hay and pasture, with a few areas in woodland or used for row crops. This series is considered prime farmland.

Secesh series (member of mapping unit 92A, Cedargap-Secesh silt loams)

The Secesh series consists of deep, well-drained soils on flood plains. Slopes range from 1 to 3 percent. Permeability is moderate. Surface runoff is slow, and available water capacity is moderate. Most areas are used for hay and pasture, with a few areas in woodlands or used for row crops. This series is considered prime farmland.

Tonti series (mapping unit 81B, Tonti silt loam)

The Tonti series consists of deep, moderately well-drained soils that have a fragipan. These soils are on ridgetops and high terraces. Slopes range from 2 to 5 percent. Permeability is moderate above the fragipan and slow in the fragipan. Surface runoff is medium, and available water capacity is low. Most areas have been cleared and are used for hay and pasture, with a few areas in woodland or used for row crops.

Wilderness series (mapping unit 5C, Wilderness cherty silt loam)

The Wilderness series consists of deep, moderately well-drained soils that have a fragipan. These soils are on ridges on uplands. Slopes range from 2 to 9 percent. Permeability is moderate above the fragipan and slow in the fragipan. Surface runoff is medium, and available water capacity is low. A perched water table is at a depth of 1 to 2 feet from December to March in most years. Most areas have been cleared and are used for hay and pasture. Some areas are in woodland, with a few areas used for row crops.

## Soils Features

Tables B-1 through B-3 summarizes general suitability of the soil series in Christian County for building development, on-site sewage disposal and general soils characteristics. The following terminology is used to describe the various soil limitations summarized in these tables:

<b>Slight</b>	Soil properties and site features are generally favorable for the indicated use. Limitations are minor and easily overcome.
<b>Moderate</b>	Soil properties or site features are not favorable for the indicated use. Special planning, design or maintenance is needed to overcome or minimize the limitation.
<b>Severe</b>	Soil properties or site features are so unfavorable or so difficult to overcome that special design; significant increases in construction costs and possible increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

TABLE B-1

SOIL AND WATER FEATURES

The symbol > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated.

Soil Name and Map Symbol	Frequency	Flooding Duration	High Water Table		Bedrock Depth	Potential	Risk of Corrosion	
			Depth	Kind			Uncoated	Concrete
6B Creldon	None	None	1.5-3.0	Perched	>60	Moderate	High	High
22C Ocie	None	None	3.0-5.0	Perched	40-60	Moderate	High	Moderate
23B Bolivar	None	None	>6.0		20-40	Moderate	Low	Moderate
24F Gatewood	None	None	>6.0		20-40	Moderate	High	Moderate
Ocie	None	None	3.0-5.0	Perched	40-60	Moderate	High	Moderate
Rock outcrop.								
25D Ocie	None	None	3.0-5.0	Perched	40-60	Moderate	High	Moderate
Bardley	None	None	>6.0		20-40	Moderate	Moderate	Moderate
Gatewood	None	None	>6.0		20-40	Moderate	Moderate	High
27D Bolivar	None	None	>6.0		20-40	Moderate	Moderate	High
35D Domiphan	None	None	>6.0		>60	Moderate	Moderate	High
Clarksville	None	None	>6.0		4-20	Moderate	High	Low
45D, 45F, 45G Clarksville	None	None	>6.0		>60	Moderate	Low	High
83G Gasconade	None	None	>6.0		4-20	Moderate	High	Low
Rock outcrop.								

94 Pits.

Dumps

Flooding-Frequency: Occasional means flooding occurs no more than once every two years.

Flooding-Duration: Frequent Means flooding occurs more than once every two years.

Brief means two to seven days. Very Brief occurs less than two days.

High Water Table: Apparent means a thick zone of freshwater in the soil.

Perched means water standing in a saturated zone of the soil above a dry zone.

TABLE B-2

BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined below.)

Soil name and Map Symbol	Shallow Excavations	Dwellings without Basements	Dwellings with Basements	Small Commercial Buildings	Local Roads and Streets	Lawns and Landscaping
6B Creldon	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Severe: low strength	Moderate: wetness
22C Ocie	Moderate: too clayey, depth to rock	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength, shrink-swell	Moderate: large stones
23B Bolivar	Moderate: depth to rock	Moderate: shrink-swell	Moderate: shrink-swell depth to rock	Moderate: shrink-swell	Moderate: low strength, shrink-swell	Moderate: thin layer
24F Gatewood	Severe: slope, depth to rock	Severe: shrink-swell, slope	Severe: shrink-swell depth to rock, slope	Severe: shrink-swell, slope	Severe: low strength, slope, shrink-swell	Severe: small stones, slope
Ocie	Severe: slope	Severe: shrink-swell, slope	Severe: shrink-swell slope	Severe: shrink-swell, slope	Severe: low strength, slope, shrink-swell	Severe: slope
Rock outcrop.						
25D Ocie	Moderate: too clayey, depth to rock, slope	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell, slope	Severe: low strength, shrink-swell	Moderate: large stones, slope
Bardley	Severe: depth to rock	Moderate: shrink-swell	Severe: depth to rock	Severe: slope	Severe: low strength	Severe: small stones
Gatewood	Severe: depth to rock	Severe: shrink-swell	Severe: depth to rock, shrink-swell	Severe: shrink-swell, slope	Severe: low strength, shrink-swell	Moderate: large stones, slopes
27D Bolivar	Moderate: large stones, depth to rock, slope	Moderate: shrink-swell, large stones, slope	Moderate: depth to rock, slope, shrink-swell	Severe: slope	Moderate: low strength, slope, frost action	Severe: large stones
35D Doniphan	Moderate: too clayey, slope	Moderate: shrink-swell, slope	Moderate: shrink-swell, slope	Severe: slope	Severe: low strength	Severe: small stones
35D Clarksville	Moderate: too clayey, slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action, slope	Severe: small stones
45D Clarksville	Moderate: too clayey, slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action, slope	Severe: small stones
45F, 45G Clarksville	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, small stones
83G Gasconade	Severe: large stones, slope, depth to rock	Severe: large stones, slope, depth to rock	Severe: large stones, slope, depth to rock	Severe: large stones, slope, depth to rock	Severe: large stones, slope, depth to rock	Severe: large stones, slope, thin layer
Rock outcrop.						
94 Pits. Dumps.						

Large stones - Rock fragments 3 inches (7.5 cm) or greater.

Shrink-swell - Expansion and contraction of clays from wetting and drying.

TABLE B-3

SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined below.)

Soil Name and Map Symbol	Septic Tank Absorption Fields	Sewage Lagoon Areas	Trench Sanitary Landfill	Area Sanitary Landfill	Daily Cover for Landfill
6B Cvelton	Severe: wetness, percs slowly	Moderate: slope	Severe: wetness, too clayey	Moderate: wetness	Poor: too clayey, small stones, hard to pack
22C Ocite	Severe: percs slowly, wetness	Severe: wetness	Severe: too clayey, depth to rock	Moderate: depth to rock	Poor: too clayey, hard to pack
23B Bolivar	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: area reclaim
24F Gatewood	Severe: percs slowly, slope, depth to rock	Severe: depth to rock, slope	Severe: too clayey, slope, depth to rock	Severe: slope, depth to rock	Poor: too clayey, area reclaim, hard to pack
Rock outcrop.					
25D Ocite	Moderate: percs slowly, large stones	Severe: seepage	Severe: too clayey, large stones	Severe: seepage	Poor: too clayey, small stones
43D Goss	Moderate: percs slowly, slope, large stones	Severe: seepage, slope	Severe: too clayey, large stones	Severe: seepage	Poor: too clayey, small stones
44G Goss	Severe: slope	Severe: seepage, slope	Severe: slope, too clayey, large stones	Severe: seepage, slope	Poor: too clayey, small stones, slope
Gasconade	Severe: depth to rock, slope, large stones	Severe: depth of rock, large stones	Severe: depth to rock, slope, too clayey	Severe: depth to rock, slope	Poor: area reclaim, too clayey, large stones
45E Clarksville	Severe: slope	Severe: seepage, slope	Severe: seepage, slope, too clayey	Severe: seepage, slope	Poor: too clayey, small stones, slope
55A Huntington	Severe: flooding	Severe: flooding	Severe: flooding, wetness	Severe: flooding	Good
81B Torti	Severe: percs slowly, wetness	Moderate: slope	Severe: too clayey, wetness	Moderate: wetness	Poor: hard to pack, too clayey
92A Cedargap	Severe: flooding	Severe: seepage, flooding	Severe: flooding, seepage	Severe: flooding, seepage	Poor: small stones
Seecesh	Severe: flooding	Severe: seepage, flooding	Severe: flooding, seepage	Severe: flooding, seepage	Poor: small stones
93A Cedargap	Severe: flooding	Severe: seepage, flooding	Severe: flooding, seepage	Severe: flooding, seepage	Poor: small stones

Perc slowly: slow movement of water through the soil.

Seepage: movement of water through the soil.

## APPENDIX C

### EXISTING LAND USE CLASSIFICATION SYSTEM

<u>Grouping</u>	<u>Subgrouping and Examples</u>
<u>Residential</u>	<p><u>Single Family</u> - Detached single family homes.</p> <p><u>Duplexes</u> - Two-family homes.</p> <p><u>Multi-Family</u> - Triplexes, apartments.</p> <p><u>Group Quarters</u> - Boarding houses; retirement homes; juvenile care homes.</p> <p><u>Mobile Homes</u> - Mobile homes on individual lots.</p> <p><u>Mobile Home Parks</u> - Mobile homes in a group park.</p>
<u>Commercial</u>	<p><u>General Commercial</u> - Retail and wholesale establishments selling: dairy products, bakeries, auto parts, clothing, shoes, furniture, food, appliances, drugs, liquor, hardware,, sporting goods, books, jewelry, etc.; photographic studios; beauty and barber shops; shoe repair, funeral homes; health clubs; repair services for appliances; theaters; bowling alleys; hotels and motels; restaurants; photo copy and blueprint services; other similar uses. Banks and banking services; credit agencies; real estate sales; insurance agents; title and abstract; investment offices; medical and dental labs; services such as: legal, architectural, engineering, accounting, advertising, data processing, management and other similar uses.</p> <p><u>Heavy Commercial</u> - Motor vehicle sales and service; service stations; motorcycle sales and service; laundries and dry cleaners; carpet and upholstery cleaners; motor vehicle renting; car washes; building materials; lawn and garden shops; mobile home dealers; equipment rentals; agricultural products; kennels; other similar uses.</p>

**Industrial**

**Light Industrial** - Warehouses; wholesale trade establishments; automobile auctions; truck warehouses. Production such as: clothing, lumber and paper products; professional instruments; and other similar uses.

**Heavy Industrial** - Production of new products such as: stone, glass, concrete and clay products; metal products; machinery and equipment; petroleum products; rubber and leather products; chemicals; ordinance; and extractive industries.

**Transportation,  
Communication &  
Utilities**

Transit services such as taxi, school buses; transit maintenance services; telephone; radio and television broadcasting; electric, gas, water and sanitary sewer services and facilities.

**Public/Semi-Public**

All public and private schools and educational services; museums; art galleries; historic sites; libraries. Government offices; public health services; post offices; job services; social service agencies. Nursing homes; convalescent homes. Churches; cemeteries; business associations; labor unions; civic organizations; political organizations.

**Parks & Recreation**

Parks; special activity facilities; playgrounds; gymnasiums; fairgrounds; campgrounds.

**Streets & Right-  
of-Way**

Public and private streets and rights-of-way.

**Agriculture**

Fallow land; farming; cattle grazing and related activities; hogs and poultry production.

**Forest**

Public and privately owned forested land with no obvious activity.

**Vacant**

Vacant lots in urbanized areas.

Note: Existing land use data collected in the field was assigned a two-digit land use code. For future land use updates, see Chapin, F. Stuart and Edward Kaiser, (1985). Urban Land Use Planning, pp. 244-247.

## APPENDIX D

TABLE D-1  
 ---DATE--- AVERAGE DAILY TRAFFIC COUNTS  
 Christian County, Missouri

ROUTE	SEGMENT MILEAGE	BEGINNING SEGMENT DESCRIPTION	---DATE--- ADDT
B-65	01.341	RTE 65	
AA	02.200	BEGIN STATE CON	528
AA	00.536	RTE 160	4,140
BB	02.050	RTE 176	220
CC	00.500	RTE 160	7,010
CC	04.072	E RD SEC 36	
DD	03.454	RTE 14	158
EE	03.567	RTE 160	4,182
HH	02.640	RTE 160	538
JJ	03.500	RTE 125	1,246
JJ	00.800	MCCRACKEN	
JJ	00.224	W RD SEC 30	
KK	01.476	RTE U	340
MM	1.517	BEGIN STATE CONS	190
NN	03.010	Route 60	2,040
NN	03.205	RTE J	5,300
OO	02.550	RTE 14	222
PP	00.500	RTE 14	1,004
PP	01.500	E RD SEC 36	
UU	00.540	DOUGLAS CO LINE	174
UU	02.160	RTE T S JCT	168
UU	01.200	W RD SEC 29	
UU	04.500	E RD SEC 32	
UU	02.553	E RD SEC 20	
VV	01.006	GREENE CO LINE	996
ZZ	01.000	GREENE CO LINE	1,162
ZZ	01.900	W RD SEC 2-35	
ZZ	00.900	W RD SEC 3-10	
ZZ	00.700	E RD SEC 10	
ZZ	00.987	W RD SEC 9-16	
A	00.677	RTE 65	362
F	03.025	BEGIN STATE CON	1,256
H	02.600	RTE 125	500

ROUTE	SEGMENT MILEAGE	BEGINNING SEGMENT DESCRIPTION	---DATE--- ADDT 2002
H	07.294	W RD SEC 2	
J	00.567	RTE 65	7,876
K	00.600	RTE 14	4,042
K	00.400	SW RD IN CLEVER	
K	02.454	S RD SEC 29	
M	00.800	STONE CO LINE	
M	03.071	NW RD SEC 33	
N	04.045	RTE 14	1,128
O	03.375	STONE CO LINE	
P	03.000	GREENE CO LINE	
P	01.307	E RD SEC 28	
T	03.100	RTE 125	480
T	02.700	N RD SEC 11	
T	03.710	RTE DD	502
T	00.640	RTE UU N JCT	454
T	00.107	RTE UU S JCT	538
U	03.141	RTE 125	454
U	01.859	RTE VV	426
U	01.000	S RD SEC 5	
U	02.990	S RD SEC 4	
U	00.284	RTE KK	1,110
V	02.283	STONE CO LINE	582
W	00.250	BEGIN STATE CON	2,448
W	03.250	RTE 14	2,682
W	01.400	W RD SEC 13	
W	00.700	CHRISTIAN CENTER	
W	02.686	E RD SEC 19	
Z	03.372	BEGIN STATE CON	208
13	03.914	RTE 60	2,404
14	01.510	LAWRENCE CO LINE	
14	00.990	RTE MM	886
14	00.222	W C-L BILLINGS	
14	06.098	RTE 60 N JCT	1,718
14	01.510	RTE K-P	2,562
14	02.580	RTE ZZ	3,000
14	04.330	RTE N	3,960
14	01.320	RTE M	7,114
14	04.760	RTE 160	11,574
14	01.010	RTE 65	16,544

ROUTE	SEGMENT MILEAGE	BEGINNING SEGMENT DESCRIPTION	ADDT
14	01.640	RTE NN	19,028
14	01.720	BUS 65	15,868
14	00.880	RTE W	8,150
14	02.020	RTE JJ	5,804
14	02.010	RTE OO	5,190
14	00.260	RTE 125 W JCT	6,108
14	00.440	RTE PP	4,380
14	07.360	RTE 125 E JCT	3,718
14	00.540	RTE DD	1,828
14	02.598	RTE Z	1,564
60	03.130	LAWRENCE C/L	10,088
60	00.960	RTE 13	12,426
60	00.610	RTE 14 S JCT	15,261
60	00.300	RTE 14 N JCT	15,094
60	02.811	N C-L BILLINGS	
65 SB	01.500	GREENE CO LINE	21,985
65 NB	01.500	GREENE CO LINE	20,180
65 SB	03.280	RTE CC-J	15,309
65 NB	03.280	RTE CC-J	15,074
65 SB	01.420	RTE 14	14,727
65 NB	01.420	RTE 14	14,070
65 SB	03.726	RTE F	10,598
65 NB	03.726	RTE F	10,997
65	07.270	RTE EE	17,724
65		END DIV PAV	17,714
65	02.110	RTE BB-A	17,451
125	00.500	GREENE CO LINE	
125	01.000	SW RD SEC 33	
125	02.100	RTE U	1,790
125	02.300	RTE JJ	786
125	01.700	W RD SEC 23	
125	00.413	N C-L SPARTA	
125	02.687	RTE 14 E JCT	3,022
125	03.400	RTE T	2,066
125	01.560	CHADWICK	
125	08.340	RTE H	686
125	02.890	SE RD SEC 34	
125	01.911	RTE UU	664
160 EB	00.250	GREENE CO LINE	

ROUTE	SEGMENT MILEAGE	BEGINNING SEGMENT DESCRIPTION	---DATE---
160 WB	00.250	GREENE CO LINE	
160 EB	00.490	RTE AA	10,953
160 WB	00.490	RTE AA	10,953
160 EB	02.799	RTE CC	9,636
160 WB	02.799	RTE CC	9,636
160 EB	00.259	RTE 14	6,853
160 WB	00.259	RTE 14	6,853
160	00.302	END DIV PAV	10,776
160	03.300	S C-L NIXA	
160	00.654	RTE EE	9,838
160	01.192	RTE O	7,722
160	01.299	RTE HH	7,116
160	02.042	RTE V	8,232
160	02.614	RTE 176 N JCT	8,482
160	00.975	RTE 176 S JCT	6,766
176	00.368	STONE CO LINE	
176	03.417	RTE 160 N JCT	758
176	02.400	RTE BB	658

Source: Missouri Department of Transportation.

\*A Actual Count

\*B Revised Count (based on growth factor formula).

All other counts are estimated projections for 1991.

## APPENDIX E

### LAND USE SPACE ALLOCATION FORMULAS

This appendix provides space allocation formulas used in determining future acreage requirements in the Land Use element of the Comprehensive Plan. The specific formulas and assumptions applied to arrive at acreage needs for residential, industrial and commercial developments in the unincorporated portions of the County are noted below.

#### Residential Development Requirements

1. It is projected that 60% of future population growth will occur in the unincorporated (rural) portions of the County to the year 2010.

	<i>Projected Year 2010 Population</i>	75,926
	<i>- 2000 Population</i>	- 54,285
	<i>Additional Year 2000 Population</i>	21,641

	<i>Projected Year 2010 Population</i>	97,567
	<i>- 2000 Population</i>	- 54,285
	<i>Additional Year 2010 Population</i>	43,282

3.  $60\%(\text{Additional Population}) = \text{Additional Rural Population}$

$$.60(21,641) = 12,985 \text{ Additional Rural Population Year 2010}$$

$$.60(43,282) = 25,969 \text{ Additional Rural Population Year 2020}$$

4. Assume 90% of rural population to reside in single family dwellings, 10% in multiple family dwellings.

$$.90(12,985) = 11,687 \text{ Population in Single Family Dwellings in Year 2010}$$

$$.10(12,985) = 1,298 \text{ Additional Population in Multiple Family Dwellings in Year 2020}$$

$$.90(43,282) = 38,954 \text{ Additional Population in Single Family Dwellings in Year 2010}$$

$$.10(43,282) = 4,328 \text{ Additional Population in Multiple Family Dwellings in Year 2010}$$

5. Assume average household size of 2.7 persons for single-family dwellings and 1.8 persons for multiple family dwellings.

Additional Population = Additional Single Family Dwellings  
Average H.H. Size

$$\frac{11,687}{2.46} = 4,751 \text{ Additional Single Family Dwellings-Year 2010}$$

$$\frac{38,954}{2.46} = 15,835 \text{ Additional Single Family Dwellings-Year 2010}$$

$$\frac{866}{1.8} = 482 \text{ Additional Multiple Family Dwellings-Year 2000}$$

$$\frac{2,053}{1.8} = 1,141 \text{ Additional Multiple Family Dwellings-Year 2010}$$

6.  $Total \text{ Additional Dwellings Year 2000} = 3,370$

$$Total \text{ Additional Dwellings Year 2010} = 7,987$$

7. Project 85% of dwelling units at density of 1 d.u./5 acres and 15% of dwelling units at density of 1 d.u./acre.

$$.85(3,370) \times 5 = 14,322 \text{ acres}$$

$$.15(3,370) = 506 \text{ acres}$$

---

$$Total \text{ Additional Residential Acres Year 2000} = 14,828 \text{ Acres}$$

$$.85(7,987) \times 5 = 33,945 \text{ acres}$$

$$.15(7,987) = 1,198 \text{ acres}$$

---

Total Additional Residential Acres Year 2010 = 35,143 Acres

### **Commercial Development Requirements**

1. Future commercial acreage requirements are projected on the basis of 1,000 square feet of commercial space for every person added to the population. This formula is based on acreage requirements to serve the local population. Commercial activity designed to draw and serve customers from outside the local area, such as tourists, would require additional space allocation.
2. Projected Year 2000 Additional Rural Population = 8,663  
 $8,663(1,000) = 8,663,000 \text{ sq. ft.} = 199 \text{ Acres}$   
*199 Acres Additional Commercial Land by Year 2000*
3. Projected Year 2010 Additional Rural Population = 20,536  
 $20,536(1,000) = 20,536,000 \text{ sq. ft.} = 472 \text{ Acres}$   
*472 Acres Additional Commercial Land by Year 2010*

### **Industrial Development Requirements**

1. Future industrial space requirements are projected on the basis of 12 acres per 1,000 additional residents. The following requirement is projected 30 years into the future (1990-2020) as industrial activity has specific site location requirements that necessitate reserving appropriate space for a longer time period.
2. Projected Year 2000 Additional Rural Population = 8,663  
 $\frac{(8,663 \times 12)}{1,000} (30 \text{ year requirement}) = 312 \text{ Acres}$   
*312 Additional Acres Industrial Land by Year 2020*

## GLOSSARY

**Aquifer** - A rock formation or group of formations that contains sufficient saturated, permeable material to yield quantities of water to wells and springs.

**Average Daily Traffic (ADT)** - The total traffic volume during a given time period, in whole days greater than a day and less than a year, divided by the number of days in the time period.

**Flood (100-Year)** - A base flood having one percent chance of annual occurrence.

**Floodplain** - Low-lying region along rivers and streams, periodically subject to natural flooding.

**Floodway** - The channel of a river or other watercourse and the adjacent portion of the floodplain required to discharge the 100-year flood without cumulatively increasing the water surface elevation more than one foot.

**Fragipan** - An often hard and impervious layer beneath the surface soil. A fragipan appears cemented and restricts root penetration and the downward percolation of surface waters. When moist, it tends to rupture suddenly under pressure.

**Karst Topography** - The relief of an area underlain by calcium-rich limestones and dolomite bedrock. Surface waters, entering the bedrock through fractures and joints, dissolve the calcium in the bedrock, resulting in the formation of sinkholes, caves and other underground features which connect the surface water with the groundwater.

**Loess** - Fine grained silt materials deposited by wind.

**Losing Stream** - A stream which loses its water to the underlying groundwater system in areas of karst topography.

**Metropolitan Statistical Area** - A city of 50,000 or more people, including the suburbs of the city and the surrounding economic area. The Springfield MSA includes Greene and Christian Counties.

**Percolation** - The downward flow or infiltration of water through the pores of rock or soil.

**Pollutant** - Any gas, liquid or solid introduced into an environment that makes a resource unfit for a specific purpose.

**Porosity** - A measure of the space between the grains or cracks in soil and rock that can fill with water.

**Runoff** - The precipitation discharged into stream channels from an area. Water that flows off the land without sinking into the soil is called surface runoff.

**Septic System** - An underground system using a septic tank for the decomposition of domestic wastes.

**Sinkhole** - A steep depression in the landscape, normally associated with karst topography, where the underlying limestone bedrock has been dissolved.

**Slope** - The inclination of the land surface from horizontal.

**Soil Permeability** - The ability of the soil to transmit groundwater or other fluids through pores and cracks.

**Soil Series** - A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils have horizons that are similar in composition, thickness and arrangement.

**Transportation System Management Improvements (TSM)** - Non-structural improvements to a transportation system to ease congestion and improve upon the movement of traffic. Examples: ride-share programs, one-way streets, traffic signal improvements, bicycle paths, pedestrian separation, etc.

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