# *West Sunshine/Highway 60 Corridor Study*

***Prepared for:***
***Republic, Greene County and Springfield, Missouri***

***March 23, 2009***

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# 1. INTRODUCTION

This study focuses on a road corridor known by three names (West Sunshine, Missouri Route 413, and US Highway 60) and referred to in this study as West Sunshine/Highway 60. The study area includes West Sunshine/Highway 60 from just east of West By-Pass in the City of Springfield to State Route 174 in the City of Republic and all land 700 feet from the right-or-way of West Sunshine/Highway 60 (Figure 1). The majority of the study area is currently in unincorporated Greene County. However, portions of the corridor are expected to be annexed into the cities of Springfield and Republic as contiguous properties are developed because of the requirement that development at urban densities be served by municipal sewers.

The study area is located in the southwestern part of metropolitan Springfield, an area that is expected to receive a significant portion of regional growth in the immediate future. The Springfield Metropolitan Area (comprised of five counties) is the fastest growing region in the state of Missouri and is expected to nearly double its population and employment levels by the year 2030. Because the City of Springfield has a limited amount of vacant land, much of the expected metropolitan growth will occur outside the city's current boundaries. This study is intended to guide development in the study area as it develops.

The portion of West Sunshine/Highway 60 located in the study area passes through three governmental jurisdictions. There are four reasons for the corridor's importance:

1. The corridor is a major transportation link between the two largest communities in the metropolitan area, Springfield and Republic. On a daily basis a large number of people commute along this corridor to jobs in Springfield. The corridor is also used to access services and entertainment opportunities.
2. The corridor is a major east-west highway linking the region to the national highway network, including State Route 13, Interstate 44, and Highway 60. US Highway 60 is a major national traffic carrier with endpoints in Virginia and Arizona. This greatly enhances the future development potential of the corridor because of the volume and types of traffic passing through the study area.
3. The corridor and the area it traverses are relatively undeveloped. There is strong potential for new developments providing employment, public services, and residential opportunities. By planning for this development, the best use of the street system and the surrounding properties can be encouraged.
4. The Springfield Metropolitan Area is the fastest growing region in Missouri, and is poised to nearly double its population and employment levels by the year 2030.

Meeting the demand for quality living environments and employment centers while providing for safe, efficient, and reliable transportation of people and goods will be challenging. In order to prepare for anticipated development, the City of Springfield, the City of Republic, and Greene County have worked together on this corridor study. All three jurisdictions recognize the growth potential of the corridor and believe that new development can be created in a sustainable manner that respects the land and existing development.

## *A. GOALS FOR THE STUDY*

After a number of public meetings in the study area and after months of work by staff from the three jurisdictions, the following goals for the study were formulated:

1. **Promote Transportation Mobility**
   This goal involves creation of a transportation network with improved mobility, better connectivity, and multiple modes of transportation (transit, auto, bicycle, and pedestrian paths).
2. **Promote Mixed-Use Developments**
   This goal involves creation of mixed-use activity centers at major intersections along the highway corridor. Activity centers contain jobs, housing, and retail areas. Combining land uses has the potential to reduce the number and length of daily trips.
3. **Promote Higher Quality Development**
   This goal involves site design requirements that improve the quality of the built environment and, as a result, the quality of life in the area.

## *B. VISION FOR THE STUDY AREA*

A vision for the study area has been created from input gathered at public meetings and from the goals listed above.

> *The study area will be a place where jobs and housing are balanced, where compact development allows for an efficient use of land and resources, where impacts on the environment and residents are minimized, and where mixed-use neighborhoods and activity centers encourage walking, biking, and transit use, and less reliance on the automobile.*

Implementation of the Vision will cause traffic on the West Sunshine/ Highway 60 corridor to move efficiently with a minimum of delay. A number of lesser roads will intersect the highway at right angles to minimize collisions. A minimum number of traffic lights will be placed along the highway corridor to manage traffic flow. Access to properties fronting on the highway will take access from service roads or from cross access through other properties rather than from new curb cuts on the

highway. Non-residential uses will be clustered in activity centers taking access off secondary roads that intersect with the highway. Developments will meet minimum design guidelines to assure quality in the built environment.

This vision will be achieved incrementally over the coming years, through private redevelopment and public improvements. This study outlines goals and actions designed to realize the vision over a number of years. Progress in achieving this vision will need to be reviewed periodically, and the study, along with the vision, may need to be revised and updated accordingly. Updates and revisions would involve input from the community and each of the three jurisdictions involved.

## *C. BACKGROUND*

**The Study Area.** The study area covers approximately 1,178 acres of land located 700 feet on either side of the West Sunshine/Highway 60 right-of-way for a distance of 8 miles. The project area, as illustrated in Figure 1, extends from West By-Pass in the City of Springfield to State Route 174 on the east side of the City of Republic. Unincorporated Greene County makes up the largest portion of the study area, 813 acres or 69% of the total land area (Table1).

**Table 1**

| | **Total Acres in Study Area** | | | |
|---|---|---|---|---|
| | ***City of Republic*** | ***Greene County*** | ***City of Springfield*** | ***Total Area*** |
| *Acres in Study Area* | *311* | *813* | *53* | *1,178* |
| *Percent* | *26.5%* | *69%* | *4.5%* | *100%* |

Source: City of Springfield GIS, 2006

Complicating planning and implementation for this study is the fact that roads, land uses, and development regulations in the study area are regulated by four government entities: the City of Republic, the City of Springfield, Greene County, and the Missouri Department of Transportation (MoDOT). Each of these entities was involved in the development of this study. Each of these entities will have a part in implementing this study.

**Growth Trends**. Over the last two decades the West Sunshine/Highway 60 corridor has experienced a moderate amount of growth. The corridor, though it remains largely agricultural and vacant land in character, has more recently begun to feel the overall growth pressures faced by the metropolitan region. Continued growth in this part of the metropolitan region has placed pressure on roads in the area. Traffic projections show a rapid increase in traffic on the corridor over the next 10 – 20 years. Many existing roadways in the area will exceed capacity if growth trends continue.

**The Highway Corridor**. The eight miles of West Sunshine/Highway 60 included in this study are part of the east-west US Highway 60, running 2,670 miles across the United States from Virginia to Arizona. Within the Springfield Metropolitan Area, the West Sunshine/Highway 60 Corridor is designed as a four lane limited

access highway separated by a grass median. The road is classified by the regional Metropolitan Planning Organization (MPO) as an expressway from the City of Springfield to James River Freeway and then as a primary arterial from James River Freeway to the City of Republic. James River Freeway was designed to re-route East US Highway 60 around the City of Springfield and to connect US 65 to Interstate 44. It crosses West Sunshine/Highway 60 with a full diamond interchange midway through the study area.

Along the portion of West Sunshine/Highway 60 within the study area there are six signalized intersections with 47 un-signalized median crossovers and 101 private driveways. The corridor is intersected by 16 county roads with three having at-grade railroad crossings near the highway right-of-way. In addition, there is a railroad bridge that crosses over the highway corridor that is currently being used to serve City Utilities' Southwest Power Plant.

**Land Uses in the Study Area**. Between the City of Springfield and the City of Republic, the land uses along the corridor are predominately agricultural with pockets of commercial and/or industrial uses at or near major intersections. There are several manufactured home parks located along the corridor that have commercial zoning. Zoning along the portion of the highway in the study area is predominately industrial/manufacturing; there is commercial zoning near the city limits of the City of Republic and the City of Springfield. Agricultural zoning is scattered throughout the study area. The major sales tax generators for the area are the Wal-Mart located at either end of the study area, one in the City of Springfield and one in the City of Republic. Another recently constructed major sales tax generator is the Lowe's at the intersection of West Sunshine/Highway 60 and State Route 174 in the City of Republic.

## *D. TRANSPORTATION AND GROWTH PLANNING*

**Transportation Plans**. *Journey 2030: Ozark Transportation Organization Long Range Transportation Plan* was adopted by the MPO in 2006. Its purpose is to direct planning for all transportation modes (vehicle, transit, bicycle, and pedestrian) within the MPO region. This plan applies to the entire West Sunshine/Highway 60 study area. The transportation plan makes recommendations for the future classification of and alignment of major roadways. Its goal is to preserve and to improve their functionality of major roads in the metropolitan area. The transportation plan also makes recommendations relating to secondary circulation systems, access controls, bike routes and spacing of interchanges and intersections (see Table 7).

**Comprehensive Plans**. The *Springfield-Greene County Growth Management and Land Use Plan* was adopted in 2001 and covers all of the study area. The *City of Republic Land Use Plan*, which takes precedence within the City of Republic, was adopted in 2005. Comprehensive plans are an official long-range policy statement adopted and amended by formal resolution of local jurisdictions. They

are a major component of the planning process for the three local jurisdictions that make up the study area and offer guidance for long-range, comprehensive decision making for land development and facilities planning. The comprehensive plans contain goals, objectives, policies, and guidelines for growth and redevelopment for the cities and the county. The adopted comprehensive plans of the three local jurisdictions served to guide the development of this study.

## *E. COMMUNITY INPUT*

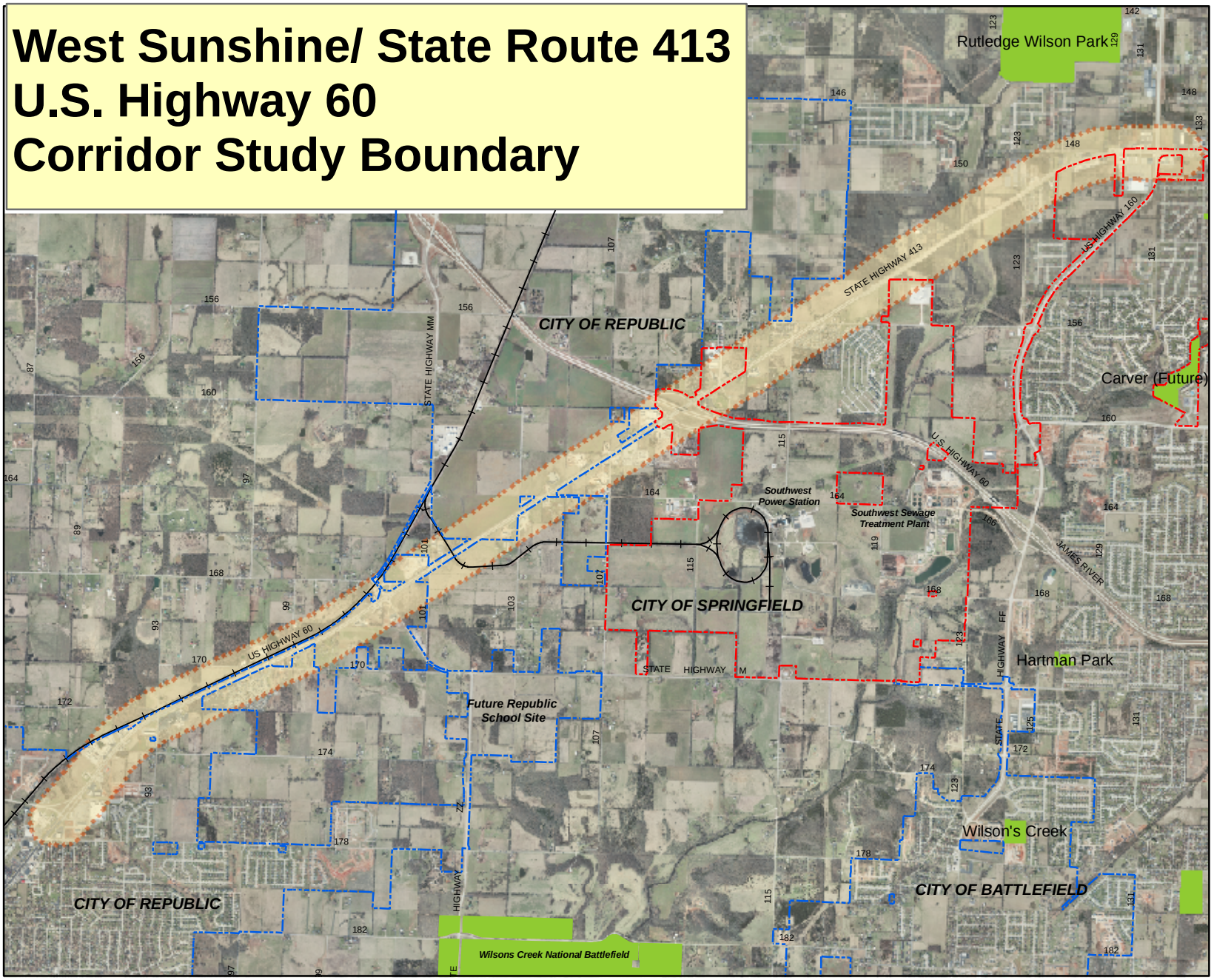
A critical element of West Sunshine/Highway 60 Corridor Study was the public input process. The study process was based on an open and collaborative approach designed to involve citizens and stakeholders prior to the formulation of recommendations. Because the recommendations within this study will have significant economic and environmental consequences, it was important to conduct the study with transparency and full participation from the public, particularly property owners within the study area.

The public input process included six public meetings held at significant points in the development of the study. These public meetings were held at a location within the study area in order to increase public participation. The project team incorporated public comments from the meetings and from written questionnaires. These surveys and other information were also available online at a website dedicated to the project. The rate of public participation throughout preparation of the study was high. Many of the comments provided by the participants have been adopted and incorporated into the study and helped contribute to the quality of this study.

## *F. APPLICABILITY*

This study is designed to allow each jurisdiction to fine tune specific plans and regulations. The three goals for the study impact the development of the road systems, the proposed future land use map, and the recommended design guidelines for the corridor. Changes to the road system will have to be adopted by the regional Metropolitan Planning Organization (MPO) Ozarks Transportation Organization. If the land uses proposed in the study are to be implemented, each local jurisdiction will need to amend its future land use plans and/or development ordinance(s). Some transportation improvements can be implemented through amendments to each jurisdiction's subdivision regulations using the Access Management Principles proposed in the appendices. In order to implement the design guidelines found in this study, each of the three local jurisdictions should implement a corridor overlay district as part of their zoning regulations.

# West Sunshine/ State Route 413
# U.S. Highway 60
# Corridor Study Boundary




**Legend**

- Corridor Boundary
- Parks
- Railroad

**City Boundary**

- Republic or Battlefield City Limits
- Springfield City Limits

FIGURE 1

***West Sunshine State Route 413 US Highway 60 Corridor Study***

Feet
0 1,200 2,400 4,800 7,200 9,600

1:51,081.60141

Map Source: City of Springfield Dept. of Planning and Development, 2007 GIS

# 2. EXISTING CONDITIONS ANALYSIS

## A. POPULATION

### *Population Analysis*

Based on projections for continued population growth, there will be demands for new jobs, housing, shopping, and recreational opportunities within the study area. Current projections show that within a decade there could be between 45,000 to 58,000 people living in the census tracts that contain the study area.

The vision for the corridor calls for a balancing of jobs and housing. Achieving this vision while meeting the needs of an increasing number of both residents and persons traveling through the study area will be a challenge.

### Supporting Data

The 2005 population estimate for the six census tracts that contain the study area was 33,182 residents (Figure 2). This represents a 37% increase in population in five years (2000 – 2005) and demonstrates the rapid growth rate in the study area. Census tract 43.01, which includes part of the City of Springfield, was estimated to have the largest percent of change between 1990 and 2005. Census tract 48.02, which includes the eastern half of the City of Republic, has historically contained the most people and had an estimated population of about 7,000.

From 1990 to 2005 the population of Greene County increased by 62,621 persons, more than a 30% increase (Table 2). Between 1990 and 2000, Greene County increased by about 16% or 32,442 people. However, between 2000 and 2005, Greene County is estimated to have grown by more than 30,000 people. That is a 13% increase from 240,391 to 270,570

**Table 2**

| Population Change 1990 to 2005 | | | | | |
|---|---|---|---|---|---|
| | ***1990*** | ***2000*** | ***2005 Estimate*** | ***% Change 2000-2005*** | ***% Change 1990-2005*** |
| *City of Republic** | *6,292* | *8,438* | *9,936* | *17.75%* | ***57.9%*** |
| *City of Springfield* | *140,494* | *151,580* | *161,016* | *6.23%* | *14.6%* |
| *Greene County* | *207,949* | *240,391* | *270,570* | *12.55%* | *30.1%* |
| *Brookline** | *283* | *326* | *360* | *10.43%* | *27.2%* |
| *Census Tract 42.01* | *2,275* | *4,386* | *5,368** | *22.39%* | *136.0%* |
| *Census Tract 42.02* | *1,989* | *4,059* | *5,962** | *46.88%* | *199.7%* |
| *Census Tract 43.01* | *2,047* | *4,320* | *6,692** | ***54.91%*** | ***226.9%*** |
| *Census Tract 48.01* | *2,451* | *2,623* | *4,038** | *53.95%* | *64.7%* |
| *Census Tract 48.02* | *3,543* | *5,172* | *6,944** | *34.26%* | *96.0%* |
| *Census Tract 48.03* | *3,177* | *3,650* | *4,178** | *14.47%* | *31.5%* |
| ***Total Census Tracts*** | ***15,482*** | ***24,210*** | ***33,182*** | ***37.06%*** | ***114.3%*** |

Source: Comparative Census Statistics 1990-2000 City of Springfield, June 30, 2005 Growth Trends Report, City of Springfield
*note: Village of Brookline consolidated into the City of Republic in 2005

Among the jurisdictions involved in the study, the City of Republic is estimated to have had the greatest increase in population from 1990 to 2005 (a 58% change or roughly 4% growth per year). Republic was estimated to have a population of more than 10,000 people in 2005. This population increase is partly attributed to the consolidation of the Village of Brookline into the City of Republic in 2005. However, Republic is increasing in population and will continue to grow in an easterly direction towards a new Republic High School being constructed at the intersection of Highway ZZ and Republic Road. The latest MPO population projections estimate that Republic will have a population of over 40,000 people by the year 2030. If this occurs it would be the largest estimated change in population for a jurisdiction within the MPO boundary (which includes most of Greene County and the northern part of Christian County).

The City of Springfield is estimated to have increased in population by over 14% from the 1990 census to the 2005 estimate for a population of 161,916 people. This is less than a 1% change in population per year. The census tracts on the edges of the City of Springfield have shown a dramatic increase in population with changes ranging from 22% to 54% from the 2000 census to the 2005 estimate and changes of 136% to 226% from the 1990 census to the 2005 estimate. Springfield is projected to have a population of 184,892 by the year 2030 according to the MPO Transportation Plan. The future growth areas for the corridor, according to the MPO Transportation Analysis Zones, will be on the north side of the corridor around the City of Springfield and on the south side of the corridor around the City of Republic (Figure 3). If the population continues to grow, as it has in the past, the census tracts around the corridor could have a population between 45,000 to 58,000 people in the next 10 – 15 years.

## *B. HOUSING*

### *Housing Analysis*

Based on population projections for the six census tracts included in the study area, the number of housing units is expected to increase between 20% and 35% in the next 10-15 years. New residential subdivisions are expected to fill in the rural areas between Springfield and Republic. The land use pattern recommended by this study will allow an adequate amount of housing for the expected population increase. Supplying a variety of housing types will help ensure that people of all incomes can afford homes near jobs and that businesses will have access to an adequate workforce. In addition, locating housing near job centers and shopping will help reduce the number of daily trips and prevent increased traffic congestion in the study area.

### Supporting Data

When planning for growth in an area it is necessary to address housing trends. Planning for future residential areas will provide the number of residents necessary to support future increases in commercial and employment activity in the study area.

In 2005 there were 13,452 housing units within the census tracts containing the study area (Table 3). This number represents a 34% increase in the number of housing units in 2000.

**Table 3**

| Housing Units Change 2000 to 2005 | | | |
|---|---|---|---|
| | *2000* | *2005 Estimate* | *% Change 2000-2005* |
| *City of Republic** | *3,310* | *4,171* | *26.0%* |
| *City of Springfield* | *69,877* | *74,070* | *6.0%* |
| *Greene County* | *104,517* | *116,770* | *11.7%* |
| *Census Tract 42.01* | *1,940* | *2,334** | *20.3%* |
| *Census Tract 42.02* | *1,655* | *2,388** | *44.3%* |
| *Census Tract 43.01* | *1,813* | *2,750** | ***51.7%*** |
| *Census Tract 48.01* | *1,143* | *1,709** | *49.5%* |
| *Census Tract 48.02* | *1,928* | *2,561** | *32.8%* |
| *Census Tract 48.03* | *1,499* | *1,710** | *14.1%* |
| **Total Census Tracts** | **9,978** | **13,452** | **34.8%** |

Source: Comparative Census Statistics 1990-2000 City of Springfield, *June 30, 2005 Growth Trends Report, City of Springfield note* Brookline has since been consolidated into the City of Republic

The census tract with the largest percent change in housing was census tract 43.01 recording a 52% change (census tract 43.01 includes portions of the City of Springfield). Census tract 48.01, which is located in the mid section of the study area, had over a 49% increase in housing units during this same time span.

It is expected that dwelling unit numbers within the study area will continue to increase as the region's overall urban development pattern expands into the study area from Republic and Springfield, filling portions of un-incorporated, rural Greene County.

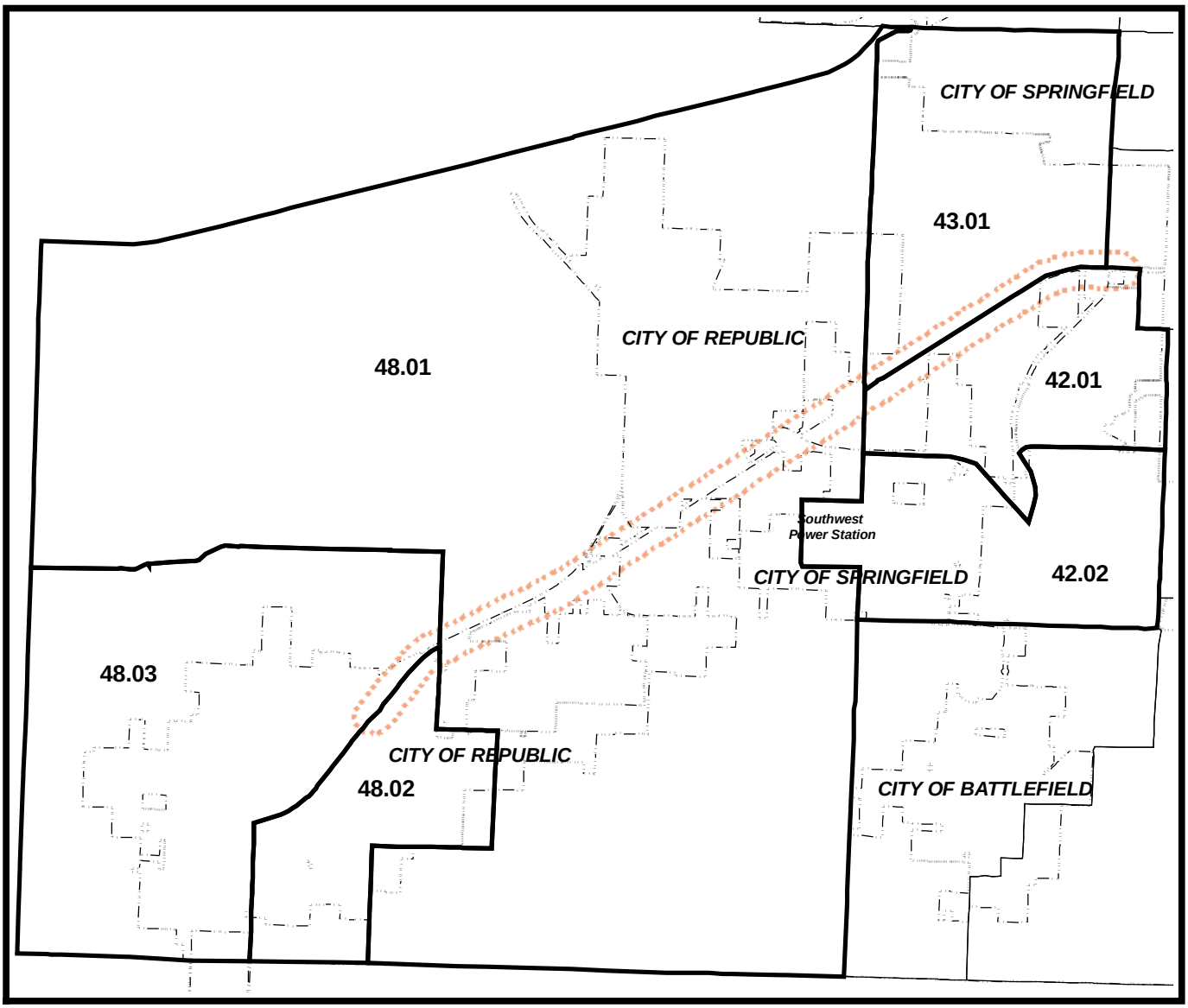
The projected population for the six census tracts is between 45,000 and 58,000 people. Therefore, to meet the projected population growth there will need to be an additional 4,000 to 9,000 housing units needed as illustrated in Table 4. It is estimated that 96% of new housing will be single unit housing and 4% of housing will be multi-unit housing.

**Table 4**

| ***Housing Needs Based on Census Tracts*** | | |
|---|---|---|
| | ***High Projection*** | ***Low Projection*** |
| *2015 Population Projection* | ***58,000*** | ***45,000*** |
| *Divided by Persons Per Household (2000 census)* | ***2.55*** | ***2.55*** |
| *Total Housing Units For 2015* | ***22,745*** | ***17,647*** |
| *Minus total housing units 2005 estimate* | ***13,452*** | ***13,452*** |
| *Total New housing units needed for 2015* | ***9,293*** | ***4,195*** |
| *Total new single unit housing needed (96%)* | ***8,921*** | ***4,027*** |
| *Total new multi-unit housing needed (4%)* | ***372*** | ***168*** |

Source: 2000 US Census, City of Springfield Growth Trends, 2007

# 2000 Census Tracts




Map Source: City of Springfield Dept. of Planning and Development GIS, 2007

0 4,800 9,600 19,200 Feet

**Legend**

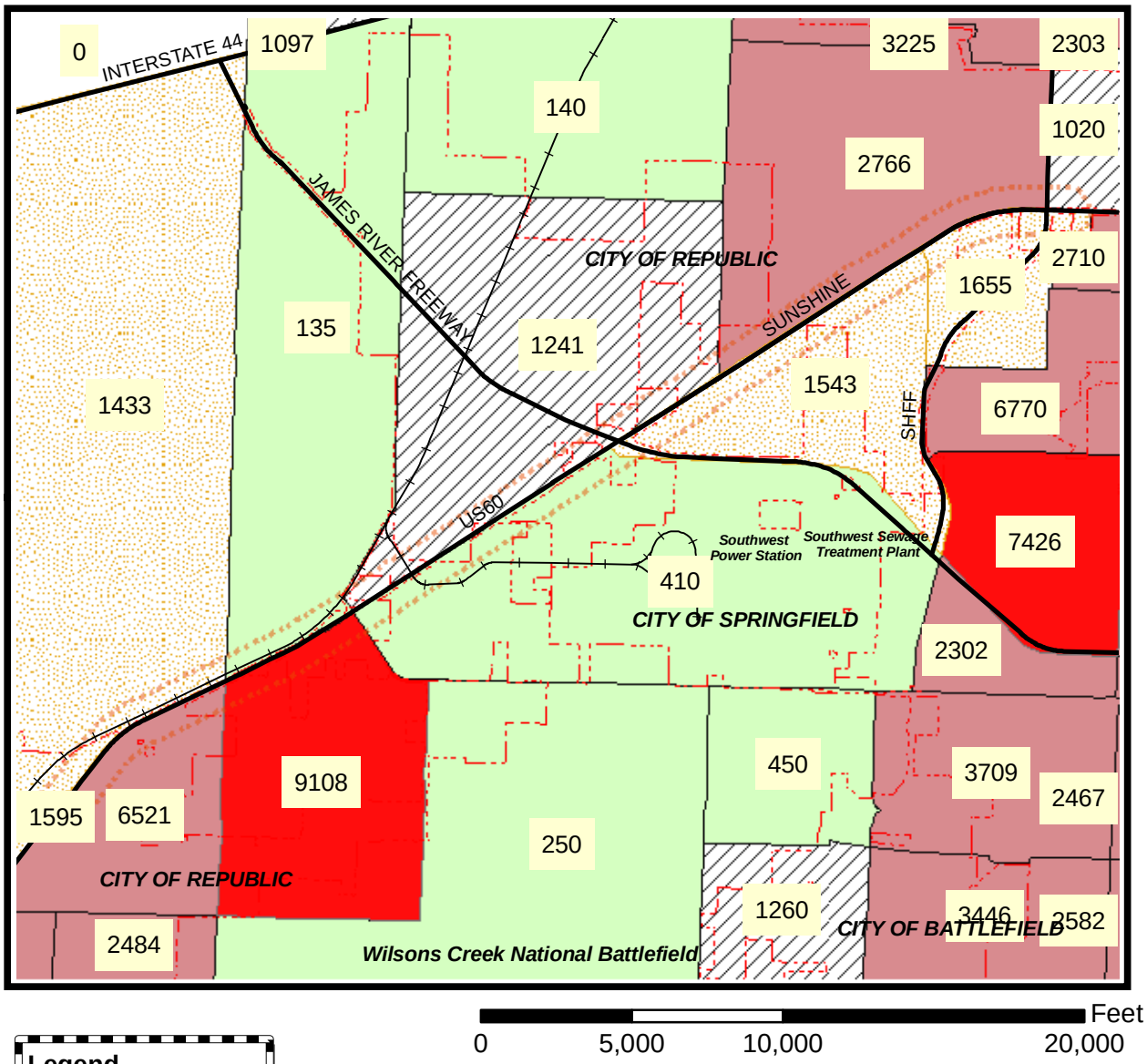
City Limits

Corridor Study Area

FIGURE 2

## West Sunshine
## State Route 413
## US Highway 60
## Corridor Study

# Population by Transportation Analysis Zone 2030




Feet
0 5,000 10,000 20,000

**Legend**

- Railroad
- Major Streets
- Corridor Study Area
- City Boundary

**2030 Population**

- 0
- 1 - 649
- 650 - 1,300
- 1,301 - 2,000
- 2,001 - 7,000
- 7,001 - 9,108

FIGURE 3

## West Sunshine State Route 413 US Highway 60 Corridor Study



Map Source: City of Springfield Dept. of Planning and Development GIS, 2007

## C. ZONING AND EXISTING LAND USES

### *Zoning and Existing Land Uses Analysis*

To implement the proposed land use pattern changes to the existing zoning pattern will be needed. The existing land uses may not be the most appropriate land uses for a study area undergoing significant development pressure. For example, it is more appropriate for low-density residential uses to be set back from a busy roadway such as West Sunshine/Highway 60. Single-family residential uses need a significant setback distance to buffer traffic noises and other negative impacts. Commercial, office, or mixed uses would be better located at major intersections along the corridor or in activity centers.

### Supporting Data

Zoning is the method local governments use to regulate the use of land. Republic, Greene County and Springfield all use their own set of zoning regulations to control the kinds of activities that are allowed on a particular lot within their jurisdiction.

**Table 5**

| 2006 Zoning | | |
|---|---|---|
| **Zoning District** | **Acres in Study Area** | **Percent of Total** |
| *Agricultural* | *307* | ***26.1%*** |
| *Agricultural Residential* | *17* | *1.5%* |
| *R-1 and Urban Residential* | *117* | *9.9%* |
| *R-2* | *9* | *0.8%* |
| *R-3* | *26* | *2.2%* |
| *MH-1* | *4* | *0.3%* |
| *C-1* | *5* | *0.5%* |
| *GR and C-2* | *252* | *21.4%* |
| *C-3* | *42* | *3.5%* |
| *M-1* | *228* | *19.4%* |
| *M-2* | *19* | *1.6%* |
| *Government/ Institutional* | *12* | *1.0%* |
| *PAD/ PDD* | *139* | *11.8%* |
| **TOTAL** | **1,178** | **100.0%** |

Source: Greene County, City of Republic and City of Springfield GIS, 2006

The Greene County agricultural zoning district contains the largest percent of acreage within the study area, 26%, which is consistent with the fact that 69% of the total land area in the study area is within rural Greene County (Table 5). Commercial zoning makes up just over 25% of the total study area with manufacturing containing about 21% of the total zoned land area. Residential zoning represents just over 14% of the study area.

Planned developments such as Greene County's PAD and the City of Republic's PDD are means employed by developers to obtain either commercial or higher density residential uses but with governmental or self-imposed restrictions or

conditions. The County PAD areas are located on the eastern portion of the study area and the City of Republic PDD areas are located near the intersection of Highway MM and West Sunshine/Highway 60 (Figure 4).

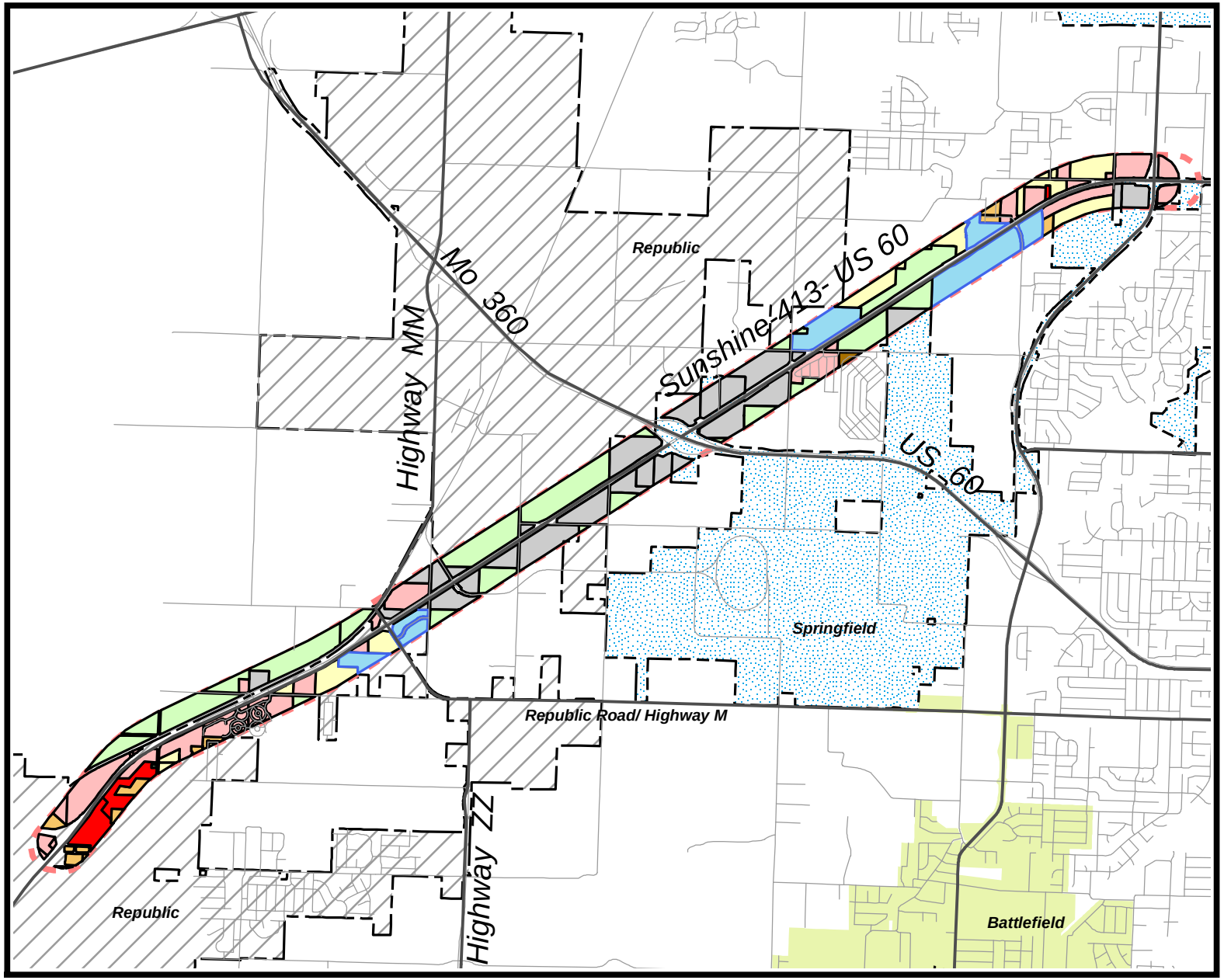
In 2005 about 32% of the total acreage in the study area was in agricultural use (Table 6). The study area, which is mostly rural, contained about 24% vacant land. The rural character of the study area accounts for the almost 56% of the land in either agricultural use or vacant land uses. A combination of all commercial uses in the study area accounts for 20% of the total land area. Additionally, all residential uses combined account for 12% of the total land area within the study area (Figure 5).

**Table 6**

| 2005 Land Uses | Acres in Study | Percent of Total |
|---|---|---|
| *Vacant* | *292* | *23.8%* |
| *Agricultural* | *391* | ***31.9%*** |
| *Single Family* | *60* | *4.9%* |
| *Multifamily, Group Quarters* | *6* | *0.4%* |
| *Mobile Home Park* | *84* | *6.9%* |
| *Office* | *4* | *0.3%* |
| *Light Commercial* | *73* | *6.0%* |
| *Heavy Commercial* | *175* | *14.3%* |
| *Manufacturing, Warehouse, Industrial* | *49* | *4.0%* |
| *Public, Quasi-Public* | *32* | *2.6%* |
| *Recreational* | *3* | *0.3%* |
| *Transportation, Communication and Utilities* | *16* | *1.3%* |
| *Rights-of-way* | *41* | *3.3%* |
| **Total** | **1,226** | **100.0%** |

Source: City of Springfield Planning Dept. 2005

# Existing Zoning




## West Sunshine State Route 413 U.S. Highway 60 Corridor Study

**Legend**

- Corridor Boundary

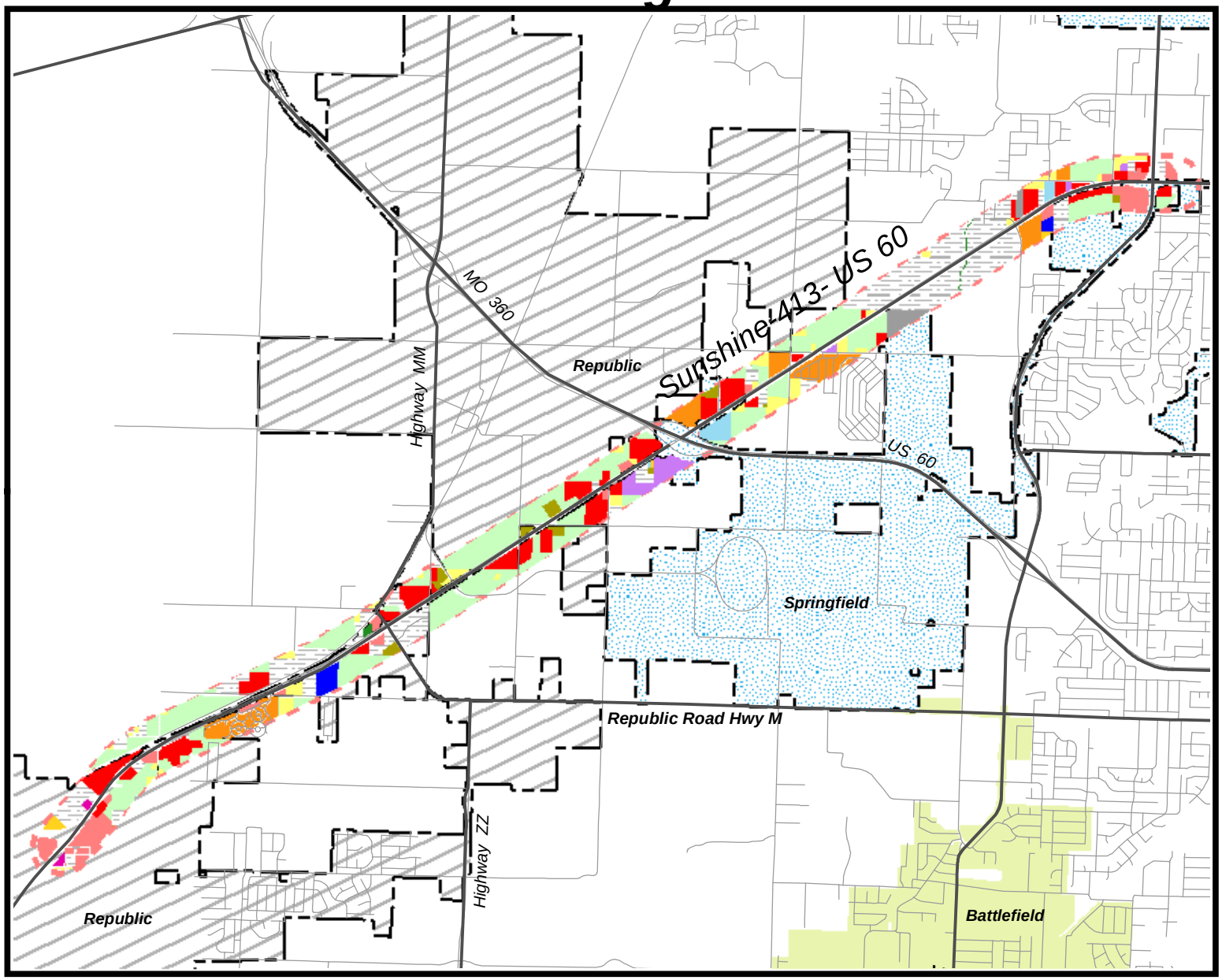
**Generalized Zoning**

- Agricultural
- Single Family Residential
- Multi-Family Residential
- Manufactured Homes
- Heavy Commercial
- Light Commercial
- Planned Developments
- Manufacturing

FIGURE 4

0 0.15 0.3 0.6 0.9 1.2
Miles

# 2005 Existing Land Uses




## West Sunshine State Route 413 US Highway 60 Corridor Study

**Legend**

**2005 Land Use**

- Vacant
- Agriculture
- One Family
- Multi-Family
- Group Quarters
- Mobile Home Park
- Office
- Light Commercial
- Heavy Commercial
- Manufacturing
- Public
- Quasi-Public
- Recreation
- Transp, Utilities, Comm
- Warehouse
- ROW
- Corridor Boundary

FIGURE 5

0 0.2 0.4 0.8 1.2
Miles

## *D. TRANSPORTATION SYSTEMS*

### *Transportation Analysis*

Studies by the Metropolitan Planning Organization show a projected increase in vehicular traffic in and around the study area, especially on the West Sunshine/Highway 60 roadway. A traffic study conducted by the MPO projected 2030 traffic volumes on West Sunshine/Highway 60 that are 35% to 72% greater than current volumes. Increased development and increased traffic will place additional pressure on a transportation system that must balance driveway access and median cuts with mobility and safety and must also balance traditional modes of transportation with alternative modes of transportation. This study addresses these issues and seeks balance through a series of policies and through managed development illustrated in the proposed land use plan. The policies and development patterns in this study will help each of the jurisdictions involved to achieve economic, environmental, and quality-of-life benefits from development that is compact, mixed-use, pedestrian-friendly, and transit-oriented.

### Supporting Data

West Sunshine/Highway 60 connects the City of Republic to the City of Springfield through rural Greene County. The highway has four lanes of pavement with some sections separated with grassed medians (Figure 6).

Along the West Sunshine/Highway 60 corridor there are six signalized intersections: West By-Pass, Zimmer Road, Highway MM/, State Route 174 and two at the intersection of James River Freeway. In addition there are 47 un-signalized median break crossovers and 101 private driveways along the corridor. The corridor is intersected by 16 roads with 10 not aligning with the corridor at safe angles. Those roads are Farm Road 129, 148, 123, 156, 115, James River Freeway, Farm Road 107, 164, 103, 101, State Hwy M &MM, Farm Roads 170, 93, 172, and State Hwy 174. Of these 16 roads that intersect the corridor three have at-grade railroad crossings very near the corridor. There is also a railroad bridge that crosses over the corridor that is used by City Utilities for coal distribution to the Southwest Power Plant.

West Sunshine/ US Highway 60 Corridor is classified by the MPO as an Expressway from West By-Pass to James River Freeway and as a primary arterial from James River Freeway through the City of Republic. The MPO defines these two classifications as the following:

**Expressways:** Partial access control and high priority for traffic flow with at-grade signalized intersections for major streets. Intended for high-volume, moderate-to-high speed traffic movement across the metropolitan area with minimal access to adjacent land. May be designed as a highway with separation from adjacent land uses or as a street with controlled access to adjacent land uses. Service access should be provided from lower order streets.

**Primary Arterial:** Provides for high- moderate- volume, moderate-speed traffic movement between and through major activity centers. Access to abutting property is subordinate to traffic flow and is subject necessary control of entrances and exits.

The MPO has adopted design standards for expressways and primary arterials, which are outlined in Table 7.

**Table 7**

| ***MPO Design Standards*** | | |
|---|---|---|
| | **Expressway** | **Primary Arterial** |
| Minimum Right-of-Way: | 180 feet, plus 40 feet each side if frontage roads are needed. | 110 feet plus intersection triangles |
| Number of Lanes: | 4-6 | 4-6 |
| Lane Width: | 12 feet (plus shoulders in rural areas only) | 12 feet |
| Median Width: | 40 foot landscaped | 18 feet |
| Shoulder Width: | -- | If shoulders are used they should be between 6 and 10 feet wide. |
| Design Service Volume: | 20,000 – 50,000 | 10,000-30,000 |
| Design Speed: | 40- 55 mph | 35-45 mph |
| Turning Lanes: | At intersections only | At intersections only |
| Intersection: | Left and right turn lanes desired. | Left and right turn lanes desired |
| Minimum area behind curb: | 28 feet used for sidewalks, utilities, and landscaping (where appropriate) | 17 feet --used for sidewalks, utilities, and landscaping (where appropriate) |
| Drainage: | Curb and gutter or shoulders (rural areas) | Curb and gutter (shoulders permitted in rural areas) |
| On-street Parking: | Not permitted | Not permitted |
| Pedestrian Provisions: | Sidewalks required on frontage roads. | 4-5 foot (minimum) sidewalks both sides |
| Transit Provisions: | Turnouts at major generators | Scheduled stops every ¼ mile (where transit service is provided) |
| Median Breaks: | Allowed at signalized intersections only. | -- |
| Bicycle Provisions: | Bicycle lane provided on frontage road | Bicycle facilities provided according to adopted bicycle plan |
| Traffic Flow/ Access Priority | 90/10 | 70/30 |
| Facility Spacing: | 3-5 miles | 1 – 2 miles |
| Trip Length: | Across metropolitan area and between major activity centers. (2 plus miles) | Between and through major activity centers (2-8 miles) |
| ***Access:*** | | |
| Full Access Intersection Spacing: | ½ mile | 1/4 mile |
| Directional Median Break Spacing: | -- | 660 feet |
| Non-Signalized Intersection/ Driveway Spacing: | 660 feet (right-In/ right-out only) | 330 feet center to center (right-in/ right-out only) allowed only if internal circulation, cross access and minimum driveway radii and grade are provided. |
| Residential Driveway Spacing: | No residential drives permitted | No residential drives permitted |

*Medians and shoulders provide options for landscaping where appropriate
Source: MPO Long Range Transportation Plan Journey 2030

The primary mode of transportation along the corridor is the private automobile. As the population increases and vehicle ownership increases there is a direct relationship to the increase in traffic.

The traffic volumes shown on maps and tables are annual average daily traffic, (AADT), developed from 24-hour counts taken during the calendar year. These counts are factored to estimates of AADT taking into consideration volume variations among seasons of the year and days of the week.

There has been a steady but moderate increase in the traffic counts along the corridor with some areas declining (Table 8). Although, at the intersection of West

By-Pass and West Sunshine there was a 25% decline in traffic counts between 2003 and 2004. However, there was about a 54% increase in traffic counts at James River Freeway intersection during the same time span, which can be partly attributed to the opening of James River Freeway to Interstate 44 to the north. State Route 174 in the City of Republic showed a 31% increase in traffic counts between 2000 and 2004. This is an area of significant commercial activity with Wal-Mart and other retail establishments being located in this destination area.

**Table 8**

| Average Daily Traffic Counts | | | | | | |
|---|---|---|---|---|---|---|
| ***West Sunshine/U.S. 60*** | ***2000*** | ***2001*** | ***2002*** | ***2003*** | ***2004*** | ***% Change 2000-2004*** |
| *at West By-Pass* | *38,381* | *34,239* | *34,239* | *33,931* | *28,403* | *-25%* |
| *at Springfield City Limits* | *16,111* | *13,581* | *14,030* | *14,212* | *14,581* | *-9.6%* |
| *at James River Freeway* | *13,784* | *14,131* | *14,597* | *19,008* | *21,211* | ***53.8%*** |
| *at Route MM* | *19,872* | *24,575* | *25,386* | *22,371* | *20,930* | *5.3%* |
| *at Republic City Limits* | *24,154* | *30,189* | *31,186* | *27,555* | *25,467* | *5.4%* |
| *at Route 174* | *19,788* | *25,807* | *25,807* | *25,575* | *25,991* | *31%* |

Source: Missouri Department of Transportation District 8 Office

The transportation Level of Service (LOS) system uses the letters A through F, with A being the best and F being the worst. LOS A is described as conditions where traffic flows at or above the posted speed limit and all motorists have complete mobility between lanes. In many of the nation's urban areas, roadways are designed to meet design standards for functional classification and accept a LOS D operation during the peak hours.

1. Level of Service A = Free flow
2. Level of Service B = Reasonably free flow
3. Level of Service C = Stable flow
4. Level of Service D = Approaching unstable flow
5. Level of Service E = Unstable flow
6. Level of Service F = Forced or breakdown flow

The forecasted 2030 traffic volumes for the West Sunshine/Highway 60 Corridor show an increase of between 35% and 72% (Table 9). During peak hours this would put the entire corridor in a level of service of E, which is an unstable flow.

**Table 9**

| Forecasted Traffic Volumes 2000 to 2030 | | | | | |
|---|---|---|---|---|---|
| ***W. Sunshine, SR 413, U.S. Hwy 60*** | ***Volume 2000*** | ***Level of Service 2000*** | ***Forecast Volume 2030*** | ***Level of Service 2030*** | ***Volume % Change*** |
| *Hines Street to State Highway M* | *33,780* | *LOS E* | *45,754* | *LOS E* | *35.45%* |
| *State Highway M to James River Freeway* | *35,518* | *LOS E* | *49,847* | *LOS E* | *40.34%* |
| *James River Freeway to U.S. 160* | *27,470* | *LOS A, B, C* | *47,325* | *LOS E* | ***72.28%*** |

Source: MPO Long Range Transportation Plan, 2006

The 2030 capacity deficiencies show that the West Sunshine/Highway 60 Corridor will either be near or over capacity between Springfield and Republic.

## Bicycle and Pedestrian Connections

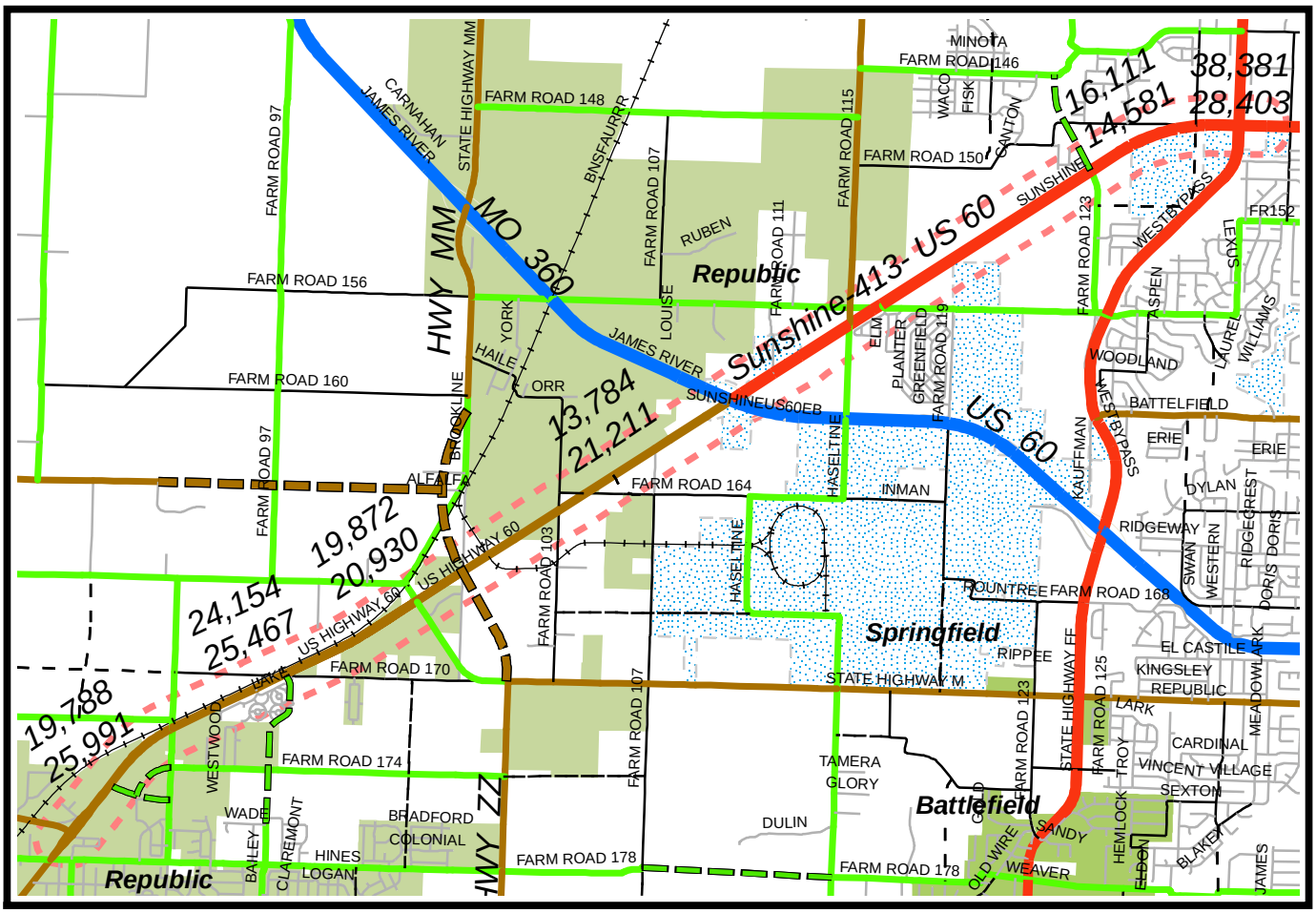
There are several on-street bike routes that transverse the corridor (Figure 7). Bicycle routes are located on West By-Pass, Farm Road 156 and Farm Road 85. *Journey 2030: Ozark Transportation Organization Long Range Transportation Plan* recommends additional bicycle route connections within the study area.

Currently, there are no sidewalk connections within the study area along the West Sunshine/Highway 60 corridor. The proposed Wilsons Creek Greenway crosses the West Sunshine/Highway 60 corridor on the eastern side of the study area. This Greenway extends between two community parks, the Wilson-Rutledge Park and the Rountree Spring Park. Additionally the City of Republic has identified several linear park trails that will act as bike and pedestrian connections internally throughout the city.

FIGURE 6

# Major Thoroughfare Plan

## with 2000 and 2004 Traffic Volumes




0 0.2 0.4 0.8 1.2 1.6
Miles

**Legend**

- Corridor Boundary

**EXISTING MPO CLASSIFICATION**

- Freeway
- Expressway
- Primary Arterial
- Secondary Arterial
- Collector
- Local
- Private
- Railroad

**PROPOSED MPO ROADS**

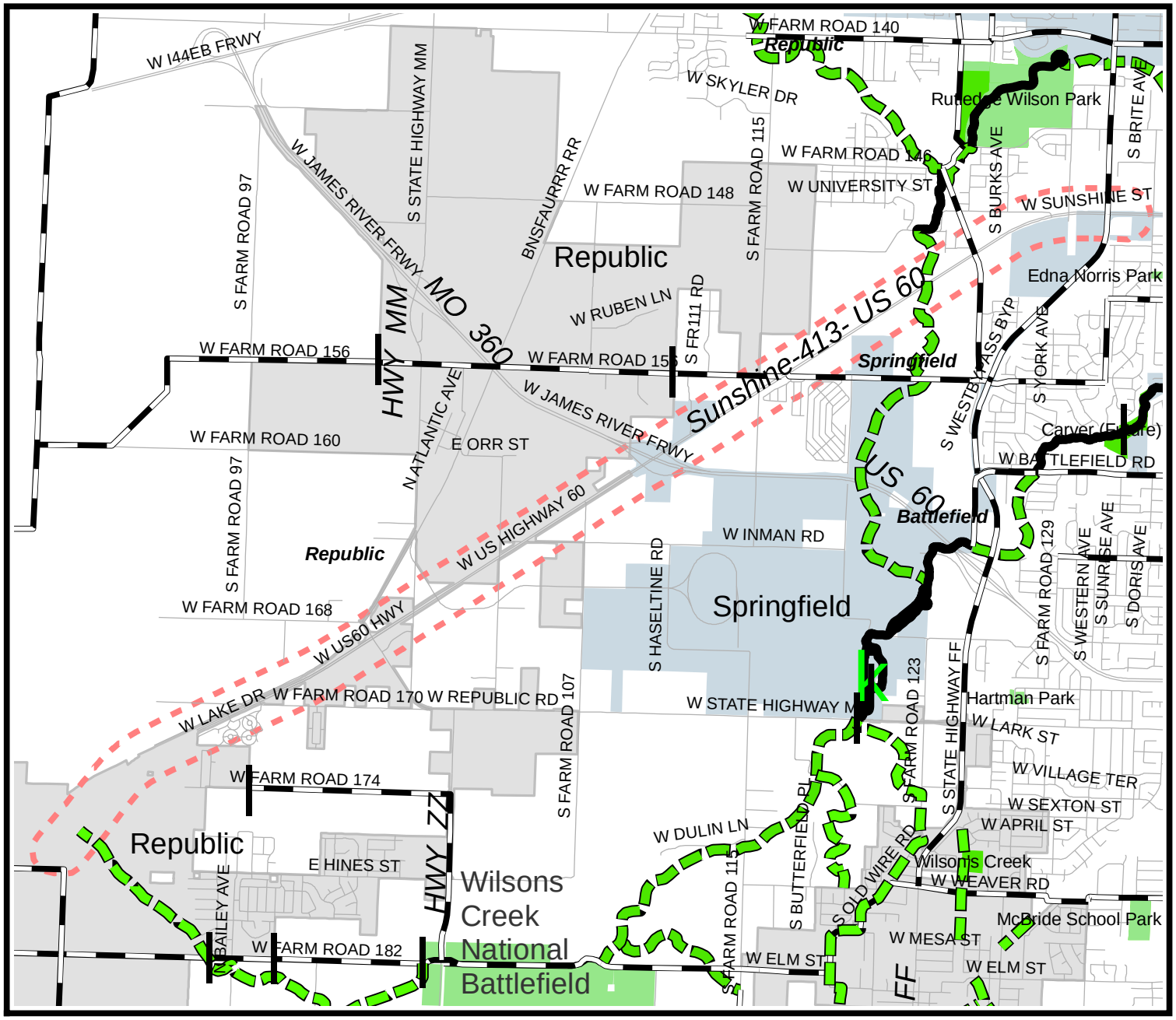
- FUTURE EXPRESSWAY
- FUTURE PRIMARY ARTERIAL
- FUTURE SECONDARY ARTERIAL
- FUTURE COLLECTOR

top number = 2000 Volume
bottom number = 2004 Volume

# West Sunshine State Route 413 U.S. Highway 60 Corridor Study

Source: MPO, 2007

# *Proposed Bike Routes and Greenway Trails*




# West Sunshine State Route 413 US Highway 60 Corridor Study

**Legend**

- Connection for Bike Route
- Vision 2020 Future Parks
- Primary Bike Routes
- COMPLETED TRAILS
- FutureTrails
- PARKS
- Corridor Boundary

FIGURE 7

0 0.15 0.3 0.6 0.9 1.2
Miles

## *E. GROWTH BOUNDARIES*

### *Growth Boundaries Analysis*

Growth boundaries between the City of Springfield and the City of Republic have been adopted in order to provide developers a transparent system for provision of services and enforcement of development regulations. Clearly defined growth boundaries will reduce inefficient use of resources, duplication of services, and confusion for developers within the region.

The provision of services is a fundamental responsibility of government and its operating agencies. The availability and capacity of such services strongly influence the intensity, distribution and timing of urban development and, in a broader context, the growth potential and pattern of the community as a whole. In consideration of the enormous public investment these services represent and the limited fiscal resources available to maintain and expand these services, a clear articulation of the extension of major urban services is fundamental to sound fiscal management and a vital economy. The City of Republic, Springfield and Greene County are committed to a “guided growth” concept –one that accommodates future growth but does so in a manner that is sensitive to environmental, community and fiscal resources. This study identifies future growth patterns, land use and transportation policies that support the framework for the Urban Service Area Policy.

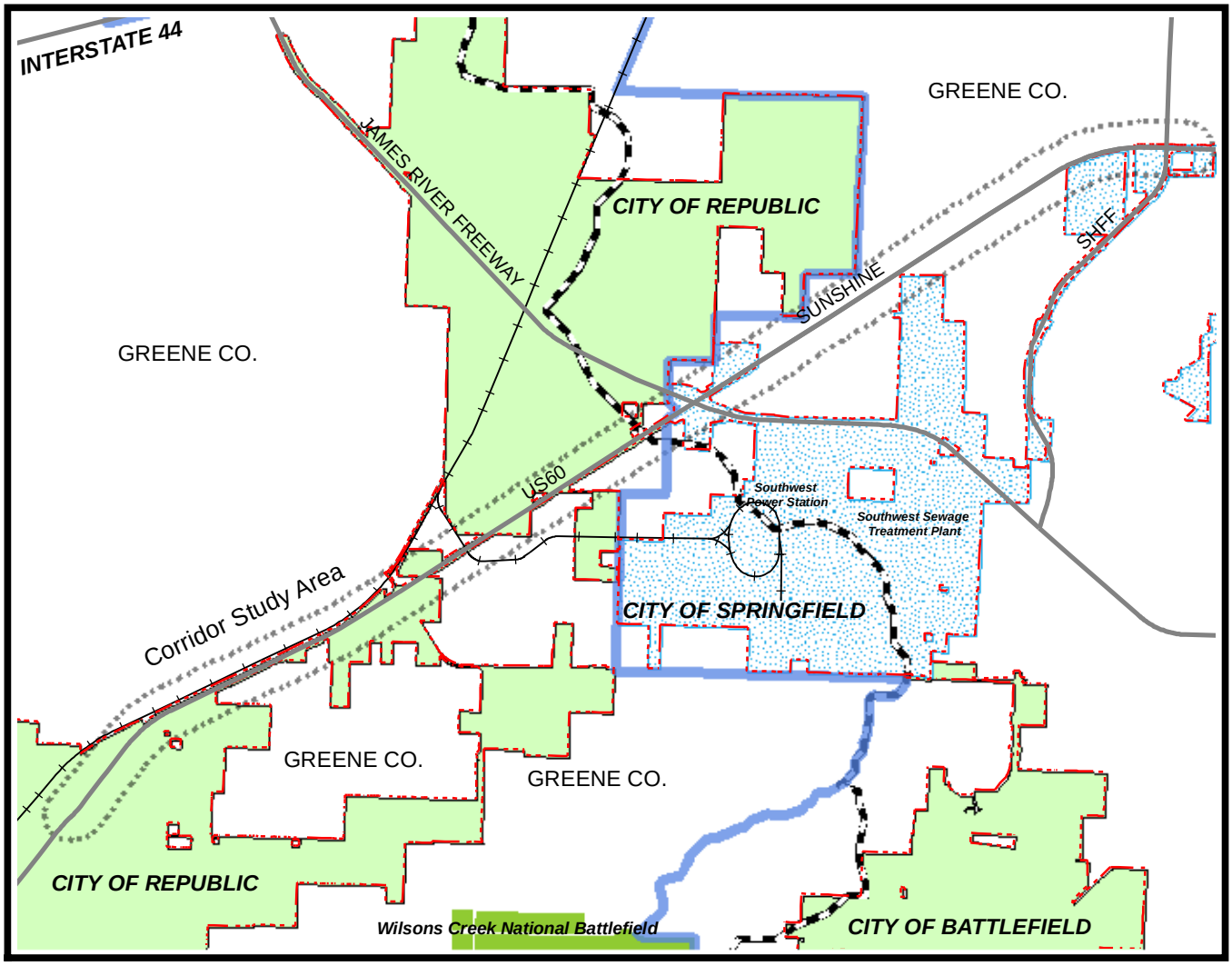
### Supporting Data

Springfield’s Urban Service Area Policy was established in April 1984 as an agreement between the City of Springfield and the Board of Public Utilities. Its purpose was to set geographic boundaries for the provision of urban services. It set forth a philosophy for providing urban services that allows for continued growth and development by maximizing the use of existing resources while minimizing the cost to the citizens. An amendment to the Urban Service Area Policy in 1998 made the policy a matter between the City of Springfield and Greene County rather than between the City and City Utilities. Currently, Springfield and Greene County work together to provide public sewer service and urban-quality roads within the Urban Service Area Boundary. Currently the boundary runs through the middle of the study area (Figure 8).

The City of Republic and the City of Springfield signed an intergovernmental development agreement on April 3, 2006 to set a boundary for future development and annexations. This agreement set the boundary for Springfield and Republic’s service area expansions within unincorporated Greene County. The boundaries extend up to Interstate 44 west to the Lawrence County line and south to the Christian County line.

FIGURE 8

# Growth Boundaries




**Source: City of Springfield Dept. of Planning and Development GIS, 2007**

0 1,650 3,300 6,600 9,900 Feet

**Legend**

- Republic/Springfield Agreement
- Springfield's Urban Service Area
- BATTLEFIELD
- REPUBLIC
- SPRINGFIELD
- Railroad
- Major Streets
- Corridor Boundary

***West Sunshine***
***State Route 413***
***US Highway 60***
***Corridor Study***

## *F. ENVIRONMENTAL ISSUES*

### *Environmental Analysis*

Environmental conditions such as water drainage basins, flood plains, and sinkholes must be considered before any development occurs within the study area. The City of Springfield, the City of Republic, and Greene County all have ordinances and regulations that protect environmentally sensitive features. Developing within the framework of these regulations will protect environmental quality within the study area and will help prevent flooding.

It is critically important for the City of Republic, Springfield and Greene County to take extra precautions with its surface and ground water because of the nature of the geology in the region. Throughout the study area the bedrock is composed of fractured limestone and is close to the surface. Surface water can easily travel into the bedrock from faults or sinkholes and then into the underlying aquifers, rivers, or creeks from which drinking water is drawn. Pollution from urban or rural activities may reach drinking water sources in a matter of hours. Topsoil in the study area is often not sufficiently thick to filter such pollutants. These conditions make it necessary that future land uses and transportation systems within the study area are developed in a manner that protects both the environment and residents.

There are four drainage watershed areas within the study area, they are; the Wilsons Creek which crosses the corridor on the eastern side, the Pond Creek and McElhaney Creek drainage areas south of the James River Freeway and the Schuyler Creek drainage area on the western edge of the study area (Figure 9). The headwaters of the Sac River begin on the west side of the corridor, near the City of Republic. The corridor is traversed by two flood plains; the Wilsons Creek on the eastern side and to a smaller degree the Schuyler Creek flood plain on the western edge.

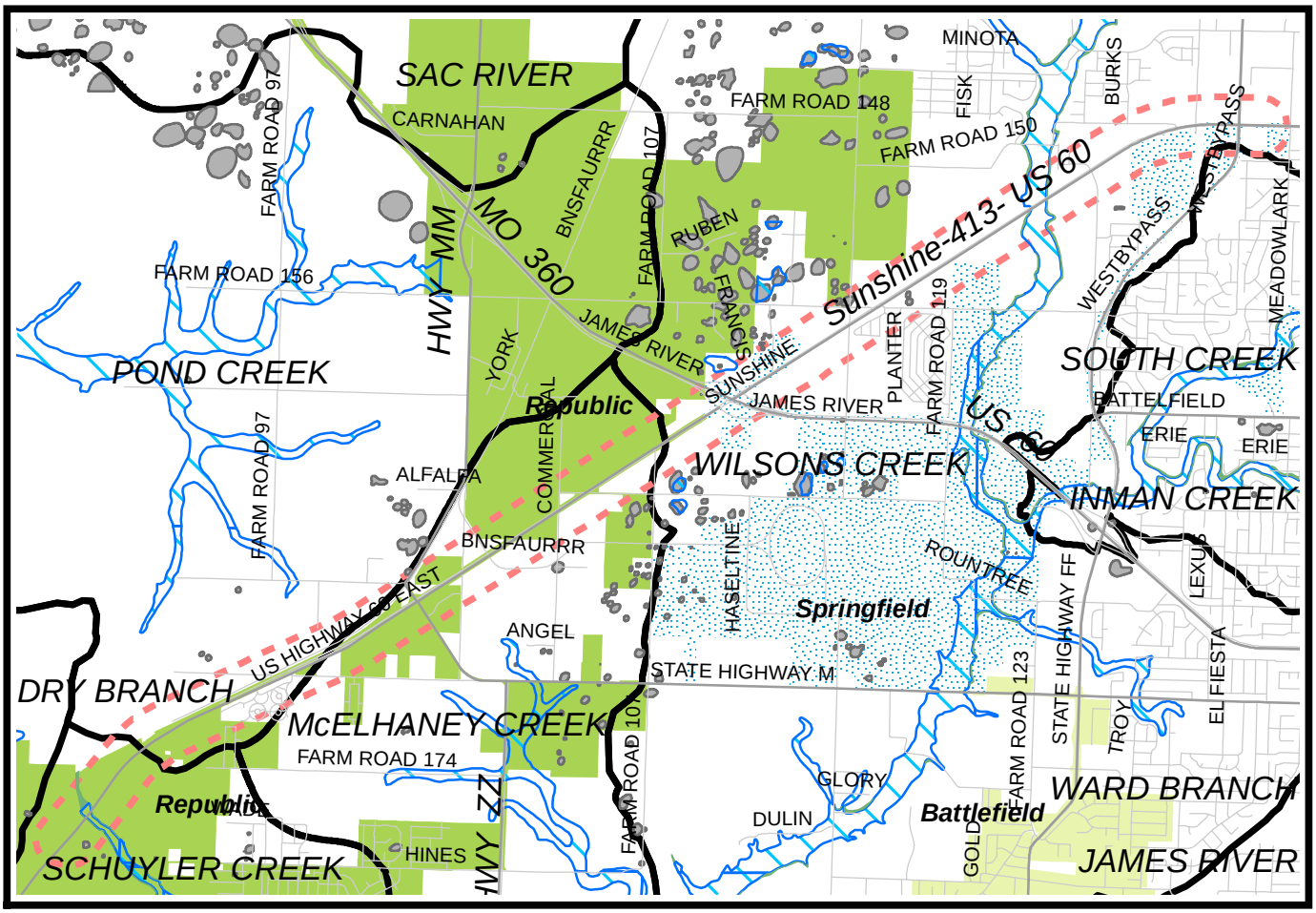
### Supporting Data

The study area lies within the Ozark Plateau physiographic region. The topography of the Springfield Plateau area is classified as moderately rolling hills with karsts depressions located throughout the area. Thick carbonate rock units that host a wide variety of karsts features underline this area. The karsts landscape is characterized by the presence of caves, springs, sinkholes and losing streams.

Sinkholes are located throughout the study area; however, the largest concentration is located off of the intersection of Sunshine/U.S. 60 and James River Freeway. There are smaller concentrations of sinkhole depressions located west of the railroad spur to the Southwest Power Plant main railroad line.

*FIGURE 9*

# Environmental Conditions




Source: City of Springfield GIS, 2007

0 0.25 0.5 1 1.5 2
Miles

**Legend**

- Roads
- 100 Year Flood Plain
- 500 Year Flood Plain
- Sinkhole Boundary
- Corridor Boundary

**West Sunshine**
**State Route 413**
**US Highway 60**
**Corridor Study**

# *G. VISUAL APPEARANCE*

### *Visual Appearance Analysis*

The visual appearance of the built environment is an important economic factor that is too often neglected. The vision for the study area calls on developers and residents to balance economic development, prosperity, and the need for quality development.

### Stakeholders Questionnaire

The study team conducted a series of public meetings to obtain stakeholder input and to gather input from the general public on the future of the study area. A citizen questionnaire was submitted to participants at one of these public meetings. Thirty surveys were collected (see appendices). Citizen input on the questionnaire provided the following data: 77% of respondents owned property within the study area, 73% of those surveyed used the corridor on a daily or weekly basis (of those, 76% used the corridor primarily for work or shopping). When asked whether they would support median closing; 59% responded that they would not support closing center median breaks to control access along the corridor and 57% would not support driving farther down the corridor if access is limited. It was found that 75% of those surveyed would support requiring single family residential developments to be set back at least 600 feet for the right-of-way of West Sunshine/Highway 60. Citizens showed concern for the visual appearance of the corridor: 55% of respondents would not support billboards along the corridor but 86% would support better design of buildings facing West Sunshine/Highway 60. Roughly 74% of respondents support parking lot landscaping and 77% support parking lot inter-connectivity. Additionally, 67% were in support of requiring commercial developments to be located at or near major intersections.

When asked what they thought were the major concerns facing the highway corridor the respondents focused on three issues: traffic and driveway access were identified as major safety concerns, billboards and overhead utility lines were identified as major visual appearance issues, and increased growth was identified as a major issue facing the area.

### Design Preference Survey

The study team conducted a design preference survey to obtain input from stakeholders and the general public on what types of development they would like to see along the corridor. The survey participants were asked to view 35 development pictures and to rate each picture from 1 to 5 with 1 being the highest or most desired development and 5 being the least desired type of development. The results depicted that a majority of the participants were in favor of higher quality in building development along the corridor, increased landscaping,

improved parking lot design, changes to signage, and more open space (see appendices).

**Supporting Data**

Components of community appearance can include a multitude of visual issues. Among these concerns are: the presence or absence of street trees, the appearance of public and private signage, street-scape conditions, parking lot landscaping, architectural design and building rehabilitation, public and private outdoor art, the presence or absence of overhead wires, and the way in which local development practices seek to preserve the natural features of land and properties in the community.

In the 2005 Activity Center Plan for the City of Springfield, a national consulting firm made the following observations about the appearance of buildings in the region:

*"Recent commercial and industrial building construction in Springfield reflects both the good and the bad examples of design. At many of its key entry points from the interstate/highway network, the commercial and industrial building design is mediocre in quality, and in some cases, bad. Poor building design quality and low cost building materials affects the image of the Springfield community to both residents and visitors. For example, the consulting firm, observed that Springfield has more commercial and industrial buildings of metal construction (often generically called "Butler buildings" after the name of the firm that pioneered this construction) than many other cities of its size. Contrary to the marketing position of the metal building industry, these buildings are rarely attractive examples of design, particularly when used to house larger industrial or warehousing operations. Today, most developers of high quality business and industrial parks will not allow this type of construction and many municipal development codes do not permit the use of metal siding for any side of a structure visible from the street. Metal buildings also show the wear and tear of use more quickly than similar buildings of tilt-up concrete or other masonry construction.*

*Many cities, in an effort to grow sales tax revenues, will allow the construction of "logo" type retail buildings. For example, Wal-Mart, left to its devices, almost always builds an unattractive retail building unless the community demands something better. On an increasing basis, cities are requiring better design using higher quality materials and increased landscaping, especially where a retail development project is receiving some level of local financial incentive.*

*As a part of the 2005 Plan, the consultant is recommending that the City develop a set of general design standards for new construction in the Activity Centers. These design guidelines should encourage the use of higher quality building materials, attention to design (such as breaking up the large blank walls expanses, greater use of glass, and expanded, and irrigated, landscaping) ease of maintenance and energy efficiency.*

*In the end, Springfield should be developed in a coordinated, well designed manner, which enhances the image, appearance and functional quality of the City."*

# 3. CORRIDOR ENHANCEMENT STRATEGIES

## A. INTENT

The intent of the corridor enhancement strategies is to implement the vision for the study area by providing actions that address a series of goals. It may take somewhat longer to fully achieve the goals of the study. Both the goals and the actions have received community support during a series of public meetings in the study area.

The goals and actions found in the study provide concepts, ideas, and opportunities that address conflicts between safe access for developments and the need to protect the overall functionality of the West Sunshine/Highway 60 corridor. The proposed road improvements offer improvements to alignments and access that address major safety and capacity issues for primary and secondary roadways.

Additionally, the study proposes appropriate land uses within the study area and suggests design guidelines that insure quality development and quality of life within the area. The actions and strategies in the study provide each of the three jurisdictions within the study area with implementation options. The three jurisdictions must decide whether or not to amend adopted plans and regulations to implement this study and to meet the needs of their community.

It should be noted that failure to act will have long term consequences which could result in traffic congestion, greater cost in providing public services, decaying neighborhoods, commercial strip centers, and ultimately a decline in the overall quality of life in the area.

## B. PROPOSED ROAD IMPROVEMENTS

The proposed road improvements have been a joint undertaking of stakeholders within the study area and the technical review committee, which was made up of representatives from each of the three jurisdictions within the study area, MoDOT and City Utilities.

The vision for the study areas streets and highways includes an adequate system of thoroughfares that will ensure logical development of the community, safe and efficient movement of people and goods, and an economical expenditure of public funds. This vision can only be met by a public/private partnership that will finance necessary improvements. In order to achieve the vision, it will be necessary to develop alternate road alignments. Realigning primary and secondary roads will require an update of the Metropolitan Planning Organization’s Major Thoroughfare Plan, which is part of the adopted Long Range Transportation Plan.

The major standards guiding the proposed road system are:

1. All proposed signalized intersections along the West Sunshine/Highway 60 corridor would be separated by at least ½ mile separation as required by MPO design standards,
2. All proposed frontage roads would be encouraged to be separated by at least a 700-800 feet separation at the first full intersection off the corridor,
3. All roads would intersect the corridor with between 85 to 90 degree angles,
4. New driveway access to the West Sunshine/Highway 60 corridor would not be allowed; and
5. Direct access to properties along the corridor should be from a system of frontage roads and cross access easements for better connectivity.

## *Intersections*

Only one primary arterial, Farm Road 115 (Haseltine Road), intersects the West Sunshine/Highway 60 corridor. However, this arterial ends at the corridor and does not extend southward (Figure 10). Highway MM, a primary arterial, ends at Farm Road 160 prior to intersecting with the corridor. According to the MPO Major Thoroughfare Plan, Highway ZZ and Highway MM will connect to each other with a new alignment to the east of the existing State Highway M/ MM intersection (Figure 10).

A new intersection for Farm Road 115 is proposed to cross the corridor with a safer 90-degree intersection. This will allow the primary arterial at Battlefield Road to be extended to the West Sunshine/Highway 60 corridor. This new roadway could become an important route since Farm Road 115 continues north toward I-44/ Chestnut Expressway and the new airport terminal and new airport road.

A majority of the roads that connect to the West Sunshine/Highway 60 corridor intersect at dangerous angles. The transportation standards and development regulations require an intersection of between 85 and 90 degrees. However, there are 16 intersections in the study area that do not meet this standard. It is recommended that these roads be aligned to improve safety along the West Sunshine/Highway 60 corridor.

## *Access and Functionality*

The Major Thoroughfare Plan classifies each roadway according to its function. The roadway classification system is a hierarchical system based on traffic flow and land accessibility. Improving the overall functionality along the corridor, combined with measures to reduce the desirability of using shortcuts through neighborhoods, helps to keep through traffic on arterials. It is the major arterials that are designed to handle higher traffic volumes. Maintaining and restoring system connectivity has the potential to reduce reliance on the automobile and to

increase bicycle and pedestrian mobility. In order to improve functionality of the West Sunshine/Highway 60 corridor, this study recommends developing frontage roads, placement of traffic signals at carefully selected intersections, and making specific intersections improvements (see Access Management Principles in appendices).

**Reclassification of Roadways.** The MPO currently classifies West Sunshine/Highway 60 as an expressway from West By-Pass to James River Freeway and as a primary arterial from James River Freeway through the City of Republic. This study recommends that the classification of West Sunshine/Highway 60 be changed from a Primary Arterial to an Expressway from James River Freeway to the City of Republic. With this classification, there is a need to limit access and to reduce the number of median breaks to improve mobility.

**Decrease the number of private access points onto the Corridor**.
The corridor should be designed for a limited-access highway with some at grade crossings and signals at major intersections. An expressway is intended for high traffic volume, moderate to high-speed traffic across the study area with minimal access to adjacent land.

The MPO transportation plan does not recommend driveway access on a roadway classified as an expressway. However, the Missouri Department of Transportation (MoDOT) is likely to allow existing driveways to remain. MoDOT also currently allows property access along the roadway corridor if there is no other way to access a property. Currently there are 101 private driveways (12 driveways per mile within the corridor), 47 un-signalized full access points, six stop signals and 16 intersections road connections. There is also one over pass intersection at James River Freeway and one railroad-bridge near the intersection of Highway MM and the corridor.

In addition, creating a fine grain network of redundant secondary streets and improving connections from those streets will help to reduce the need for direct access to main corridors. This in turn reduces vehicle conflict points and helps preserve capacity and increase safety for all modes using the corridor.

**Encourage Inter-connectivity**. In order to preserve the functionality of the Corridor, access easements should be required during the subdivision and development of property along the corridor. If driveway access is allowed along the corridor there must be a long-term remedy to phase out the direct access to the corridor overtime.

## *Frontage Road System*

A frontage road (also called access road, service road, outer road, or feeder road) is a non-limited access road running parallel to a higher speed road usually a freeway/expressway and feeding it at appropriate points of access. Frontage roads separate local traffic from through traffic, removing trips from the corridor.

Frontage roads provide access to properties that would be cut off by a limited access road and connect these locations with roads that have direct access to the main highway. Frontage roads give indirect access to abutting property along a freeway, either preventing the commercial disruption of an urban area that the freeway traverses or allowing commercial development of abutting property. The benefits to nearby properties can more than offset the cost of building the frontage roads.

Frontage roads are encouraged throughout the study area but the areas identified on the Road Network maps are those that are more likely to be built. Frontage roads should have at least a 700-800 feet separation at the first full intersection off the West Sunshine/Highway 60 corridor.

## *Possible Signalization*

The *"Manual on Uniform Traffic Control Devices"* establishes traffic volumes that would warrant the need for traffic signals. When volumes do not meet warranted levels, typical stop control of approach streets and driveways will result in undue delay and hazard to motorists. When these warrants are met, the developer should be asked to provide an acceptable traffic operations plan by providing alternative access points, providing signal control at major intersections, or designing the roadway system to provide passive intersection control. The developer should be expected to pay a share of traffic control relative to the proportion of traffic contributed by the development to the need for the traffic control device.

The study recommends the following signals, when warranted by traffic studies; Farm Road 123, new road extension to South Lulwood Avenue, Farm Road 115, New road just east of James River Freeway, Farm Road 107, Farm Road 103, Move current traffic light at State Route MM to a new alignment with Highway ZZ, Farm Road 97, and at Farm Road 93. These signalized areas are only proposed and will be determined by a traffic impact study as development occurs. Limiting the number of traffic signals on the corridor allows a freer flow of traffic.

## *Transit, Pedestrian and Bicyclist*

**Provide a comfortable, safe, and comprehensively connected system of bicycle and pedestrian routes.** In general, efforts to provide for pedestrians in an auto-oriented corridor involve investments in sidewalks, signal heads, and

crosswalks. These efforts improve pedestrian safety and heightened driver awareness of pedestrians.

The scale and utility of these facilities are generally inconsistent with the walking comfort of pedestrians. A variety of improvements, such as changing the orientation and design of buildings and providing buffers between pedestrians and automobiles will help improve the pedestrian environment. Improved bicycle and pedestrian systems are fundamental to decreasing the reliance of automobiles along the corridor. Bicycle improvements could include marked lanes and secure bicycle parking. Future development along the Corridor that creates walkable distances with uninterrupted pedestrian connections designed for pedestrian comfort will increase walking and transit use. The proposed greenways should be incorporated into the pedestrian system.

**Encourage conditions that support greater transit frequency and more extensive transit coverage**. Both of these ideas require greater densities of employment and housing in recommended activity centers. Transit depends on safe and pleasant pedestrian access and stop amenities such as waiting comfort and security, and service information. If transit is to be extended these elements should be incorporated into development site-plans to accommodate future transit extensions.

The current city charter for the City of Springfield prohibits City Utilities from extending its transit lines outside the city limits of Springfield. However, the Metropolitan Planning Organization is currently exploring development of a transit authority that could provide transit service throughout the metropolitan area. Extended and more frequent transit service, combined with development densities that facilitate transit use, could lower use of the private automobile, reduce congestion on roadways, and lower pollution levels.

## *PROPOSED ROAD IMPROVEMENTS:*
### *GOALS, OUTCOMES AND ACTIONS*

GOAL: Provide for better mobility and safety for vehicular traffic on the corridor as development occurs.

OUTCOMES

1. Reduced accidents and minimized travel delays by reducing conflict points where traffic enters and exits the corridor.
2. Minimized travel delays by separating local traffic from through traffic.
3. Minimized travel delays by maximizing traffic flows in both directions.
4. Reduce accidents by improving driver visibility at intersections.

ACTIONS

1. Amend the major thoroughfare plan to designate the entire West Sunshine/ US Highway 60 corridor as an expressway classification.
2. Restrict full-access street intersections, with signalization to at least 1/2-mile apart.
3. Allow non-signalized intersections, with no median breaks, or driveways where future frontage roads are not provided as or allowed by MoDOT to at least 660 feet (right-in/ right-out only) apart.
4. Close intersections or median breaks, which do not meet the spacing requirements, as development occurs on adjoining properties.
5. Develop a frontage road system as shown on the proposed study and in other locations where possible.
6. Require all intersections of frontage roads and roads that intersect with West Sunshine/ US Highway 60 to be at least a 700-foot apart.
7. Require access easements between adjoining properties as they develop.
8. Realign existing intersections so that roads intersect West Sunshine/Highway 60 at an 85-90 degree angle.
9. Provide for new road intersection improvements through any combination of public/ private partnerships with alternative financing such as the implementation of Transportation Development Districts, Neighborhood Improvement Districts, Community Improvement Districts or other financial or tax incentive programs as appropriate or any combination of these revenue sources to ensure that the needed transportation enhancements are constructed and that the city or county can provide municipal services in accordance with their approved standards.
10. Adopt sound access management practices as proposed in this study.

## *PROPOSED ROAD IMPROVEMENTS:*
### *GOALS, OUTCOMES AND ACTIONS*

GOAL: Provide for better mobility and safety for pedestrian and bicycle traffic within the corridor as development occurs.

OUTCOMES

1. Promote pedestrian and bicycle safety within the corridor.
2. Reduce local vehicular traffic within the corridor.

ACTIONS

1. Continue to implement the plans for expanding bicycle routes and the creation of bicycle lanes.
2. Require a minimum of five-foot sidewalks, proper grade changes, lighting, median islands or refuge island crossings for new developments within the corridor to ensure continuous and safe travel.
3. Coordinate plans for greenways and plan for removal of barriers when road improvements are undertaken.
4. Consider the use of bridges and storm water culverts as possible connections for bicyclist and pedestrians as the need arises.
5. Implement the comprehensive MPO Area Bicycle-Pedestrian plan.
6. Continue to work with Ozark Greenways and SpringBike to develop the greenway trail system per the recommendations of the Vision 20/20 plan.
7. Consider the incorporation of bicycle and pedestrian movements into all road plans where possible.

GOAL: Provide transit services along the corridor.

OUTCOMES

1. Promote the development of transit travel within the corridor.

ACTIONS

1. Investigate the feasibility of establishing a Metropolitan Transportation Authority to plan, build, and/or operate transit services within the Springfield Metropolitan Area.
2. Provide for safe and convenient use of transit by requiring new developments and road improvements to provide for transit stops along identified transit corridors.
3. Work with MoDOT to ensure park-and-ride facilities are provided along the corridor as the need arises.

4. Work with the MPO on new and more aggressive car-pooling and vanpooling strategies within the corridor (Work at the MPO level is underway).

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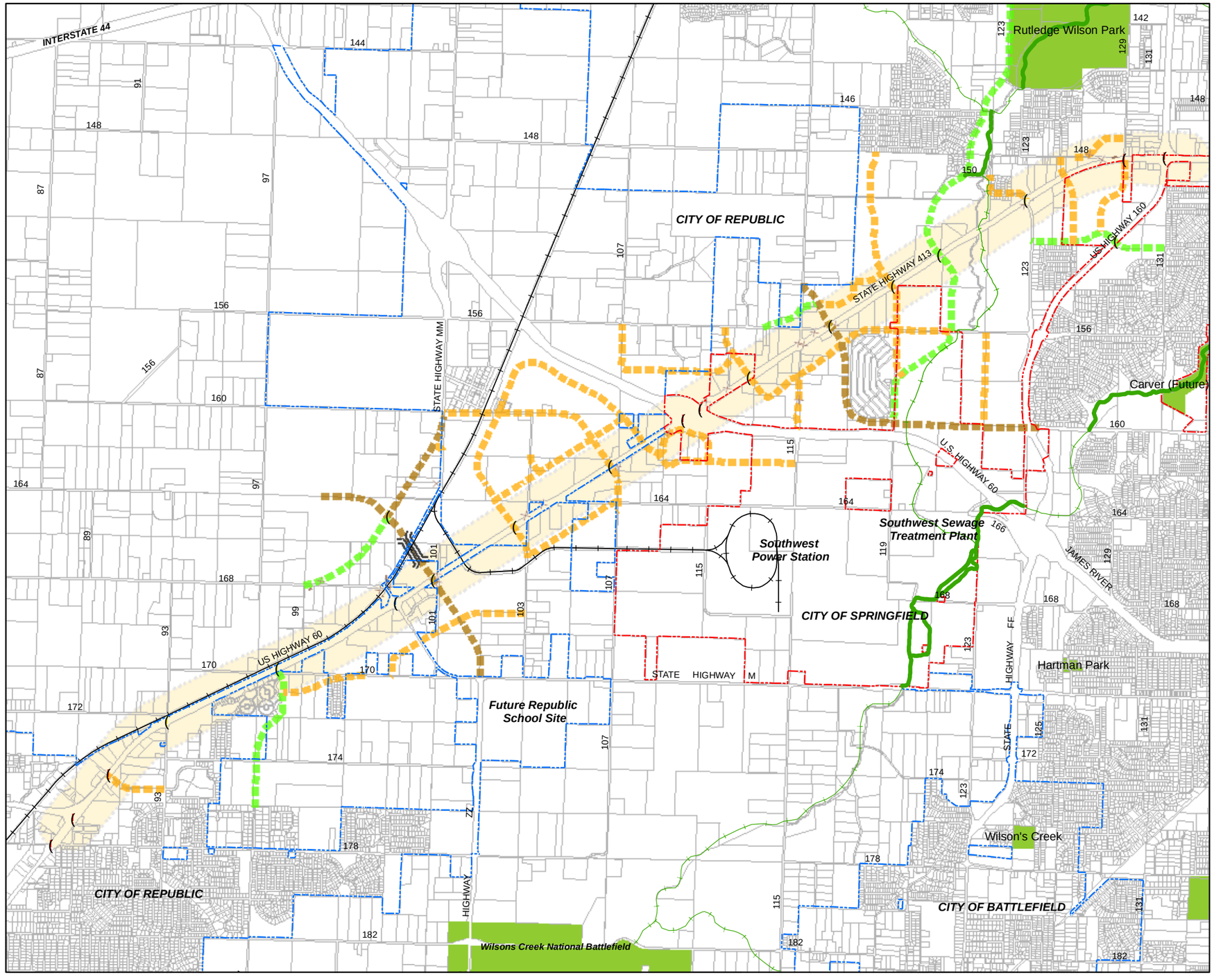
# Road Network




**Legend**

**Proposed Improvements**

- Proposed Primary Arterial
- Proposed Secondary Arterial
- Proposed Collector
- Proposed Bridge
- Proposed Road/Median Closure
- Existing Signal
- Possible Signal
- Removed Signal
- Completed Greenway
- Proposed Greenway
- Parks
- Republic or Battlefield City Limits
- Springfield City Limits
- Railroad
- Corridor Boundary

***West Sunshine State Route 413 US Highway 60 Corridor Study***

FIGURE 10

0 1,150 2,300 4,600 6,900 9,200 11,500 Feet

1:37,837

**Map Source: City of Springfield Dept. of Planning and Development, 2007 GIS**

Map date: August 24, 2007

## *C. GENERALIZED LAND USE LOCATION STANDARDS*

The General Land Use Location Standards are intended to provide guidance on creating land use patterns that support the vision of the West Sunshine/Highway 60 Corridor by maintaining the attractiveness and distinct character in the study area. These guidelines will assist in preventing future development from occurring in a linear or haphazard pattern along the corridor and along any future frontage roads. The guidelines will also ensure that future development is located in a manner that will make the most efficient use of local and regional transportation investments. Guidance toward these ends is provided to help each jurisdiction accomplish its goals, both through specific regulatory statements and through the suggestion of policies or concepts already being used in some areas of the study area.

**Applicability**

These standards should apply to all development within a specified boundary of the West Sunshine/Highway 60 study area as adopted by each of the three underlying jurisdictions. These standards are intended to be supplemented by and to provide the framework for design standards, corridor overlay district ordinance language, and access management guidelines.

These standards provide guidance to communities for the appropriate location and intensity of various land uses within the study area and provide a framework for implementing design guidelines and access management principles. This section includes generalized recommendations regarding the overall approach to land use planning for the study area in its entirety. This section also includes a high intensity mixed-use area map (Figure 12). The generalized Activity Center map (Figure 11) and a possible Land Use Scenario map (Figure 13) are intended as policy guides for future development and redevelopment activities. These maps suggest suitable land use activities based on environmental characteristics, community facilities, current land uses, and other factors. Location standards provide a basis for each jurisdiction's master planning and zoning decisions within the study area. The location standards may require that multiple steps be undertaken by each jurisdiction to achieve the intent. These steps may include modifications to existing zoning and other land use regulations, subdivision regulations, and long range planning documents. In some situations, a location standard may require ongoing coordination between jurisdictions, such as an intergovernmental agreement

## *Location of Activity Centers and Connecting Corridors*

The preferred development pattern for the study area includes new development concentrated in activity centers that support the efficiency of alternative modes of transportation. Concentration of development within activity centers is one way to reduce short-term land consumption. The activity centers should be designed to

provide a mix of urban uses, including employment, residential, retail, and commercial. It is the responsibility of each jurisdiction to define the location and extent of activity centers within their own growth areas.

Activity centers should only be located at or near existing or proposed interchanges or at the intersections of major roadways and within one-half mile of the corridor, or within one-quarter mile of a transit center, or park-and-ride facility. The location of activity centers should be designated by the local jurisdiction administering land use location standards

The generalized location standards map identifies two activity center categories: Community Activity Centers (CAC) and Neighborhood Activity Centers (NAC) (Figure 11). They are defined in the following:

**Community Activity Centers (CAC)** ½ mile radius around major intersections
Community Activity Centers contain shopping, recreation, employment, and institutional services supported by the surrounding community. Examples of uses include a discount department store, supermarket, drug store, home improvement, large specialty shops, service stations, one or more large places of worship, a community park, mid-size offices, low-to-mid rise housing (none within the 700 feet of the corridor) and high-to-moderate density housing, and perhaps an elementary or middle school.

**Neighborhood Activity Centers (NAC)** 1/4 mile radius around minor intersections
Neighborhood Activity Centers contain services vital to the day-to-day activity of the neighborhood along two frequently traveled thoroughfares of the city. Examples of uses include a supermarket, convenience store, small service stations, small restaurant, personal service shops, church or synagogue, daycare, moderate density housing (none within 700 feet of the corridor), low-to-mid rise office buildings where appropriate based on the heights and uses of surrounding buildings, small park, and perhaps an elementary school.

Within each activity center there are areas that should have more intensive uses due to their location along the West Sunshine/Highway 60 corridor. These areas are defined as High Intensity Mixed Use Area, which will allow higher development intensity with a higher degree of design (Figure 12). High Intensity Mixed Use areas are defined as:

**High Intensity Mixed Use Areas** are located within a proposed activity center. These areas provide a mix of urban uses, including employment, high density residential, retail, and commercial. High intensity development should be encouraged with the use of development bonuses. Bonuses such as increased density, increased allowable floor area ratio (FAR), increased building height, increased lot coverage percentage, reduced parking requirements, reduced building setback requirements, or reduction of development fees. There should be a connection between better design and the use of bonuses. No new low density housing should be allowed within High Intensity Mixed Use areas.

Areas between activity centers and high intensity mixed use areas are defined as connecting corridors. These areas are further defined in the following definition:

**Connecting Corridors (CC)**
Connecting Corridors are areas in between activity centers but within 700 feet from the rights-of-way of the corridor**.** Connecting Corridors contain services vital to the day-to-day activity of the neighborhoods along frequently traveled thoroughfares of the city. The primary focus should be towards employment near the activity centers and high-density housing in the middle of the connecting corridors. Secondary examples of uses include a small convenience stores, small service stations, small restaurants, personal service shops, church or synagogue, daycare, low-to-mid rise office buildings where appropriate based on the heights and uses of surrounding buildings, small park, and perhaps an elementary school. No new low-density housing should be allowed within this area.

## *Preferred Location of Residential Uses*

### Single Family Residential

Single-family, duplexes, and other similar low-density residences should be located outside of activity centers along the West Sunshine/Highway 60 Corridor and set back from the right-or-way to minimize noise impacts on residents. Although often convenient in terms of access, locating residences adjacent to an expressway may necessitate the construction of costly sound barriers or berms to keep noise impacts below acceptable levels. In addition to their cost, these barriers should also be avoided because of their visual impacts. They significantly detract from the scenic, open character of the study area, block views, and limit future transportation options. Natural landforms should be used where possible to mitigate these impacts. If single-family uses are to be included within an activity center, they should be incorporated as part of an overall master plan for the center.

Subdivisions containing low-density residences such as single-family homes or duplexes should not be located within 700 feet of the West Sunshine/Highway 60 right-of-way. Single-family subdivisions located closer than the proposed 700 feet from the West Sunshine/Highway 60 right-of way should utilize clustering techniques to concentrate densities away from the West Sunshine/ US Highway 60 right-of-way, maximize views, and preserve landscape features or open space.

### Multi-Family Residential

Multi-family residences should be located within or adjacent to activity centers, where a range of services, including transit, is available or is planned. Actual densities of the multi-family developments will vary depending on surrounding uses, zoning, and site conditions. However, multi-family densities should generally range between 8 and 30 dwelling units per acre. A development vision and master plan should be drafted for each activity center and should, where appropriate, devote between 10% and 25% of the total gross land area to multi-family or mixed-use projects that incorporate residential uses. A plan should also ensure that residential uses within an activity center are sited to minimize noise and other undesirable impacts.

Multi-family residential uses should be located within or adjacent to mixed-use activity centers, where employment, retail/commercial services, schools, recreation, transit service, and other amenities are available. The underlying jurisdiction should approve up to a 25% increase in permitted density over what is allowed in the zoning district for vertically integrated mixed-use development, e.g., residential over commercial use.

## *Preferred Location of Non-Residential Uses*

### Commercial, Retail Development and Mixed Use Areas

Properties near interchanges, frontage roads, and other north/south or east/west roadways are valuable locations for commercial and retail businesses because of their high visibility, ease of access, and in some cases, because of their likelihood of functioning as future multi-modal hubs. To further enhance their visibility, businesses often spread out along these auxiliary roadways, limiting future development potential and hindering circulation patterns. These standards are intended to ensure that commercial and retail development is concentrated within activity centers, rather than in a linear pattern along frontage roads or other roadways. This would help to preserve the appearance of the West Sunshine/Highway 60; promote a more coordinated, compact pattern of development; take advantage of nearby services for employees; and maintain critical transportation and infrastructure connectivity.

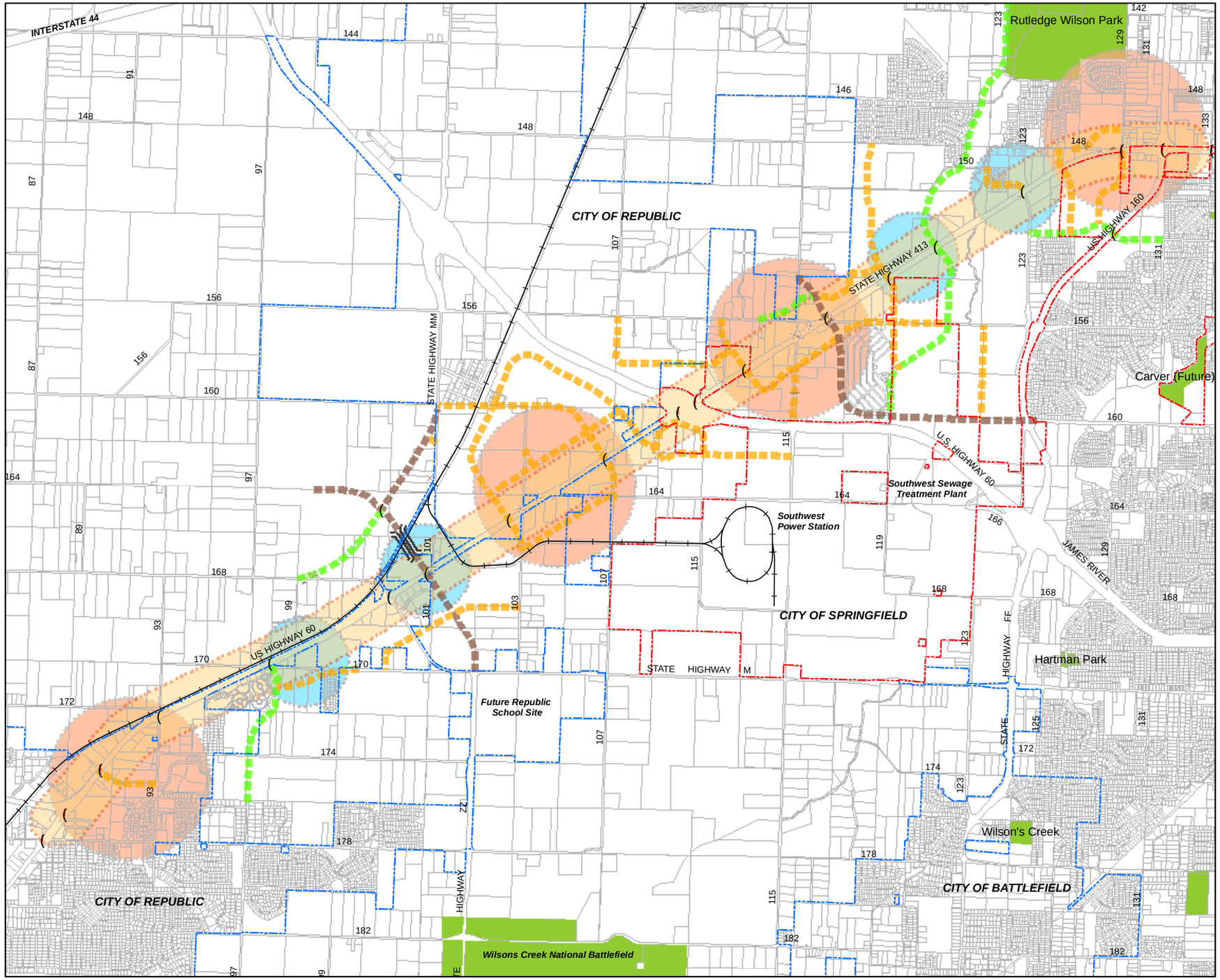
Commercial and retail development should be concentrated within activity centers and discouraged from developing in a linear “strip” form along frontage roads. Properties within agricultural districts, as defined by the underlying jurisdiction, and located outside of planned activity centers should not be rezoned for commercial or industrial use, except for appropriate agribusiness uses. Existing zoning within activity centers should be reviewed and modified to support planned higher intensity commercial and retail uses.

### Employment Centers

Office complexes and industrial uses often require large sites not compatible with the more compact, urban pattern of development desired in activity centers. These uses should be located in an office park or industrial park setting adjacent to activity centers. Other uses suggested for location within an activity center will need to be evaluated individually for their compatibility with adjacent retail, commercial, and residential uses. This will ensure that concerns such as vehicle and pedestrian connectivity and block patterns are adequately addressed in the site’s design. Development of well-planned employment centers will allow employees to utilize nearby services and transit opportunities. Development of such centers will also help to create a more gradual transition between activity centers and the less intense development found in the outlying areas. Large employers and industrial uses should locate in coordinated, campus or office park

settings adjacent to activity centers or be integrated into the more urban pattern within activity centers.

# Activity Centers




**Legend**

- Community Activity Center
- Neighborhood Activity Center
- Connecting Corridor
- Parks
- Republic or Battlefield City Limits
- Springfield City Limits
- Railroad
- Property Lines

**Proposed Improvements**

- Proposed Primary Arterial
- Proposed Secondary Arterial
- Proposed Collector
- Proposed Bridge
- Proposed Road Closure
- Existing Signal
- Possible Signal
- Removed Signal

Feet
0 1,125 2,250 4,500 6,750 9,000

1:37,837

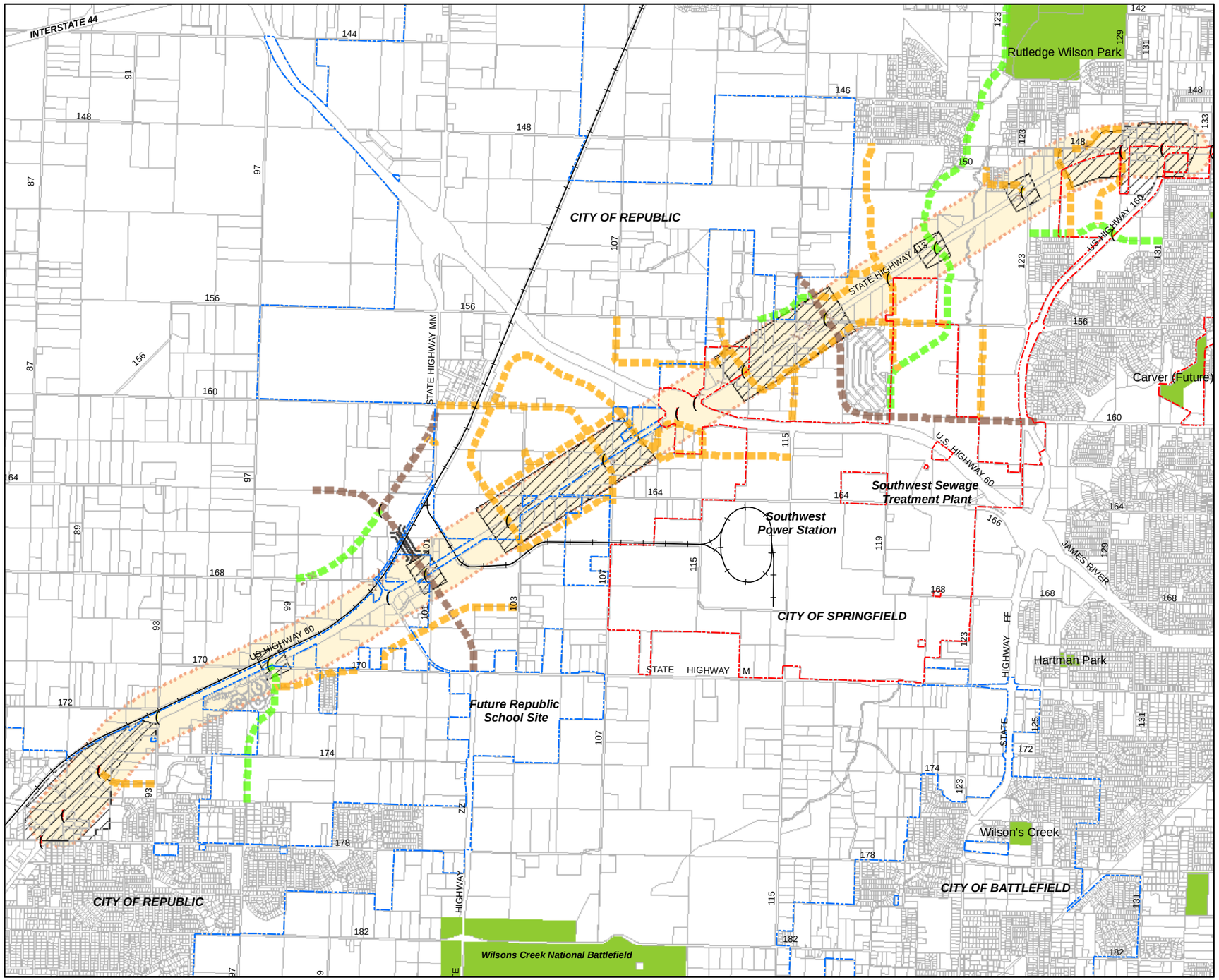
**Map Source: City of Springfield Dept of Planning and Development/ GIS, 2007**

Map date: August 24, 2007

***West Sunshine State Route 413 US Highway 60 Corridor Study***

FIGURE 11

# High Intensity Mixed Use Areas




**Legend**

- High Intensity Mixed Use
- Corridor Boundary
- Parks
- Republic or Battlefield City Limits
- Springfield City Limits
- Railroad

**Proposed Improvements**

- Proposed Primary Arterial
- Proposed Secondary Arterial
- Proposed Collector
- Proposed Bridge
- Proposed Road Closure
- Existing Signal
- Possible Signal
- Removed Signal

0 1,200 2,400 4,800 7,200 9,600 Feet

1:38,278

**Map Source: City of Springfield Dept. of Planning and Development, 2007 GIS**

Map date: August 24, 2007

***West Sunshine State Route 413 US Highway 60 Corridor Study***

FIGURE 12

## D. FUTURE LAND USE PLANS

Future land use decisions will impact transportation on the highway corridor and on secondary streets in the study area. One of the key tasks of the study was to identify future or potential activity centers along the West Sunshine/Highway 60 corridor and to define the type and size of activity centers. The study was also to examine land use development scenarios based on future transportation networks and environmental issues within the study area. In order to achieve this end, a public information workshop was conducted that invited community stakeholders to participate in an open house format. This informational meeting was held to focus on and to identify key land use issues and sites/destinations within the study area. The technical review committee staff members, who represented each of the three jurisdictions involved, held their own meetings to discuss land use possibilities.

**Proposed Conceptual Land Use Plan.** This conceptual land use plan does not represent a physical location, but could be utilized as a possible land use scenario toward the West Sunshine/Highway 60 Corridor (Figure 13). The direct relationship between the transportation system and land uses cannot be emphasized enough. Therefore the general policy of placing higher intensity and density levels at or near identified activity centers or transportation nodes was the common linkage that produced the proposed conceptual land use development plan which could be used to meet proposed population and housing demands along the West Sunshine/Highway 60 Corridor.

**Maintain and support the land development pattern just outside the Corridor**. Although this study focuses on the corridor immediately adjacent to the West Sunshine/Highway 60 right-of-way, the area of impact extends beyond the properties fronting on the corridor. The properties immediately beyond the study area are predominantly agricultural or residential. The proposed land uses for the study area should support the surrounding agricultural or residential neighborhoods. Commercial land uses along the corridor should be designed as mixed-use developments. Proper buffering and setbacks should be used in order to integrate new uses with existing residential developments or agricultural uses.

**Improve gateways to the Corridor**. The gateways to the West Sunshine/Highway 60 corridor are nondescript; they do not announce to travelers that they are moving into a new (corridor) area. A gateway design can also be used to announce the existence of major activity center as drivers travel from residential areas to commercial areas. For example, a jurisdiction could require that each corner of a signaled intersection provide a small, attractive public space designed in a similar and consistent fashion. It could be required that each corner of a signalized intersection within any activity center along the corridor have consistent gateway focal point treatments or that each signalized intersection within all community activity centers include a consistent gateway focal point treatments.

**Improve aesthetics in the Corridor.** A balance must be found between the community level benefits of an enhanced built environment and improved urban design and the concerns of property owners who may have concerns over increases to the cost of development. This balance can be addressed by implementing consistent design standards with the use of and adoption of a corridor overlay district (COD).

**Develop a land-use pattern that can be served better by alternate modes of transportation**. The land use pattern within the corridor must have mid-to-high level residential densities and commercial/ employment intensities in order to support transit services and to facilitate a significant number of bicycle and pedestrian trips. In addition, street design can be improved to create a pattern of interconnected streets and sidewalks that support adjacent land uses. The use of frontage roads, implementing the proposed land use scenarios, and encouraging more intensity and density within proposed activity centers are all means of accomplishing this goal.

**Activity Centers.** The Corridor should not be developed in a linear strip pattern. It should not be developed with conventional large-scale regional retail area that are not compact, that do not have a mix of uses, and that are not supportive of all modes of transportation. The jurisdictions involved should require large-scale developments to locate near proposed community activity centers. The jurisdictions can use incentives such as Transportation Development Districts (TDD), Tax Increment Financing (TIF), Community Improvement Districts (CID), and/or Neighborhoods Improvement Districts (NID) to encourage higher design and quality developments. This study recommends that developers locate local-serving uses such as grocery stores within or near neighborhood activity centers.

**Concentrate retail uses at Activity Centers and at key intersections along the Corridors.** The proposed land use scenario offers a mix of uses along the highway corridor, focusing retail uses at accessible (particularly transit-accessible) locations. The land use pattern should facilitate easy movement between stores without impacting travel on the highway corridor. Retail areas should be located within proposed activity centers and where frontage roads and county farm roads are proposed.

**Mixed-Use Developments**. Mixed-use development should be located in areas where it is easiest to develop a pedestrian-friendly node (i.e. at the intersection of a frontage road and a County farm road that intersects the corridor or at two major intersections along the corridor). The success of mixed-use developments depends on surrounding amenities, such as existing neighborhood serving businesses and services, supporting residential uses, and a friendly pedestrian environment.

# *PROPOSED LAND USES:*

## *GOALS, OUTCOMES AND ACTIONS*

GOAL: Create land use patterns that support the vision of the West Sunshine/ US 60 Corridor Study.

OUTCOMES

1. A balance between jobs and housing.
2. Concentrated higher density and more intense land uses around proposed activity centers.
3. Mixed-use developments that can be served by all modes of transportation.
4. High quality development that enhances the visual appearance of the corridor.
5. Attractive gateway/ focal point entrances along the corridor.

ACTIONS

1. Group land uses into distinct segments within activity centers, connecting corridors and high intensity/density areas that are supported by interconnected frontage streets and sidewalks with possible expansion of a transit supported system in the area in the future.
2. The West Sunshine/Highway 60 area should maintain a 1:1 jobs-housing ratio. A jobs-housing balance is often presented in a jobs-employed residents' ratio. A ratio of 1:1 represents one job for every one household. Generally, when the ratio is below 1.0 the area is considered to have a jobs deficit and housing surplus. This is a general indication of the need of the community to commute out of the area for employment. Furthermore, when the ratio is above 1.0 the area is considered to have a housing deficit and jobs surplus.
3. Land use patterns outside the corridor should be protected and supported by proposed land uses with proper buffering and setbacks.
4. Each jurisdiction should adopt a Corridor Overlay District (COD) to guide development in order to improve the visual appearance along the corridor.
5. Meet periodically with other jurisdictions along the corridor to ensure implementation of the corridor study goals.
6. Work with interested developers to create a TIF, CID, and/or other infrastructure funding strategies.
7. Implement the conceptual land use policies or similar land use changes within each jurisdictions land use map.
8. Locate more intense commercial activity and higher residential density developments within proposed high intensity mixed use areas such as allowing high density residential over commercial spaces.

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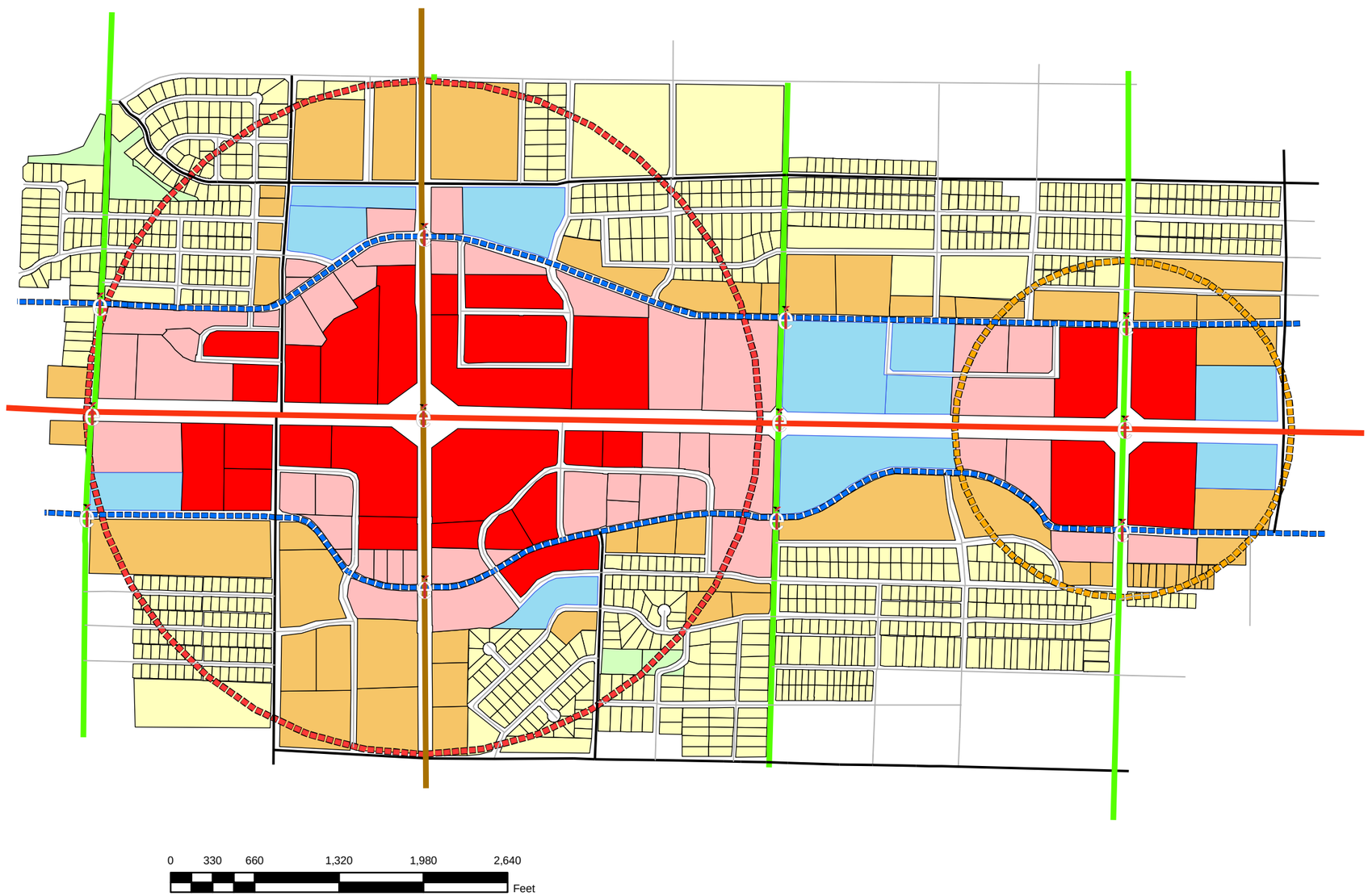
# Conceptual Land Use Plan




## *Conceptual Land Use Plan*

**Legend**

**Conceptual Land Use Plan**

- Heavy Commercial, Retail or Mixed Use
- Light Commercial, Retail or Mixed Use
- Multi-Family Residential
- Office
- Parkland/ Open Space
- Single Family Residential
- Community Activity Center
- Neighborhood Activity Center

**Conceptual Roads**

- EXPRESSWAY
- PRIMARY ARTERIAL
- SECONDARY ARTERIAL
- FRONTAGE
- COLLECTOR
- LOCAL
- Traffic Light

***West Sunshine State Route 413 US Highway 60 Corridor Study***

FIGURE 13

## *E. GENERALIZED DESIGN STANDARDS*

### Purpose

The intent of the design standards is to improve the overall quality and organization of development along the West Sunshine/Highway 60 Corridor Study Area. As prescribed, the design standards will create a variety of development types. These types will range from compact, urban forms within activity centers, to a less intense, open character of development on the fringes of and between established centers. Providing this range of development types will help protect the corridor's open character and natural amenities by ensuring the compatibility of new development with existing uses, concentrating more intense development within activity centers, creating a complementary mix of land uses near future transit stops, and improving mobility within the study area.

The design standards should apply to all new development and redevelopment within the West Sunshine/Highway 60 Corridor Study Area. The standards should not apply to construction of individual homes on existing lots, existing subdivisions, or agricultural uses and operations, but should apply to new residential subdivisions that consist of more than one lot.

### General Design Standards

The general design standards were formulated from a design questionnaire submitted to study area stakeholders and concerned citizens, a landscape preference survey conducted during preparation of the comprehensive plan, the *Community Physical Image* element of the Vision 20/20 Springfield-Greene County Comprehensive Plan, and from the City of Republic's commercial overlay district regulations. The corridor study utilized information from these sources as the underlining, guiding principles for formulating general design standards. These general design standards will be incorporated into an overlay district designed to implement the preferred vision for the corridor presented in this study.

The design questionnaire administered to the stakeholders for this study resulted in the following ideas:

1. Parking lots should be better landscaped
2. Parking lots should be linked to each other by access easements or by streets
3. Commercial buildings should have better design fronts facing the corridor
4. Commercial development should be centered on major intersections
5. Single-Family Developments be located at least 600 feet from the corridor
6. Billboards should be eliminated or strongly limited along the corridor

The following four goals are identified by the citizen focus group preparing the *Community Physical Image* element of the comprehensive plan:

1. Improve the visual appearance of the urban area.

2. Ensure high quality development.
3. Maintain a small-town atmosphere while enhancing and developing character, livability, and pride in the community.
4. Increase the amount, attractiveness, and impact of open space and public spaces in urbanized areas.

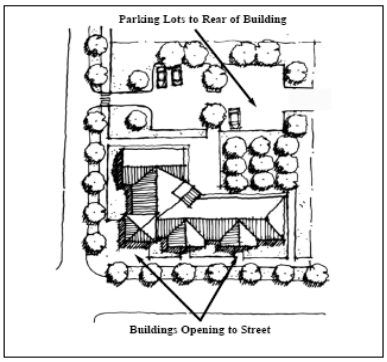
The following general design standards are a synthesis of the Community Physical Image goals, the design preference visual survey, the citizen questionnaire, and the City of Republic's commercial overlay district regulations.

## General Design Standards

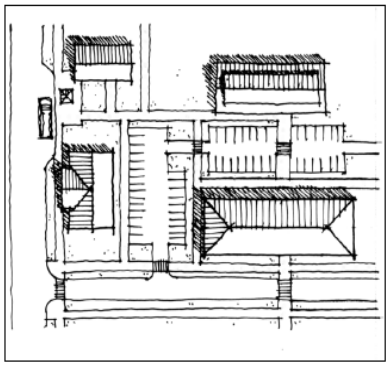
**Building Orientation:** New buildings located along a street frontage should, to the maximum extent feasible, align building walls with conforming existing streets and adjacent buildings and buildings across the street to help create a consistent building edge. New buildings should be integrated with open space to enhance living and working areas. Buildings are encouraged to address the street by not allowing parking between buildings and streets (see Site Plan A and B).

**Multiple-Building Developments**: When there is more than one building in a development, all principal and pad site buildings should be arranged and grouped so that their primary orientation complements adjacent, existing development.

Site Plan A




Site Plan B



**Activity Centers:** Locate higher intensity commercial developments as well as higher density residential developments within identified activity centers along the corridor requiring higher design standards for buildings, parking lots, signs and landscaping.

**Employment or Office Complexes:** These types of uses should be encouraged to be located adjacent to activity centers and designed to blend into the overall development pattern with as little impacts as possible on traffic, adjacent land uses and general site plan layout.

**Multi-Family Developments:** Create affordable residential and multi-family residential areas that include innovative designs and on-site open space amenities that are linked with public bicycle/pedestrian ways, neighborhood centers and transit stops.

**Single-Family Developments:** New neighborhoods should be designed so that daily shopping errands and trips to community facilities can generally be completed within easy walking and biking distances. Large single-family subdivisions should not be located within 700 feet of the corridor.

**Access:** Future development should be encouraged to share and consolidated driveways and reduce the amount of curb-cuts. The first full access into a site from any new proposed side road

should be no less than 700 feet from the Sunshine/US 60 corridor right-of-way.

**Connectivity:** Streets, pedestrian paths and bike paths should contribute to a system of fully connected and interesting routes to all destinations. Their design should encourage pedestrian and bicycle use by being small and spatially defined by buildings, trees and lighting; and by discouraging high speed traffic.

**Traffic Impacts:** Developers of new businesses and residential subdivisions shall provide transportation improvements to offset trip increases caused by their developments. Developers shall mitigate significant adverse traffic impacts upon existing neighborhoods to reduce the impacts to less-than-significant levels, unless the city finds that full mitigations would be incompatible with the neighborhood.

**Pedestrian Connections:** Each development should be connected by well defined pedestrian paths between businesses, between parking lots to buildings and cross street pedestrian connections (see Site Plan B above).

**Parking:** Encourage shared parking lots, internal parking lot landscaping islands every 15-20 parking spaces. Discourage parking between street and building. Require parking in rear or on side of building.

**Prohibited Materials:** Buildings should have all sides facing the corridor designed without blank walls. Buidlings adjacent to a public street within 700 feet of the corridor are encouraged to not use certain materials such as building facades with ribbed metal sheeting/siding.

**Corridor Gateways or Commercial (Activity Center) Entrances:** Create opportunities for interesting visual focal points and vistas throughout for all major street layouts. Major intersections of commercial activity along the corridor need special attention so that all four corners are linked and function as a whole. On each of the four corners of a secondary or higher classified street intersection of the corridor, all developments shall provide a "focal point" within a 200-foot radius from the intersection of the centerlines of the two thoroughfare streets. A "focal point" shall be visible from the intersecting thoroughfare streets. Examples of focal points include: architectural features with a minimum height of twenty-five feet (such as a clock tower, spire, or interesting roof form), public art or sculpture, fountains or other water features, public plazas or other open spaces, or a landscaping feature.

**Setbacks:** Provide for adequate building setbacks from the corridor and frontage roads within activity centers and outside activity centers.

**Signage:** All development signage along the corridor should be designed to a higher standard with limitations on size and height and a general reduction of billboards.

**Landscaping:** Each development should have a well-defined seasonal landscaping plan to enhance the presence of all street frontages.

**Open Space or Natural Areas** Public spaces should be designed to encourage the attention and presence of people at all hours of the day and night and seasons. Wherever possible, the natural terrain, drainage, and vegetation of the community should be preserved with large groupings contained within parks and/or greenways

**Outside Storage of Merchandise:** All outside storage or sale of merchandise should not be seen from the corridor or from a public street.

## Corridor Overlay District

The best method to manage land uses and implement design guidelines along the West Sunshine/ US Highway 60 is by using a corridor overlay district or (COD). The COD in conjunction with the roadway improvements recommended herein will provide a consistent approach to managing development for the corridor within Greene County, the City of Republic and the City of Springfield. Consistency among these localities will help ensure that isolated roadway segments do not develop in ways that negatively affect the corridor as a whole. While roadway improvements are a critical element to maintaining the corridor's safety and function, land use decisions are also an important component, and can support or degrade investments in highway infrastructure. Simply put, effective access management requires roadway and land use management, based on coordination between localities and MoDOT.

## Activity Center Design

Activity Centers (Community and Neighborhood levels) should provide a mix of employment, residential, retail, and commercial uses that accommodate and complement multiple modes of transportation including transit, bicycles, and pedestrians. The intent of this study is to provide the tools for creating an improved quality of appearance and a more integrated mix of land uses for activity centers. Implementation of the study will also improve circulation within and between the centers by providing basic requirements for vehicle, pedestrian, and bicycle circulation. This in turn will improve connectivity between sites and integrate sites within the surrounding transportation network. Although many of these activity centers will not be served by transit in the short-term, the recommendations found in this study provide the necessary steps towards creating more transit-oriented activity centers.

## Applicability

These recommendations made in this study should apply to all development within activity centers (Community Activity Centers and Neighborhood Activity Centers) and connecting corridors in the West Sunshine/Highway 60 study area. It will be up to all of the three jurisdictions involved to implement the study within their territory. The general size, shape, and specific location of each activity center will vary as implemented by the appropriate jurisdiction. Activity centers will generally be located near an interchange or at the intersection of two major roadways or transit facilities. General locations and sizes of each activity center are provided by this study; however, specific boundaries should be determined by each jurisdiction.

# *DESIGN STANDARDS:*

## *GOALS, OUTCOMES AND ACTIONS*

GOAL: Create attractive development within the West Sunshine/ US Highway 60 Corridor.

OUTCOMES

1. Promote development that enhances the visual appearance of the corridor.
2. Develop attractive gateway/focal point entrances along the corridor.
3. Promote development that creates a more walkable environment and develops attractive commercial spaces with safe pedestrian walkways while providing for a variety of transportation choices.

ACTIONS

1. Amend zoning ordinances to include a Corridor Overlay District with design guidelines.
2. Complete one activity center detailed plan.
3. Implement a plan to develop and fund gateways/ focal points at major intersections.

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# APPENDICES

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# *Questionnaire Results*

**1. Do you □-live, □-own property, or □-work within the corridor study area? (Check all that apply)**
**27% 77% 20%**

**2. How often do you travel along the corridor?**
**□ Almost daily, □ Almost weekly, □ 1-3 times a month, □ Less than monthly, □ Never**
**60% 23% 3% 13% 0%**

**3. What is the primary purpose of your travel along the corridor?**
**□ Work, □ Shopping, □ School, □ Recreational, □ Other**
**63% 13% 3% 7% 0%**

**4. Would you support closing center median breaks to control access along the corridor?**
**□ Strongly support, □ Somewhat support, □ Somewhat not support, □ Strongly not support**
**14% 28% 28% 31%**

**5. If the corridor has limited access, are you willing to drive farther down the corridor to access a commercial site?**
**□ Strongly support, □ Somewhat support, □ Somewhat not support, □ Strongly not support**
**13% 30% 27% 30%**

**6. Billboard signs should be allowed along the corridor.**
**□ Strongly support, □ Somewhat support, □ Somewhat not support, □ Strongly not support**
**14% 31% 17% 38%**

**7. Single-Family residential uses should be located at least 600 feet from the highway as a buffer.**
**□ Strongly support, □ Somewhat support, □ Somewhat not support, □ Strongly not support**
**50% 25% 18% 7%**

**8. Parking lots should be required to have landscaping.**
**□ Strongly support, □ Somewhat support, □ Somewhat not support, □ Strongly not support**
**47% 27% 16% 10%**

**9. Commercial developments should be required to have better designed building fronts facing the corridor. □ Strongly support, □ Somewhat support, □ Somewhat not support, □ Strongly not support**
**53% 33% 7% 7%**

**10. All parking lots should be linked to each other by streets or access easements parallel to the highway.**
**□ Strongly support, □ Somewhat support, □ Somewhat not support, □ Strongly not support**
**47% 30% 6% 17%**

**11. Commercial development should be centered around major intersections.**
**□ Strongly support, □ Somewhat support, □ Somewhat not support, □ Strongly not support**
**27% 40% 6% 27%**

**12. What safety concerns do you have about the corridor?**

| |
|---|
| Traffic should flow quickly without a lot of turnoffs |
| Too much cross access |
| Improve roads for better access |
| Traffic should flow quickly without a lot of turnoffs |
| None |
| Stop lights |
| Speeding |
| Traffic should flow quickly without a lot of turnoffs |
| Traffic hazard |
| Traffic hazards |
| Traffic increase |

| |
|---|
| Increase vehicle traffic |
| None |
| Traffic |
| Traffic volume & RR crossings |
| Traffic |
| None |
| Speed |
| Don't allow too many access roads or drives |

**13. What is the most important issue for this corridor?**

| |
|---|
| That there be commercial & that the buildings look good |
| Street improvements & access |
| Transportation |
| Easy go east |
| Strong retail business |
| Flow of traffic, plan for future growth South |
| Access |
| Access |
| Convenience |
| More growth, but don't get over crowded |
| Growth, but well accessible |
| Traffic and or road improvements |
| Well designed plan for development |
| Plan the development |
| Traffic flow |
| Traffic volume |
| I would like orderly commercial development |
| Speed |
| Safety and appearance |
| Appearance, access |
| Good planning for road access |

**14. Which corridor improvements are needed? (Check all that apply)**

**20% More traffic law enforcement**
**50% Improvements to existing commercial and residential driveway entrances and exits**
**53% Construct shared commercial driveway entrances/exists with turning lanes**
**20% Add center median breaks**
**26% Add more lanes**
**56% Bury all new over head utility lines (electric, cable, telephone etc…) underground**
**Other ___**
**3% Utilities**
**3% Collector road improvements**

**15. Should industrial or manufacturing uses be located along the corridor. Yes 50% No 50%**

**16. How should the corridor be developed to meet future demands in housing, shopping and for parks and open space? (use back of sheet if necessary)**

| |
|---|
| Parks & open spaces should be well off corridor with good turn lanes & access |
| Access control |
| If study is only 700 ft, then should not concern residential development |
| Sewer for commercial development |
| Move existing industrial & mfg. |
| Make convenient for development |
| Home Depot |
| Shopping mall, restaurants, recreation park |
| Shopping malls, eat in restaurants, nice recreation park, storm shelters a must: we have nothing this side of town in either direction |
| Annexed into city of Springfield and or Republic |

| |
|---|
| **Come up w/a nice looking plan that is a combination of business, multifamily, single family and parks** |
| **You tell me! I'll vote yes or no** |
| **No junk yards** |
| **Should be attractive & not garbaged via huge billboards & loud colors & landscaped** |

**17. Other comments? (use back of sheet if necessary)**

| |
|---|
| **Did not like the slides; all wrong for the 700 ft.** |
| **No utilities - no development** |
| **None** |

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# *Design*
# *Preference Survey Results*

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Slide 1

## Corridor Preference Survey

Survey participants are asked to look at a series of images and rate them from lowest to highest in terms of their own preferences, using a scale from one (lowest) through five (highest). (Please print off the tally sheet before beginning).

Slide 2

## Strongly Support Picture #8

3.95

Slide 3

## Strongly Support Picture #35

3.90

Slide 4

## Strongly Support Picture #14

3.88

Slide 5

## Strongly Support Picture #1

3.71

Slide 6

## Strongly Support Picture #18

3.71

Slide 7

## Strongly Support Picture #34

3.66

Slide 8

## Strongly Support Picture #15

3.61

Slide 9

**High Support Picture #32**

3.59

Slide 10

**High Support Picture #4**

3.54

Slide 11

**High Support Picture #5**

3.54

Slide 12

**High Support Picture #28**

3.50

Slide 13

**High Support Picture #13**

3.50

Slide 14

**High Support Picture #17**

3.40

Slide 15

**High Support Picture #16**

3.31

Slide 16

**High Support Picture #26**

3.26

Slide 17

**High Support** Picture #12

3.26

Slide 18

**Somewhat Not Support** Picture #10

3.19

Slide 19

**Somewhat Not Support** Picture #27

3.16

Slide 20

**Somewhat Not Support** Picture #33

3.16

Slide 21

**Somewhat Not Support** Picture #3

3.16

Slide 22

**Somewhat Not Support** Picture #9

3.16

Slide 23

**Somewhat Not Support** Picture #11

3.11

Slide 24

**Low Support** Picture #20

2.92

Slide 25

**Low Support** Picture #2

2.85

Slide 26

**Low Support** Picture #7

2.61

Slide 27

**Low Support** Picture #19

2.57

Slide 28

**Low Support** Picture #25

2.50

Slide 29

**Low Support** Picture #31

2.50

Slide 30

**Low Support** Picture #23

2.35

Slide 31

**Low Support** Picture #24

2.31

Slide 32

**Low Support** Picture #21

2.21

Slide 33

**Low Support** Picture #6

2.14

Slide 37

Slide 34

**Strongly Not Support** Picture #30

1.66

Slide 38

Slide 35

**Strongly Not Support** Picture #22

1.66

Slide 39

Slide 36

**Strongly Not Support** Picture #29

1.47

Slide 40

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# MISSOURI DEPARTMENT OF TRANSPORTATION
# ACCESS MANAGEMENT
# GUIDELINES

**May 1, 2005**

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# 1.0 INTRODUCTION AND DEFINITIONS

## Problem statement

As development occurs and vehicle traffic increases, many roadways deteriorate into highly congested routes that experience unacceptable delays and crashes. This deterioration can be due in part to improperly spaced and designed intersections and driveways. These intersections and driveways cause crashes and conflicts to through traffic. Roadways serve a dual purpose of providing a means of transport between one place and another and providing access to adjacent property. Access management is intended to balance the roadways' role of serving through traffic with the role of providing access to property.

Once the safety and efficient operation of a roadway is lost, it is difficult and expensive to restore. Adding lanes to an existing route does not completely solve the problem. Relocating the route causes loss of public investment in the roadway, and loss of private investment in adjacent property. Yet it can be difficult to get support from affected communities, business owners, and the public, for access management as a strategy to improve a roadway experiencing problems with safety and delay.

## Purpose

Access management involves the proper planning and design of points of access to the public roadway system. These points of access include interchanges, public road intersections, and driveways. Sound access management can have a positive impact on roadway safety and the ability of roadways to carry traffic efficiently and safely. Failure to properly manage access can result in safety and operational problems, negatively impact adjacent property owners, and cause a loss of the public's investment in the roadway system.

The access management guidelines contained in this document are intended to provide for the appropriate design and provision of access to facilities operated by the Missouri Department of Transportation(MoDOT), while allowing for flexibility where necessary. The guidelines apply to long-range planning, project planning and design, right-of way acquisition, redesign of existing highway corridors, and driveway permitting. The purpose of the guidelines is to improve the safety and efficiency of traffic moving on and off of public roadway facilities, while balancing the need for access to adjacent property. These guidelines are also offered to municipalities and other entities involved with establishing and maintaining access to the Missouri highway system.

## Background

The goals established for the development of access management guidelines for the Missouri Department of Transportation include the following:

- Improve roadway safety
- Improve traffic operations
- Protect the taxpayers' investment in roadways
- Create better conditions for non-automobile modes

A roadway classification system that balances movement of traffic with access to properties was developed as a first step to defining access management guidelines. Guidelines were then developed for the intersections and interchanges, driveways, and other pertinent issues related to these classifications of roadway. Where possible, national studies and other state's experience with comprehensive access management were used. Guidelines for intersections and interchanges include:

- interchange spacing
- clearance of functional areas for interchanges
- spacing for public road intersections
- spacing of traffic signals

Driveway guidelines include the following:

- Driveway spacing and density
- Corner clearance and clearance of functional areas of public road intersections
- Sight distance minimums
- Driveway geometric design
- Angle of intersection and approach radii
- Driveway width, throat length, and grade
- Guidelines for surfacing and curbs

MoDOT will work with cities, counties, and affected property owners to manage access through shared access, and access from local roadways. Guidelines for the use of two-way left-turn lanes (TWLTLs), three-lane roadways, and raised medians, warrants for auxiliary turn lanes, frontage and backage roads, recommended practices for local land use planning agencies, and consideration of non-automobile modes in managing access are included.

The stakeholders involved in the development of the plan saw the need for development of department wide guidelines. Existing procedures have led to parallel standards used by the separate business units, creating confusion both within the department and with our outside customers. The guidelines will encourage uniformity within the department and provide property owners and developers with a clear expectation of the requirements involved with gaining access to the MoDOT system. Some local government entities in Missouri have chosen to adopt their own access management classification systems and standards for use on their roadway system.

**Benefits of Access Management**

The proven benefits of access management include increased safety for motorists and pedestrians, decreased delay (through better operation), decreased emissions, and aesthetic improvements.

Safer Roadways

National studies show that as many as 68% of all crashes are access related. As demonstrated in other states, implementation of a comprehensive plan will significantly reduce access related crashes. Studies have shown that crash rates can drop as much as 50 % on routes where access management techniques have been implemented.

The safety benefits of access management impact other modes of transportation as well. The reduction of vehicular conflicts creates a similar conflict reduction for pedestrians and bicyclists and decreased exposure to vehicular movements. This translates to a roadway environment that is conducive to pedestrian and bicycle activity.

Improved Operations

Managing access can provide significant improvement to roadway capacity and operational benefits. These improvements to roadway capacity can be documented by analysis using the Highway Capacity Manual (HCM). An example analysis of a four-lane roadway at level of service D, concludes that the same roadway can accommodate nearly 10,000 more vehicles per day by incorporation of access management techniques. Another example analysis demonstrates the effects of one particular element of access management, traffic signal spacing. The capacity of a six-lane roadway with traffic signals spaced at ¼ mile increments is no greater than a four-lane roadway with traffic signals spaced at ½ mile increments.

See Section 5.0 for discussion of alternate analysis procedures.

Environmental Benefits

The operational improvements gained by access management techniques have environmental benefits. Reduced delay results in improved fuel economy and reduced emissions on well-managed roadways.

Improved Roadway aesthetics

Techniques such as increased driveway spacing and median treatments provide additional areas for green space and landscaping. These areas can create an improved climate for commercial and residential areas.

**Expected Impacts of the Proposed Access Management Plan**

Business community/property impacts

On routes where access is not managed, increased congestion can lead to decreased traffic volumes as motorists avoid the routes to escape the delay. Lower traffic volumes can result in a drop in business revenues and property values. Thriving business corridors can experience an economic decline associated with traffic congestion.

On routes where access is managed, certain types of businesses located in the mid-block that depend on convenience for passer-by traffic may experience a negative impact, but studies done in other states indicate that the majority of businesses located on roadways with properly managed access experience increased sales and property values. Overall, the market area of businesses will increase on well-managed routes, due to reduced congestion.

The possible reduction in access points will be perceived as a negative impact by adjoining property owners, in particular commercial property owners. A reduction in the

total number of access points has not been shown to have a detrimental effect on business. With regard to a possible reduction in left turning opportunities, national studies show mixed results on the effect of the use of restrictive medians to limit left turns. Any negative impacts are directly related to the specific type of business and are not demonstrated in the results of all case studies. The proposed plan is designed to minimize the detrimental effects of restricting left turns while maximizing the operational advantages.

Increased Life Span of Roadways

Vergil Stover and Bud Koepke, two national experts in the field of access management, reflect the observation of most engineers and planners when they stated: "The failure to manage access is the major cause of highway obsolescence". Many roadways in Missouri have deteriorated operationally from inadequate access management. This deterioration eventually drives MoDOT to construct bypasses in order to relieve the congestion. If a bypass is not an alternative for improvement, the motorists and the property owners have no other choice than to live with the operational problems. The proposed comprehensive plan allows for cost effective use of the taxpayer investment by ensuring the maximum available capacity for a given roadway improvement.

Right of Way Costs

An increased investment will be necessary for additional right of way and access limitations. This increased investment will be offset by additional capacity and greater longevity of the roadway. The most visible changes will include:

1. An increased footprint for freeway interchanges.
2. An expansion of access limitations on minor arterial roadways. Current standards require access limitations in the area immediately surrounding public street intersections. The proposed guidelines will require the purchase of access limitations along the entire right of way.
3. Defined spacing guidelines for driveways will reduce the number of access points available to some properties, while increasing the number available to other properties.

Less Direct Access for Motorists

The reduction of conflict points proposed by the plan will also reduce the number of left turn opportunities on some routes resulting in less direct access to some properties. The plan minimizes the impact through the use of various design features (U-turn phases at signals, roundabouts, etc)

## Implementation

Access Management retrofit projects

To address problems with safety and traffic operations on those highly developed and congested arterial routes on the state highway system, an evaluation of improvement alternatives should include the application of access management techniques. In the process of determining project scope, if an access management retrofit can be shown to provide cost effectiveness, improvements to safety, capacity, and traffic operations

beyond that of other project alternatives, the access management alternative should be pursued. Where access is being managed on an existing roadway (a "retrofit project"), MoDOT will strive to incorporate the Access Management guidelines. However, it may not be possible to incorporate and attain all of the access management guidelines in retrofit projects due to existing development, economic, physical, and other constraints. Through public involvement and cooperation with local governments, MoDOT staff will work to provide a reasonable solution under the existing conditions.

Inclusion of the Access Management guidelines in projects with new roadway alignments

All corridors that are improved through a MoDOT project need to continue to operate efficiently and safely for many years to protect taxpayer investment in the roadway. The incorporation of Access Management into these projects will provide for proper placement and design of accesses, so that additional development does not cause them to deteriorate into highly congested routes that experience excessive delay and safety problems.

The Project Development Manual contains the minimum acceptable criteria that can be implemented without approval from headquarters. On both retrofit and new roadway alignment projects, collaboration with General Headquarters Design and documentation in the Scoping Process will be required when the Access Management guidelines are not attained on the project. For statewide consistency on projects and permits, the State Traffic Engineer will provide a recommendation as part this collaboration process. The Director of Project Development will resolve any differences between Design and Operations. An evaluation process will be conducted to determine the department's success in implementing the Access Management guidelines on projects.

Permitting Procedures

When a request for access is received, the district staff will work with the property owner to determine whether applicable spacing guidelines can be met. If they cannot, collaboration with Headquarters must occur and other options such as side road access and shared access will be pursued. For requests on normal access right of way, if no workable alternative exists, a permit can be pursued with documentation required as to why the guidelines were not met. For requests on limited access right of way, if no workable alternative exists and the request is compliant with the Commission's policy for Changes in Access on Limited Access Right of Way, the appropriate agreement (and subsequent permit) may be pursued with documentation required as to why the guidelines were not met. Requests that are not compliant with the Commission's Policy for Changes in Access on Limited Access Right of Way must be forwarded to the State Traffic Engineer for review (for further information, see the Permitting Processes Manual).

For larger developments, if it is determined that the access point requested will meet the guidelines for spacing, a traffic study will be required to determine what roadway improvements will be required. To ensure that operations on our roadway are not negatively impacted by the additional access, the developer will provide the roadway improvements. The policy of the Missouri Highways and Transportation Commission and MoDOT should be in all cases to discourage the proliferation of access points and conflict points within the State highway system.

Cooperation with city and county planning and zoning authorities

Successful access management involves a partnership between MoDOT and local land use planning officials. Implementation of the Access Management plan will include face-to-face informational meetings between District staffs and local authorities. Districts should work to establish mutually beneficial and cooperative relationships with city and county stakeholders. This relationship should allow MoDOT to provide input into the plat and zoning review process to assure that sound access management principles are implemented. A cooperative relationship can help to successfully manage on-site circulation and lot frontages. Access to local side streets and cross access easements necessary to maintain proper access spacing can also be accomplished. While MoDOT has no authority to manage on-site issues that occur beyond the MoDOT right of way, these on-site issues can influence the operation of our roadway.

## Legal Authority For Access Management In Missouri

The Missouri Department of Transportation (MoDOT) operates under the supervision of the state transportation commission.

Article IV, Section 29 (Highways and Transportation) of the Missouri Constitution states:

> " The highways and transportation commission shall have authority over all state transportation programs and facilities as provided by law, including, but not limited to, bridges, highways, aviation, railroads, mass transportation, ports, and waterborne commerce, and shall have authority to limit access to, from and across state highways where the public interest and safety may require."

Compensation to property owners is governed by Article I, Section 26 of the Missouri Constitution. That section states that:

> "Private property shall not be taken or damaged for public use without just compensation. Such compensation shall be ascertained by a jury or Board of Commissioners of not less than three freeholders, in such manner as may be provided by law; and until the same shall be paid to the owner, or into court for the owner, the property shall not be disturbed of the proprietary rights of the owner therein divested."

The Commission has the authority to restrict access, but it may have to pay for the exercise of that power. The principal limitation on the exercise of police power to limit access is that any limitation must be reasonable.

### Permit Exceptions to Access Management Guidelines

For access granted through permitting procedures that do not meet the Access Management guidelines, appropriate documentation will be required. For permits involving sight distance, clearance of the functional area of an interchanges, signal spacing, collaboration with Headquarters Traffic is strongly suggested.

A system will be put in place to track permits statewide and an evaluation process will be conducted to determine the level of success in implementing the Access Management guidelines through permitting.

## Definitions of Terms

**AASHTO** – The American Association of State Highway and Transportation Officials.

**Access** – The ability to enter or leave a business, residence or land parcel from a public roadway via a connecting driveway. In real estate law, the term "access" denotes the right vested in an owner of land that adjoins a highway or other road to go and return from his/her own land to the highway without obstruction.

**Access Management** – The design of driveways, intersections, interchanges, and other access features of roadways so as to maintain safety and operational performance of roadways.

**Access Management Program** – The whole of all actions taken by a governing council, board, or agency to maintain the safety and traffic carrying capacity of its roadways.

**Annual Average Daily Traffic (AADT)** – The annual average two-way daily traffic volume on a route. AADT represents the total traffic on a road per year, divided by 365. For the purposes of access management on MoDOT routes, all AADT figures should come from MoDOT data collection (past or current traffic), a Metropolitan Planning Organization (MPO) urban transportation model, or the MoDOT statewide traffic model (forecast traffic).

**Arterial** – A road intended primarily to serve through traffic and where access is carefully managed.

**At Grade** – Where two or more facilities meet in the same plane of elevation.

**Auxiliary Lane** – A lane adjoining a roadway that is used for acceleration, deceleration, or storage of vehicles.

**Backage Road** – A local road that is used to provide alternative access to a road with higher functional classification; backage roads typically run parallel with the main route and provide access at the back of a line of adjacent properties.

**Collector** – Roads intended to move traffic from local roads to secondary or principal arterials.

**Commercial** – Property developed for the purpose of retail, wholesale, or industrial activities, and that typically generate higher numbers of trips and traffic volumes than do residential properties.

**Conflict** – A traffic-related event that causes evasive action by a driver to avoid a collision.

**Conflict Point** – Any point where the paths of two through or turning vehicles diverge, merge, or cross and create the potential for conflicts.

**Congestion** – A condition resulting from more vehicles trying to use a given road during a specific period of time than the road is designed to handle with what are considered acceptable levels of delay or inconvenience.

**Corner Clearance** – The distance between the edge of an intersection between a public road and the closest edge of the first driveway.

**Corridor** – A major roadway designed for relatively uninterrupted, high-volume mobility between regions.

**Crash Rate** – The number of vehicular collisions occurring on a facility divided by traffic volume during a selected time period.

**Cross Access** – A service drive that provides access between two or more abutting sites so that the driver need not enter the public street system to move between them.

**Deceleration Lane** – A speed-change lane that enables a vehicle to leave the through-traffic lane and decelerate to stop or make a slow speed turn.

**Directional Median** – A (typically) raised median used to channel traffic in a particular direction. For example, a directional median may allow only right turns at a particular location.

**Design Traffic Volume** – The traffic volume that a roadway or driveway was designed to accommodate and against which its performance is evaluated.

**Downstream** – The next feature (e.g., a driveway) in the same direction as the traffic flow.

**Driveway** – A (typically) private roadway or entrance used to access residential, commercial, or other property from an abutting public roadway.

**Driveway Density** – The number of driveways divided by the length of a particular roadway.

**Driveway Width** – The width of a driveway measured from one side to the other at the point of tangency.

**Easement** – A grant of one or more property rights by a property owner. For example, one property owner may allow a neighbor to access public roads across his/her property.

**Entering Sight Distance** – The distance of minimum visibility needed for a passenger vehicle to safely enter a roadway and accelerate without unduly slowing through traffic.

**Expressway** – A major roadway designed for relatively uninterrupted, high-volume mobility between regions, access to which is limited and often includes a mixture of intersections (at grade) and interchanges (grade separated).

**Facility** – A transportation asset designed to facilitate the movement of traffic, including roadways, intersections, auxiliary lanes, frontage roads, backage roads, bike paths, etc.

**FHWA** – The Federal Highway Administration of the U.S. Department of Transportation.

**Flag Lot** – A lot not meeting minimum frontage requirements where access to a public road is provided by a narrow strip of land carrying a private driveway.

**Freeway** - A major roadway designed for relatively uninterrupted, high-volume mobility between areas, access to which is limited to grade-separated interchanges only. Interstates are freeways.

**Frontage** – The length of a property that directly abuts a highway.

**Frontage Road** – A local road that is used to provide alternative access to property from a road with higher functional classification; frontage roads typically run parallel to the mainline road and provide access at the front of a line of adjacent properties.

**Functional Area** – The area surrounding an interchange or intersection that includes the space needed for drivers to make decisions, accelerate, decelerate, weave, maneuver, and queue for turns and stop situations. The functional area should be kept as clear as possible of driveways and median openings where left turns are allowed.

**Functional Classification System** – A system used to categorize the design and operational standards of roadways according to their purpose in moving vehicles; higher functional classification implies higher traffic capacity and speeds and typically longer traveling distances.

**Functional Integrity** – Incorporation of appropriate access management guidelines and controls that allow a roadway to maintain its classified purpose.

**Geometric Design Standards** – The acceptable physical measurements that allow a facility to maintain functional integrity.

**Grade Separated** – Two or more facilities that intersect in separate planes of elevation.

**Highest and Best Use** – The probable and legal use of vacant land or improved property that is physically possible, appropriately supported, and financially feasible, which results in the highest property value.

**Highway** – A public way that every person has a right to use. The two critical aspects of a highway are the right of common enjoyment and the duty of public maintenance**.** In this document, a highway generally refers to a roadway under MoDOT jurisdiction that plays some role in moving through traffic.

**Highway Capacity** – The maximum number of vehicles a highway can handle during a particular amount of time and at a given level of service.

**Highway System** – All public highways and roads, including controlled access highways, freeways, expressways, other arterials, collectors, and local streets.

**Interchange** – A grade-separated facility that provides for movement between two or more roadways.

**Internal Circulation** – Traffic flow that occurs inside a private property.

**Internal Site Design** – The layout of a private property, including building placement, parking lots, service drives, and driveways.

**Intersection** – An at-grade facility that provides mobility between two or more roadways.

**Interstate** – A federally designated roadway system for relatively uninterrupted, high-volume mobility between states.

**Jersey Barrier** – A special variety of very high raised median that is used to separate opposing flows of traffic on high-speed urban interstates and freeways.

**Joint (or Shared) Access** – A private access facility used by two or more adjacent sites.

**Just Compensation** – The measure of damages in condemnation that represents the difference between the fair market value of the property immediately before a taking (a change in access that altered the value) and the value of the property in the after condition.

**Land Use** – The particular application for which a portion of land is employed, for instance, commercial use.

**Lane** – The portion of a roadway used in the movement of a single line of vehicles.

**Left-Turn Lane** – A lane used for acceleration, deceleration, or storage of vehicles conducting left-turning (cross traffic) maneuvers.

**Level of Service** – The factor that rates the performance of a roadway by comparing operating conditions to ideal conditions; "A" is the best, "F" is the worst.

**Local Land Use Authority** – Governmental entities such as cities and counties have authority to plan, zone, and control the subdivision of land on properties outside the right-of-way. Such authority is often critical to an effective program of roadway access management.

**Local Service Street** – A road whose primary purpose is to provide access between abutting properties and roads of higher functional classification.

**Median** – A barrier that separates opposing flows of traffic. Raised medians (with curbs and a paved or landscaped area in the center) are generally used in urban areas. Raised medians should not be confused with the more obtrusive Jersey Barriers. Flush medians (with no curbs and a grass-covered area in the center) are generally used in rural areas. Medians can be both functional and attractive.

**Mid-Block Crossing** – A crossing that is provided so that pedestrians can conveniently and safely cross a roadway in the middle of a block or segment of roadway.

**Minor Arterial** – A road whose primary purpose is to provide access between collectors and roadways of higher functional classification; these roads mainly provide local mobility and some access to land.

**MoDOT** – The Missouri Department of Transportation.

**NCHRP** – The National Cooperative Highway Research Program, a program that sponsors research on highway safety, operations, standards, and other topics.

**Peak Hour Traffic** – The number of vehicles passing over a section of roadway during its most active 60-minute period each day.

**Police Power** – The general power vested in the legislature to make reasonable laws, statutes, and ordinances where not in conflict with the Constitution that secure or promote the health, safety, welfare, and prosperity of the public.

**Principal Arterial** – A road whose primary purpose is to provide long-distance mobility between areas as well as connections between roads of lower functional classification, particularly minor arterials and collectors.

**Queue Storage** – A lane used to temporarily hold traffic that is waiting to make a turn or proceed through a location controlled by a traffic control device such as a stop sign or traffic signal.

**Raised Median** – The elevated section of a divided road that separates opposing traffic flows.

**Residential** – Property developed for the purpose of family, multi-unit, or other housing quarters, and that typically generates a lower number of trips and a lower volume of traffic than do commercial properties.

**Right-In, Right-Out** – A driveway or median where left turns are prohibited either by physical or regulatory means. In general, regulatory approaches to preventing left turns are ineffective.

**Right-of-Way** – Land reserved, used, or slated for use for a highway, street, alley, walkway, drainage facility, or other public purpose related to transportation.

**Road** – For the purposes of this document, a transportation facility extending from one community to another.

**Roadway** – The part of a public transportation facility intended for use by through traffic.

**Roadway Classification System** – See "Functional Classification System"

**Rural** – A geographic area that is not in an urbanized Area, municipality, or similarly densely developed area and which is not likely to be so in the next 20 years.

**Service Road** – A local road that is used to provide alternative access to a road with higher functional classification; service roads may include internal circulation systems, frontage roads, or backage roads.

**Shared Driveway** – A single, private driveway serving two or more lots.

**Side Friction** – Driver delays and conflicts caused by vehicles entering and exiting driveways.

**Sight Distance** – The distance visible to the driver of a passenger vehicle measured along the normal travel path of a roadway to a specified height above the roadway when the view is unobstructed to oncoming traffic.

**Speed Differential** – The difference in travel speed between through traffic and traffic entering or exiting a roadway. Large speed differentials can contribute to delay, congestion, and rear-end collisions.

**Stopping Sight Distance** – The minimum distance required for a vehicle traveling on a roadway to come to a complete stop upon the driver seeing a potential conflict; it includes driver reaction and braking time and is measured on a wet pavement.

**Storage Length** – The length of a lane of roadway used to temporarily accumulate traffic that is waiting to proceed through a traffic control device or other stop or yield situation.

**Street** – For the purposes of this document, roads or public ways that are contained within a city, town, or village.

**Strip Development** – A linear pattern of roadside commercial development that often creates a large number of driveways and conflict points along a roadway.

**Subdivision** – A tract of land that is divided into multiple lots, often along an existing or proposed street, highway, easement, or right-of-way.

**Taper** – The transitional area of a roadway where it becomes wider or narrower.

**Thoroughfare Plan Map** – A long range traffic circulation map that identifies the right-of-way widths for each roadway and serves as an official listing of rights-of-way to be reserved.

**Throat Length** – The distance between an intersecting roadway and where the internal circulation of a commercial driveway or parking lot begins; it provides queue storage mainly for traffic exiting a development.

**Traffic Flow** – The actual amount of traffic movement.

**Traffic Impact Study** – A report that compares relative roadway conditions with and without a proposed development; it may include an analysis of mitigation measures.

**Transition** – The area of a roadway where a change in traffic patterns occurs, including acceleration, deceleration, and turning activities.

**Trip Generation** – The estimated volume of entering and exiting traffic caused by a particular development.

**Turning Radius** – The radius of an arc that approximates the turning path of a vehicle.

**Two-Way Left-Turning Lane (TWLTL)** – A lane located between opposing traffic flows, which provides a transition area for left-turning (cross traffic) vehicles.

**Uncontrolled Access** – A situation that results in the incremental development of an uncontrolled number, spacing, and/or design of access facilities; an access management program is intended to constrain uncontrolled access.

**Upstream** – Against the direction of the traffic flow.

**Urban** – Within a current census urbanized area or municipal boundary or an area with similar density characteristics or forecast to be of an urban character within the next 20 years.

**Vehicle Trip** – A vehicle moving from a point of origin to a point of destination.

**Warrant** – The standardized condition under which traffic management techniques are justified.

**Weaving** – Crossing of traffic streams moving in the same general direction through merging and diverging, for instance, near an interchange or intersection.

## 2.0 ROADWAY CLASSIFICATION SYSTEM

Roadways serve a dual purpose of providing a means of transport between one place and another and providing access to adjacent property. Access management is intended to balance the roadways' role of serving through traffic with the role of providing access to property.

Highways should be carefully classified based on their intended function so that access can be managed in an appropriate way. Highways that are intended to mainly serve through traffic (e.g., interstates, freeways, and principal arterials) should play a limited role in terms of direct property access. These are routes where the Highway and Transportation Commission purchases rights of access from landowners and allows for access only at those points where it is appropriate. Access management on these routes should be stricter than on other routes such as collectors and local roads and streets. These collector routes may carry some through traffic; however, the main purpose of collectors is to provide direct access to property.

The following classification system is used throughout this document to establish a functional hierarchy of roadways. It was developed based on the existing MoDOT functional classification system. Each roadway under MoDOT jurisdiction is classified according to this system. Routes classified as interstate/freeway or principal arterial are intended to carry long-distance, high-speed travel and will have a high level of access control. Routes classified as minor arterials and collectors will make up the bulk of the miles of the system, serve more local destination traffic, and have a lower level of access control.

| Urban/ Rural |
|---|
| **Interstate/Freeway** |
| **Principal Arterial** |
| **Minor Arterial** |
| **Collector** |

- Some of the guidelines for the Principal Arterial classification will be a range of values. The high end of this range should be applied to Principal Arterial routes that are intended to serve long-distance trips at relatively high speeds.

- The "collector" classification includes both major collectors and minor collectors.

- Urban: Any area forecasted as urban within 20 years, or future urban highways should be planned as such in terms of access management.

- A rural designation means that the highway is *not* within a current or 20-year forecast urban area.

The Missouri Department of Transportation does not have jurisdiction for local roads and streets; cities and counties in Missouri control such routes. Routes on the MoDOT system that serve a local road or street function should be transferred to a local jurisdiction.

## 3.0 GUIDELINES FOR DETERMINING URBAN AND RURAL SEGMENTS

Breaks between urban and rural designations will be established on a regular basis by MoDOT district staff for access management purposes. In general, this should be done according to the definitions of urban/rural currently used in MoDOT's planning process, except that each break between urban and rural must occur at a readily identifiable physical feature such as a bridge, creek, river, or public road intersection.

Urban areas will be set to take into account that the urban area around metropolitan areas will grow substantially beyond the current urban boundary over the next 15–20 years. Most Metropolitan Planning Organizations (MPOs) forecast and establish a 20-year planning boundary for long-range transportation planning purposes. This boundary should be adopted as the future urban boundary for access management purposes.

### Outside Urban Areas

In some places, traffic density may be a more important consideration than population density. Such areas might be described as "commercial communities" located in what are now rural areas. Examples of this type of development would be strip commercial centers located along major routes outside of city boundaries. Reasonable guidelines for identifying "rural commercial communities" are individual commercial developments that generate at least 250 trips per hour (2,500 trips per day) or clusters of commercial development that generate at least 4,000 trips per hour (4,000 trips per day) along a mile of road. (This equates to 200 trips per hour for a one half mile of road.)

Other rural areas that appear likely to develop at urban densities (either in terms of population or traffic/trip generation) over the next 15 to 20 years should be considered as *urban* for access management purposes.

### Minimum Length For An Urban Designation

In order to preserve continuity on the Missouri highway system, urban designations for access management purposes should be *at least* one-half mile in length or more. Frequent transitions in designations along routes between urban and rural should be avoided wherever possible.

### Urban-Rural Designation Process

The planning and traffic staff in each district should determine the urban and rural boundary points along each route for access management purposes. This should be done in consultation with appropriate MPO, regional planning, and local government representatives. Adjacent districts must coordinate urban and rural designations near their boundaries.

As noted above, each break between urban and rural must occur at a readily identifiable physical feature such as a bridge, creek, river, or public road intersection.

Urban and rural designations for access management purposes may be expected to change over time, depending on development trends and changes in the highway network. Urban and rural break points should be reviewed by district planning personnel at least every two years.

## 4.0 LIST OF GUIDELINES

The following table provides a listing and rationale for the guidelines included in this document.

| Access Management Guideline | What It Means | Why It Is Important |
|---|---|---|
| **Classification System** | | |
| **Access management roadway classification system.** | Access management guidelines should vary by the functional roadway type; the system classification should be mapped. | Allows access management guidelines to properly fit the functional role of the highway, street, or road—the higher function, the less direct access is allowed. |
| **Interchanges/ Intersections** | | |
| **Distance between interchanges on interstates and other freeways.** | The minimum distance allowed between two interchanges. | Avoids intense weaving situations that create congestion and increase crash rates. |
| **Clearance of functional areas of interchanges.** | The minimum distance between an at-grade intersection or driveway and an interchange. | Preserves safety and traffic flow at and near interchanges. |
| **Freeway/expressway transition.** | The minimum transition distance between freeway interchange and at-grade intersection on a principal arterial that changes from a freeway to an expressway. | Helps drivers make a safe transition when a roadway changes in terms of its access management features. |
| **Distance between major at-grade intersections.** | The minimum distance or spacing between types of roadways (e.g., between two major arterials). | Preserves traffic flow and ensures that a functional hierarchy of roads is maintained. |
| **Distance between traffic signals.** | The minimum and desirable spacing between signals. | Ensures efficient traffic flow on signalized arterials. Too many signals placed too close together will disrupt traffic flow. |

| Access Management Guideline | What It Means | Why It Is Important |
|---|---|---|
| **Driveways** | | |
| **Driveway spacing and density.** | The amount of distance between driveways and the number of driveways per unit of frontage. These guidelines should vary with the roadway classification, the expected land use, and the speed limit for the road. | Short spacing between driveways and high driveway densities generate conflict points that in turn lead to higher crash rates and more traffic congestion. |
| **Corner clearance and clearance of the functional areas of intersections.** | The minimum distance allowed between an intersection and the first driveway. | Insufficient corner clearance is a major cause of access-related crashes. |
| **Sight distance standards.** | The sight distance conditions under which a driveway should not be allowed. | A driveway opening where there is insufficient sight distance is inherently dangerous. |
| **Driveway geometric guidelines.** | The width, turning radius, throat length, approach angle, grade, and surfacing requirements for driveways. These can vary by the expected land use served by the driveway and the roadway classification. | Insufficient driveway geometrics lead to slow driveway entrance and exit speeds. This leads to conflicts between turning and through traffic. Driveway geometric design can help or hinder pedestrians and bicyclists. |

| Access Management Guideline | What It Means | Why It Is Important |
|---|---|---|
| **Other Access Features** | | |
| **Median opening.** | Where openings in medians will and will not be allowed. | Too many median openings or closely spaced median openings detract from the proper functioning of a median. |
| **Guideline on using two-way left-turn lane (TWLTL).** | When TWLTLs should be used and when raised medians should be used instead. | TWLTLs are far less controversial than raised medians; however TWLTLs do not function well once a certain traffic volume range has been reached. |
| **Auxiliary lanes (dedicated left- and right-turning lane guidelines.)** | The traffic conditions under which turning lanes should be provided to serve a commercial or industrial driveway. | Some high volume driveways should have dedicated left- or right- turn lanes to reduce conflicts with through traffic. This is particularly true on high-speed routes. |
| **Frontage and backage road spacing.** | How far away frontage and backage roads should be placed from the mainline. | Frontage and backage roads that are placed too close to mainlines may create more conflicts than they solve. |
| **Guideline for using three-lane TWLTL cross-section.** | A three-lane road may perform better than a four-lane undivided roadway under the right circumstances. | Three-lane roads are a relatively new concept that may be an economical solution to some access problems. |

## 5.0 ANALYSIS OF RETROFIT APPLICATIONS

Where access is being managed on an existing roadway (a "retrofit project"), it may not be possible to incorporate and attain all of the access management criteria due to economic, physical or other constraints. In such cases where the access management criteria cannot be met, a detailed analysis should be performed to determine the optimum solution. This solution should strive to improve safety and operations along the roadway, and maintain uninterrupted flow on the transportation system.

While HCM procedures can provide quick and reliable results for predicting whether or not a facility will be operating at or below capacity, they are generally limited in their ability to evaluate systems effects, queues and the effects of queues, and over saturated conditions. Additionally, there are several gaps in the HCM procedures, such as roadways with the following:

- closely spaced traffic signals
- two-way left turn lanes
- roundabouts
- tight diamond interchanges
- freeway weaves
- other unique scenarios

In cases where HCM procedures will not adequately analyze the roadway improvements, a microsimulation analysis may be appropriate. The VISSIM software package has been identified as the most capable of analyzing the limitations and gaps of the HCM. In regards to roundabouts, the HCM may be used as a primary check of a roundabout's capacity, but additional operational analyses should use either the SIDRA or VISSIM software package.

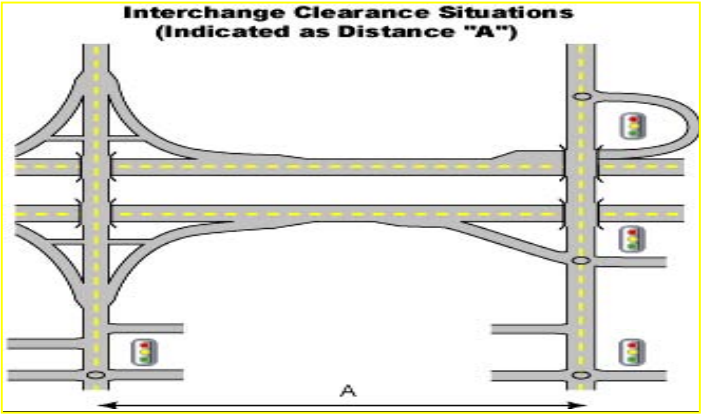
## 6.0 MINIMUM SPACING BETWEEN INTERCHANGES

### What This Guideline Means

This guideline governs the minimum spacing between grade-separated interchanges on high-speed roads that are intended to mainly serve long distance travel. Spacing of interchanges is needed to preserve smooth traffic flow and to allow for safe and efficient weaving or changing of lanes for traffic that is entering and exiting. Generally, speeds are higher in rural areas; therefore, interchanges must be spaced farther apart there than in urban areas.

All interchange spacing decisions will be subject to operational and level of traffic service analysis for traffic. Connectivity, speed, and safety will also be considered. In highly dense urban central city areas, the configuration of the local street system may require a closer interchange spacing to maintain connections and mobility. Shorter spacing may be considered when the analysis indicates this is prudent and necessary. Measurements are made between the centers of interchanges as shown below.

### Diagram




### Minimum Guideline

| Roadway Classification | In Current and Projected Urban Areas | In Rural Areas |
|---|---|---|
| **Interstate/Freeway** | 2 miles | 5 miles |
| **Principal Arterial** | 2 miles | 5 miles |
| **Minor Arterial** | Generally not applicable | Generally not applicable |
| **Collector** | Generally not applicable | Generally not applicable |

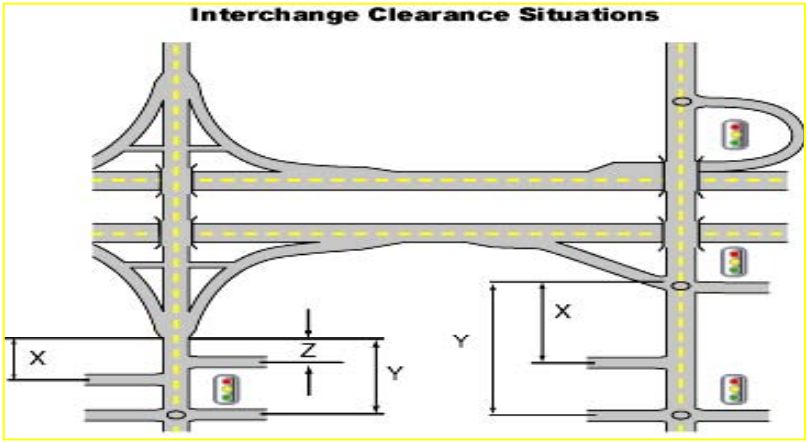
## 7.0 CLEARANCE OF FUNCTIONAL AREAS OF INTERCHANGES

### What This Guideline Means

This guideline applies to areas where grade-separated facilities (e.g. interstates and other freeways) interchange with surface streets, highways, and roads. In such cases, adequate areas need to be provided for traffic to make the transition from a road with a very high level of access control to a different road with at-grade access points. The functional area of the interchange is the area in which merging and diverging of traffic takes place. Drivers must travel along an exit ramp, find acceptable gaps, change lanes (weave), and merge within this distance.

In order to provide a safe distance for this activity to occur, a spacing of about 1,320 feet needs to be provided from the end of the off ramp to the first private driveway on the left-hand side, median opening, or intersection with a public road in urban areas. (This is measured from the point of intersection of the ramp baseline and roadway centerline.) These guidelines also apply to on-ramps. When only right turns into or out of driveways or public roads are involved, a shorter clearance area (750 feet) may be used.

### Diagram




X = Minimum distance from baseline off-ramp to first right-in, right-out driveway/public road intersection.

Y = Minimum distance from baseline off-ramp to first major public road intersection, full median opening, or left-turn opportunity.

Z = Minimum distance from last right-in, right-out opportunity to baseline on-ramp.

**Minimum Guidelines for Interchange Area Clearance**

| Type of Area | Minimum Distance from Off-Ramp to First Right-In, Right-Out Driveway (X) | Minimum Distance to First Major Public Road Intersection, Full Median Opening, Or Left-Turn Opportunity (Y)* | Minimum Distance from Last Right-In, Right-Out Driveway to On-Ramp (Z) |
|---|---|---|---|
| **Urban** | 750 feet | 1,320 feet | 750 feet |
| **Rural** | 750 feet | 1,320 feet | 750 feet |

*No left turns should be allowed in this section of roadway. The public road intersection is likely to become a signalized intersection as the interchange area develops. Right –in, right –out driveways configuration must include a non-traversable median.

Note: All ramp measurements are taken to or from baseline ramp.

Any proposal for a clearance of less than the minimum guidelines contained in the above table will require a study of alternatives to ensure safety and traffic flow. All reasonable alternatives, including relocating the interchange to a different location should be considered. Other alternatives to be examined may include installation of raised medians or alternative access ways such as frontage and backage roads.

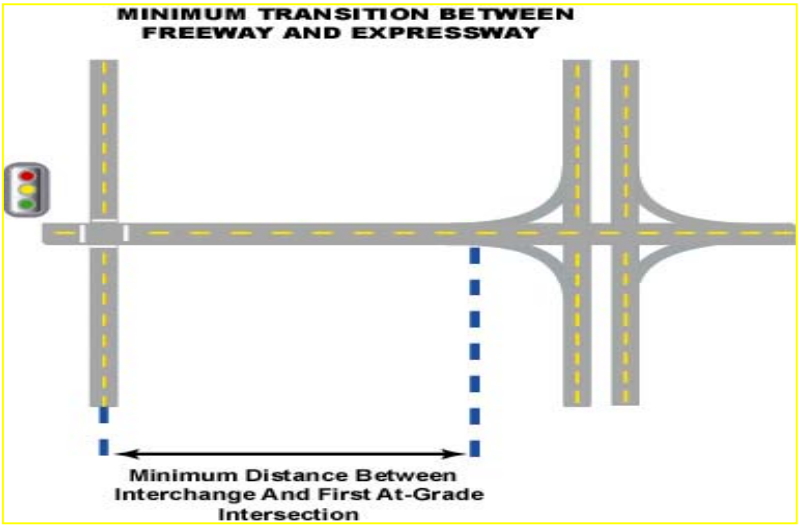
## 8.0 FREEWAY AND EXPRESSWAY TRANSITION

### What This Guideline Means

Some principal arterials will consist of a mixture of freeway (with grade-separated interchanges and no driveway accesses) and expressways (with at-grade public road intersections and driveways). The transition between freeway and expressway must be made carefully so drivers are well aware that a change in the access character of the roadway has occurred. This guideline will not apply to minor arterials or collectors.

The following guideline represents the minimum distance that should exist between the taper of the final ramp on a freeway cross section to the first at-grade intersection (and potentially the first traffic signal) on an expressway cross section on the same facility.

### Diagram




### Minimum Guideline

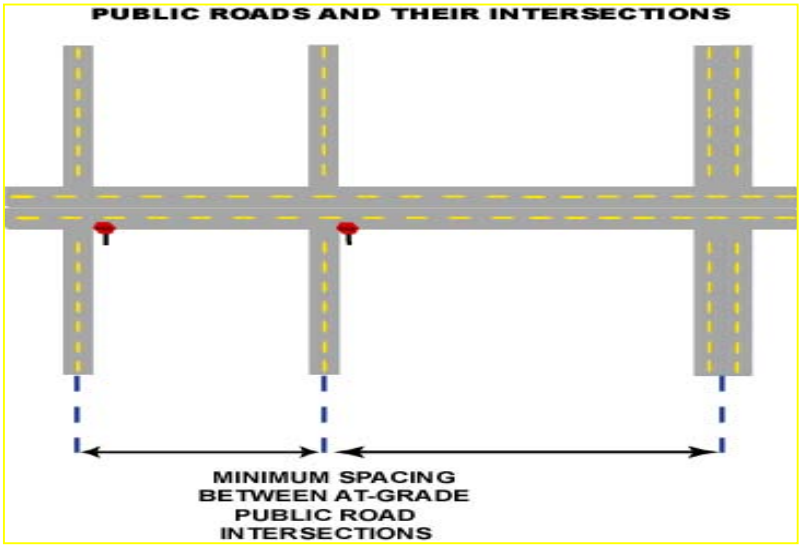
| Roadway Classification | In Current and Projected Urban Areas | In Rural Areas |
|---|---|---|
| **Interstate/Freeway** | No at-grade intersections are allowed (no expressway cross sections) | No at-grade intersections are allowed (no expressway cross sections) |
| **Principal Arterial** | ½ mile (2,640 feet) | 1 mile (5,280 feet) |

## 9.0 AT-GRADE INTERSECTIONS SPACING

### What This Guideline Means

This guideline governs the minimum distance or spacing between types of public roadways and their intersections. This guideline provides for a hierarchy of roads and maintains adequate spacing between roads that are intended to mainly serve through traffic. Interstates, freeways, and the three types of arterials are mainly intended to serve through traffic and therefore are spaced the farthest apart. Collectors provide some service to through traffic but also provide direct access to property; therefore, they can be placed closer together.

### Diagram




### Minimum Guideline

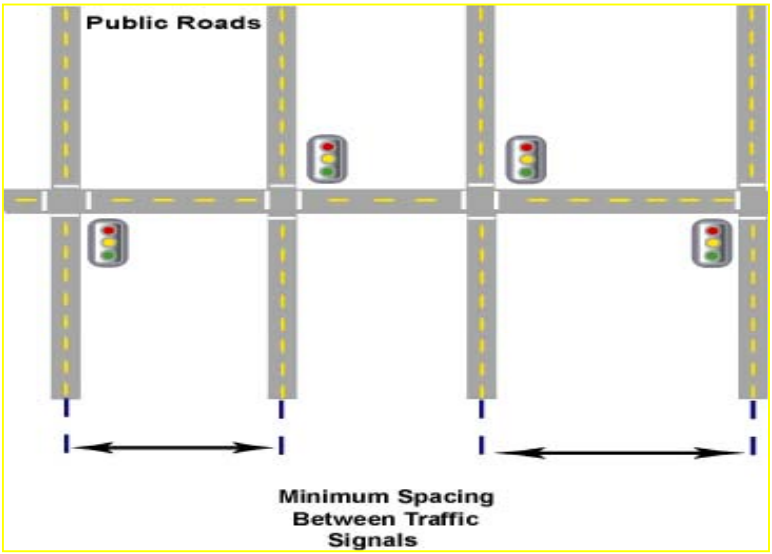
| Roadway Classification | In Current and Projected Urban Areas | In Rural Areas |
|---|---|---|
| **Interstate/Freeway** | No at grade intersections are allowed | No at grade intersections are allowed |
| **Principal Arterial** | ½ mile (2,640 feet) | 1 mile (5,280 feet) |
| **Minor Arterial** | ¼ mile (1,320 feet) | ½ mile (2,640 feet) |
| **Collector** | 660 feet(desirable) | 1,320 feet(desirable) |

## 10.0 TRAFFIC SIGNALS SPACING

### What This Guideline Means

This guideline governs the distance between signalized at-grade intersections on public roadways. Minimum spacing is mainly intended to preserve efficient traffic flow and progression on urban arterial roadways; for instance, a quarter- or half-mile spacing allows traffic signals to be effectively interconnected and synchronized. Adequate spacing will also tend to reduce rear-end collisions and “stop and go” driving that increases congestion, delay, and air pollution. In urban areas, these guidelines were developed to allow for smooth operations given a 90-second total traffic signal cycle length.

### Diagram




### Minimum Guideline

| Roadway Classification | In Current and Projected Urban Areas | In Rural Areas |
|---|---|---|
| **Interstate/Freeway** | Traffic signals not allowed | Traffic signals not allowed |
| **Principal Arterial** | ½ mile (2,640 feet) | * |
| **Minor Arterial** | ½ mile (2,640 feet) | * |
| **Collector** | ¼ mile (1,320 feet) (desirable) | * |

* Rural traffic signals are generally isolated signals rather than signals placed in a progression along a route. Signals should be placed at least one mile (5,280 feet) apart because of high operating speeds in rural areas.

## 11.0 MEDIAN OPENING SPACING

**What This Guideline Means**

Openings in raised medians should only be provided to accommodate turning traffic in locations where this can be safely done. When openings are provided, an adequate spacing between them is required to allow for weaving of traffic so as to preserve traffic flow and provide for safe lane changes and turns.

A full opening allows turns to be made in both directions; a directional opening allows turns to be made in only one direction. An example of a directional median would be one that allows left turns into a driveway but does not allow left turns to be made out.

Median openings *shall not* be allowed under the following circumstances:

- On interstates or other freeways
- Within the functional area of an interchange
- Within the functional area of an intersection between two public roads
- At locations that have high accident rates
- Where an opening would be unsafe because of inadequate sight distance

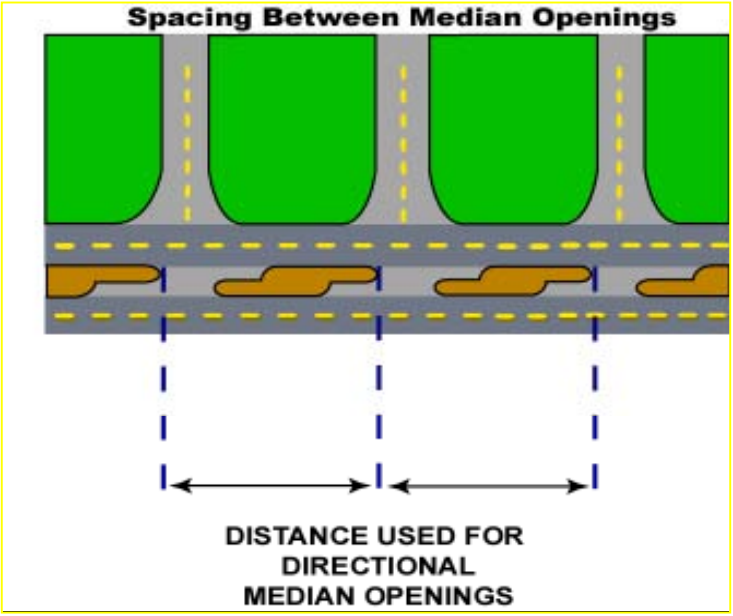
Under conditions of inadequate sight distance, median openings *shall not* be allowed.

Queue storage for median openings should be a minimum of 40 feet (two guideline car lengths) in rural areas and 60 feet (three guideline car lengths) in urban areas. Traffic studies should support the required length of queue storage for major traffic generators such as a shopping mall or industrial plant.

**Accommodating Safe U-Turns**

In cases where left turns are restricted by lack of median openings, care must be taken to allow for U-turns to be made in a safe manner. U-turns can be safely accommodated through a variety of means, including signal phasing and timing, widening, and including physical design features such as turning lanes and “jug handles.” Where U-turns cannot be made safely, they should be explicitly prohibited. U-turn opportunities should be designed with a typical design vehicle type in mind, generally a guideline passenger car.

**Diagram**




**Minimum Guideline**

| Roadway Classification | In Current and Projected Urban Areas | In Rural Areas |
|---|---|---|
| **Interstate/Freeway** | No median openings allowed | No median openings allowed |
| **Principal Arterial** | 1,320 to 2,640 feet<br>1,320 to 660 feet (directional) | 2,640 feet (full) when posted speed is over 45 mph<br>1,320 feet (full) when posted speed is under 45 mph |
| **Minor Arterial** | 1,320 feet (full)<br>660 feet (directional) | 1,320 feet (full) at all speeds |
| **Collector** | Medians generally not used | Medians generally not used |

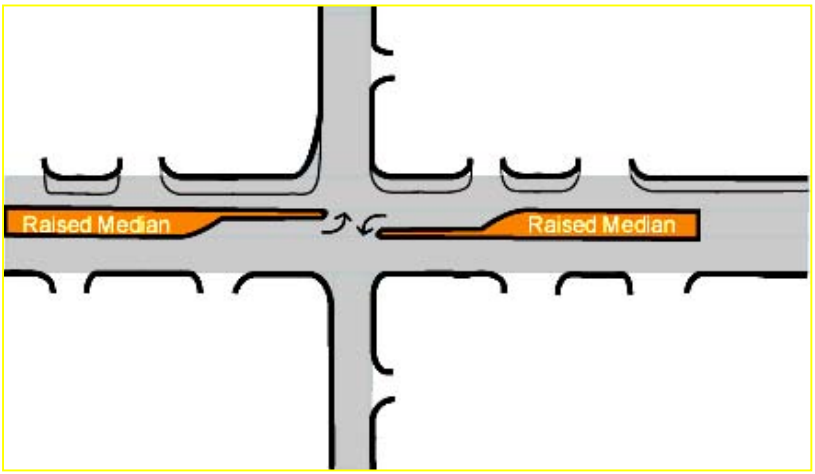
## 12.0 RAISED MEDIANS

**What This Guideline Means**

Raised medians are the most effective access management strategy on high-volume urban routes. They are 25 or more percent safer than multi-lane undivided sections and 15 percent safer than two-way left-turn lane cross sections in such high traffic situations.

In general, use of raised medians is recommended where current and projected traffic volume is greater than 28,000 average annual daily traffic (AADT). Raised medians are especially recommended in corridors where the traffic volume is high, the density of commercial driveways is high (over 24 per mile in both directions), and other access management strategies such as driveway consolidation and corner clearance are not practical. Raised medians should be used on arterial facilities with three or more through traffic lanes in each direction.

**Diagram**




**Guideline**

| Roadway Classification | In Current and Projected Urban Areas | In Rural Areas |
|---|---|---|
| **Interstate/Freeway** | Not applicable | Not applicable |
| **Principal Arterial** | Use a raised median when current and projected traffic exceeds 28,000 AADT | Use flush median instead |
| **Minor Arterial** | Use a raised median when current and projected traffic exceeds 28,000 AADT | Use flush median instead |
| **Collector** | Generally not applicable due to low traffic volumes | Generally not applicable due to low traffic volumes |

## 13.0 AUXILIARY ACCELERATION AND TURNING LANES

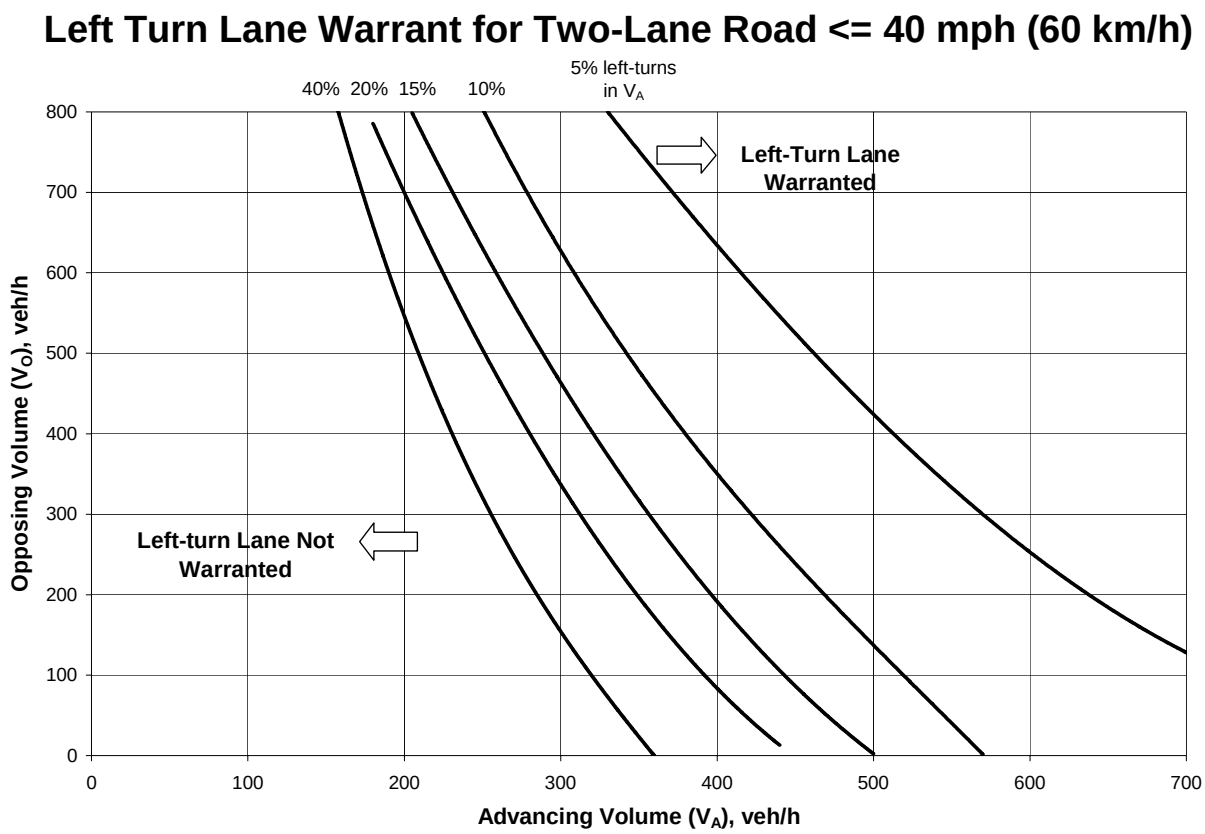
**What This Guideline Means**

Dedicated left- and right-turn lanes should be provided in situations where traffic volumes and speeds are relatively high and conflicts are likely to develop at public road intersections and private driveways between through and turning traffic. Auxiliary lanes are an asset in promoting safety and improved traffic flow in such situations. The use and design of any auxiliary lanes should always be guided by a traffic study. Some major applications for and considerations for the design of auxiliary lanes are as follows:

- Installing a right-turn acceleration lane. These lanes allow entering vehicles (those that have turned right from a driveway or minor public road onto the major route) to accelerate before entering the through-traffic flow. Such acceleration lanes may be appropriate when the average daily traffic on the major route with a posted speed of 35 miles per hour or more exceeds 10,000 and there are at least 75 right-turn egress movements from a driveway or minor public road. Such lanes may also be warranted where crash experience indicates a problem with right-turning, entering vehicles. The right-turn acceleration lane should be of a sufficient length to allow safe and efficient merge maneuvers. The design length, tapers, and other features of right-turn acceleration lanes should always be guided by a traffic study.

- Installing auxiliary left-turn lanes. Such lanes, installed in the roadway center, are intended to remove turning vehicles from the through traffic flow. This should reduce the frequency of rear-end collisions at locations where there is considerable left-turn ingress activity, such as major driveways and minor public road intersections. Left-turn lane warrants are shown in the figures below. To use the figures, peak hour traffic counts, including directional splits, will be required, which may be obtained from Traffic Staff. In addition, the ITE Trip Generation Manual may be used as an estimate for peak hour traffic counts. For design year analyses, appropriate growth rates will be required, which may be obtained from Planning Staff.

- The use and design of auxiliary left-turn lanes should always be guided by a traffic study. In general, auxiliary left-turn lanes must be long enough to accommodate a safe deceleration distance and to provide adequate storage of a queue for expected peak hour turning traffic. MoDOT's Project Development Manual (PDM) should be consulted for appropriate storage and deceleration lengths.

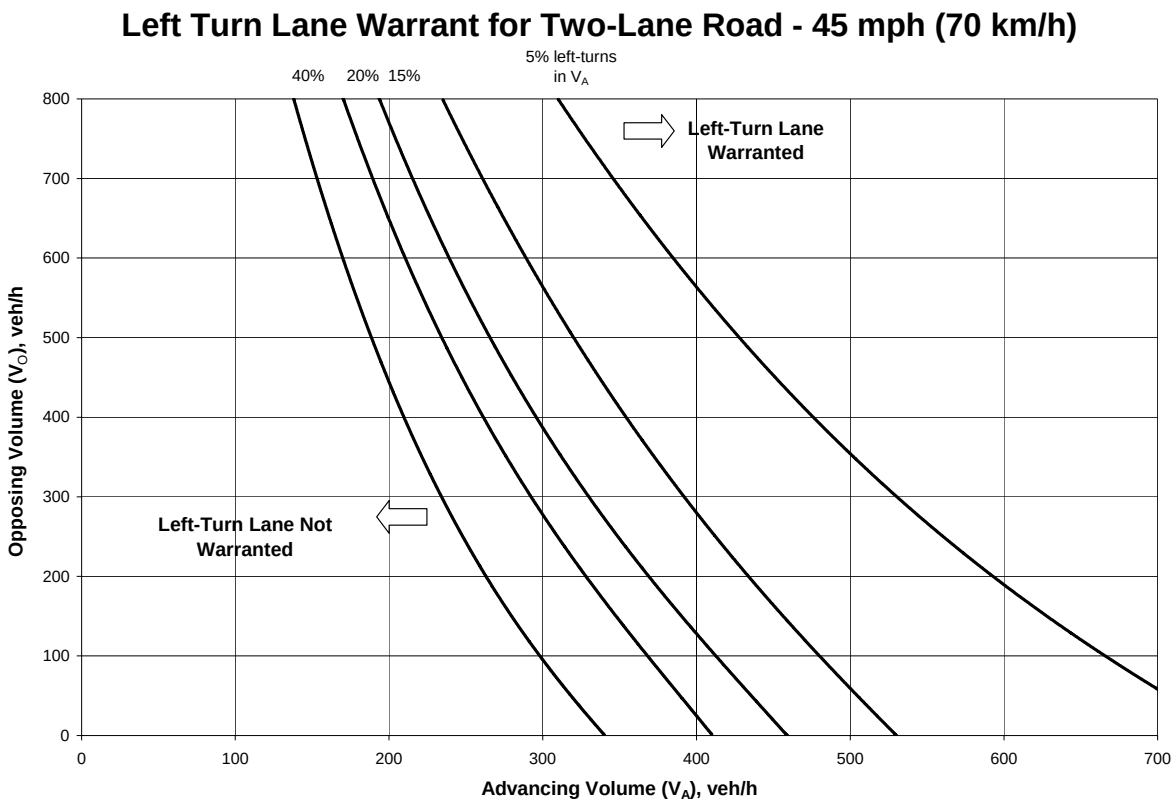



The following data are required:

1. Opposing Volume (veh/hr) - $V_O$ - The opposing volume should include only the right-turn and through movements in the opposite direction of the left turning vehicle.
2. Advancing Volume (veh/hr) - $V_A$ - The advancing volume should include the right-turn, left-turn and through movements in the same direction as the left turning vehicle.
3. Operating Speed (mph) - The greater of design or posted speed.
4. Percentage of left turns in $V_A$

Left turn lane is not warranted for left turn volume less than 10 vph. However, criteria other than volume, such as crash experience, may be used to justify a left turn lane.

The appropriate trend line is identified on the basis of the percentage of left-turns in the advancing volume, rounded up to the nearest percentage trend line. If the advancing and opposing volume combination intersects above or to the right of this trend line, a left-turn lane is warranted.




The following data are required:

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2. Advancing Volume (veh/hr) - $V_A$ - The advancing volume should include the right-turn, left-turn and through movements in the same direction as the left turning vehicle.
3. Operating Speed (mph) - The greater of design or posted speed.
4. Percentage of left turns in $V_A$

Left turn lane is not warranted for left turn volume less than 10 vph. However, criteria other than volume, such as crash experience, may be used to justify a left turn lane.

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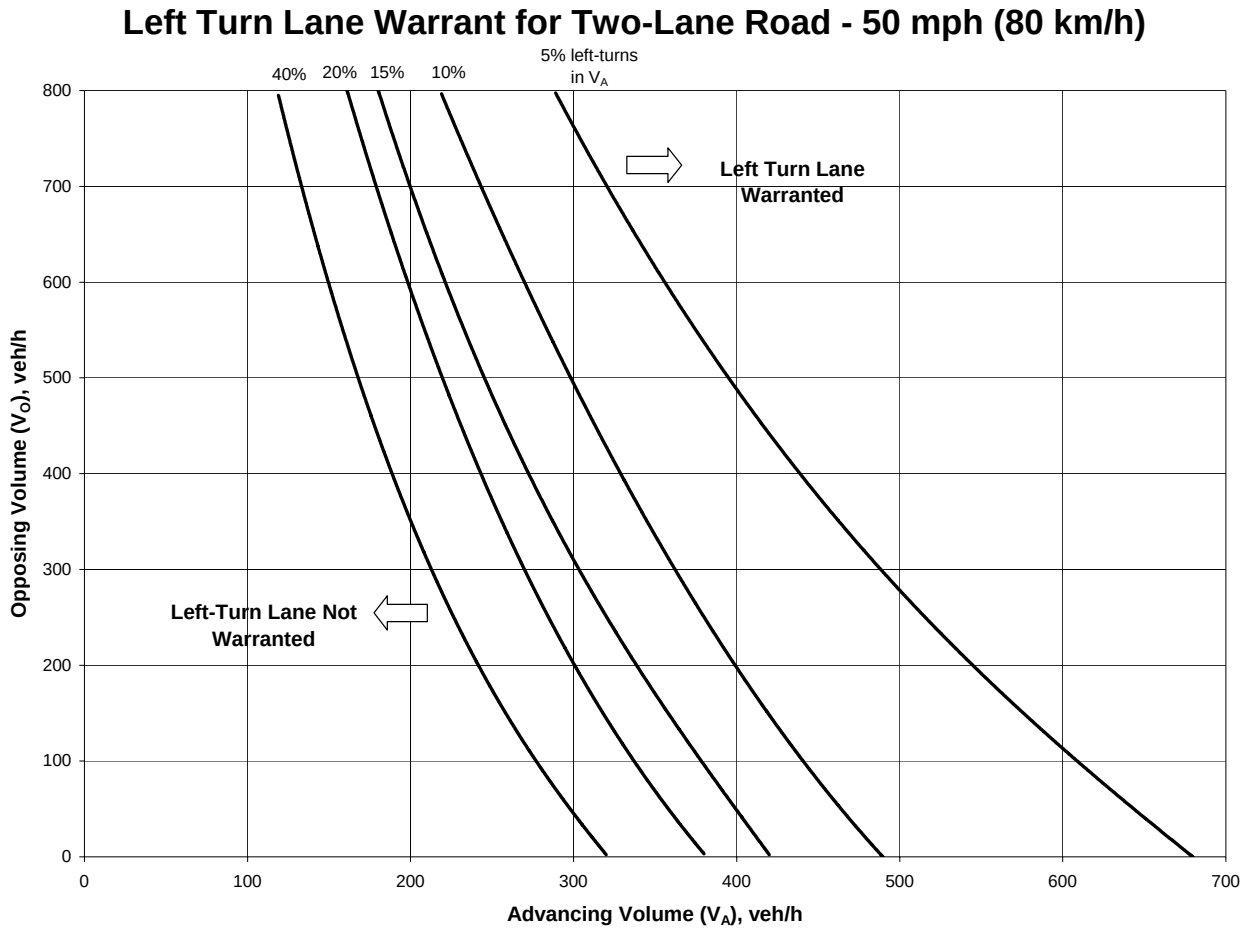


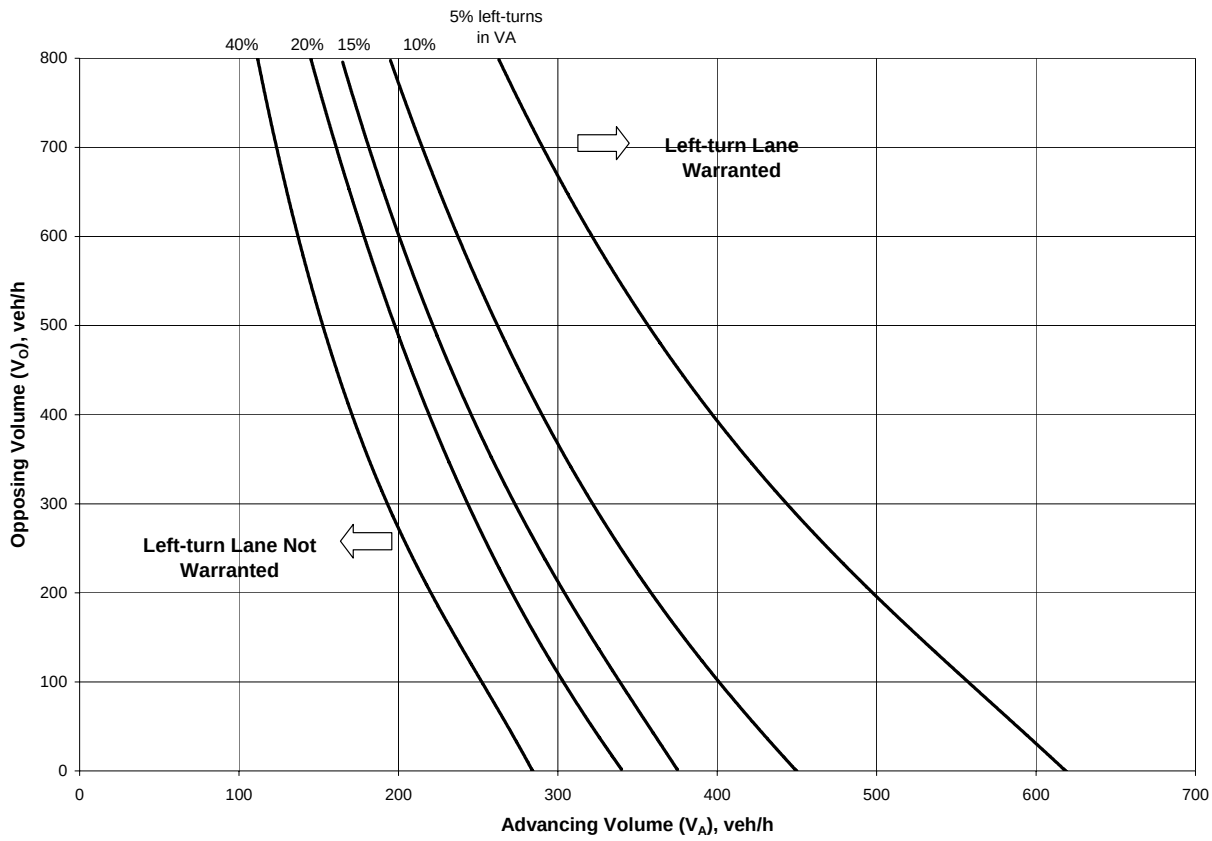

The following data are required:

1. Opposing Volume (veh/hr) - $V_O$ - The opposing volume should include only the right-turn and through movements in the opposite direction of the left turning vehicle.
2. Advancing Volume (veh/hr) - $V_A$ - The advancing volume should include the right-turn, left-turn and through movements in the same direction as the left turning vehicle.
3. Operating Speed (mph) - The greater of design or posted speed.
4. Percentage of left turns in $V_A$

Left turn lane is not warranted for left turn volume less than 10 vph. However, criteria other than volume, such as crash experience, may be used to justify a left turn lane.

The appropriate trend line is identified on the basis of the percentage of left-turns in the advancing volume, rounded up to the nearest percentage trend line. If the advancing and opposing volume combination intersects above or to the right of this trend line, a left-turn lane is warranted.

## Left Turn Lane Warrant for Two-Lane Road - 55 mph (90 km/h)

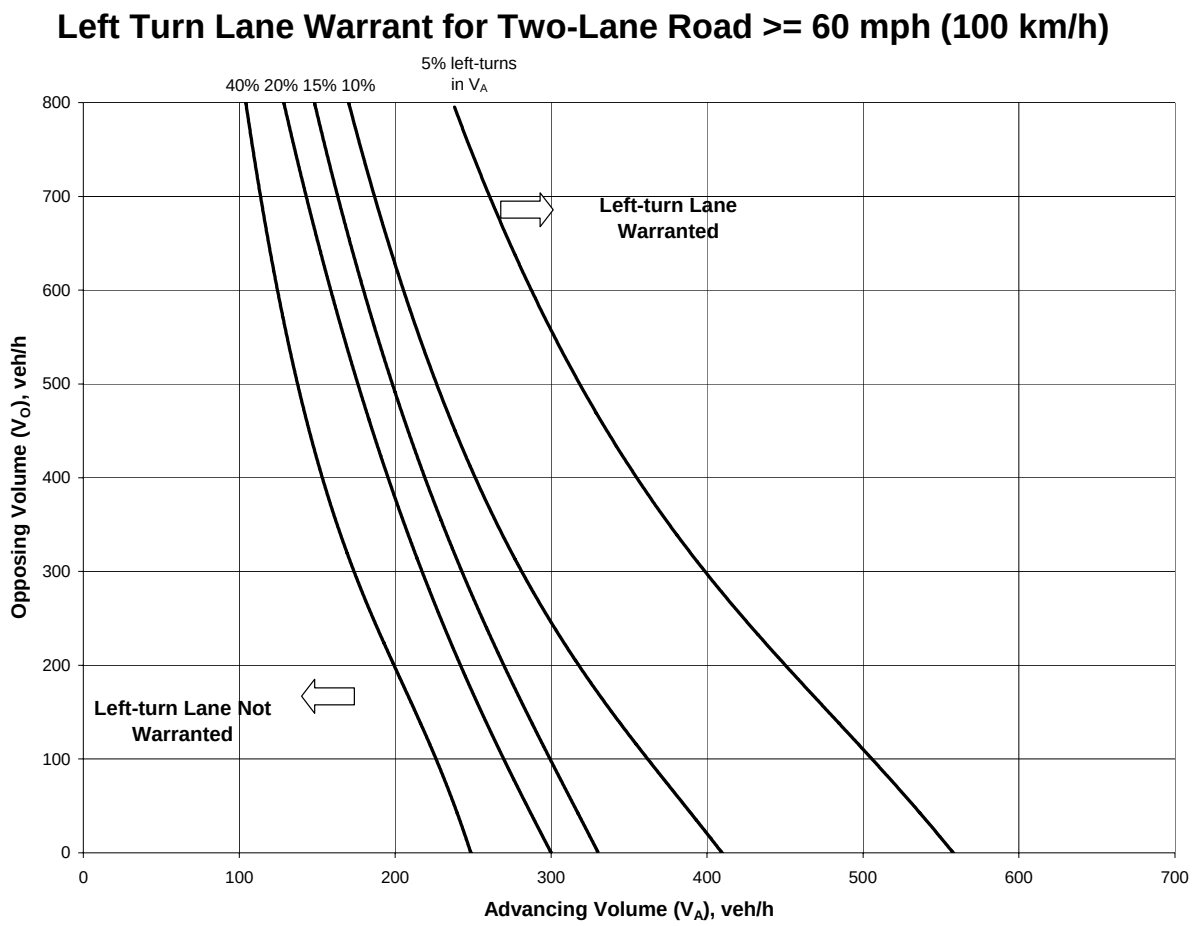



The following data are required:

1. Opposing Volume (veh/hr) - $V_O$ - The opposing volume should include only the right-turn and through movements in the opposite direction of the left turning vehicle.
2. Advancing Volume (veh/hr) - $V_A$ - The advancing volume should include the right-turn, left-turn and through movements in the same direction as the left turning vehicle.
3. Operating Speed (mph) - The greater of design or posted speed.
4. Percentage of left turns in $V_A$

Left turn lane is not warranted for left turn volume less than 10 vph. However, criteria other than volume, such as crash experience, may be used to justify a left turn lane.

The appropriate trend line is identified on the basis of the percentage of left-turns in the advancing volume, rounded up to the nearest percentage trend line. If the advancing and opposing volume combination intersects above or to the right of this trend line, a left-turn lane is warranted.




The following data are required:

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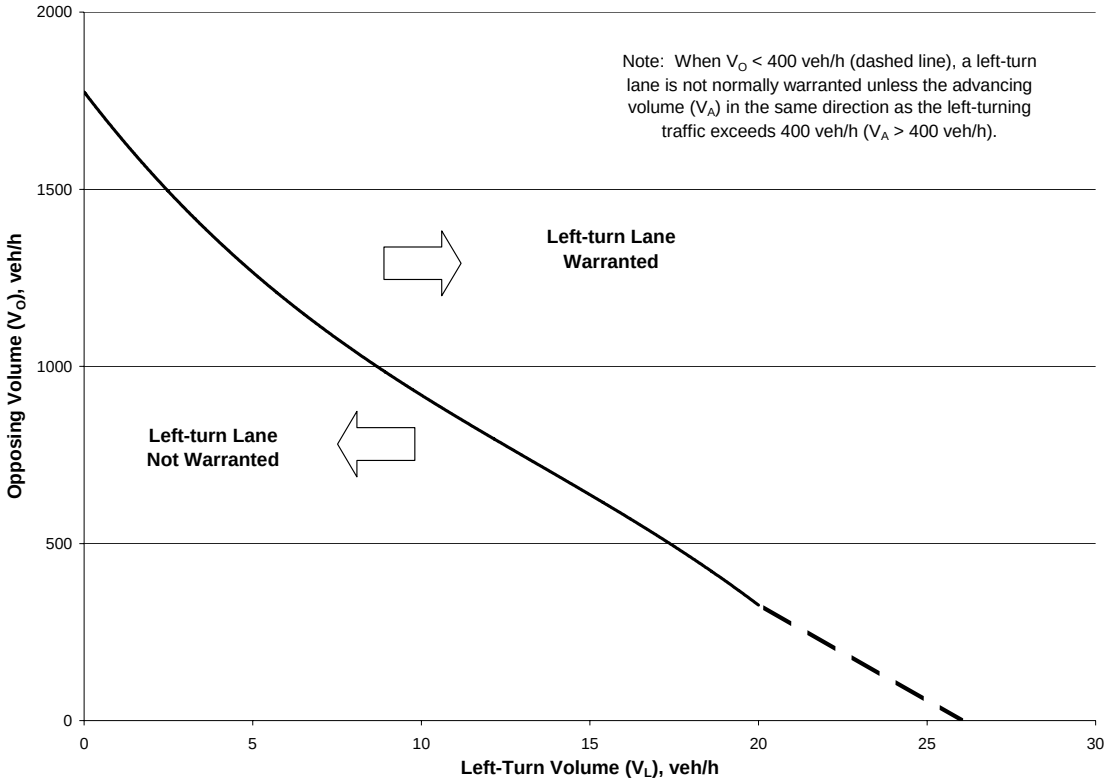
2. Advancing Volume (veh/hr) - $V_A$ - The advancing volume should include the right-turn, left-turn and through movements in the same direction as the left turning vehicle.
3. Operating Speed (mph) - The greater of design or posted speed.
4. Percentage of left turns in $V_A$

Left turn lane is not warranted for left turn volume less than 10 vph. However, criteria other than volume, such as crash experience, may be used to justify a left turn lane.

The appropriate trend line is identified on the basis of the percentage of left-turns in the advancing volume, rounded up to the nearest percentage trend line. If the advancing and opposing volume combination intersects above or to the right of this trend line, a left-turn lane is warranted.

## Left Turn Lane Warrant for Four-Lane Undivided Roadway




The following data are required:

1. Opposing Volume (veh/hr) - $V_O$ - The opposing volume should include only the right-turn and through movements in the opposite direction of the left turning vehicle.
2. Left-Turn Volume – $V_L$

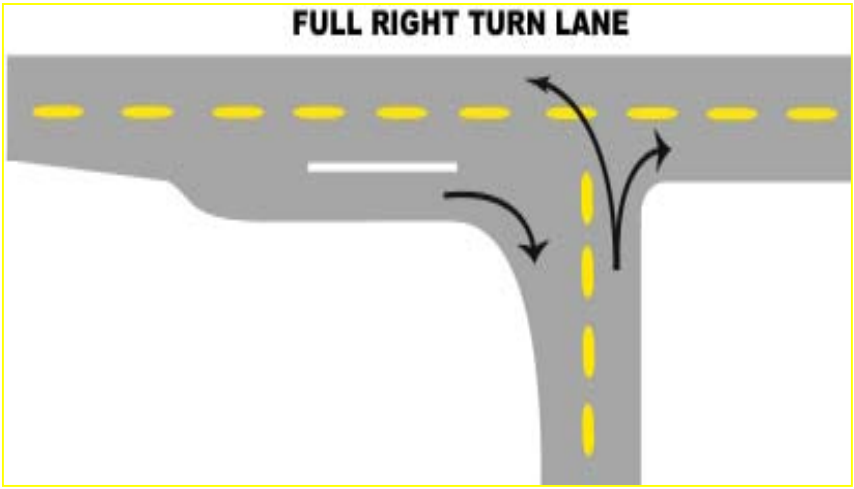
If the opposing and left-turn volume combination intersects above or to the right of the trend line, a left-turn lane is warranted.

- Installing auxiliary right-turn lanes. The use of dedicated right-turn lanes should also always be guided by a traffic study. In general, dedicated right-turn lanes should be provided in both rural and urban areas on two lane routes as shown in the figures below. Right-turn lane warrants are shown in the figures below. To use the figures, peak hour traffic counts, including directional splits, will be required, which may be obtained from Traffic Staff. In addition, the ITE Trip Generation Manual may be used as an estimate for peak hour traffic counts. For design year analyses, appropriate growth rates will be required, which may be obtained from Planning Staff.

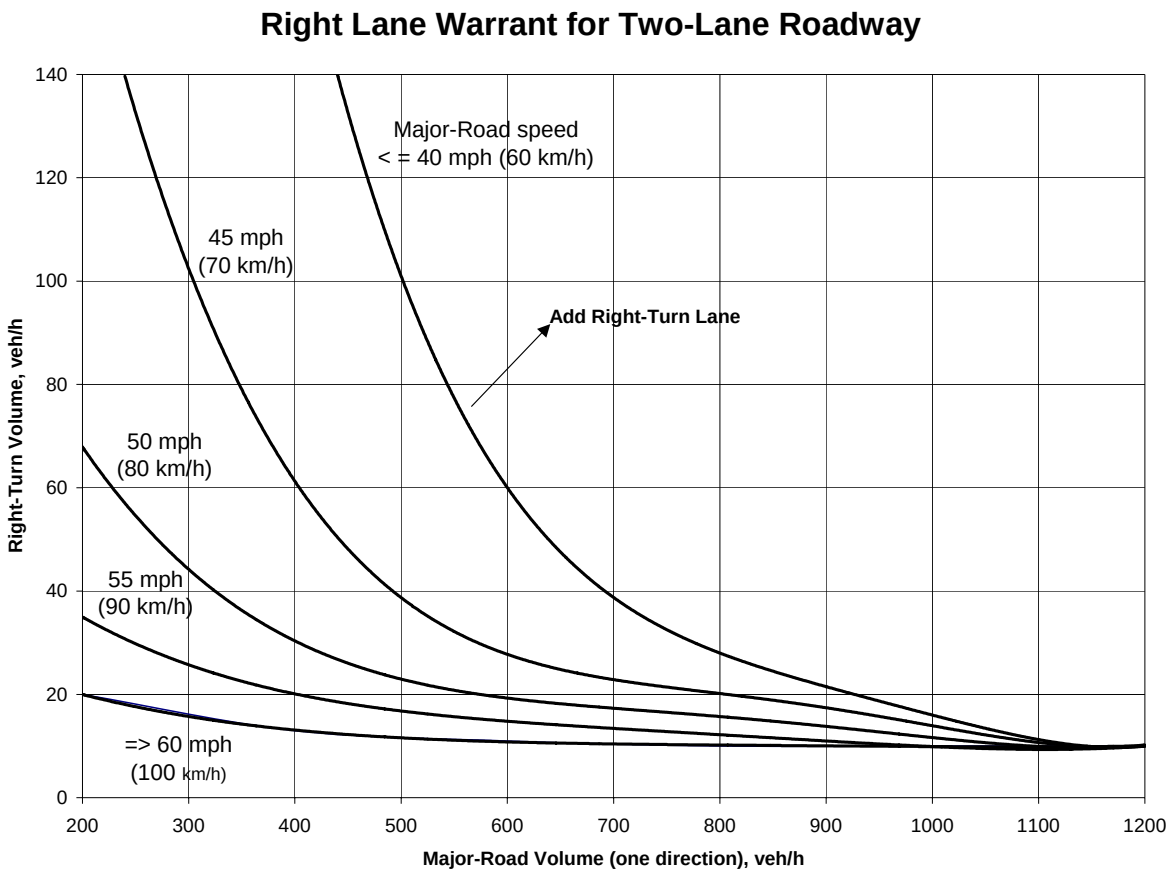
Dedicated right turn lanes should also be strongly considered in situations where:

- Poor internal site design and circulation leads to backups on the mainline. Auto-oriented businesses with short drive-through lanes or poorly-designed parking lots would be prime examples of this situation.
- The peak hour turning traffic activity is unusually high (e.g. greater than 10 percent of the daily total.)
- Operating speeds on the mainline route are very high (greater than 60 miles per hour) and right turns would generally not be expected by drivers.
- The driveway or minor public road intersection is difficult for drivers to see.
- The driveway entrance is gated or otherwise must be entered very slowly.
- Right turning traffic consists of an unusually high number of trailers or other large vehicles.
- The intersection or driveway angle is highly skewed.
- Rear end collision experience is unusually high at a location.

**Diagram**




As with any auxiliary turning lane, dedicated right-turn lanes should be designed based on the results of a traffic study.

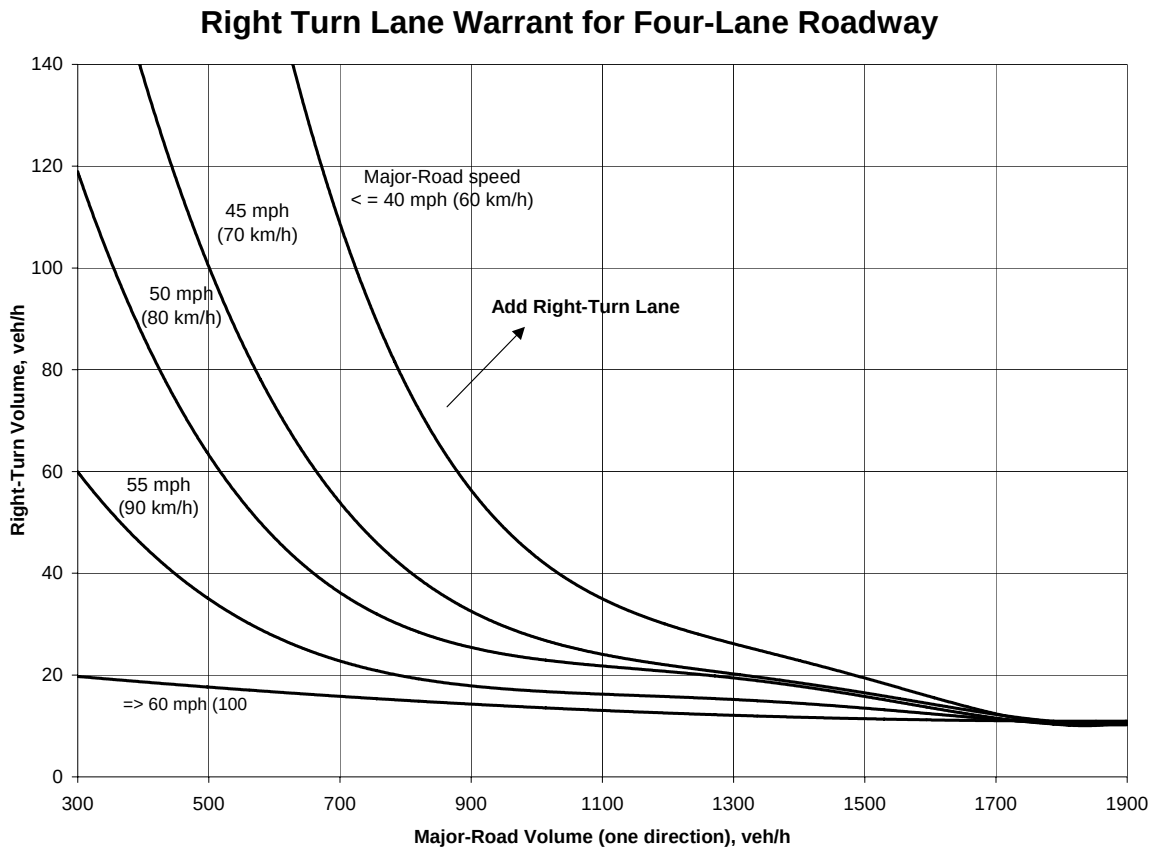



The following data are required:

1. Advancing Volume (veh/hr) - The advancing volume should include the right-turn, left-turn and through movements in the same direction as the right turning vehicle.
2. Right Turning Volume (veh/hr) - The right turning volume is the number of advancing vehicles turning right.
3. Operating Speed (mph) - The greater of design or posted speed.

Note: Right turn lane is not warranted for right turn volume less than 10 vph

If the combination of major-road approach volume and right-turn volume intersects above or to the right of the speed trend line corresponding the major road operating speed, then a right-turn lane is warranted.




The following data are required:

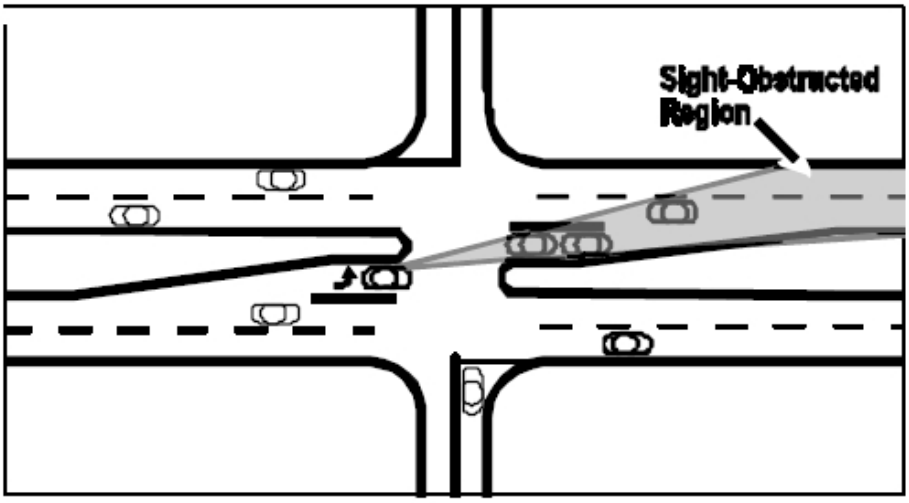
1. Advancing Volume (veh/hr) - The advancing volume should include the right-turn, left-turn and through movements in the same direction as the right turning vehicle.
2. Right Turning Volume (veh/hr) - The right turning volume is the number of advancing vehicles turning right.
3. Operating Speed (mph) - The greater of design or posted speed.

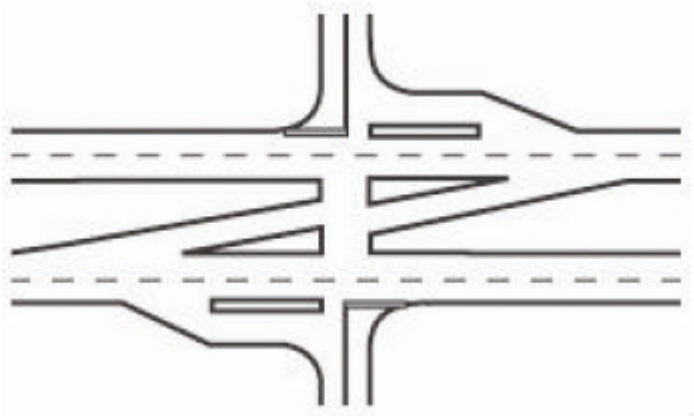
Note: Right turn lane not warranted for right turn volume less than 10 vph

If the combination of major-road approach volume and right-turn volume intersects above or to the right of the speed trend line corresponding the major road operating speed, then a right-turn lane is warranted.

- **Offset Right- and Left- Turn Lanes**

Vehicles in the right-turn lane tend to obstruct the vision of drivers waiting at the stop bar of the minor roadway. One way to reduce the obstruction of the minor roadway drivers' view is to offset the right-hand turning bay to the right. Similarly, vehicles in the opposing left-turn lane block the views of left-turning vehicles from the opposite direction, as shown in the figure below. An example intersection with offset right- and left-turn lanes is shown below. Offsetting left-turn lanes to the left as far as practical improves the visibility of opposing traffic. By improving the visibility of opposing traffic, drivers can more effectively use available gaps. Offsetting right-turn lanes to the right gives drivers on the minor approach (at the stop bar) an unobstructed view of oncoming traffic in the near expressway lanes, which allows for more effective use of gaps.



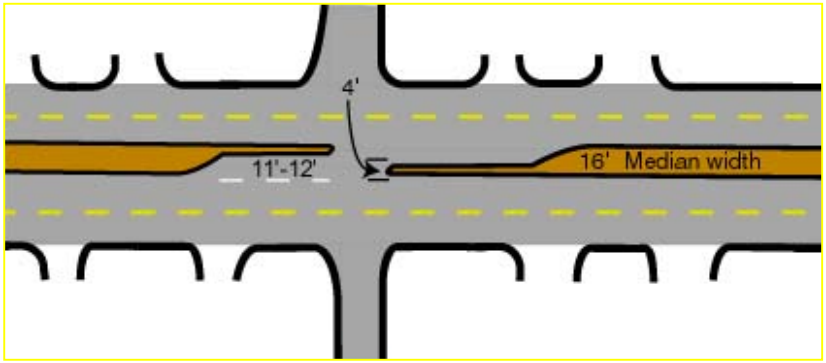



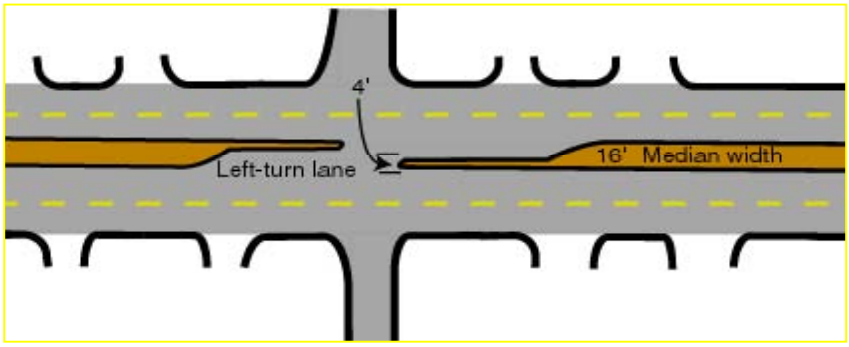
Rural Expressway Intersection Synthesis of Practice and Crash Analysis
Center for Transportation Research and Education – October 2004

Consideration should be given to offset right- and left-turn lanes lane in locations with high mainline operating speeds, large percentage of turning trucks, unique sight distance issues, or crash experience where investigation of crash diagrams indicates a safety benefit may be obtained from an offset turn lane. Care should be taken when implementing offset auxiliary turn lanes to ensue the horizontal geometry of the roadway does not negate the line-of-sight improvement.

## Width of Auxiliary Acceleration and Turn Lanes

Any auxiliary turning lanes such as dedicated right-turn, left-turn, and acceleration lanes should always be at least 11 feet wide. Twelve feet is a desirable width, not including the gutter. The following diagram shows several typical left-turn lane designs.



## 14.0 TWO-WAY LEFT-TURN LANES ("Five-Lane" Facilities)

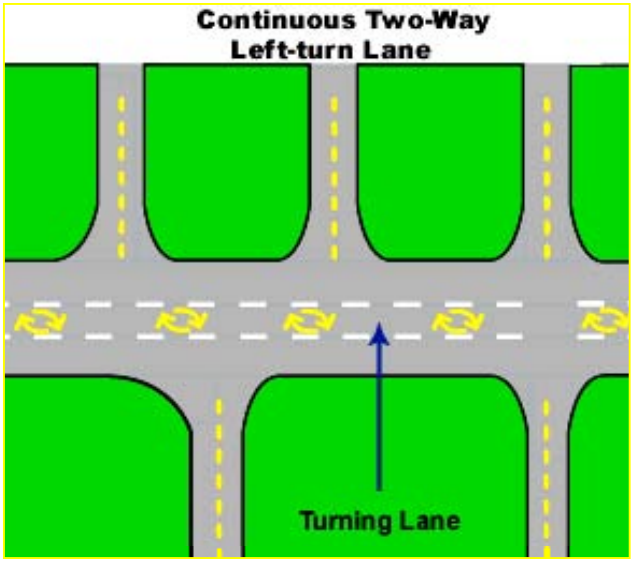
**What This Guideline Means**

Two-way left-turn lanes may be effective as an access management tool when used in conjunction with other techniques such as driveway consolidation and corner clearance. TWLTL cross sections work best in situations where traffic volume and the density of driveways is relatively low, and the proportion of left-turning vehicles is relatively high. It is recommended that they only be considered in places where commercial driveways make up a substantial portion of total driveways and where the percentage of vehicles turning left at peak hour is at least 20 percent.

Their use should be avoided on retrofit projects where the commercial driveway density is above the driveway spacing guideline. Research indicates that when commercial driveway density is over 24 per mile (12 per mile in each direction), crash rates increase significantly. This roughly equates to an average driveway spacing of 440 feet. TWLTL configurations should generally be avoided unless driveway density can be kept at that level or below, or other viable alternatives do not exist.

TWLTL configurations should not be used along high traffic volume (over 28,000 AADT) urban routes; in such situations raised medians are 25 or more percent safer than multilane undivided sections and 15 percent safer than TWLTL cross sections. TWLTL configurations should never be used on facilities with more than four through-traffic lanes, e.g., to create a "seven lane" facility. Crash experience with such large roadway cross sections is poor.

**Diagram**



**Guideline**

| Roadway Classification | In Current and Projected Urban Areas | In Rural Areas |
|---|---|---|
| **Interstate/Freeway** | Not applicable | Not applicable |
| **Principal Arterial** | May be used when appropriate if AADT in design year is less than 28,000; otherwise use a raised median | Do not use |
| **Minor Arterial** | May be used when appropriate if AADT in design year is less than 28,000; otherwise use a raised median | Do not use |
| **Collector** | May be used when appropriate if AADT in design year is less than 28,000; otherwise use a raised median | Do not use |

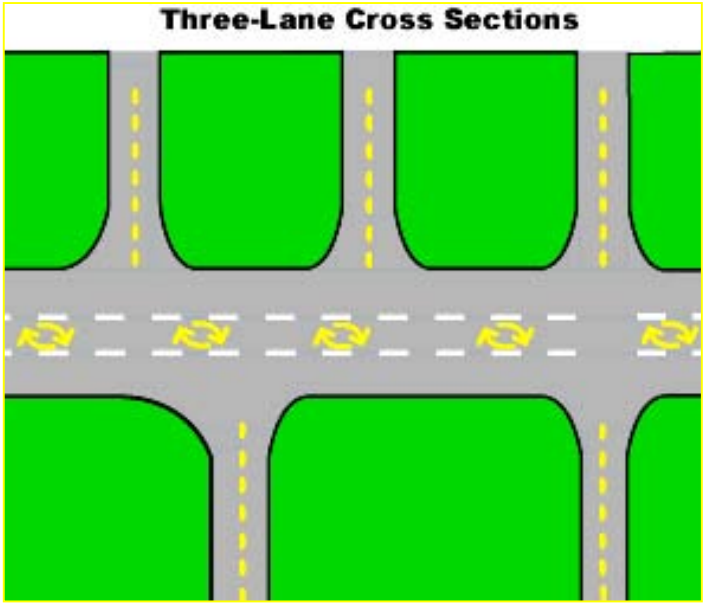
## 15.0 THREE-LANE CROSS SECTIONS

**What This Guideline Means**

Three-lane cross sections (two through lanes with a TWLTL in the center) are a possible access management tool in certain situations. Such roadways are about 25 percent safer than an undivided four-lane road and can provide comparable capacity provided that intersections are well designed. They work best in situations where traffic volumes are moderate and where the proportion of vehicles turning left is high. The use of TWLTL's should be discouraged in rural areas, as their use in high speed, low volume situations can lead to increase in head on crashes. They should also be avoided in urban areas where the design year traffic is expected to grow beyond 17,500 AADT. TWLTL's are best used in situations where driveway density is low to moderate (e.g., below 24 commercial driveways per mile, which equates to a spacing of about 440 feet between driveways). They should be strongly considered in multifamily residential areas or mixed land use areas, especially on urban minor arterials and collectors.

This guideline does not refer to third lanes used as passing, turning, or climbing lanes in rural areas.

**Diagram**



**Guidelines**

| Roadway Classification | In Current and Projected Urban Areas | In Rural Areas |
|---|---|---|
| **Interstate/Freeway** | Not applicable | Not applicable |
| **Principal Arterial** | May be used when appropriate and where AADT in design year is less than 17,500 | Not applicable |
| **Minor Arterial** | May be used when appropriate and where AADT in design year is less than 17,500 | Should not be used |
| **Collector** | May be used when appropriate and where AADT in design year is less than 17,500 | Should not be used |

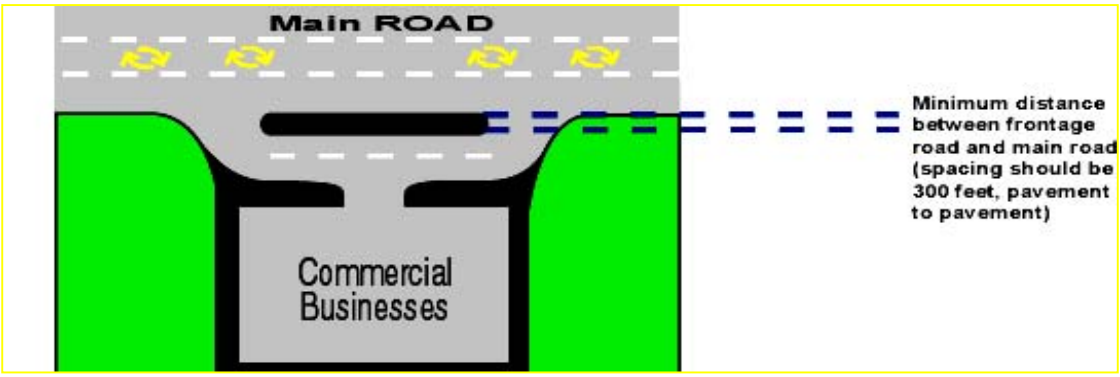
## 16.0 FRONTAGE AND BACKAGE ROADS

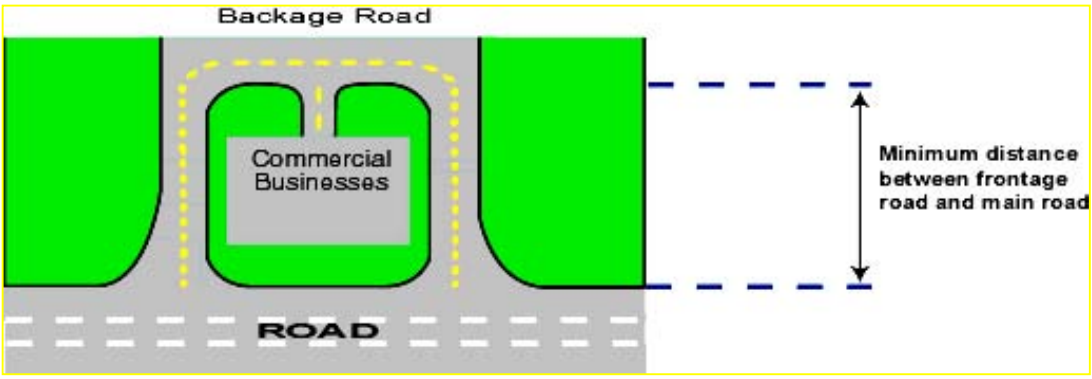
**What This Guideline Means**

Frontage and backage roads provide alternative access to property and help remove turning traffic from the through traffic on a mainline route. When such roads are used, direct access is not provided to property from the mainline road. A frontage road provides alternative access at the front of properties while a backage road provides alternative access at the rear of properties. These types of roads are most often used to provide alternative access to commercial businesses and developments.

Frontage and backage roads can dramatically improve safety and operations. However, a common mistake involves placing frontage or backage roads in very close proximity to the mainline. Placing frontage roads very close to mainline roads can actually create additional opportunities for delay, congestion, and crashes because insufficient storage ("throat length") is provided for entering and exiting vehicles. When this happens, the access problem the frontage or backage road was designed to address is relocated rather than cured.

**Diagrams**




**Minimum Guideline**

Frontage and backage roads should be spaced a minimum 300 feet from the mainline route they provide alternative access for. Measurements should be taken from pavement edge to pavement edge. In effect, this 300-foot minimum spacing will tend to promote the use of backage roads rather than frontage roads.

## 17.0 DRIVEWAY SPACING

**What This Guideline Means**

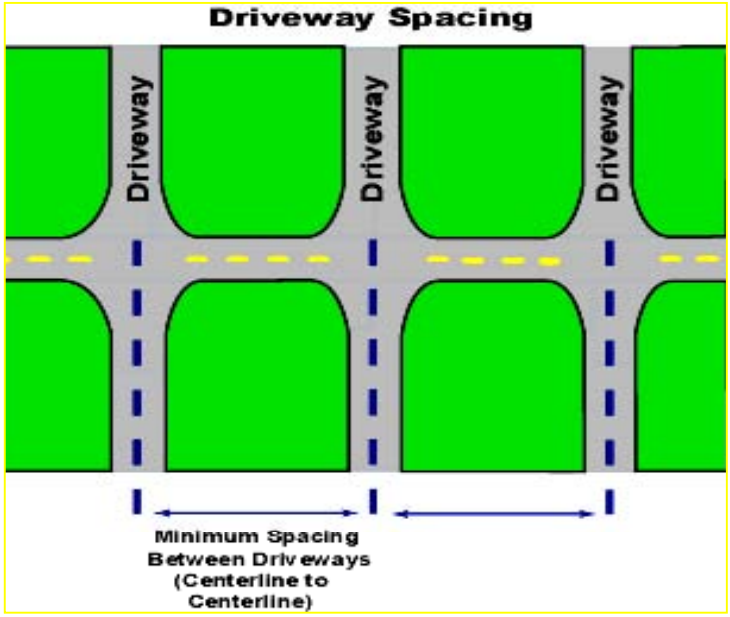
This guideline governs the minimum recommended spacing between private driveways necessary to preserve both safety and traffic flow. Spacing between driveways must be longer on higher speed routes in rural areas than in urban areas. In urban areas, these guidelines allow for about one driveway per city block face on principal arterials and minor arterials, and two driveways per block face on collectors.

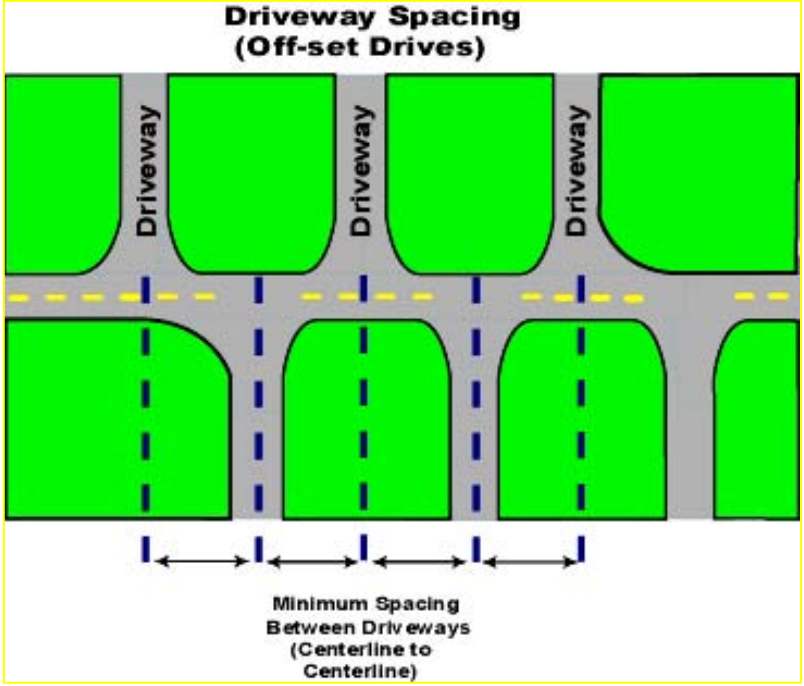
In order to preserve spacing, direct access should be moved to local streets (not arterials) where possible. In particular, access for corner lots should be moved to a lower traffic side street whenever possible. Access can often be better accomplished on major streets through such means as frontage and backage roads, joint access, cross access, and shared driveways. This guideline only applies where sight distance allows. Driveways should *not* be allowed where sight distance is inadequate even if the driveway spacing guideline would allow them.

Driveway accesses should be provided on local and collector streets ("side streets") rather than arterials wherever possible. Driveways should also be lined up across the public roadway from each other whenever possible. When driveways are not lined up, the minimum spacing should be measured from the closest driveway on either side of the road, except where a non-traversable (e.g., raised) median exists.

On urban routes where non-traversable medians exist, shorter driveway spacing may be acceptable for right-in, right-out driveways only.

**Diagrams**






**Minimum Guideline**

| Roadway Classification | In Current and Projected Urban Areas | In Rural Areas |
|---|---|---|
| **Interstate/Freeway** | No driveways are allowed | No driveways are allowed |
| **Principal Arterial** | 440 to 660 feet | 660 to 1,320 feet * |
| **Minor Arterial** | 330 feet | 440 feet * |
| **Collectors** | 220 feet (desirable) | 330 feet (desirable) * |

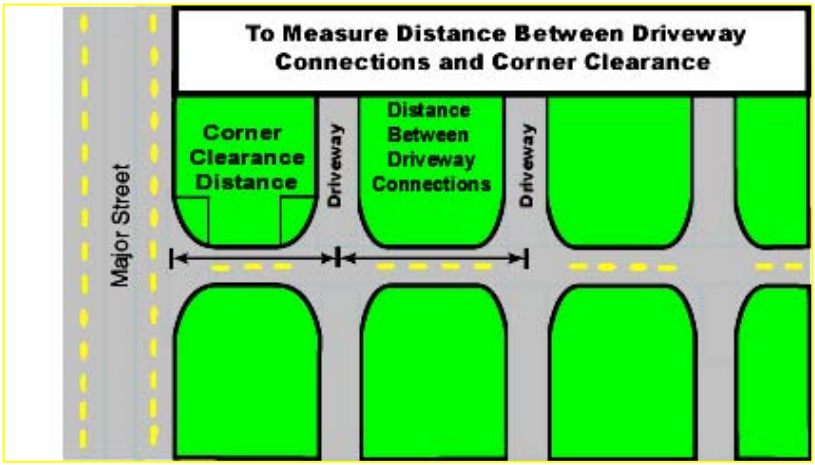
* The urban guideline may be applied in developed areas that are not urban, for example, cities with populations under 5,000. On collectors in cities with population under 5,000, the recommended minimum guideline is 220 feet (same as the urban guideline).

## 18.0 DRIVEWAY CORNER CLEARANCE

### What This Guideline Means

Corner clearance represents the distance between the corner of the intersection of two public roadways and the next private driveway. It is important to provide enough distance between the corner and the first driveway to effectively separate conflict points and to allow drivers enough time to make safe maneuvers. When corners are not adequately cleared, high crash rates tend to occur. Delays and traffic congestion also result when corners are not adequately cleared. These guidelines correspond to the minimum driveway spacing guidelines for the same roadway classification. *This guideline only applies where the minimum sight distance guideline allows.*

### Diagram




### Minimum Guideline

| Roadway Classification | In Current and Projected Urban Areas | In Rural Areas |
|---|---|---|
| **Interstate/Freeway** | No driveways are allowed | No driveways are allowed |
| **Principal Arterial** | 440 to 660 feet | 660 to 1,320 feet * |
| **Minor Arterial** | 330 feet | 440 feet * |
| **Collector** | 220 feet(desirable) | 330 feet(desirable) * |

* The urban guideline may be applied in developed areas that are not urban, for example, cities with populations under 5,000. On collectors in cities with population under 5,000, the recommended minimum guideline is 220 feet (same as the urban guideline).

## 19.0 SPACING / CLEARANCE FOR RIGHT-IN, RIGHT-OUT DRIVEWAYS

**What This Guideline Means**

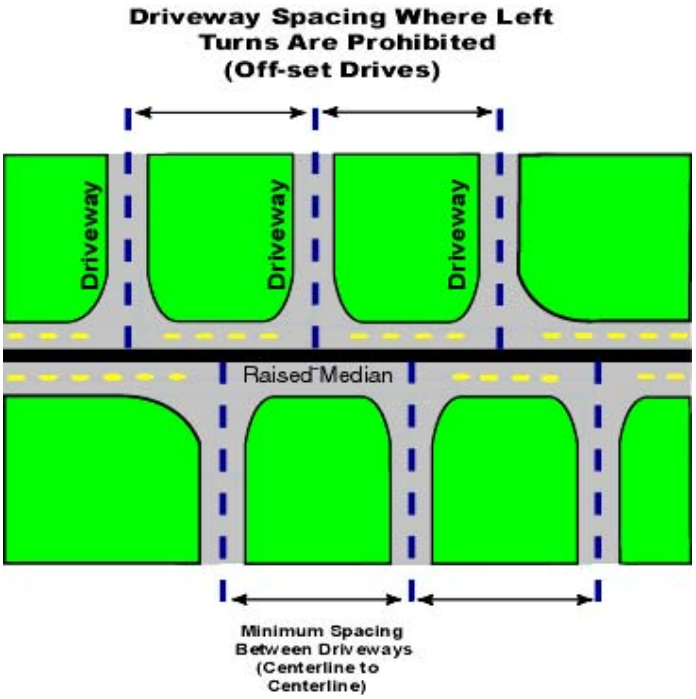
This guideline governs the minimum recommended spacing and corner clearance for driveways along roadways in urban areas that have a non-traversable median and speed limits at or below 45 miles per hour. A non-traversable median restricts left-turn movements into and out of driveways. Adequate spacing between driveways and corner clearance are both necessary to preserve safety and traffic flow. Spacing between driveways must be greater on higher speed routes and in rural areas than in urban areas because of higher posted speed limits.

Research and experience in other states indicates that on urban routes *where non-traversable medians exist*, shorter driveway spacing and corner clearance upstream from an intersection is acceptable for right-in, right-out driveways. This guideline provides for double the number of right-in, right-out driveway access points that are allowed when left turns into and out of driveways are permitted. It also allows for a shorter clearance distance from corners to the last driveway upstream from the corner. For safety reasons, the minimum downstream corner clearance should stay the same as in situations in which there is no non-traversable median present. This shorter guideline for right-in right-out driveways *should not* be used where a non-traversable median does not exist (e.g., where there is a continuous left-turn lane.) It should also not be used in rural areas, where higher operating speeds prevail, for safety reasons.

Experience has shown that a shorter guideline for right-in, right-out drives will only work well where there is a significant physical barrier that prevents left turns (e.g., a non-traversable median). Regulatory restrictions on left turns (e.g., “No Left Turn” signs) are not effective in preventing left turns. Neither are small traffic directors located at driveway entrances.

In order to preserve spacing, direct access should be moved to local streets (not arterials and collectors) where possible. Access can be better accomplished on major streets through such means as frontage and backage roads, joint access, cross access, and shared driveways. These guidelines only apply where sight distance allows. *Driveways should not be allowed where sight distance is inadequate even if the spacing guideline would allow them.*

**Diagram**




**Minimum Guidelines, in Urban Areas** *

| Roadway Classification | Minimum Spacing between Right-In, Right-Out Driveways on Roadway with a Restrictive Median | Upstream Corner Clearance for Right-In, Right-Out Driveways on Roadway with a Restrictive Median** |
|---|---|---|
| **Interstate/Freeway** | No driveways are allowed | No driveways are allowed |
| **Principal Arterial** | 220 to 330 feet | 220 to 330 feet |
| **Minor Arterial** | 165 feet | 165 feet |
| **Collectors** | 110 feet (desirable) | 110 feet (desirable) |

* The urban guideline may be applied in rural but developed areas that are not urban, for example, cities with populations under 5,000. On collectors in cities with population under 5,000, the recommended minimum guideline is 110 feet (same as the urban guideline).

** Downstream corner clearance guidelines should not be modified from the main corner clearance guideline even when a non-traversable median exists.

## 20.0 DRIVEWAY GEOMETRICS

The design of driveways is critical in access management in that it affects the speed of traffic turning into and out of driveways. This in turn affects the speed differential between through traffic and turning traffic. Large speed differentials are created when driveways are inadequately designed. Large speed differentials are associated with higher crash rates and diminished traffic operations.

The following standards are adapted from the Institute for Transportation Engineers (ITE) latest recommended practice for driveway design with modifications by the Access Management Technical Committee. The existing ITE guidelines are from 1974 and are currently undergoing substantial revision; this should result in standards that resemble those on these pages. Driveway designs should always be based on the results of a study of the traffic likely to use them; these guidelines are presented to illustrate good practices for driveway designs.

**Lining Up Driveways Across Roadways**

Driveways should be as closely lined up with driveways across roadways without non-traversable medians to the maximum extent possible even if less spacing between driveways is the result.

**Angle of Intersection to the Public Roadway**

- Driveways that serve two-way traffic should have angles of intersection with the public road of 90 degrees or very near 90 degrees. The minimum acceptable angle for driveways that serve two-way traffic is 70 degrees.

- Driveways that serve one-way traffic may have an acute angular placement of from 60 to 90 degrees.

## Right-Turn (Approach) Radius

Approach radii should be large enough to allow entering vehicles to do so at a reasonable rate of speed. The following are suggested as minimum approach radii and are measured from the edge of the driving surface of the roadway. Any maximum approach radius is allowable for driveways.

| Minimum Right-Turn Radius for Driveways | Urban Areas (At or below 45 mph Posted Speed) | Rural Areas (Greater than 45 mph Posted Speed) |
|---|---|---|
| **Residential Driveways** | 10 feet | 25 feet |
| **Commercial Driveways** | 25 feet | 50 feet |
| **Industrial Driveways** | Design to handle typical large truck that uses the driveway | Design to handle typical large truck that uses the driveway |

Inside radii should be determined on a case by case basis given driveway angle, traffic volume, and other relevant factors. Sites that generate substantial large truck traffic need inside larger radii to accommodate the wheel path of the turning trucks.

## Driveway Width

No driveways should have widths less than 20 feet. Driveways of greater than 54 feet should be strongly discouraged unless they contain a raised median to separate traffic lanes. Driveways that serve one-way traffic should be from 20 to 30 feet wide. Driveway widths should be measured from the face of curb to the face of curb at the point of tangency. Any medians contained in the driveway are above and beyond the minimum widths in the table. Minimum acceptable and maximum acceptable widths for various levels of traffic and directions of access are shown in the table below:

| Driveway Traffic Category | Average Daily Traffic Using Driveway | Peak Hour Traffic Using Driveway | With Two-Way Access | | With One-Way Access | |
|---|---|---|---|---|---|---|
| | | | Minimum Width | Maximum Width | Minimum Width | Maximum Width |
| **Residential** | 0 – 100 | 0 – 10 | 20 feet | 30 feet | NA | NA |
| **Low Volume Commercial/Industrial** | < 1500 | < 150 | 28 feet** | 42 feet*** | 20 feet* | 20 feet* |
| **Medium Volume Commercial/Industrial** | 1,500 – 4,000 | 150 – 400 | 42 feet*** | 54 feet**** | 20 feet* | 30 feet** |
| **High Volume Commercial/Industrial** | > 4000 | > 400 | 42 feet*** | To be determined through a traffic study | Generally not applicable | Generally not applicable |

* One-lane driveways.

** Driveway striped for two lanes.
*** Driveway striped for three lanes.
**** Driveway striped for four lanes.

All commercial and industrial driveways should be curbed on approach.

## Driveways and Accommodation of Pedestrians

In current and future urban places, all driveways must adequately accommodate pedestrians using sidewalks or paths. The minimum practical width should be used to accommodate pedestrians, and the driveway should be designed to provide the shortest practical path across the driveway for pedestrian movements. Where four or more driveway lanes are created, they should be designed so that the pedestrians have a refuge from entering and exiting traffic. A safe boundary should always be created between pedestrian and motor vehicle traffic.

## Driveways and Accommodation of Bicycles

Where a new driveway crosses a bicycle facility (such as a dedicated bike path or an on-street bike lane), the driveway should be designed so as to accommodate the safe crossing of bicyclists. Likewise, when a new bicycle facility is built that crosses existing driveways, the bicycle facility should be designed with safe crossings in mind.

## Tapers

The minimum distance between the entrance and exit tapers of adjacent driveways must be at least 50 feet. If they are not, the tapers should be eliminated and the shoulder paved to form a turn lane.

## Driveway Throat Length

The throat length is the distance between the street and the parking lot served by a driveway. An adequate throat length helps to keep traffic conflicts within a parking lot to a minimum and frees up space on the driveway for incoming and outbound traffic. The following throat-length guidelines are suggested:

- For low traffic volume commercial and industrial driveways (below 150 peak hour vehicles in both directions), the minimum desirable driveway throat length is 20 feet (about one 20-foot car length).

- For medium traffic volume commercial and industrial driveways (150 – 400 peak hour vehicles in both directions), the minimum desirable driveway throat length is 60 feet (about three 20-foot car lengths).

- For high-volume driveways (over 400 peak hour vehicles in both directions) such as a shopping center entrance, the adequate throat length should always be determined by the results of a traffic study.

## Vertical Geometrics (Driveway Grade Change)

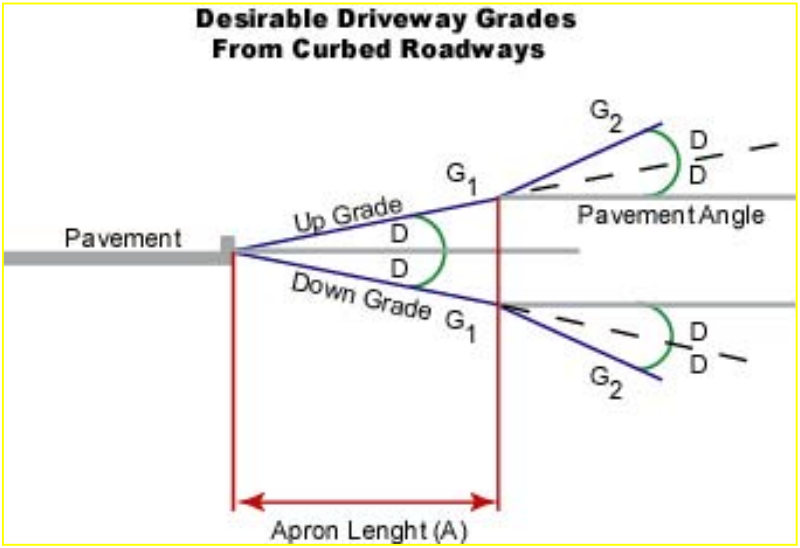
Access driveways on arterial roadways should always be designed to allow vehicles to proceed into or out of the driveway at a speed that will prevent large speed differentials between turning and through traffic. Required apron lengths, desirable grade changes and maximum allowable grade changes are shown in the table below. The apron is a relatively flat area where the driveway meets the public roadway. These guidelines apply to all types of driveways, including for residential, commercial and industrial uses. Driveways should always have a minimum grade change between ½ to 1 percent to provide for adequate drainage. Either an upgrade or downgrade is permissible.

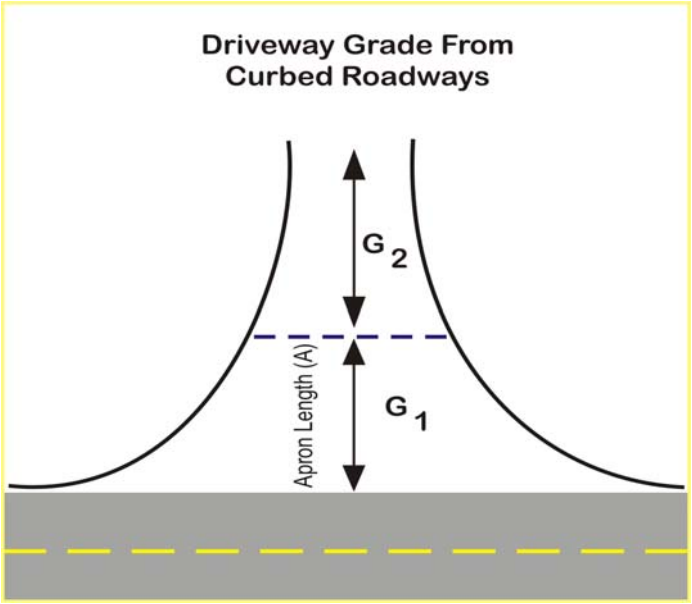
Desirable grades and maximum allowable grades are shown in the following table. Driveways should have a minimum grade of ±1% for drainage.

| Roadway Classification | Required Minimum Apron Length ("A" in the Diagram) | Desirable Grade Change, ("D" in the Diagram) Urban | Maximum Grade Change Allowed, Urban | Desirable Grade Change, ("D" in the Diagram) Rural | Maximum Grade Change Allowed, Rural |
|---|---|---|---|---|---|
| **Interstate/Freeway** | NA | NA | NA | NA | NA |
| **Principal Arterial** | 25-30 feet | 2%-3% | 3%-4% | 1%-2% | 2%-3% |
| **Minor Arterial** | 20 feet | 4% | 5% | 3% | 4% |
| **Collector** | 15 feet | 5% | 6% | 4% | 5% |

Notes: NA: No driveways are allowed on this classification.
The Apron Length is shown as "A" and grade change as "D" on the diagram below.
The grade may change along the course of the driveway, as indicated by $G_1$ and $G_2$. In such cases, it is very important to ensure that the minimum apron length is maintained.

## Diagrams






**Driveway Surfacing**
Required driveway surfaces depend on the roadway they are entering:

| Roadway Classification | In Current and Projected Urban Areas | In Rural Areas |
|---|---|---|
| **Interstate/Freeway** | No driveways are allowed | No driveways are allowed |
| **Principal Arterial** | Paved | Paved, except for residences, farm field, and forest lot entrances |
| **Minor Arterial** | Paved | Paved, except for residences, farm field, and forest lot accesses |
| **Collectors** | Paved | Unpaved driveways are acceptable |

In general, the minimum pavement depth for a commercial or industrial driveway should be eight-inch deep portland cement concrete (PCC) or its equivalent in asphalt (a ten-inch deep Type-A asphalt mix with an eight-inch base course and a two-inch surface course). On residential driveways, a lesser pavement depth of seven inches for portland cement or nine inches of asphalt (7-inch base and 2-inch surface course) is acceptable. Having paved driveways is most critical on principal arterial routes to keep the speed differential between through and turning traffic as low as possible. As noted before, all commercial and industrial driveways should be curbed on approach.

## 21.0 PARKING ON FACILITIES

### What This Guideline Means

This guideline suggests when parking may be allowed on facilities. In general, parking should not be allowed on highway facilities that are primarily intended to serve through-traffic movement. This includes such facilities as interstates, other freeways, and arterials. On-facility parking should not generally be allowed along collectors in rural areas since these roadways allow for high travel speeds. On facilities such as urban collectors, parking may be allowed if an engineering study indicates that it is safe to do so and that the parking will not unduly hinder traffic operations.

Only parallel parking should be allowed. No angle parking should be permitted on any of the types of facilities listed in the table below. Angle parking may, however, be appropriate if the goal is to provide something other than smooth traffic flow or safety. For instance in a small town, promotion of a "walkable community" may be encouraged by providing angle parking in the central business district.

It should be noted that there is currently no statutory prohibition in Missouri regarding parking on the highway right-of-way. Motorists are permitted to stop momentarily to pick up passengers or discharge cargo. Local governments do have the ability to prohibit or restrict parking within their jurisdiction.

### Recommended Guideline

| Roadway Classification | In Current and Projected Urban Areas | In Rural Areas |
|---|---|---|
| **Interstate/Freeway** | No parking | No parking |
| **Principal Arterial** | No parking | No parking |
| **Minor Arterial** | Parking should be studied but may be allowed when warranted to serve and when it can be provided safely | No parking* |
| **Collectors** | Parking should be studied but may be allowed when warranted to serve and when it can be provided safely | No parking* |

* The urban guideline may be applied on minor arterials and collectors in developed areas that are not urban, for example, cities with populations under 5,000.

## 22.0 OTHER MODES

Other complementary corridor management features that are not access management features per se, such as bicycle and pedestrian accommodation and public transit pull-ins are included here. MoDOT has developed a General Pedestrian and Bicycle Guide that should be used to determine what should be done to accommodate those modes when access is managed. The section of this handbook that discusses driveway geometrics has the largest bearing on pedestrians and bicyclists. In addition, access management treatments such as reducing driveway density and adding raised medians and mid-block crossings will have a positive impact on safety and convenience for pedestrians and bicyclists.

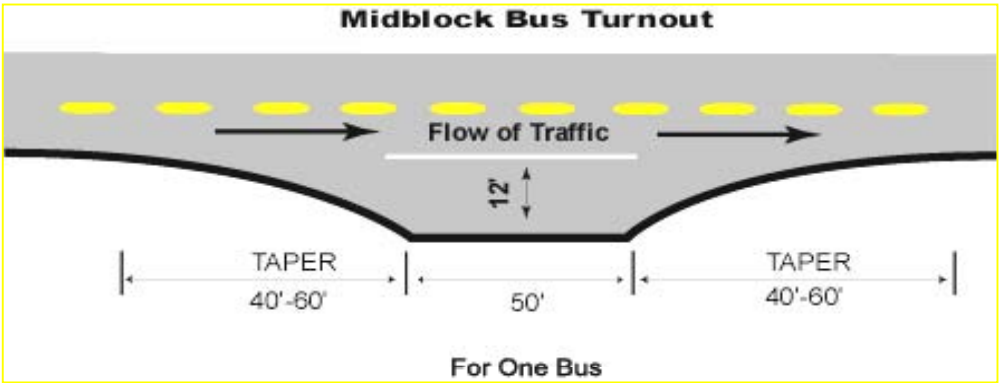
Managing access can also have a positive impact on the operation of public transit vehicles since they will be able to operate more efficiently and safely when they use arterial and collector routes.

### What This Guideline Means

In urban areas and future urban areas, access management projects should accommodate public transit vehicles through the use of such design features as bus pull-outs as shown in the table below.

Mid-block bus pull-outs should be a minimum of 50 feet in length, and 12 feet in width and have an additional 40 – 60 foot taper in each direction. These guidelines do not apply in future urban areas.

### Diagram



**Guideline For Public Transit Accommodation**

| Roadway Classification | Public Transit Buses |
|---|---|
| **Interstate/Freeway** | Use of these facilities recommended for express bus routes only |
| **Principal Arterial** | Use of these facilities recommended for express bus routes only |
| **Minor Arterial** | Include bus pull-outs in design as appropriate |
| **Collectors** | Generally no applicable due to low traffic volumes |