

Defining the ideal relationship between land use and transportation has long been a conundrum for those involved in the planning of either. A number of studies have focused on the impacts of new roads on land use as improvements to the transportation network increases access to land parcels, which often brings more opportunities for development and growth. Several such studies have concluded that, while new roads have little to do with the rate of growth in a region, they do shape our cities and towns by attracting new development and redevelopment<sup>1</sup>. However, few studies have addressed the impacts of land use on new roads. Controlling land use impacts will require land use policies that guide development in a way that distributes local traffic more evenly throughout the local road network, maintains the long-term mobility of our highways, and maximizes mobility for through traffic.

Though striking a balance between competing land use and transportation objectives has multiple benefits, reducing congestion is the primary goal of those wrestling with this issue. Congestion on our roadways is one of the first signs that urban growth and development have outpaced the rate of improvements to the transportation network. While economists will point out that some amount of congestion is good for business, planners know—and economists agree—that too much congestion will have negative impacts that will outweigh the good. Thus, finding and maintaining that balance between development levels and traffic flow is important, especially in rapidly growing areas.

Controlling development, which involves adopting and implementing land use policies, is largely the responsibility of local government. With states investing millions of dollars in major transportation improvements every year, it is not surprising that each state has an interest in protecting its investments through land use policy, as well. However, the specific activities that can be undertaken at the state level to ensure such protection are few. The purpose of this chapter is to summarize a broad range of land use policies that can inform the decisions of those who can make a difference in protecting the mobility of a new roadway, particularly a freeway or expressway [hereafter referred to as “the highway”], and identify the ways in which those policies can be translated into action at all levels of government.

## **9.1 The Land Use/Mobility Issue**

Before land use policies can be evaluated, consideration must be given to the primary issue that the policies must address: the loss of mobility on major roadways.

Freeways and expressways are high-speed roadways designed to carry through traffic (inter- and intra-state traffic as well as some regional traffic). Such roadways are constructed when existing roads that once served this purpose become too congested to function in that way.

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<sup>1</sup> Salila V., Handy, S., & Kockelman, K.M. (2003, April 18). *State-Local Coordination in Managing Land Use and Transportation Along State Highways*. Available: [http://www.ce.utexas.edu/prof/kockelman/public\\_html/JUPD,InteragencyCoop.pdf](http://www.ce.utexas.edu/prof/kockelman/public_html/JUPD,InteragencyCoop.pdf)



They are constructed with the capacity needed to accommodate existing and future through traffic.

Whether the highway is constructed as an upgraded roadway on an existing alignment, or as a new roadway on a new alignment, the result is the same. Development near the intersections and interchanges intensifies. First, highway-dependent uses will locate along the new roadway, followed by uses that benefit from proximity to the highway-dependent uses. This combination and pattern of land uses boosts the number of local trips between them, placing a new burden on the local street network and often putting so many local trips onto the freeway or expressway that it acts as a part of that network. Over time, mobility is lost when such roads are utilized for local trips. Building our way out of congestion is a logical response, but the results are temporary. Typically, this congestion requires an increase in roadway capacity in the form of a new road or widening of an existing road. Once the improvement is made and congestion decreases, access is again perceived as good and development continues in that area until the additional traffic generated by new development results once more in an undesirable level of congestion. Again, one of two choices must be made to alleviate the congestion: build a new road or widen an existing one, creating a continuing cycle of increased development and increased congestion.

There are a limited number of solutions to this cyclical problem. One of those solutions is the adoption of effective land use policies that are aimed at protecting the mobility of new roads. Assessing the potential effects of land use on transportation facilities requires determining what kind of development will occur, where it will occur, and what form it will take. These determinations (and the land use policies that arise from them) are associated with two activities: growth management (where and when development occurs) and land use planning (what type of development occurs). Growth management techniques control the direction, pace, and timing of development, while land use plans describe the nature of development—its density/intensity, mixture of uses, site layout, building orientation, street patterns, and access/connectivity. The level to which both types of techniques are employed, which depends on adopted land use policies, affects the way a highway functions in the long term. Both growth management techniques and land use regulations, which should be based on adopted policies, need to work in conjunction to achieve the desired balance between transportation improvements and future land use.

No particular land use can be described as suitable or unsuitable for areas adjacent to highways. Instead, it is the mixture of uses, the relationship between them, and the way each use is accessed that determines whether development will have a positive or negative impact on the highway. Definitions of “Land Use” need to be expanded to help communities guide growth and land use decisions. This definition includes design of development, which includes density/intensity, mixture of uses, site layout, building orientation, street patterns, and access/connectivity.

## 9.2 Existing Development Patterns and Related Issues

The US 64–NC 49 Corridor is characterized by various development patterns. The changing development patterns throughout corridor reflect the history of development in the corridor, which spans several decades. These patterns range from undeveloped areas to completely developed urban conditions.

All these different conditions affect the way the corridor functions. Undeveloped parts of the corridor provide better mobility; the more developed areas, while having access to goods and services, have experienced a decrease in mobility along the corridor.

Between the developed portions of the corridors lies land that to date has remained relatively undeveloped for a variety of reasons. These undeveloped areas include the following:

- **Scenic/Protected** – A segment of NC 49 is a designated NC Scenic Byway, and another segment passes through the Jordan Lake Recreation Area. Flanked by tree-covered areas, lakes and other natural features, these sections of the corridor are two of a few through which the roadways pass that stand the best chance of maintaining their natural, rural character. Some of these segments are protected in their undeveloped state, while others are not.
- **Rural: Vacant or Agricultural** – Clusters of large tracts of land that have never been developed or have been farmed (and continue to be farmed) can be found in multiple locations throughout the corridor.



*Scenic/Protected  
US 64 – West of Lexington*

The patterns that should be examined include both those that exist in the corridor today and those that are emerging throughout the corridor.

- **Rural: Low-density Residential** – Over time, single family homes have been constructed on large tracts of land. Many of these structures are not visible from the highway, but the private driveways that provide access to them give an indication of the number that exist within areas that otherwise appear vacant.



*Rural: Vacant or Agricultural  
US 64 – East of Pittsboro*

*Rural: Low-Density Residential*



*US 64 – East of Asheboro*



*US 64 - Ramseur*

- **Conventional, Single-use Subdivisions** – The subdivision of large tracts of land has occurred in multiple locations along the corridor. Some have been developed for single family homes on lots of one acre or less, while others have been developed as business parks for business and/or industrial uses. Common to both are the single (or few) points of access that, in this corridor, direct all related traffic to either US 64 or NC 49. Also, these subdivisions rarely have direct, physical connections to adjacent development. These subdivisions are more common near the endpoints of the corridor, in places such as Western Wake County and Concord.



*Conventional, Single-Use Subdivision  
US 64 - Cary*

- **Commercial Strip** – Taking advantage of the access from the highway, commercial development comprised mainly of large- and small-scale retail, restaurants, gas stations, and other commercial development lines both sides of several sections of US 64 and NC 49. Each commercial establishment is oriented toward the highway, and gains its access to the highway through at least one private driveway serving only that parcel. Such commercial development is typically continuous, stretching one parcel deep on each side of the highway for at least one-half mile where it occurs. Siler City, Ramseur and Asheboro are three of several communities within the corridor that have these commercial strips.



*Commercial Strip  
US 64 – Siler City*

- **Highway-oriented Business** – An emerging development pattern is the highway-oriented business development, which is often comprised primarily of regional-scale retail, typically found at freeway interchanges. As improvements to US 64 and NC 49 have

been made, interchanges have been constructed that encourage a concentration of businesses that depend on the patronage of passing traffic. Such interchanges, like those found along the bypass around Pittsboro, in Apex, and near Lexington are attracting large-scale retail and restaurant chains as well as gas stations, which are all being incorporated into conventional “power centers” (regional shopping centers of 300,000 or more square feet). While these businesses are typically not accessed by individual driveways, the centers in which they locate typically have a single point of entry near the interchange.



*Highway-Oriented Business  
Hwy 64 – US 1*

- Downtown – The alignments of US 64 and NC 49 pass through or near the original centers of the towns and cities (Mocksville and Lexington) within the corridor. In these locations, the development patterns still reflect forms of the traditional town center, such as narrow streets and small blocks edged by two- and three-story buildings containing a mixture of uses.



*Downtown Mocksville*

Development, where it has occurred, has had an impact on mobility in the US 64–NC 49 Corridor. Unless the issues presented by current and emerging development patterns are addressed, mobility will continue to be compromised even with improvements made to the roadways. The Future Land Use Map (see **Figure 3.10**) depicts the land use vision of different communities. To understand the overall emerging patterns, the detailed future land use categories were simplified into Conservation, Rural, Suburban, and Urban in **Figure 9.1**. What is reflected in **Figure 9.1** is the continuation of the development patterns discussed above but depicted in a simpler form to show the linear urbanization of the corridor. The specific, related issues are as follows:

- Separation of uses – When uses are isolated, or when located near each other, but not well-connected, travel to and from them becomes more difficult, which encourages vehicular travel and makes bike and pedestrian travel less convenient or feasible. When these isolated or separated uses are located on or near US 64 or NC 49, the local vehicular trips to or between the developments are often made via the highways, compromising mobility on them.
- Multiple access points (driveways) along the highway – Having multiple driveways on US 64 or NC 49 results in multiple turning movements, which slows traffic and contributes to congestion on the highway.



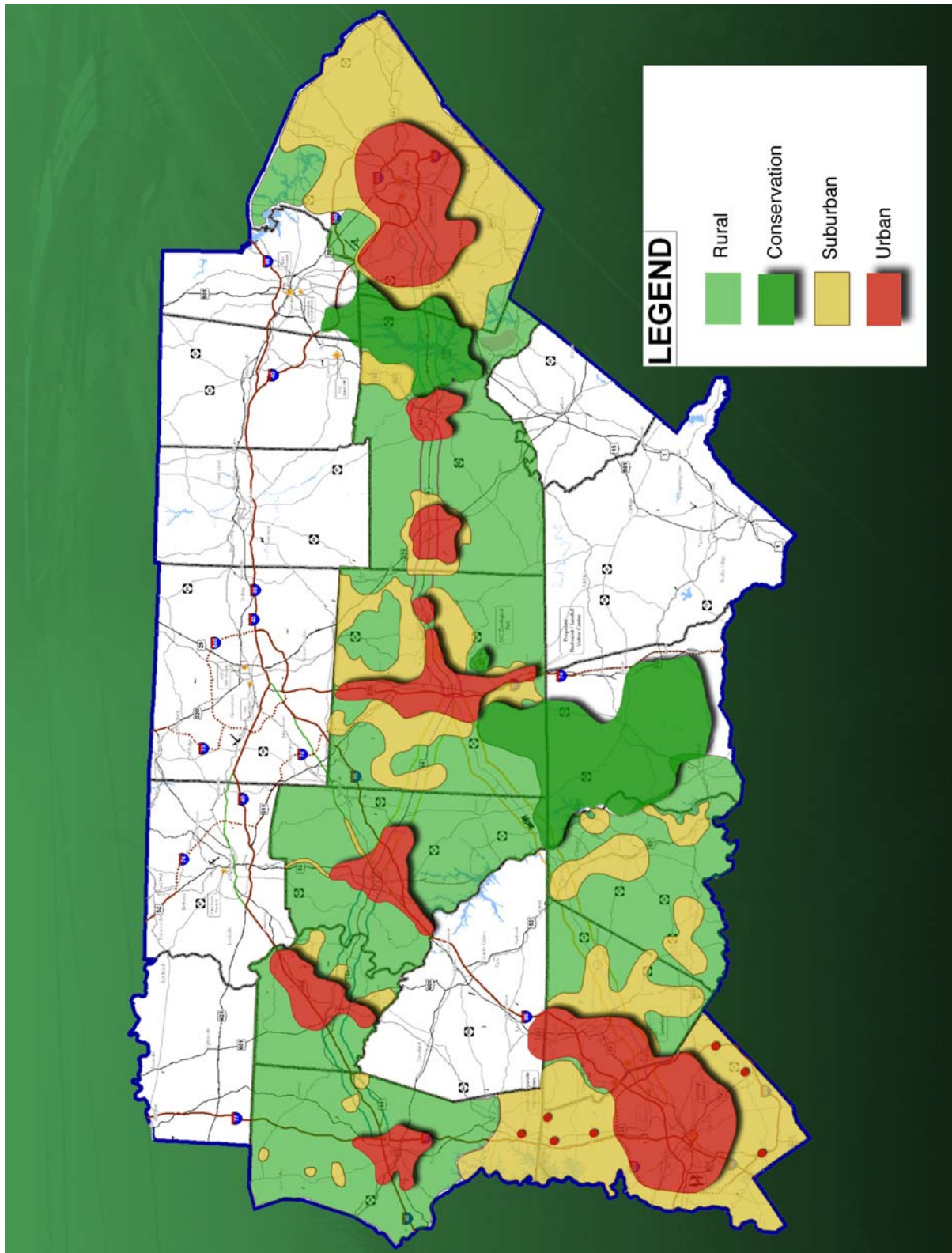


- Single points of ingress and egress serving large developments – When most or all of the traffic generated by one development is directed to a single entrance, the traffic entering and exiting the development utilizes only one road instead of being evenly distributed throughout the street network. If the ingress/egress point is located on US 64 or NC 49, the development compromises mobility on the highway.
- Lack of connectivity between adjacent developments – Without connections between developments, traffic traveling from one to another is unnecessarily forced out onto adjoining roads, increasing traffic on those roads.
- Lack of attention to parallel roads – Parallel roads are not constructed or improved to be attractive local routes when the new facility (Strategic Highway Corridor) is constructed. Providing alternative east-west connections is critical for the corridor to maintain mobility. Unless local, parallel streets are created—or re-created—in a manner that attracts private investment and encourages orientation of development and access toward the local street, the highway will be perceived as the “front door” and the more appealing route for local trips, thus impacting mobility on the highway.
- Greenfield development – Development will follow the construction of infrastructure. When infrastructure is improved further and further from an urban core, development is attracted to these previously undeveloped “greenfield” locations. This phenomenon often contributes to the problem of suburban, low-density sprawl, which attracts local trips on the highway as people travel longer distances to and from the development. Highway-oriented developments, especially around interchanges, possess additional problems since they attract a lot of local trips, often on the highway.
- Lack of strategic growth management – Unless growth is managed in a manner that directs it to key locations in an urbanizing area, development will continue to “strip out” highway corridors. This uncontrolled development pattern increases the occurrence of a number of the issues mentioned above, especially multiple access points, greenfield development, and interchange growth.

In combination, many of the issues listed above contribute to the larger issue of local trips shifting to the highway that is intended to move regional traffic. This increase in local trips impedes mobility.



Figure 9.1: Future Development Pattern Based on Current Land Use Plans



### 9.3 Precedents

The best policies are those based on lessons learned. Where an issue has been successfully addressed in a similar situation, pinpointing the specific features of that successful solution and learning from them—learning why they contributed to success—will increase the likelihood of developing effective policies.

Based on the key issues associated with existing and emerging development patterns described in the previous section, several development alternatives, or precedents, were examined. Precedents are actual places that exhibit the characteristics that are believed to help achieve a desired condition. In this case, the precedents examined have qualities that help maintain the mobility of highways. Those that possess such characteristics that address such issues are presented below.

#### **Precedent: Protected corridor with limited development**

Lexington-Paris Pike

*Lexington, KY*

The corridor passes through a historic bluegrass landscape of rolling hills, passing large historic mansions and horse farms featuring plank and rock fencing. The corridor has remained virtually unchanged since the 1830s, flanked by agricultural uses for most of its length.



Source: [www.asla.org/lamag/lam03/may/feature3.html](http://www.asla.org/lamag/lam03/may/feature3.html)

Notable features:

- Twelve miles of the corridor have remained undeveloped, as land has been protected by adherence to and regulations based on small area plans (recognized by all of the affected jurisdictions that call for preserving and protecting the character of the corridor.)

#### **Precedent: Corridor redevelopment**

US 311 Bypass

*High Point, NC*

When the US 311 Bypass alignment was placed parallel to Brentwood Drive, enough distance was left for development to occur and thrive between the two roads.



*Existing*



Notable features:

- Orientation of development is toward local street, not the US 311 Bypass.
- Depth of parcels between two roads suitable for viable development.
- Planned streetscape improvements are intended to create a safer, more comfortable pedestrian environment.



**Precedent: Corridor development**

Whitehall

Charlotte, NC

Whitehall is a major employment center in the southern part of Charlotte located along I-485.

Notable features:

- Roadways parallel to the highway was designed to allow traffic to access the development without using the highway.
- Interchanges provide access to the local street network that includes these 2 parallel roadways, thereby keeping Whitehall traffic off of the highway.
- Internal circulation is designed to minimize traffic on these local roads, which minimizes congestion interchange areas.



**Precedent: New interchange development**

Ballantyne

Charlotte, NC

Ballantyne is a 2,000+ acre mixed-use development that offers a wide variety of employment, residential, and shopping uses all taking advantage of proximity to an interchange and major highway.

Notable features:

- An interconnected street system within the development allows users to access various areas without returning to the main roadway.
- Only one point of access (an interchange) to the highway (I-485) was created, with limited access to the perpendicular, intersecting road.
- Access through the local road network is encouraged.



### Precedents: Greenfield, mixed-use development

Greenfield sites will always experience development pressure when infrastructure is extended to them. The next four precedents show how a mix of uses developed at different scales could achieve desired balance between land use and transportation.

#### Abingdon Charlotte, NC

Notable features:

- Mix of uses within Abingdon combined with a highly connected system of streets and pedestrian and bicycle paths means that visitors, residents, and employees rarely have to use the highway or the major arterial roads that adjoin the site for local trips.



#### Birkdale Village Huntersville, NC

An integrated mixed-use development combines street-level retail and office with apartments above for an exciting, truly walkable environment.

Notable features:

- A walkable, connected system of vehicular and pedestrian routes combined with a mix of residential, retail, and office space reduces the need for local trips on the highway.
- Connection points are provided allowing access to future development, and facilitating a highly connected local street system through developments lessening the pressure on the highway.







### Harrisburg Town Center *Harrisburg, NC*

A new town center was created around institutional use using the Town Hall as the focal point. Different residential types are mixed with retail to create a more walkable community.

Notable features:

- Compact mixed-use community next to NC 49.
- Interconnected local street network, providing alternative ways of getting in and out.



### Baxter *Fort Mill, SC*

A 1,000-acre mixed-use community with a blend of residential projects laid out in tight-knit, walkable neighborhoods. Civic uses including a library, elementary school, parks and greenways are an integral part of the plan. The Town Center includes businesses, employment, civic and open spaces, and a variety of residential units in a pedestrian-oriented setting.

Notable features:

- The mix of residential, retail, office, and open space combines with institutional uses such as a library and school to further reduce the need for local trips outside of the development.
- A development like this almost functions as a small town in its own right, which reduces residents' needs to use the highway to reach their everyday destinations.



**Precedent: Developed area, mixed-use development**

US 311 Bypass  
*High Point, NC*

A US 311 Bypass interchange connects to Lexington Avenue, which is already a congested roadway lined with a wide variety of commercial uses having access to Lexington Avenue.



Notable features:

- Redevelopment of the commercial strip along Lexington Avenue will allow for better integration of commercial uses in a residential area.
- Redevelopment will also reduce congestion on the highway by creating a better, more connected local street system and managing access along Lexington Avenue.



**Precedent: Multi-modal design**

Transit-oriented development (TOD)  
*Cornelius, NC*

TOD possesses the characteristics of a good, walkable community. Where walking and biking is convenient, the environment is also conducive to transit. In many ways, it recreates the ‘streetcar suburbs’ of the late 1800s and early 1900s, before automobile use became a predominant transportation option.



Notable features:

- Compact development with compatible mix of uses.





**Precedent: Infill development**

Southend, including Camden Village and Atherton Mill

*Charlotte, NC*

Charlotte's Southend has been redeveloped from a declining district of warehouses and mill facilities to a vital and attractive area popular with visitors, residents, and employers.



Notable features:

- Brownfield redevelopment, with the use of grants, in this area has offered a feasible alternative to greenfield development on the outskirts of city for retailers and offices.
- Infill development creates an urban environment that is compact.
- Existing infrastructure is better utilized.





### **Beneficial Characteristics of the Precedents**

Though the specific features of the precedents presented above have been executed with varying degrees of success, these precedents have one or more of the following characteristics that, in combination, aid in protecting the mobility of highway corridors.

- Compatible uses are mixed in a compact environment where the proximity of uses makes alternative modes of travel as convenient as or more convenient than vehicular travel.
- Few access points (driveways) along the highway. Parcel access is internal to development, minimizing the number of—and need for—driveways along the highway and other major roads adjoining development.
- Multiple points of ingress and egress serving large developments provide access to more than one local road off site, allowing traffic entering and exiting the development to be more evenly distributed throughout the local street network.
- Connectivity between adjacent developments providing routes for all types of traffic to travel between destinations without having to use the highway or other major roads.
- Parallel roads serve as the preferred routes to development. In addition, such streets are designed and constructed to attract private investment and encourage orientation of development toward the local street. This forces development to treat local roads as the “front door” and encourages primary access from it instead of the highway or other major roads.
- Preservation of greenfields by taking advantage of existing—and sometimes under utilized—infrastructure, thereby avoiding (or at least reducing) development outside from the urban core. This is incentivized in many communities through a number of mechanisms including brownfield redevelopment grants.
- Strategic growth management has been undertaken in the community in a manner that directs development to key locations, which helps to prevent the “stripping out” of highway corridors. Instead, a nodal pattern of development emerges, which limits access to the highway to a few key places along it.

## **9.4 Policy Guidelines**

In order to address the issues outlined in Section 9.2 and begin achieving the characteristics identified as beneficial in Section 9.3, appropriate land use policies should be adopted throughout the corridor. The following land use policy guidelines address conditions associated with the many facets of the land use/mobility issue described in Section 9.1. Each policy statement is followed by a series of recommended actions for putting it into practice,



which target various audiences from local planning staffs to the state's Department of Transportation. Some of these recommendations are followed by associated sub-recommendations or specific tools that may be used to carry them out. *These policies are not intended to be assigned to specific communities. Each is appropriate for application in every segment of the US 64–NC 49 Corridor, although the prioritization of the policies and their application may vary depending on the particular challenges in each community.*

The policies and accompanying recommendations on the following pages outline ways to achieve a balance between land use and transportation along the highway and at interchanges.

**Policy #1: Promote adherence to land development principles that minimize the need for local trips on the highway.**

As stated previously, no particular land use can be described as suitable or unsuitable for areas adjacent to highways. Instead, it is the mixture of uses, the relationship between them, and the way each use is accessed that determines whether development will have a positive or negative impact on the highway. Thus, development should follow design principles that reduce numbers and lengths of local trips and provide alternatives to the new highway for those trips. Efficient travel behavior is positively associated with such land-use characteristics as density of development and a mix of complementary land uses within walkable distances. These land-use characteristics are in turn associated with transportation infrastructure and facilities that support efficient travel behavior, such as frequent transit service and complete sidewalk and bike lane networks. Development design must incorporate these elements effectively.

Recommended actions for putting this policy into practice:

- Encourage the concentration of a mixture of uses to minimize the number and length of local trips.
  - Locate auto-oriented businesses in a manner that does not conflict with the compact form of mixed-use development and can be accessed via the local street network.
  - Allow vertical mixing of uses (such as residential above commercial/retail) by right in zoning. Cities such as Seattle, Orlando, and Washington, DC, use density bonuses to encourage mixed uses.
  - Vary the intensity of development along a highway corridor by encouraging commercial/mixed-use activity centers near intersections of through streets that are well linked to the surrounding area.
- Establish site design standards to promote development patterns that make feasible a variety of transportation options for pedestrians, bicyclists, transit users, and automobile drivers. Not accommodating this variety of transportation choices encourages vehicular travel, thereby increasing local trips on a nearby highway.



- Support human-scaled design and streetscape features that help enclose and define a more pedestrian-friendly environment by orienting buildings to the street and requiring building entrances to be placed close to the street. Also promote the incorporation of ground-floor windows, articulated facades, appropriately scaled signs and lighting, awnings and other weather protection, and landscaping, including buffering where appropriate.
- Locate parking and vehicle drives away from building entrances and not between building entrances and streets with pedestrian activity. Orient surface parking behind or to the side of buildings.
- Provide access from shared driveways or alleys to minimize the number of driveways pedestrians must cross. Driveways separate buildings; minimizing them tends to shorten the walk between uses.
- Provide pedestrian walkways through sites, connecting building entrances and the public sidewalk with safe crossings of streets, drives, and parking lots.
- One way to do this is to create an overlay zoning district that applies design principles across multiple zoning districts without rewriting entire zoning categories. Parcels affected by an overlay zone are subject to the standards of the underlying zone in addition to the standards of the overlay zone.

#### **North Street Revitalization Project**

In Burlington, NC, the Community and Economic Development Office is working on a North Street Revitalization Project to create a thriving, pedestrian-friendly area to encourage economic development along the mixed-use street. Transportation improvements are aimed at pedestrian safety, street aesthetics, and traffic reduction. Traffic-calming measures include narrowing the street and using pedestal-mounted signals and bump-outs at intersections and crosswalks. Bicycle use will be encouraged with additional signs and education. Lighting reconfiguration will improve lighting levels on the street and sidewalks, address issues of safety, glare, and discoloration, and decrease light pollution.

#### **Traditional Neighborhood Development Ordinance**

Belmont, NC, was the first community in the country to adopt a municipal traditional neighborhood development (TND) zoning ordinance. Belmont's TND ordinance allows for the development of fully integrated, mixed-use, pedestrian-oriented neighborhoods. The intent of the ordinance is to minimize traffic congestion, suburban sprawl, infrastructure costs, and environmental degradation.

- Manage parking design, location, supply, and demand to help create more balanced auto and pedestrian environments. Surface lots should be small, on-street parking should be offered, and structured parking should be incorporated in order to avoid substantially separating uses and impeding pedestrian movement. Oversupply of parking should be avoided since it not only induces auto travel (including travel on the highway), but can discourage travel by foot or bicycle.





- Reduce or waive minimum off-street parking standards.
- Establish a maximum parking ratio based on land use.
- Provide shared parking requirements in areas of mixed retail and commercial uses.
- Allow “in-lieu” parking fees to be paid by a developer to forego providing on-site parking. These funds would combine in a fund for constructing off-site municipal parking facilities.

**Policy #2: Support efforts to increase connectivity within and between developments.**

Travel patterns within a road network are dynamic; they shift with each network improvement as motorists search for and find the optimal route: one that is the shortest in terms of travel time and distance between destinations. Many local roads are created through the subdivision of private property, but as developers strive to minimize costs, money spent on infrastructure is kept to a minimum. As a result, few streets, particularly through streets that could contribute to the local road network, are built; developers build only what is necessary to provide access *within* each development, leading to deficiencies in the transportation network. When the local street network is not sufficient, a highway or expressway can become the quickest route, reducing mobility for through traffic. Connectivity between and within developments not only encourages drivers to use the local street network for local trips without traveling on the highway, but also provides options for people to walk or bike to their local destinations instead of driving, further reducing the number of local trips made by vehicle.

Recommended actions for putting this policy into practice:

- Foster the creation of a dense and highly connected street system.
  - Require a continuous network of streets at the local level. While local transportation plans recommend critical connections, implementation occurs primarily through the development process.
  - Designate future street extensions to plan for connectivity. Stub-out connections to neighboring parcels may be constructed if cross-access is not feasible at time of permit approval.
  - Require the formation of blocks with a minimum street spacing standard. Local governments can plan ahead by stipulating maximum block lengths and perimeters in their zoning codes.
  - Limit closed street systems and cul-de-sac designs to situations where topography, environmental impacts, or existing development patterns prevent full street connections.
- Encourage connectivity for pedestrian and bicycle travel by requiring a continuous network of pedestrian and bicycle pathways that link to roadways and adjacent developments. These pathways need not coincide with street and driveway locations,



making their creation more feasible and, often, their use more convenient than taking a vehicular route.

- Require multiple points of ingress and egress for new developments, locating them on secondary roads in addition to or instead of the highway when possible. Encourage, require, or provide a density bonus for providing access points along more than one roadway, where appropriate, to distribute the trips to and from the development and reduce the burden on the main roadway.

**Policy #3: Promote development design that adequately manages access and reduces congestion levels on roads.**

Achieving transportation efficiency requires addressing potential conflicts between mobility on the highway and accessibility to the highway. As access to a highway is increased, mobility may be reduced. For example, when a highway has an excessive number of curb cuts, access is increased allowing multiple turning movements which slow traffic. Also, easy access facilitated by the many curb cuts encourages local trips on the highway. Access management is key to maintaining the mobility of the highway.

Recommended actions for putting this policy into practice:

The following access management recommendations should be applied to the highway, but may also be considered for intersecting roadways when access management could help reduce congestion on those roads. They may be applied by incorporating the techniques into the zoning code, creating an access management ordinance, or requiring the techniques' application during the subdivision and site plan review process.

- Minimize the number of driveways/curb cuts on the highway. Fewer driveways, appropriate driveway location, and design standards will allow for vehicular movement that will help minimize congestion.
  - Adopt minimum spacing requirements and maximum driveways per development.
  - Encourage shared driveway access through regulations and incentives.
  - Encourage cross-access agreements that allow one or more parcels to gain secondary access across the property of another, reducing the reliance on driveways onto the highway.
  - Because the width of lot frontage affects the spacing between driveways, set minimum lot frontage requirements high enough to prevent land along thoroughfares from being subdivided into small lot frontages. On strategic highway corridors, minimum lot frontage requirements could be tied to minimum driveway spacing standards. Where there are alternatives to direct

**Alternate Access**

DelDOT works with Delaware property owners to find access points to their property other than those linking directly onto the corridor. They also try to achieve a site design that conforms to the corridor capacity preservation program.

access onto the highway (such as access to a cross street or shared driveway), smaller lot frontages could be permitted<sup>2</sup>.

- At the intersection of arterial and local roads, require corner lot access from local roads in order to minimize access points on the highway.

- Encourage smooth traffic flow on the highway by regulating the nature of driveways and other access points.

- Encourage driveway turn-around areas to improve the safety of vehicles that would otherwise be backing out on the highway.
- Implement adequate sight distance policies based on posted speed limits to allow traffic to enter the highway safely and efficiently and to improve visibility of driveways.

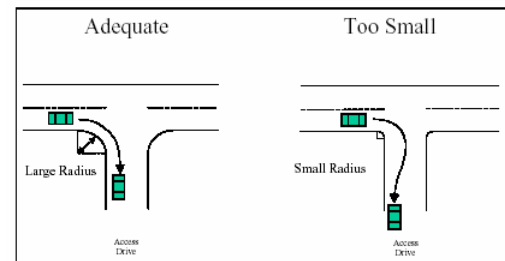
*Landsaped Driveway*



Source: Iowa Access Management Handbook

- Establish guidelines for a minimum turn radius, minimum driveway width, and maximum driveway slope are important because they help slower, turning traffic move off the arterial more quickly, and help the traffic leaving a driveway turn and enter the stream of traffic more efficiently<sup>3</sup>.

*Adequate Turn Radius*



Source: Iowa Access Management Handbook

- Require new developments to conduct traffic impact analyses to determine the need for turn lanes to allow entering and exiting traffic to move smoothly.
- Require bus pullout bays along transit routes.
- Establish a minimum offset between a local road intersection and the highway in order to give enough stacking distance for traffic to exit the highway and turn onto the local road without causing congestion on the highway.

- When access must be provided to small lot frontages, build a back road that can be integrated into the local street system more easily than a frontage road. To do this, the department of transportation may consider building the back road.

- Encourage or require a traffic impact study for all projects that would generate traffic above a certain level in order to lay the groundwork for effective access management.

<sup>2</sup> Williams, K. & Marshall, M. (1996). *Managing Corridor Development: A Municipal Handbook*. Tampa: Center for Urban Transportation Research.

<sup>3</sup> *Access Management Handbook* (2000). Ames: Center for Transportation Research and Education, Iowa State University Research Park.



#### **Statewide Programs**

In August 2000, the North Carolina Department of Transportation (NCDOT) made it easier for local governments to implement traditional neighborhood street networks in new developments. NCDOT approved street design guidelines to support community interest in streets that slow and disperse vehicular traffic and provide a pedestrian-friendly environment. The guidelines specify widths, street geometry, utility placement, and provision of bicycle and pedestrian facilities that promote walkable, human-scaled communities.

New Jersey and Delaware have created similar statewide programs that combine access management approaches to road and street design with context-sensitive design principles. These programs seek to provide alternatives to street widening in order to preserve the character of small historic or suburban towns while improving conditions for traffic through the towns (Ewing, R. 2001. *Flexible Street Design of New Jersey's Main Streets*. New Brunswick: Voorhees Transportation Policy Institute, Rutgers University.).

#### **Policy #4: Maintain the viability of existing development when new highways are constructed.**

When a new highway is built parallel to an existing roadway, whether immediately adjacent or as a bypass around a town or city, the danger exists that the development along the original roadway can migrate toward the highway, drawing local trips onto the highway and leaving the original roadway to lose vitality and users. This can have a negative impact on the existing land uses, provided these uses remain. Fully utilizing an existing roadway as a parallel connection after the new highway is built advances connectivity goals and helps reduce congestion on the highway. A main factor in ensuring that the existing development thrives is a roadway that continues to be used for local trips. The treatment of the existing roadway (i.e. investment that enhances the appearance and function of the roadway as a local street and front door to the existing uses) and the distance between it and the highway are critical.

Recommended actions for putting this policy into practice:

- Provide adequate space between the existing road and the new parallel highway for development to occur on both sides of the original roadway. The appropriate distance will vary depending on the municipality's size, type, and development pattern.
- Invest in streetscape and pedestrian amenities along the existing roadway to attract private investment and help convert it into a vibrant street with the look, feel, and function of a local street instead of a highway or commercial corridor.
- Encourage continuous local streets as development and redevelopment occurs, particularly those that may provide an alternative, east-west route paralleling the new highway.





### **Orphan Highways**

The “Orphan Highways” program in Portland, Oregon, promotes the conversion old highways running parallel to freeway to more pedestrian-friendly, dense, mixed-use corridors. Congressman Blumenauer recently introduced “H.R. 2927, the Orphan Highway Restoration Act,” which would authorize funding for repair and rehabilitation of the nation’s “orphan highways,” many of which function as Main Streets in communities throughout the nation. Orphan highways are federal routes that served as major thoroughfares before the advent of the Interstate Highway System, but now suffer from neglect and maintenance needs. Investing in orphan highways creates a major opportunity for economic redevelopment, safety improvements, and enhancing community livability. With targeted funding and greater decision-making directed to urban areas where the impacts are most directly felt, we can have a positive impact on efforts to reinvigorate tired old highways and restore the Main Streets so important to our nation’s communities. In the Portland region, Sandy Boulevard, Martin Luther King, Jr. Boulevard, Grand Avenue, and SW Pacific Highway are all examples of orphan highways. For more information visit <http://blumenauer.house.gov/Issues/Issue.aspx?IssueID=15>.

### **Policy #5: Encourage redevelopment in the urban core to reduce pressure for greenfield development, which is likely to occur along the highway and attract local trips to it.**

Development is often attracted to areas where construction is easiest and access is most convenient, such as greenfield sites along new and existing highways. However, development of these greenfield sites often has negative effects on the highway, attracting local trips and resulting congestion. If new development can be concentrated in areas that have already been developed, especially areas within the inner city and urban core of a municipality, there will be less pressure for the growth to occur in greenfield locations, and the increased number of local trips on the highway can be avoided.

Recommended actions for putting this policy into practice:

- Use brownfield redevelopment incentives as a catalyst to promote growth in inner city and urban areas. Give tax incentives to municipalities (ultimately passed on to the developer) for site assessment, clean-up, and redevelopment. In order to encourage reuse of brownfield sites, Department of Environment and Natural Resources (DENR) enters a “brownfields agreement” with a prospective developer that defines the clean-up and land management actions that are necessary for a particular brownfield site. With this agreement in place, the developer receives liability protection that opens the door to obtaining loans that would previously not have been offered for the project.

### **Policy #6: Manage development around highways, particularly the interchanges that pass through relatively undeveloped areas (greenfields) in order to minimize negative effects of highway-oriented development on mobility.**

Introducing unfavorable development patterns around highways and highway interchanges often attracts development patterns that are highway-oriented. Such patterns are not desirable from a transportation standpoint. For example, interchanges can attract the development of large land parcels that are typically commercial or industrial, are destinations for local trips, and are typically not connected in any way to neighboring parcels, which are often vacant.



Because of its isolation, this type of development encourages local vehicular trips, as travelers must drive between the parcel and almost any other destination. In addition, the nature and the isolation of these developments often combine to create a lack of both pedestrian connections to neighboring parcels and transit links to more distant destinations, further promoting the number of local trips made by automobile. Thus, managing development in these high-impact areas is key to controlling the effects of land use on a new highway or expressway. The following recommendations show how this development may be managed.

Recommended actions for putting this policy into practice:

- Prepare small area plans at the local level prior to new highway construction. Interchange and other capacity expansions along the corridor should not take place until adequate land use preservation and facility access restrictions are put in place.
- Establish an additional layer of regulation for corridors and interchange areas to control the nature of this development.
  - Implement Interchange Zoning districts.
  - Implement Corridor Overlay Districts.
  - Establish conditional uses.
  - Require Planned Unit Developments (PUDs).
- Purchase land within a specified distance of such access points to prevent development in those locations.
- Provide incentives to stimulate development in target areas and to achieve desired design, intensity, and other characteristics.
  - Allow the transfer of development rights, when permitted in North Carolina.
  - Provide density bonuses.
- Establish easements (e.g. scenic easements) or employ other preservation tools that can be put in place around interchanges.

#### **Interchange Zoning Technique**

Jurisdictions in several states have created specific interchange zoning categories that set forth the uses, standards, and restrictions for land within that zoning category. Lakeland, Florida, has an interchange activity center zoning category as one of the categories in local ordinances that are implemented at the regional level along key corridors. Use of this zoning category has encouraged compact development at interchanges along important corridors. (Salila V., Handy, S., & Kockelman, K. M. 2003, April 18. State-Local Coordination in Managing Land Use and Transportation Along State Highways.

[http://www.ce.utexas.edu/prof/kockelman/public\\_html/JUPD,InteragencyCoop.pdf](http://www.ce.utexas.edu/prof/kockelman/public_html/JUPD,InteragencyCoop.pdf)

#### **Executive Order for Conservation**

Vermont's Executive Order No. 19-3 (No. 07-01) addresses conservation of land in and around interstate interchanges. It encourages state agencies and departments to conserve land in these areas and ensure that any development that does occur meets the state's goals for new development, including compact development patterns and preservation of scenic, agricultural, natural, and historic assets.



- Create multi-governmental interchange access agreements (see **Appendix F** for examples of multi-governmental agreement to better integrate land use with transportation), which could ensure that development around interchanges is managed to meet the criteria agreed upon by the interested municipalities, counties, and state department of transportation. This type of agreement is allowed under North Carolina law section 160A-461 – Inter-local cooperation authorized.
- Utilize new technology to predict and understand the impact of different land use policies on growth around interchanges. The Interchange Development Model (IDM) is a computerized, multivariate regression model that helps in identifying the overall impact of current development and how an interchange may help or fall below development expectations. It also helps determine steps that can be taken to enhance or limit development and provide future alternative scenarios.

**Policy #7: Encourage growth management initiatives that would manage the rate and direction of growth community-wide.**

The pace and direction of growth directly affects road mobility and therefore congestion. If the rate of growth in a region outstrips the road mobility serving and connecting it, then any new improvements, including the new or improved highway, will immediately feel negative impacts such as congestion. One way to handle this problem is by assessing existing and future transportation improvements in light of the rate of growth. If it is determined that the transportation infrastructure planned, especially the highway, is not compatible with the growth rate, growth management efforts will be even more vital to protecting the mobility of the highway.

Recommended actions for putting this policy into practice:

- Restrict extension of services in areas where development should be limited.
- Conduct planning studies such as small area plans to guide development in areas in which growth should be directed.
- Adopt adequate public facility ordinances to make the connection between road mobility and the rate of growth.

**Jobs-Housing Balance Grants**

California offers “Jobs-Housing Balance Grants” to communities that have the greatest increase in the number of housing units permitted in comparison to a previous three-year average. The program goal is to encourage new housing construction, primarily in high job-growth areas where housing has not kept pace with job growth. There are two components to the award: production, which rewards increases in housing supply relative to county-level employment demand and the jobs-housing relationship; and planning incentive, which rewards production of types of housing that advance livable-community objectives. The competitive grant program also offers bonus points for infill and affordable housing projects. The communities can use the grants for a wide variety of community projects (Environmental Protection Agency Smart Growth Initiative. September 2004. <http://cfpub.epa.gov/sgpdb/sgdb.cfm>).



- Create a program for protecting corridor mobility, incorporating an educational component that addresses land use policies.
- To reduce the number of workers driving on the highway to commute long distances to employment, reward communities that create a balance between jobs and housing. The state may do this by offering grants, tax incentives, or other advantages to communities that meet certain criteria.

## **9.5 Conclusions**

Land uses along the US 64–NC 49 Corridor range from agricultural in the rural areas to commercial and industrial in the relatively dense suburban and urban environments. Many of these uses depend on access to US 64 and NC 49 to be successful. However, the specific conditions surrounding development in the corridor are also varied, so the impact of land use on existing and future roadway mobility differs from one area to the next. Thus, the number and types of land use policies that should be applied vary throughout the length of the corridor.

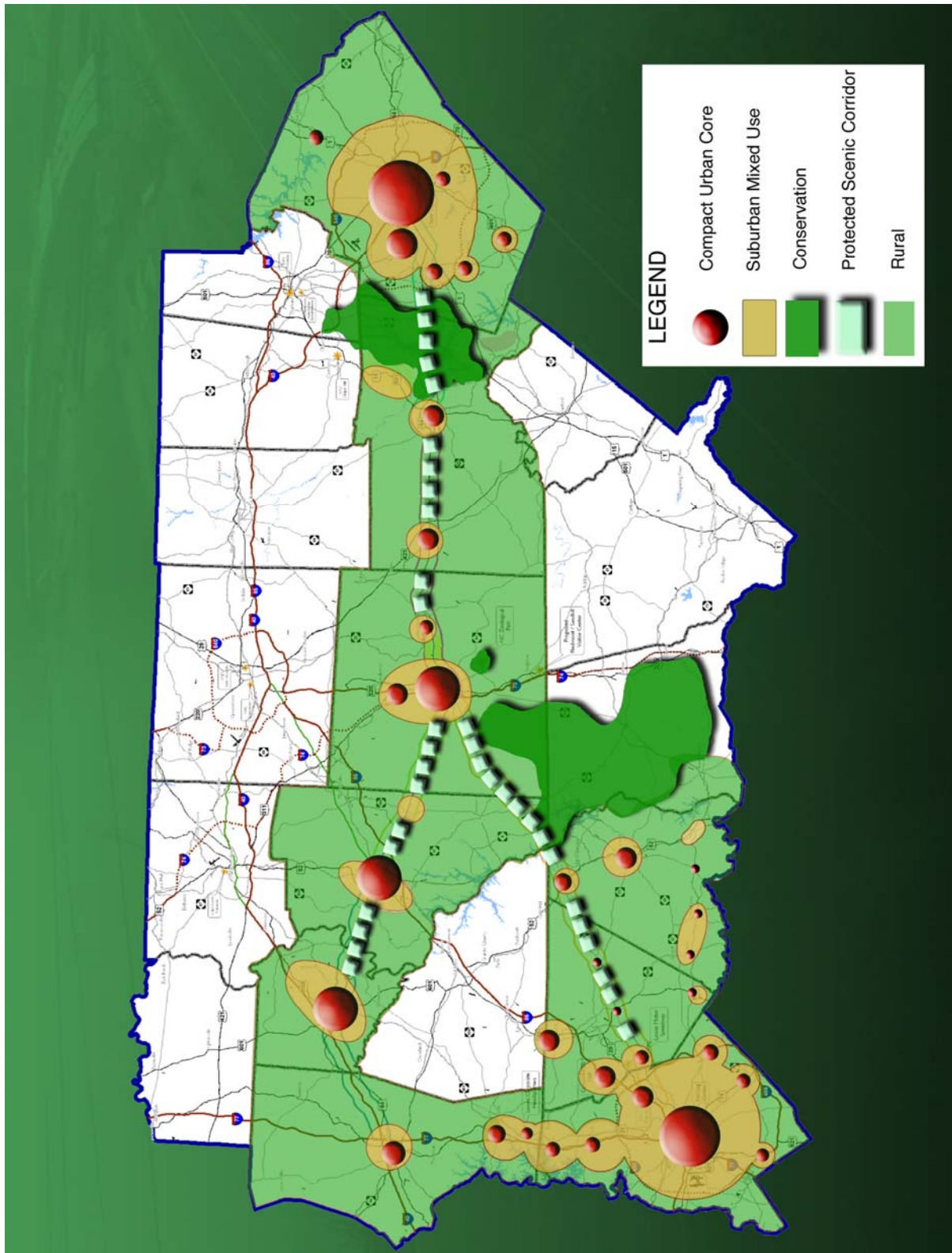
One of the key issues in addressing the need for balance between land use and transportation priorities is how various authorities work at different levels. Most highway transportation improvements fall under the state’s jurisdiction, while land use planning is a heavily guarded power of local jurisdictions. Thus, the power to directly control two closely connected issues is dealt with at two very different levels by two very different organizations. Both state and local jurisdictions will play important roles in preserving highway mobility, and all of these entities working together to achieve this goal will be as important as any efforts they make individually.

In conjunction with other planning and zoning activities, adoption of the policies discussed above at the local level may result in land use patterns that satisfy the needs of both the communities through which the roads pass and the agencies responsible for maintaining mobility for through traffic in a given area. Each jurisdiction may choose to adopt a subset of the policies described in this report, depending on the needs in the area and the input of citizens who are affected by the policies. While embracing these policies is an important first step in implementation, the true benefits will be realized when such policies are reflected in the regulatory frameworks of each municipality and county, ideally in a consistent manner.

If policies are applied appropriately throughout the corridor, the future development pattern that ultimately emerges may resemble that which is illustrated in **Figure 9.2**. The alternative future land use development pattern suggests compact urban cores surrounded by lower density suburban mixed-use development. It also depicts future scenic corridors protected at local level from intense development, mainly between major urban areas. It discourages



Figure 9.2: Alternative Future Development Pattern





stripping of the corridor for high intensity uses between Asheboro and Ramseur by encouraging more compact development.

Since land use is controlled at the local level, the state's ability to influence land use decisions is limited to communication and coordination with the units of local government. As a resource, the state can fill an educational role, giving the affected jurisdictions equal access to useful policy information, including helping to train local officials about land use and its impact on transportation. Providing consistent information opens the door for regional coordination, as neighboring jurisdictions consider the adoption of common policies. State government can also provide a policy framework to encourage changes in land use and transportation patterns in response to population growth. The state might also consider the practices of other states, such as New Jersey, of providing funding and incentives. For instance, NCDOT might direct state and federal transportation funding to cities and regions that preserve land around key interchanges, facilitate the development of land use plans that foster long-term mobility, or demonstrate improvements in vehicle miles traveled per capita.

While efforts at the local level and the state level can be very effective, the best solution lies in bringing the two levels of government together and adopting an incentive-based approach in which road mobility and level of service (issues critical to NCDOT) are balanced with the intensity and nature of development (issues important to local jurisdictions). Balancing the needs and priorities of the two types of organization is part of the larger quest to balance land use and transportation needs and design principles. Successful land use/transportation programs are accomplished in states where inter-governmental cooperation thrives, such as California, Maryland, New Jersey, and Oregon. Such efforts, though difficult and complex undertakings, will provide the most effective solution, allowing both statewide and local needs to be met as goals for the relationship between transportation facilities and land use patterns are realized.