



Central Indiana Suburban Transportation & Mobility Study

Peer Cities Review

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CENTRAL INDIANA SUBURBAN TRANSPORTATION & MOBILITY STUDY

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CENTRAL INDIANA SUBURBAN TRANSPORTATION & MOBILITY STUDY

EXECUTIVE SUMMARY

Background

The purpose of the Central Indiana Suburban Transportation and Mobility Study (referred to as CISTMS and pronounced “systems”) is to examine transportation and mobility needs among and between the communities surrounding Indianapolis in order to identify suburban travel needs and develop recommendations for improvements. Many studies have been conducted for radial routes leading to Marion County. Few have addressed “crosstown” travel between surrounding counties as will be accomplished by this study.

The study focuses on broad corridor areas in central Indiana, including State Route 32 and State Route 38 on the north, State Route 9 on the east, State Route 44 on the south and State Route 267/39 on the west. The implementation of one or more of these broad corridors could establish a portion of a circumferential roadway that could “bypass” segments of I465 or possibly create an entire outer beltway. Other parallel roadways that may be under the jurisdiction of the state, county or the local municipality may also be considered if appropriate. Major problems and deficiencies are being identified and solutions investigated for key areas along those corridors.

Peer Cities Examination of Outer Beltways

A key task of the Central Indiana Suburban Transportation and Mobility Study was the examination of other cities’ experiences with the development of “outer belts” (freeways or limited access roadways) that were built outside an initial freeway “ring” surrounding an urban area.

This report addresses the experience of other communities with outer belts (and related topics associated with urban bypasses) in two ways: through a literature review of research intended to address the experience of a large number of metropolitan areas, and by a more detailed review of the direct experience of four “peer” cities.

Key Findings of Literature Review

Beltways, Traffic and Sprawl: The Empirical Evidence, 1990-1997, David T. Hartgen, University of North Carolina at Charlotte. September 29, 2000. (65 Cities with Beltways)

- Employment rather than roadways is the key factor related to traffic growth.
- Growth Impacts: No-beltway and partial-beltway cities grew faster in area, population and employment.
- Beltways are generally a minor factor in the low-density “spread” of urban areas (sprawl).
- Conclusion: Many factors besides transportation relate to growth and sprawl, including the quality of housing, perceptions of crime, schools, taxes, and a host of other factors.

Measuring Sprawl and its Impact, Rutgers and Cornell Universities for Smart Growth America, 2000. (83 Metropolitan Areas)

- Land use and density were used to measure sprawl (1st=most sprawl; 83rd = least sprawl).
- Some cities with no outer beltways ranked high: Greensboro/Winston-Salem, NC (#2), Greenville/Spartanburg, SC (#5), Knoxville, TN (#8), and Rochester, NY (#12). Other no-beltway cities were at the bottom of the list: Springfield, MA (#68), and Albuquerque, NM (#72).
- Houston, with two freeway belts, and a third beltway under construction, was ranked in the middle (#32) right next to Indianapolis (#33). Dallas, with a partial outer beltway, ranked in the top 15. Baltimore, with partial beltways 5, 10 and 15-miles out ranked 64th.
- Considering residential density, neighborhood mix, strength of activity centers and downtowns, and accessibility of the street network, little correlation was found between urban sprawl and the presence of beltways.

Road Expansion, Urban Growth, and Induced Travel: A Path Analysis, Robert Cervero, APA Journal, Spring 2003, Vol. 69, No. 2. (California freeways)

- In both the long and short term, induced travel and induced development (new building) was found along the expanded freeway corridors, but the magnitude of the induced-travel growth effects was not as great as what was found in previous research.

Land Use and Travel Choices in the Twin Cities, 1958-1990, Gary Barnes and Gary Davis (Minneapolis/St. Paul)

- People spent about the same time traveling to work in 1990 as they did in 1958. Census data shows similar results between 1980 and 2000 (three-minute variation). Beltways (and radial freeways) can extend the distance traveled within a given “time budget,” thus extending the potential development area and contributing to urban sprawl.

The Effect of Beltways on Metropolitan Economic Activity, A. C. Nelson and Mitchell Moody, Journal of Urban Planning and Development, December, 2000. (44 Standard Metropolitan Statistical Areas)

- “...beltways would appear to so disperse populations that market thresholds needed to support marginal retail and service operations are not achieved. The result is that, with regard to economic activity in those sectors, metropolitan areas with beltways are made somewhat worse off than those without.”

Market Choices and Fair Prices: Research Suggests Surprising Answers to Regional Growth Dilemmas, Report #17, Transportation & Regional Growth series. University of Minnesota Center for Transportation Studies, January 2003 (Minneapolis/St. Paul)

- Sprawl issues aside, people are going to travel, whether the path is fast or slow. And they will take jobs and pick places to live for a complex set of reasons, including school quality, closeness to friends and relatives, and personal preference. Daily travel is but one of those factors.

The Economic Impact of Highway Bypasses on Communities; Summary; A Research Project by the Wisconsin Department of Transportation,” January 1988 (17 Cities)

- These Wisconsin communities considered their bypasses to be beneficial, while suggesting a proactive approach to ensuring the most benefits and fewest adverse impacts for individual businesses. The need for coordinated, multi-jurisdictional plans was often cited.

Key Findings of Peer Cities Analysis

Boston, Massachusetts

- I- 95 (formerly MA-128), 15 miles from the CBD, was constructed in 1936.
- I-495, 30 miles from the CBD was completed in 1977.
- The I-495 corridor is characterized by open space, New England town culture, good access to central Boston, and relatively low housing prices.
- During the 1990’s, the I-495 corridor became the fastest growing area in the state. Roughly 29 percent of all manufacturing jobs in the state are found in this corridor and by 2025, it is expected to be chronically congested due to continued economic growth.
- In the past, regional plans in the I-495 corridor have been unsuccessful due to a strong “home rule” tradition, but a visioning process called “the I-495 Initiative” has been instituted to begin to establish control of growth along the highway.
- Lessons Learned: In order to be most effective, outer beltway planning should include the affected jurisdictions from the beginning. The process should proceed through the following three steps:
 1. Visioning – to identify the purpose of the proposed facility.
 2. Planning & Design – to design the facility to “fit” the characteristics of the areas it will serve.
 3. Land Use Controls & Zoning – to facilitate urban development as envisioned.

Houston, Texas

- Houston has three circumferential roads around its downtown and is moving forward on developing a fourth, to be 170 miles long, called the Grand Parkway to serve suburb-to-suburb travel.
- Land along the inner three beltways is nearly fully developed.
- An “expert panel” has determined that development will continue to spread (along radial highways) with or without the Grand Parkway.
- The Grand Parkway Association was formed in 1984 “to facilitate the efficient development of the...outer highway loop and to serve the regional mobility needs of metropolitan Houston and the eight surrounding counties.” The seven member board of directors is appointed by the Governor’s Texas Transportation Commission.
- Lessons Learned: Houston’s experience with the Grand Parkway project suggests the following lessons for Central Indiana:

1. Despite considerable national and local attention, there will continue to be controversy regarding whether an outer loop will cause urban sprawl.
2. Portions of outer beltways may warrant the institution of tolls as a financing mechanism without compromising the overall objectives of the beltway.

Nashville, Tennessee

- The existing “inner loop” is only three to five miles from downtown.
- An outer loop, called SR 840, will be 20 to 50 miles from downtown. It is approximately 30% complete, primarily south of Nashville.
- The primary purpose of the road is “to provide economic development opportunities in areas around Middle Tennessee.” Traffic relief on urban interstates in Nashville and improved through-travel for trucks and other long-distance vehicles is identified as a “by-product” of the roadway.
- The trucking industry has been solidly in favor of this outer beltway “bypass” around Nashville.
- Lessons Learned: The proposed outer beltway for Nashville is seen either as a bypass for through-traffic or as an economic development tool for the area it is passing through.

Following are some lessons for Central Indiana:

1. Outer loops can benefit through-traffic, particularly trucks, by providing an “external bypass” around urbanized areas. A full loop may not be needed as long as heavily traveled routes entering and leaving the area are connected.
2. Outer beltway segments located far from the urban core can be seen either as economic development opportunities or threats to local quality of life. Local areas should determine their expectations of the roadway and take actions to plan future land use and zoning prior to roadway construction.
3. Depending on the purpose to be served by the roadway and the opinions of citizens along the roadway’s path, one or more “bypasses” may be preferable to a full outer loop.

Charlotte, North Carolina

- Construction of I-485 (8-12 miles out) began in 1988 and will be complete around 2010. Planning for a second outer beltway began in the early 1990’s.
- Two options resulted from the planning study of the outer beltway: a new-terrain beltway 25 to 40 miles from the Charlotte CBD, and the upgrading of existing roads to form a circle connecting existing cities and towns.
- The new-terrain option was rejected in favor of the “improve existing” alternative. Towns outside Charlotte wanted development and traffic relief, but after further consideration decided their objective was actually to provide a better way to get to other suburban and exurban towns.
- Currently the towns are improving existing links to four-lane divided arterials at their own pace. The original plan has been split into dozens of independent plans and projects for improving links between various destinations.

- In addition to rejecting a new terrain outer belt, Charlotte’s MPO, the Mecklenburg-Union Metropolitan Planning Organization (M-UMPO), studied ways to avoid the negative land use impacts of I-485 (still under construction). The guiding principles and general recommendations of that study (attached) may to be relevant to Indianapolis.
- Lessons Learned: Charlotte’s experience in evaluating beltway vision and design “later” in the process of interstate highway construction suggests several timely lessons for Central Indiana, as follows:
 1. The purpose of a proposed bypass or beltway needs to be identified (and agreed to) by affected jurisdictions up front.
 2. The best way to encourage positive growth around interchange areas is to plan and adjust for it in advance.
 3. Establishing and agreeing on guiding principles for design is an important initial step, particularly if implementation is to be accomplished by multiple agencies.

Conclusions

1. The national trend of urban growth and economic expansion, combined with a trend favoring decentralized development, has prompted a concern for urban sprawl that is virtually nationwide. These trends were noted in all the cities surveyed.

In areas where growth is occurring, the research findings were inconclusive regarding whether the presence of a beltway contributed to the overall expansion of the area and urban sprawl. Rather, land use planning was found to be a key factor. In areas where land use planning was emphasized and coordinated, the control of growth was more orderly and focused.

2. Beltways (and radial freeways) do impact the location of development and may contribute to some loss of marginal retail and service operations, but research is inconclusive regarding the causal relationship of beltways and urban sprawl. Experience of peer cities clearly indicates, however, that local and regional land use effects (and policies) should be a major part of beltway planning.
3. Since land use policies are determined locally (in Indiana and in all the peer cities reviewed), coordinated planning among jurisdictions is essential for effective beltway planning. Objectives to be served may be regional, but land use impacts are local. Beltway segments need to be integrated with local comprehensive plans.
4. Beltways are not a panacea for improving congestion on existing routes. Linking suburban centers by improved arterial routes rather than a suburban freeway or beltway may best satisfy local needs. The key is to clearly identify the objectives being served through regional studies, local impact reviews and public involvement.
5. Coordinated planning by jurisdictions being served can be effective in reducing the negative land use impacts of beltways (freeway or arterial) and establishing common design standards. Principles and guidelines should be project specific and should reflect state-of-the-art

knowledge of the potential development impacts of transportation facilities. A three-step process should be used:

- *Visioning* to identify the purpose of the project,
- *Design and Location Studies* to fit the plan to the context, and
- *Zoning and Land Use Controls* prior to construction to control development.

CISTMS will contribute to the important first step of visioning. The relationship of land use and transportation will be explored through a local expert panel, public involvement, and state-of-the art modeling. Coordination among jurisdictions will be encouraged and facilitated, establishing a pattern that should be continued through project construction.

At the conclusion of the study, the objectives and character of each roadway segment will be identified, and recommendations will be developed for implementation. These recommendations will include facility descriptions to guide design and location studies, and suggested guidelines for land use controls by local agencies.

CENTRAL INDIANA SUBURBAN TRANSPORTATION & MOBILITY STUDY

1. BELTWAYS & DEVELOPMENT

Evaluating outer beltway proposals is a complex activity, as indicated by experiences of cities across the country. This report addresses this topic in two ways: through a literature review of research looking at the experience of a large number of metropolitan areas, and by a more detailed review of four “peer” cities with lessons applicable to Central Indiana.

For the purposes of this paper, “outer” beltways are defined as controlled-access or limited-access highways that extend 20 miles or more from a region’s central business district. There is much to be learned from the experiences of peer cities in both the planning and the building of these highways. That is the purpose of this report.

1.1 Impacts of Beltways on Development

One of the main issues to be evaluated for any new highway is its impact on development. A large volume of research has been conducted on the impact of highways on land use, economic development and infrastructure, but only a few of these studies focus specifically on the impact of beltways. One that does, *Beltways, Traffic and Sprawl: The Empirical Evidence, 1990-1997*,¹ examined three hypotheses that conventional wisdom attributes to beltways:

1. Beltways accelerate sprawl² (by making it easier to live farther away)
2. Beltways increase traffic congestion (by encouraging more & longer vehicle trips)
3. Beltways increase local street traffic (by encouraging more trips and/or discouraging transit use)

The analysis examined the 65 largest urbanized areas in the United States and compared those with no belts (or partial belts) to those with completed or nearly-completed beltways.

Beltway completed by 1990:	25 cities
Beltway 60%-90% completed by 1990:	12 cities
Beltway 10%-55% completed by 1990:	13 cities
No beltway in 1990:	15 cities
Total Areas Examined	65 cities

Between 1990 and 1997, the population of these 65 cities grew by about 10% (measured by Census-defined urbanized area), employment by 9.5%, land area by about 24%, and total traffic (total vehicle miles traveled) by 21%. According to the study, a substantial portion of this growth is attributable to urbanized areas spreading out to include new or nearby communities (as opposed to new people moving into the region from outside).

¹ David T. Hartgen, author. University of North Carolina at Charlotte. September 29, 2000.

² Generally, “sprawl,” refers to the spreading of a city’s homes and jobs away from traditional residential and commercial areas, usually in a low-density pattern that fosters an auto-dependent lifestyle.

Population Growth – Interestingly, the no-beltway and partial beltway cities generally grew faster in land area, population, and employment than full-beltway or almost-full beltway cities. As the author points out, this “is in stark contrast to the conventional wisdom that targets beltway construction as a major cause of urban sprawl.”

Traffic Growth – Beltway availability seemed to increase traffic density on the higher-level systems: overall growth in vehicle miles traveled (VMT) per capita and freeway traffic per lane was highest in those cities that had a beltway fully in place in 1990, and was lowest in those cities without a beltway in 1990. Interstate and other freeway traffic was also higher in belted cities. This would indicate that beltways divert some traffic from lower-level roads (arterials and local streets), thus reducing neighborhood congestion.



However, the study also found that traffic density on lower systems showed no clear relationship to beltway availability, indicating that beltways do not necessarily ameliorate congestion on arterials and local streets (at least no more than other freeways would).

The study further found that employment change was the key factor influencing change in total traffic. Measures of beltway availability were not statistically significant. The author notes: “As a city reaches out to suburban counties for workers...in-commuting substantially increases urban area traffic.” The study concludes that beltway completion does not materially affect the overall growth rate of a region’s traffic, but notes that changes in freeway mileage have a modest effect.

Sprawl – The paper suggests that beltway completion has been a generally minor factor in the physical spreading of urbanized areas. “Beltways open up land and allow higher-class roads to carry more traffic, but these effects are also occurring in urbanized areas that do not have beltways.”³

Policy implications – the Hartgen study concludes that during the 1990s, “US cities of all circumstances have been growing outward, and that beltways have only indirectly affected this pressure. Housing quality, cost of land, perception of crime, taxes and a host of other factors influence sprawl.” Hartgen suggests that beltways should be seen not as a cause of traffic growth, but as “an alternative means for carrying the traffic created by employment growth, and locating it where policy-makers want.”

1.2 Beltways and Sprawl

A number of recent studies have found that beltways, as with all transportation improvements, can and do influence the location of development. While they may or may not contribute directly to sprawl, beltways do attract new development, and new construction is often in the form of low-density single-use (residential-only or commercial-only) developments.

Sprawl, while widely discussed, can be difficult to define. Perhaps the most comprehensive effort to quantify sprawl was done by a team of researchers from Rutgers and Cornell Universities, sponsored by an organization called Smart Growth America. In its report, *Measuring Sprawl and its Impact*, indicators of sprawl were grouped into four categories.

³ Hartgen, page 22.

1. Residential density
2. Neighborhood mix (of homes, jobs & services)
3. Strength of activity centers and downtowns
4. Accessibility of the street network⁴

Residential density is key – the more spread-out homes are, the farther people need to travel to get anywhere, and the longer roads and utility lines need to be built to serve residential needs.

Neighborhood mix is important as well. When homes are kept separate from shopping and job centers, it means that every trip has to be made by vehicle. Likewise, if service centers (shopping districts) are kept separate from job centers, multi-purpose trip-making becomes difficult.



The strength of activity centers is also key in reducing sprawl. Centers can be downtowns, small towns, or suburban commercial centers. Dense mixed-use residential areas also help in reducing sprawl.

The fourth factor, accessibility of the street network, refers to the interconnectedness of streets and highways. Large super-blocks, cul-de-sacs, and disconnected roads discourage walking and biking, and hamper transit accessibility. The presence of sidewalks and paths are also important, but were not covered in the study.

Based on the four factors, 83 metropolitan regions were ranked for sprawl. Cities with outer beltways could be found all over the spectrum. Houston, with two freeway belts and a third under construction, was ranked in the middle (32nd) right next to Indianapolis (33rd most sprawling). Dallas, with a partial outer beltway, and Atlanta, which is currently planning an outer beltway, ranked in the top 15. On the other hand, Boston, with two beltways that have been in place for decades, ranked in the bottom 10. Baltimore, with partial beltways 5, 10 and 15-miles south of its downtown ranked 64th out of 83. Similarly, some cities with no outer beltways were at the top of the list: Greensboro/Winston-Salem NC (#2), Greenville/Spartanburg, SC (#5), Knoxville, TN (#8), and Rochester, NY (#12)⁵. Other no-beltway cities were at the bottom of the list: Springfield, MA (#68), and Albuquerque, NM (#72).⁶

⁴ Measuring Sprawl And Its Impact, Reid Ewing, Rolf Pendall, Don Chen. Sponsored by Smart Growth America (www.smartgrowthamerica.org).

⁵ The #1 ranked city for sprawl was Riverside-San Bernadino, part of the Los Angeles region. With all the cities and freeways in that region, it is difficult to determine if there is an outer beltway there or not.

⁶ Many other low-sprawl cities had no beltway or no outer beltway, but in many cases this was due to geographical constraints, where water, mountains, and/or international borders made beltway construction, and infeasible. Examples include San Francisco, New Orleans, Honolulu and El Paso.

1.3 Circular Relationship of Road Construction, Congestion, and Development



Current thinking in many circles is that adding new road capacity creates increased traffic levels. It certainly appears to: time after time roads are expanded or new roads are built, and they become congested in a matter of a few years. Once a road is built, it usually attracts development, which in turn attracts more traffic. When this traffic becomes excessive, demands are created to add more road capacity. But is this the true relationship? Perhaps roads simply attract development that would have sprawled elsewhere (not *creating* development and traffic, but just re-locating it). And why was the road capacity added in the first place? Usually it was provided to serve an area where new development or traffic was already expected.

A report released in 2003 by Robert Cervero explored these relationships in “Road Expansion, Urban Growth, and Induced Travel: A Path Analysis.”⁷ The study used data on California freeway projects to test two models of induced travel demand. One was a short-term model, focusing on a one-year timeframe; the other was longer term model, tracing how road investments attract new building in the years after construction.

The theory was that induced demand comes from many sources. In the short term, increased road capacity prompts behavioral shifts: some formerly suppressed trips are made (latent demand), and some motorists switch routes, times of travel, or modes (carpool vs. bus vs. car). Over the long term, structural changes can be expected which further increase travel demand. Both people (homes) and businesses locate to exploit the faster drive times created by the new capacity. Businesses also locate to take advantage of the additional traffic exposure (for many businesses, such as gas stations and some restaurants, the more cars that drive by, the more business they attract).

The study had some interesting conclusions:

- Road improvements and the resulting higher travel speeds spur building activities along a corridor. The model (based on freeways in California) explained about two thirds of the variation in total building activity as a share of countywide totals, and revealed the presence of “institutional delays” (time needed for permit approval, construction, etc.)
- Some land use types were more sensitive to freeway improvements than others. Home building was the most responsive. More modest effects and longer institutional delays were found for commercial and industrial uses along widened freeways.
- Over the long run, for every 10% increase in travel speed (due to added capacity), there was a 6.4% increase in vehicle miles traveled (VMT).
- Higher traffic volumes do erode some (but not all) of the speed benefits of new capacity.
- Influences of behavioral shifts on VMT on new roads (latent trips, modal changes, route diversions) is nearly four times as strong as the impact of structural changes (development-induced demand).

⁷ Article appeared in APA Journal, Spring 2003, Vol. 69, No. 2. <http://www.planning.org/japa/archive.htm>

One of the more interesting findings was that the *new highway* → *more traffic* → *more development* → *even more traffic* model actually is circular. As traffic and development increase in an area, a demand for additional lanes is created (and often fulfilled). New capacity is most often added in areas that are already experiencing growth, and this complicates the ability of studies to determine exactly what share of traffic and development is being created because of new road capacity, and how much is due to pre-existing or exogenous factors.

The study found that in both the long and short term, induced travel and induced development (new building) was found along the expanded freeway corridors, but that the magnitude of the induced-travel growth effects was not as great as what was found in previous research.

The author stated that “The contention that capacity additions are quickly absorbed by increases in congestion,” and that “you can’t build yourself out of congestion” will not hold in all settings. Houston is a case in point. Over the past 15 years, during which the city invested about a billion dollars annually in freeway improvements, Houston has made greater headway in relieving traffic congestion than most of its U.S. counterparts.” Cervero suggested that while congestion relief measures may work in some areas, these do “not necessarily make for a sustainable and livable metropolis.”

1.4 Time Budgets for Traveling

Every transportation improvement, from electric trolleys to interstate highways, has allowed people to live further from work. This reflects sensitivity to a time (not distance) budget for the daily work trip. A study of the Minneapolis/St. Paul region found that people spent about the same time getting to work in 1990 as in 1958.⁸ The distances, speeds and modes may have changed, but the commute time is essentially the same.



More recent proof is available from the decennial Census survey, showing that the average commute in the United States was 20 minutes in 1980, growing to 21 minutes in 1990, and 23 minutes in the year 2000.⁹ This small change is perhaps surprising given all the recent reports of increasingly congested urban road networks, increased time spent in congestion, and metropolitan areas that continue to sprawl outwards.

The previously cited Smart Growth America study compared the sprawl ranking of 83 metropolitan areas to transportation-related measures. It found that the higher ranking (more sprawling) cities exhibited more vehicle miles traveled, a greater number of vehicles owned per household, an increased traffic fatality rate, and higher concentrations of ground-level ozone.¹⁰

Not surprisingly, sprawl was negatively correlated with the use of transit, bicycling and walking for work trips. The study found no relationship, however, between the degree of sprawl and the average commute time of its residents, nor the annual traffic delay per capita. This refutes the claim that

⁸ *Land Use and Travel Choices in the Twin Cities, 1958-1990*, by Gary Barnes and Gary Davis. 2001. As cited in the University of Minnesota study.

⁹ “Market Choices and Fair Prices: Research Suggests Surprising Answers to Regional Growth Dilemmas” Report #17 in the Transportation & Regional Growth series. University of Minnesota Center for Transportation Studies, January 2003.

¹⁰ *Measuring Sprawl And Its Impact*, Reid Ewing, Rolf Pendall, Don Chen. Sponsored by Smart Growth America (www.smartgrowthamerica.org), page 17.

sprawl helps to “spread out” traffic, thereby reducing congestion and travel times. It supports the concept that individuals have time budgets for their commutes, and will select their homes and job locations with this in mind.

As with most major highway improvements, faster speeds are possible when outer beltways are built (at least until demand increases and congestion occurs). This increased speed typically enables commuters to live further away from their jobs and other destinations, while still keeping within their time budgets. In this manner, outer beltways can contribute to sprawl (although to no greater a degree than other highway improvements).

1.5 Economic Impact of Beltways

One study that focused specifically on beltways (and one of the few that examined outer beltways separately from other beltways) is Nelson & Moody’s *The Effect of Beltways on Metropolitan Economic Activity*,¹¹ as reported in the *Journal of Urban Planning and Development* in December, 2000. The study compared various characteristics of 44 metropolitan statistical areas,¹² using regression analysis to determine the impact of beltways on the service sector of the regional economy.

The Nelson & Moody study concluded that beltways do cause sprawl, somewhat in contrast to the Hartgen study. The difference may be largely attributable to the definition and measurement of sprawl. The Hartgen study looked for evidence of a region spreading outward, while the Nelson & Moody study focused on the presence of low-density single-use development.

The assumption of the Nelson & Moody study was that beltways would increase the opportunity for homes and businesses to spread out in a less-dense pattern, thus reducing the ability of specialty retailers to succeed. The best way to understand this phenomenon is through the example of a theoretical corner bakery. Service businesses have a core trade area population that they require for survival. A typical corner bakery might require a population of 5,000 people in a one-square-mile area. If the population spreads out over ten square miles, those same 5,000 people will not be able to support a bakery, as few would be willing to travel over a mile on a weekly basis for baked goods.

Where do these potential sales go? Some of the demand is captured by other businesses in the region (a grocery store selling lesser-quality bread or cakes), but some of the sales “leak” out of the region in the form of internet purchases of specialty breads or catalog-order cheesecake.

This is the same principle that explains why there are many Walmarts and K-marts, but few Nordstroms, and why there are some types of businesses that only exist in Chicago, New York, San Francisco, or other large, high-density cities.

The study found that metropolitan areas with one beltway suffer a loss of \$626 in retail and service sales per capita (about 6 percent of mean sales of \$10,550 per capita). For cities with two beltways, the loss is \$772 per capita (about 7.3% of mean sales per capita). The study concluded that:

“...beltways would appear to so disperse population that market thresholds needed to support marginal retail and service operations are not

¹¹ From the *Journal of Urban Planning and Development*, December 2000. Authors A. C. Nelson and Mitchell Moody.

¹² The 44 areas included all Census-defined Metropolitan Statistical Areas exceeding 700,000 population in 1990, but excluding the three largest areas of Chicago, New York, and Los Angeles. Of these 44, 15 had no beltways, 21 had one beltway, and 8 had two beltways.

achieved. The result is that, with regard to economic activity in those sectors, metropolitan areas with beltways are made somewhat worse off than those without. The fact that the coefficient for two or more beltways is larger than for one indicates that competitive advantage is eroded when more opportunities are present for the population to disperse.”

The study points out that “some may argue that gains made in other areas of the economy such as construction, office development, and development of modern, land-extensive business and industrial parks, may offset losses in retail and service sales.” However, the authors ask if these same gains could be had without sacrificing retail and service sales, for example by zoning for higher-density residential uses, mixed housing opportunities, and park-and-ride lots at retail and service centers.

It should be emphasized that this impact is seen on total, overall metropolitan area sales. The study did not examine the sales data of central cities, or of specific towns or suburbs through which the beltways pass.

Market Choices and the Costs of Sprawl

To a large extent, land-use decisions are market-based. People want newer and larger homes on larger lots for lower prices. Businesses want the same thing: new facilities with lots of floor area and ample parking and delivery areas for lower prices. These can often be had at the edge of existing development. People as well as businesses assume that government will extend and expand transportation facilities and other infrastructure to wherever they build.¹³ In many cases, this assumption proves to be true.

With continued growth, however, it can become more and more difficult for road-building to keep up with traffic demand. For example, a study on land use and transportation in the Minneapolis/St. Paul area cautioned that available funding for highways in future years, even though it was projected to grow every year, would largely be spent on maintenance of the road network, and not on the expansion that might be needed for the area’s growing population.¹⁴

Although traffic and transportation investments are most readily apparent, maintenance of overall infrastructure is an increasingly significant issue. As stated in the Twin Cities report, “If it were not for today’s traffic, undermining expectations of convenient mobility, most people would not think that there was any problem with this low density, spread-out pattern. But there is. The costs of maintaining the system are growing.”¹⁵

So what are the policy changes that could make a difference? According to the Minneapolis study, the answers lie in two categories: providing more choices than exist today for community development and travel modes, and adopting policies of honest pricing. Attempts to restrict development through regulatory measures can have some effectiveness, but working with the market can be more successful, cost less, and be much more acceptable to the public in the long run.

¹³ “Market Choices and Fair Prices: Research Suggests Surprising Answers to Regional Growth Dilemmas” Report #17 in the Transportation & Regional Growth series. University of Minnesota Center for Transportation Studies, January 2003, page 23.

¹⁴ “Market Choices and Fair Prices: Research Suggests Surprising Answers to Regional Growth Dilemmas” Report #17 in the Transportation & Regional Growth series. University of Minnesota Center for Transportation Studies, January 2003, page 23.

¹⁵ “Market Choices and Fair Prices: Research Suggests Surprising Answers to Regional Growth Dilemmas” Report #17 in the Transportation & Regional Growth series. University of Minnesota Center for Transportation Studies, January 2003, page 23.

Sprawl issues aside, the primary conclusion of the Minnesota study is that people are going to travel, whether the path is fast or slow. And they will take jobs and pick places to live for a complex set of reasons, including school quality, closeness to friends and relatives, and personal preference. The challenge (or ease) of daily travel is but one of those factors.¹⁶

1.6 Multi-City Studies of Bypasses: A Literature Review

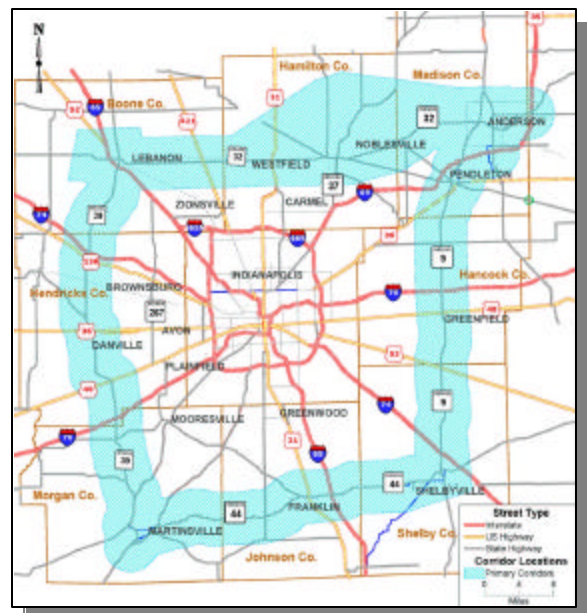
In many cases, an outer beltway could be defined as a series of local bypasses, connected together. For each city or town that the corridor touches, a decision must be made as to whether the beltway will travel through existing developed areas, or serve as a bypass around it. A case-by-case review of each community is consistent with the segmentation that ordinarily occurs with beltway planning and implementation. While early planning for beltways is usually done holistically, most agencies identify manageable segments for refining alignments, developing mitigation plans, and performing environmental studies.

Segmentation has a number of benefits, including the opportunity to respond more effectively to public concerns. A proposed outer beltway corridor might travel through many miles of territory, through dozens of political jurisdictions, and countless neighborhoods and resource areas. Simply being aware of all the concerns along a beltway corridor can be a difficult task.

Segmentation also facilitates design differences by section. Just as I465 varies in the number of lanes, outer beltways are often comprised of segments of varying widths and classifications. Some are not built all the way around (eg, Louisville). In some cases, a beltway might be tolled in some segments and free in others (eg, Houston). Segmentation allows beltways to better serve specific local needs, while still facilitating longer-distance through movements.

The state routes addressed in the Central Indiana Suburban Transportation and Mobility Study currently pass through residential neighborhoods and commercial areas in cities and towns all along the study corridor (including Pendleton, Noblesville, Westfield, Shelbyville, Danville, and others). The potential for bypasses of state highways through these communities is likely to be a continuing issue, whether or not they are part of an outer beltway for the region.

There are advantages and disadvantages to bypasses. By removing high-speed traffic from downtowns, bypasses can make streets safer and quieter, improve air quality, and increase parking availability. They can also create economic development opportunities for nearby properties. On the downside, bypasses have been accused of “emptying out” traditional downtowns, as new businesses locate or re-locate along the bypass.



¹⁶ “Market Choices and Fair Prices: Research Suggests Surprising Answers to Regional Growth Dilemmas” Report #17 in the Transportation & Regional Growth series. University of Minnesota Center for Transportation Studies, January 2003. Page 27.

In 1988, the Wisconsin Department of Transportation (WisDOT) conducted a study of the impact of bypasses on traffic, safety, and economic factors in small towns. The study took multiple approaches, including analysis of traffic count data, origin-destination surveys, economic reviews, field data collection, interviews, and a survey of civic and local business leaders. The study looked at 17 cities and towns ranging in size from 304 population to 28,100.

The study found little evidence that bypasses adversely impact the overall economies of most communities. Over the long term, average traffic levels on the old routes were found to be close to pre-bypass levels (indicating no need for “retail flight” from downtowns). Furthermore, in nearly all of the large and medium-sized communities, traffic was still heavier on the old routes than on the new bypass route.

The study found that most bypass communities had significant economic growth occurring before the bypass was built (not surprising, as economic growth generates traffic, which often triggers bypass plans in the first place). In towns over 2,000 population, this economic growth continued after the bypass was opened. Economic growth in these communities exceeded that in a control group of similar “non-bypass” communities.

In the larger towns, which served as a destination for local and regional residents, old route traffic was substantially higher than bypass traffic (10,300 vehicles per day (vpd) compared to 7,700 vpd on the bypass). In the medium-sized communities, the old routes averaged 7,600 vpd, with traffic virtually equal on the bypass (7,500 vpd). For the smallest communities, (population under 2,000), daily traffic on the old routes averaged 1,800 vpd, compared to more than 10,000 on the bypass. The average decrease in traffic on the old route was 72%. In these communities, there would have been substantial economic pressure for traffic-dependent businesses to relocate along the bypass.

In the medium and larger sized communities, average traffic loss on the old route after the bypass opened was 18% and 30% (respectively). While this is a significant drop, the fact that the old routes had generally higher traffic than the bypasses made business relocation a less attractive option.

Further analysis was done to determine the extent to which retail flight may have occurred, including classifying and mapping over 1,900 retail, lodging, and entertainment businesses in the communities. The results of the mapping showed that less than 5% of these businesses were located within a half-mile of a bypass interchange or intersection. In fact, the vast majority of retail businesses had not moved from their pre-bypass location. Furthermore, the community interviews and site visits showed that many traffic-oriented businesses were newly-built inside the communities (long after the bypass had opened), with no proximity to the bypass.

It should be noted that there were some additional factors in many of these Wisconsin towns that may have kept bypass-area development low. The study noted that:

- some communities made conscious planning and zoning changes to control development near the interchanges
- the cost and feasibility for some communities to provide municipal services to interchange areas outweighed the potential revenues of new development
- many bypasses have a limited number of access points, either due to terrain unsuitable for development, or due to WisDOT access-control policies

Six of the towns were selected for a special survey¹⁷ of business and civic leaders. One of the towns had a population of 22,500 in 1987; the others had populations ranging from 3,500 to 9,400. Each of the towns had a bypass in place for less than ten years (so that community leaders could be expected to recall changes since the bypass was built). Towns were also selected based on whether they were served by one arterial or more than one, with emphasis given to those towns dependent on just one arterial.

The WisDOT survey found that bypasses were perceived to have had differing effects in each of the towns. Moreover, within each of the six towns, the surveyed individuals often had different impressions of the impact of bypasses on their town. Perceptions of the traffic and safety impacts were the most clear, with perceptions of economic impacts showing little consensus.

These results should serve to indicate that road location decisions, including whether to build a beltway, bypass, or add travel lanes, can have a wide variety of impacts, both positive and negative.

Traffic congestion on the old highway was perceived to be reduced. Within each town, 74%-94% of all respondents agreed that traffic congestion was reduced on the old route. The perceived reduction in truck traffic was slightly stronger, with 74%-100% of respondents selecting “fewer large trucks on old highway.”

Parking along the old route was also strongly perceived to be improved, or at least “not much different.” “Bypass made parking easier” was selected by about half of the respondents of four of the towns, with “not much different” selected by much of the other half of respondents.

Perceptions of **pedestrian safety** showed 52%-83% of respondents in each town believing that pedestrian safety was better on the old highway after the bypass was built.

Opinions on the economic impacts of bypasses varied widely, with responses for most questions split more-or-less three ways between “improved”, “no change” and “not improved”.

Impacts on employment were not clear, with leaders in only one of the cities, West Bend, showing a strong majority of opinion (in this case that the bypass brought jobs to the community). In the other towns 40-78% of respondents felt that either there was no change in jobs, or that the change in the number of jobs had nothing to do with the bypass.

Perceived impacts on the **property tax base** were also heavily weighted to the “not sure/no effect/change not related to bypass” answers. Again West Bend respondents strongly felt that the bypass brought development. Of the other towns, respondents showed more of a preference for “bypass brought development” (6% to 48%) than for “loss of tax base” (4% to 13%).

A question was asked as to whether the bypass had improved or harmed the **quality of life of residents along the old highway route**, and whether their property values were higher or lower. While “not sure” and “not much different” received the most responses, in all six towns “nicer neighborhood/higher value” beat “poorer place to live/lower property values.”

¹⁷ Detailed results of the survey were presented in “Impacts of Highway Bypasses on Wisconsin Communities; Technical Summary” July 1988, Wisconsin DOT.

Responses of “nicer” ranged from 17% to 43%, while those for “poorer” ranged from 0% to 9%.

A later study, done by the National Cooperative Highway Research Program (NCHRP), reviewed 190 studies that examined the impact of bypasses on communities with populations under 50,000. That study, *Effects of Highway Bypasses on Rural Communities and Small Urban Areas*,¹⁸ found that research supported some conclusions about the impacts of bypasses, but other beliefs about bypass impacts were inconclusive.

Unlike the Wisconsin study, the NCHRP study found that traffic levels on old routes virtually always decreased. Average daily traffic (ADT) on the older routes declined by 50-70 percent on average. Economically, however, the impact of this decline is not at all clear. While there is evidence that businesses along the older routes may suffer loss of sales, the overall assessed impact even on the vulnerable locations (gas stations and other traffic-dependent businesses) seems to be limited or inconclusive. Many of the cases where areas experienced declining sales or other indicators of adverse impact are attributable to broad demographic and economic trends unrelated to the highway bypass.

A review of land value data seemed to indicate that bypasses were a benefit to properties along the old routes. Land value increases along the new routes, not surprisingly, were observed in all cases reviewed (68 cases had land use data for new-route properties). Along the older routes, increases were observed in 47 of the 50 cases, and the three cases that saw declines were small – the worst case involved value decreases of 2.4 percent.

It is true that individual businesses may suffer when a new bypass is opened. A Texas Department of Transportation study traced the fate of individual businesses in bypassed communities. Of the traffic-serving businesses (gas stations, fast-food restaurants, etc.) cases were reported where as many as 36 percent closed following bypass construction. For other businesses, the rate was less than 25 percent. Losses in one area of a community’s economy may be made up for elsewhere: in some communities, nearly 90 percent increases were seen in the number of businesses along the old routes. Along the new routes, this study showed a substantial increase in new businesses in virtually all cases.



The opinions of local residents, as reported in the NCHRP study and supported by statistics on sales, indicate that in most cases, adverse effects on otherwise viable bypassed businesses appeared to be largely compensated for by improved ambience for patrons and residents in the community (for example, due to reductions in traffic noise or difficulties in parking).

As indicated by interviews, the communities in the Wisconsin study considered their bypasses to be beneficial, while suggesting a proactive approach to ensuring the most benefits and fewest adverse impacts for individual businesses. The communities reported that the bypasses expanded the geographic scope of their planning since many were being built outside city and town boundaries. The need for coordinated, multi-jurisdictional plans was often cited.¹⁹

¹⁸ “Effects of Highway Bypasses on Rural Communities and Small Urban Areas,” published in the National Cooperative Highway Research Programs *Research Results Digest*, No. 210, May, 1996.

¹⁹ “The Economic Impact of Highway Bypasses on Communities; Summary; A Research Project by the Wisconsin Department of Transportation,” January 1988, page 14.

2. PEER CITIES REVIEW

There is much to be learned by reviewing how other communities have responded to issues associated with beltways. Since outer beltways are nearly always constructed in rural areas or areas that were recently developed, many local community concerns and potential impacts are likely to be similar for Central Indiana. Anticipating social and environmental impacts, responding to public concerns, and implementing proactive planning solutions differs little by community size or geographic location.

There can be no “perfect match” peer city for this study. Cities vary not only in population and growth potential but in many other aspects that impact outer beltway planning, including:

- Public attitudes (desired and expected impacts of a beltway)
- Natural, historical, and community resources along the proposed corridor
- Existing and desired development levels in the proposed corridor
- Intended purpose of the beltway (congestion relief, economic development, improvements to interstate travel)

Even if a matching city were found, variations within the Central Indiana study area would limit opportunities for direct comparisons. The study area varies from rural parts of Johnson and Morgan counties to growing new suburbs such as Avon, to established older cities like Franklin and Noblesville. Some communities do not encourage new development, while in others, attracting growth and development is a major local priority.

As in Central Indiana, suburbs in other metropolitan areas also vary in their needs and desires; planned development levels; and natural, historical and other resources. In response to varied site conditions and community expectations, a number of cities that originally planned full-circle outer beltways are only building part of the circle. Because beltways are usually intended for suburb-to-suburb travel (not for full-circle travel) this is often most appropriate. Identifying the purpose of the facility and matching it to the physical context is a major element of any beltway plan.

2.1 Peer City Selection

The first step in locating peer cities for Central Indiana was identifying those that had an outer beltway, were planning to build one, or had rejected one. An initial list was compiled using a variety of techniques, including the use of two listservs (one from a large national planning and engineering company, one comprised of planning officials at state transportation agencies). Project staff input and map reviews were also used to identify potential peer cities. The resulting list of cities (presented in Appendix A) was subjected to multiple screenings to identify those most appropriate for comparison to the Central Indiana region.

Some metropolitan areas were eliminated because the radius of their beltway was too small, or the population of the area was much too low. This list included Nashua, NH (pop 87,000); Petoskey, MI (pop 6,000); and Lincoln, NE (pop 250,000). Later screenings eliminated most multi-city metropolitan areas and regions that were too large or cut across state boundaries involving rivers with limited crossings. The cities eliminated from further consideration are listed in the table below.

Table 1: Cities Eliminated from Further Research

City	2000 Population*	Reason for Elimination
Atlanta, GA	4,112,000	Region is facing limits on use of federal highway funds due to air quality non-conformance. Pressures on Atlanta region differ from those here.
Cincinnati, OH	1,979,000	Three-state area involving limited river crossings.
Columbus, OH	1,540,000	(Partial) beltway plans were driven by plans for a new Toledo, OH-to-Myrtle Beach, SC interstate to be called I74. There was no local interest in building the bypass/beltway around Columbus.
Dallas-Fort Worth, TX	5,222,000	Two-city metropolitan area.
Raleigh, NC	1,188,000	Three-city metropolitan area and the outer beltway is only 10-12 miles from downtown Raleigh.
Richmond, VA	997,000	Small population, and two-city area (metropolitan area is merging with Petersburg, 20 miles away).
Seattle, WA	3,555,000	Linear city built around a bay. Also, beltway study was requested by one state legislator, and is not a result of local or state planning.
St. Louis, MO	2,604,000	Two-state metropolitan area, limited river crossings.
Washington, DC	4,923,000	Multi-state, limited river crossings, large population.

* Figures shown are 2000 Census data for the Consolidated Metropolitan Statistical Area (MSA), except for Washington, DC, where the (non-consolidated) MSA population was used to exclude the population of neighboring Baltimore.

Ultimately, four cities were deemed worthy of further investigation as peer cities for Central Indiana: Boston, Massachusetts; Charlotte, North Carolina; Houston, Texas; and Nashville, Tennessee.

2.1.1 BOSTON, MASSACHUSETTS



Boston’s outer beltway, I495, is an 87-mile-long expressway located about 30 miles from the Boston central business district (CBD). Planning for this highway began in the late 1940s, and the original purpose was twofold: (1) to provide a bypass for the heavily populated areas north of Boston, and (2) to give “a much needed boost to the economic development of the cities and towns it serves by providing swift, easy access to all parts of the state and the nation.” At the time, Boston already had a circumferential beltway, MA-128, about 15 miles from the

CBD. Construction of this road, which on maps is designated as I-95, began in 1936. Although it was built well outside existing development, MA-128 was so congested by the late 1950s that most of it was expanded from the original 4 lanes to 6-8 lanes.

Seeing the development that had taken place around MA-128, town boards along the then-proposed I-495 corridor anticipated the need to accommodate growth along the new road. Local officials recommended zoning changes and utility enhancements to promote development along the corridor.²⁰

In the past three decades, the I-495 corridor has become the fastest growing area in Massachusetts. Much of the growth is based on high-technology manufacturing industries (similar to the growth pattern along MA-128). In fact, roughly 29 percent of all manufacturing jobs in the state are found along I-495 even though these communities account for just 18 percent of the state’s employment.²¹

²⁰ http://www.bostonroads.com/roads/I-495_MA/ (a history of I-495).

²¹ Kuhn, Sarah, *From the Field: Interstate 495 West: The Challenges of Change in an Information Technology Corridor* Massachusetts Benchmarks, Fall 2000 Vol. 3, Issue 4.

The area is attractive because it offers a high quality of life, distinguished by its open space, New England town culture, low levels of congestion, and access to the Boston metropolitan area. Compared to Silicon Valley and Boston's MA-128 corridor, it also offers relatively low housing prices. Yet, as one report on the west segment of I-495 notes: "the growth that I-495 West is experiencing, if not carefully managed, will damage the very qualities that make life there so attractive."²²

In fact, congestion is already building in the corridor. Between 1977 and 1997, traffic counts along parts of I-495 have doubled or tripled or more. Congestion on some local roads is growing as well. Median home prices in three towns along the middle part of I-495 doubled between 1990 and 1997 and grew by 25 percent in six other communities (compared to a 13 percent increase in the greater Boston area). School-age populations are also burgeoning and in some communities along I-495 West there are increasing signs of aquifer or groundwater depletion.²³ By 2025, the I-495 corridor is expected to be chronically congested due to continued economic growth.

For this reason an effort is underway to bring the communities that make up the corridor together for a visioning process. Currently the corridor is served by multiple MPO jurisdictions, six counties, and many towns. Earlier efforts to develop regional plans for development, services, and resource management have clashed with the strong "home rule" tradition held by towns along the route.²⁴ It is hoped that this new effort, the "I-495 Initiative" will take the process from visioning to design to proactive land use control in a manner that retains local autonomy while bringing the benefits of coordinated planning.

Lessons Learned – Boston

In order to be most effective, outer beltway planning should include the affected jurisdictions from the beginning. The process should proceed through the following three steps:

1. Visioning – to identify the purpose and character of the proposed facility.
2. Planning & Design – to identify the physical character of the facility.
3. Land Use Controls & Zoning – to facilitate urban development as envisioned.

2.1.2 CHARLOTTE, NORTH CAROLINA



Charlotte is an unusual city in that it was planning its outer beltway at roughly the same time as it was beginning construction on its inner beltway. Original planning for the first beltway (with a radius of about 8-12 miles) was begun in the 1970's and construction, which will be completed around 2010, began in the late 1980's. In Charlotte, as was the case for North Carolina's other cities, no beltways were built during the time of major interstate construction. In addition to Charlotte, beltways are under construction in Raleigh, Greensboro, and Fayetteville.

The first beltway (I-485) has met some objection but it is largely supported by the public, businesses, and the political leadership. The reasons given include traffic relief, new roads to better meet circumferential demand, and an expectation that the city simply

²² Kuhn article

²³ Kuhn article

²⁴ http://www.bostonroads.com/roads/I-495_MA/

“should have a beltway” at this point in its development. Charlotte is growing (with 29% MSA population growth from 1990 to 2000), and the number of vehicle trips has increased noticeably. (One individual interviewed commented that Charlotte needed a beltway to prevent it from becoming another sprawling, congested Atlanta.)

I-485 is being built primarily on the edge of existing development. In some directions, there is little development outside the beltway. In other directions, such as towards the north, development goes far beyond the planned beltway alignment. Growth also exists beyond the beltway on the southeast side, where a number of small towns are popping up just beyond the county border (in areas where taxes and land are cheaper). MPO planners believe that growth would happen there with or without the beltway. Certainly growth to the north has been happening well in advance of the beltway.

Planning for Charlotte’s outer beltway took place in the early 1990s. It was initiated by a group called the Committee of 100, originally established by the Charlotte City Council and the Mecklenburg Board of County Commissioners (and funded by those two groups as well as the North Carolina Department of Transportation (NCDOT)). The group was made up of residents from a cross section of the 30 communities in the two-state, seven-county metropolitan Charlotte area. The Committee of 100 conducted a transportation visioning process for the region, which resulted in two recommendations: (1) that the city construct an outer beltway, and (2) that it should develop a transit plan, specifically along five proposed corridors, and make use of fixed-guideway technologies such as light rail.

The original outer beltway plan would have placed it just outside the ring of towns outside Charlotte. The belief was that an outer beltway in conjunction with transit would help to relieve congestion on interstate highways near downtown. The outer beltway was also associated with progress.

The Committee of 100 followed up on the visioning process by advocating a one-cent regional sales tax increase. Half a cent was to be used as a dedicated source of funding for highway construction, with the other half-cent to be used to fund a future transit system.

The half-cent proposal for highways failed, but the half cent for transit was approved. The Committee of 100 changed its name to the Business Committee for Regional Transportation Solutions (BCRTS), and it continues to advocate the transit plan (two light rail corridors, one commuter rail corridor, and two bus rapid transit corridors). In 1998, the state legislature granted BCRTS \$500,000 to study regional land use and transportation issues in the Charlotte region.

The half-cent increase in regional sales taxes for highways failed for two reasons. First, the state (NCDOT) is currently funding the construction of the first beltway, reducing the immediate need for more highway funding. Second, all sales tax increases must be approved by the state legislature (as in Indiana), as well as pass a referendum. The highway tax was not approved by the legislature. They felt that little harm would be done by allowing localities to impose a transit tax because it would have limited applicability. (Probably no other city in the state would be interested.) Allowing counties to impose a tax to raise funds for road building, however, might result in tax increases in many jurisdictions.

Two options resulted from the planning study of the outer beltway: a new-terrain beltway 25-40 miles from the Charlotte CBD, and the upgrading of existing roads connecting existing towns and cities surrounding Charlotte. The new-terrain option was rejected in favor of the “improve existing” alternative. Reasons for this included the expense of a new-terrain outer beltway, and the realization by the towns outside Charlotte that a new-terrain beltway would not help bring economic development

to their towns, but would attract it out *beyond* them. Development often clusters near interchanges for maximum accessibility, and homes built on new land or farmland are almost always less expensive to build than homes in established areas.

The towns outside Charlotte wanted development and traffic relief. Officials had originally assumed that an outer beltway would provide this, but after further consideration they decided that what they were looking for was a better way to get to other suburban and exurban towns. The improvement of existing roads, which already formed a loop, seemed the best way to accomplish this without the negative development consequences that might occur with a new-terrain road built outside of existing development.

Currently the towns are improving existing links to four-lane divided arterials at their own pace. There is no coordination among their efforts, and the overall plan has been split into dozens of independent plans for improving links between various destinations. Right now only one of those links is being upgraded and some other links are now in local transportation plans.

Local action on beltway construction

Seven years after construction began on I-485, Charlotte's MPO (the Mecklenburg-Union Metropolitan Planning Organization/M-UMPO) began a detailed study of existing and proposed I-485 interchanges. The study²⁵ looked at transportation and potential development around new and proposed interchanges, and the resulting impacts on land use and beltway operations.

The study recognized that each beltway interchange could become a popular location for businesses. "Businesses located at an interchange have good connectivity with all of the other businesses at all of the other interchanges for about twenty hours of the day." These businesses, in most cases, also have excellent access from residential areas along the beltway as well as high visibility by commuters and other beltway travelers. As the study puts it, beltways present a "paradoxical spiral." Additional interchanges imply more mobility and lower volumes at existing interchanges. However, because the additional interchanges facilitate growth and development, the net result can be less mobility and more congestion overall.

The study stated that a beltway would work well with a large number of interchanges if land use could be held constant and if interchanges were properly spaced. "Each of the interchanges would enhance mobility and lessen the traffic demands on other interchanges." The study recognized that, historically, outer loops constructed without land use controls prompted increased demand for new development, which compromised the function of the roadway.

The intent was to avoid the negative impacts of development by not allowing transportation improvements to control land use. As the resulting report states:

"While the opening of each new section of I-485 has provided welcome relief for some motorists, and increased the off-peak hour traffic mobility for many, it has also heightened concern about the negative impacts often associated with such roadways. Among these impacts are increased traffic congestion at interchange areas; unplanned and poorly designed development, especially retail shopping centers and fast food restaurants; noise; lack of a pedestrian and bicycling-friendly street system; and loss of community."

²⁵ I-485 Interchange Analysis: Detail Report of Existing Conditions and Recommendations. Adopted July 1999 by the Mecklenburg-Union Metropolitan Planning Organization.

The study examined each of the 35 interchanges in detail, and eight public meetings were held throughout the study area to receive input from citizens. Planning staff from nine municipalities and both counties were involved as they met to discuss issues and analyze concerns expressed by area citizens.

The study examined zoning maps and future land use maps (which reflect the community's vision), as well as proposed developments, to get a sense of likely and desired future land use. In many cases adopted land use plans were already being updated to better address the impacts of I-485.²⁶ Transportation plans and travel demand model forecasting were also used in the analysis.

The result was a document that describes current land use and zoning in the impact area and recommends plan amendments or other changes as warranted. (The study recommended further planning studies for seven of the interchanges.) The document has been used to alter NCDOT's plans for constructing the beltway, and it is followed by local agencies when zoning changes or plan revisions are requested. The plan recommended the following changes for the 35 interchanges:

- Add a loop (6 interchanges)
- Provide access management (15 interchanges)
- Extend control access (14 interchanges)
- Construct roundabouts instead of traditional interchanges (5 interchanges)
- Delay construction of interchange ramps (3 interchanges)
- Complete Thoroughfare Plan amendments, road realignments, or other road improvement studies (24 interchanges)
- Build or convert interchange to an urban diamond interchange configuration (5 interchanges)

NCDOT has largely followed the recommendations for design changes. In addition to these specific items, a series of guiding principles and general recommendations were developed for I485 (See Appendix B). Most of these could have applicability for any modern beltway (or freeway) being developed in today's urban environment.

While all of the recommendations developed for Charlotte might not apply to an outer beltway in rural areas around Indianapolis, a number of them currently apply or will apply once any interchanges are built and development pressures build. The main point is to make land use plans in advance of development.

In reviewing options to coordinate transportation and land use plans for the corridor, The Charlotte study noted a problem that is shared by all large regional transportation projects – the problem of coordinating planning among multiple jurisdictions. The land use and mobility impacts of large beltway projects are felt across many towns, townships and counties, each of which are making their own land use and transportation decisions, sometimes with conflicting goals. Coordination of planning and managing growth and development across borders is therefore vital to addressing transportation and land use impacts, and “to ensuring the long-term viability of the...region.”

²⁶ I-485 Interchange Analysis: Detail Report of Existing Conditions and Recommendations. Adopted July 1999 by the Mecklenburg-Union Metropolitan Planning Organization, page 11.

Lessons Learned – Charlotte

Charlotte’s experience in evaluating beltway vision and design “later” in the process of interstate highway construction suggests several timely lessons for Central Indiana, as follows:

1. The purpose of a proposed bypass or beltway needs to be identified (and agreed to) by affected jurisdictions up front.
2. The best way to encourage positive growth around interchange areas is to plan and adjust for it in advance.
3. Establishing and agreeing on guiding principles for design is an important initial step, particularly if implementation is to be accomplished by multiple agencies.

2.1.3 HOUSTON, TEXAS



Houston has three circumferential roads in place around its downtown and is working on a fourth:

- I-610 – an interstate loop about 6 miles from the CBD
- Beltway 8/Sam Houston Parkway – toll road, except in free section along northeast corner
- Highway 6/FM 1960 - Not a true beltway. There is much development along this road and numerous traffic lights, making it useful only for local traffic.
- Grand Parkway – some sections of this proposed road are built, others are still in the planning stages.

The Grand Parkway (SH99), a proposed 170-mile circumferential scenic highway would traverse seven counties. The project has been divided into nine segments, each of which has been identified as a complete and independently justifiable project.

The project has been shown on governmental planning documents since the early 1960s. Twenty miles of the highway (part of the southwestern quadrant) have been constructed as a toll-free road, open to the public since 1994. Construction is scheduled to begin on a second section (in the southeast quadrant) in 2003. Other segments are in various stages of planning, with five EIS’s underway or complete.

The proposed corridor is on the edge of existing development. Some sections are in developed areas (such as segments on the south and southwest portion); others are more towards the edge of recent development. The northeast segment would run through undeveloped areas, but the land there is undesirable, and no location studies or environmental studies have been started for this segment.

To study the potential impact of the Grand Parkway on future development patterns, the Grand Parkway Association (described below) assembled an expert panel. The expert panel consisted of planning officials, developers, transportation providers, school representatives, environmental advocates, and a private developer. Working with a consultant study team, the panel determined that future development patterns without the new beltway would be concentrated around radial highways, with areas in between maintaining low densities of development.

The expert panel concluded that development would spread out with or without the completion of Grand Parkway (as it has been already), although GP would influence the location of this growth. While dense development was still expected along radial routes, it did not extend as far out from the Houston central business district (CBD) as was expected in the no-build scenario.²⁷

Purpose of Grand Parkway

The primary function of the Grand Parkway would be to serve suburb-to-suburb travel. Additional intended purposes include:

- Provide a circumferential route around the metropolitan area, allowing through traffic to bypass the more highly congested urban areas
- Address the long term needs of the Houston community by providing a corridor for both private and public modes of transportation improvements
- Relieve existing and anticipated congestion on local thoroughfares
- Augment existing hurricane and emergency evacuation routes (a serious concern in the Houston area)
- Create a road that is scenic in nature with a greenbelt easement and limits adjacent development through minimal use of frontage roads; and
- Save taxpayer highway dollars through partnership with the Texas Department of Transportation (TxDOT), local governments and private landowners (for donation of right-of-way)

Existing beltways are not serving Houston's needs. Highway 6/FM1960 is congested and cannot be improved due to right-of-way constraints (development is right up against the existing road). Highway 8 is also very congested, even though it is 10-12 lanes wide. Most travel along Highway 8 appears to be suburb-to-suburb travel.

Plans for the Grand Parkway call for a 400-foot right-of-way. Original plans were for 300 feet. Access roads are to be kept far from the highway. These factors would keep development at a distance, to encourage use of the Grand Parkway for longer trips (not short trips from one developed interchange to the next one).

The Grand Parkway Association

Planning for the Grand Parkway has been going on since the 1960s. In 1968, the project was planned and approved for construction in 1990. In the early 1980s, a specific corridor was set aside and developers were asked to avoid this proposed right-of-way.

A group of developers met with TxDOT officials and asked for more of a commitment. They were willing to avoid the corridor, but wanted assurances that the road would indeed be built where it was planned. TxDOT agreed that Houston was very



²⁷ Interim Working Paper 2: Secondary Development Analysis, Final, December 2000. Prepared for the Houston, TX Grand Parkway Association as part of their studies on Segment F-1.

congested, but their staff was already overburdened with other road projects, and additional resources could not be devoted to further development of the Grand Parkway project.

In response, the state legislature acted in 1984 to allow the formation of “State Transportation Corporations.” The purpose of the corporations was:

- the promotion and development of public transportation facilities and systems by new and alternative means
- The expansion and improvement of transportation facilities and systems
- The creation of corporations to secure and obtain rights-of-way for urgently needed transportation systems and to assist in the planning and design of those systems
- The reduction of burdens and demands on the limited funds available to the Texas Transportation Commission, and an increase in the effectiveness and efficiency of the Commission; and
- The promotion and development of transportation facilities and systems that are public, not private, in nature, although these facilities and systems may benefit private interests as well as the public.

The Grand Parkway Association (GPA) was formed in 1984 under this legislation. It was established “to facilitate the efficient development of the Houston’s third outer highway loop and to serve the regional mobility needs of metropolitan Houston and the eight surrounding counties.” Its stated objectives were:

- Facilitate development of a 170-mile scenic outer loop highway
- Acquire by donation as much of the total project right-of-way as possible
- Secure funding for engineering design and environmental studies
- Coordinate efforts among various landowners, community groups, local governments, TxDOT, and public interest groups; and
- Provide information to the public on the status of planning, approval and construction.

The Grand Parkway Association is governed by a seven-member board of directors appointed by the Governor’s Texas Transportation Commission. It reports semi-annually to TxDOT concerning the status of various project segments together with financial information.

The GPA, a quasi-governmental non-profit organization, has extra-jurisdictional authority to perform planning functions, including the preparation of environmental studies and other NEPA documentation.

Funding

GPA currently utilizes funds from various sources including TxDOT, METRO,²⁸ Harris County, Fort Bend County, Chambers County, Galveston County, and Brazoria County. Funds can be received from any willing source. Counties contribute to the planning, environmental, or design studies for the specific segments of the beltway that pass through their jurisdictions. While no federal funds are

²⁸ METRO is the Harris County transit authority. Houston is located in Harris County.

currently involved, it is assumed that a combination of state and federal funds will be used during the construction phase.

The northwest segment of the Grand Parkway is planned to be a toll road. Proceeds from the tolls would not be high enough to cover all costs, but it has been estimated that this would allow the project to be built 15 years sooner. It is because of this expedited schedule that tolling is supported by backers of the Parkway.

Public Opinion

The beltway has been quite controversial. In 2001-2002, public hearings were held on a few of the segments. Concerns of those against the Grand Parkway include loss of homes due to right of way acquisition, and fears that truck traffic (particularly unregulated Mexican trucks) will be brought through or near residential neighborhoods. The Sierra Club has promoted the idea that in-fill development and transit are better alternatives to the sprawl that it believes would be caused by construction of the beltway, particularly in the north and northwest part of Houston. The proposed route also runs through sensitive areas on the west side (the Katy Prairie). A group in the northwest segment set up a website dedicated to stopping the construction in that area.

Developers and some local governments support the construction of the Parkway. Portions of it have been proposed for the new I-69 NAFTA route as well, which many believe will bring economic development wherever it is located.

The Houston area is in non-conformance with the ozone pollutant. Discouraging increases in automobile usage is a real concern for the area because only 35% of ozone produced in the area comes from cars. Thirty percent comes from industry, and most of the rest comes from bio-genic sources (plants).

Lessons Learned – Houston

Houston's experience with the Grand Parkway project suggests the following lessons for Central Indiana:

1. Despite considerable national and local attention, there will continue to be controversy regarding whether an outer loop will cause urban sprawl.
2. Portions of outer beltways may warrant the institution of tolls as a financing mechanism without compromising the overall objectives of the beltway.

2.1.4 NASHVILLE, TENNESSEE



The metropolitan area population of Nashville is somewhat smaller than that of Indianapolis at 1.2 million, but it is a fast-growing area (25% population growth 1990-2000). Like Indianapolis, it is crossed by several interstate highways. Three interstates (six legs) utilize Nashville's relatively small beltway (three to five miles from the CBD). For this reason, the state trucking industry has been solidly in favor of an outer beltway "bypass" around Nashville.

The outer loop, known as State Route 840, is being built very far from downtown Nashville. The southern part of the loop, of which 56 of the planned 78 miles are open to traffic, will run through five

counties ranging from 20 to 50 miles from the CBD. The northern portion of the loop would be even larger at 108 miles long and extending through six counties.

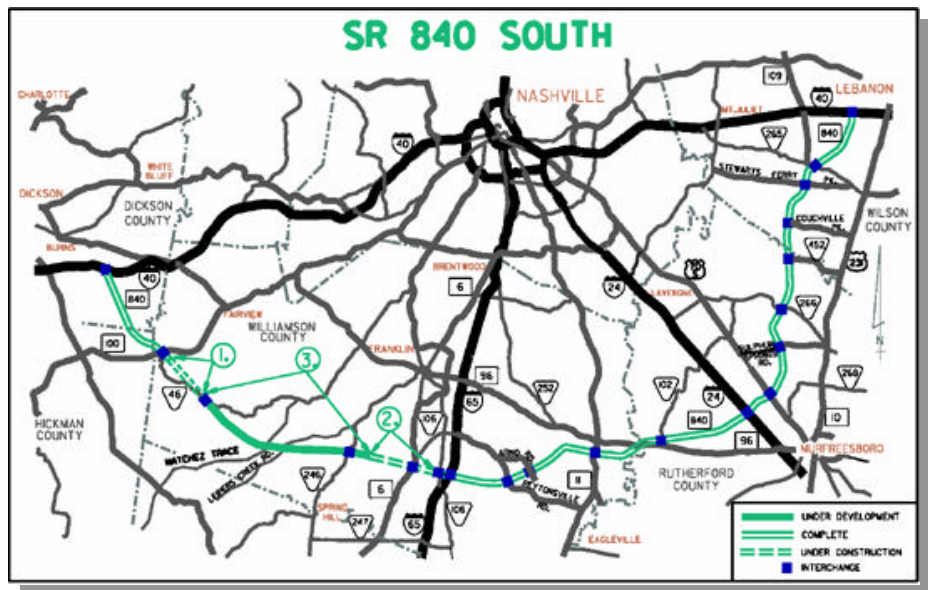
The primary purpose of the road is “to provide economic development opportunities in areas around Middle Tennessee.” Tennessee Department of Transportation’s project webpage lists traffic relief on urban interstate highways in Nashville and improved through travel for trucks and other long-distance vehicles as a “by-product” of implementing 840.

According to the Tennessee Transportation Commissioner, 840 South will result in an immediate reduction of 8,000 vehicles per day from the Nashville Urban Interstate System, including an estimated 500 trucks. Commissioner Saltsman also noted that the road will provide motorists in outlying towns and cities with a safer highway.

The project was proposed in 1986 by Governor Lamar Alexander and it has been under construction since 1988. While construction has not begun on the northern leg, the draft environmental impact statement is being finalized and public hearings have recently been held to discuss points where 840 will connect main corridors in the area.

Construction on the southern leg has been underway for many years and all but 22 miles are now complete. Construction on the remaining segments has been temporarily stopped due to a lawsuit over environmental concerns.

An interesting aspect of the project is that it was designed to use only state funds – no federal funds. Because there are no formal state or local environmental study requirements, it was thought that this funding plan would reduce the possibility of lawsuits and other construction delays. Although TDOT maintains that it is following NEPA-like procedures, environmental lawsuits have still had an impact on project development.



A citizens group in Williamson County filed suit in federal court in March 2002 against the Army Corps of Engineers for failing to fully study the impact of the project on water quality and aquatic habitat. TDOT was accused of violating NEPA by not preparing a formal EIS for the many places where the corridor crosses a stream or wetland (many of which are in Williamson County). A regional environmental advocacy organization, the Southern Environmental Law Center, filed the suit on behalf of the Williamson County organization.

The Corps of Engineers (COE) issued an environmental assessment for ten permits issued for the eight-mile section going through the Turnbull Creek watershed, forgoing a more detailed EIS. The assessment turned up no significant impacts, so TDOT was allowed to proceed with construction.

However, local creeks soon became so choked with mud (believed to result from construction runoff) that a local utility district that supplies water to 35,000 residents was forced to temporarily shut down. The incident led the Tennessee Department of Environment and Conservation to issue one of its largest fines (\$500,000) against TDOT.

With many additional permits also resulting from environmental assessments for unbuilt segments, the Williamson County citizens group asked the court to suspend all permit decisions until a thorough environmental impact statement has been done. The court issued a preliminary injunction ordering TDOT and the COE to stop all further work on 840 in Williamson County.

There seems to be little doubt that 840 South will be completed, but for now work has stopped pending further review of water resources impacts and mitigation measures.

Public Concerns

With the beltway being so far from Nashville's Davidson County, it is hard for many people close to the city to imagine that the road will be anything more than a bypass. A June 2000 article by the Nashville Tennessean²⁹ found little evidence of serious concern by Nashville officials. While some expressed concern that 840 would create sprawl and congestion, no study had been conducted to gauge that effect. With construction of the southern loop well underway, the Nashville mayor told the reporter that his focus was on whether Nashville is receiving its fair share of transportation dollars and how his administration can enhance the city's quality of life. Making the city an attractive place to live may be the best tool to keep people from leaving for outer suburbs.

In contrast, the counties surrounding Nashville are expecting new development and some are planning for it. Rutherford County has required school planning officials to move proposed schools closer to 840. Environmental advocates are warning against development along segments of the corridor that are now farmland and forests.

In addition to water quality concerns, residents of the largely rural Williamson County are upset about other impacts on their homes and communities. The County completed a number of advance planning studies on likely land use impacts of 840 (specifically around proposed interchange areas). One of the main findings was that sewer utilities were insufficient to handle the development around the interchanges, and that providing such infrastructure would be costly. Public opinion was largely in favor of leaving zoning as it was in order to discourage dense development.

Lessons Learned – Nashville

Nashville's existing and planned roadway system is characterized by an inner loop that is unusually small and a proposed outer loop that is unusually large. As a result, the outer beltway will not provide an alternative route for diversion of local trips. Although traffic relief is mentioned by the mayor as a benefit, it is a "secondary by-product."

The proposed outer beltway for Nashville is seen either as a bypass for through traffic or as an economic development tool for the area it is passing through. Following are some lessons for Central Indiana:

1. Outer loops can benefit through traffic, particularly trucks, by providing an "external bypass" around urbanized areas. A full loop may not be needed as long as heavily traveled routes entering and leaving the area are connected.

²⁹ "State Route 840: Will it make us another Atlanta?" Nashville Tennessean, June 18, 2000.

2. Outer segments located far from the urban core can be seen either as economic development opportunities or threats to local quality of life. Local areas should determine their expectations of the roadway and take actions to plan future land use and zone properties prior to roadway construction.
3. Depending on the purpose to be served by the roadway and the opinions of citizens along the roadway's path, one or more "bypasses" may be preferable to a full outer loop.

2.2 CONCLUSIONS

1. The national trend of urban growth and economic expansion, combined with a trend favoring decentralized development, has prompted a concern for urban sprawl that is virtually nationwide. These trends were noted in all the cities surveyed.

In areas where growth is occurring, the research findings were inconclusive regarding whether the presence of a beltway contributed to the overall expansion of the area and urban sprawl. Rather, land use planning was found to be a key factor. In areas where land use planning was emphasized and coordinated, the control of growth was more orderly and focused.

2. Beltways (and radial freeways) do impact the location of development and may contribute to some loss of marginal retail and service operations, but research is inconclusive regarding the causal relationship of beltways and urban sprawl. Experience of peer cities clearly indicates, however, that local and regional land use effects (and policies) should be a major part of beltway planning.
3. Since land use policies are determined locally (in Indiana and in all the peer cities reviewed), coordinated planning among jurisdictions is essential for effective beltway planning. Objectives to be served may be regional, but land use impacts are local. Beltway segments need to be integrated with local comprehensive plans.
4. Beltways are not a panacea for improving congestion on existing routes. Linking suburban centers by improved arterial routes rather than a suburban freeway or beltway may best satisfy local needs. The key is to clearly identify the objectives being served through regional studies, local impact reviews and public involvement.
5. Coordinated planning by jurisdictions being served is the best way to establish common design standards and reduce the negative land use impacts of beltways (freeway or arterial). Consensus among jurisdictions should be reached on common principles and guidelines early in the planning process. They should be project specific and should reflect state-of-the-art knowledge of the potential development impacts of transportation facilities. A three-step process should be used:
 - *Visioning* to identify the purpose of the project,
 - *Design and Location Studies* to fit the plan to the context, and
 - *Zoning and Land Use Controls* prior to construction to control development.

CISTMS will contribute to the important first step of visioning. The relationship of land use and transportation will be explored through a local expert panel, public involvement, and state-of-the-art modeling. Coordination among jurisdictions will be encouraged and facilitated, establishing a pattern that should be continued through project construction.

At the conclusion of the study, the objectives and character of each roadway segment will be identified, and recommendations will be developed for implementation. These recommendations will include facility descriptions to guide design and location studies, and suggested guidelines for land use controls by local agencies.

APPENDIX A

Central Indiana Suburban Transportation and Mobility Study PEER CITIES REVIEW List of Potential Peer Beltway Cities

City	2000 MSA Pop	Inner beltway?		Outer beltway?	Comments
Atlanta, GA	4,112,000	complete	8 mile radius	Partial "Northern Arc" (about 30 miles out)	Northern Arc project started as a complete second beltway around Atlanta (about 30 miles out from the CBD) many years ago. After a great deal of public furor, the Atlanta Regional Commission reduced the project to only a northern section of the Beltway (from about 10:00 to about 2:00). The western half of the project had undergone a DEIS several years ago and the eastern half is just finishing a DEIS. The Governor recently put a stop to any further activity on the "ARC" as it is locally called because of controversy regarding public officials. Some officials serve on many local boards and are accused of having bought property in the path of the ARC or would benefit from the ARC.
Baltimore, MD	2,553,000	complete	6-7 mile radius	Partially built, partially rejected	Wealthy areas fought strenuously, so their segment of the beltway will probably never be built. Southern part of the beltway has recently been built (Route 100). The southern area is more congested. It is mixed commercial & residential, with booming employment (plus airport).
Boston, MA	3,407,000	nearly complete beltway	10-mile radius	Almost complete outer beltway 25-30 miles outside city.	Outer beltway (I-495) was constructed from 1958-1983. It has experienced growth as a computer hardware employment center. Inner beltway (Route 128/I-95) was built during 1936-1959. It was America's first beltway (planning for the one in NYC started first, but Boston's was the first to be built). Route was built through farms and wetlands to avoid "NIMBY", but public derided route as "road to nowhere." During 1950s, residential population in towns along route quadrupled, and they doubled again in the 60s. By the end of 1950s, route had to be widened.
Charlotte, NC	1,499,000	Half done, part under construction.	8-12 mile radius	Plans dropped in early 90s for a beltway 25 miles out.	Proposed outer beltway would have extended into South Carolina.
Cincinnati, OH	1,979,000	yes, complete	5-15 miles out	No information	No information
Columbus, OH	1,540,000	complete	6-8 mile radius	Considered (no-action)	This topic has been in discussion in Columbus, Ohio for some time. Most of the conversation revolves around the "New" I-73 Corridor which at this point is still a dream. It's an idea for a new Interstate from Toledo, OH to Myrtle Beach, SC which would go around Columbus thus forming an outer-outerbelt.
Dallas-Ft. Worth, TX	5,222,000	complete	10-mile radius	15-18 mile radius	Part of the outer beltway has already been built in the form of the George Bush tollway.

City	2000 MSA Pop	Inner beltway?		Outer beltway?	Comments
Houston, TX	4,670,000	complete	5-6 mile radius	Complete, 12-16 mile radius, fourth beltway in the works	Most of the second outer beltway is a toll road. There also a non-interstate third beltway about 18 miles outside the city along the north and western parts of the city. A fourth beltway around the city is being planned called the Grand Parkway. It is controversial for environmental reasons.
Indianapolis, IN	1,607,000	yes, complete	6-12 mile radius	Not currently	One consideration as part of current CISTMS study
Nashville, TN	1,231,000	yes, odd shape but surrounds city	3-5 mile radius	25-45 miles out. South part halfbuilt, rest under construction. North part still in EIS stage.	Outer beltway (I-840) has been in planning since the 80s. Is being built with 100% state funds (although TNDOT says they are still following NEPA anyway). Road is designed mainly for economic development of outlying rural areas, and also as a bypass for trucks
Oklahoma City, OK	1,083,000	yes, partial	4 mile radius	Partially built, more under consideration (12 miles out)	Built part of outer loop is in NW quad and is a toll road. Outer loop study saw a lot of opposition from east side of the city. East side is rural and residents opposed.
Pittsburgh, PA	2,359,000	No		Partial, some under construction	Pittsburgh's suburban beltway system is being piecemealed and is based on transportation plans developed in the 1960's. The beltway components now in study or under construction are the Mon Fayette expressway (3 separate design sections, some of which are now open to traffic, the final section is in the DEIS public comment phase) and the southern beltway (which has received environmental clearance and has funding, but has not moved into construction. All of this work is being done by the PA Turnpike Commission
Portland, OR	2,265,000	Interstates form a partial, oddly shaped beltway 3-15 miles from city		REJECTED	Western Bypass Study. After a five-year study and sustained opposition to the project by the citizens land-use group 1000 Friends of Oregon, ODOT announced that it would not seek construction of the Bypass outside Portland's urban growth boundary, but will pursue smaller road projects instead. 1000 Friends challenged the project from its inception in 1988, saying studies showed the freeway would not serve existing development, but would encourage low-density, single-use auto-dependent development in the future. The group sponsored a planning effort called LUTRAQ ("Making the Land Use, Transportation, and Air Quality Connection". The project developed mixed-use, pedestrian friendly, transit-oriented development scenarios and compared their effects to those of the Bypass. Review by ODOT showed the LUTRAQ alternative served the Portland area's mobility needs as well as the Bypass, but had substantially fewer environmental impacts. Say 1000 Friends, "The Bypass was shown to be nothing more than a boondoggle, community wrecker, and urban growth boundary buster."
Raleigh, NC	1,188,000	yes	5-mile radius	Under construction, about 10 miles out.	About 10 miles completed. A 15 or 20-mile radius beltway would encompass Durham & Chapel Hill, so the issue of an outer beltway that far out gets complicated.
Richmond, VA	997,000	Odd configuration	Furthest circumf. road is 10 miles from CBD	No information	No information. Petersburg is close to Richmond, and they share part of a beltway (perhaps more of a I-95 bypass around the cities)

City	2000 MSA Pop	Inner beltway?		Outer beltway?	Comments
Rochester, NY	1,098,000	yes, complete	interstate 1 mile from CBD	U-shape, most is 4 miles from CBD.	No information as to whether a further outer beltway is being considered.
Seattle, WA	3,555,000	linear city	7-miles out	Probably-to-be-rejected plans for highway 12-15 miles from Seattle	This study was not requested by WSDOT, but mandated by the state legislature at the behest of one legislator who has long favored building a new "605" freeway outside the current I-405 area (and outside the urban growth boundary surrounding metropolitan Seattle). Study considered a freeway option (comprised mainly of widened existing roads plus some new connections) as well as an option to add north-south arterial capacity instead. WSDOT concluded that something needs to be done there, but that more study is needed, and policy choices need to be made, in order to determine the best solution
Washington, DC	4,923,000	complete	8-12 mile radius	Almost-rejected plan for a beltway with a 20-30 mile radius	Proposed Outer Beltway has been a major issue for Washington DC for decades. Original plan (circa 1960s) called for it to be approx 10 - 15 miles beyond the existing Capital Beltway. Over the years, bits and pieces were deleted from the local master plans, including both Potomac River crossings. At this point, all that's left on the maps is a 20 mile segment in Maryland termed the Intercounty Connector (highly controversial and an issue in the current gubernatorial campaign). Meanwhile, there's a push from business groups & others to resurrect one or both of the Potomac crossings. There are many studies on all of this.

REJECTED CITIES					
Lincoln, NE	250,000	No		I-80 is 3-4 miles from CBD	They have recently completed the planning process for a partial beltway on the south and east sides of the city. Interstate 80 runs on the north and another state highway already exists on the west. The proposed beltway would connect to these existing roads.
Nashua, NH	87,000	Partial	1.5 miles		New Hampshire abandoned plans this summer for a \$200 million highway project encircling the city of Nashua. The decision came after overwhelming local opposition led by EPA Region 1 Administrator John DeVillars to recommend that EPA leaders in Washington veto the project, a move the <i>Boston Globe</i> reports is unprecedented. NH Governor Stephen Merrill was persuaded to drop the project by opposition from Nashua mayor and voters, as well as from local planning boards and conservation groups in neighboring towns. The road project would have spread development in southern New Hampshire's largest remaining open space. While the NH transportation commissioner and legislators pushed for the road, saying it would spur job growth and ease commuting, the EPA and the Conservation Law Foundation made sure local opposition was recognized in Washington. Merrill now favors a smaller road expected to ease up to 90% of the traffic the Nashua Circumferential would have handled.
Petosky, MI	6,000	No			The beltway was to help eliminate some of the seasonal traffic traveling through the City of Petoskey. The City is a tourist town and is in between two other tourist towns: Charlevoix and Harbor Springs. They all get summer traffic because they are on the lake and winter traffic because there are many ski resorts nearby. The City was in support of the beltway, but it would not be within City limits. The beltway would go through two Townships (Resort and Bear Creek). One of the Townships supported the beltway; the other did not. The City could not get a consensus between the Townships regarding this issue. The Michigan Department of Transportation (MDOT) has not made a decision on whether to continue pursuing the beltway or to let the project die.

APPENDIX B

Central Indiana Suburban Transportation and Mobility Study PEER CITIES REVIEW Guidance for I-485 Interchanges (Charlotte)³⁰

Guiding Principles

- Each interchange area has unique characteristics that must be understood in making specific land use and/or transportation recommendations.
- An interchange should allow the land use future envisioned for the surrounding community. Therefore, the preferred land use future should be determined and the transportation/mobility infrastructure needed to achieve that future should be identified.
- The interchange design should correspond with expected future conditions including land use, access issues, signal system needs, capacity of local roadways, and environmental concerns.
- Good access management is a critical element in ensuring that the interchange functions effectively.
- Opportunities to provide open space near interchange areas should be identified and pursued as a key part of integrating the interchange area into the community.
- Negative impacts of the interchange on existing neighborhoods should be mitigated as much as possible.
- Development in the interchange area should be designed to provide connections to adjacent areas.

General Recommendations

- Design interchange areas to accommodate bicycle and pedestrian travel. This includes providing sidewalks, crosswalks, and medians for pedestrians, and extra width on the road for bicyclists, particularly at bridge locations.
- Encourage internal connectivity between land uses and developments near interchanges.
- Include streetscape improvements such as landscaping and pedestrian-scale lighting to better integrate the interchange area into the community.
- Locate any proposed service roads far enough away from I-485 so that land can be developed along both sides of the road. In addition, build service roads to the local standard for their intended future use or, at a minimum, inform the land owners that they may be required to improve the road to local standards when they develop the property.
- Ensure that any “land-locked” property is provided access through the land subdivision process.
- Amend local subdivision ordinances to require developers to utilize natural land contours or otherwise provide visual screening in residential areas along I485 wherever the NCDOT is not proposing to construct noise walls.
- Provide adequate lighting at interchange areas and especially at on and off ramps to facilitate the safety of motorists, pedestrians and bicyclists. The lighting should not intrude into adjacent neighborhoods.

³⁰ I-485 Interchange Analysis: Detail Report of Existing Conditions and Recommendations. Adopted July 1999 by the Mecklenburg-Union Metropolitan Planning Organization.