3-1989

Highway improvements and economic growth: a study of Lee Highway between Airport Road and Shallowford Road

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Highway Improvements and Economic Growth:

A Study of Lee Highway

Between Airport Road and Shallowford Road

by

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Departmental Honors Thesis

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March 29, 1989

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Section I Part A: Introduction

When I first selected this topic to research for an honors project, the question I asked was: Does economic growth in an area serve as a catalyst for highway improvement projects, or do highway improvement projects cause economic growth? The segment of Lee Highway between Airport Road and Shallowford Road in Chattanooga has experienced quite a bit of economic growth in recent years, and this stretch of road has been improved by the addition of more traffic lanes. By focusing my research on this particular highway, I felt that I would gain insight into my question.

In this paper I first discuss the fact that this stretch of road is a part of three very long routes, and then I provide details about this local portion regarding intersecting streets and average daily traffic. After this I establish a general economic model to predict the results which could follow a highway improvement project. After developing a model, I compare it to reality by examining two recent projects that widened Lee Highway. I hope to ascertain whether highway improvements cause economic growth or whether economic growth makes highway improvements necessary. If I find that economic growth and highway improvements occurred simultaneously on Lee Highway, I will conclude that the two most likely influenced each other.

Section I Part B

I. Introduction
   A. Introduction of the paper and the research.
   B. An outline of the paper.
II. Description of Lee Highway.
   A. Part of U.S. Routes 11 and 64.
   B. The Lee Highway.
   C. A network of roads that intersect Lee Highway.
   D. Average Daily Traffic Counts.
III. A model of highway and economic development.
IV. Construction Projects.
   A. The original 1928 construction.
   B. The construction of I-75 and State Route 153.
   C. Widening between Airport Road and S.R. 153.
   D. Widening between S.R. 153 and Shallowford Road.
   E. Traffic Signals on Lee Highway.
V. The influence of Hamilton Place Mall.
VI. Conclusion.

Section II Part A

The section of road that my study deals with is the 2.6 mile-long segment of Lee Highway in Chattanooga between Airport Road and Shallowford Road. This section of road is more than just a city street; it is a part of three extremely long routes that overlap as one strip of road through Chattanooga: U.S. Route 11, U.S. Route 64, and the Lee Highway.

U.S. Highway 11 originates at the border of Canada and the United States just north of Rousses Point, New York. From there, U.S. 11 heads west then south through New York state to enter Pennsylvania. U.S. 11 travels through eastern then central Pennsylvania and into Maryland. The highway goes through Hagerstown and the northeast tip of West Virginia, and then moves into Virginia. U.S. 11 criss-crosses Interstate 81 through the state to the Tennessee border at Bristol. After travelling through east Tennessee, the highway goes through the northwest corner of Georgia into Alabama. The road cuts across Alabama and enters Mississippi roughly in the center of the border of the two states. U.S. 11 then heads southwest toward New Orleans, Louisiana. The Route ends at a junction with U.S. Route 90 just east of New Orleans. (1) The total length of U.S. Route 11, including Business and Alternate Routes, is 1,776 miles. (2)

U.S. Route 64 originates in Nags Head, North Carolina at a junction with U.S. Route 158. The Route heads west through the state, passing through the cities of Raleigh and Asheville, and enters the southeast corner of Tennessee. The highway then goes through Cleveland, Chattanooga, rural south Tennessee, and into Memphis. After crossing the Mississippi River, U.S. 64 continues west through central Arkansas and into Oklahoma. The Route turns to the northwest to go through Tulsa then the state's "panhandle" and into New Mexico. The highway covers 388 miles in the northern part of that state to end at a junction with U.S. Route 550 in Farmington, New Mexico.③ The total length of U.S. Route 64, including Business and Alternate Routes, is 2,289 miles.④

U.S. Highways 11 and 64 join together at Cleveland, Tennessee, and form one route that stretches from that point through Chattanooga to a junction in Tiftonia, Tennessee, where they separate.⑤ In Chattanooga, segments of this route are referred to as Lee Highway, Brainerd Road, McCallie Avenue, Bailey Avenue, Martin Luther King Junior Boulevard, and a section of Broad Street.

Section II Part B

When the Lee Highway Association was originally formed in 1919, Dr. S. M. Johnson was its General Director. He set forth on a quest of constructing a transcontinental

highway honoring General Robert E. Lee.[6] His hard work led to the transfer of approximately $248,000,000 worth of surplus war property from the federal to the state governments to be used in highway construction.[7] After the construction, it was said in 1929 that "Lee Highway is a modern, high-speed road from the Zero Milestone in Washington to the Pacific Milestone in San Diego."[8] The total length of the highway, as measured by the Association, was 3,127.4 miles.[9] In addition to Washington, D.C., and San Diego, Lee Highway passed through Lexington, Roanoke, and Bristol, Virginia; Knoxville and Chattanooga, Tennessee; Huntsville and Florence, Alabama; Corinth, Mississippi; Memphis, Tennessee; Little Rock and Hot Springs, Arkansas; Durant, Ardmore, and Frederick, Oklahoma; Vernon and Plainview, Texas; Clovis and Roswell, New Mexico; El Paso, Texas; Lordsburg, New Mexico; and Globe, Phoenix, and Yuma, Arizona.[10]

Section II Part C

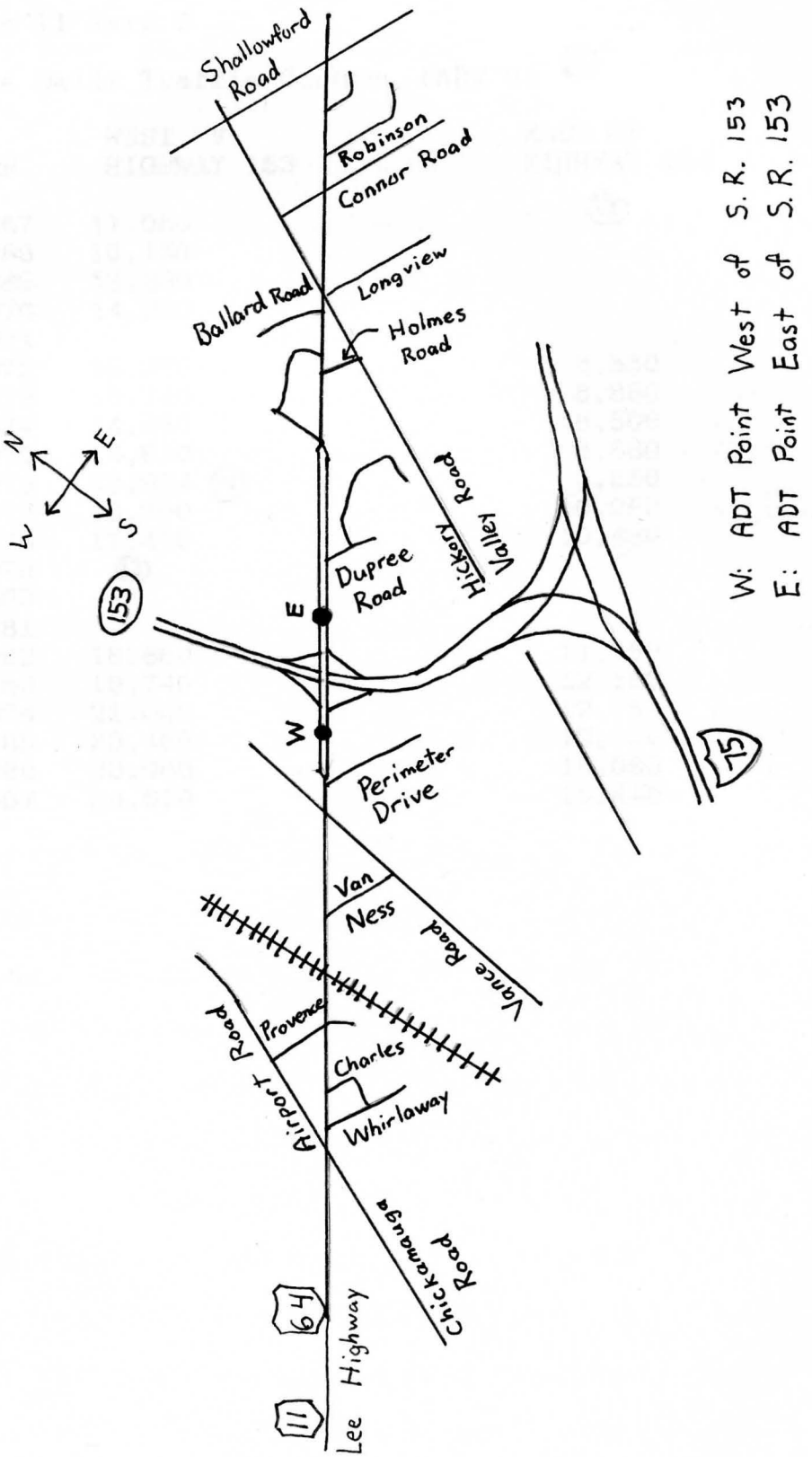
A Network of Roads Which Intersect Lee Highway * (11)

Inter-section	Road Name	Direction from Lee Highway	Where the Road Goes
1	Chickamauga Road	SW	East Brainerd Road
	Airport Road	NE	Lovell Field
2	Whirlaway	ESE	A Residential Area
3	Charles Drive	ESE	A Residential Area
4	Provence Road	WNW	Airport Road
5	Van Ness Avenue	SE	Vance Road
6	Vance Road	S	East Brainerd Road
		N to NW	Shepherd Road
7	Perimeter Drive	SE	Shopping Center
8	Highway 153	NNE	Chickamauga Dam and U.S. Route 27
		SE	Interstate 75
9	Dupree Road	ESE	Hickory Valley Road
10	Holmes Road	ESE	Hickory Valley Road
11	Ballard Road	NW	A Residential Area
12	Hickory Valley	SW	East Brainerd Road
		NE	Shallowford Road and Bonny Oaks Drive
13	Connor Road	NW	Hickory Valley Road
		SE	A Residential Area
14	Robinson Drive	SE	A Residential Area
15	Shallowford Road	NW	Toward Downtown
		SE	I-75 and Hamilton Place Mall

* See Figure 1 Page 5

A Map of the Area

Figure 1



Section II Part D

Average Daily Traffic Counts (ADT'S) (12)

YEAR	WEST OF HIGHWAY 153	EAST OF HIGHWAY 153 (13)
1967	11,050	
1968	10,160	
1969	12,330	
1970	14,280	
1971		
1972	16,020	8,550
1973	14,740	8,860
1974	14,960	8,500
1975	16,810	8,630
1976	23,954 (14)	9,550
1977	18,750	10,060
1978	17,410	10,460
1979	(13)	
1980		
1981		
1982	18,680	11,250
1983	19,740	12,560
1984	21,040	12,750
1985	20,450	12,020
1986	23,960	18,060
1987	24,610	18,440

The volume of traffic on Lee Highway between Airport Road and Shallowford Road has increased drastically over the years. The Tennessee Department of Transportation (DOT) first made an Average Daily Traffic Count (ADT) at a point on Lee Highway west of Highway 153 in 1967. (This is illustrated by Point W on Figure 1 on page 5.) The figure obtained was 11,050 vehicles per day. In 1972 the volume of traffic at this point was 16,020 vehicles per day -- an increase of 45% since 1967. In 1977, 18,750 vehicles crossed Point W daily; this was an increase of 17% over five years. In 1982, 18,680 vehicles passed over Point W each day -- a decrease of 0.37% in the traffic there. 24,610 vehicles per day travelled over Point W in 1987, an increase of 31.7% over the total measured five years earlier.

In 1972 the DOT first measured the ADT at a point on Lee Highway east of Highway 153. (This is illustrated by Point E on Figure 1.) The measurement that year was 8,550 vehicles per day. Between 1972 and 1977, the measurement increased 17.7% to 10,060 vehicles per day. Over the next five years the volume increased 11.8% to 11,250 vehicles daily in 1982. The traffic volume at Point E was 18,440 vehicles each day in 1987 -- an increase of 63.9% from the 1982 figure. The largest percentage increase in a single year occurred between 1985 and 1986 when traffic increased from 12,020 to 18,060

vehicles per day at Point E -- an increase of 50.2% in a single year!

Section III

A theoretical model should exist to illustrate the causes and effects of a highway improvement project. In the simplest form of a model, a need for an improved road is the catalyst for an improvement project.

Factors such as increased traffic in an area, growth in an area's population, or commercial or industrial growth can be adequate reasons for a road construction project. When the need for a better road exists, government should take appropriate action to improve it.

Following a road improvement project, certain results would be expected. Herbert Mohring and Mitchell Harwitz develop a model identifying eight potential effects from a highway improvement project. They are:

1. Land Development
2. Increased Capital
3. Access Roads
4. Service Facilities
5. Industrial Growth
6. Recreational Opportunities
7. Community Expansion
8. Tourism (15)

Land development is a change in the manner in which a tract of land is used. A highway construction project, whether it is a new construction project or an improvement

to an existing highway, has the potential to bring about land development. In like manner, land development can bring about a need for a highway construction project to accommodate traffic volume.

When the particular portion of Lee Highway was first built in 1928, most of the land immediately surrounding the road was either farmland or unused wooded land. Over the years, various firms chose to locate beside the highway in such numbers that now most of the land there is used for non-agricultural purposes. In fact, the only currently undeveloped section is a piece of property directly across from Sam's Wholesale club bordered by Lee Highway to the northeast and Highway 153 to the southwest. Figures 2 and 3 on pages 11 and 12 illustrate changes in land use from 1969 to 1987. There has been a major increase in the amount of land used for commercial purposes.

The establishing of new firms beside a highway will increase the amount of capital in the economy. This increase in capital should affect the economy in two ways. First, capital is one of the three factors of production from basic economic theory: land, labor, and capital. An increase in the amount of capital should increase the productive capacity of the economy; it makes possible the production of more goods and services than were previously produced. Second, the new buildings on property by a highway

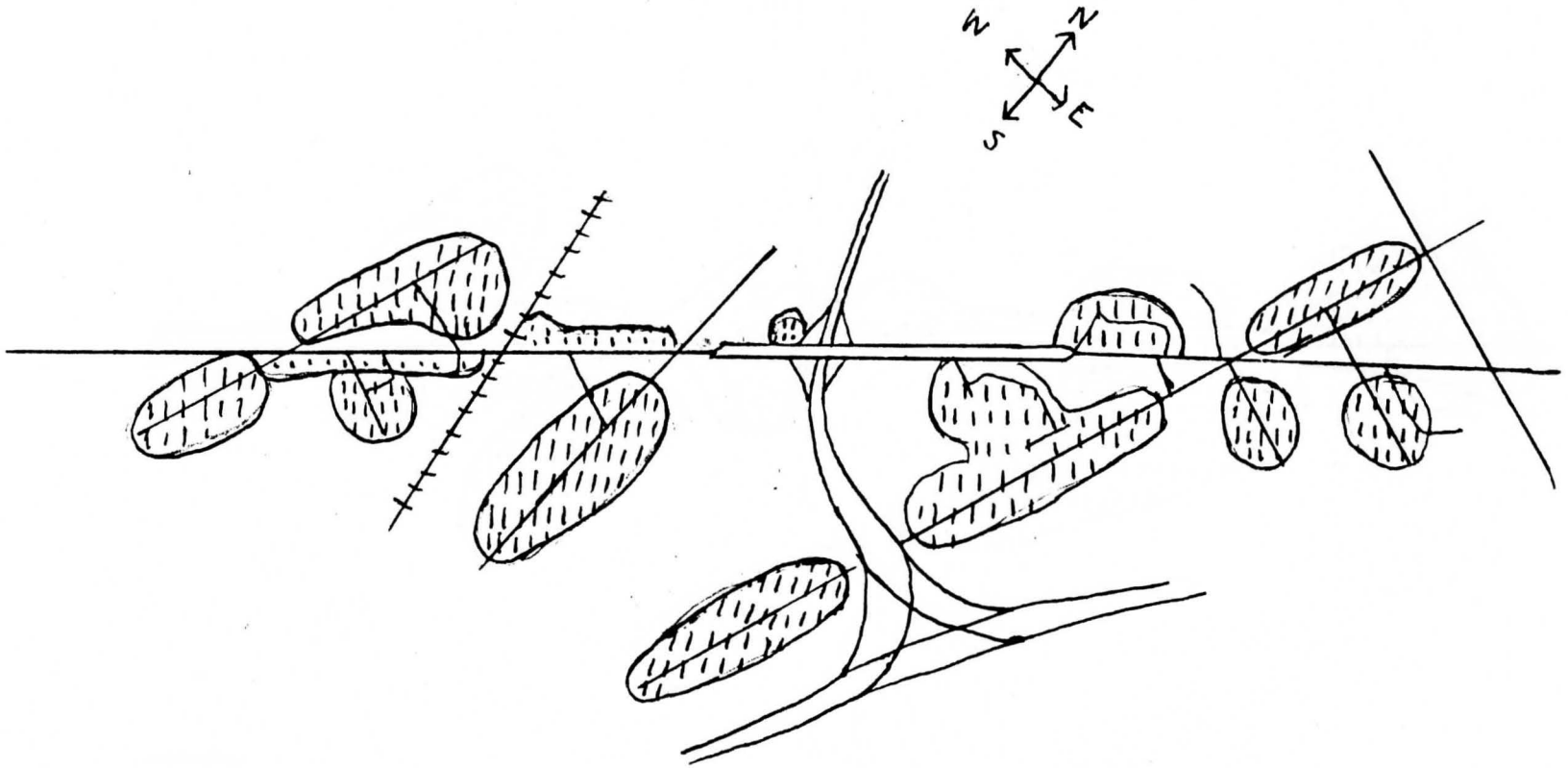
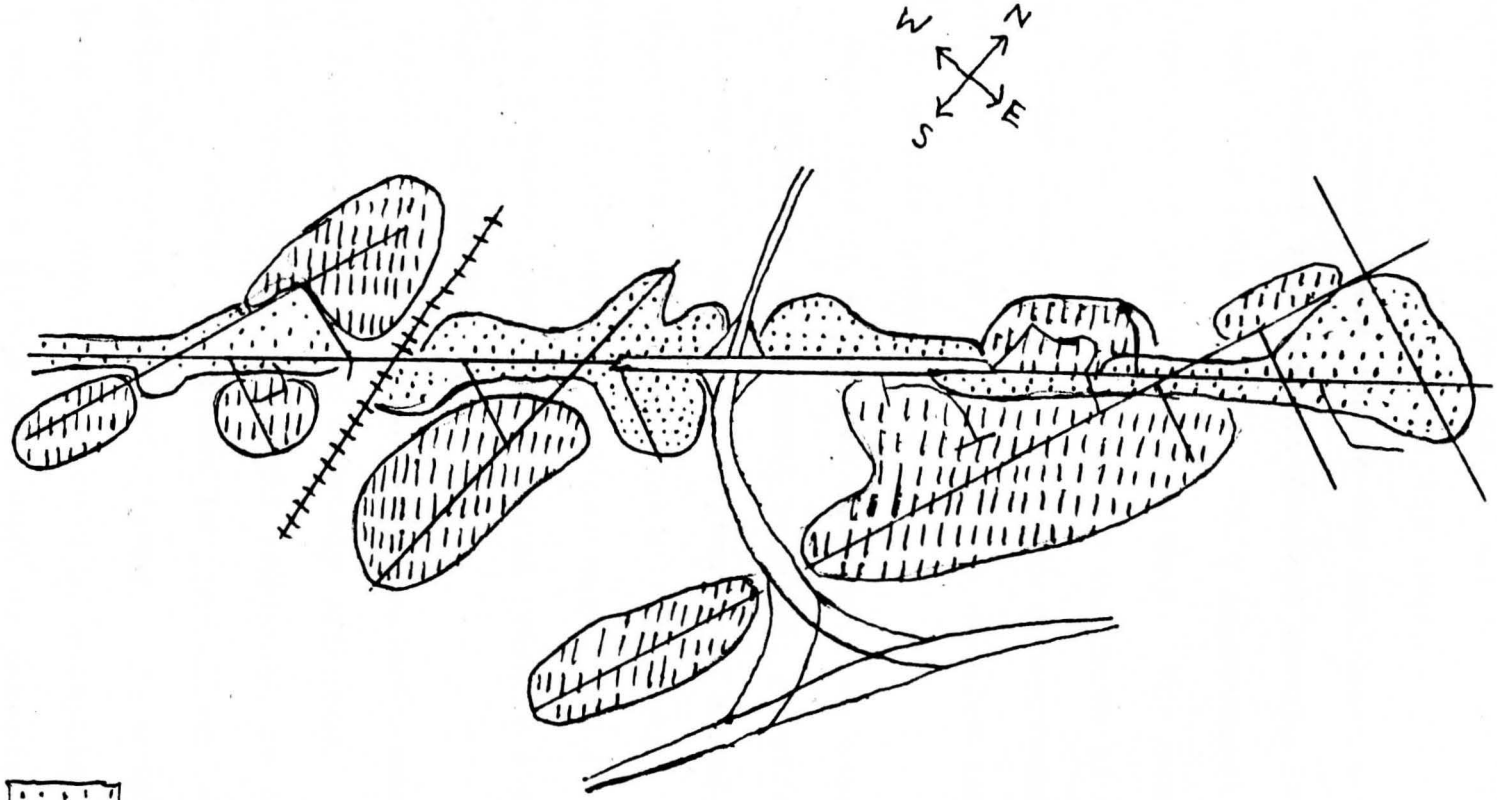


Figure 2
Land Use in 1969 ★

★ Adapted from 1969 Existing Land Use Map
from the Chattanooga - Hamilton County Planning Commission.

Figure 3
Land Use in 1987 ✡



✡ Adapted from 1987 Existing Land Use Map
from the Chattanooga - Hamilton County Planning Commission.

add to the value of individual tracts of real estate. This will benefit the local government in that the government could collect more tax revenue from property taxes than they would have before the buildings were constructed.

A highway improvement project should improve access for vehicles into an area. This improvement in access can open up an area to development. For example, customers are more likely to visit a business if it is easily accessible than if it is not. An entrepreneur who recognizes this fact would be eager to develop land in an area that is easily accessible.

When land in a certain area becomes more accessible due to a highway improvement project, service facilities are likely to be established there. A broader spectrum of services would then be available for customers. Automotive maintenance and repair, medical care, and financial services are three types of services readily available for customers on Lee Highway.

After a highway improvement project, new industry could locate on property directly affected. The industry could be heavy industry, light industry, or commercial business. Most of the firms located along Lee Highway could be described as retail firms. Millwrights, The Home Depot, and Lowe's could be exceptions; The Home Depot and Lowe's sell a good deal of materials to builders

and contractors instead of to the final consumer.

The economic model indicates that a road construction project could produce an effect on recreational opportunities. Currently the recreational opportunities available along this segment of Lee Highway consist of shopping at the various stores or dining at the restaurants or engaging in physical fitness activities at the Sports Barn. In the 1960's and the first part of the 1970's, the Marlboro Drive-In was one of Chattanooga's few drive-in theaters. When the popularity of drive-in theaters declined, the Marlboro closed. Today this property is vacant and awaiting possible commercial development.

After a highway improvement project, it is possible for the local community to expand. This section of Lee Highway is in the East Brainerd area of Chattanooga. This part of town is expanding, but the boundaries for expansion seem to be in the areas of East Brainerd Road and Ooltewah-Ringgold Road rather than in the Lee HIghway area.

According to the model, a road construction project could affect tourism in the area. The recent Lee Highway projects could possibly affect the local tourist industry indirectly. If local motorists choose Lee Highway as a substitute for I-75, there would be fewer vehicles on the Interstate. Tourists travelling on I-75

would perhaps have a better opinion of Chattanooga than if they were hindered in their travel by excessive local traffic. This idea is feasible, but the true impact of Lee Highway's improvements on tourism would be minimal at best for two reasons. First, this segment of road is now more of a local road rather than a long-distance through route, and second, there are no major tourist attractions along this section of Lee Highway.

Mohring and Harwitz categorize the benefits of a highway improvement project into two major types of benefits: user benefits and non-user benefits. (16)

User benefits are benefits that go directly to those who use the road. They categorize these benefits as "existing use benefits" and "substitute benefits." Existing use benefits involve a reduction in the cost of transportation. For example, drivers would experience savings in travel time, the amount of gasoline consumed, and vehicle depreciation due to a better and safer road. Substitute benefits occur when the improved highway is chosen as a route to substitute for another road.

Non-user benefits are benefits which occur in the economy as a result of the highway improvement. One non-user benefit is an increase in the productive capacity of the economy. For example, the time and money saved by travelling on a better road can be re-allocated to other places to increase their productive capacity.

The other type of non-user benefit is from the improvement triggering additional industrial development. In theory, an improved road should increase the area's lure to new businesses. New businesses create new jobs which increase wage and salary income to employees and generate additional tax revenues.

Section IV Part A

The part of Lee Highway which my project deals with was originally built in 1928. At this time, the entire road was made of two traffic lanes (one in each direction), and it remained this way until the first half of the 1960's. Although the road was only two lanes, the state had the foresight to purchase right-of-way beside the highway in case it became necessary later to widen it to four lanes. According to a Tennessee DOT map from that time, the land around the highway was mostly farmland or undeveloped. (17) According to Mr. Joe Cannon of the Tennessee DOT, both the state and the federal government provided inputs for the construction, but an exact dollar amount to measure the cost of the original construction of this segment would be impossible to determine. (18)

Section IV Part B

From the time of its original construction until the early 1960's, Lee Highway was THE road which connected Chattanooga to Knoxville and the Northeast. The Interstate and Defense Highway Act of 1956 called for the construction of I-75 to provide a faster and safer route between Chattanooga and Knoxville. What would the anticipated effect be? Long-distance travellers would most likely choose I-75 over Lee Highway. This would siphon-off some of the

traffic from Lee Highway. At that time, there were few businesses along the local portion of Lee Highway, so local traffic was sparse. In a 1984 newspaper article, Eugene Reno, the owner of Millwrights, a business beside the railroad tracks that pass under a bridge on Lee Highway, recalled that Ralph Lewis, the man who had been the City Traffic Engineer in the early 1960's, predicted that "as soon as the freeway opens, Lee Highway will be a dead-end street, and...ragweed would grow up between the concrete." (19) Obviously, this prediction did not come true. The freeway was built, and drivers, for the most part, chose I-75 for longer trips northeast from Chattanooga, but drivers have not ignored Lee Highway. If fact, the Lee Highway area has developed tremendously over the years.

While I-75 was being built, the Tennessee DOT was working on the final segment of State Route (S.R.) 153. Once it was completed in 1963, Highway 153 ran north from its junction with I-75 to intersect Lee Highway, Shallowford Road, Bonny Oaks Drive, and State Route 58. After crossing the Tennessee River via the Chickamauga Dam, Highway 153 continued north to intersect U.S. Route 27 at the northern tip of the city. (20)

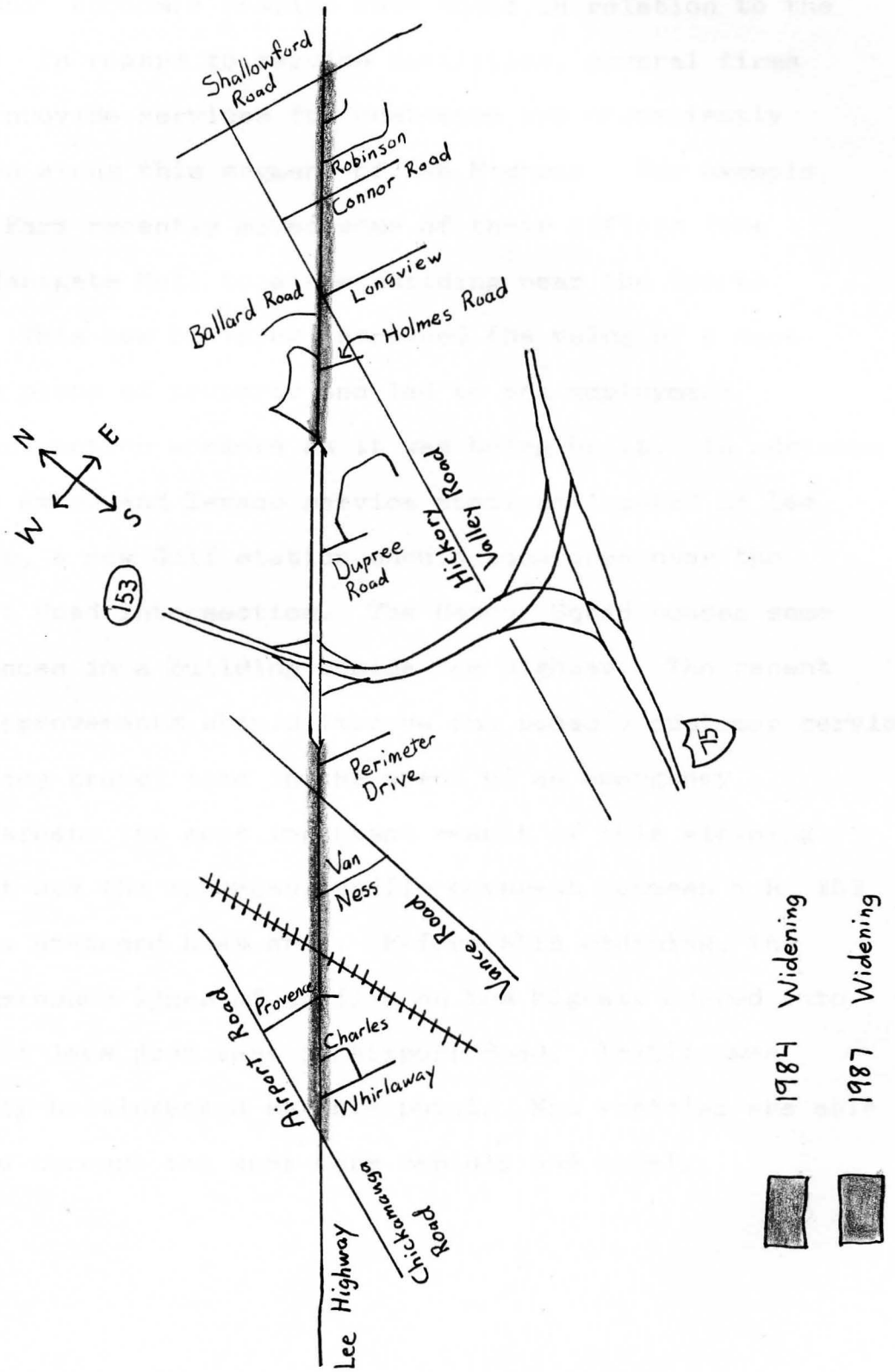
Once finished, the combination of I-75, I-24, and S.R. 153 could provide easy access to the Lee Highway area from most parts of the nearby region. The Interstates

could bring traffic from the northeast, the south, and the downtown areas, and Highway 153 could bring traffic from the Hixson area north of the Tennessee River. This project greatly improved access to the Lee Highway area.

Section IV Part C

After the completion of I-75 and Highway 153, the next major construction project that directly affected Lee Highway was the work which widened most of the segment between Airport Road and Highway 153 (This is illustrated by Figure 4 on Page 20) from two lanes to five lanes (two traffic lanes each direction plus a lane to make left turns from). The road was widened to only four lanes atop the bridge which passes over the railroad tracks between Provence and Van Ness Avenue. According to Mr. Bill Allen of the Chattanooga-Hamilton County Planning Commission, a two-lane road needs to be widened to four lanes when the average daily traffic is between 16,000 and 20,000 vehicles.(21) Over 16,000 vehicles had been travelling this segment of highway daily since 1975, and nearly 20,000 vehicles per day in 1983.(22) Hence, this widening had been needed for several years by the time it was completed in 1984. This work was paid for jointly by the city and state governments; the city took care of the land clearance, the drainage, and the base of the road, and state workers applied the surface pavement.(23)

Figure 4
The recent road construction projects



What economic results came about in relation to the model? In regard to service facilities, several firms which provide services for customers are conveniently located along this segment of Lee Highway. For example, State Farm recently moved some of their offices from near Eastgate Mall to a new building near the Sports Barn. This new building increased the value of a once unused piece of property and led to the employment of construction workers as it was being built. In addition to the Exxon and Texaco service stations located on Lee Highway, a new Gulf station should soon open near the Airport Road intersection. The Rescue Squad houses some ambulances in a building beside Lee Highway. The recent road improvements should improve the squad's customer service by saving travel time in the event of an emergency.

Perhaps the most important result of this widening project was the enhanced traffic movement between S.R. 153 and the Brainerd Road area. Before this widening, the two eastbound lanes of traffic on Lee Highway merged into a single lane just east of Airport Road. Traffic was commonly bottlenecked at this point. Now vehicles are able to flow through the area more rapidly and safely.

Section IV Part D

The most recent widening project on Lee Highway was undertaken during the summer of 1987. Prior to this project, the road narrowed from four to two lanes just east of the Highway 153 interchange. With completion of the project, there were four lanes for traffic plus a continuous lane for making left turns. The average daily traffic count for this section of Lee Highway went from 12,020 vehicles per day in 1985 to 18,060 vehicles per day in 1986 -- an increase of approximately 50.2% in one year.[34] As mentioned earlier, a two-lane road needs to be widened when the average daily traffic is between 16,000 and 20,000 vehicles. The 1986 figure of 18,060 made this construction an urgent project. Like the other widening project, both the city and the state had a hand in this project. As before, the city took care of the widening, the drainage, and the road base, while the state was responsible for the surface pavement.

What economic results came about in relation to the model? In regard to land development, a new Ryan's Steak House was built on a previously unused piece of land near Hickory Valley Road. This new business increased the amount of capital in the economy and created quite a few new jobs.

In regard to access, this project improved access to points between S.R. 153 and Shallowford Road. This has improved travel to points on Lee Highway and to Hamilton Place Mall.

Section IV Part E

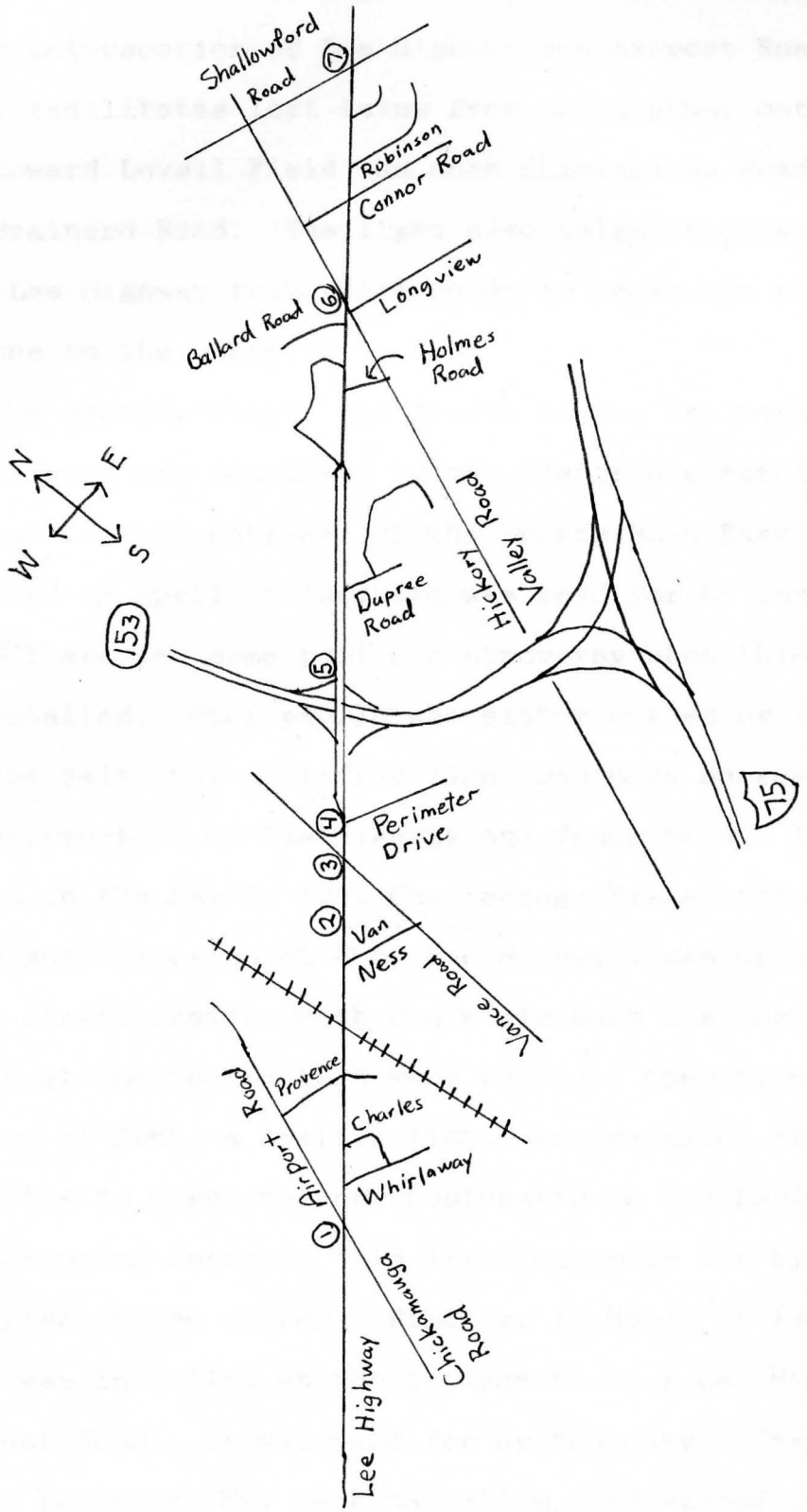
The construction of Interstate 75, Highway 153, and additional lanes are not the only public works projects which have affected traffic flow on Lee Highway; seven traffic lights have an impact also. (See Figure 5 Page 23.)

According to government standards, traffic signals are installed when the volume of traffic entering a main road from an intersecting street is great enough to warrant the change. Traffic lights directly affect vehicles travelling to or from streets that intersect Lee Highway at a light. Traffic lights induce gaps into the traffic flow so that vehicles can enter the road safely -- even from side streets that do not have traffic lights. In this way, traffic signals affect the flow of traffic along the entire length of the road. (25)

Seemingly, traffic lights should decrease the number of collisions along a road, but according to Mr. Rick Davis of the Chattanooga Traffic Engineering Department, traffic lights change the types of collisions at intersections. He said that usually there is a decrease in the number of right-angle collisions but an increase in the number of rear-end collisions. Many of these collisions can be attributed to the fact that some people interpret a yellow light as a warning to stop while others interpret it as a signal to speed up to avoid stopping for a red light.

Figure 5

Traffic Lights on Lee Highway



The first traffic light along this section of road is at the intersection of Lee Highway and Airport Road. This signal facilitates left turns from Lee Highway onto Airport Road toward Lovell Field and onto Chickamauga Road toward East Brainerd Road. The light also helps vehicles safely enter Lee Highway from these roads or cross the highway from one to the other.

The second, third, and fourth lights are very close together and are regulated by one electric controller. The light to the entrance of the Sports Barn East was installed in April of 1984 and was paid for by its developer.(26) There was some public controversy when this light was installed. Some people who either worked or lived in the area felt that a traffic light was more necessary at the intersection of Lee Highway and Vance Road. In an article in the May 2, 1984 Chattanooga Times, the owner of Millwrights (located at 6050 Lee Highway) was upset because he was afraid traffic back-ups would harm his business if a light at the Sports Barn were put into operation.(27) In November of 1985, a traffic light was installed at Perimeter Drive to serve the new businesses in the Perimeter Place Shopping Center. This light was paid for by the developers of the center. Finally, in March of 1986, a signal was installed at the intersection of Lee Highway and Vance Road. It was paid for by the city. Chattanooga's Traffic Engineer, Mr. Jack Marcellis, had wanted the light

there nearly two years before this date, but at that time, funds were not available, and the state DOT had refused to pay for it.(28)

The fifth traffic light in the sequence was activated in November of 1986 at the east end of the bridge which passes over highway 153. For vehicles travelling east on Lee Highway, this light provides a signal for traffic in the right lane to go forward, but traffic in the left lane to turn left only. This left-turn signal enables traffic to safely enter Highway 153 northbound after crossing in front of stopped traffic headed west on Lee Highway. This signal also allows traffic exiting Highway 153 northbound to safely turn either left or right onto Lee Highway.

The sixth traffic light in the sequence was installed at the Hickory Valley Road intersection in December of 1987. This light was paid for by the city. Hickory Valley Road connects Lee Highway to the I-75/East Brainerd Road interchange to the southwest and Lee Highway to the Tyner Junior and Senior High Schools area to the northeast. The signal at Lee Highway helps traffic to flow more safely to and from these areas.

The final traffic light in the sequence is at the intersection of Lee Highway and Shallowford Road. This signal has become extremely important since the construction of Hamilton Place Mall. Now this light helps shoppers

and employees going to and from the mall and nearby businesses to enter, exit, and cross Lee Highway as efficiently as possible in the area.

How much does a traffic signal cost? It could cost around $15,000 to make a traffic light functional. This amount includes the signal itself, a custom-built controller to manage the changing lights, and installation of the unit.

Section V

The construction and opening of the Hamilton Place Mall and nearby businesses has had quite an impact on the East Brainerd section of Chattanooga. In 1982 CBL, a development firm, first announced plans to build a new shopping mall for Chattanooga on a large undeveloped piece of property bordered by I-75, Shallowford Road, and Gunbarrell Road. The formal ground-breaking ceremony for the mall was held on August 5, 1986. one year later, the mall opened for customers. At that time it was noted that the new mall "is having a weighty impact on the economy through its cost of $120 million and its serving as the potential business home of more than 3,000."[29] This mall was built on 187 acres of land, and consisted of 1.4 million square feet of space. In addition, 160,000 square feet of space was available for shops at the nearby Hamilton Crossing Shopping Center. In August of 1988, it was projected that the mall could have annual sales of $160 million. At that time 98% of the available mall space was leased, and 3,600 people were employeed there.[30]

During 1988, there were approximately 15 million visitors to the mall.[31] Traffic of this volume requires high-quality roads for safe and efficient movement. The improvements to Lee Highway discussed in this paper have made travel to the mall via Lee Highway much better than it would have been had no improvements been made. Lee

Highway has continued, of course, to be secondary to I-75 for providing access to Hamilton Place Mall.

Section VI: Conclusion

When I first started my research I was evaluating whether highway improvement projects cause economic growth or whether economic growth necessitates highway improvement projects. The evidence suggests that these factors influence one another. Highway improvements and economic growth occurred simultaneously along this stretch of Lee Highway. It can be hypothesized that growth in an area may make a highway improvement project necessary, and the improvement may lead to further economic growth. It could be said, therefore, that highway improvements and economic growth form a two-way street.

Footnotes

1. UNITED STATES NUMBERED HIGHWAYS. pp. 28-33. AASHTO. Washington, D. C. 1979.

2. ibid. page xiii of the Introduction.

3. ibid. pp. 169-174 and RAND McNALLY ROAD ATLAS. Rand McNally and Company. New York, 1988.

4. UNITED STATES NUMBERED HIGHWAYS. p.xiii of the Introduction. AASHTO. Washington, D.C. 1979.

5. ibid. pp. 31-32.

6. LEE HIGHWAY: THE BACKBONE ROAD OF THE SOUTH. National Highways Association. Washington, D. C. 1929.

7. ibid. pp. 6-8.

8. ibid. p.5

9. MAP OF LEE HIGHWAY. The Lee Highway Association. Washington, D. C. 1929.

10. Hart, Val. THE STORY OF AMERICAN ROADS. p.240 William Sloane Associates, Inc. New York, 1950.

11. Adapted from MAP OF GREATER CHATTANOOGA. Arrow Publishing. Canton, MA 1985.

12. Davis, Rick. Personal Interview. October 4, 1988.

13. Data for these years was unavailable.

14. The figure of 23,954 is correct from the official source. No explaination for this figure was given.

15. Mohring, Herbert and Mitchell Harwitz. HIGHWAY BENEFITS: AN ANALYTICAL FRAMEWORK. p.5-31. Northwestern U. Evanston, Illinois. 1962.

16. ibid. pp. 3-25 and 3-26.

17. Cannon, Joe. Personal Interview. June 17, 1988.

18. Cannon, Joe. Telephone Interview. March 2, 1989.

19. Frank, Judy. "City Refuses to Relocate Lee Highway Traffic Light." CHATTANOOGA TIMES. p. B5 May 2, 1984.

20. Cannon, Joe. Telephone Interview. March 2, 1989.

21. Allen, Bill. Personal Interview. September 29, 1988.

22. Chart: Section II Part D of this paper.

23. Scott, Tom. Telephone Interview. March 8, 1989.

24. Chart: Section II Part D of this paper.

25. Davis, Rick. Personal Interview. October 4, 1988.

26. The information regarding the dates of installation and the source of funds for specific traffic signals this section of the paper all came from a personal interview with Mr. Rick Davis on October 4, 1988.

27. Frank, Judy. "City Refuses to Relocate Lee Highway Traffic Light." CHATTANOOGA TIMES. p. B5 May 2, 1984.

28. Collins, J. B. "Lack of State Help Hinders Vance Accord." CHATTANOOGA NEWS-FREE PRESS. pp A1 and A2. May 17, 1984.

29. Vass, John. CHATTANOOGA NEWS-FREE PRESS. p. E1. August 4, 1987.

30. "Happy Anniversary Hamilton Place." CHATTANOOGA NEWS-FREE PRESS. p. C2. August 3, 1988.

31. "New Projects Continuing at Hamilton Place." CHATTANOOGA NEWS-FREE PRESS. p.P1. January 29, 1989.

Bibliography

Allen, Bill. Personal Interview. September 29, 1988.

Cannon, Joe. Personal Interview. June 17, 1988.

Cannon, Joe. Telephone Interview. March 2, 1989.

Collins, J. B. "Lack of State Help Hinders Vance Accord." CHATTANOOGA NEWS-FREE PRESS. pp.A1 and A2. May 17, 1984.

Davis, Rick. Personal Interview. October 4, 1988.

Frank, Judy. "City Refuses to Relocate Lee Highway Traffic Light." CHATTANOOGA TIMES. Page B5. May 2, 1984.

"Happy Anniversary Hamilton Place." CHATTANOOGA NEWS-FREE PRESS. Page C2. August 3, 1988.

Hart, Val. THE STORY OF AMERICAN ROADS. William Sloane Associates, Inc. New York, 1950.

LEE HIGHWAY: THE BACKBONE ROAD OF THE SOUTH. National Highways Associations. Washington, D. C. 1929.

MAP OF GREATER CHATTANOOGA. Arrow Publishing. Canton, MA. 1985.

MAP OF LEE HIGHWAY. The Lee Highway Association. Washington, D. C. 1929.

Mohring, Herbert and Mitchell Harwitz. HIGHWAY BENEFITS: AN ANALYTICAL FRAMEWORK. Northwestern U. Evanston, Illinois. 1962.

"New Projects Continuing at Hamilton Place." CHATTANOOGA NEWS-FREE PRESS. Page P1. January 29, 1989.

RAND McNALLY ROAD ATLAS. Rand McNally and Company. New York, 1988.

Scott, Tom. Telephone Interview. March 8, 1989.

UNITED STATES NUMBERED HIGHWAYS. AASHTO. Washington, D. C. 1979.

Vass, John. CHATTANOOGA NEWS-FREE PRESS. Page E1. August 4, 1987.