SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

Executive Summary

Prepared for:
Orange County Department of Planning

Prepared by:
AKRF

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Southeastern Orange County Traffic and Land Use Study - 2005

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A. INTRODUCTION

Orange County has undergone a period of tremendous growth over the past thirty years as it has been transformed from a predominantly rural environment to a mixed suburban, rural and, in places, urban setting that has become a part of the greater New York metropolitan area. The Towns and Villages in the southeastern portion of the County are at the leading edge of the development cycle. These communities have become the logical place to settle for people and businesses moving away from the older, more densely developed areas of downstate New York. As more people move into this area, the demand for the roadways, schools, and infrastructure will also increase. One of the most visible impacts of this increased demand is traffic congestion. With segments of the main thoroughfares already operating at or above their design capacity, the growth projections and the subsequent effect on the transportation systems are major concerns for both the residents, businesses, and elected officials in these municipalities.

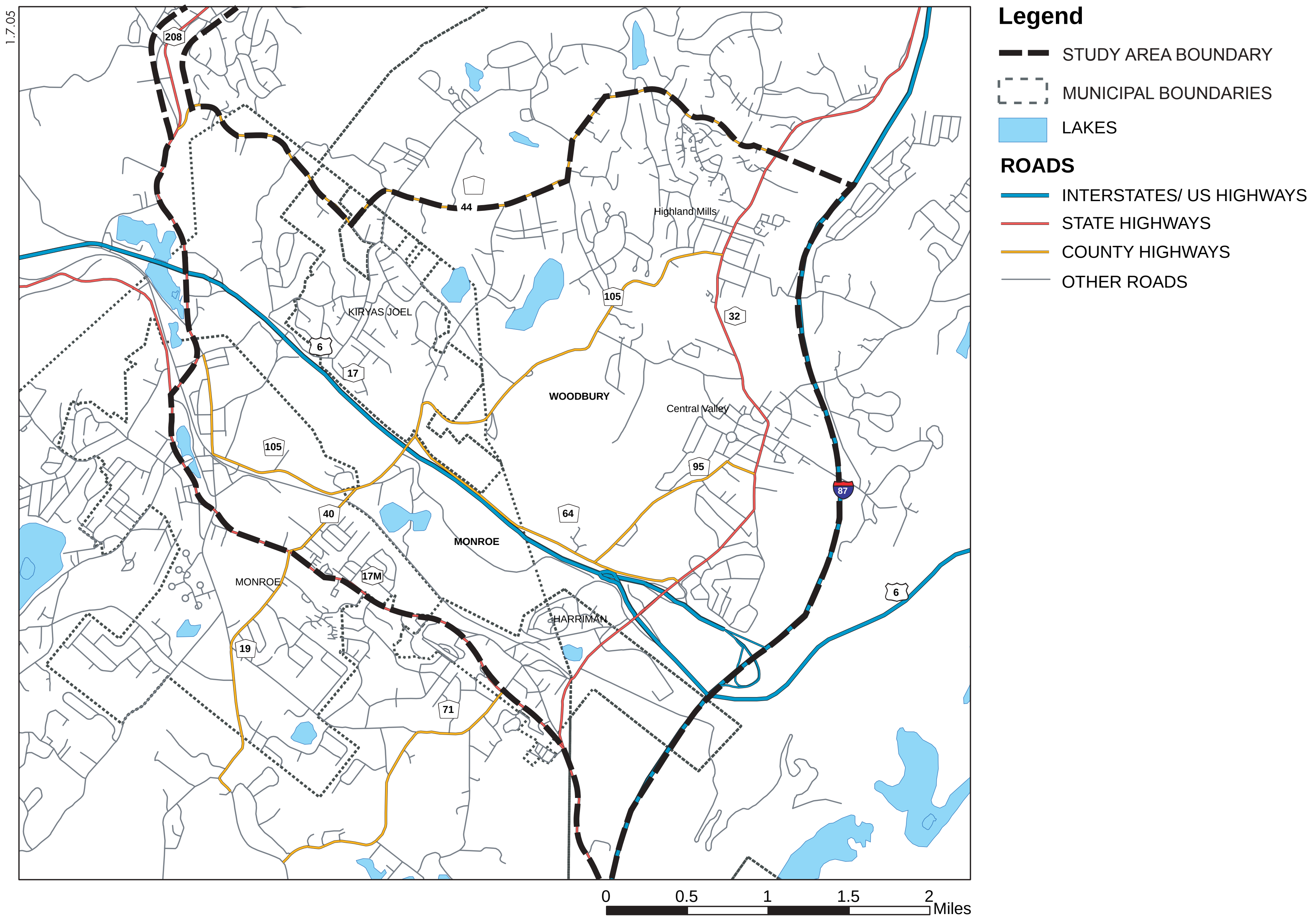
B. PROJECT EVOLUTION AND STAKEHOLDERS

In 1998 a grass roots Traffic Task Force was formed focusing on traffic congestion in the Monroe-Woodbury area and the types of regional, inter-municipal, solutions that could be advanced to address these issues. The Task Force consisted primarily of elected officials and planning and zoning board members representing the Towns of Monroe and Woodbury, as well as from the Villages of Harriman, Kiryas Joel, and Monroe. Meeting on a monthly basis, the Traffic Task Force discussed potential transportation improvement measures and land use controls that could be initiated to help preserve the area’s unique character and maintain the quality of life that makes this portion of Orange County such an attractive place to live and do business. Responsible development and smart growth became important issues.

Building from the Task Force’s work, Orange County and New York State Department of Transportation agreed to sponsor and fund unique, new research. The Southeastern Orange County Traffic and Land Use Study involves a detailed analysis of traffic conditions on the state-owned corridors in the area including Route 17, Route 17M, Route 208, Route 32, and the heavily traveled Route 17/6/32 interchange area (see Figure S-1). The study also evaluates potential solutions that include modifications to the New York State Thruway and County Route 105 as well as improvements to transit and pedestrian operations and the provision of multi-modal transportation centers.

A number of goals were established as part of this Federally funded study including:

- Determining the current operational characteristics and deficiencies of the transportation system;
- Forecasting future conditions of the transportation system;



SOUTHEASTERN ORANGE COUNTY
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Study Area Location
Figure S-1

- Recommending improvements to enhance the efficiency and safety of the transportation system;
- Developing and recommending sustainable development guidelines that are compatible with and help preserve the capacity of future transportation improvements;
- Building a consensus for proposed transportation improvements and sustainable development through public forums.

C. STUDY FINDINGS

LAND USE PATTERNS AND TRENDS

The most intense development in Orange County in recent years has been concentrated in the southeastern portion of the county, particularly near the New York State Thruway and Route 17. In addition, there has been a significant increase in residential subdivision and commercial development in the Towns of Monroe, Woodbury, and Blooming Grove although Monroe and Woodbury have seen significantly more recent development than Blooming Grove. The Villages of Monroe and Harriman are older centers, and although mostly built-out under current zoning rules, have experienced the impacts of increased traffic as a result of growth in the adjacent municipalities. The rapid growth of the Village of Kiryas Joel over the past two decades into a new community has also added new population to the area.

The growth in population that the southeastern portion of the county has experienced in recent decades has resulted in a substantial boom in commercial development along the Route 17 corridor. Woodbury Common is a regional retail center that has served as an anchor for other new retail construction around Routes 32 and 17. Subsequently, undeveloped land in this area has been increasingly developed for retail and commercial uses as market demand has increased. Southeastern Orange County still has large tracts of open space, as well as numerous tracts of undeveloped, forested, and wetland properties. Demand for residential property has led to new construction in the remaining countryside.

CURRENT TRAFFIC PATTERNS

The Southeastern Orange County study area is connected to other parts of Orange County and the rest of New York State via an established regional highway network that converges at its towns of Woodbury and Harriman. The New York State Thruway (I-87), as the primary north-south highway in the area, connects regionally to adjacent counties and points east of the Hudson River. Access to I-87 is provided via its Woodbury/Harriman toll interchange at Exit 16, which feeds west directly into the limited access Quickway (overlap of State Route 17 and US Route 6) and connects to State Route (SR) 17 and SR 32 via interchange ramps. Due to the rapid population and economic growth over recent years, travel to and from the area has increased, both in volume and in average distance. On a typical weekday, commuter travel generally peaks southbound in the morning and northbound in the evening. On the weekends, directional travel is more homogeneous, with significant peaking of traffic volumes along SR 17/32 near the Thruway interchange. This condition is attributed mainly to the continual growth of destination retail activities from Woodbury Common, the newly opened Woodbury Center and others in the area.

Traffic data were collected along three key corridors in fall 2002 to assess existing traffic conditions within the study area. A combination of automatic traffic recorder (ATR) and manual counts were conducted to formulate existing peak hour traffic volumes along SR 17/32 between SR 17M and Ridge Road, SR 17M between SR 17 and SR 208, and SR 208 and County Route (CR) 105 between CR 44 and Bakertown Road. Based on the collected data, the weekday 7:30 to 8:30 AM and 5:00 to 6:00 PM, and the Saturday noon to 1 PM peak hours were selected for analysis. These hours represent the typical peak commuter and weekend travel periods within the study area. The *Synchro 5 Traffic Signal Coordination Software*, which was developed based on the *2000 Highway Capacity Manual (HCM)* methodologies, was used to evaluate individual analysis locations and provide simulations of peak hour traffic flows along each of the above corridors.

Of the three study area corridors, traffic volumes are the highest along SR 17/32, with peak bi-directional hourly volumes nearing 2,800 vehicles, and lowest along SR 17M. On a typical weekday, directional peaking generally occurs southbound in the morning and northbound in the evening. Along SR 17M, which has more of an east-west alignment, weekday traffic is heavier eastbound towards SR 17 in the morning and westbound towards SR 208 in the evening. Weekend traffic is more homogeneous in both north-south and east-west directions.

Operational characteristics reflecting the travel conditions at individual intersections along the Route 17/32 corridor were summarized based on analysis results from the Synchro simulation of existing peak hour traffic. These results indicate how existing peak hour volumes compare to roadway capacities, the amount of average vehicle delays at intersection controls, and the levels of service of specific lane groups, approaches or intersections. Level of Service (LOS) is categorized from A through F. LOS A and B signify good operating conditions with minimal delay. At LOS C, the number of vehicles stopping is higher, but congestion is still fairly light. LOS D describes a condition at which congestion levels are more noticeable and individual cycle failures (motorists having to wait for more than one green phase to clear the intersection) at signalized intersections can occur or available gaps for minor street movements at unsignalized intersections are diminished. Conditions at LOS E and F reflect poor service levels, where cycle breakdowns are frequent or extended waits are needed for one or more turning movements. Under ideal suburban settings, the boundary between LOS C and LOS D is generally considered the threshold of acceptable operations.

Existing Levels of Service within each of the study area corridors are summarized in Tables S-1.

Table S-1
2002 Existing Levels of Service – SR32 Signalized Intersections

Cross Street	Dir	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
		Move	Delay (sec)	LOS	Move	Delay (sec)	LOS	Move	Delay (sec)	LOS
CR 105	EB	LR	29.7	C	LR	29.4	C	LR	34.5	C
	NB	LT	4.2	A	LT	6.8	A	LT	8.7	A
	SB	TR	7.5	A	TR	4.8	A	TR	6.0	A
		Int.	**9.5**	**A**	**Int.**	**8.6**	**A**	**Int.**	**11.1**	**B**
Smith Clove Road	WB	LR	20.7	C	LR	35.6	D_a	LR	21.0	C
	NB	TR	8.0	A	TR	48.2	D_u	TR	12.1	B
	SB	LT	11.7	B	LT	53.7	D_u	LT	9.1	A
		Int.	**12.7**	**B**	**Int.**	**48.1**	**D_u**	**Int.**	**12.5**	**B**
Woodbury Common North	WB	LTR	55.3	E	LTR	52.2	D_u	LTR	55.5	E
	NB	LTR	2.0	A	LTR	2.9	A	LTR	24.4	C
	SB	LTR	4.2	A	LTR	6.7	A	LTR	15.2	B
		Int.	**4.3**	**A**	**Int.**	**10.4**	**B**	**Int.**	**23.2**	**C**
Woodbury Common South	EB	LR	49.6	D_u	LR	50.8	D_u	LR	52.8	D_u
	WB	LR	47.8	D_u	LR	45.8	D_u	LR	45.1	D_u
	NB	T	5.8	A	T	13.2	B	T	10.7	B
	SB	T	5.5	A	T	11.3	B	T	13.6	B
		Int.	**8.4**	**A**	**Int.**	**18.7**	**B**	**Int.**	**16.0**	**B**
SR 17 WB Off Ramp / Nininger Road	EB	LR	82.1	F	LR	76.5	E	LR	129.1	F
	WB	LTR	73.9	E	LTR	116.6	F	LTR	57.5	E
	NB	LT	11.9	B	LT	6.7	A	LT	16.4	B
	SB	TR	13.8	B	TR	20.9	C	TR	16.7	B
		Int.	**32.0**	**C**	**Int.**	**44.1**	**D_a**	**Int.**	**33.2**	**C**
SR 17 EB On/Off Ramps	EB	LTR	34.3	C	LTR	36.7	D_a	LTR	72.4	E
	NB	TR	44.4	D_a	TR	27.9	C	TR	14.1	B
	SB	LT	81.2	F	LT	62.7	E	LT	82.6	F
		Int.	**60.7**	**E**	**Int.**	**44.8**	**D_a**	**Int.**	**57.1**	**E**
Locey Lane / Woodbury Center	EB	LTR	50.4	D_u	LTR	55.4	E	LTR	92.1	F
	WB	LTR	51.6	D_u	LTR	49.9	D_u	LTR	89.9	F
	NB	LTR	4.1	A	LTR	7.0	A	LTR	7.1	A
	SB	LTR	16.3	B	LTR	27.5	C	LTR	32.2	C
		Int.	**12.6**	**B**	**Int.**	**19.3**	**B**	**Int.**	**28.0**	**C**
US Route 6 Off Ramp	WB	LR	75.0	E	LR	51.9	D_u	LR	74.7	E
	NB	T	0.2	A	T	1.0	A	T	3.3	A
	SB	T	0.7	A	T	5.3	A	T	3.0	A
		Int.	**7.9**	**A**	**Int.**	**10.3**	**B**	**Int.**	**18.9**	**B**
Larkin Drive / US Route 6 On Ramp	EB	LTR	55.6	D_u	LTR	61.5	E	LTR	70.7	E
	NB	LTR	25.2	C	LTR	29.3	C	LTR	21.6	C
	SB	LT	16.4	B	LT	12.1	B	LT	20.2	C
		Int.	**27.5**	**C**	**Int.**	**29.9**	**C**	**Int.**	**36.7**	**D_a**

Note: SR 32 is oriented NB/SB, while cross streets are oriented EB/WB.
D_a = marginally acceptable LOS (delay ≤ 45 seconds); D_u = marginally unacceptable LOS (delay > 45 seconds)

Table S-2
2002 Existing Levels of Service – SR 32 Unsignalized Intersections

Cross Street	Dir	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
		Move	Delay (sec)	LOS	Move	Delay (sec)	LOS	Move	Delay (sec)	LOS
Ridge Road	EB	LR	16.0	C	LR	17.7	C	LR	15.6	C
	NB	LT	0.5	A	LT	1.2	A	LT	1.0	A
	SB	TR	--	--	TR	--	--	TR	--	--
		Int.	**2.1**	**A**	**Int.**	**1.8**	**A**	**Int.**	**1.7**	**A**
Dunderberg Road / Estrada Road	EB	LTR	26.7	D_a	LTR	391.1	F	LTR	44.2	E
	WB	LTR	327.4	F	LTR	332.2	F	LTR	49.2	E
	NB	LTR	0.2	A	LTR	1.1	A	LTR	0.6	A
	SB	LTR	0.5	A	LTR	1.1	A	LTR	0.5	A
		Int.	**21.9**	**C**	**Int.**	**25.0**	**C**	**Int.**	**3.0**	**A**

Note: SR 32 is oriented NB/SB, while cross streets are oriented EB/WB.
D_a = marginally acceptable LOS (delay ≤ 30 seconds); D_u = marginally unacceptable LOS (delay > 30 seconds)

Table S-3
2002 Existing Levels of Service – SR 17M Intersections

Cross Street	Dir	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
		Move	Delay (sec)	LOS	Move	Delay (sec)	LOS	Move	Delay (sec)	LOS
SR 17	EB	R	10.9	B	R	6.4	A	R	8.0	A
	NB	LT	3.8	A	LT	4.5	A	LT	3.7	A
	SB	TR	9.0	A	TR	8.9	A	TR	6.9	A
		Int.	**8.5**	**A**	**Int.**	**5.3**	**A**	**Int.**	**5.5**	**A**
Harriman Heights Road / Church Street	EB	LTR	6.9	A	LTR	5.8	A	LTR	6.1	A
	WB	LTR	5.6	A	LTR	7.3	A	LTR	5.7	A
	NB	LTR	15.5	B	LTR	19.8	B	LTR	13.4	B
	SB	LTR	14.4	B	LTR	16.5	B	LTR	13.3	B
		Int.	**10.2**	**B**	**Int.**	**10.8**	**B**	**Int.**	**8.7**	**A**
North Main Street (unsignalized)	EB	LT	4.1	A	LT	4.7	A	LT	3.7	A
	WB	TR	--	--	TR	--	--	TR	--	--
	SB	LR	10.8	B	LR	22.6	C	LR	16.9	C
		Int.	**4.0**	**A**	**Int.**	**7.3**	**A**	**Int.**	**5.5**	**A**
K-Mart / Vista Lane	EB	LTR	10.3	B	LTR	18.3	B	LTR	18.8	B
	WB	LTR	3.2	A	LTR	7.1	A	LTR	6.7	A
	NB	LTR	21.9	C	LTR	23.4	C	LTR	26.0	C
	SB	LTR	24.5	C	LTR	23.9	C	LTR	22.8	C
		Int.	**9.8**	**A**	**Int.**	**13.3**	**B**	**Int.**	**15.3**	**B**
Still Road / Freeland Street	EB	LTR	28.7	C	LTR	51.1	D_u	LTR	40.3	D_a
	WB	LTR	17.6	B	LTR	59.3	E	LTR	33.5	C
	NB	LTR	29.9	C	LTR	32.5	C	LTR	21.3	C
	SB	LTR	25.4	C	LTR	25.6	C	LTR	29.5	C
		Int.	**26.6**	**C**	**Int.**	**43.7**	$\mathbf{D_a}$	**Int.**	**33.2**	**C**
Stage Road	EB	LTR	9.3	A	LTR	8.9	A	LTR	8.3	A
	WB	LTR	6.4	A	LTR	13.4	B	LTR	9.5	A
	NB	LTR	32.9	C	LTR	39.4	D_a	LTR	30.5	C
	SB	LTR	26.0	C	LTR	26.3	C	LTR	29.7	C
		Int.	**12.9**	**B**	**Int.**	**17.0**	**B**	**Int.**	**13.0**	**B**
Lakes Street/Road	EB	LTR	23.8	C	LTR	33.4	C	LTR	24.7	C
	WB	LTR	17.6	B	LTR	60.4	E	LTR	28.3	C
	NB	LTR	28.0	C	LTR	44.0	D_a	LTR	38.4	D_a
	SB	LTR	17.8	B	LTR	29.6	C	LTR	30.5	C
		Int.	**23.5**	**C**	**Int.**	**44.6**	$\mathbf{D_a}$	**Int.**	**29.7**	**C**
Shop Rite	EB	TR	10.3	B	TR	16.2	B	TR	20.5	C
	WB	LT	3.2	A	LT	7.8	A	LT	13.5	B
	NB	LR	30.8	C	LR	33.3	C	LR	69.2	E
		Int.	**7.9**	**A**	**Int.**	**13.8**	**B**	**Int.**	**25.2**	**C**
SR 208	EB	LT	19.6	B	LT	30.7	C	LT	74.5	E
	WB	T	12.4	B	T	17.6	B	T	15.4	B
	SB	LR	18.8	B	LR	33.7	C	LR	30.6	C
		Int.	**18.2**	**B**	**Int.**	**29.1**	**C**	**Int.**	**41.2**	$\mathbf{D_a}$

Note: SR 17M is oriented EB/WB, while cross streets are oriented NB/SB.

Table S-4
2002 Existing Levels of Service – SR 208/CR105 Intersections

Cross Street	Dir	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
		Move	Delay (sec)	LOS	Move	Delay (sec)	LOS	Move	Delay (sec)	LOS
CR 44 (unsignalized)	WB	LR	35.1	E	LR	54.7	F	LR	42.7	E
	NB	TR	--	--	TR	--	--	TR	--	--
	SB	LT	0.9	A	LT	1.0	A	LT	1.0	A
		Int.	**2.3**	**A**	**Int.**	**3.8**	**A**	**Int.**	**1.7**	**A**
SR 17 WB Ramps	EB	LTR	42.8	D_a	LTR	27.5	C	LTR	43.0	D_a
	WB	LT	53.2	D_u	LT	96.2	F	LT	65.1	E
	NB	LT	0.6	A	LT	7.1	A	LT	0.7	A
	SB	LTR	28.0	C	LTR	8.2	A	LTR	6.6	A
		Int.	**25.7**	**C**	**Int.**	**29.3**	**C**	**Int.**	**13.1**	**B**
SR 17 EB Ramps	WB	L	52.7	D_u	L	50.3	D_u	L	51.5	D_u
	NB	T	36.1	D_a	T	82.2	F	T	79.8	E
	SB	LT	39.4	D_a	LT	12.5	B	LT	30.8	C
		Int.	**38.9**	**D_a**	**Int.**	**50.1**	**D_u**	**Int.**	**53.5**	**D_u**
Schunnemunk Street / SR 208 Extension	EB	LTR	25.6	C	LTR	30.4	C	LTR	23.6	C
	WB	LTR	29.3	C	LTR	42.0	D_a	LTR	27.4	C
	NB	LTR	26.1	C	LTR	31.7	C	LTR	26.9	C
	SB	LT	23.3	C	LT	30.4	C	LT	22.9	C
		Int.	**25.5**	**C**	**Int.**	**31.7**	**C**	**Int.**	**24.4**	**C**
Freeland Street (unsignalized)	WB	R	--	--	R	--	--	R	--	--
	NB	L	33.7	D_u	L	171.7	F	L	504.8	F
	SB	LT	--	--	LT	--	--	LT	--	--
		Int.	**8.3**	**A**	**Int.**	**23.8**	**C**	**Int.**	**100.3**	**F**
Larkin Drive	WB	LR	11.3	B	LR	13.1	B	LR	16.9	B
	NB	TR	9.1	A	TR	9.9	A	TR	12.2	B
	SB	LT	7.2	A	LT	12.6	B	LT	22.3	C
		Int.	**8.7**	**A**	**Int.**	**11.6**	**B**	**Int.**	**17.2**	**B**
Dunderberg Road (unsignalized)	WB	LR	31.5	D_u	LR	129.0	F	LR	94.6	F
	NB	TR	--	--	TR	--	--	TR	--	--
	SB	LT	2.8	A	LT	3.6	A	LT	0.7	A
		Int.	**8.6**	**A**	**Int.**	**22.0**	**C**	**Int.**	**28.8**	**D_a**
CR 105 Extension / Bakertown Road (unsignalized)	NEB	LT	1.8	A	LT	3.3	A	LT	1.5	A
	SWB	TR	--	--	TR	--	--	TR	--	--
	SB	LR	10.1	B	LR	48.1	E	LR	11.6	B
		Int.	**2.9**	**A**	**Int.**	**15.9**	**C**	**Int.**	**3.4**	**A**

Note: SR 208 and CR 105 are oriented NB/SB, while cross streets are oriented EB/WB.

D. TRAFFIC AND LAND USE FORECASTING

Projections of traffic conditions on the study area corridors for the horizon year 2020 and for full build-out (maximum development permitted by current zoning) were developed by the Orange County Department of Planning utilizing a four-step travel demand model for several future scenarios and a No-Build Scenario, which assumes that no significant changes to land use regulations or the current transportation system are made beyond those currently committed to by the transportation providers and local municipalities. Potential visions for future development, building off comments and recommendations from the public visioning sessions, were developed. These scenarios were then assembled into a matrix for comparative purposes using the County's four-step travel demand model (see Figure S-2).

LAND USE SCENARIOS

- ***Existing Zoning* –** Development of existing vacant or underdeveloped parcels according to existing zoning codes.
- ***Village Center Scenario* –** Changing land use patterns to increase densities and expand the limits of the villages and hamlets in the study area while reducing the amount of developable land in the outlying areas.
- ***Reduced Density Scenario* –** Limit commercial development to the established business zones with no expansions allowed beyond the existing commercial boundaries. Reduce residential development by increasing required lot sizes.
- ***Infrastructure-Based Zoning Scenario*** – Concentrate both commercial and residential development in the areas that contain sufficient sewer infrastructure. Development outside of these areas would be required to install, and/or make financial provisions for, the utilities and services necessary to support the additional expansion.

TRANSPORTATION SCENARIOS

- ***No Action- Current Improvements Only*** – The existing transportation network supplemented with improvement projects currently under consideration or in construction.
- ***Transportation Management Strategies*** – Maximize the effectiveness of the existing transportation network without major changes or construction. Key elements include small improvements to the transit system (i.e. better interconnections to and from existing bus and rail), signal optimization, bikeways and other bicycle-use incentives, pedestrian safety and circulation improvements.
- ***Roadway Focused Investment*** – Invest in roadway improvements designed to alleviate congestion using a range of roadway capacity enhancements and new roadway links, such as roadway improvements to circumvent key congestion points and adding travel lanes on major corridors.
- ***Transit Focused Investments*** – Increase the efficiency and frequency of the transit systems along with improvements that would facilitate multi-modal transit connections. A system of regional park-and-ride facilities would be coordinated with new regional and intra-county transit services.

12.2.04

LAND USE / TRANSPORTATION	1 Existing Zoning Build-Out	2 Village Center	3 Reduced Density	4 Infrastructure Based Zoning
1 No Action Current Improvements Only				
2 Transportation Management Strategies				
3 Roadway Focused Investment				
4 Transit Focused Investment				

Scenario Matrix
Figure S-2

A. PURPOSE AND NEED

Orange County has undergone a tremendous period of growth over the past thirty years as it has been transformed from a predominantly rural environment to a suburban setting that has become a part of the greater New York metropolitan area. Since 1970 the population in Orange County has increased by over 50 percent. In the 1990s, Orange County's population has grown from just over 307,600 people in 1990 to over 341,400 people, as reported in the 2000 Census. This 11 percent increase in population is the fourth largest in the entire state, with Putnam being the only county, outside the five boroughs of New York City that exceeded Orange County's ten year growth rate. This trend of increased growth is expected to continue, with projections from the Orange County Department of Planning estimating that by the year 2025 the County's population is expected to grow by an additional 36 percent to over 464,000 people.

The Towns and Villages in the southeastern portion of the County are at the leading edge of the development cycle as these communities have become the logical place to settle for people and businesses moving away from the older, more densely developed areas of downstate New York. The populations in the Towns of Blooming Grove, Monroe, and Woodbury have increased by more than 21percent over the past ten years, which is almost double the County's rate of growth. Projections by the County's Planning Department indicate that the populations in the Towns and Villages making up the southeast portion of Orange County are all anticipated to undergo substantial growth over the next twenty-five years, with many of these municipalities faced with a doubling of its population by 2025. As more people move into this area the demand for the roadways, schools, and infrastructure will also increase. One of the most visible impacts of this increased demand is traffic congestion. With segments of the main thoroughfares already operating at or above their design capacity, the growth projections and the subsequent effect on the transportation systems are major concerns for both the residents and elected officials in these municipalities.

B. PROJECT EVOLUTION AND STAKEHOLDERS

In 1998 a grass roots Traffic Task Force was formed focusing on traffic congestion in the Monroe-Woodbury area and the types of regional, inter-municipal, solutions that could be advanced to address these issues. The Task Force consists of elected officials and planning and zoning board members representing the Towns of Monroe and Woodbury, as well as from the Villages of Harriman, Kiryas Joel, and Monroe. Meeting on a monthly basis, the Traffic Task Force discussed potential transportation improvement measures and land use controls that could be initiated to help preserve the area's unique character and maintain the quality of life that makes this portion of Orange County such an attractive place to live and do business. By 2000, the Task Force had gained the attention of the County Executive's Office and the major agencies and providers of transportation services in the region, including the New York State Department of Transportation (NYSDOT), the New York State Thruway Authority (NYSTA), MTA Metro-North Railroad (MNR), and the Monroe-Woodbury School District. These agencies became members of the Task Force. In addition, the scope of the group's effort was expanded to include the growing concern over the demand for water, sewer, and the limited capacity of the area's existing infrastructure and how development in the surrounding Towns would affect these services. Recognizing the magnitude of the challenges facing the Traffic Task Force, Orange County and NYSDOT issued a Request for Proposals for consulting firms in March of 2001 to conduct a comprehensive study of the transportation system within the Towns of Monroe and Woodbury.

Responsible development and smart growth became an important issue in the November 2001 elections. These same issues formed a portion of newly elected County Executive Edward Diana's platform and by the middle of 2002 a consultant for the Monroe-Woodbury Transportation Study was selected and introduced to the Traffic Task Force. The project study area was expanded to include the Town of Blooming Grove so that a truly regional approach to both land use and transportation solutions could be studied and representatives from the Town of Blooming Grove were added to the Task Force. To more accurately reflect the size and scope of the project it was renamed the Southeastern Orange County Traffic and Land Use Study. As a "home-rule" State, the participation by each of the municipalities in the study area made the Traffic Task Force the likely organization to act as the project's Steering Committee, since the Towns and Villages will ultimately be responsible for initiating and implementing any future land use recommendations. For a complete list of the Project Advisory Group, see Table 1-1.

Table 1-1
Project Advisory Group

Name	Affiliation	Title
Michael Amo	County Legislature	County Legislator, 1st District
Roxanne Donnery	County Legislature	County Legislator, 14th District
Frank A. Fornario, Jr.	County Legislature	County Legislator, 5th District
Spencer M. McLaughlin	County Legislature	County Legislator, 7th District
Charles J. Bohan	Town of Blooming Grove	Supervisor
Sandy Leonard	Town of Monroe	Supervisor
Sheila Conroy	Town of Woodbury	Supervisor
G. Bruce Chichester	Village of Harriman	Councilman
Gedalye Szegedin	Village of Kiryas Joel	Village Clerk
Joseph Mancuso	Village of Monroe	Mayor
Captain Martin Hansen	New York State Police	Zone Commander
Richard A. Peters	NYS Dept. of Transportation	Regional Planning Manager
Ramesh Mehta	NYS Thruway Authority	Division Director
Wai Cheung, PE	NYS Thruway Authority	Traffic Systems Engineer
Edmund A. Fares	Orange County DPW	Commissioner
David Church	Orange County Department of Planning	Commissioner
Clifford Berchtold	Monroe-Woodbury School District	Director of Transportation
Robyn Hollander	MTA Metro-North Railroad	Capital & Long Range Planning
Jean Shanahan	Newburgh-Orange County Transportation Council	Staff Director
Patricia Gilchrest	Orange County Citizens Foundation	Executive Director
Tom Falzer	The Chelsea Group	

The Southeastern Orange County Traffic and Land Use Study involves a detailed analysis of traffic conditions on the state-owned corridors in the area including Route 17, Route 17M, Route 208, Route 32, and the heavily traveled Route 17/6/32 interchange area. The study also evaluates potential solutions that include modifications to the New York State Thruway and County Route 105 as well as improvements to transit and pedestrian operations and the provision of multi-modal transportation centers.

C. GOALS AND OBJECTIVES

A number of goals were established as part of this Federally funded study including:

- Determining the current operational characteristics and deficiencies of the transportation system;
- Forecasting future conditions of the transportation system;
- Recommending improvements to enhance the efficiency, capacity, and safety of the transportation system;
- Developing and recommending sustainable development guidelines that are compatible with and help preserve the capacity of future transportation improvements; and
- Building a consensus for proposed transportation improvements and sustainable development through public forums.

D. STUDY AND CONSENSUS BUILDING PROCESS

Throughout the study process the consultant team met monthly with the Traffic Task Force and solicited input from the public through three visioning sessions, the project web site, and a public opinion survey that was distributed to over 1,000 residents of the study area. The insight gained from the public's comments was combined with traditional data collection efforts regarding traffic volumes, safety, highway characteristics, physical features of the corridor, bicycle and pedestrian facilities, transit systems and other relevant features to develop a comprehensive analysis of existing and future travel conditions and to identify deficiencies and problems with the transportation infrastructure. The analysis of the existing transportation systems and recommendations to improve future operations were reviewed by a Study Technical Group consisting of Orange County, NYSDOT, NYSTA, and Metro-North. Each of the Towns and Villages in the study area were also consulted, with their input being an instrumental component in the development of transportation and land use solutions that could be administered within their jurisdictions. Upon concurrence by the Study Technical Group and the involved municipalities, the analyses and resulting improvement options were presented to the Traffic Task Force. Acting in its role as the project's Steering Committee, the Traffic Task Force was used to build public consensus for potential improvement alternatives.

E. TRAFFIC AND LAND USE FORECASTING

EARLY ACTION INITIATIVES

As part of the project, short term transportation management strategies (0-3 years) were developed to address the impact of trips being generated by existing and approved development, as well as the growth of through traffic in the study area. These short-term solutions were generally lower cost improvements focusing on existing safety and operational problems along the project corridors. The majority of these early action projects maximize the effectiveness of the existing roadway infrastructure by optimizing signal timings and coordinating the phasing of adjacent traffic lights to allow for a smooth progression of flow. Additional turning lanes at high volume intersections along with the establishment of consistent speed limits, safe passing zones, and landscape design features are also being proposed to alleviate congestions bottlenecks while respecting the land uses and character of the adjacent areas.

LONG-TERM MODELING

Projections of traffic conditions on the study area corridors for the horizon year 2020 and for full build-out (maximum development permitted by zoning) were developed by the Orange County Department of Planning utilizing a four-step travel demand model for several future scenarios and a No-Build Scenario, which assumes that no significant changes to land use regulations or the current transportation system are made beyond those currently committed to by the transportation providers and local municipalities. Potential visions for future development, building off of comments and recommendations from the public visioning sessions, were developed. These scenarios were then assembled into a matrix for comparative purposes using the County's four-step travel demand model (see Figure 1-1). The Land Use and Transportation Scenarios are described briefly below and in more detail in Chapter 3.

LAND USE SCENARIOS

- ***Existing Zoning –*** Development of existing vacant or underdeveloped parcels according to existing zoning codes.
- ***Village Center Scenario –*** Changing land use patterns to increase densities and expand the limits of the villages and hamlets in the study area while reducing the amount of developable land in the outlying areas.
- ***Reduced Density Scenario –*** Limit commercial development to the established business zones with no expansions allowed beyond the existing commercial boundaries. Reduce residential development by increasing required lot sizes.
- ***Infrastructure-Based Zoning Scenario*** – Concentrate both commercial and residential development in the areas that contain sufficient sewer infrastructure. Development outside of these areas would be required to install, and/or make financial provisions for, the utilities and services necessary to support the additional expansion.

12.2.04

TRANSPORTATION ↓ / LAND USE →	1 Existing Zoning Build-Out	2 Village Center	3 Reduced Density	4 Infrastructure Based Zoning
1 No Action Current Improvements Only				
2 Transportation Management Strategies				
3 Roadway Focused Investment				
4 Transit Focused Investment				

Scenario Matrix
Figure 1-1

A. INTRODUCTION

This chapter inventories existing conditions within the project's primary study area—the area roughly bounded by State Route 17M to the south, State Route 208 to the west, Ridge Road (County Route 44) to the north, and State Route 17/State Route 32 to the east[1]. The primary study area also includes portions of the Route 17 (former Quickway and Future I-86) and I-87 corridors. Figure 2-1 shows the primary study area in its regional context, and Figure 2-2 shows the primary study area in detail. A secondary study area is located along the Route 208 corridor from Route 17M to the Village of Washingtonville (see Figure 2-3).

The following subject areas are discussed in this chapter:

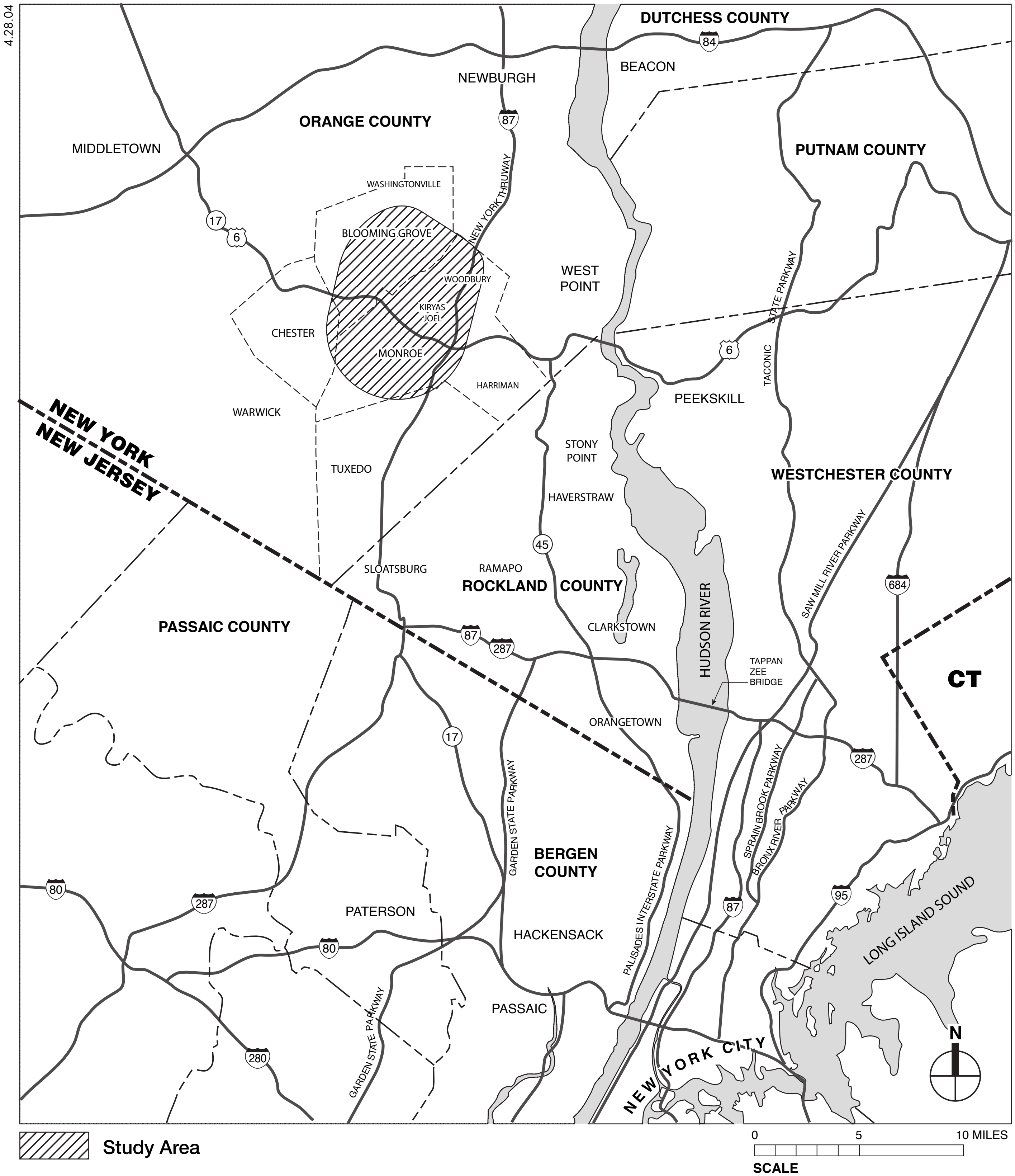
- Demographics;
- Land Use, Zoning and Public Policy;
- Environmental Features;
- Historic and Archaeological Resources; and
- Traffic.

B. DEMOGRAPHICS

POPULATION AND HOUSING

Orange County as a whole has an estimated total population of 341,367 according to the 2000 census. This represents an increase of approximately 11 percent in the decade between 1990 and 2000 (see Table 2-1). Much of the county's development has been concentrated in the southeastern portion of the county, in and around the Towns of Monroe, Woodbury and Blooming Grove (including the villages within the towns). The population from 1990 to 2000 within this project study area increased by approximately 24 percent (see Table 2-2). Interestingly, unlike the County as a whole, the number of housing units within the study area has not increased in direct proportion with the population. The number of renter-occupied housing units increased by over 30 percent during the same time period. These statistics may indicate a potentially unmet demand for new housing units.

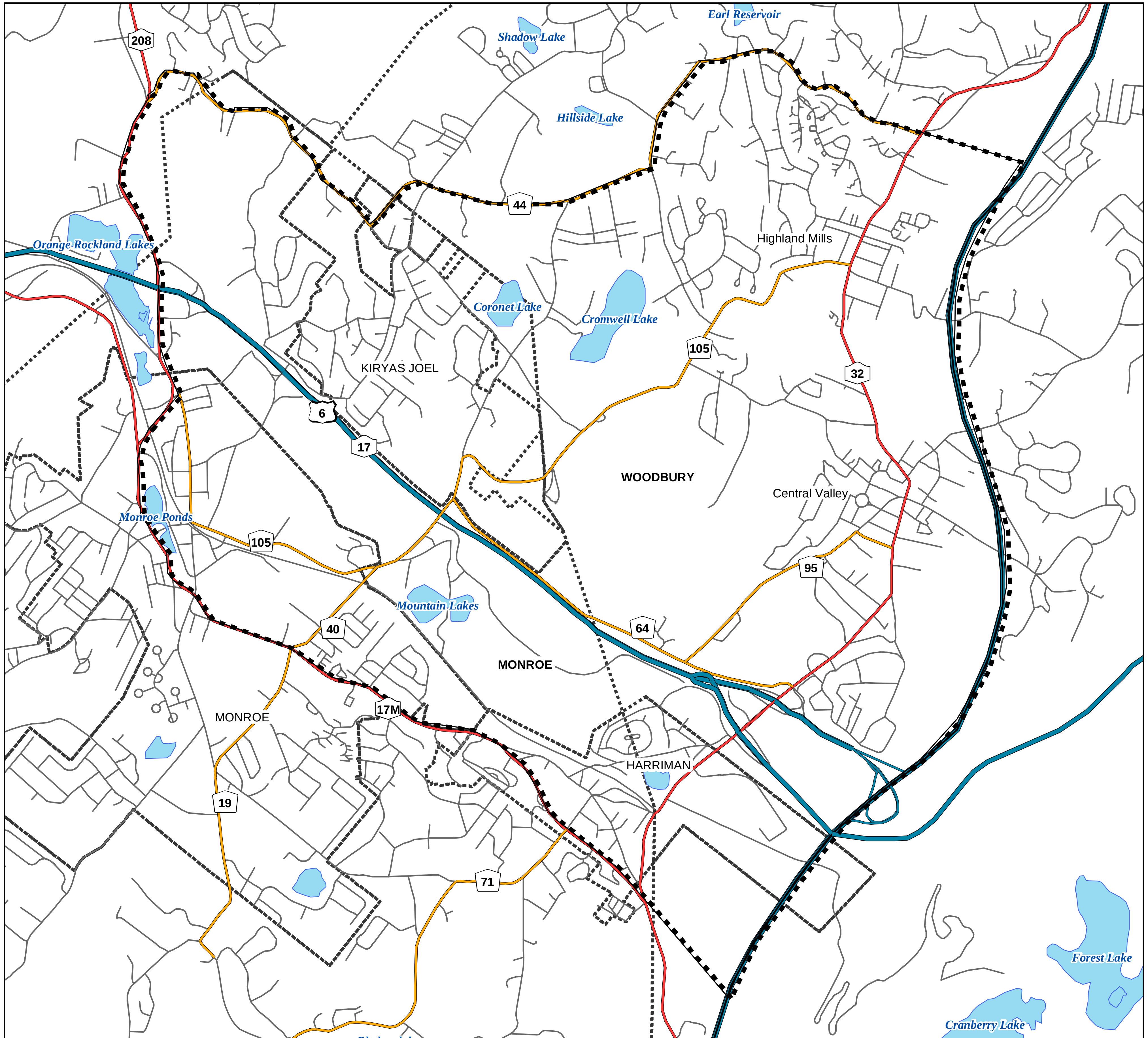
[1] To avoid confusion, this study will refer generically to SR 32 as the north-south arterial roadway that runs from Route 17M north through Woodbury even though SR 17 does continue south into Harriman. SR 17 will only refer to the Quickway (SR 17 and US Route 6 overlap) limited access highway west of the Thruway Interchange.



REGIONAL LOCATION

Figure 2-1

SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY



Legend

Primary Study Area
Municipal Boundaries

Major Roads

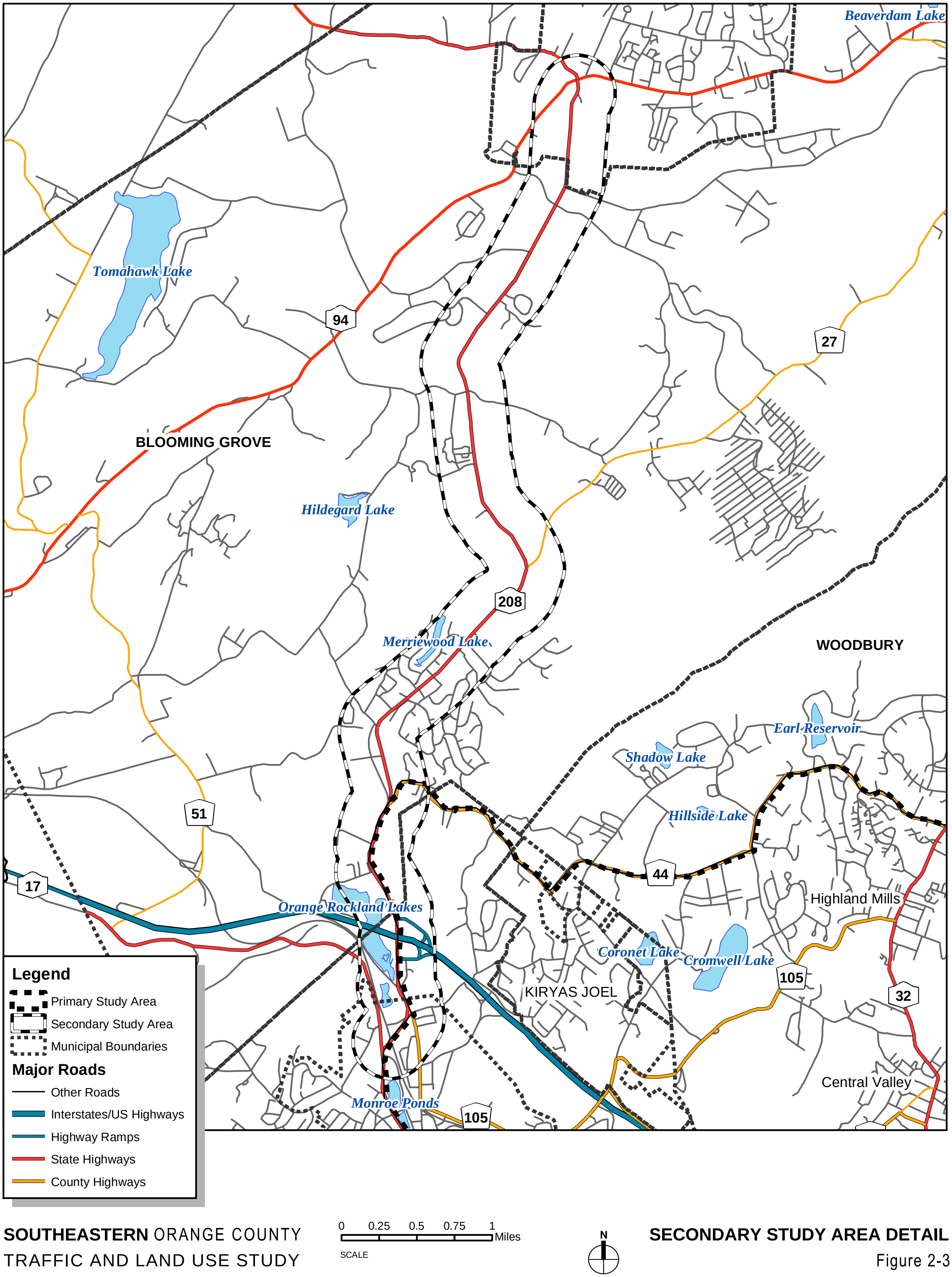
Other Roads
Interstates/US Highways
Highway Ramps
State Highways
County Highways

N

0 0.25 0.5 0.75 1 Miles
SCALE

PRIMARY STUDY AREA DETAIL

Figure 2-2



SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

SECONDARY STUDY AREA DETAIL
Figure 2-3

Table 2-1
Orange County
Population and Housing (1990-2000)

	1990	2000	Percent Change
Population	307,647	341,367	11.0%
Total housing units	110,814	122,754	10.8%
Occupied households	101,506	114,788	13.1%
Owner-occupied units	68,470	76,959	12.4%
Renter-occupied units	33,036	37,829	14.5%
Median per capita income	15,198	21,597	42.1%
Median household income	39,198	52,058	33.9%

Source: 1990 Census and Census 2000, US Census Bureau.

Table 2-2
Study Area Population and Housing (1990-2000)

	1990	2000	Percent Change
Population	46,905	58,215	24.1%
Total housing units	16,021	18,433	15.1%
Occupied households	13,984	17,180	22.9%
Owner-occupied units	10,643	12,789	20.2%
Renter-occupied units	3,341	4,391	31.4%
Median per capita income	$15,566	$17,699	12.1%
Median household income	$48,217	$51,911	7.1%

Note: For purposes of this analysis, the study area population and housing figures include the following census tracts and block groups: Census Tract 132 Block Groups 1-5, Census Tract 133 Block Groups 1-4, Census Tract 135 Block Groups 1-3, Census Tract 139 Block Groups 1-4, Census Tract 141 Block Groups 1-5, Census Tract 142.01 Block Groups 1-3, Census Tract 142.02 Block Groups 1-5, Census Tract 150.01 Block Groups 1-2, Census Tract 150.02 Block Groups 1-3.

Source: STF1 1990 Census and Census 2000 SF1, US Census Bureau.

The Orange County Department of Planning (OCDP) prepared population projections in June 2002 for each of the towns and villages in the county using the 2000 US Census as a base. Table 2-3 summarizes those estimates. It should be noted that the methodology used for those estimates relies on a statistical extension of data for small areas over a long period of time, which may result in an over-estimation of future populations. Similarly, because of the limited historic data available for population within the Village of Kiryas Joel, no projections were calculated for that community. The population projection for the Town of Monroe, then, only includes residents of the Town and Village of Monroe and most of Harriman Village.

Table 2-3
Population Projections

Municipality	2010	2015	2020	2025
Blooming Grove (T)	22,376	25,410	28,855	32,768
Monroe (T)	43,300	50,842	59,697	70,095
Woodbury (T)	11,529	12,727	14,049	15,509
Harriman (V)	3,149	3,724	4,404	5,207
Monroe (V)	10,705	12,557	14,730	17,278

Notes: Town totals include villages.
Source: Orange County Department of Planning, June 2002.

EMPLOYMENT

ORANGE COUNTY

Like many counties in the Lower Hudson Valley, Orange County experienced dramatic changes in its economic profile between 1990 and 2000. Significant declines in the manufacturing and extractive sectors (e.g., agriculture, forestry, and mining) were offset by large gains in service sector employment, including the arts, entertainment, and accommodations industries (see Table 2-4). In general, construction, manufacturing, and agriculture lost over 7,600 jobs between 1990 and 2000 (18.6 percent) while professional services; finance, insurance, and real estate (FIRE); arts/education; and public administration gained approximately 18,000 jobs (17.9 percent). Overall employment increased in Orange County by 7.3 percent between 1990 and 2000.

Table 2-4
Employment by Category
Orange County (1990-2000)

Industry	1990	2000	Percent Change
Agriculture, forestry, fishing and hunting, and mining	2,996	1,546	-48.4%
Construction	9,977	10,297	3.2%
Manufacturing	21,343	15,404	-27.8%
Wholesale trade	6,708	6,146	-8.3%
Retail trade	23,769	20,399	-14.2%
Transportation, communication, information, and utilities:	12,211	14,336	17.4%
Finance, insurance, real estate and rental and leasing:	8,307	9,702	16.8%
Professional, scientific, management, administrative, and waste management services:	8,979	11,579	29.0%
Educational, health and social services:	27,740	36,167	30.4%
Arts, entertainment, recreation, accommodation/food, and other services (except public administration):	10,782	14,711	36.4%
Public administration	8,603	11,457	33.2%
Total Employed	**141,415**	**151,744**	**7.3%**

Source: 1990 Census and Census 2000, US Census Bureau.

STUDY AREA

The trends evident in Orange County as a whole are also generally true of the study area. The most significant change is seen in the sharp decrease in agricultural employment. Within the study area, the construction, manufacturing, and agricultural sectors lost nearly 900 jobs (15.3 percent) between 1990 and 2000 while the service sectors gained over 4,000 jobs (27.6 percent) (see Table 2-5).

Table 2-5
Employment by Category
Study Area (1990-2000)

Industry	1990	2000	Percent Change
Agriculture, forestry, fishing and hunting, and mining	305	144	-111.81%
Construction	1,265	1,586	20.24%
Manufacturing	3,042	2,225	-36.72%
Wholesale trade	1,098	884	-24.21%
Retail trade	3,191	3,291	3.04%
Transportation, communication, information, and utilities:	2,067	2,447	15.53%
Finance, insurance, real estate and rental and leasing:	1,380	1,771	22.08%
Professional, scientific, management, administrative, and waste management services:	1,409	2,012	29.97%
Educational, health and social services:	4,168	6,087	31.53%
Arts, entertainment, recreation, accommodation/food, and other services (except public administration):	1,735	1,901	8.73%
Public administration	1,130	1,736	34.91%
Total Employed	**20,790**	**24,084**	**15.8%**

Note: For purposes of this analysis, the employment figures include the following census tracts and block groups: Census Tract 132 Block Groups 1-5, Census Tract 133 Block Groups 1-4, Census Tract 135 Block Groups 1-3, Census Tract 139 Block Groups 1-4, Census Tract 141 Block Groups 1-5, Census Tract 142.01 Block Groups 1-3, Census Tract 142.02 Block Groups 1-5, Census Tract 150.01 Block Groups 1-2, Census Tract 150.02 Block Groups 1-3.

Source: 1990 Census and Census 2000, US Census Bureau

JOURNEY TO WORK

The 2000 census statistics for journey to work present useful data for transportation and land use planning. Table 2-6 summarizes the journey to work data for residents of the towns within the study area (village residents are included in the town totals). Half of the study area’s labor pool works within Orange County; 18 percent commute to New York City (reflecting the high number of police and fire personnel and FIRE industry employees residing in the study area). The remaining commuters are split between Rockland County (12 percent), Westchester County (5 percent), and counties in northern New Jersey (11 percent).

The transportation choice used most frequently for the journey to work is the single-occupant vehicle. Nearly three-quarters of the workers 16 years and older living within the study area reported that they drive to work alone; only eight percent use public transit. Table 2-7 summarizes the modal split for the study area and its towns and villages.

The Village of Kiryas Joel is unique from a transportation perspective because of its high reliance on mass transit and pedestrian travel for mobility. A large reason for this is cultural.

Vehicular travel is prohibited altogether for more than 75 days per year for religious purposes. Women in Kiryas Joel do no not own vehicles nor do they drive. As a result, only 25 percent of eligible drivers actually own vehicles or drive in Kiryas Joel according to Department of Motor Vehicle statistics. In addition, over 50 percent of the Kiryas Joel population is under the age of 16 and ineligible to drive, which further increases the importance of sidewalks, pedestrian crosswalks, and the village bus system as a means of safe travel from place to place in the Kiryas Joel community.

Indeed, Kiryas Joel's reliance on mass transit and pedestrian travel for mobility is paramount. Countywide transit statistics indicate that 46 percent of all transit trips in Orange County are from Kiryas Joel even though Kiryas Joel comprises only 4 percent of Orange County's total population. Census journey-to-work figures further show that 49 percent of all work related travel in Kiryas Joel is either primarily by mass transit or by walking. Leaders of Kiryas Joel have long recognized the reliance on pedestrian facilities and mass transit services for mobility, as well as the imperative to enhance such facilities and services for their citizens. To help bolster pedestrian travel, they have engaged in an aggressive sidewalk rehabilitation and construction program. Since 2001, Kiryas Joel has either added, replaced, or repaired over 11,660 linear feet of sidewalk and curbs through their Pedestrian Walk Program. Although these are significant improvements, 51,320 linear feet of roadway system still remain deficient, in need of sidewalks and curbing to enhance pedestrian mobility and safety. In addition, to make transit services more convenient and efficient, Kiryas Joel is actively pursuing the necessary funding to construct a park-and-ride lot in the vicinity of the Bakerstown Road - CR 105 intersection.

Table 2-6
Journey to Work: Destination

County of Employment	No.	Pct. of Total
New York		
Orange County	11,597	48.8%
Rockland County	2,774	11.7%
Sullivan County	44	0.2%
Ulster County	146	0.6%
Dutchess County	272	1.1%
Putnam County	52	0.2%
Westchester County	1,259	5.3%
New York City	4,354	18.3%
New Jersey		
Bergen County	2,006	8.4%
Essex County	215	0.9%
Hudson County	163	0.7%
Passaic County	172	0.7%
Sussex County	17	0.1%
Other	694	2.9%

Notes: Data are reported for residents of the towns of Blooming Grove, Monroe, and Woodbury. Village residents are included in town totals.
Source: Census 2000, US Census Bureau.

Table 2-7
Journey to Work: Modal Split

Municipality	Drive Alone	Carpool	Public Transit	Walk	Other	Work at Home
Orange County	77%	11%	5%	4%	1%	3%
Study Area	73%	11%	8%	4%	1%	3%
Blooming Grove (T)	80%	10%	5%	2%	0%	3%
Monroe (T)	66%	12%	11%	7%	1%	4%
Woodbury (T)	79%	9%	8%	1%	0%	3%
Harriman (V)	78%	10%	6%	3%	n/a	2%
Kiryas Joel (V)	23%	20%	20%	30%	4%	4%
Monroe (V)	75%	10%	9%	2%	1%	3%

Notes: Figures represent percentage of total workers 16 years and older. Town totals including villages. Totals may not add due to rounding.
Source: Census 2000, US Census Bureau.

C. LAND USE, ZONING, AND PUBLIC POLICY

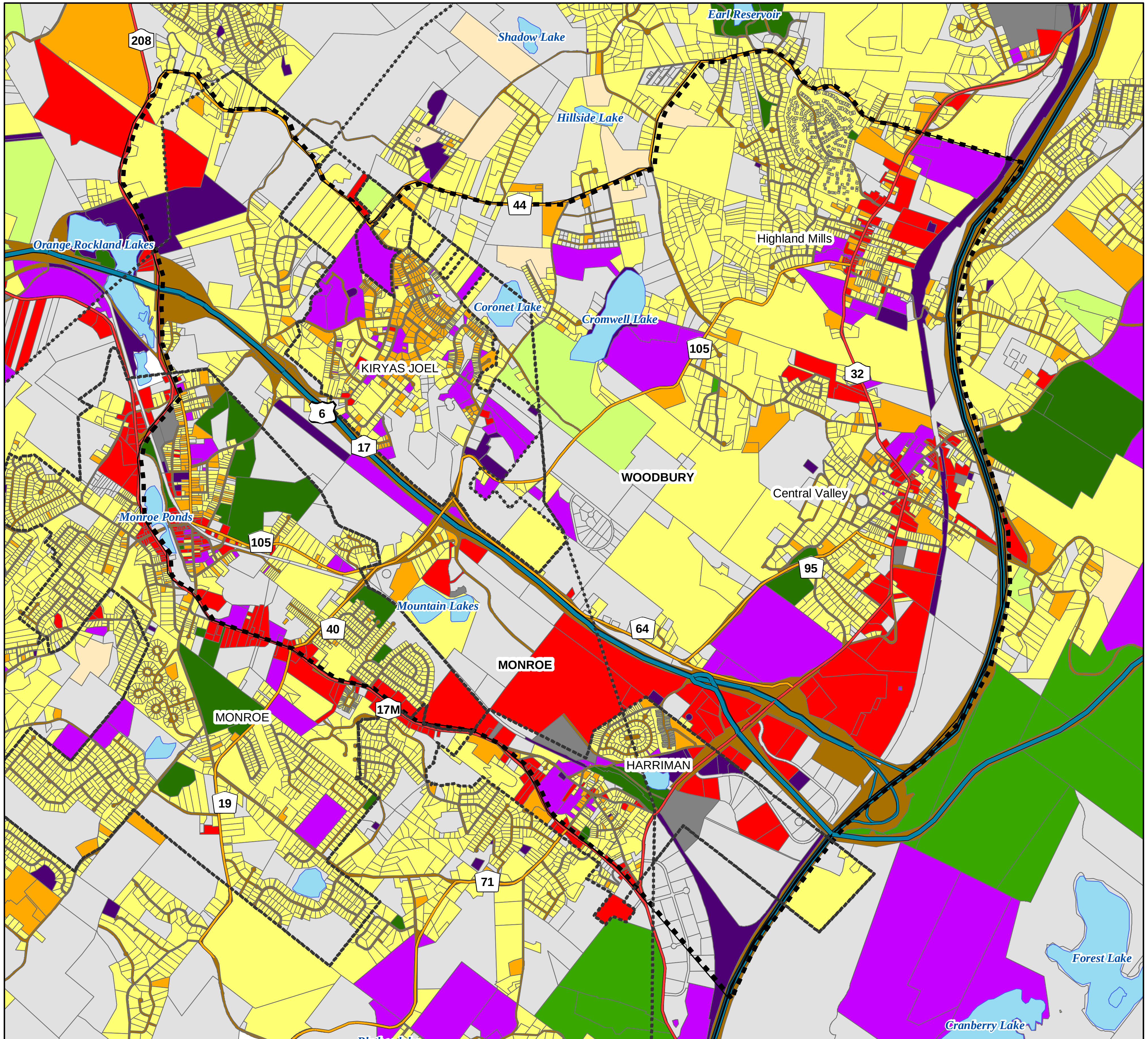
OVERVIEW

LAND USE PATTERNS AND TRENDS

The most intense development in Orange County in recent years has been concentrated in the southeastern portion of the county, particularly near the New York State Thruway and Route 17. In addition, there has been a significant increase in residential subdivision and commercial development in the Towns of Monroe, Woodbury, and Blooming Grove although Monroe and Woodbury have seen significantly more recent development than Blooming Grove. The Villages of Monroe and Harriman are older centers, and although mostly built-out, have experienced the impacts of increased traffic as a result of growth in the adjacent municipalities. The rapid growth of the Village of Kiryas Joel over the past two decades into a new community has also added a new population to the area. Figure 2-4 shows existing land use for the study area.

The significant growth in population that the southeastern portion of the county has experienced in recent decades has resulted in a substantial boom in commercial development along the Route 17 corridor. Woodbury Common is a regional retail center that has served as an anchor for other new retail construction around Routes 32 and 17. Subsequently, undeveloped land in this area has been increasingly developed for retail and commercial uses as market demand has increased. Southeastern Orange County still has large tracts of open space, as well as numerous tracts of undeveloped, forested, and wetland properties. Demand for less expensive residential property has led to new construction amidst the open space in undedicated parkland and rolling hills of the countryside.

SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY



Legend

- Municipal Boundaries
- Primary Study Area
- Agriculture
- Single-Family Residential
- Multi-Family Residential
- Vacant Land
- Commercial
- Camps; Cottages; Bungalows
- Parks; Recreation; Entertainment
- Community Service
- Roads
- Industrial
- Utilities
- Wild; Forested; Conservation Lands

N

0 0.25 0.5 0.75 1 Miles
SCALE

LAND USE - PRIMARY STUDY AREA

Figure 2-4

ZONING

The zoning ordinances in the study area's various municipalities are generally consistent with the distribution of different uses and the densities seen in the study area communities. In the primary study area, the highest densities are found in the Town and Village of Monroe, the Village of Kiryas Joel, and the Hamlets of Highland Mills and Central Valley in Woodbury. Areas outside of the village centers generally have lower densities. Figure 2-5 provides a composite view of zoning in the study area by indicating zoning districts by density category. More detailed discussions of zoning within each municipality and along the primary road corridors in the study area are provided below.

PUBLIC POLICY

The *Orange County Comprehensive Plan – Quality Communities Plan*, drafted in 2001, provides a framework for development within the County for a twenty-year period. The Plan recognizes the locations of traditional downtown centers, hubs, crossroads, activity nodes, corridors, natural areas and residential areas. The Plan encourages appropriate development in these areas for the purposes of providing residents with amenities in close proximity to where they live and work, thereby reducing journey-to-work times and roadway congestion. Focusing growth in downtown centers allows development to rationally progress so that the existing infrastructure is not overburdened, and substantial transportation infrastructure investment is limited.

The primary study area encompasses the roads that pass through the centers of the Villages of Monroe, Harriman, and Kiryas Joel, as well as hamlets such as Central Valley and Highland Mills. The secondary study area examines conditions in the Town of Blooming Grove along Route 208. The study areas recognize the importance of the connections between these centers, and reflect the goals of the *Quality Communities Plan* in maintaining distinctions in the county between developed urban/suburban areas and protected open spaces and undeveloped areas.

Because governance and implementation of land use changes within the county rest with local municipalities, the role of the County is to aid each municipality in making informed decisions that work toward resolving inter-municipal or countywide problems. The Orange County Department of Planning, therefore, serves to facilitate the process of focusing attention on regional issues and concerns, and providing guidance and direction for stakeholders on all levels to coordinate solutions that will benefit the individual municipalities and the region.

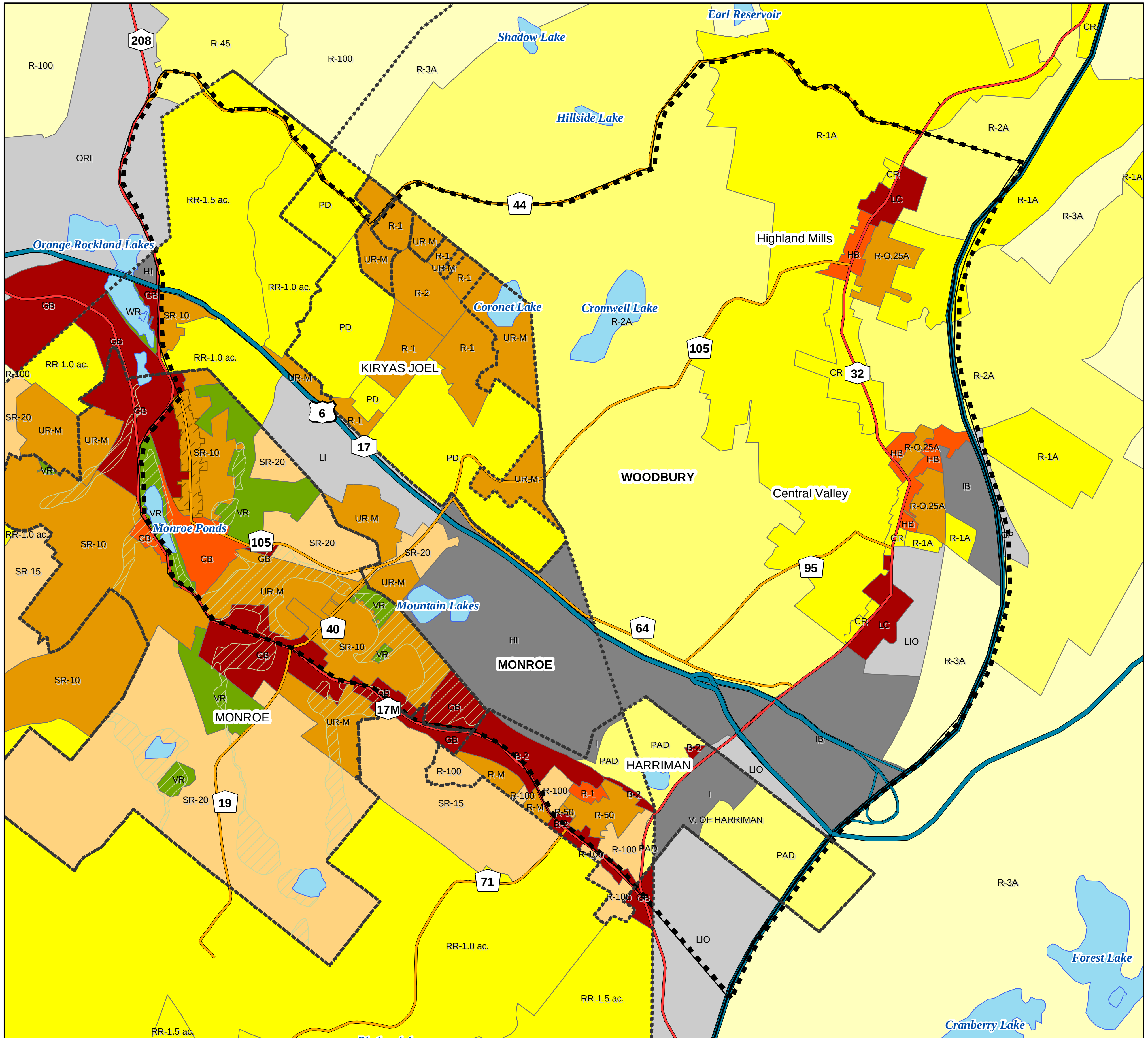
STUDY AREA LAND USE AND ZONING

Land use data for the study area were gathered from a number of sources including the Orange County Department of Planning, the Orange County Water Authority, and the Towns and Villages within the study areas. These data, along with aerial photography and field surveys were used to determine current land use within the study area.

Electronic parcel data and boundary files were obtained from the Orange County Water Authority in ArcView-compatible Geographic Information Systems (GIS) files. These data were published in 1993, making many of the associated Real Property Service (RPS) land use codes outdated. In addition to land use, the boundaries of many parcels have significantly changed as a result of subdivisions and lot merges.

In an effort to work with the most up-to-date and accurate land use information possible, updates were made based on centroid parcel data received from the Orange County Planning Department. The centroid data were last updated in 2001. The centroids were placed over the

SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY



Legend

- Primary Study Area
- Municipalities

General Land Use Permitted by Zoning

Residential (Dwelling Units Per Acre)

- < 0.5
- 0.5 - 0.99
- 1 - 1.99
- 2 - 3.99
- > 4

Other Uses

- Central Business Area
- General Business
- Office/Light Industrial
- Industrial
- Recreation
- ES Overlay
- MFC Overlay

ZONING - PRIMARY STUDY AREA

Figure 2-5

existing parcel data utilizing GIS software and each parcel was evaluated to find where changes occurred. The RPS codes of the parcels were updated if the old and new data differed.

In some instances, centroids were present in locations that conflicted with parcel boundaries. These cases were examined more closely and updated based on the centroids and analysis of aerial photography (dated May 2002) and field checked. The parcel boundaries in some situations were modified to more accurately reflect actual conditions and the data associated with the centroids.

For zoning and public policy analysis, documents at the county and local levels were reviewed. Orange County recently completed its Comprehensive Plan in October 2001. This plan addresses land use objectives and goals for encouraging suitable development in appropriate areas.

The County has little control over the development that occurs in the study area. Zoning is enforced at the local level, and County site plan and subdivision plat review only applies to projects with structures over 100,000 square feet in area or consisting of 50 or more residential units or lots. Local land use planning policies, zoning, and development regulations were examined for each of the municipalities in the study area.

TOWN OF MONROE

General Land Use Patterns

The Town of Monroe is situated in the southeastern portion of Orange County bordered by the Town of Blooming Grove to the north, the Town of Woodbury to the east, the Town of Tuxedo to the south, the Town of Warwick to the southwest, and the Town of Chester to the west. Within the Town are three incorporated villages: Kiryas Joel, Monroe, and a portion of the Village of Harriman. These villages are all located in the northern portion of the Town flanking the north and south side of Route 17.

Residential development is found throughout much of the northern part of the Town, and consists mainly of single-family units, with some duplex and townhouse units. Along Route 17 in the northeastern part of the Town, there has been recent large-scale chain retail development at Harriman Commons, a 795,182 square-foot retail power center. This new construction is in close proximity to Exit 16 of the New York State Thruway and Woodbury Common. Neighborhood commercial businesses are concentrated within the village boundaries. However, some strip retail exists on Route 17M between the incorporated areas of the Villages of Monroe and Harriman. Industrial and office park uses are also occasionally present.

There are several portions of Harriman State Park that extend into the southern most portion of the Town, including parts of the Appalachian Trail. Land in this area is predominantly undeveloped with rolling topography and numerous lakes and ponds. There is still some agricultural land between the parkland in the south and residential development to the north, but the amount of area is diminishing as housing development is expanding onto undeveloped land.

Zoning

There are six residential zoning districts within the Town of Monroe: RR-1.5 ac., RR-1.0 ac., SR-20, SR-15, SR-10, and UR-M. Of these residential districts, the most restrictive zone is the RR-1.5 ac. zone, allowing “mountain residences” on three (3) acre lots. Assuming that central sewer facilities are present, the RR-1.0 ac., SR-20, SR-15, and SR-10 districts allow single-family dwellings on 25,000 square-foot (sf) lots, 20,000 sf lots, 15,000 sf lots, and 10,000 sf lots, respectively. If central sewer facilities are not present these lots must be at least 40,000 sf each. UR-M zones allow multiple residences on 10,000 sf lots.

There are several commercial districts within the Town of Monroe, including the neighborhood business (NB) district, waterfront recreational business (WR) district, and the commercial, wholesale, storage, and automotive sales and service (GB) district. Also located within the Town of Monroe are two industrial districts: the light industrial (LI) district and the heavy industrial (HI) district. The NB district is mapped at the intersection of Lakes Road and Margaret Road. The WR district is mapped at several locations along Lakes Road in the western part of the Town and along a section of Orange and Rockland Road in the northwestern section of the Town. The GB district is mapped at various locations along the length of Route 17M. The LI district is mapped on the south side of Route 17 in the northern part of the Town. The HI district is mapped along Route 17 in the northeastern part of the Town. Figure 2-5 shows the locations of the zoning districts within the study area.

Public Policy

The *Town of Monroe Master Plan* was updated in 1998 to reflect growth within the Town and a substantial increase in new residents. The plan addresses key areas of importance to the Town's long-term development and quality-of-life. Land use, conservation of natural resources, open space and recreation, community facilities and human services, housing, and infrastructure are addressed in terms of a series of policies and actions meant to allow the Town to grow, while protecting the natural features and beauty of undeveloped areas.

The Plan includes recommendations indicating that new housing should be built at a very low net density in the undeveloped parts of the Town. There should be a focus on encouraging residential development in areas already serviced with central water and sewer. Certain types of new commercial development should also be encouraged in water and sewer serviced areas near existing commercial areas and major transportation corridors. Although natural resource and open space preservation remain very high priorities for the Town, equally important is the need for affordable housing and senior citizen housing within the community. The plan encourages clustered development as a means of achieving the new diversified housing stock and preserving the natural environment that is a characteristic of the Town. The plan also recommends exploring the development of innovative policies for housing, land use, open space conservation and provision of community services.

Since the adoption of the *Master Plan*, the Town of Monroe Planning Board received a substantial number of development applications for new residential projects within existing areas served by sewer and water. To better plan for this anticipated wave of development, the Town commissioned a land *Build-out Analysis* (completed in May 2002) to evaluate the impacts of changes that might be expected within the Town if available land is built-out to its maximum potential under the existing zoning regulations. The *Build-out Analysis* estimated potential new growth under several scenarios essentially based on whether public sewer collection and treatment is or is not available. Including projects in review by the Planning Board at the time the study was prepared, the *Build-out Analysis* estimated anywhere from 563 new single-family units to 1,300 single-family detached dwelling units and close to 500 multiple-family dwelling units within the Town of Monroe (excluding the villages).

TOWN OF WOODBURY

General Land Use Patterns

The Town of Woodbury is located in the southeast portion of Orange County. The Town is bordered by the Town of Cornwall to the north, the Town of Highlands to the east, the Town of Tuxedo to the south, the Town of Monroe to the southwest, and the Town of Blooming Grove to the northwest. Of the Town's nearly 23,000 acres, about half is occupied by the Palisades Interstate Park, West Point Military Reserve, and Columbia University Arden House Conference Center lands. These large parcels are not likely to change from their current use.

The predominant land use within the northern part of the Town of Woodbury is low-density residential uses. Residential density gradually increases with a mix of commercial and business uses along the Route 32 corridor. Single-family residential development occupies the area between Route 44 and Route 105 in the hamlet of Highland Mills. Several single-family residential units also exist in the hamlet of Central Valley. Density of these homes decreases as distance from the hamlet center increases.

In the area west of the New York State Thruway and north of Route 17, large-scale commercial development projects line Route 32 including Woodbury Common, an outlet center comprising over 600,000 square feet of retail space and Woodbury Centre with 280,000 square feet of retail space just north of Route 6. Harriman Commons, with 795,182 square feet of retail space south of Route 6, in the Town of Monroe has made this an intense node of commercial activity and the traffic associated with that activity.

Several undeveloped areas exist in the northern part of the Town near Schunnemunk Mountain. In the foothills of this ridgeline, environmental constraints are more pronounced with floodplains, wetlands, steep slopes and bedrock outcrops limiting new development from occurring in these areas.

Zoning

There are five residential zones within the Town of Woodbury: R-3A, R-2A, R-1A, R-0.25A, and CR districts. Three residential zones allow one-family dwellings and agricultural and horticultural operations; the R-3A, R-2A, and R-1A districts allow development on three-acre, two-acre, and one-acre lots, respectively. Properties located within these three zoning districts may be located outside of the publicly operated or approved water and sewer districts. (Those properties within the R-1A zoning district that are served by a publicly owned central sewer and water system have a minimum lot area of 30,000 square feet.) The R-0.25A zoning district permits one-family dwellings on minimum lot areas of 10,000 square feet (approximately one-quarter acre) and two-family dwellings on minimum lot areas of 15,000 square feet. Properties within the R-0.25A district are typically found in highly developed portions of the town close to or in hamlet centers where public water and sewer services are available. The uses permitted within the CR, or Corridor Residential district, are the same as those permitted in the R-1A district; however, this district can only be mapped along a direct-access state highway, preferably where a public water system serves the property. The purpose of the CR district is to retain the primarily open and residential environment and create a smooth transition in land uses and intensities of development along Route 32 between the hamlets of Central Valley and Highland Mills, by allowing limited nonresidential uses (i.e., professional offices, arts and crafts shops), provided that they conform to the character of established surrounding patterns of development, as well as to save older or architecturally significant homes.

There are two commercial districts in the Town of Woodbury: the Limited Commercial (LC) district and the Hamlet Business (HB) district. The LC-zoned lots can be found interspersed with the properties located within the Corridor Residential (CR) district, along Route 32. The purpose of this zone is to accommodate limited business activity along portions of Route 32 so as to retain the existing residential character, architectural style, and development intensity, while also recognizing the appropriateness of highway commercial uses. This district acts as a transitional area between residential and commercial districts. The LC district permits single-family dwellings on 30,000 sf lots. The Hamlet Business (HB) district permits one- and two-family dwellings (on 10,000 sf and 15,000 sf lots respectively), banks and professional offices, service establishments (excluding automobile repair stations), funeral homes, restaurants and drinking places, and retail and personal service stores, all on lots with a minimum area of 10,000 square feet (with the exception of two-family dwellings, which require a minimum lot area of 15,000 square feet). The purpose of this zone is to provide community focal points and business centers where retail, service and community needs can be met.

Within the Town of Woodbury, there are three industrial/office park districts: the Industrial Business (IB) district, the Light Industrial/Office Park (LIO) district, and the Office Park (OP) district. The IB district provides for a variety of economic development opportunities at appropriate locations surrounding major roadway interchanges but physically separated from residential uses. The IB district permits numerous uses by special permit including hotels and motels, offices, warehouses, self-storage facilities, light industry, restaurants, and other business excluding heavy industry or automotive service. The LIO district permits offices for business, research, and professional use; specialized education and training facilities; and indoor commercial recreation (such as fitness centers, ice skating rinks, and tennis courts). The purpose of this zone is to provide a location for various types of light industrial and office uses in an industrial-park-type setting at low densities. The LIO district is located to the north and to the south of the Village of Harriman, as well as on the west side of Route 32, just north of the IB district. The OP district permits agricultural and livestock operations, and offices for business, research, and professional use. The purpose of this district is to provide an appropriate location, adjacent to major transportation routes, for limited office uses in a low-density setting. The OP district is mapped along the east side of the New York State Thruway outside of the study area.

Public Policy

The Town of Woodbury last updated its *Master Plan* in March 1988, stating long-term goals and objectives to preserve a semi-rural and suburban character in the Town while accommodating gradual economic growth to support the tax base and provide employment. Preservation and enhancement of natural features, open spaces, historic resources and aesthetic views remains important to the Town today as it did at the time of adoption of the *Master Plan*. As such, the Town reviews development proposals considering the overall pattern of land development, and considers factors such as available land, neighboring development densities, infrastructure capacity including water and sewer, and other sensitive environmental features. Additionally, the Town continues to make the provision of community services and access to goods within the area a high priority.

The Town continues to encourage mixed use, moderate-density development near arterial corridors and close to hamlet centers. However, the pressure of new residential and commercial development near Route 32 and County Route 95 has increased traffic volumes and congestion levels substantially in recent years. This has increased the demand on community services and transportation routes, raising some concerns about traffic safety. The Town continues to regard its ecological resources as a treasure, and employs a rigorous review process to ensure that new construction is confined to appropriate areas of development.

VILLAGE OF HARRIMAN

General Land Use Patterns

Incorporated in 1914, the Village of Harriman is located partially within the Town of Monroe (approximately 22,200 acres) and partially within the Town of Woodbury (approximately 23,000 acres). The Village is situated near the hub of several county, state, and interstate roads, and contains mostly developed land – the exception being Mary H. Harriman Memorial Park and land within the Planned Area Development District (near the New York State Thruway). The intersection of Church Street, Maple Street, and South Main Street forms the center of the Village, where the Post Office and Village Hall are located. South of the village center, Route 17M roughly follows the south village boundary with the Village of Monroe to Route 17.

Land use in the western portion of the Village is a mix of residential development and commercial uses along Route 17M. The eastern portion of the Village remains largely undeveloped with the exception of a residential subdivision on the west side of Route 32 and some industrial uses on the east side of Route 32.

Zoning

The residential districts located within the Village of Harriman include the R-100, the R-50, and the R-M districts. The R-100 district permits single-family dwellings on lots with a minimum area of 15,000 square feet. The R-50 district permits single-family dwellings on a minimum lot area of 5,000 square feet. The R-M district permits single-family dwellings (on a minimum lot area of 5,000 square feet), two-family dwellings (on a minimum lot area of 6,000 square feet), townhouses in groups of four or more dwelling units (on a minimum lot area of 2,500 square feet), and apartment buildings (on a minimum lot area of 20,000 square feet). Townhouse or apartment building sites must provide at least 700 square feet of open space per dwelling unit.

The commercial districts located within the Village of Harriman include the Neighborhood Commercial (B-1) district and the General Commercial (B-2) district. The B-1 district allows as its principal permitted uses retail establishments; business and professional offices; municipal buildings; post offices and banks; personal services establishments (such as beauty parlors, appliance repair, and dry-cleaning establishments); eating and drinking places (excluding taverns and live entertainment); and any combination of the above uses in a single structure. The minimum lot area required for the B-1 district is 5,000 square feet. The B-2 district permits hotels and motels; business, professional, and industrial offices; banks; appliance repair establishments; motor vehicle accessory retail establishments; funeral homes; restaurants and other eating and drinking places (excluding live entertainment); and bus or railroad passenger/freight terminals. The minimum lot area for the B-2 district is 15,000 square feet. The B-1 zones are typically found near the center of the Village, while B-2 zones are more common towards the edges of the Village.

The Industrial (I) district in the Village of Harriman allows manufacturing or other processing of products or materials; warehouses; and industrial office and research buildings. The minimum lot area for the (I) district is 40,000 square feet. However, on lots within the (I) district of at least ten acres, more than one industrial office or commercial use may be permitted in multiple buildings, with a minimum separation between buildings of 100 feet.

In addition to the standard residential, commercial, and industrial zoning districts, the Village has a Planned Area Development (PAD) district designed to encourage the more efficient allocation and maintenance of common open space adjacent to new residential areas. The principal permitted uses within the PAD district include single-family dwellings (on a minimum lot area of one acre); crops and orchards, raising of dairy cattle, and farm buildings (on a minimum lot area of five acres); and the same uses as permitted in the (I) district (on a minimum lot area of ten acres).

Public Policy

The Village of Harriman was included in a comprehensive development plan written in the mid 1970s for both Monroe and Woodbury. Although the Village of Harriman did not officially adopt this plan, it was the basis for its zoning regulations and the land use pattern evident in the Village today. The Village’s last major revision to its zoning code occurred in June 2000.

VILLAGE OF MONROE

General Land Use Patterns

Of the three incorporated villages within the Town of Monroe, the Village of Monroe is the largest (approximately 107,000 acres). The center of the Village is situated just north of the geographic center of the Town opposite Mill Pond from Route 17M. The southern terminus of Route 208 meets Route 17M at the northern end of Mill Pond. This area constitutes the traditional “village center” of the community and contains the Village Hall (and Town Hall), library, and several downtown business. The center is a focus of community activity – particularly governance for both the Town and the Village – and serves as a sub-regional shopping center and destination for dining out. The Mill Pond walking trails, Airplane Park, and the Heritage Trail attract many people for recreation purposes.

Three other pockets of commercial development exist along Route 17M. Around the intersection of Route 17M and Route 208 are several convenience retail and dining establishments and gas stations. Some additional small businesses and local retailers are clustered near Route 17M and Lakes Road, the intersection of which acts as a gateway into the Village Center. Further southeast along both sides of 17M, and outside the village center, strip development is prevalent and dominates the corridor.

Beyond the commercial development of Route 17M is mostly single-family residential development. Some multi-family residential is also located along North Main Street. The Village has also made provisions for conversion of existing structures to multi-family residential units along North Main Street from Route 208 south to approximately Spring Street. Several acres of land in the Village that are currently zoned as residential have yet to be developed, and remain undeveloped. As demand for new housing continues to increase, the Village will need to address what type of development it wishes to permit in these undeveloped areas of the community.

Besides the undeveloped land that is zoned for future residential, commercial or light industrial development, there are several greenspace areas that are designated as parks within the Village. Adjacent to the northern boundary of the Village is Smith Clove Park, which contains a number of ball fields and an inline skating rink. Additionally, land along Stage Road, Rye Hill Road, and Archer Drive has been set aside for parkland and recreation.

Zoning

There are three residential zoning districts located within the Village of Monroe. The SR-20 Suburban Residential district permits one-family detached dwellings on a minimum lot area of 20,000 square feet, two-family duplex dwellings on a minimum lot area of 30,000 square feet, religious assembly uses on a minimum lot area of 10,000 square feet, noncommercial community recreation uses and parks, and agricultural/horticultural uses. The SR-10 Suburban Residential district allows the same uses as the SR-20 district, but with minimum lot areas of 10,000 square feet for one-family detached dwellings and 15,000 square feet for two-family duplex dwellings. The Urban Multifamily (UR-M) district permits multifamily dwellings, townhouses, and row houses on minimum lots of five acres. Several community service uses (daycare, schools, and convenience stores) are also permitted.

There are two commercial districts within the Village of Monroe: the Central Business (CB) district and the General Business (GB) district. The purpose of the CB district is to achieve a mix of higher-density uses that will create beneficial interrelationships between the business community and those utilizing the businesses; as well as to provide an ample supply of decent housing, typically in the form of residential apartments on the second floor of multi-use structures above business uses, in order to encourage walking between places of business and/or residences. Some of the uses permitted in the CB district subject to site plan approval by the Planning Board include: ambulance service, banks and real estate offices, restaurants, government administrative office buildings, laundromats, theaters, and medical or dental offices. The GB district permits much of the same uses as within the CB district, although this district was not necessarily intended to encourage businesses and residences to be located side-by-side. While there is no minimum lot area required for the CB district, the minimum lot area required for the GB district is 20,000 for most uses.

The Village Recreation (VR) zoning district permits the following uses subject to site plan approval by the Planning Board: agricultural/horticultural uses, community recreation uses and parks, and religious assembly. The VR-zoned properties are typically relatively large lots situated adjacent to more densely developed residential and commercial zones.

In addition to standard residential, commercial, and recreation districts there are two overlay districts designed to provide additional land development regulations that supplement the relevant provisions of the underlying zoning: the Multifamily Conversion (MFC) overlay district and the Environmentally Sensitive (ES) overlay district. The MFC overlay district allows for the conversion of an existing dwelling to multifamily dwellings by a conditional use permit issued by the Planning Board. The MFC overlay district is mapped in the northern part of the Village along North Main Street. The ES overlay district permits (as a conditional use subject to Planning Board approval) agricultural/horticultural uses and community recreation uses and parks, including conservation and related uses. This overlay zone imposes greater restrictions upon the use of a building or lot than are imposed or required by the underlying zoning. The ES overlay district spans multiple zones and is mapped in several areas throughout the Village that are classified as environmentally sensitive.

Public Policy

The Village of Monroe was included in a comprehensive development plan written in the mid 1970s for Monroe and Woodbury. Although the Village of Monroe did not officially adopt this plan, it was the basis for its zoning regulations and the land use pattern evident in the Village today. The Village adopted its zoning code in December 1990.

VILLAGE OF KIRYAS JOEL

General Land Use Patterns

The Village of Kiryas Joel is situated within the northeastern portion of the Town of Monroe, immediately north of Route 17 and west of Route 105, and is bordered to the north and east by the Town of Woodbury. The community has one of the largest suburban Hasidic populations outside of New York City, and many of its public institutions reflect the language and culture of this denomination.

Incorporated as a village in 1977, Kiryas Joel has grown dramatically over the last two decades. The Village's population growth has been accommodated by a practice of replacing single-family dwellings with multi-family dwellings and acquiring new land through annexation.

Although located adjacent to Route 17, there is no direct access to Route 17 from the village. Routes 44 and 105 both pass through the village and provide indirect access to Route 17. Forest Avenue remains an important link over Route 17 between the village centers of Kiryas Joel and Monroe.

Zoning

The Village of Kiryas Joel contains three zoning districts including PD, R-1, and R-2 according to the most recent zoning map dated 1977. The PD district is intended to enable the development in a planned fashion of various residential and related retail uses including single, two-family, multi-family, and local retail uses. R-1 and R-2 districts allow for residential buildings on 25,000 square-foot and 18,000 square-foot lots respectively.

Public Policy

The Village of Kiryas Joel does not have an adopted comprehensive plan.

TOWN OF BLOOMING GROVE

General Land Use Patterns

The Town of Blooming Grove is primarily an area of low-density development with hilly topography, and numerous streams, creeks, and lakes. Located in central Orange County at the north and west edges of the primary study area, the Town is bordered by the Town of New Windsor to the north, the Town of Cornwall to the east, the Town of Woodbury and Village of Kiryas Joel to the southeast, the Town of Monroe to the south, the Town of Chester to the southwest, the Town of Goshen to the west, and the Town of Hamptonburgh to the northeast. The Town includes the Village of Washingtonville, a small community of about 6,000 residents that is located some eight miles north of Route 17 at the junction of Routes 94 and 208.

Approximately 40 percent of the land within the Town is undeveloped, of which over 7,000 acres is potentially developable. Commercial, industrial, community service, and designated park lands total approximately 13 percent of the Town's area. About one-fifth of the Town's land area is currently utilized for agricultural purposes. However, as existing developable residential property decreases, more of this land may be converted to residential development. A small commercial node exists near the intersection of Route 208 and County Route 27. This development is surrounded by the residential and undeveloped land on either side of Route 208 between the Villages of Washingtonville and Monroe. Further south along Route 208, an office park containing medical offices and commercial space is located near Exit 130 on Route 17.

Route 208 serves as a primary link between communities to the north of Blooming Grove and Route 17 and the greater New York Metropolitan Region. As such, Blooming Grove, and Route 208 specifically, serves as a conduit for much of the region's traffic.

In recent years, Blooming Grove has experienced increased development pressure as a result of people moving to outlying regions of the New York metropolitan region while remaining close to major employers in the region. Because of the relative ease of accessibility and affordable cost of housing, Blooming Grove has continued to experience residential growth. The Town has access to Route 17 at three interchanges. As such, traffic volumes along roads throughout the Town have increased with the expanding new development both within Blooming Grove and within the communities to the north and west. Direct driveway access onto major arterial routes has become hazardous.

Zoning

The Town of Blooming Grove has residential, business, and office/industrial zoning districts. There are two residential districts: the R-45 district, with a minimum lot area of 45,000 square feet; the R-100 district, with a minimum lot area of 100,000 square feet. The R-100 zoning district is mapped in the eastern, western, and southwestern portions of the Town of Blooming Grove, while the R-45 district is mapped between properties zoned R-100 stretching from the northeast part of the Town to the southeast. The Town of Blooming Grove Planning Board has authorization to allow clustered residential development on lots smaller than that required in the zoning if such modifications result in the preservation of areas containing steep slopes, wetlands, floodplains, water bodies and other environmentally sensitive or unique open space features.

Business zones found in the Town of Blooming Grove include general business (GB) and neighborhood business (NB) districts. Both the GB and the NB zoning districts allow retail stores, office buildings, banks, museums, libraries, and churches or other places of worship as of right. The NB district is more restrictive with a limitation of 15,000 square feet for retail stores. The GB district is mapped in the western portion of the Town along Route 94 and in the southern part of the Town along Route 17. The NB district is mapped in several locations at major intersections along Route 208 and Route 94.

The Town of Blooming Grove also has an office research/light industry (ORI) zone. The ORI district permits office buildings on lots with a minimum area of two acres, non-nuisance industries on lots with a minimum area of 160,000 square feet, and research institutes or laboratories on lots with a minimum area of 160,000 square feet. The ORI district is mapped in the southern part of the Town along Route 208 and Route 17 and in the center of the Town at the intersection of Route 208 and Clove Road.

Public Policy

In 1994, the Town of Blooming Grove revised its *Master Plan Report* based upon a series of planning goals and assumptions. In this document, planning criteria were stated to guide the protection of existing resources and new development within the community. In general, the Town intends to encourage the development of low-density residential development in appropriately zoned areas to ensure that open spaces and natural elements are protected from more intensive development. Moderate-density residential development shall continue to be encouraged near the Village of Washingtonville and in areas that are provided with central water supply and sewage disposal systems. A pattern of non-residential land, including neighborhood and general businesses and office research/light industrial uses will be encouraged in areas that are suitably near arterial routes and transportation corridors. Development should also be encouraged in areas that are compatible with density and development in communities adjacent to Blooming Grove. The plan expresses the need to preserve and maintain the Town's open space resources and to prevent urban sprawl from destroying sensitive environmental areas.

STUDY AREA CORRIDORS

This section describes the land use patterns along each of the three road corridors (Route 17/17M, Route 32, and Route 208) analyzed within the primary and secondary study areas.

ROUTE 17/17M

Land Use Patterns and Trends

Route 17 is a limited access highway that provides regional access to the Town of Monroe. It extends from the northwest corner of the study area at the Route 208 interchange to the southeast corner of the study area where it connects with Route 17M in the Town of Woodbury. Within the study area, access on and off Route 17 is limited to two interchanges: the Route 208 interchange in the Town of Monroe and the Route 32 interchange in the Town of Woodbury.

Route 17M forms the southwestern boundary of the primary study area and runs roughly parallel to Route 17 extending from its intersection with Route 208 in the Village of Monroe south and east to where it meets Old Route 17 at the southernmost point of the study area. Route 17M is the main arterial road in the Town of Monroe. Most of the other major roads in Monroe feed traffic directly or indirectly onto Route 17M.

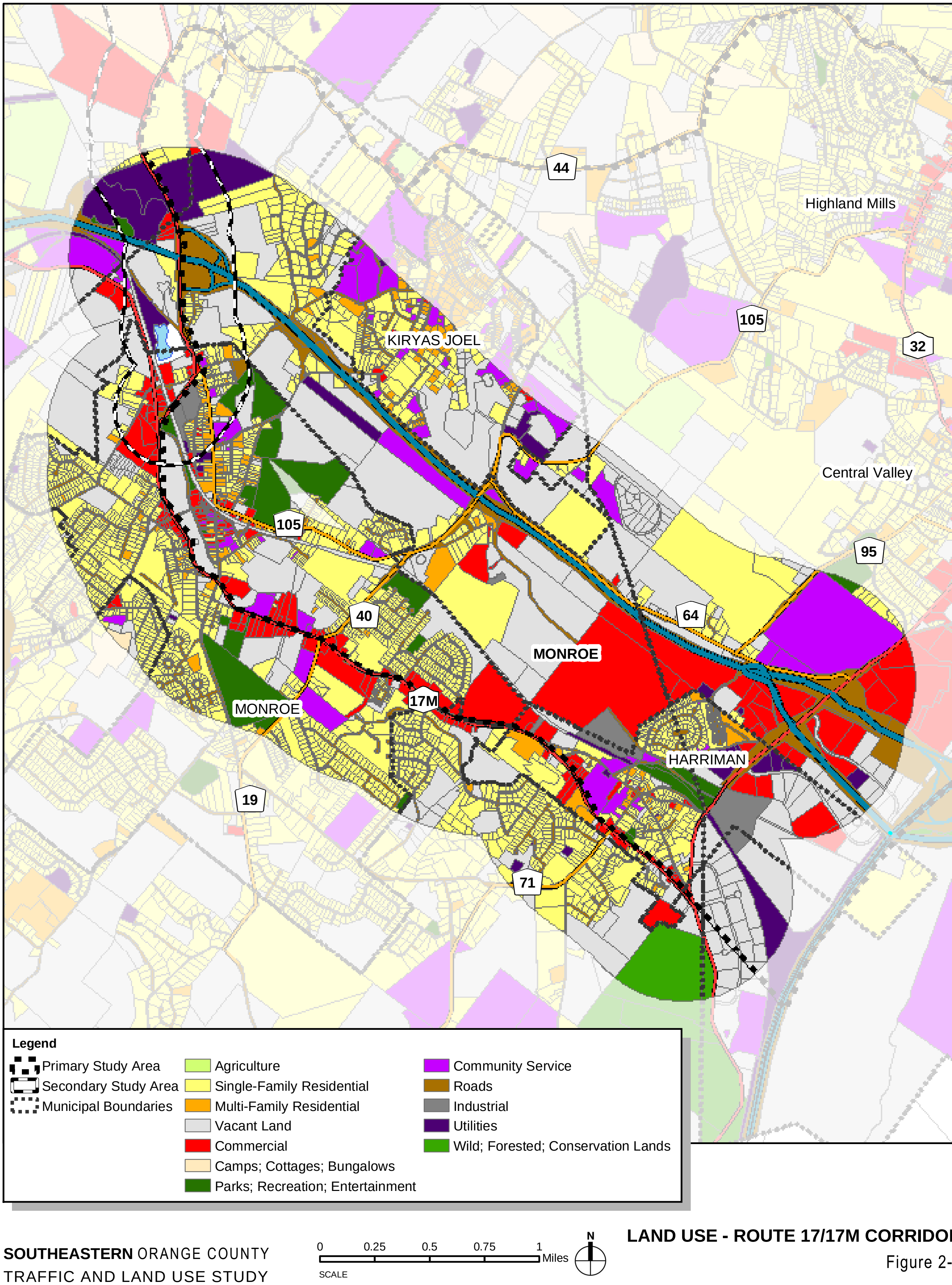
The Route 17M/17 corridor has experienced a substantial boom in commercial development in recent decades most of which has been concentrated along Route 17M in the Villages of Monroe and Harriman. As a result of this development, much of Route 17M has become a densely developed commercial strip with numerous shopping centers and automotive establishments. The densest commercial areas are located around the several signalized intersections that link Route 17M with major roads such as Route 208, Route 5, Route 19, Route 105, and Route 71. These major roads connect 17M to the residential areas throughout the study area.

Commercial development directly along Route 17 has been more limited because access on and off the highway is restricted in the study area to the two interchanges at Route 208 and Route 32. Most of the land that lines Route 17 is vacant, but significant residential development has occurred on the north side in Kiryas Joel. The south side of the highway consists mainly of undeveloped land except for a small residential area where Route 105 crosses over the highway. Land uses become increasingly commercial toward the east end of the Route 17 study corridor just before the interchange with Route 32 near Woodbury Commons. A significant amount of land in this area has recently been developed for big box retail and commercial uses such as Home Depot, Wal-Mart, and BJ's Wholesale Club (see figure 2-6). (Figure 2-7 shows the zoning within this corridor).

ROUTE 32

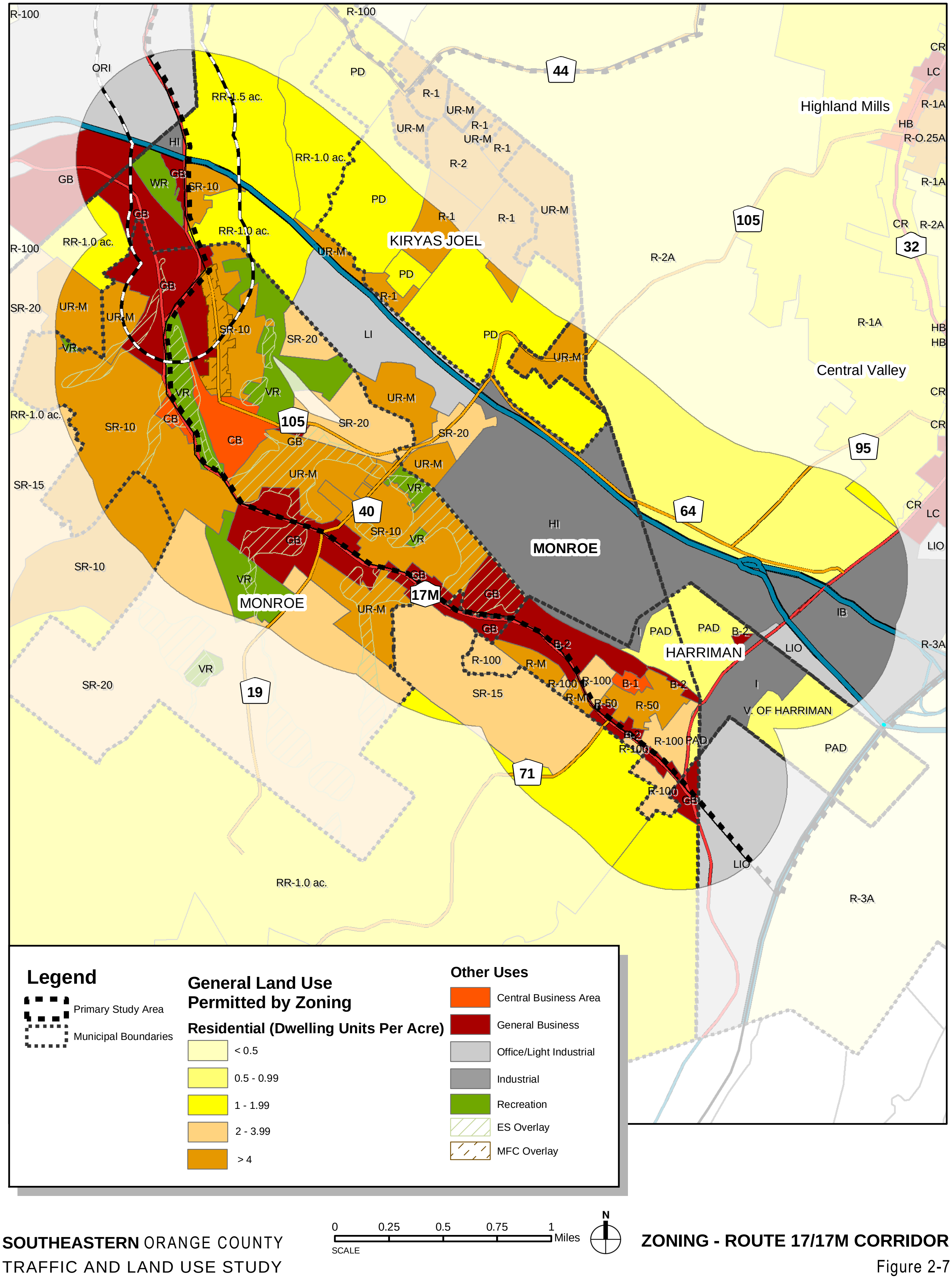
Land Use Patterns and Trends

The Route 32 corridor is located entirely within the Town of Woodbury and extends from the intersection with County Route 44 in the northeastern portion of the study area to the intersection with Route 17 in the southeastern portion of the study area. Route 32 runs along the



LAND USE - ROUTE 17/17M CORRIDOR

Figure 2-6



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ZONING - ROUTE 17/17M CORRIDOR
Figure 2-7

eastern boundary of the primary study area roughly parallel to I-87 and is a major north/south suburban arterial connecting the Town of Woodbury to Route 17 and linking the two hamlets of Highland Mills and Central Valley.

The Route 32 corridor has experienced a large increase in commercial development in recent decades. The densest commercial development has occurred at the southern end of the Route 32 corridor in the vicinity of the Route 17/I-87 Thruway interchange. Much of the commercial development in this area, which includes Woodbury Common, Woodbury Centre, and Harriman Commons serves as a regional shopping center.

New commercial development along Route 32 has also occurred within the two hamlet centers of Highland Mills and Central Valley. These hamlet centers provide services to town residents and contain a number of uses including local businesses, community facilities, professional offices, and residences. The hamlet centers are surrounded by suburban residential development with lot sizes primarily ranging from a quarter-acre to one-acre. Some areas of undeveloped land remain along Route 32 north of Highland Mills and between Highland Mills and Central Valley (see figure 2-8). (Figure 2-9 shows the zoning within this corridor).

ROUTE 208

Land Use Patterns and Trends

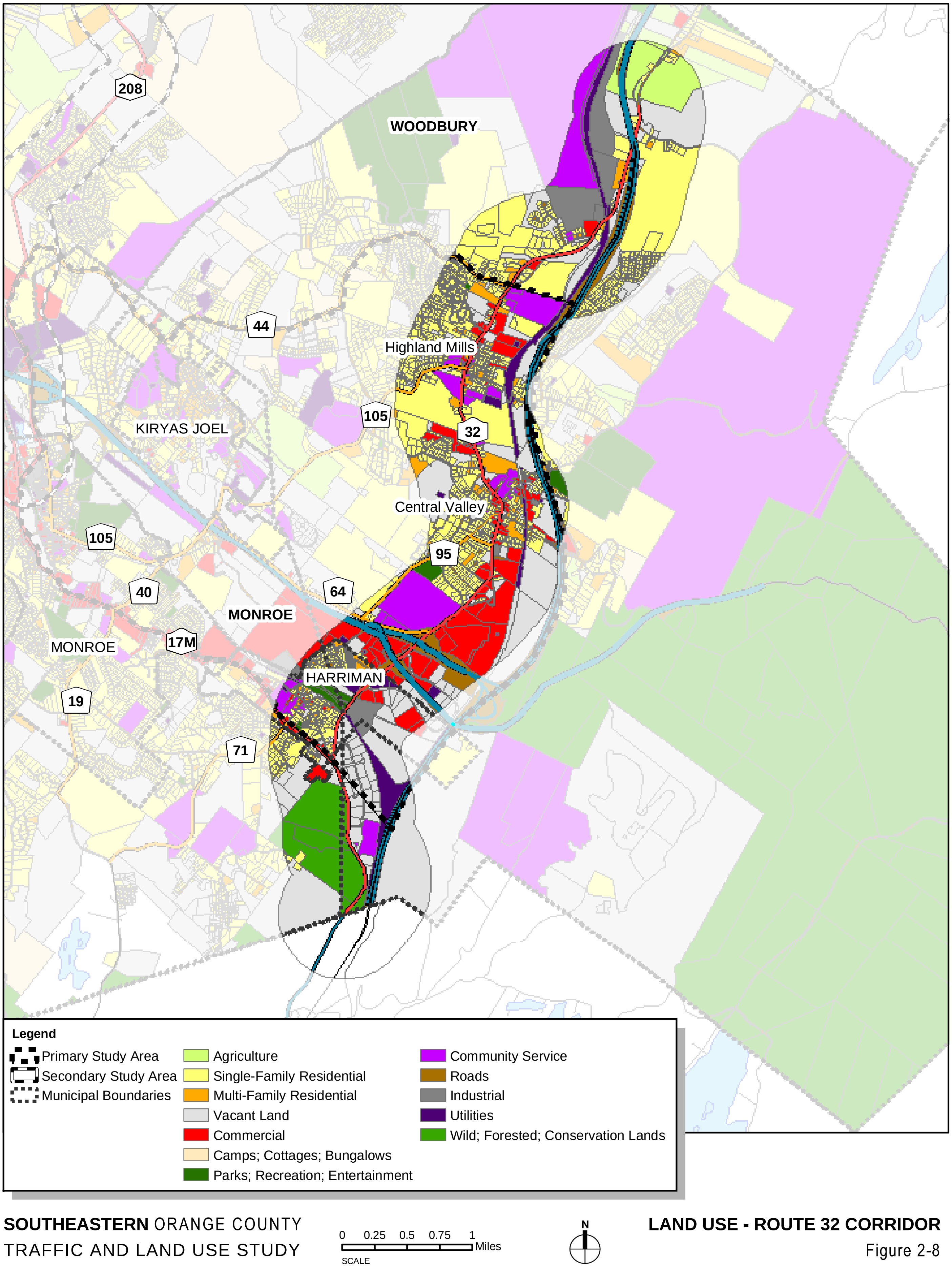
The Route 208 corridor extends from the intersection with Route 17M in Monroe north to the Village of Washingtonville. Land uses along Route 208 vary from areas of undeveloped open space and agricultural lands to low and medium density residential uses and commercial office and shopping centers. In the Village of Washingtonville, Route 208 runs through the village center, which contains commercial, residential, and some community and industrial uses. South of Washingtonville the land uses become increasingly residential interspersed with agricultural and vacant undeveloped parcels. South of the intersection with Route 27, the residential uses become denser and include condominium complexes and other newer residential developments. Pockets of commercial activity are found at the intersection with Route 27 and just north of the Monroe border where some office and municipal uses are also located.

Within the Town of Monroe, land uses within the Route 208 corridor are largely residential with some community uses at the interchange for Route 17. This interchange provides the only direct regional access to the Town of Monroe. Just south of the Route 17 interchange, Route 208 enters the Village of Monroe and the land uses become increasingly commercial. Around the intersection of Routes 17M and 208 are several chain-retail and franchise establishments, as well as gas stations (see Figure 2-10). Figure 2-11 shows the zoning within this corridor).

D. ENVIRONMENTAL FEATURES

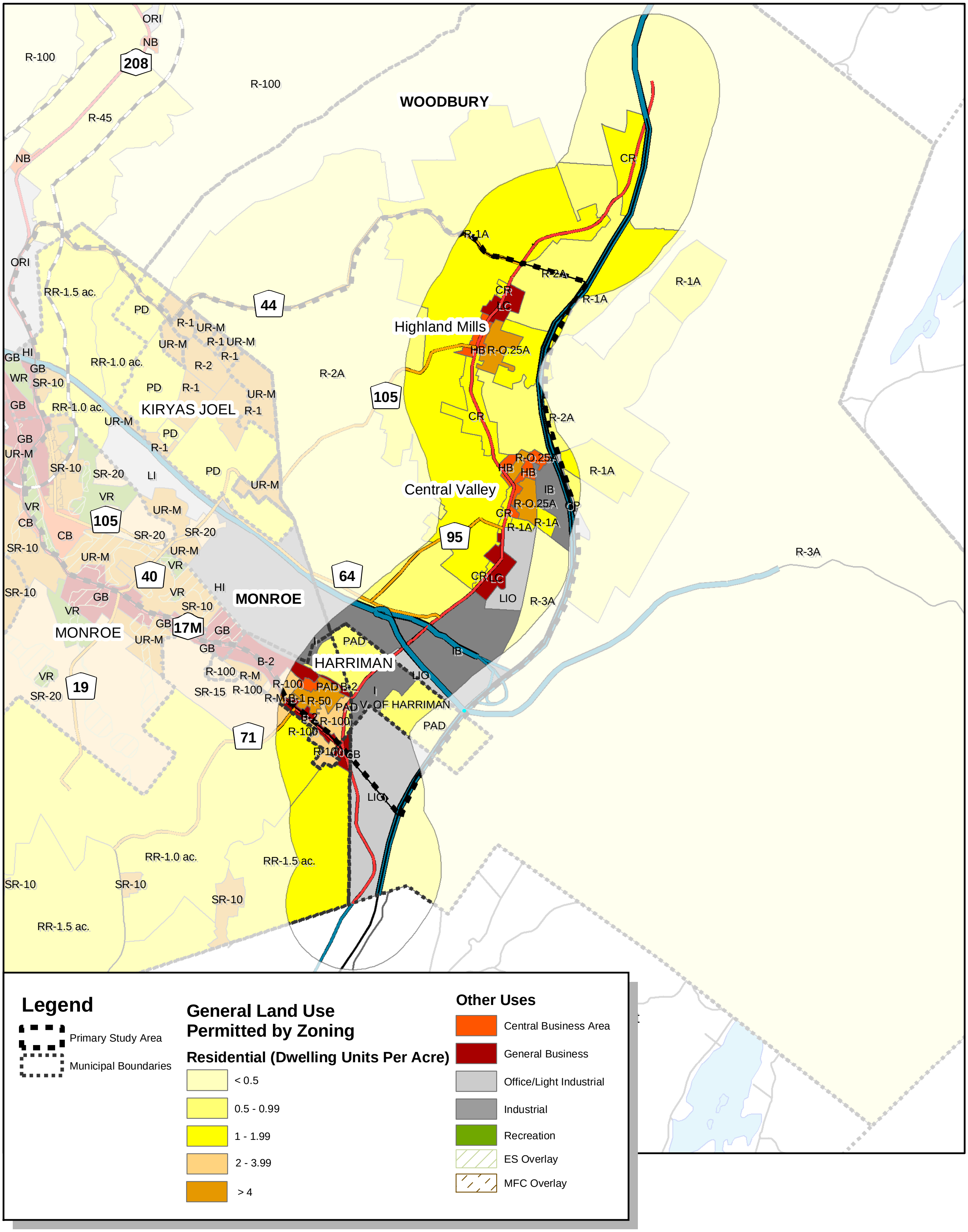
INTRODUCTION

This section provides a brief overview of the topography and physical characteristics of the primary and secondary study areas including environmental constraints that could potentially affect development within the study areas (see figure 2-12).



SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

LAND USE - ROUTE 32 CORRIDOR
Figure 2-8



0 0.25 0.5 0.75 1 Miles
SCALE

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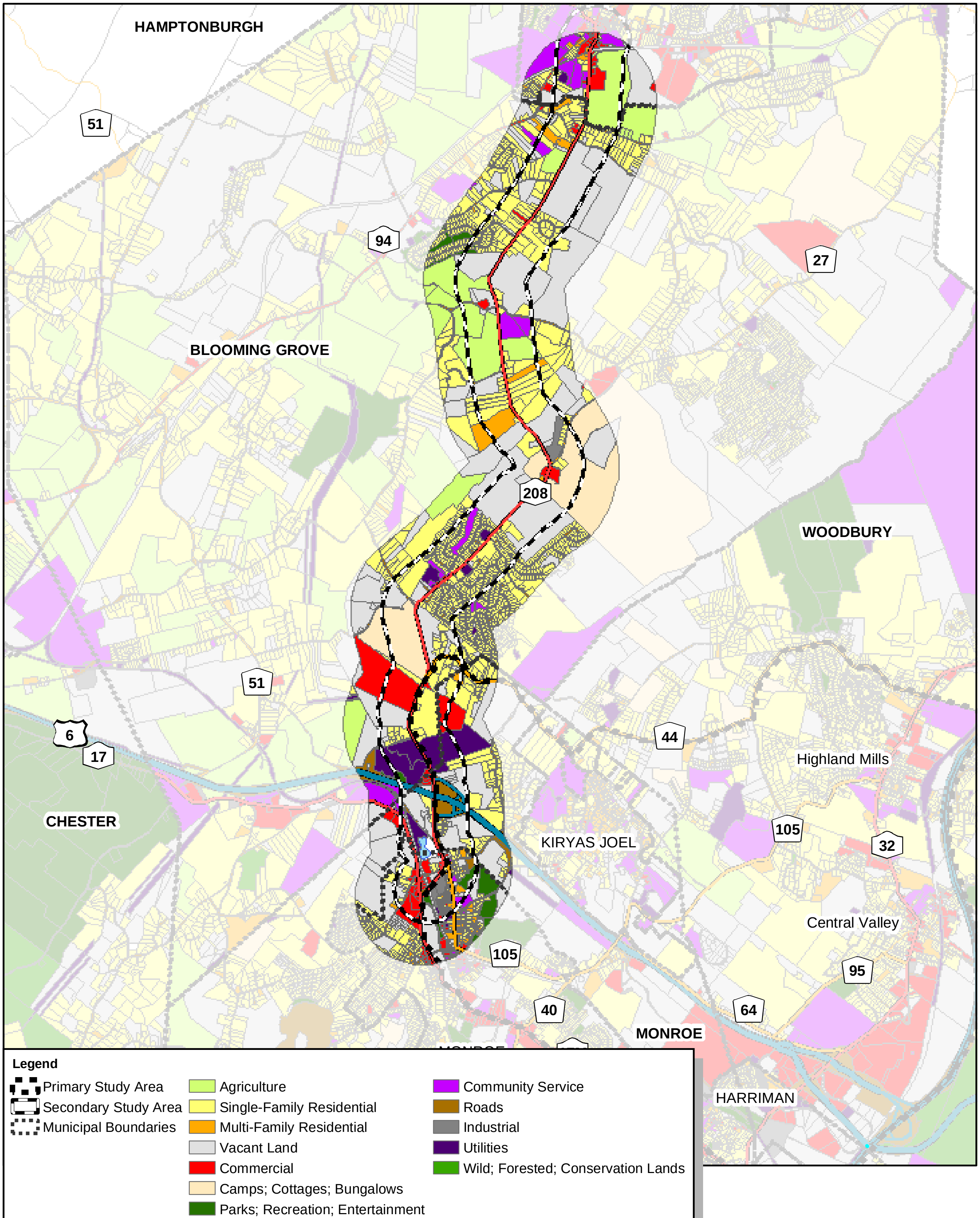
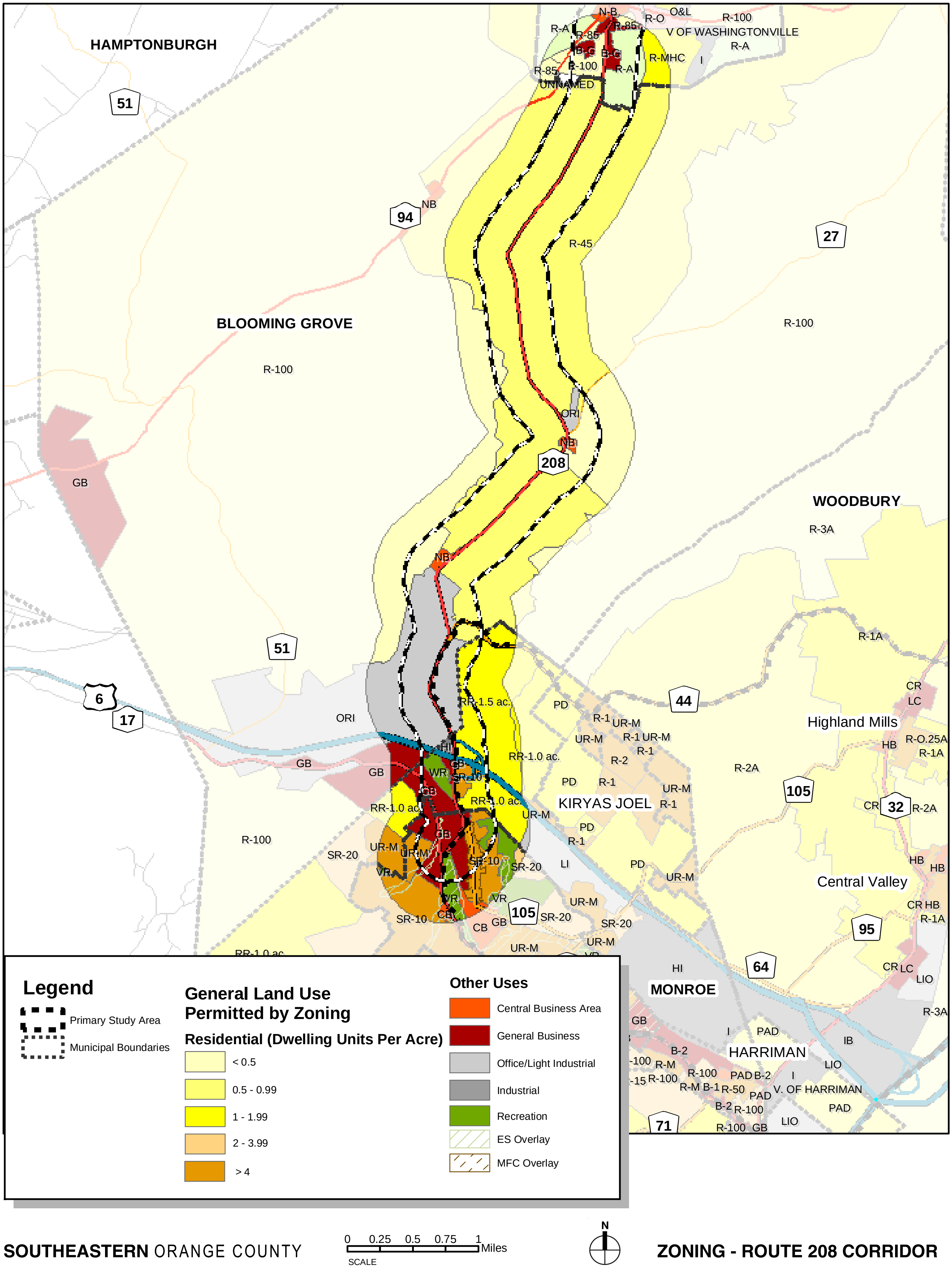
SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

ZONING - ROUTE 32 CORRIDOR
Figure 2-9



SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

LAND USE - ROUTE 208 CORRIDOR
Figure 2-10

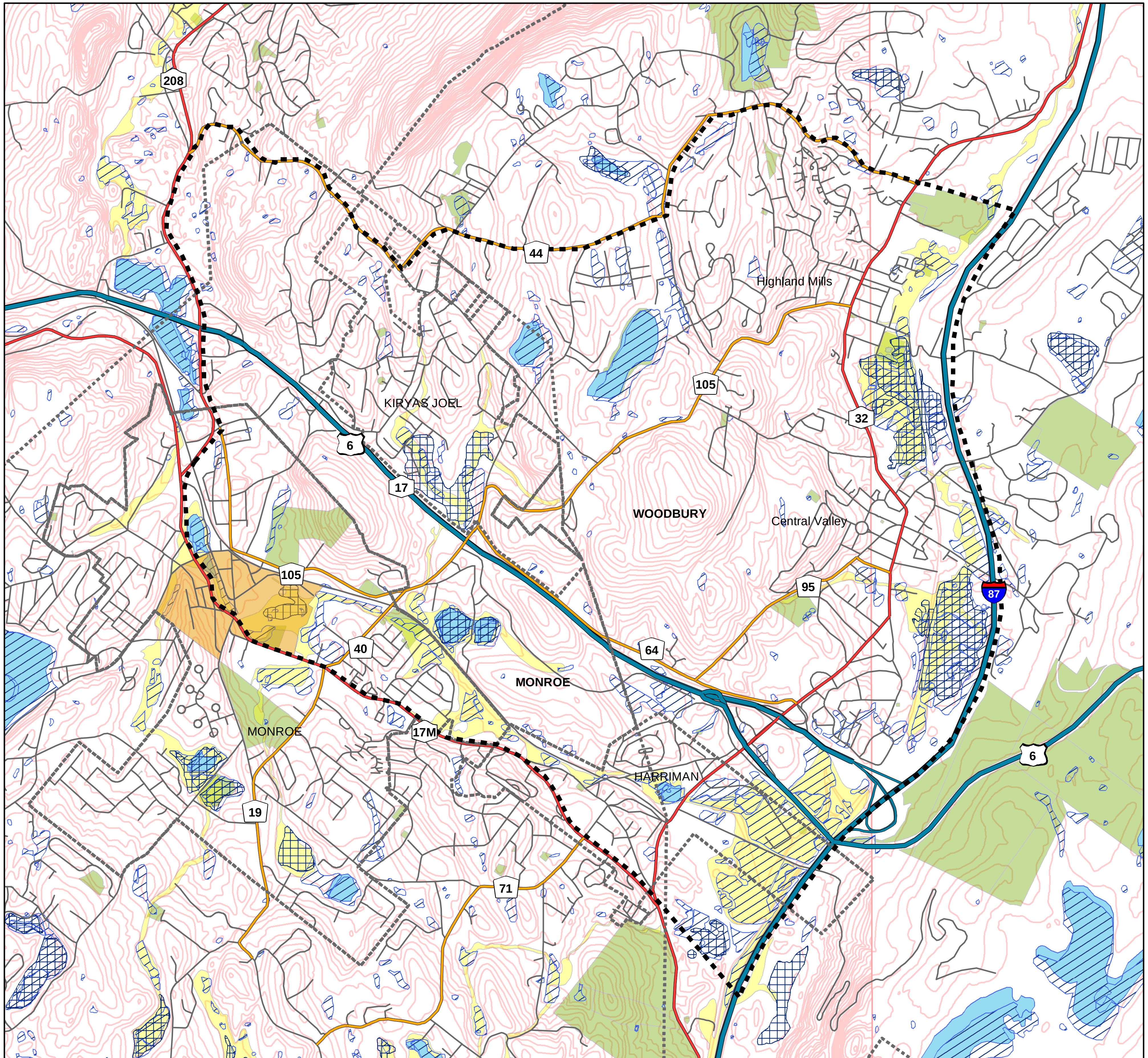


SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

ZONING - ROUTE 208 CORRIDOR

Figure 2-11

SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY



PRIMARY STUDY AREA
ENVIRONMENTAL CONSTRAINTS
Figure 2-12

ROUTE 17/17M CORRIDOR

The topography of the Route 17/17M corridor is characterized by numerous forested hills and valleys, which contain several lakes and wetlands. In general, this corridor is densely developed, particularly along Route 17M. A few areas of undeveloped land are found along Route 17. However, these areas largely remain undeveloped due to environmental constraints such as steep slopes, wetlands, and floodplains.

The north side of Route 17 between Route 208 and Route 105 is steeply sloped and hilly. This area encompasses the entire Village of Kiryas Joel and has been extensively developed with residential uses. A small area of undeveloped land containing two streams is located is the southeast corner of the Village of Kiryas Joel adjacent to Route 105. Much of the land around the southern portions of these streams is floodplain and contains National Wetland Inventory (NWI) and New York State Department of Environmental Conservation (DEC) wetlands.

The south side of Route 17 between Route 208 and Route 105 is characterized by forested hills and remains largely undeveloped. This area is dominated by Bald Hill (elevation 890 feet), which is located directly adjacent to Route 17 and north of Bakertown Road. A small stream and wetland are also located in this area immediately north of Bald Hill.

Between Route 105 and the intersection of Nininger Road and Dunderberg Roads, both sides of the Route 17 corridor are hilly and remain largely undeveloped. Adria Hill (elevation 1000 feet) is the highest point and is located on the north side of Route 17, which is largely forested. The south side of Route 17 contains Mountain Lakes and several scattered wetlands in the vicinity of Mountain Lakes and the Conrail rail tracks. Southeast of Mountain Lakes directly adjacent to Route 17 is a large shopping center containing Home Depot, Walmart, and a future Target as anchor stores. East of this Dunderberg Road to the Thruway, Route 17 is heavily developed with commercial uses and the Town of Woodbury schools.

The south side of Route 17M is densely developed with commercial and residential uses. The north side of Route 17M remains largely undeveloped due to the presence of Monroe Ponds and several NWI and DEC wetlands.

The southeastern most portion of the Route 17/17M study corridor is located within a flood plain and contains several NWI designated wetland areas and some DEC wetlands.

Flood plains and wetlands pose potential development constraints along several small streams present in the Route 17/17M study area in and near the Village of Monroe. These streams are surrounded by NWI and DEC wetlands and are in the flood plain in numerous locations along their paths.

ROUTE 32 CORRIDOR

The Route 32 corridor contains numerous NWI and DEC wetlands. Most of these wetlands are located between Route 32 and I-87. Several of these wetlands have been developed with commercial and residential uses between the intersection of Route 32 and Route 17 and the Hamlet of Central Valley. However, several large undeveloped wetlands remain east of the study corridor between the Conrail rail tracks and I-87. North of the Hamlet of Central Valley between Still Street and Hunter Street, the study corridor crosses through several large NWI and DEC wetlands. In this location, both sides of the roadway remain largely undeveloped as areas of moderately steep slope exist along the west side of Route 32. North of this undeveloped area is the Hamlet of Highland Mills. This portion of the study corridor is developed with residential and commercial uses on both sides of the road. The most significant area of steep slope in the Route 32 corridor exists along the west side between the Hamlet of Central Valley and the intersection with Route 44.

ROUTE 208 CORRIDOR

The Route 208 corridor consists of numerous hilltops and ridges cut by small valleys containing several streams and wetlands (see Figure 2-13).

At its northernmost point, within the Village of Washingtonville, the Route 208 corridor is relatively flat. Moving south along the corridor the elevation of the roadway gradually increases ranging from approximately 300 feet in Washingtonville to just over 600 feet in the Village of Monroe at its southernmost point. East of Route 208, the topography is hilly and dominated by Schunnemunk Mountain and several smaller hills including Woodcock Hill and Round Hill.

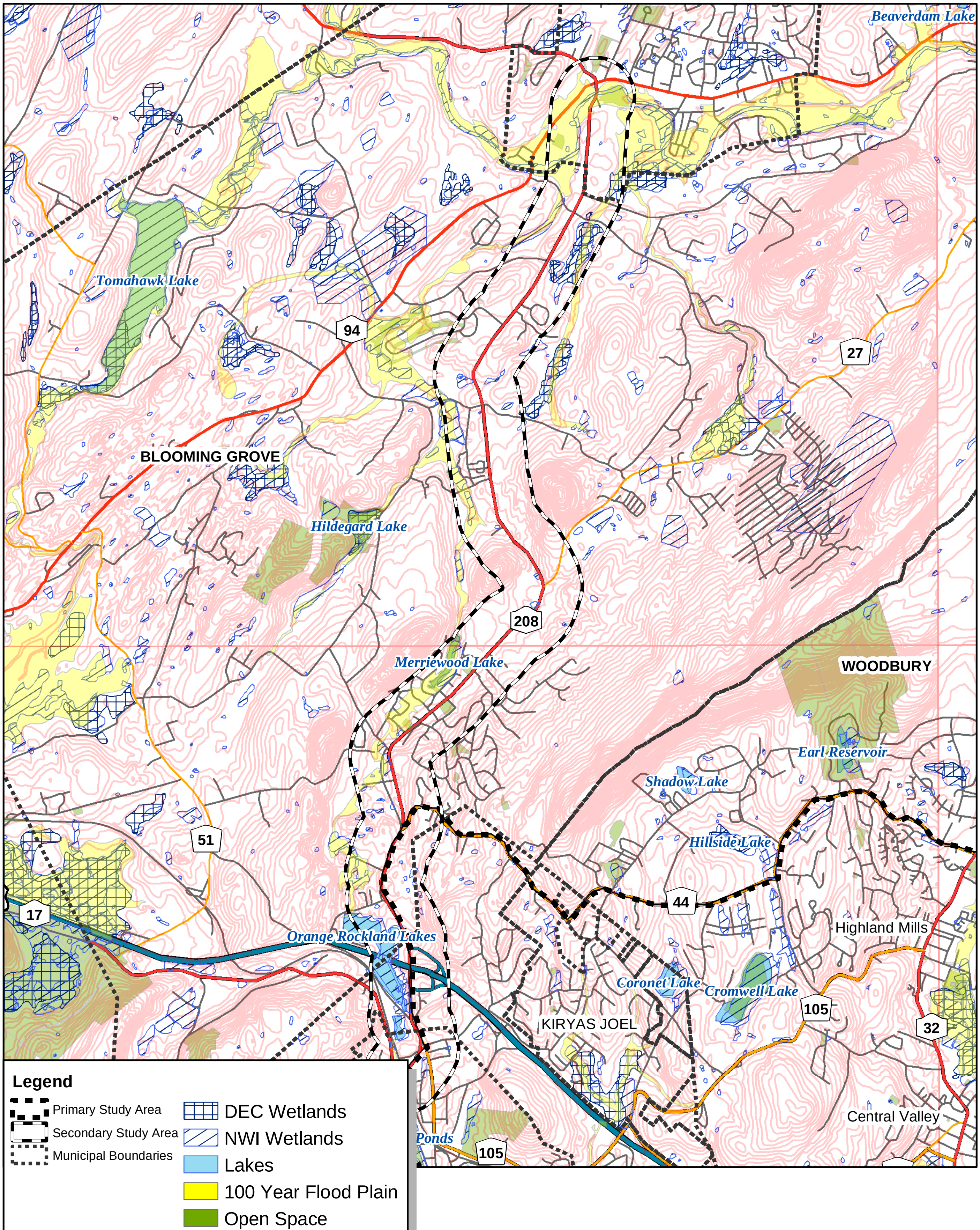
Numerous streams, wetlands, and floodplains are located within the Route 208 corridor. A majority of these wetlands and floodplains are associated with Moodna and Satterly Creeks. Moodna Creek crosses the Route 208 corridor just south of Washingtonville running in an east-west direction. Several DEC and NWI designated wetland areas are located along Moodna Creek and within its 100-year floodplain. In places, this floodplain extends to 1/2 mile from the creek's edge. A small branch of Moodna Creek, which also has NWI and DEC designated wetlands along its course, follows the east side of Route 208 between Washingtonville and Round Hill Road. Much of this area remains undeveloped.

Satterly Creek and its tributaries extend south from Moodna Creek along the west side of Route 208 to Merriewold Lake. Two branches of the creek cross to the east side of Route 208 in the vicinity of Round Hill. Much of the Satterly Creek floodplain is designated as a NWI wetland. Several DEC wetlands are also located just west of the creek. These floodplain and wetland systems remain largely undeveloped or in agricultural use. At Merriewold Lake, the corridor runs through a densely developed valley, which is surrounded to the east by Schunnemunk Mountain and to the west by a large hill and Bull Mine Mountain. A stream and several wetlands run through the valley bottom along the west side of Route 208 and eventually flow into Orange-Rockland Lakes.

E. HISTORIC AND ARCHEOLOGICAL RESOURCES

In 1989 Hartgen Archeological Associates, Inc. performed a Phase 1A literature review of Orange County in conjunction with the preparation of a Solid Waste Management Plan. The report included maps showing historic sites and previously conducted archeological surveys in the county. Hartgen Archeological Associates updated information from the 1989 report for this study by completing the following tasks for locations in the study area:

- An examination archeological site files from the New York State Museum and New York State Office of Parks, Recreation, and Historic Preservation (OPRHP);
- An examination of OPRHP cultural resource surveys previously conducted;
- An examination of computer files in OPRHP inventory for properties eligible for listing in State and National Registers.



SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

SECONDARY STUDY AREA
ENVIRONMENTAL CONSTRAINTS
Figure 2-13

DESIGNATED STATE AND NATIONAL HISTORIC RESOURCES

There are five resources within the primary study area that are designated as State and National Historic places plus two resources in the secondary study area (Village of Washingtonville) (see Table 2-8 and Figure 2-14). The Arden Estate is also listed as a National Historic Landmark.

Table 2-8
Designated Sites on the State/National Register of Historic Places

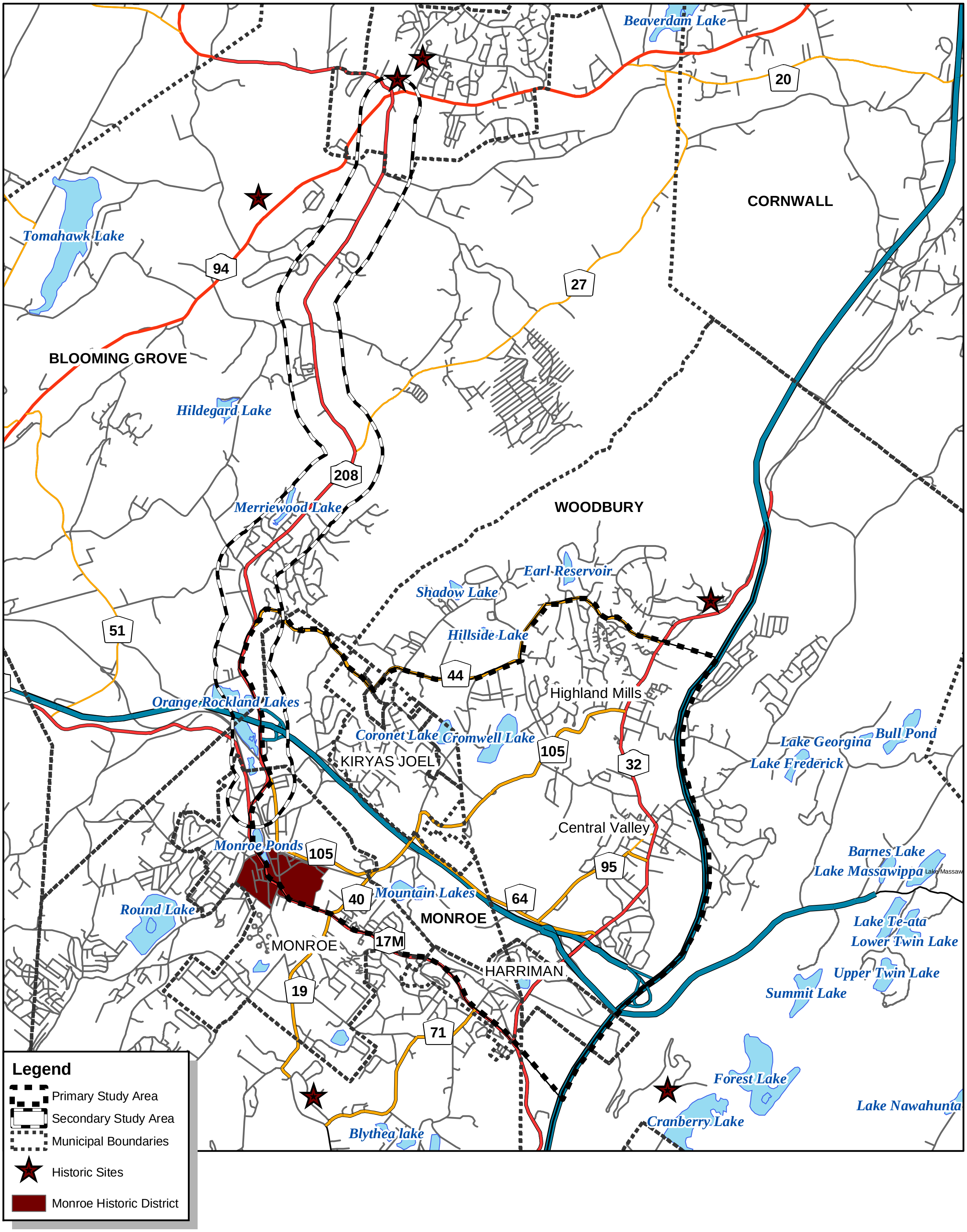
Name	Location
Town Of Blooming Grove	
Blooming Grove Church	West Side of NY 94 at Old Dominion Road
Town/Village Of Monroe	
Southfield Furnace Ruin	Southfield Mountain, south of Monroe, off NY 17
Village of Monroe Historic District	Roughly bounded by Lake St, Carpenter Place, Clark St, Monroe Race Track Site, Ramapo St, and Oakland Ave.
Village Of Harriman	
Arden (Harriman) Estate	NY 17
Town Of Woodbury	
Smith Clove Meeting House	Quaker Road, Highland Mills
Village Of Washingtonville	
Brotherhood Winery	35 North Street
Moffat Library	6 West Main Street
Source: New York State Office or Parks, Recreation and Historic Preservation.	

ELIGIBLE STATE/NATIONAL REGISTER HISTORIC SITES

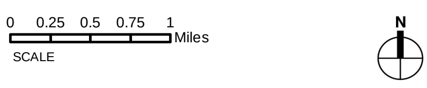
Several properties within the primary and secondary study areas were determined to be eligible for listing on the State and National Registers (see Table 2-9).

ARCHAEOLOGICAL SITES

According to the information available in the Hartgen report, several archaeological surveys have previously been conducted in the primary and secondary study areas. There were several ruins or foundations found from previous construction in the Towns of Blooming Grove, Monroe, and Woodbury; but most resources were concentrated in the village or hamlet centers. Some archeological artifacts were discovered during the surveys. The most common artifacts found were lithic or midden deposits. Because of the sensitivity of these locations, they can not be mapped; Table 2-10 summarizes the number of archaeological sites by town within the study area.



SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY



HISTORIC RESOURCES
Figure 2-14

Table 2-9
Sites Eligible for Listing on the State/National Register

Name	Location
Town Of Blooming Grove	
Barnett Residence	Moffet Road
Gonzaga Retreat Center Main Hall	Spring Road/Mountain Road
Gonzaga Retreat Center Hexagon Chapel	Spring Road/Mountain Road
Gonzaga Retreat Center Residence Hall	Spring Road/Mountain Road
Gonzaga Retreat Center Remote Stone Chapel and Cemetery	Spring Road/Mountain Road
Gonzaga Retreat Center Stone Garage	Spring Road/Mountain Road
Gonzaga Retreat Center Newer Garage	Spring Road/Mountain Road
Gonzaga Retreat Center Gazebo	Spring Road/Mountain Road
Gonzaga Retreat Center Stone Pool House	Spring Road/Mountain Road
Gonzaga Retreat Center Frame House	Spring Road/Mountain Road
Gonzaga Retreat Center Pondside Frame House, Garage, and Cemetery	Spring Road/Mountain Road
Gonzaga Retreat Center Pond Spillway	Spring Road/Mountain Road
Village Of Washingtonville	
FB Paisely House	West Main Street
Charles Brook House	West Main Street
Washingtonville School District Administrative Office	West Main Street
Washingtonville Grade School	West Main Street
Carriage House	33 West Main Street
2 ½ Story Store	East Main Street
c. 1890 Farmhouse	East Main Street
Town/Village Of Monroe	
Migel Mansion	East Side of Orange Turnpike
Greenbrae Farm Stone Barn	East Side of Orange Turnpike
Smith Federal Revival House	East Side of Orange Turnpike
Checkerboard Inn	East Side of Orange Turnpike
Jacob Compton House	158 Harriman Heights Road
Barns of Fountain Ridge	Orchard Hill Road
Fountain Ridge (Orchard Hill Farm)	Orchard Hill Road
Alexander Thompson Farmhouse	NY 17
Turner Farmhouse and Barn	Freeland Street
Town Of Woodbury	
North Hall House	Quaker Rd. near Quaker Pl.
Bailey House	Melody Lane
Methodist Episcopal Church	NYS 32
Sources: Hartgen Archeological Associates	

Table 2-10
Summary of Reported Archeological Resources

Town	Archeological Sites	Properties Determined Eligible	Surveys
Blooming Grove	26	22	17
Monroe	32	9	10
Woodbury	54	3	15
Totals	**112**	**34**	**42**
Sources: Hartgen Archeological Associates			

F. TRAFFIC

CURRENT TRAVEL PATTERNS

The study area is connected to other parts of Orange County and the rest of the region via an established regional highway network that converges in the Towns of Woodbury and Monroe. The New York State Thruway (I-87), which is the primary north-south highway in the area, connects regionally to adjacent counties and points east of the Hudson River. Access to and from I-87 from the study area is provided via the Harriman toll interchange at Exit 16, which feeds west directly into the limited access Quickway (overlap of State Route 17 and US Route 6) and connects to State Route (SR) 32 via interchange ramps. Due to the rapid population and economic growth over recent years, travel to and from the area has increased, both in volume and in average distance. On a typical weekday, commuter travel generally peaks southbound in the morning and northbound in the evening. On the weekends, directional travel is more homogeneous, with significant peaking of traffic volumes along SR 32 near the Thruway interchange. This condition is largely attributed to the continual growth of destination retail activities from Woodbury Common and the newly opened Woodbury Centre and Harriman Commons. Summer-time traffic bound for Sullivan County also adds to congestion on westbound SR 17 on Friday evenings and on eastbound SR 17 on Sunday evenings.

Travel within the region takes place predominantly by auto, although increased travel to the New York City metropolitan area has spurred a rise in commuter rail ridership. According to the 2000 census, journey to work trips from the study area totaled over 26,000 daily trips, of which approximately 87 percent were made by auto and 3 percent by rail.

Roadside interview surveys were conducted in the fall of 2002 along SR 32 at Woodbury Common and along CR 105 in the vicinity of Dunderberg Road on typical weekdays to establish existing travel patterns. In addition to providing information on existing travel patterns, the survey results also made available general characteristics of vehicles traveling during the weekday peak periods, as summarized in Tables 2-11 and 2-12. Several observations could be made from the survey results: 1) truck percentages are lower during commuter peak periods and higher during other times; 2) morning commuter traffic has more single-occupancy vehicles than during other periods; and 3) morning and afternoon commuter traffic includes generally longer distance trips and is more likely to use the Thruway.

Table 2-11
SR 32 Travel Survey Statistics – Tuesday, 9/24/02

SR 32		AM Peak	MD Peak	PM Peak	Total
Northbound	Total Surveyed		36	65	101
	Percent Auto		89%	95%	93%
	Percent Truck		11%	5%	7%
	Vehicle Occupancy		1.25	1.42	1.36
	Percent Using I-87		11%	34%	26%
	Percent Using SR 32		44%	43%	44%
	Percent Using Quickway		14%	6%	9%
Southbound	Total Surveyed	53	42		95
	Percent Auto	98%	83%		92%
	Percent Truck	2%	17%		8%
	Vehicle Occupancy	1.21	1.48		1.33
	Percent Using I-87	57%	26%		43%
	Percent Using SR 32	19%	33%		25%
	Percent Using Quickway	8%	21%		14%

Table 2-12
CR 105 Travel Survey Statistics – Wednesday, 9/25/02

CR 105		AM Peak	MD Peak	PM Peak	Total
Northbound	Total Surveyed		31	43	74
	Percent Auto		87%	95%	92%
	Percent Truck		13%	5%	8%
	Vehicle Occupancy		1.52	1.44	1.47
	Percent Using Dunderberg Rd.		35%	49%	43%
	Percent Using Quickway		6%	26%	18%
Southbound	Total Surveyed	9	41		50
	Percent Auto	100%	95%		96%
	Percent Truck	0%	5%		4%
	Vehicle Occupancy	1.11	1.56		1.48
	Percent Using Dunderberg Rd.	33%	34%		34%
	Percent Using Quickway	0%	10%		8%

As for destinations within the study area, weekday and weekend observations were made at major generators or attractions of vehicle trips. On weekdays, the highest parking utilizations were observed at park-n-ride facilities at Central Valley, Millpond Parkway, Museum Village, and at the Metro-North Harriman train station. These lots reach a high level of utilization before 9 AM and maintain at such level until the afternoon commuter period. A sharp decline in the number of vehicles still remaining in these lots is realized generally after 6 PM. On weekends, with substantially less commuter traffic, parking utilizations at the park-n-ride lots are low, with generally less than 5 percent of their available spaces filled. At the retail generators, the pattern of peak parking utilizations is reversed. These uses attract the least number of vehicles early in the morning, particularly on weekdays. During the afternoon, local shopping activities result in higher utilization rates. The highest level of activities typically occur on weekends, when destination retail services such as Woodbury Common and Woodbury Centre along SR 32 near the Harriman Thruway interchange attract a disproportionately large amount of traffic to the study area, both from local communities and from afar. Between these two shopping destinations, Saturday peak parking utilization is as high as 90 percent during the late afternoon hours, with over 5,900 of the total 6,588 available spaces occupied. Local retail uses, such as the K-Mart Shopping Center and Shop Rite Plaza along SR 17M, generally maintain a more steady demand.

TRAFFIC OPERATIONS

Traffic data were collected along three key corridors in fall 2002 to assess existing traffic conditions within the study area. Figure 2-15 shows traffic survey locations. A combination of automatic traffic recorder (ATR) and manual counts were used to formulate existing peak hour traffic volumes at the following locations:

- SR 32 between SR 17M and Ridge Road
- SR 17M between SR 32 and SR 208
- SR 208 and County Route (CR) 105 between CR 44 and Bakertown Road

Based on the collected data, the weekday 7:30 to 8:30 AM and 5:00 to 6:00 PM, and the Saturday noon to 1 PM peak hours were selected for analysis. These hours represent the typical peak commuter and weekend travel periods within the study area. The *Synchro 5 Traffic Signal Coordination Software*, which was developed based on the *2000 Highway Capacity Manual (HCM)* methodologies, was used to evaluate individual analysis locations and provide simulations of peak hour traffic flows along each of the above corridors.

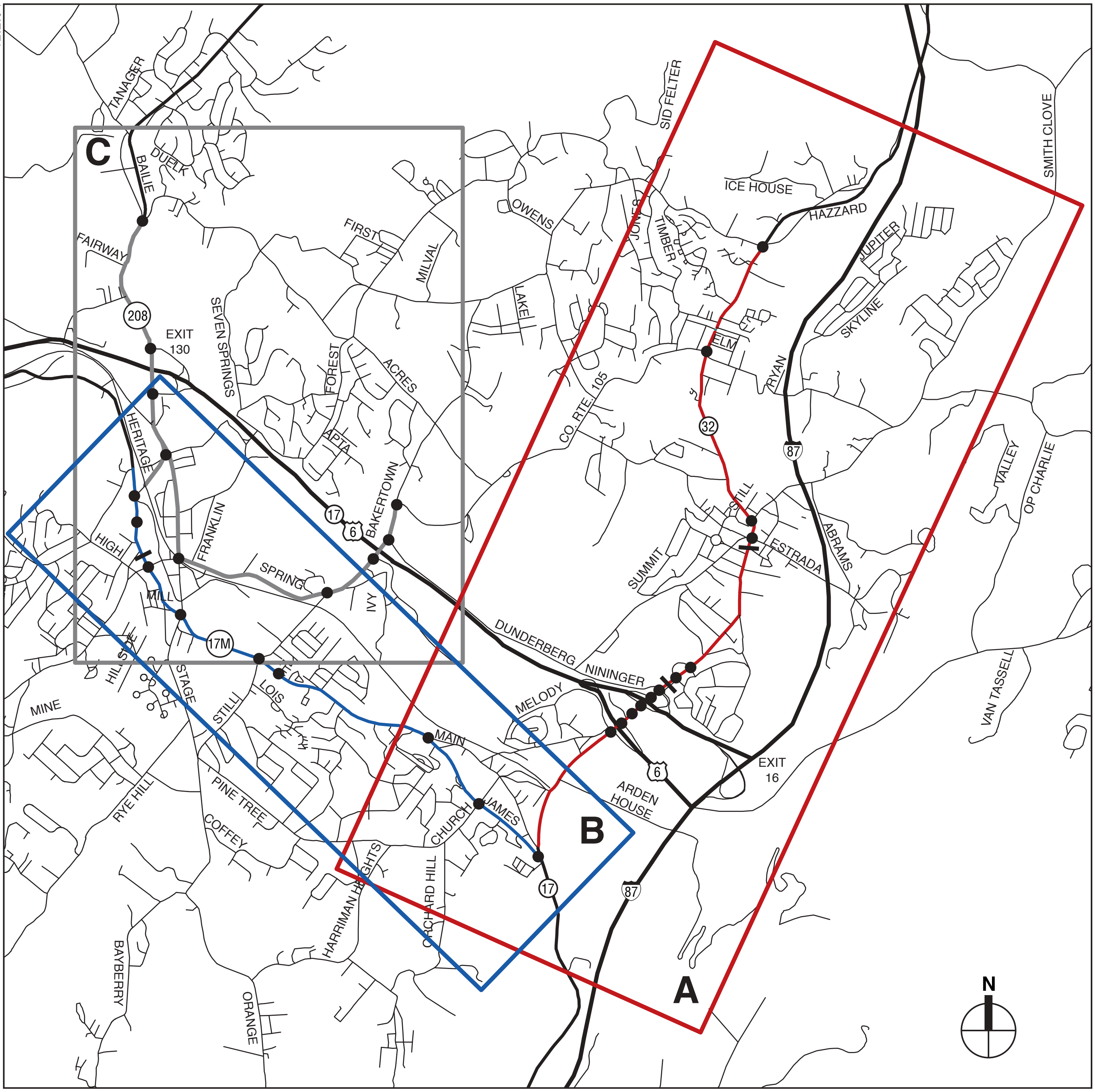
PEAK HOUR TRAFFIC VOLUMES

Of the three study area corridors, traffic volumes are the highest along SR 32, with peak bi-directional hourly volumes nearing 2,800 vehicles, and lowest along SR 17M. On a typical weekday, directional peaking generally occurs southbound in the morning and northbound in the evening. Along SR 17M, which has more of an east-west alignment, weekday traffic is heavier eastbound towards SR 17 in the morning and westbound towards SR 208 in the evening. Weekend traffic is more homogeneous in both north-south and east-west directions. The representative peak hour traffic networks are presented in Figures 2-16 to 2-24. Figures 2-25 to 2-33 summarize directional flow volumes within each of the three primary corridors for the weekday AM, weekday PM, and weekend PM peak hours.

LEVEL OF SERVICE

Operational characteristics reflecting the travel conditions at individual intersections along the three study area corridors were summarized based on analysis results from the Synchro simulation of existing peak hour traffic. These results indicate how existing peak hour volumes compare to roadway capacities, the amount of average vehicle delays at intersection controls, and the levels of service of specific lane groups, approaches or intersections. Level of Service (LOS) is categorized from A through F, with each level representing a certain range of vehicle delay, as shown in Table 2-13 for signalized and unsignalized intersections.

12.2.04



A SR 32 Corridor

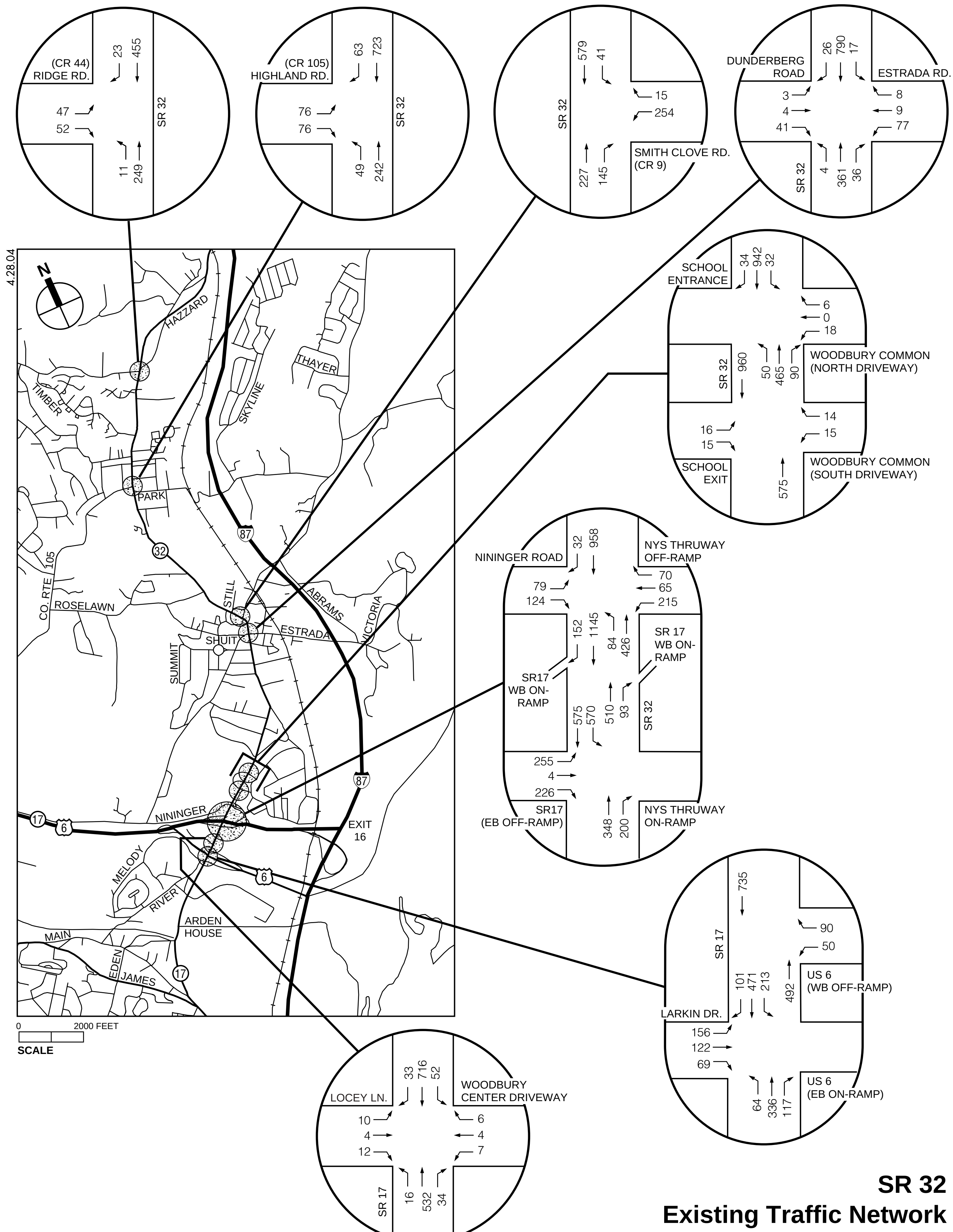
B SR 17M Corridor

C SR 208/CR 105 Corridor

● Manual Count Locations

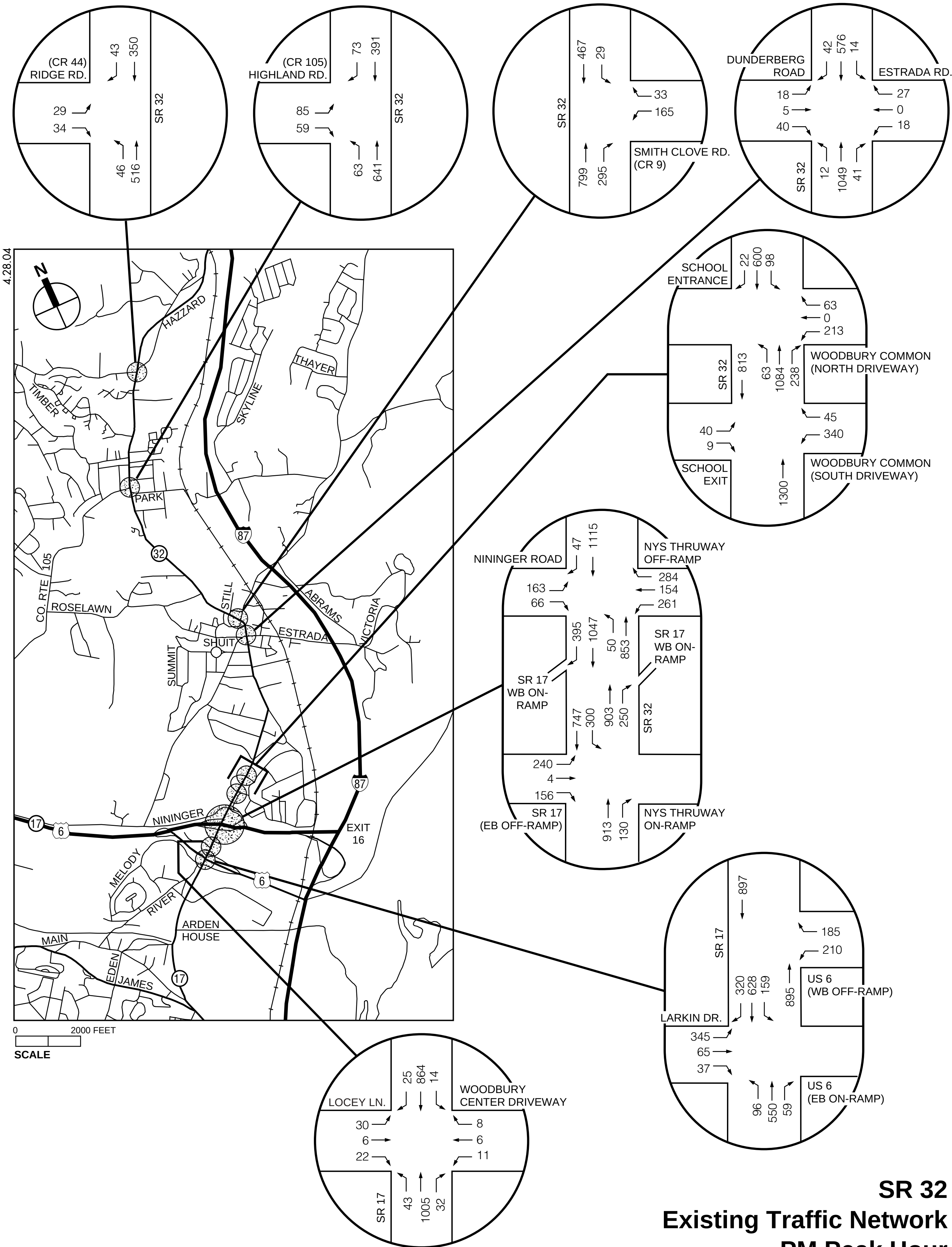
— Automatic Traffic Recorder Count Locations

Traffic Survey Locations
Figure 2-15

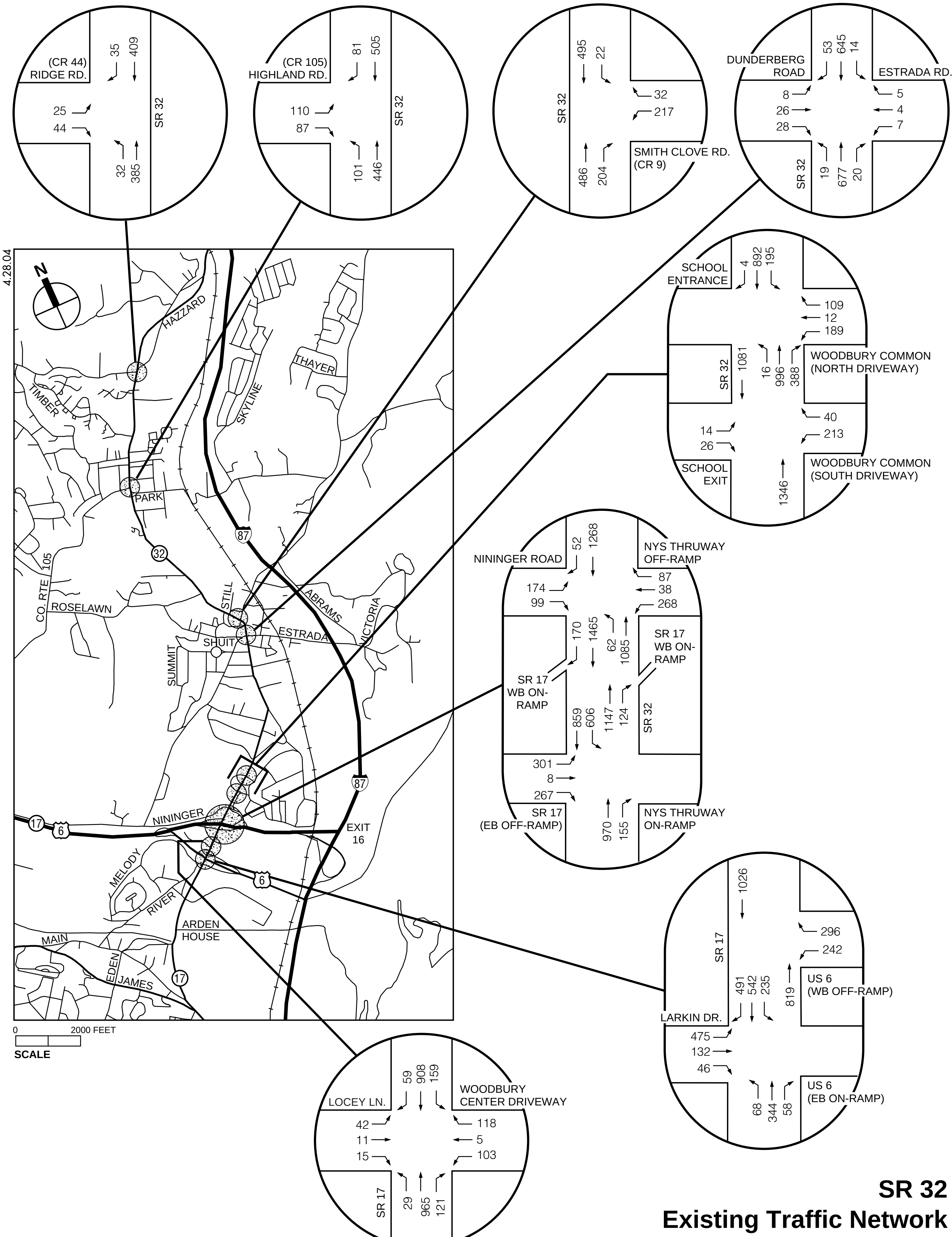


SR 32
Existing Traffic Network
AM Peak Hour
Figure 2-16

SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

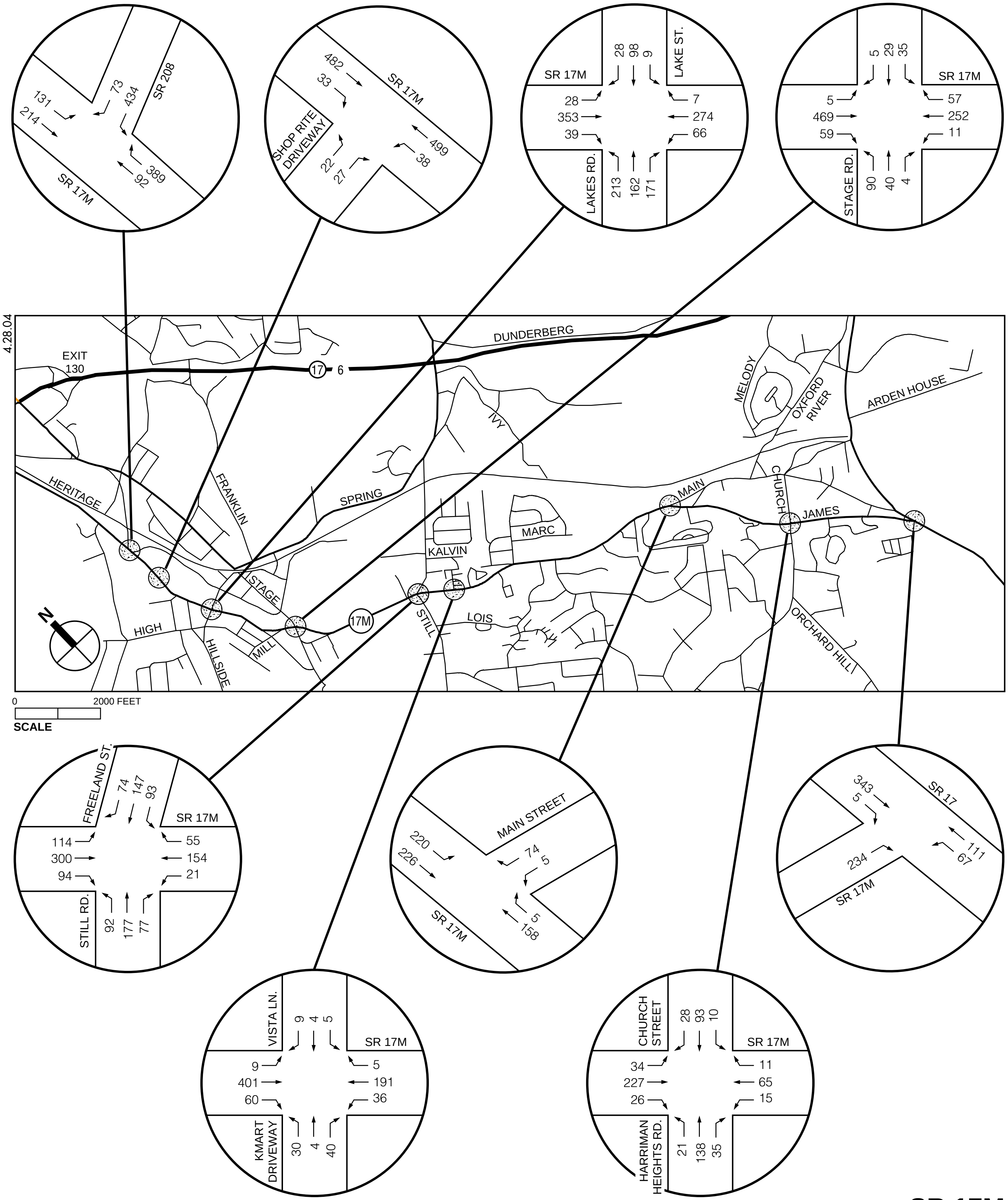


SR 32
Existing Traffic Network
PM Peak Hour
Figure 2-17

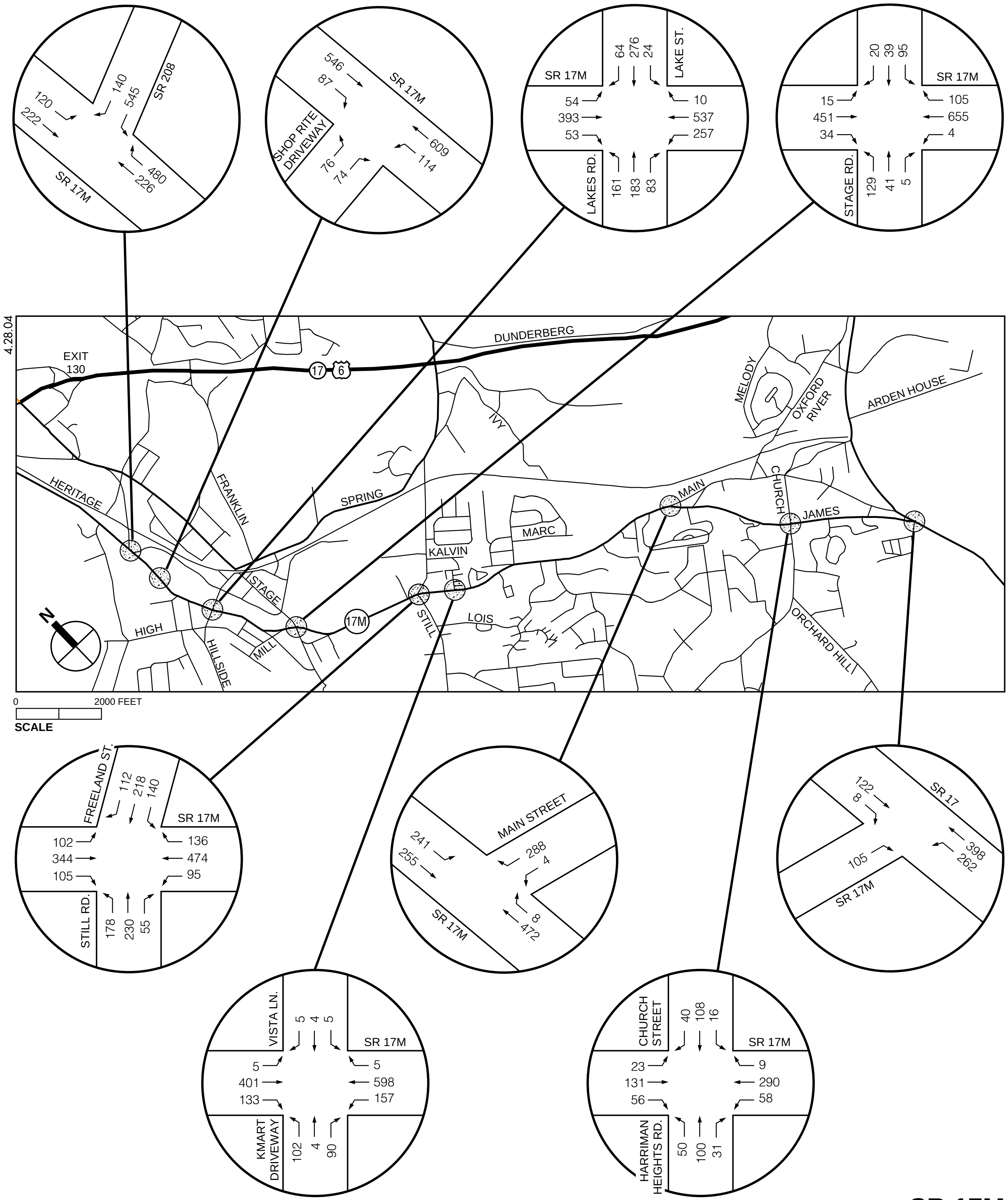


SR 32
Existing Traffic Network
Saturday Peak Hour
Figure 2-18

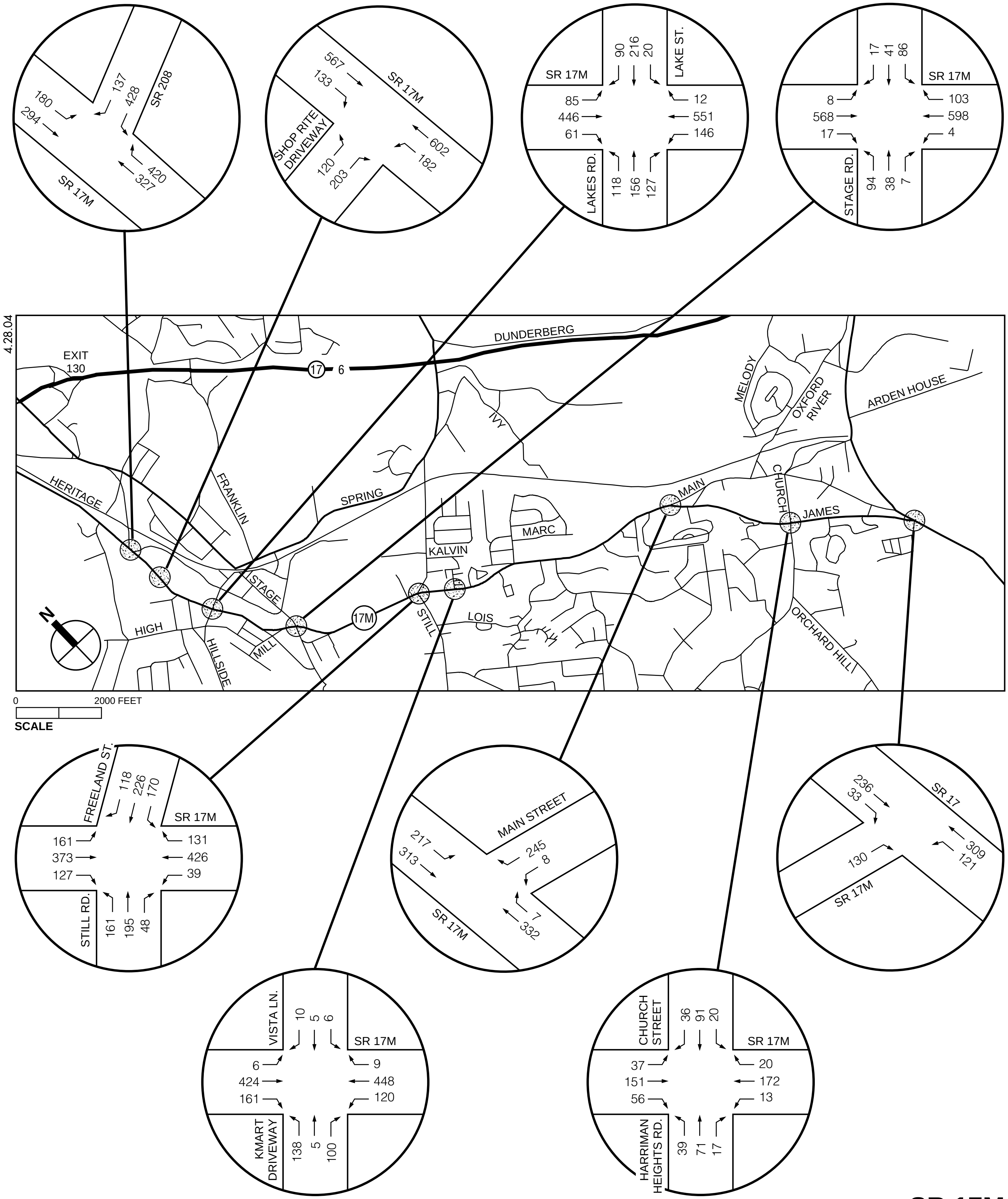
SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY



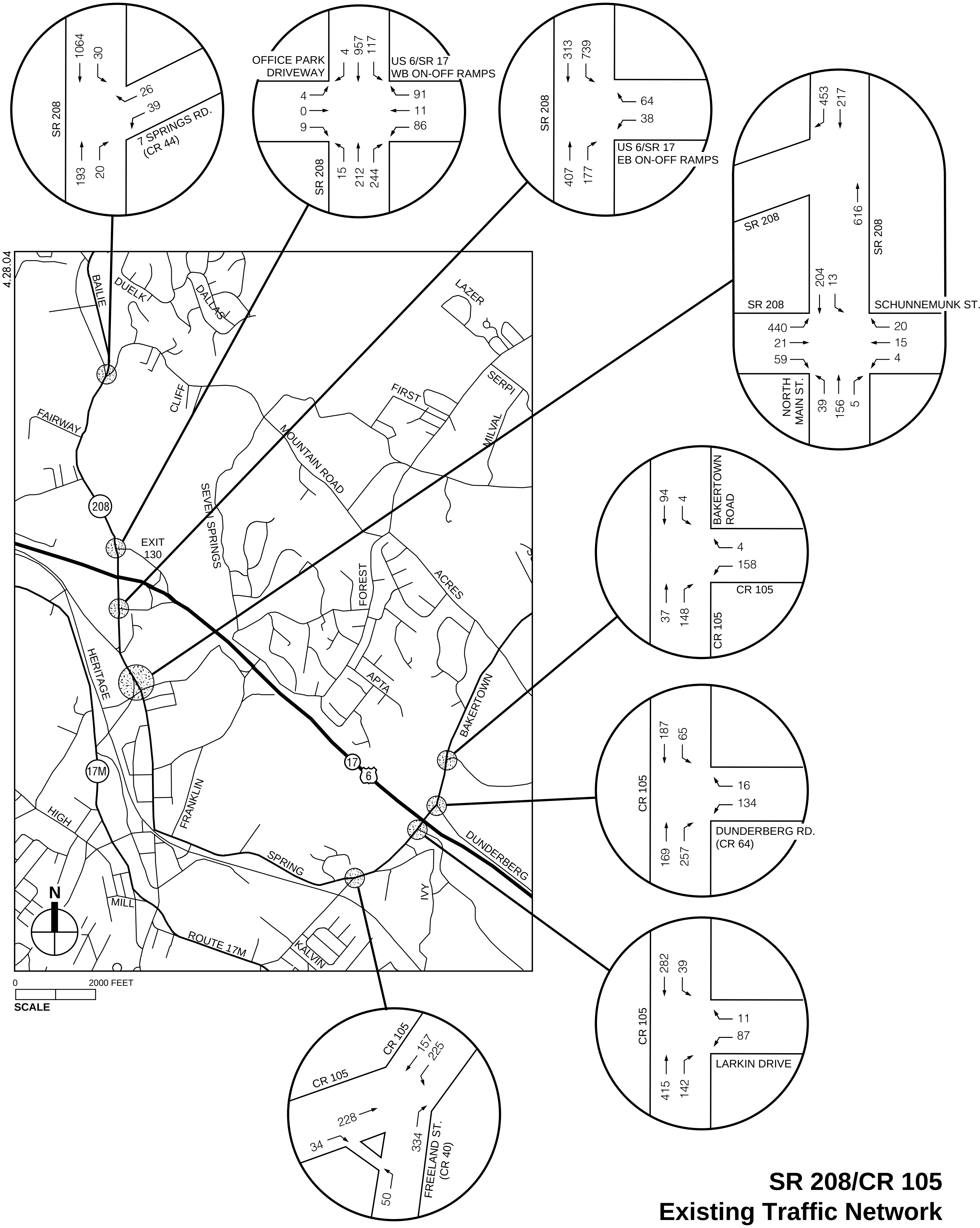
SR 17M
Existing Traffic Network
AM Peak Hour
Figure 2-19



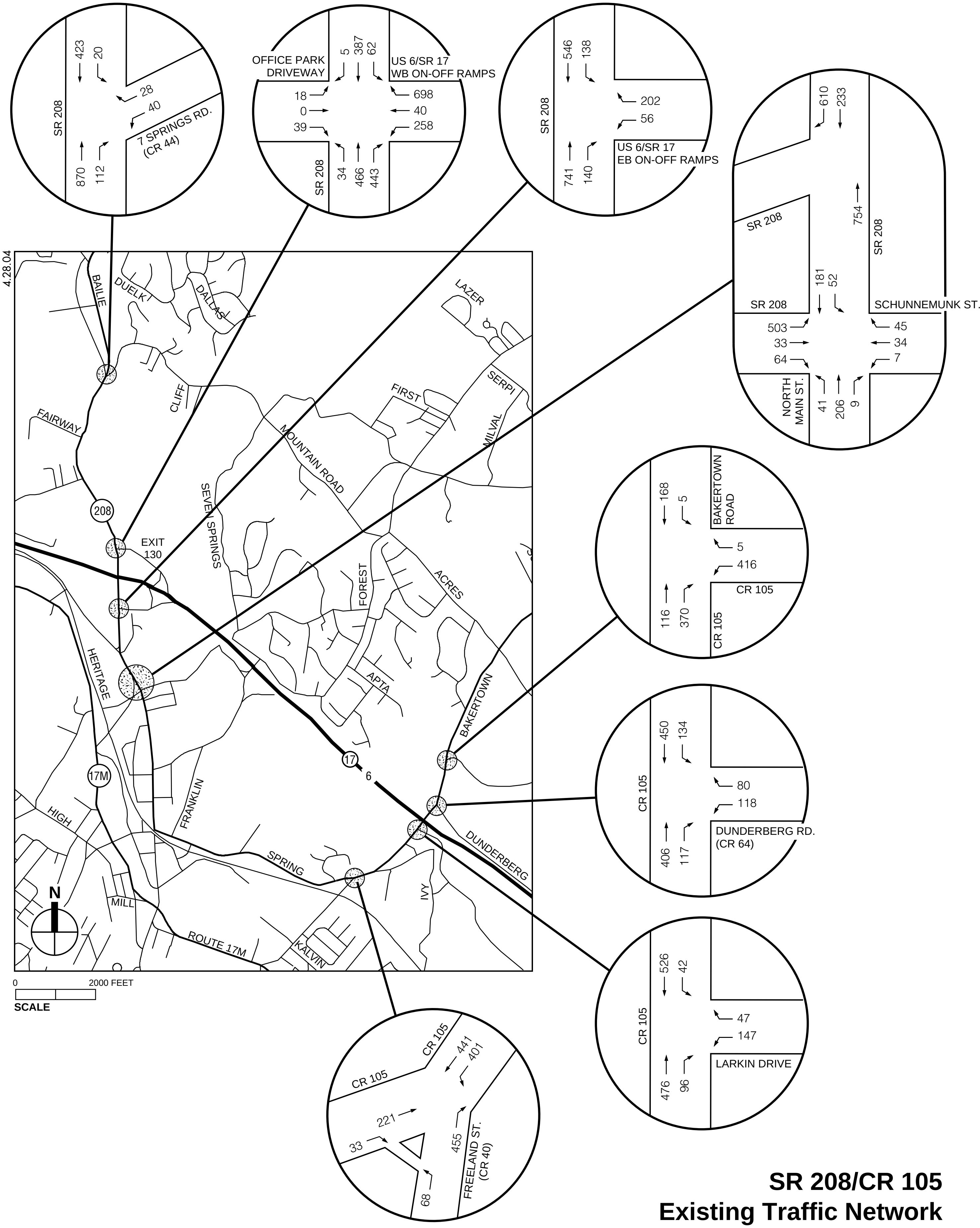
SR 17M
Existing Traffic Network
PM Peak Hour
Figure 2-20



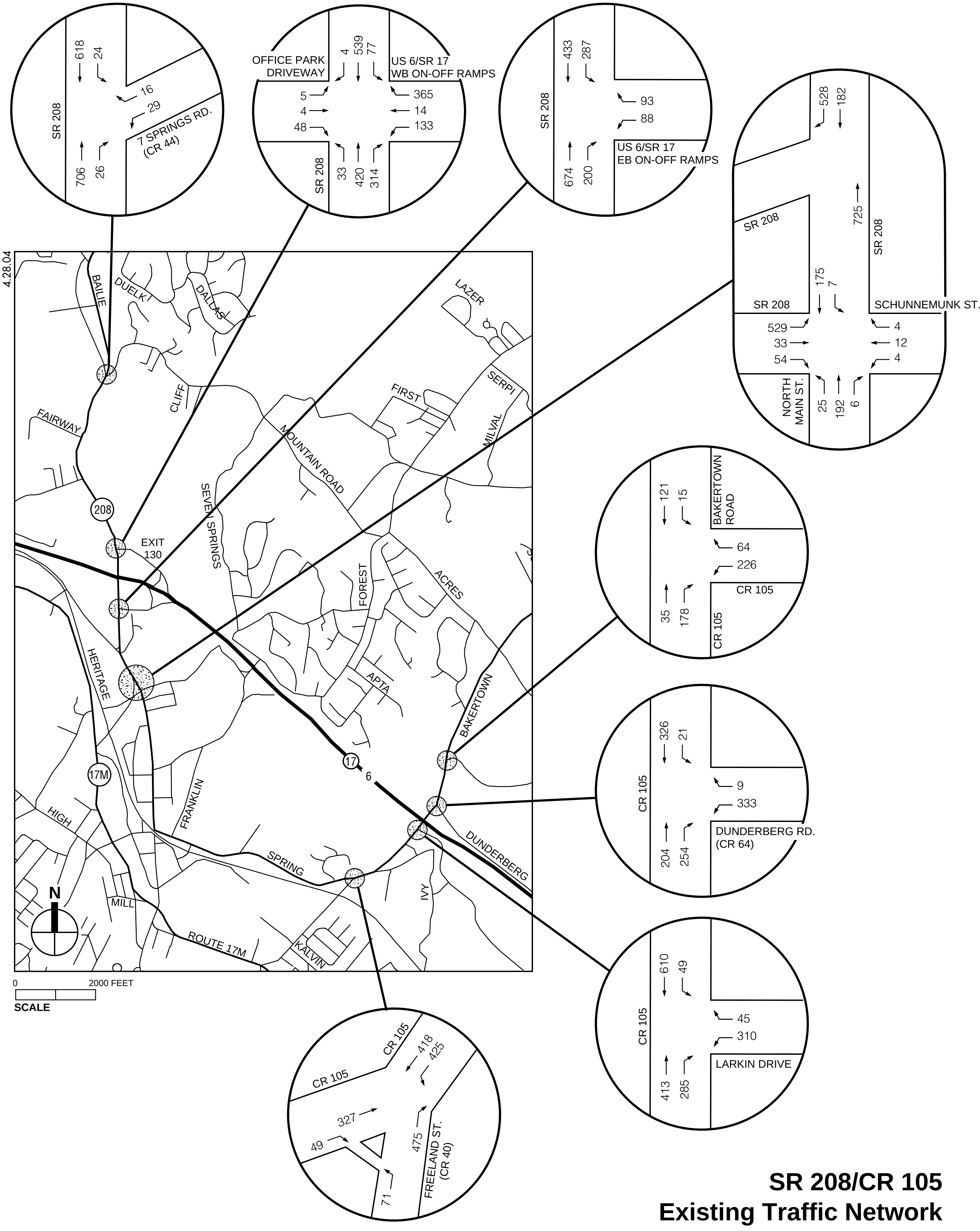
SR 17M
Existing Traffic Network
Saturday Peak Hour
Figure 2-21



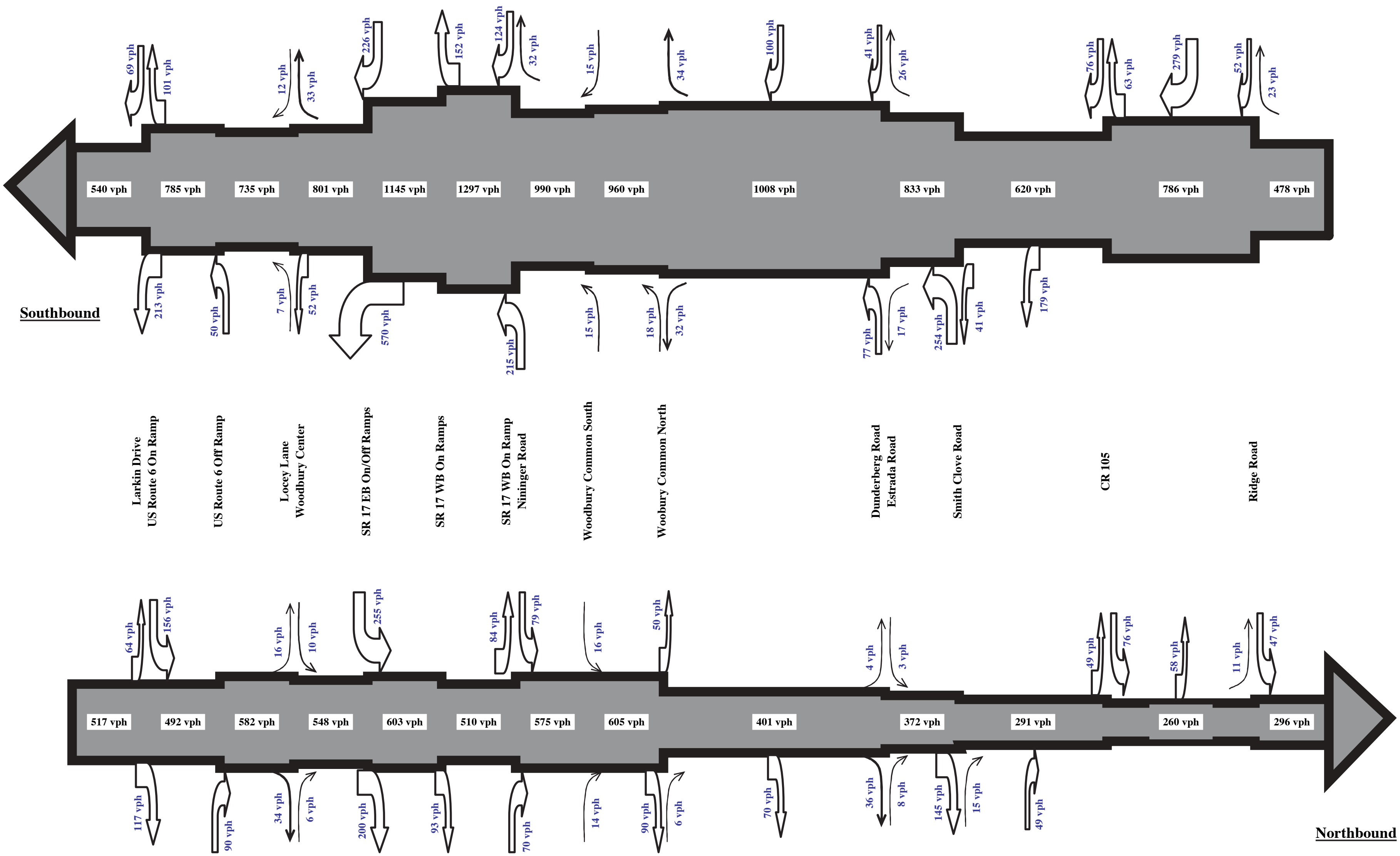
SR 208/CR 105
Existing Traffic Network
AM Peak Hour
Figure 2-22



SR 208/CR 105
Existing Traffic Network
PM Peak Hour
Figure 2-23



SR 208/CR 105
Existing Traffic Network
Saturday Peak Hour
Figure 2-24



SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

SR 32 Directional Flow
2002 Existing Weekday • AM Peak Hour

Figure 2-25

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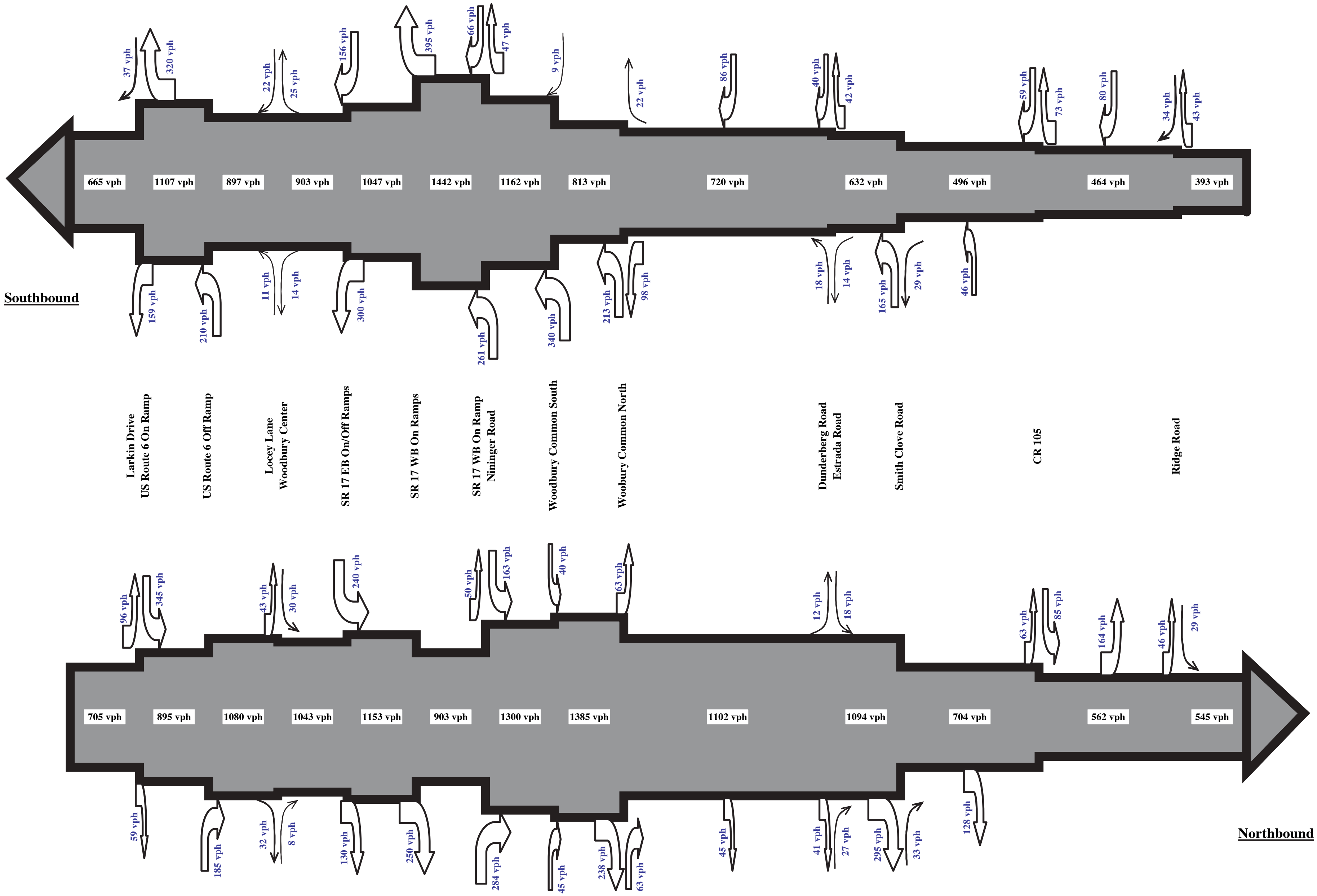
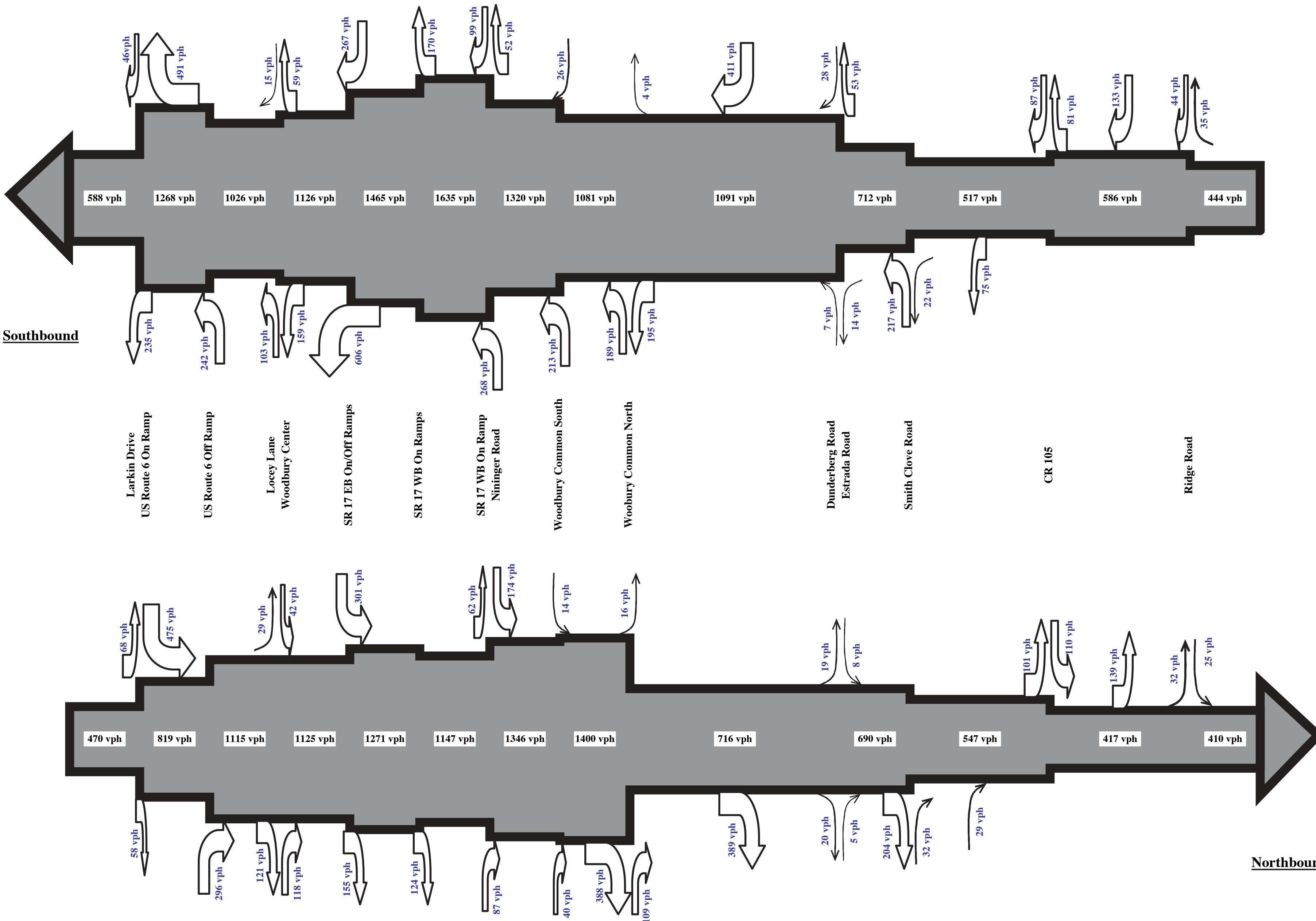


SR 32 Directional Flow
2002 Existing Weekday • PM Peak Hour
Figure 2-26

SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

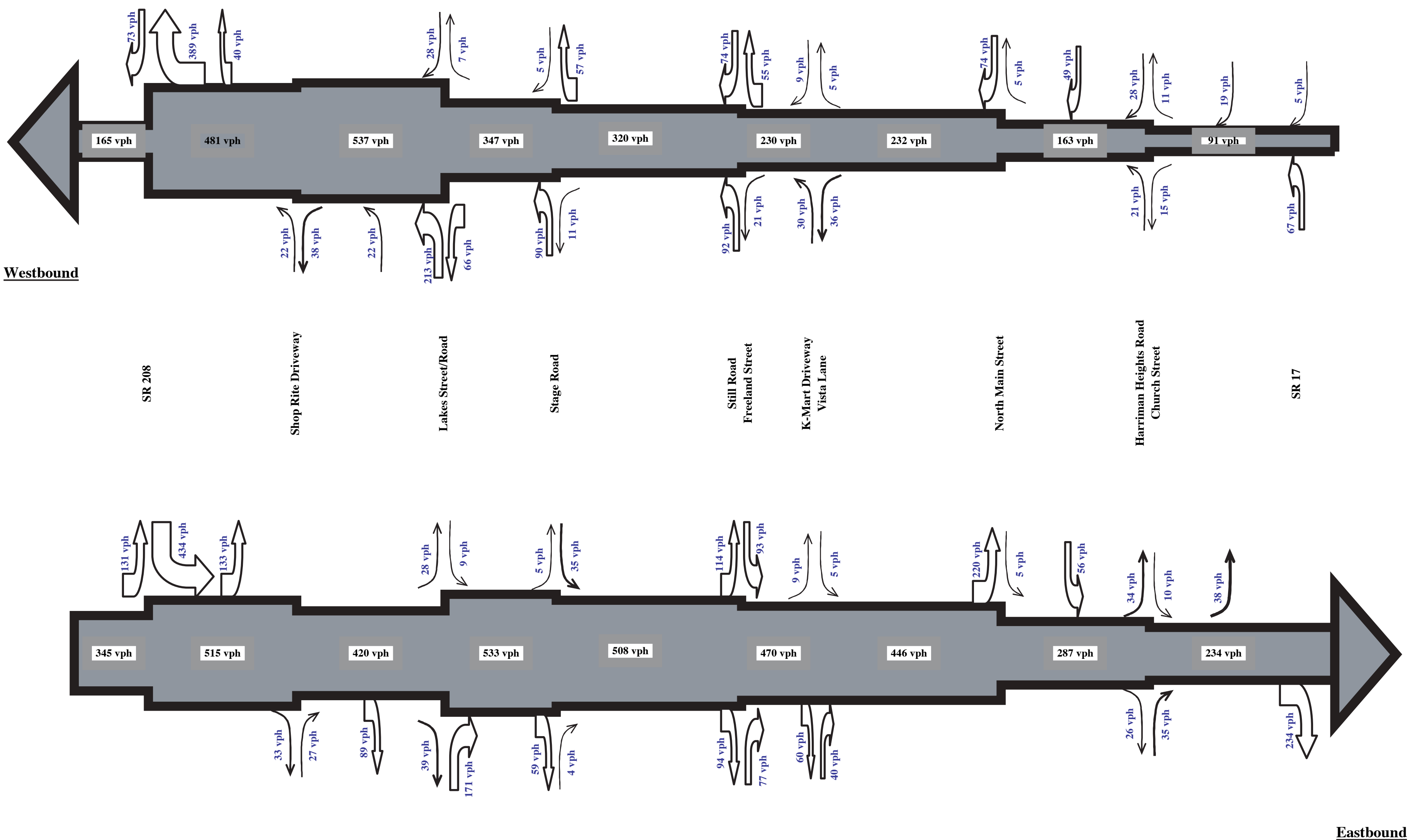
12.2.04



SR 32 Directional Flow
2002 Existing Weekday • Saturday Peak Hour
Figure 2-27

SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

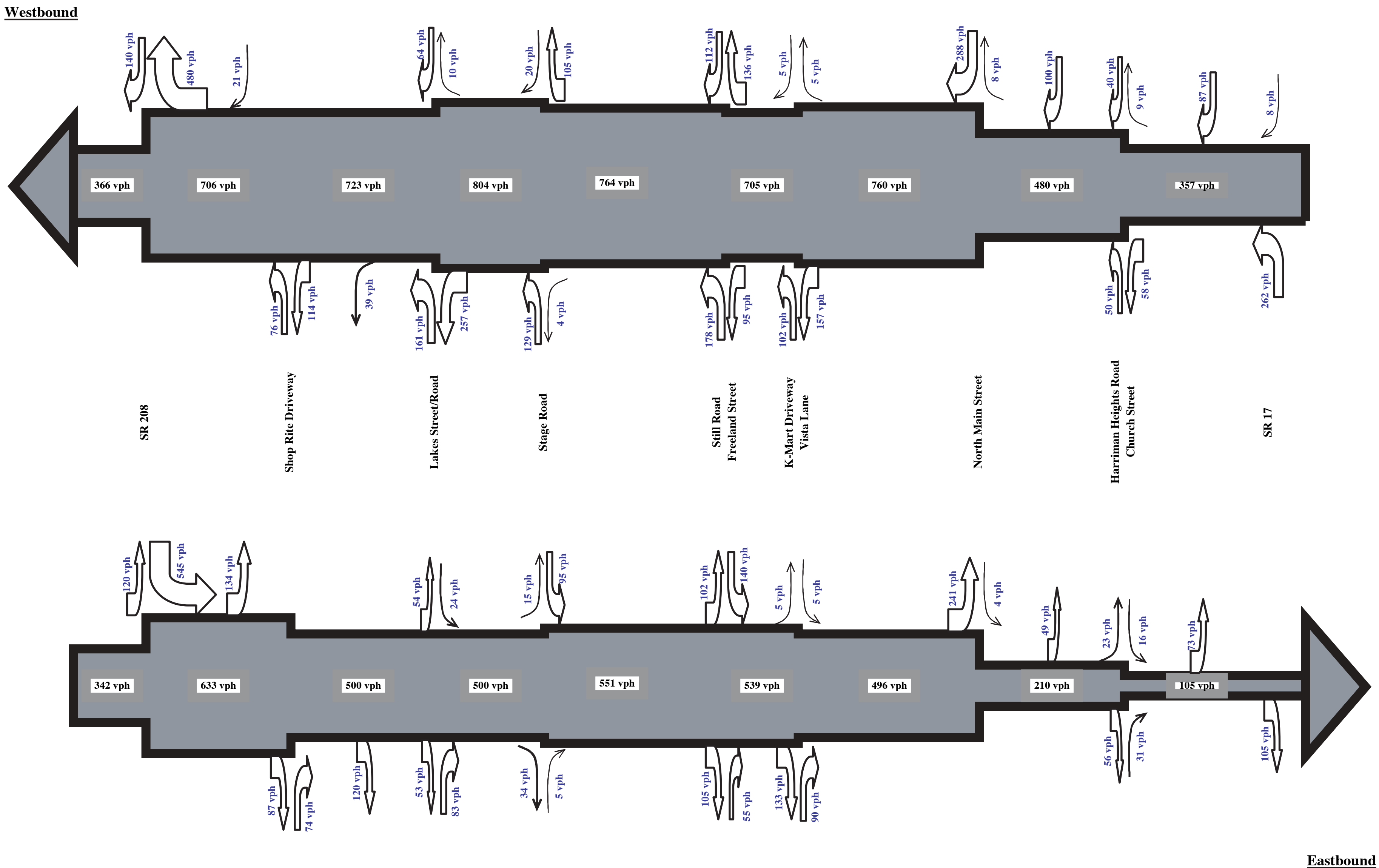
12.2.04



SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

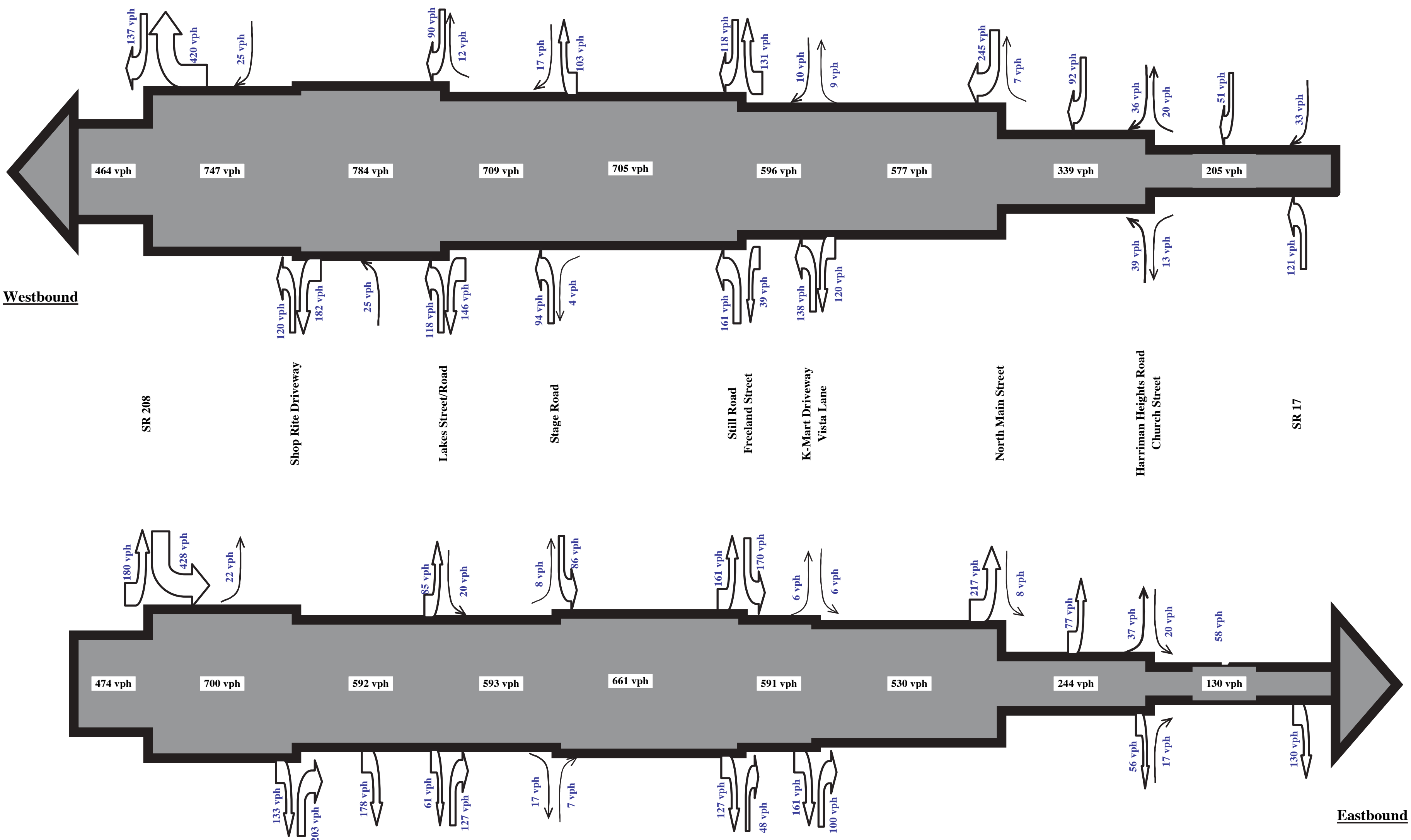
SR 17M Directional Flow
2002 Existing Weekday • AM Peak Hour
Figure 2-28

12.2.04



SR 17M Directional Flow
2002 Existing Weekday • PM Peak Hour
Figure 2-29

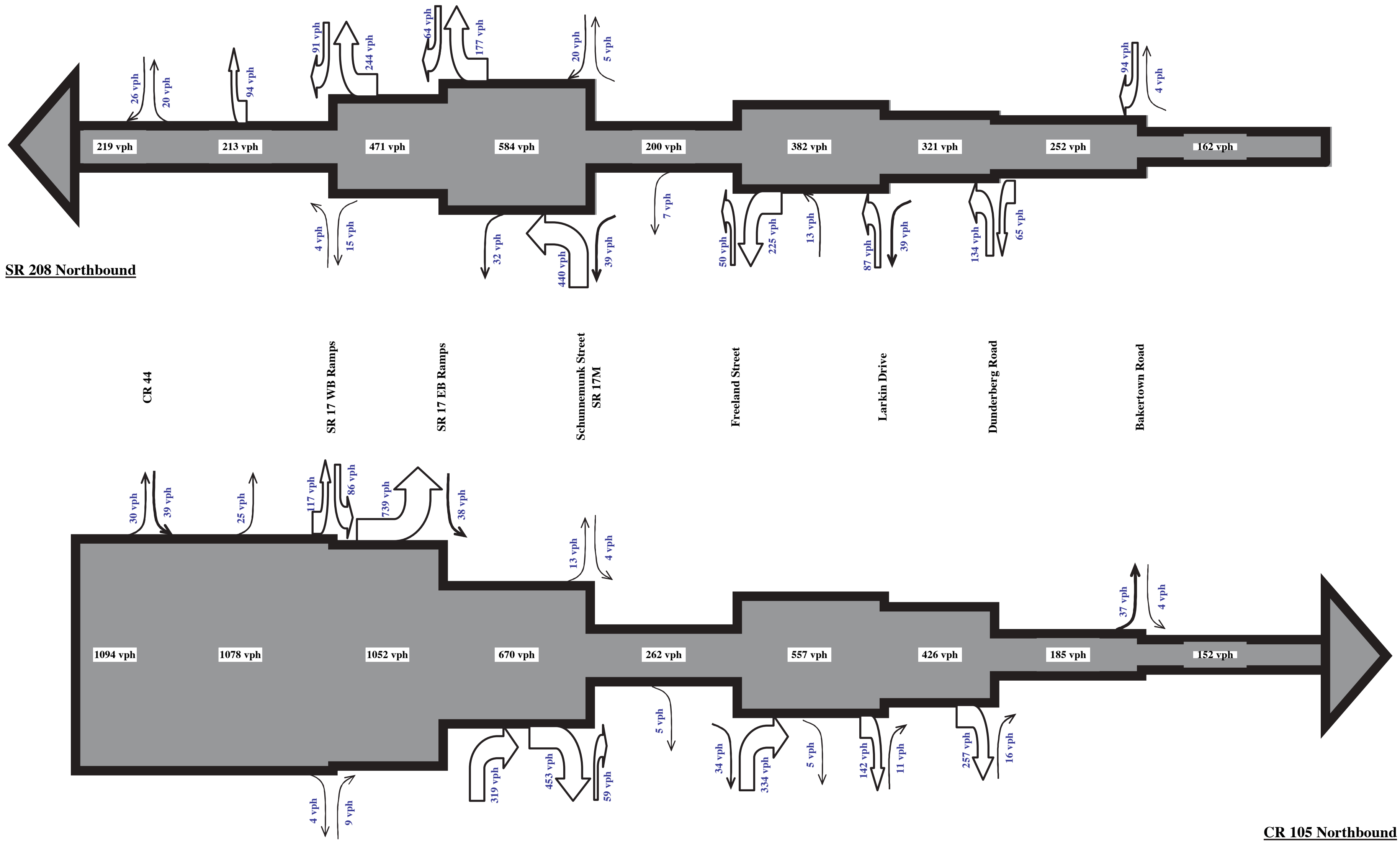
12.2.04



SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

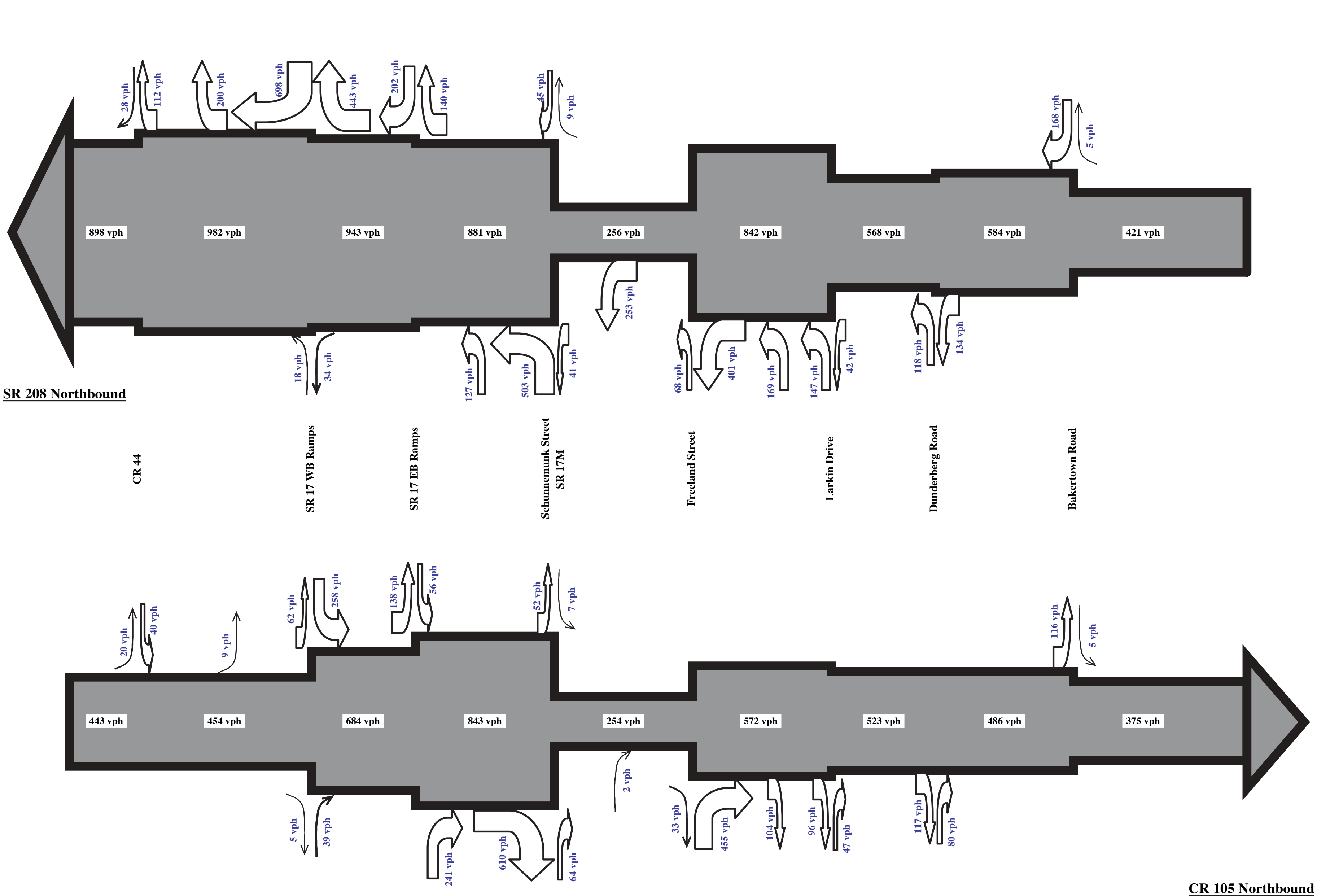
SR 17M Directional Flow
2002 Existing Weekday • Saturday Peak Hour
Figure 2-30

12.2.04



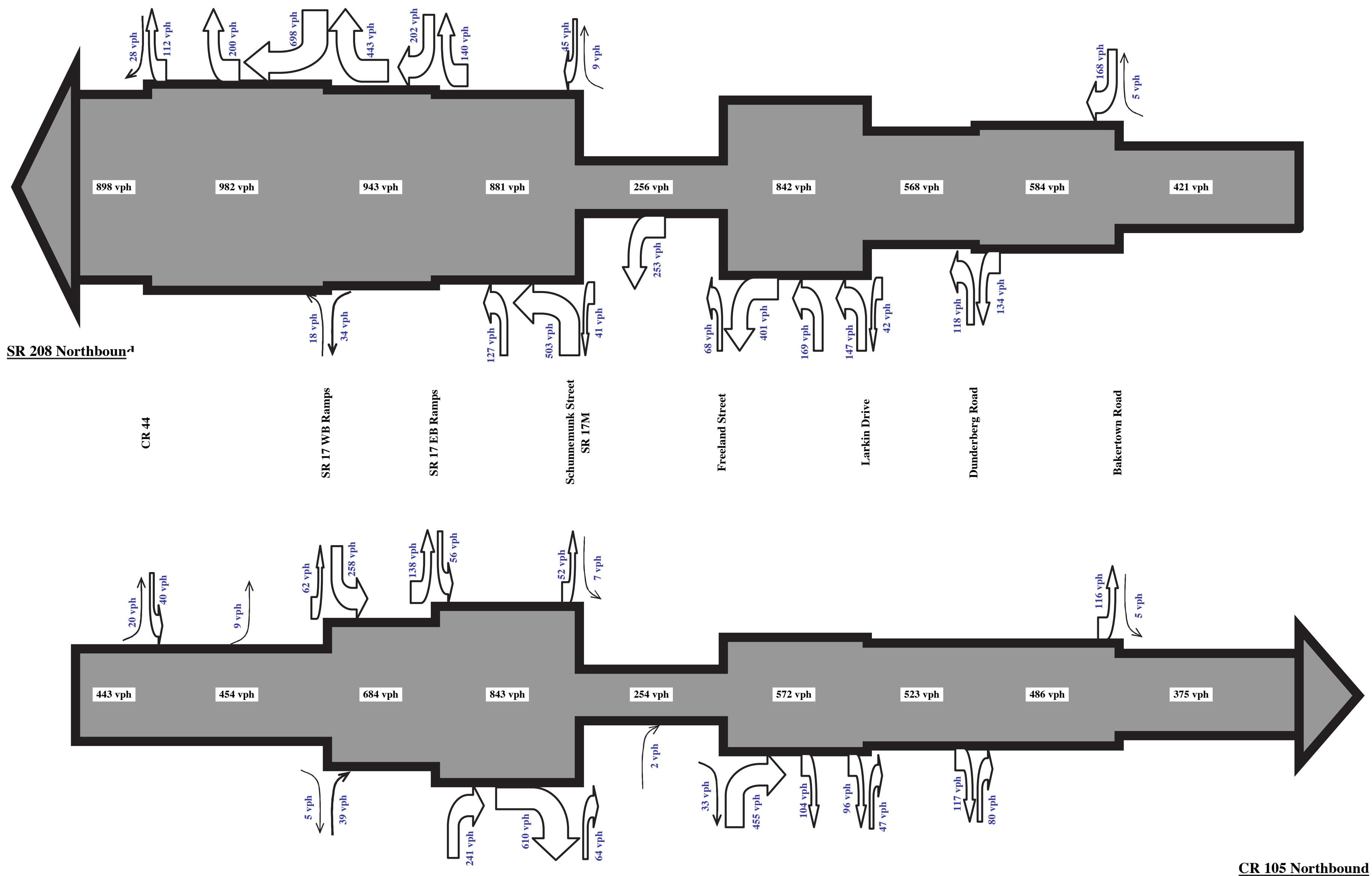
Southeastern ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

SR 208/CR 105 Directional Flow
2002 Existing Weekday • AM Peak Hour
Figure 2-31



SR 208/CR 105 Directional Flow
2002 Existing Weekday • PM Peak Hour
Figure 2-32

SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY



Southeastern ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

SR 208/CR 105 Directional Flow
2002 Existing Weekday • Saturday Peak Hour
Figure 2-33

Table 2-13
LOS Criteria for Signalized and Unsignalized Intersections

Signalized Intersections		Unsignalized Intersections	
LOS	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh)**
A	≤ 10.0 seconds	A	≤ 10.0 seconds
B	> 10.0 and ≤ 20.0 seconds	B	> 10.0 and ≤ 15.0 seconds
C	> 20.0 and ≤ 35.0 seconds	C	> 15.0 and ≤ 25.0 seconds
D	> 35.0 and ≤ 55.0 seconds	D	> 25.0 and ≤ 35.0 seconds
E	> 55.0 and ≤ 80.0 seconds	E	> 35.0 and ≤ 50.0 seconds
F	> 80.0 seconds	F	> 50.0 seconds
Source: Transportation Research Board. Highway Capacity Manual, 2000.			

LOS A and B signify good operating conditions with minimal delay. At LOS C, the number of vehicles stopping is higher, but congestion is still fairly light. LOS D describes a condition at which congestion levels are more noticeable and individual cycle failures (motorists having to wait for more than one green phase to clear the intersection) at signalized intersections can occur or available gaps for minor street movements at unsignalized intersections are diminished. Conditions at LOS E and F reflect poor service levels, where cycle breakdowns are frequent or extended waits are needed for one or more turning movements. Under ideal suburban settings, the boundary between LOS C and LOS D is generally considered the threshold of acceptable operations. Depending on the municipality, this threshold could sometimes be extended to mid-LOS D for peak travel periods. Tables 2-14 to 2-17 provide characterizations of peak traffic conditions for the three study corridors. As illustrated above, LOS A, B and C represent acceptable operating conditions, whereas LOS E and F represent unacceptable operating conditions. For the purpose of this analysis, LOS D would be considered marginal, with its midpoint (average delay of 45 seconds for signalized intersections and 30 seconds for unsignalized intersections) deemed as the boundary between acceptable and unacceptable operations. In the summary tables, marginally acceptable LOS D is designated by LOS D_a and marginally unacceptable LOS D is designated by LOS D_u. It should be noted that at unsignalized intersections, calculated delays for minor street approaches to high volume main streets tend to be overestimates of actual conditions, since the analysis methodologies do not account for traffic platoons and available gaps created by traffic signal controls upstream and downstream from an unsignalized intersection.

In accordance with NYSDOT's *EB 01-018* bulletin, which indicates that all new capacity analyses performed after July 1, 2003 should be in conformance with the *2000 HCM*, the results presented herein are HCM outputs as reported by the Synchro traffic simulation software. These outputs are consistent with field observations made for the three study area corridors during peak analysis periods.

SR 32 Corridor

Peak period operating conditions along SR 32 are congested near the I-87 Interchange at Harriman. While most intersections operate at overall acceptable levels, numerous approaches or lane groups experience long delays and poor service levels. This condition is particularly evident for the closely spaced intersections between Woodbury Common North and Larkin Drive, where all signal controls are coordinated to favor northbound and southbound travel. Due to the coordinated system's 110-second signal cycle length, even with minimal traffic volumes, the minor eastbound and westbound approaches typically function at LOS D or worse. Specific conditions during each of the analysis peak periods are discussed below.

Weekday AM Peak Hour

Traffic flow along SR 32 is generally favorable with both northbound and southbound approaches operating at LOS C or better. The only exception is the SR 17 eastbound off-ramp and I-87 toll plaza on-ramp intersection, where the combination of high southbound left-turning volumes to I-87 and exiting traffic from the Quickway results in adverse service levels (LOS E) and long vehicle delays. Among the minor street approaches with appreciable traffic volumes, Nininger Road, I-87 off-ramp to SR 32, US Route 6 off-ramp to SR 17, and Larkin Drive currently operate at congested levels. At the unsignalized intersection of Dunderberg/Estrada Road, analysis results show that the westbound minor street approach operates at LOS F. Since a traffic signal, which creates platoons and gaps in the traffic stream, exists just north of this intersection at Smith Clove Road, this condition is an overestimate of service levels.

Weekday PM Peak Hour

Traffic volumes along SR 32 are generally slightly higher in the afternoon than in morning. With commuters returning to the area via the Thruway and more discretionary trips being made, both the Quickway and I-87 on/off-ramp intersections operate at overall LOS D during the PM peak hour. At the Smith Clove Road intersection, significantly higher northbound traffic volumes result in congested conditions for both northbound and southbound travel, with the overall intersection also operating at LOS D. Congested minor street approaches with appreciable traffic volumes include Woodbury Common’s south driveway, Nininger Road, I-87 off-ramp to SR 32, US Route 6 off-ramp to SR 17, and Larkin Drive. At the unsignalized intersection of Dunderberg/Estrada Road, both eastbound and westbound approaches operate at LOS F during the PM peak hour. Conditions at this intersection are exacerbated by the sustained queues extending from the Smith Clove Road intersections.

Table 2-14
2002 Existing Levels of Service – SR32 Signalized Intersections

Cross Street	Dir	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
		Move	Delay (sec)	LOS	Move	Delay (sec)	LOS	Move	Delay (sec)	LOS
CR 105	EB	LR	29.7	C	LR	29.4	C	LR	34.5	C
	NB	LT	4.2	A	LT	6.8	A	LT	8.7	A
	SB	TR	7.5	A	TR	4.8	A	TR	6.0	A
		Int.	**9.5**	**A**	**Int.**	**8.6**	**A**	**Int.**	**11.1**	**B**
Smith Clove Road	WB	LR	20.7	C	LR	35.6	D_a	LR	21.0	C
	NB	TR	8.0	A	TR	48.2	D_u	TR	12.1	B
	SB	LT	11.7	B	LT	53.7	D_u	LT	9.1	A
		Int.	**12.7**	**B**	**Int.**	**48.1**	**D_u**	**Int.**	**12.5**	**B**
Woodbury Common North	WB	LTR	55.3	E	LTR	52.2	D_u	LTR	55.5	E
	NB	LTR	2.0	A	LTR	2.9	A	LTR	24.4	C
	SB	LTR	4.2	A	LTR	6.7	A	LTR	15.2	B
		Int.	**4.3**	**A**	**Int.**	**10.4**	**B**	**Int.**	**23.2**	**C**
Woodbury Common South	EB	LR	49.6	D_u	LR	50.8	D_u	LR	52.8	D_u
	WB	LR	47.8	D_u	LR	45.8	D_u	LR	45.1	D_u
	NB	T	5.8	A	T	13.2	B	T	10.7	B
	SB	T	5.5	A	T	11.3	B	T	13.6	B
		Int.	**8.4**	**A**	**Int.**	**18.7**	**B**	**Int.**	**16.0**	**B**
SR 17 WB Off Ramp / Nininger Road	EB	LR	82.1	F	LR	76.5	E	LR	129.1	F
	WB	LTR	73.9	E	LTR	116.6	F	LTR	57.5	E
	NB	LT	11.9	B	LT	6.7	A	LT	16.4	B
	SB	TR	13.8	B	TR	20.9	C	TR	16.7	B
		Int.	**32.0**	**C**	**Int.**	**44.1**	**D_a**	**Int.**	**33.2**	**C**
SR 17 EB On/Off Ramps	EB	LTR	34.3	C	LTR	36.7	D_a	LTR	72.4	E
	NB	TR	44.4	D_a	TR	27.9	C	TR	14.1	B
	SB	LT	81.2	F	LT	62.7	E	LT	82.6	F
		Int.	**60.7**	**E**	**Int.**	**44.8**	**D_a**	**Int.**	**57.1**	**E**
Locey Lane / Woodbury Center	EB	LTR	50.4	D_u	LTR	55.4	E	LTR	92.1	F
	WB	LTR	51.6	D_u	LTR	49.9	D_u	LTR	89.9	F
	NB	LTR	4.1	A	LTR	7.0	A	LTR	7.1	A
	SB	LTR	16.3	B	LTR	27.5	C	LTR	32.2	C
		Int.	**12.6**	**B**	**Int.**	**19.3**	**B**	**Int.**	**28.0**	**C**
US Route 6 Off Ramp	WB	LR	75.0	E	LR	51.9	D_u	LR	74.7	E
	NB	T	0.2	A	T	1.0	A	T	3.3	A
	SB	T	0.7	A	T	5.3	A	T	3.0	A
		Int.	**7.9**	**A**	**Int.**	**10.3**	**B**	**Int.**	**18.9**	**B**
Larkin Drive / US Route 6 On Ramp	EB	LTR	55.6	D_u	LTR	61.5	E	LTR	70.7	E
	NB	LTR	25.2	C	LTR	29.3	C	LTR	21.6	C
	SB	LT	16.4	B	LT	12.1	B	LT	20.2	C
		Int.	**27.5**	**C**	**Int.**	**29.9**	**C**	**Int.**	**36.7**	**D_a**

Note: SR 32 is oriented NB/SB, while cross streets are oriented EB/WB.
D_a = marginally acceptable LOS (delay ≤ 45 seconds); D_u = marginally unacceptable LOS (delay > 45 seconds)

Table 2-15
2002 Existing Levels of Service – SR 32 Unsignalized Intersections

Cross Street	Dir	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
		Move	Delay (sec)	LOS	Move	Delay (sec)	LOS	Move	Delay (sec)	LOS
Ridge Road	EB	LR	16.0	C	LR	17.7	C	LR	15.6	C
	NB	LT	0.5	A	LT	1.2	A	LT	1.0	A
	SB	TR	--	--	TR	--	--	TR	--	--
		Int.	**2.1**	**A**	**Int.**	**1.8**	**A**	**Int.**	**1.7**	**A**
Dunderberg Road / Estrada Road	EB	LTR	26.7	D_a	LTR	391.1	F	LTR	44.2	E
	WB	LTR	327.4	F	LTR	332.2	F	LTR	49.2	E
	NB	LTR	0.2	A	LTR	1.1	A	LTR	0.6	A
	SB	LTR	0.5	A	LTR	1.1	A	LTR	0.5	A
		Int.	**21.9**	**C**	**Int.**	**25.0**	**C**	**Int.**	**3.0**	**A**

Note: SR 32 is oriented NB/SB, while cross streets are oriented EB/WB.
D_a = marginally acceptable LOS (delay ≤ 30 seconds); D_u = marginally unacceptable LOS (delay > 30 seconds)

Saturday Midday Peak Hour

Because of the abundance of commercial retail uses, particularly at Woodbury Common, situated near the Thruway interchange, traffic levels along SR 32 are highest on weekends. During the Saturday midday peak hour analysis, adverse operating conditions were identified for numerous intersection approaches, including those at the Woodbury Common driveways, Nininger Road and I-87 off-ramp to SR 32, SR 17 eastbound off-ramp and I-87 toll plaza on-ramp, Locey Lane (Woodbury Center), US Route 6 off-ramp, and Larkin Drive. In contrast to weekday peak period conditions, adverse operating levels during the Saturday midday peak hour result in saturated conditions and sustained queuing for several intersection approaches. These service conditions are especially prevalent at intersections on the Quickway overpass, and at Larkin Drive.

SR 17M Corridor

Operating conditions along SR 17M are generally uncongested except for certain stretches of the roadway during peak periods. High volumes from several or all approaches at major intersection crossings, including those at Still Road/Freeland Street, Lakes Street/Road, Shop Rite, and SR 208, result in adverse service levels and long vehicle delays. In spite of this, all intersections currently operate at LOS D or better during all peak analysis periods, as discussed below.

Weekday AM Peak Hour

Traffic flow along SR 17M is generally favorable with all approaches operating at LOS C or better.

Weekday PM Peak Hour

Analysis results show that SR 17M is moderately congested at Still Road/Freeland Street and at Lakes Street/Road with eastbound service levels ranging from LOS C to LOS D, and westbound at LOS E during the PM peak hour. These two intersections currently operate at overall LOS D.

Table 2-16
2002 Existing Levels of Service – SR 17M Intersections

Cross Street	Dir	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
		Move	Delay (sec)	LOS	Move	Delay (sec)	LOS	Move	Delay (sec)	LOS
SR 17	EB	R	10.9	B	R	6.4	A	R	8.0	A
	NB	LT	3.8	A	LT	4.5	A	LT	3.7	A
	SB	TR	9.0	A	TR	8.9	A	TR	6.9	A
		Int.	**8.5**	**A**	**Int.**	**5.3**	**A**	**Int.**	**5.5**	**A**
Harriman Heights Road / Church Street	EB	LTR	6.9	A	LTR	5.8	A	LTR	6.1	A
	WB	LTR	5.6	A	LTR	7.3	A	LTR	5.7	A
	NB	LTR	15.5	B	LTR	19.8	B	LTR	13.4	B
	SB	LTR	14.4	B	LTR	16.5	B	LTR	13.3	B
		Int.	**10.2**	**B**	**Int.**	**10.8**	**B**	**Int.**	**8.7**	**A**
North Main Street (unsignalized)	EB	LT	4.1	A	LT	4.7	A	LT	3.7	A
	WB	TR	--	--	TR	--	--	TR	--	--
	SB	LR	10.8	B	LR	22.6	C	LR	16.9	C
		Int.	**4.0**	**A**	**Int.**	**7.3**	**A**	**Int.**	**5.5**	**A**
K-Mart / Vista Lane	EB	LTR	10.3	B	LTR	18.3	B	LTR	18.8	B
	WB	LTR	3.2	A	LTR	7.1	A	LTR	6.7	A
	NB	LTR	21.9	C	LTR	23.4	C	LTR	26.0	C
	SB	LTR	24.5	C	LTR	23.9	C	LTR	22.8	C
		Int.	**9.8**	**A**	**Int.**	**13.3**	**B**	**Int.**	**15.3**	**B**
Still Road / Freeland Street	EB	LTR	28.7	C	LTR	51.1	D_u	LTR	40.3	D_a
	WB	LTR	17.6	B	LTR	59.3	E	LTR	33.5	C
	NB	LTR	29.9	C	LTR	32.5	C	LTR	21.3	C
	SB	LTR	25.4	C	LTR	25.6	C	LTR	29.5	C
		Int.	**26.6**	**C**	**Int.**	**43.7**	**D_a**	**Int.**	**33.2**	**C**
Stage Road	EB	LTR	9.3	A	LTR	8.9	A	LTR	8.3	A
	WB	LTR	6.4	A	LTR	13.4	B	LTR	9.5	A
	NB	LTR	32.9	C	LTR	39.4	D_a	LTR	30.5	C
	SB	LTR	26.0	C	LTR	26.3	C	LTR	29.7	C
		Int.	**12.9**	**B**	**Int.**	**17.0**	**B**	**Int.**	**13.0**	**B**
Lakes Street/Road	EB	LTR	23.8	C	LTR	33.4	C	LTR	24.7	C
	WB	LTR	17.6	B	LTR	60.4	E	LTR	28.3	C
	NB	LTR	28.0	C	LTR	44.0	D_a	LTR	38.4	D_a
	SB	LTR	17.8	B	LTR	29.6	C	LTR	30.5	C
		Int.	**23.5**	**C**	**Int.**	**44.6**	**D_a**	**Int.**	**29.7**	**C**
Shop Rite	EB	TR	10.3	B	TR	16.2	B	TR	20.5	C
	WB	LT	3.2	A	LT	7.8	A	LT	13.5	B
	NB	LR	30.8	C	LR	33.3	C	LR	69.2	E
		Int.	**7.9**	**A**	**Int.**	**13.8**	**B**	**Int.**	**25.2**	**C**
SR 208	EB	LT	19.6	B	LT	30.7	C	LT	74.5	E
	WB	T	12.4	B	T	17.6	B	T	15.4	B
	SB	LR	18.8	B	LR	33.7	C	LR	30.6	C
		Int.	**18.2**	**B**	**Int.**	**29.1**	**C**	**Int.**	**41.2**	**D_a**

Note: SR 17M is oriented EB/WB, while cross streets are oriented NB/SB.

Saturday Midday Peak Hour

With the exception of the SR 208 intersection, which operates at overall LOS D, all intersections along the SR 17M corridor currently function at LOS C or better. With higher left-turning volumes, coupled with higher conflicting through traffic, the eastbound approach at the SR 208 intersection operates at LOS E during the Saturday midday peak hour.

SR 208/CR 105 Corridor

Peak period operating conditions are generally more congested with comparatively higher traffic volumes along the western half (SR 208) of this analysis corridor, particularly at the Quickway (SR 17) interchange ramp intersections. Along CR 105, traffic levels are lower and most of its intersections are unsignalized. All signalized intersections currently operate at LOS C or better except for the SR 17 interchange eastbound ramp intersection, where service levels are within LOS D for all three peak analysis periods. At the corridor's numerous unsignalized intersections, poor levels of service were determined for several minor street approaches. (However, as discussed, the calculated delays at these approaches are typically overestimates of actual conditions due to gaps created by nearby signalized intersections. Specific conditions during each of the analysis peak periods are discussed below.)

Weekday AM Peak Hour

Traffic flow along SR 208 and CR 105 is generally favorable with main street approaches operating at LOS C or better except at the SR 17 interchange eastbound ramp intersection and at the Freeland Street stop-controlled merge. Among the minor street approaches with appreciable traffic volumes, both SR 17 eastbound and westbound exit ramps onto southbound SR 208 operate at LOS D. North of this point at CR 44, the westbound minor street approach operates at LOS E. At the unsignalized CR 105 intersection with Dunderberg Road, the westbound minor street approach also operates at LOS D.

Weekday PM Peak Hour

Traffic levels along SR 208/CR 105 are higher in the afternoon than in morning. As a result, service levels are lower and average vehicle delays are higher. At the SR 17 interchange ramps, the westbound approach at the northern intersection and the northbound approach at the southern intersection both operate at LOS F during the PM peak hour. The westbound approach at CR 44, north of the Quickway interchange, also operates at LOS F. Along CR 105, higher delays are incurred at the stop control approaches at Freeland Street, Dunderberg Road and Bakertown Road.

Saturday Midday Peak Hour

Similar to the weekday PM peak period, Saturday operating levels are unfavorable at numerous locations in the corridor. At the SR 17 interchange ramps, the westbound approach at the northern intersection and the northbound approach at the southern intersection both operate at LOS E during the PM peak hour, while the westbound approach from eastbound SR 17 exit onto SR 208 operates at LOS D. North of this point at CR 44, the westbound minor street approach operates at LOS E. Along CR 105, both minor street approaches at Freeland Street and at Dunderberg Road operate at LOS F.

Table 2-17
2002 Existing Levels of Service – SR 208/CR105 Intersections

Cross Street	Dir	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
		Move	Delay (sec)	LOS	Move	Delay (sec)	LOS	Move	Delay (sec)	LOS
CR 44 (unsignalized)	WB	LR	35.1	E	LR	54.7	F	LR	42.7	E
	NB	TR	--	--	TR	--	--	TR	--	--
	SB	LT	0.9	A	LT	1.0	A	LT	1.0	A
		Int.	**2.3**	**A**	**Int.**	**3.8**	**A**	**Int.**	**1.7**	**A**
SR 17 WB Ramps	EB	LTR	42.8	D_a	LTR	27.5	C	LTR	43.0	D_a
	WB	LT	53.2	D_u	LT	96.2	F	LT	65.1	E
	NB	LT	0.6	A	LT	7.1	A	LT	0.7	A
	SB	LTR	28.0	C	LTR	8.2	A	LTR	6.6	A
		Int.	**25.7**	**C**	**Int.**	**29.3**	**C**	**Int.**	**13.1**	**B**
SR 17 EB Ramps	WB	L	52.7	D_u	L	50.3	D_u	L	51.5	D_u
	NB	T	36.1	D_a	T	82.2	F	T	79.8	E
	SB	LT	39.4	D_a	LT	12.5	B	LT	30.8	C
		Int.	**38.9**	**D_a**	**Int.**	**50.1**	**D_u**	**Int.**	**53.5**	**D_u**
Schunnemunk Street / SR 208 Extension	EB	LTR	25.6	C	LTR	30.4	C	LTR	23.6	C
	WB	LTR	29.3	C	LTR	42.0	D_a	LTR	27.4	C
	NB	LTR	26.1	C	LTR	31.7	C	LTR	26.9	C
	SB	LT	23.3	C	LT	30.4	C	LT	22.9	C
		Int.	**25.5**	**C**	**Int.**	**31.7**	**C**	**Int.**	**24.4**	**C**
Freeland Street (unsignalized)	WB	R	--	--	R	--	--	R	--	--
	NB	L	33.7	D_u	L	171.7	F	L	504.8	F
	SB	LT	--	--	LT	--	--	LT	--	--
		Int.	**8.3**	**A**	**Int.**	**23.8**	**C**	**Int.**	**100.3**	**F**
Larkin Drive	WB	LR	11.3	B	LR	13.1	B	LR	16.9	B
	NB	TR	9.1	A	TR	9.9	A	TR	12.2	B
	SB	LT	7.2	A	LT	12.6	B	LT	22.3	C
		Int.	**8.7**	**A**	**Int.**	**11.6**	**B**	**Int.**	**17.2**	**B**
Dunderberg Road (unsignalized)	WB	LR	31.5	D_u	LR	129.0	F	LR	94.6	F
	NB	TR	--	--	TR	--	--	TR	--	--
	SB	LT	2.8	A	LT	3.6	A	LT	0.7	A
		Int.	**8.6**	**A**	**Int.**	**22.0**	**C**	**Int.**	**28.8**	**D_a**
CR 105 Extension / Bakertown Road (unsignalized)	NEB	LT	1.8	A	LT	3.3	A	LT	1.5	A
	SWB	TR	--	--	TR	--	--	TR	--	--
	SB	LR	10.1	B	LR	48.1	E	LR	11.6	B
		Int.	**2.9**	**A**	**Int.**	**15.9**	**C**	**Int.**	**3.4**	**A**

Note: SR 208 and CR 105 are oriented NB/SB, while cross streets are oriented EB/WB.

TRAVEL SPEEDS

In addition to traffic volume data collection, travel time and delay surveys were conducted to estimate actual operating speeds for each of the above corridors under peak travel conditions. These surveys were conducted using the floating car technique by which survey personnel would travel at speeds close to the median speeds of the traffic streams. To temper the effects of red traffic signals and queues and to ensure that the estimated results are representative of average travel conditions, three sets of runs were conducted for each corridor during each of the peak periods. Table 2-18 presents a summary of the average travel times, speeds and delays estimated from this survey.

Table 2-18
Travel Time, Speed and Delay Summary

Analysis Corridor	Segment	Dir.	Dist. (mi)	Peak Period	Average Travel Time (sec)	Average Travel Speed (mph)	Average Travel Delay (sec)
SR 17	SR 17M to SR 17 EB On/Off Ramp	NB	1.10	AM	120	33.1	17.3
				PM	129	30.8	28.0
				Sat	115	34.5	0.0
	SR 17 EB On/Off Ramp to SR 17M	SB	1.10	AM	130	30.4	17.0
				PM	122	32.6	2.7
				Sat	122	32.5	0.0
SR 32	SR 17 EB On/Off Ramp to Ridge Road (CR44)	NB	3.45	AM	359	34.6	24.0
				PM	333	37.5	22.7
				Sat	359	34.6	21.3
	Ridge Road (CR 44) to SR 17 EB On/Off Ramp	SB	3.45	AM	334	37.2	43.3
				PM	353	35.4	59.0
				Sat	341	36.4	61.3
SR 17M	SR 208 to SR 17	EB	3.55	AM	332	38.6	34.7
				PM	414	31.0	53.0
				Sat	390	32.8	63.7
	SR 17 to SR 208	WB	3.55	AM	380	33.8	31.0
				PM	394	32.5	92.0
				Sat	360	35.5	14.0
SR 208	SR 17M to Seven Springs Mountain Road (CR 44)	NB	1.90	AM	189	36.3	34.7
				PM	186	36.8	16.3
				Sat	179	38.2	0.0
	Seven Springs Mountain Road (CR 44) to SR 17M	SB	1.90	AM	221	31.4	44.3
				PM	262	26.4	49.7
				Sat	222	30.9	9.0
CR 105	North Main Street to Bakertown Road	EB	2.30	AM	266	31.9	71.7
				PM	262	31.6	20.0
				Sat	240	34.5	14.7
	Bakertown Road to North Main Street	WB	2.30	AM	233	35.9	17.3
				PM	247	33.6	36.3
				Sat	248	33.3	0.0

With the exception of stop delays incurred at signal-controlled intersections and for turning vehicles, peak period traffic flows for through vehicles were generally unimpeded. Average travel speeds along each of the study corridors were calculated to be mostly in the 30 to 35 miles per hour (mph) range during peak periods.

ACCIDENT AND SAFETY

The latest three years (1999 to 2001) of available accident data on the roadway segments described above were acquired from the New York State Department of Transportation (NYSDOT) for analysis. On average, there were in excess of 240 total accidents annually, with more than half, nearly 160 cases per year, incurred along SR 32 between SR 17M and Ridge Road. Most of the accident cases, comprising 90 percent of the total accidents recorded in the three-year period, involved vehicles only. A small number of the cases (9.4 percent) involved animals, and even a smaller number (0.7 percent) involved pedestrians. In terms of severity, the majority of the accidents resulted in property damage only (92 percent), while the remaining 8 percent also had personal injuries. No fatalities were recorded in the three years of accident data. These statistics are summarized in Table 2-19.

Table 2-19
Accident Summary Data – 1999 to 2001

Analysis Corridor	Year	No. of Accidents	Type			Severity			Highest Accident Location
			C	A	P	PDO	PI	F	
SR 32	1999	152	133	19	0	152	0	0	12
	2000	154	139	15	0	154	0	0	5
	2001	169	147	20	2	167	2	0	12
	3-Yr Total	475	419	54	2	473	2	0	Woodbury Common
SR 17M	1999	75	69	5	1	62	13	0	10
	2000	64	59	5	0	49	15	0	7
	2001	59	56	2	1	42	17	0	14
	3-Yr Total	198	184	12	2	153	45	0	Lake Street/Road
SR 208	1999	12	11	0	1	7	5	0	7
	2000	12	11	1	0	11	1	0	7
	2001	10	9	1	0	10	0	0	3
	3-Yr Total	34	31	2	1	28	6	0	North Main Street
CR 105	1999	5	5	0	0	2	3	0	5
	2000	5	5	0	0	5	0	0	5
	2001	10	10	0	0	7	3	0	10
	3-Yr Total	20	20	0	0	14	6	0	Freeland Street

Legend

Type:	C - auto with auto; A - auto with animal; P - auto with pedestrian
Severity:	PDO - property damage only; PI - personal injury; F - fatality
Cause:	OE - operator carelessness; A - animal; P – pedestrian

For each of the travel corridors, locations were identified for having high numbers of recorded accidents. Along SR 32, approximately 6 percent (or 10 accidents) on average annually occurred at the roadway’s intersections with Woodbury Common, which also happen to be the points of heaviest traffic in the corridor. Along SR 17M, nearly 16 percent (or 10 accidents) on average annually occurred at the Lake Street/Road intersection. Other locations identified to also have notable numbers of accidents along SR 17M include the intersections at Church Street, SR 208, and Freeland Street (CR 40). Along SR 208, 50 percent or 6 accidents on average annually occurred at the North Main Street intersection, and along CR 105, all 20 accidents (7 accidents on average annually) identified occurred at the Freeland Street intersection. ✷

A. INTRODUCTION

To evaluate potential future land use and traffic conditions, several scenarios were developed for both land use and transportation improvements in the study area. Detailed analysis of traffic conditions using these scenarios is described in Chapter 4. This chapter describes the methodology used to project future land use development and future transportation improvements and the essential assumptions used in the modeling and sets forth the model runs to be analyzed for traffic volumes based on a Full Zoning Build-Out and a 2020 Build-Out.

B. LAND USE

Land use build-out analyses have been prepared for each of the following scenarios: full zoning build out, reduced density, village-center, and infrastructure-based zoning.

Undeveloped, or underdeveloped parcels greater than 10 acres within the Towns of Monroe, Woodbury, and Blooming Grove and the Villages of Monroe and Harriman have been identified as soft sites. Figures 3-1 and 3-2 show soft sites within the primary and secondary study areas, respectively. "Pending Projects"–major subdivisions and large commercial projects currently under review by the municipalities–are also shown on Figures 3-1 and 3-2. (Future development within the Village of Kiryas Joel is assumed to follow recent development patterns of replacing single-family dwelling units with multi-family dwellings at 20 dwelling units per acre.) Development on parcels less than 10 acres will be assumed to be within the background growth rate assigned to the model. In certain cases, parcels less than 10 acres may be included as soft sites depending on adjoining conditions (e.g. ownership, current land use, and access).

New development on soft sites within the study area was aggregated into Transportation Analysis Zones (TAZ) defined by Orange County Department of Planning (see Figure 3-3). A TAZ is defined by a contiguous area of land from which vehicle trips would enter onto the same segment of the roadway network.

GENERAL ASSUMPTIONS

DEVELOPMENT EFFICIENCY ASSUMPTIONS

1. Development efficiency will be assumed to be 75 percent in residential districts with minimum lot sizes of one (1) acre or less per single-family dwelling unit.

2. Development efficiency will be assumed to be 90 percent in residential districts with minimum lot sizes greater than one (1) acre.

ENVIRONMENTAL ASSUMPTIONS

1. Open bodies of water and lands delineated as NWI or DEC wetlands are assumed unbuildable and have been deducted from the buildable land.

2. On parcels containing steep topography (slopes greater than 15 percent), the development efficiency has been reduced by an additional 10 percent.

3. Soil conditions and subsurface geology are not considered in this study.

MULTIPLE-USE ZONING ASSUMPTIONS

1. In zoning districts where multiple uses are permitted, the build-out use was determined based on the location, access, and surrounding uses.

2. In commercial districts, an allocation between retail and non-retail (entertainment and professional services) was made based on Urban Land Institute *Dollars and Cents* averages for neighborhood, community, and regional shopping centers.

EMPLOYMENT FACTORS

To model trip generation from non-residential development, the following employment factors were used:

Table 3-1
Non-Residential Employment Factors

Use Category	Employees (no./1000 sq. ft.)
Retail	3.0
Office	4.0
Industrial (Shift)	1.5
Non-Retail*	2.0
Notes: * - Non-Retail includes entertainment and professional services.	

PENDING PROJECTS

1. All pending projects (major subdivisions and large commercial projects), as identified by the Towns and Villages, are included in each of the scenarios.

KIRYAS JOEL

Development within the Village of Kiryas Joel under each of the land use scenarios is assumed to follow recent development practice of constructing multi-family dwellings at 20 dwelling units per acre.

SCENARIO ASSUMPTIONS

NULL ALTERNATIVE SCENARIO

The Null Alternative will be modeled as existing land uses with the “No Action: Current Improvements Only” transportation scenario (see below).

EXISTING ZONING FULL ZONING BUILD-OUT SCENARIO

a. Development of soft sites according to existing zoning codes.

b. Though zoning codes may allow higher Floor Area Ratios or Building Coverage, parking, septic, and stormwater requirements often limit the developable square footage of a parcel. An alternative “site-engineering FAR” was evaluated by determining what percentage of lot was needed for parking, given a prescribed building coverage and parking, septic, and stormwater assumptions. However, analysis of recent actual building practices in the Orange and Rockland County Region reveals that the “site-engineering FAR” still exceeds typical development practices. As such, the analysis was conducted using modified FARs, based on an approximate average between the allowable FAR, the current development practices, the “site-engineering FAR”, and general trends within the industry. Table 3-2 provides a summary of the FARs evaluated.

Table 3-2
Non-Residential Floor Area Ratios

Method	Office	Retail*	Industrial
Zoning FAR	0.50	0.60	0.80
Site-Engineering FAR	0.42	0.29	0.52
Development Practice FAR	0.15	0.15	0.15
Modified FAR	**0.20**	**0.25**	**0.35**
Notes: * - Includes “Non-Retail” (entertainment and professional services)			

VILLAGE CENTER SCENARIO

1. The “village center” scenario will focus development towards existing village centers (e.g. Monroe, Harriman) and areas where new villages could be created (Harriman Train Station) (see Figure 3-4).

2. A “secondary village” area was selected where medium-density residential development could occur in Blooming Grove at 6 units per acre (the Lake Anne Country Club site in TAZ# 4 and 8).

3. Additional soft sites were identified within Village Centers that may contain existing residential or commercial uses but that are adjacent to undeveloped tracts and that could be reasonably expected to be developed in an integrated fashion.

4. Village-centered development will include a mix of residential and commercial uses allocated within each TAZ by a composite average of recent successful mixed-use developments.[1] Total number of residential units and total commercial square footage will not

[1] In the village center scenario, to determine the total square footage of retail, non-retail, industrial buildings and total number of single- and multi-family residences, the development patterns of several successful “new urban” developments were studied. The new urban developments included Kentlands in Maryland; Southern Village, in Chapel Hill, North Carolina; Laguna West, California; Orenco Station in Hillsboro, Oregon; and King Farm in Rockville, Maryland. The size of these projects range from 64 acres to 1200 acres. The average breakdown of uses was (per net acre of developable land): 3 residential

exceed Full Zoning Build Out levels. More multi-family units are assumed than would currently be permitted under existing zoning codes.

5. Residential areas outside of village centers will be downzoned to 5 acre minimum lot size.

6. Commercial areas outside village centers will be downzoned to 0.10 FAR.

7. A 30 percent trip reduction from and between all uses is assumed, as documented by case studies of New Urban and transit-oriented developments.[1]

REDUCED DENSITY SCENARIO

1. Residential: Downzone all residential districts to 5 acre minimum lot size, single family.

2. Commercial: no new commercial development outside of existing commercial districts (no zone changes), commercial FAR reduced to 0.10.

3. All additional growth will be assigned to external nodes in the traffic model.

INFRASTRUCTURE-BASED ZONING SCENARIO

Development based on current sewer-treatment plant capacity.

1. No new STPs will be built

2. The existing OCSD#1 plant will be increased by 2 million gallons per day (mgd) to 6 mgd.

3. Sewer treatment capacity will limit the amount of growth able to occur in the study area.

4. Within OCSD #1, the percentage of land used for residential and commercial uses will be based on existing zoning and land use patterns.

5. New residential units were assumed to use 400 gallons per day (gpd). Commercial uses were assumed to use 0.1 gallons/ sq. ft/ day.

6. On parcels outside the designated sewer districts, minimum lot size will be no less than 5 acres. All multifamily zoning districts outside the sewer districts will be rezoned for 5-acre minimum lot size, single-family residential.

7. On all commercially-zoned land outside the designated sewer districts, FAR will be reduced to 0.10 to account for septic system requirements.

8. All additional growth beyond the projected sewer capacity will be assigned to external nodes.

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units, 2 multifamily units, 0.003 sq. ft. of retail space, 0.010 sq. ft. of office space, 0.003 sq. ft. of non-retail space, 0.010 sq. ft. of industrial space.

[1] Source: Holtzclaw, J. (1997) *Designing Cities to Reduce Driving and Pollution: New Studies in Chicago, LA and San Francisco*, paper presented at the Air & Waste Management Association's 90th Annual Meeting & Exhibition, Toronto, 8-13 June. Accessed at: www.sierraclub.org/sprawl/ transportation/designing.asp.

TIME FRAME

Land use within the study area was estimated for full build-out (all buildable land developed over an undetermined time frame) and the year 2020.

Growth by the year 2020 has been projected based on new single-family building permit trends for each Town over the last 16 years (1987 to 2002). The 16-year, 10-year, 5-year, and 3-year averages (see Table 3-3) were calculated for each Town and evaluated against regional and national economic conditions. Based upon the patterns observed, the five-year average was selected as most approximately representing future growth in each Town. Use of the five-year average will account for recent increases in development seen in the 3-year averages and for cyclical dips in development activity that are reflected in the 10-year average. Individual growth rates were used in each community to reflect locational differences.

The Villages of Monroe and Harriman have issued very few new single-family building permits in each of the last 5 years. It is expected that only five new single-family homes would be built in each year in the Village of Harriman and only ten new single-family homes would be built in each year in the Village of Monroe.

The Village of Kiryas Joel, similarly, has issued minimal new single-family building permits but has issued large numbers of multi-family dwelling permits. The three-year average for multi-family building permits was used to project growth in Kiryas Joel. Non-residential uses in Kiryas Joel are assumed to double the existing supply of non-residential uses.

Growth in each TAZ by the year 2020 was calculated by multiplying the Full Zoning Build-Out values for each TAZ by the Town-wide ratio of single-family residential development for the 17 year period (2004 to 2020) to the expected single-family residential development under the full build-out scenario. This same proportion was applied to non-residential uses to achieve 2020 build-out by TAZ.

Table 3-3
Single-Family Residential Building Permits

Municipality	16-yr avg.	10-yr. avg.	5-yr. avg.	3-yr. avg.	USE
Town of Blooming Grove	38	40	64	48	**64**
Town of Monroe	41	48	71	80	**71**
Town of Woodbury	53	69	71	102	**71**
Village of Harriman	1	1	0	0	**5**
Village of Monroe	22	27	7	7	**10**
Village of Kiryas Joel*	75	105	153	170	**170**

Notes: * - Multi-family building permits are provided for the Village of Kiryas Joel.
Sources: Orange County Department of Planning and U.S. Census Bureau.

SCENARIO RESULTS

The number of forecast residential units and non-residential floor area varies under each scenario (see Figure 3-5 and Table 3-4). The greatest number of residential units would be achieved under the village center scenario while existing zoning provides for the greatest square-footage of non-residential development. Under the village center scenario, smaller lot sizes allow for greater density and for additional development but would result in greater pedestrian, bicycle, or transit trips. Existing zoning, while resulting in fewer residential units, requires large lot sizes that consume more land and result in greater auto dependency for mobility. Figures 3-6 to 3-13 show relative build-out amounts for residential and commercial development by TAZ for each of the development scenarios. Tables 3-5a to 3-5g summarize projected development by TAZ within each of the municipalities. Where a TAZ spans one ore more municipalities, the data are repeated in Tables 4-5a to 4-5g (e.g., TAZ 16 covers land in the Town of Blooming Grove and Town of Monroe and is shown in both tables).

Table 3-4
Build Out Forecasts

Table 3-5a
Development By TAZ:
Town of Blooming Grove

	Existing Zoning		Village Center		Reduced Density		Infrastructure Based	
TAZ #	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]
1	268	0	130	0	130	0	130	0
2	333	0	142	0	142	0	142	0
3	243	0	135	0	135	0	135	0
4	11	0	135	0	6	0	6	0
5	170	0	97	0	97	0	97	0
6	235	2,193,500	155	880,000	155	10,108,000	155	880,000
7	459	0	117	0	117	0	117	0
8	298	0	2,925	0	130	0	130	0
9	216	1,617,000	120	616,000	120	616,000	120	616,000
10	313	0	182	0	182	0	182	0
11	175	0	107	0	107	0	107	0
12	208	10,000	61	4,000	61	4,000	61	4,000
13	280	0	134	0	134	0	134	0
14	244	0	136	0	136	0	136	0
16	95	880,000	78	440,000	78	440,000	243	0
17	121	0	73	228,000	73	0	73	228,000
193	0	660,992	0	52,000	0	252,000	0	52,000
475	120	0	470	124,080	19	0	19	0
476	76	0	36	0	36	0	36	0
477	3	0	35	9,240	1	0	1	0

Notes:
[1] Number of dwelling units including single-family and multi-family.
[2] Square feet of commercial/non-residential uses.

Table 3-5b
Development By TAZ:
Town of Monroe

	Existing Zoning		Village Center		Reduced Density		Infrastructure Based	
TAZ #	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]
16	65	880000	78	440000	78	440000	243	0
21	372	0	183	0	183	0	183	0
144	0	0	0	0	0	0	0	0
146	5682	0	6606	337836	5428	0	5718	0
185	581	0	185	200000	165	0	424	306041
186	96	0	27	0	27	0	27	0
187	503	0	292	0	292	0	673	0
188	593	0	315	0	315	0	1588	0
189	150	0	28	0	28	0	211	0
190	923	0	328	0	328	0	328	0
191	106	0	33	0	33	0	226	0
192	315	0	252	0	252	0	252	0
193	0	660992	0	52000	0	252000	0	52000
194	59	0	48	0	48	0	78	0
196	118	31500	198	52272	198	12000	56	18199
201	446	0	429	33977	429	0	39	00
203	173	0	20	0	20	0	88	0
204	218	0	122	0	122	0	245	0
205	111	0	79	0	79	0	109	0
209	38	0	60	15761	60	0	18	0
213	250	960000	963	224294	963	480000	190	734948
477	45	262500	195	51480	195	100000	3	100000

Notes:
[1] Number of dwelling units including single-family and multi-family.
[2] Square feet of commercial/non-residential uses.

Table 3-5c
Development By TAZ:
Town of Woodbury

	Existing Zoning		Village Center		Reduced Density		Infrastructure Based	
TAZ #	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]
145	25	532000	372	98208	7	152000	55	234102
146	5682	0	6606	337836	5428	0	5718	0
198	1543	252000	1542	72000	1558	72000	1703	0
428	774	0	488	0	488	0	488	0
429	26	94500	9	36000	9	36000	9	36000
430	269	0	141	0	141	0	141	0
431	25	0	16	0	16	0	16	0
432	122	0	82	0	82	0	82	0
434	6	0	4	0	4	0	4	0
435	11	160000	5	80000	5	80000	5	80000
436	0	1400000	500	132000	0	400000	0	400000
437	0	0	0	0	0	0	0	0
438	0	0	0	0	0	0	0	0
439	0	57200	0	57200	0	57200	0	57200
440	23	100000	15	52000	15	52000	15	52000
441	0	0	0	0	0	0	0	0

Notes:
[1] Number of dwelling units including single-family and multi-family.
[2] Square feet of commercial/non-residential uses.

Table 3-5d
Development By TAZ:
Village of Harriman

	Existing Zoning		Village Center		Reduced Density		Infrastructure Based	
TAZ #	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]
141	0	0	0	0	0	0	0	0
142	0	0	0	0	0	0	0	0
143	0	0	0	0	0	0	0	0
144	0	0	0	0	0	0	0	0
145	25	532000	372	98208	532000	7	55	234012
205	111	0	79	0	0	79	109	0
437	0	0	0	0	0	0	0	0
441	0	0	0	0	0	0	0	0

Notes:
[1] Number of dwelling units including single-family and multi-family.
[2] Square feet of commercial/non-residential uses.

Table 3-5e
Development By TAZ:
Village of Kiryas Joel

	Existing Zoning		Village Center		Reduced Density		Infrastructure Based	
TAZ #	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]
146	5682	0	6606	337836	5428	0	5718	0
198	1543	252000	1542	72000	1558	72000	1703	0

Notes:
[1] Number of dwelling units including single-family and multi-family.
[2] Square feet of commercial/non-residential uses.

Table 3-5f
Development By TAZ:
Village of Monroe

	Existing Zoning		Village Center		Reduced Density		Infrastructure Based	
TAZ #	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]
141	0	0	0	0	0	0	0	0
185	581	0	185	200000	195	0	424	306041
187	503	0	292	0	292	0	673	0
195	0	0	0	0	0	0	0	0
196	118	31500	198	52272	7	12000	56	18199
197	200	2352000	918	539677	200	922000	202	530000
198	1543	252000	1542	72000	1558	72000	1703	0
200	0	0	50	13200	0	0	0	0
201	446	0	429	33977	305	0	339	0
202	8	0	1	0	1	0	8	0
203	173	0	20	0	20	0	88	0
204	218	0	122	0	122	0	245	0
206	9	0	30	7920	1	0	9	0
207	137	0	145	30056	35	0	66	0
208	0	178500	84	22097	0	68000	0	102574
209	38	0	60	15761	2	0	18	0
210	70	0	116	30730	4	0	36	0
211	39	0	35	9240	1	0	11	0
212	0	0	0	0	0	0	0	0
213	250	960000	963	224294	123	480000	190	734948
214	45	262500	195	51480	3	100000	3	100000
215	0	0	0	0	0	0	0	0

Notes:
[1] Number of dwelling units including single-family and multi-family.
[2] Square feet of commercial/non-residential uses.

Table 3-5g
Development By TAZ:
Village of Washingtonville

	Existing Zoning		Village Center		Reduced Density		Infrastructure Based	
TAZ #	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]	Residential[1]	Commercial[2]
1	268	0	130	0	130	0	130	0
2	333	0	142	0	142	0	142	0
474	24	0	85	2240	3	0	3	0
475	120	0	470	124080	19	0	19	0
476	76	0	36	0	36	0	36	0
477	3	0	35	9240	1	0	1	0
478	40	0	122	32076	5	0	5	0

Notes:
[1] Number of dwelling units including single-family and multi-family.
[2] Square feet of commercial/non-residential uses.

C. TRANSPORTATION SCENARIOS

NO ACTION—CURRENT IMPROVEMENTS ONLY

Existing transportation network supplemented with improvement projects currently under consideration or in construction.

1. NYS DOT Route 32 Improvements
2. Metro-North Parking expansion/Improved bus access at Harriman Station
3. County Bus Study Initiative
4. I-86 Conversion
5. CR105 Bridge Replacement and Intersection Improvements

TRANSPORTATION MANAGEMENT STRATEGIES – NON-CAPITAL PROJECTS

Traffic control only through the use of limiting access and signal timing.

ROUTE 32

1. Access Management throughout corridor
2. Synchronize traffic lights between Woodbury Common and Route 6

ROUTE 17M

1. Eliminate driveways
2. Rear service roads to business
3. No left turn off of Mill Pond from Route 17M

ROUTE 208

1. Access management

CR 105

1. Access management

ROADWAY FOCUSED INVESTMENT – CAPITAL PROJECTS

Traffic control through increasing capacity by capital improvement projects.

ROUTE 17 (I-86)

1. Collector-Distributor Road within existing Nininger Road/Dunderberg Road right-of-way
2. Town Road between Route 208 and CR105/ Larkin Road

ROUTE 32

1. Loop Ramp to Route 17 from SB Route 32 by Exxon Gas Station, south of Route 17
2. New Thruway interchange at Cornwall
3. New loop ramp to Thruway from Woodbury Common

ROUTE 17M

1. New road to Larkin Drive in Harriman
2. Two lanes in each direction between 208 and Route 17 in Harriman

ROUTE 208

1. New Route 208 bypass between Round Hill Road and Route17 at exit 130

CR 105

1. New interchange to new Route 17 collector/distributor road

TRANSIT FOCUSED INVESTMENT

Transportation management through increasing transit access.

1. Hubs/Circulators in different areas in the county
2. New Metro-North Railroad Station at Woodbury Commons
3. Line-haul improvements for Metro-North
4. Fixed Route Bus Service
5. Inter-Hamlet Transit Service
6. Expanded Dial-a-Bus service
7. Shuttle Bus system

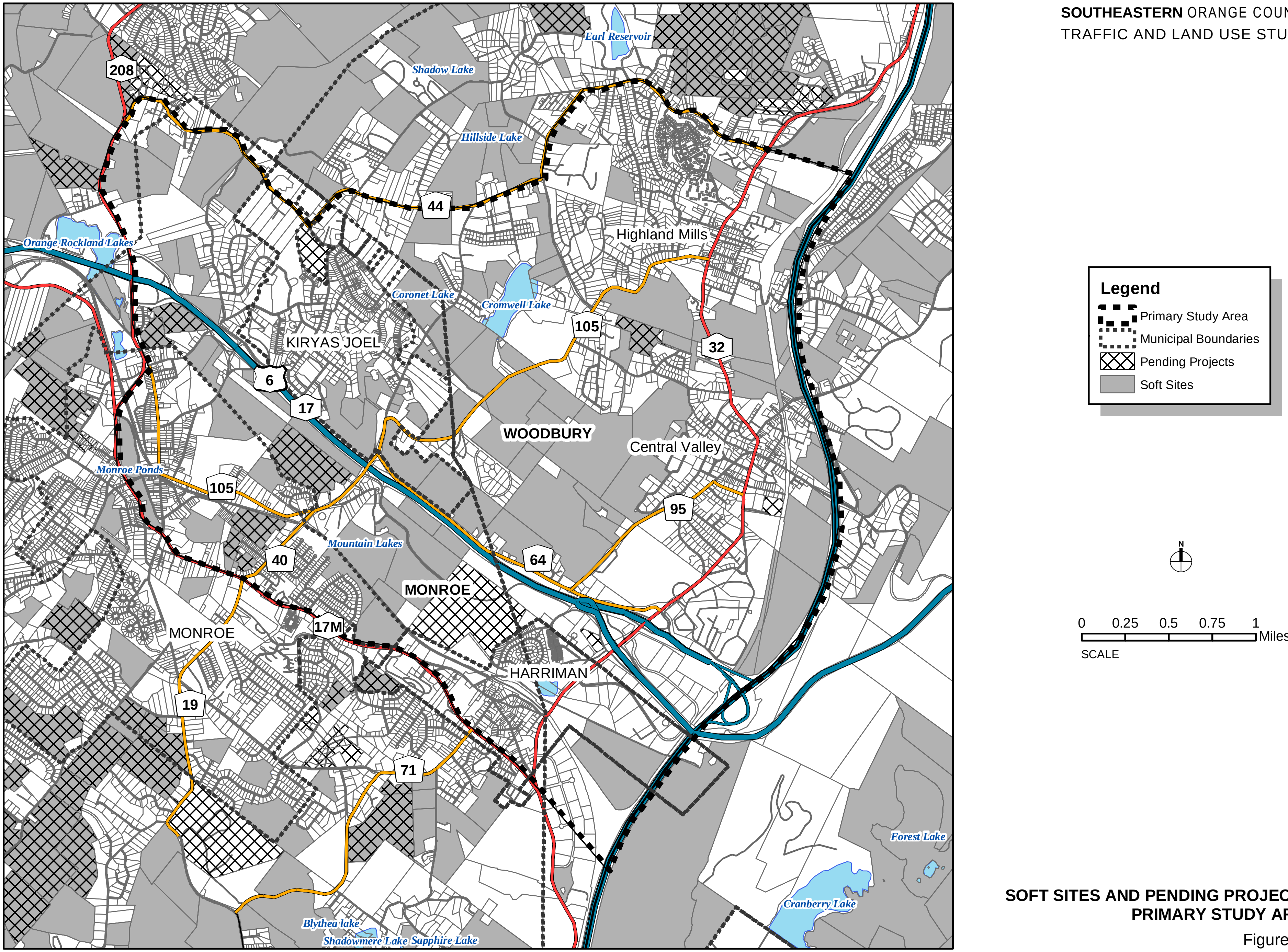
D. MODELING RUNS

A matrix of land use scenarios and transportation scenarios was then developed as an organizational tool for analyzing future conditions (see Figure 3-14). Within that matrix, the following 13 conditions were evaluated in addition to the Null Condition (existing land use with current “No Action” transportation improvements):

1. Null: existing (2003) land use with “No action current Improvement” Transportation Scenario.
2. Full Zoning Build Out with “No action current Improvement”
3. Full Zoning Build Out with “Transportation Management Strategies”
4. Full Zoning Build Out with “Roadway Focused Investment”
5. Village Center Scenario with “No action current Improvement”
6. Village Center Scenario with “Transportation Management Strategies”
7. Village Center Scenario with “Roadway Focused Investment”
8. Village Center Scenario with “Transit Focused Investment”
9. Reduced Density with “No action current Improvement”
10. Reduced Density with “Transportation Management Strategies”
11. Reduced Density with “Roadway Focused Investment”
12. Infrastructure Based Zoning with “No action current Improvement”
13. Infrastructure Based Zoning with “Transportation Management Strategies”
14. Infrastructure Based Zoning with “Roadway Focused Investment”

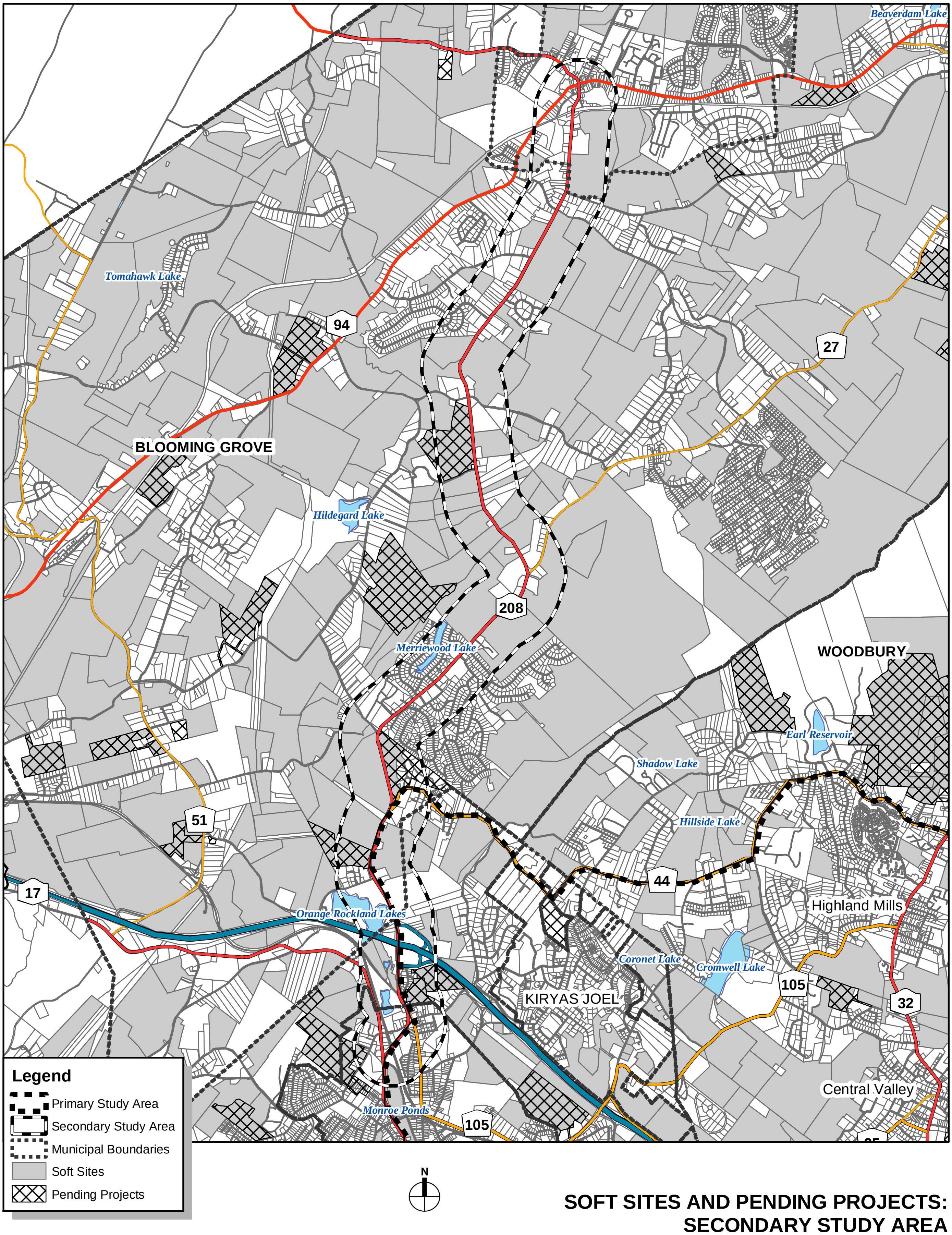
✷

SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY



SOFT SITES AND PENDING PROJECTS: PRIMARY STUDY AREA

Figure 3-1

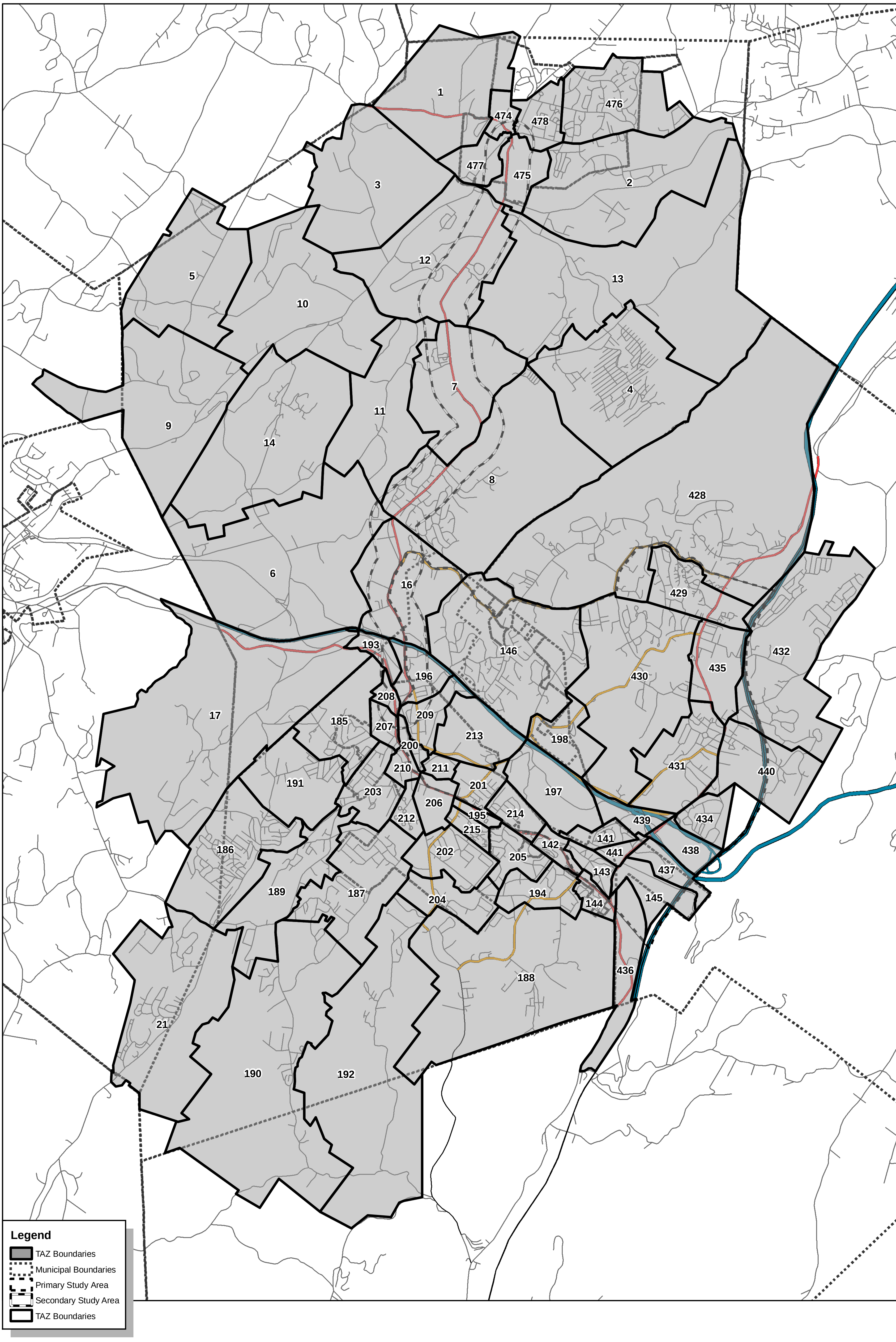


SOFT SITES AND PENDING PROJECTS: SECONDARY STUDY AREA

Figure 3-2

SOUTHEASTERN ORANGE COUNTY

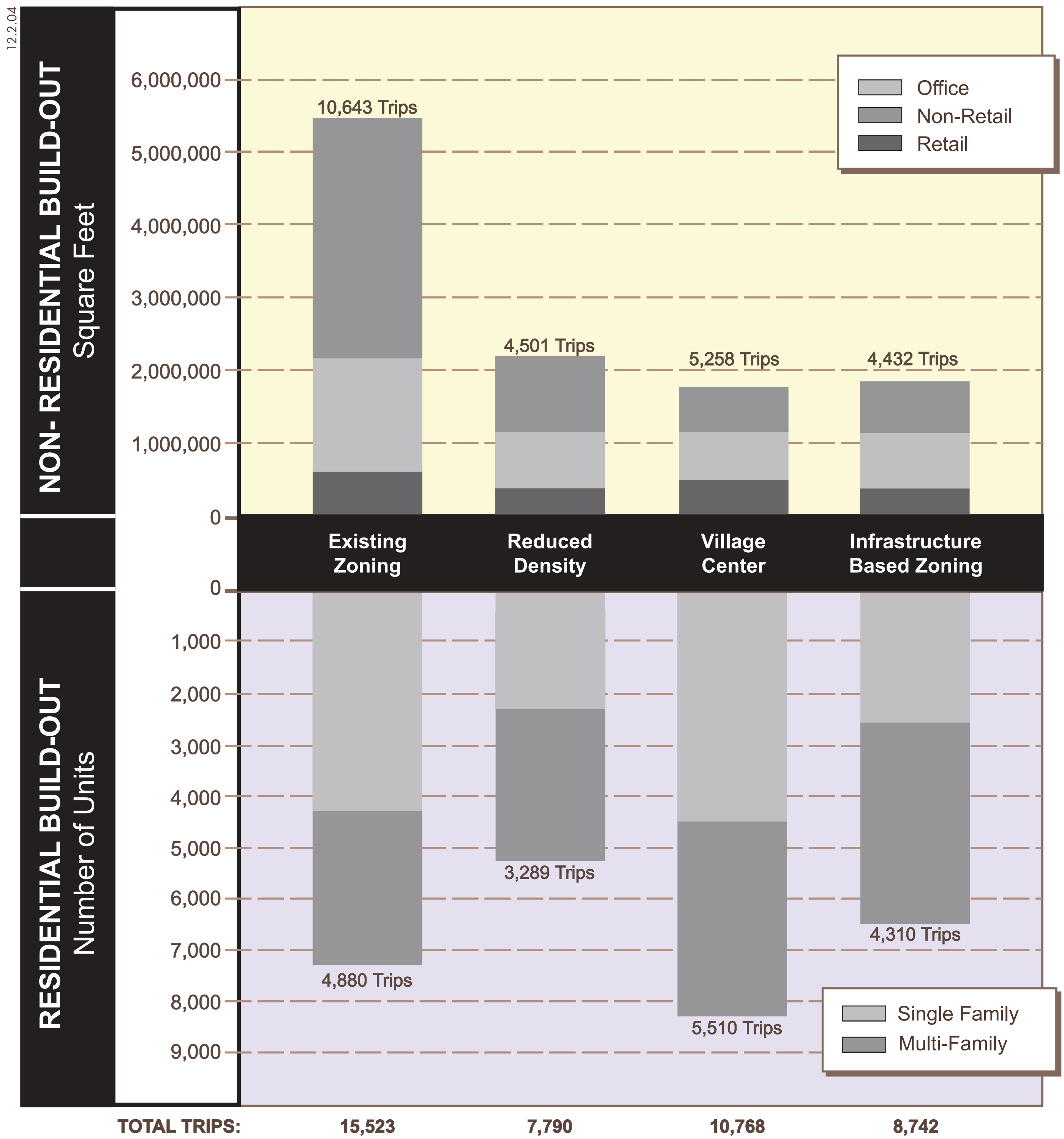
TRAFFIC AND LAND USE STUDY



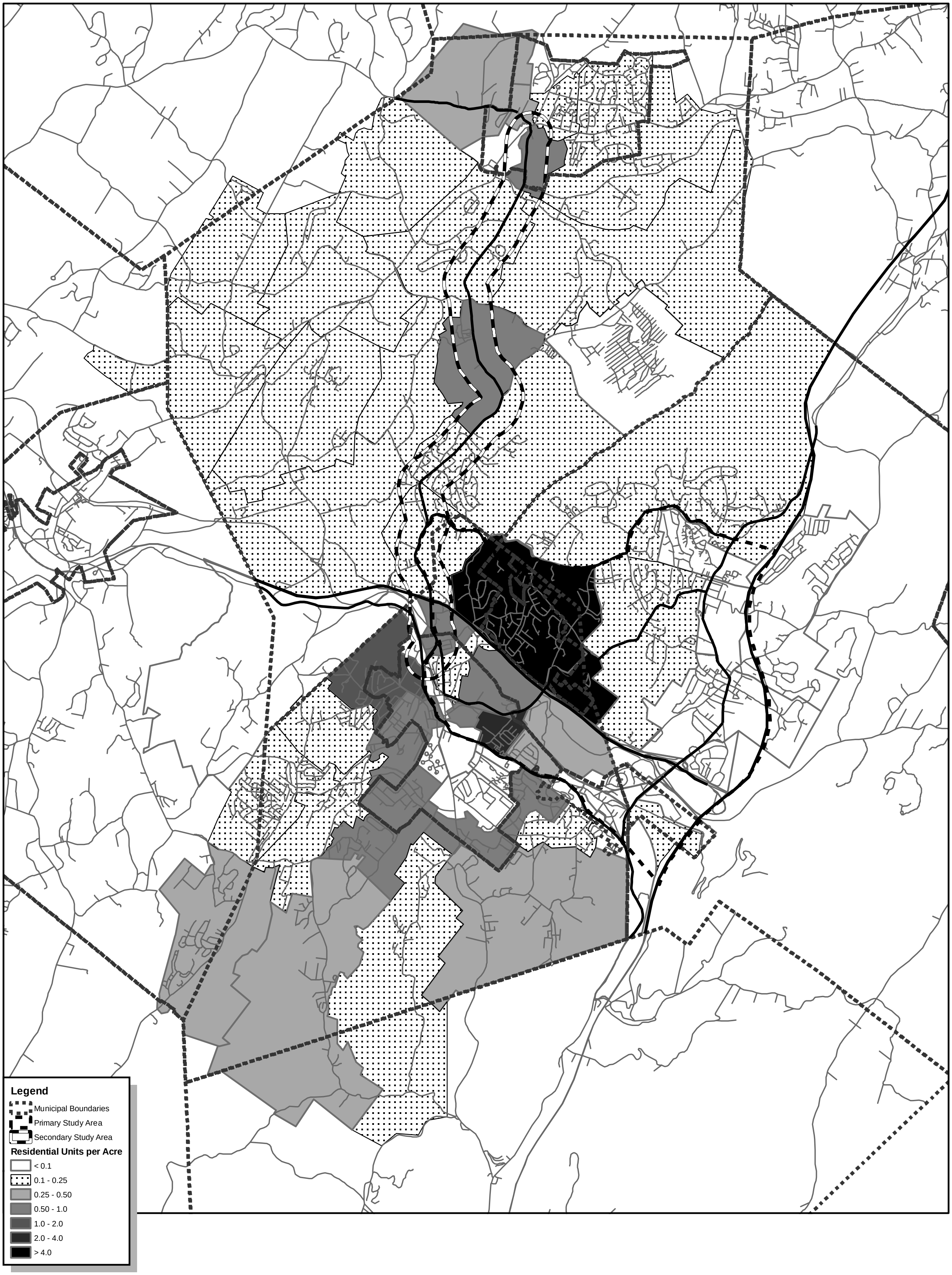
SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

TAZ BOUNDARIES
Figure 3-3

VILLAGE CENTERS
Figure 3-4

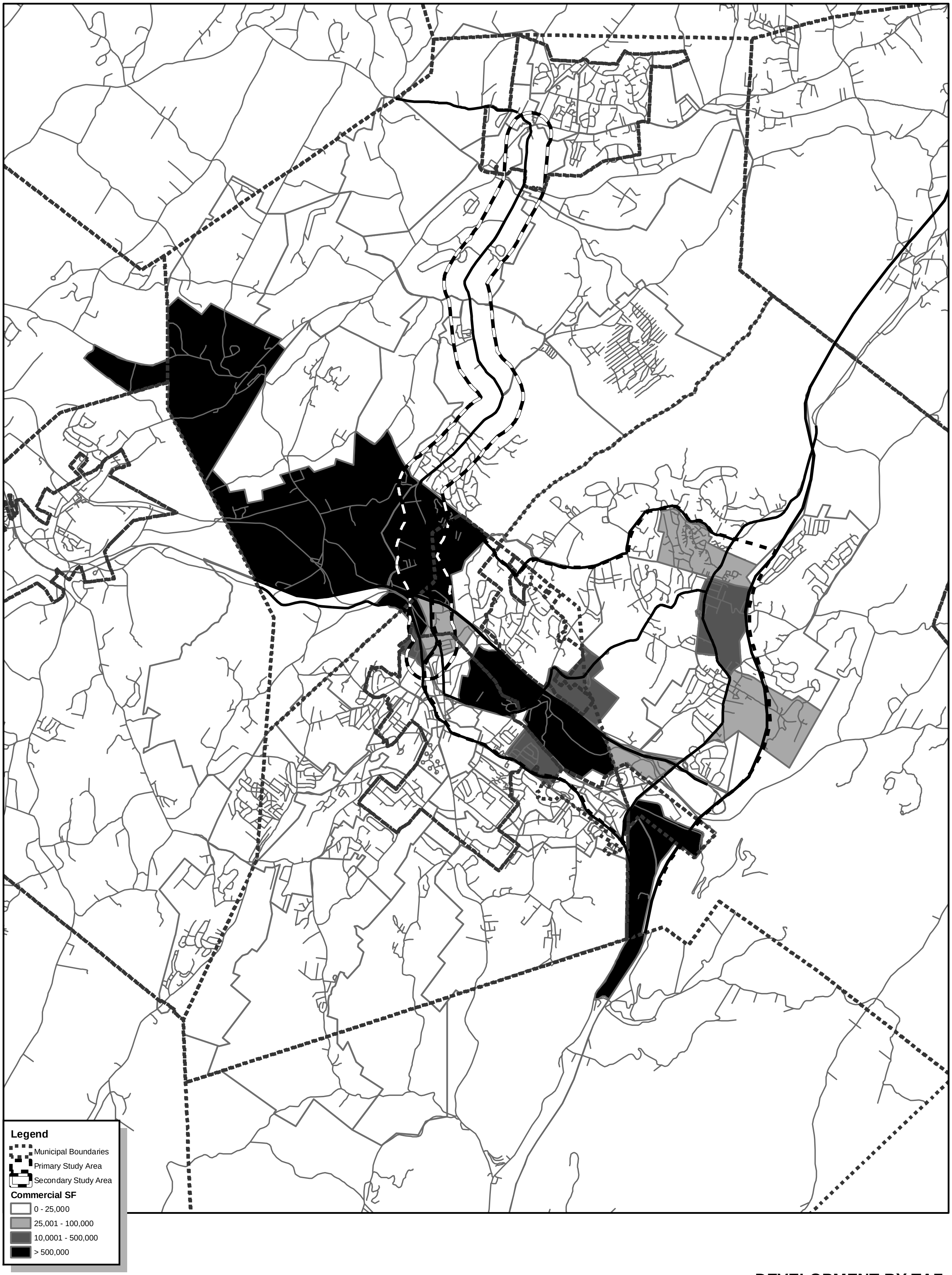


Build-Out Forecast
Figure 3-5



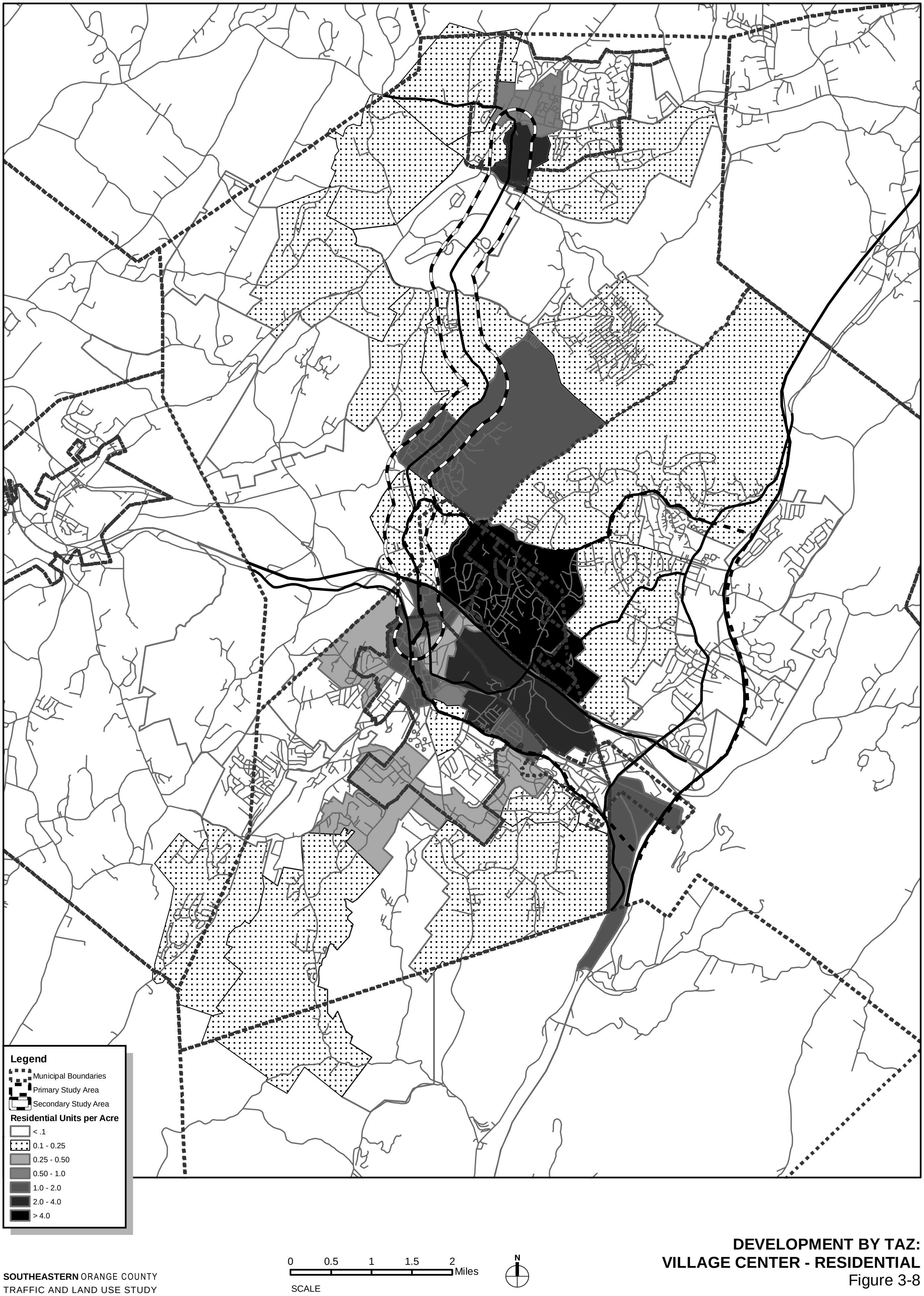
SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

DEVELOPMENT BY TAZ:
EXISTING ZONING - RESIDENTIAL
Figure 3-6

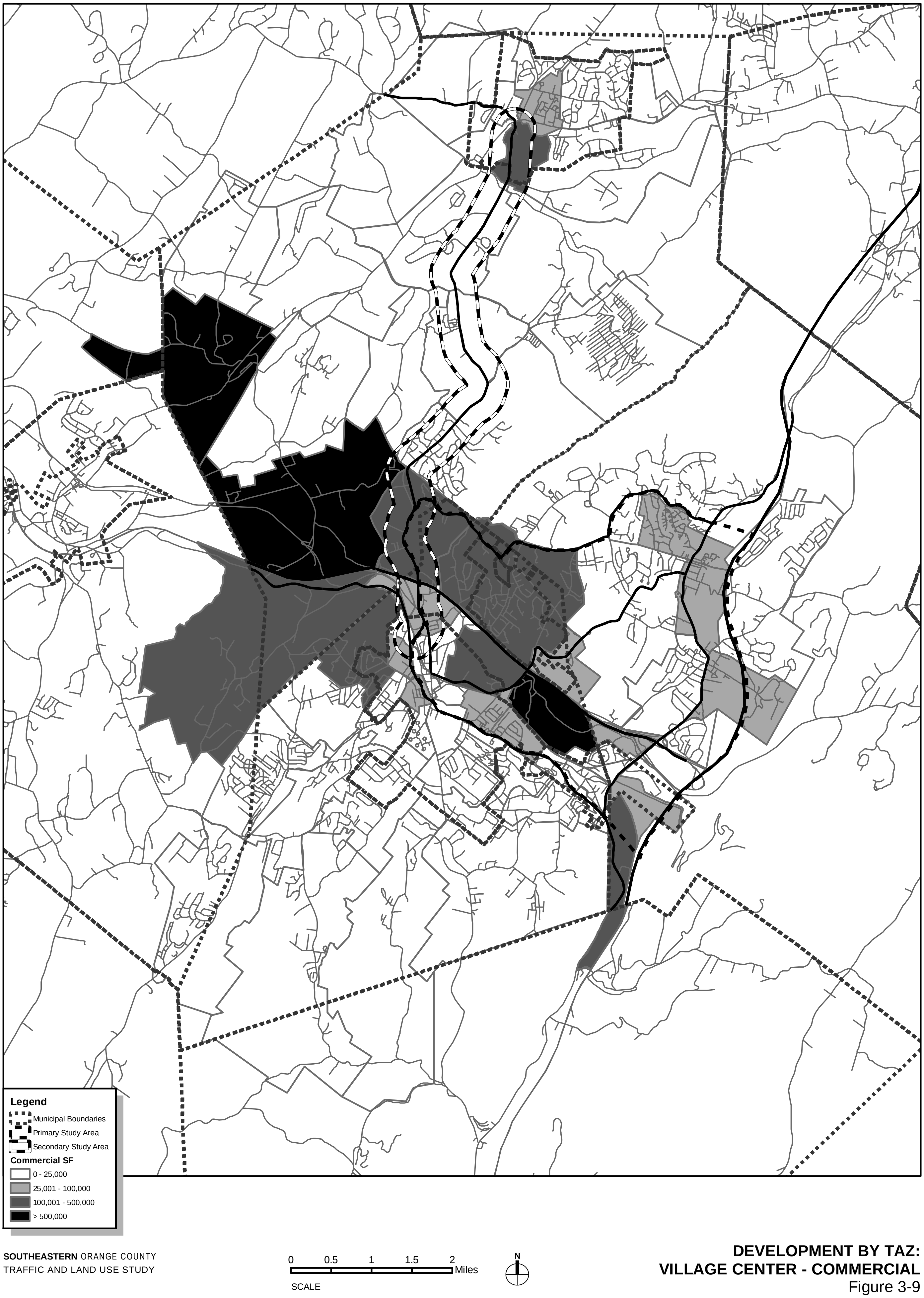


SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

DEVELOPMENT BY TAZ:
EXISTING ZONING - COMMERCIAL
Figure 3-7

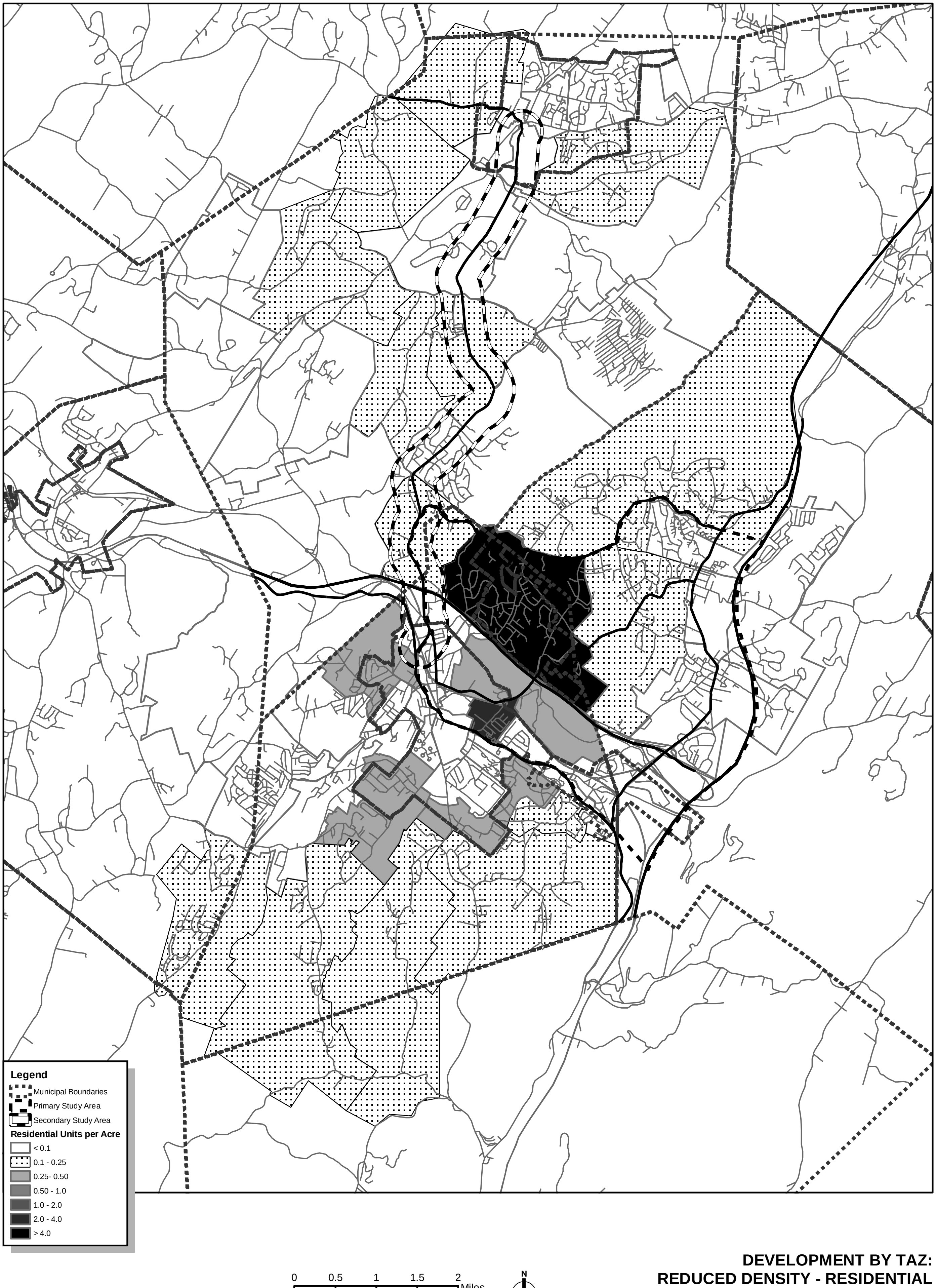


DEVELOPMENT BY TAZ:
VILLAGE CENTER - RESIDENTIAL
Figure 3-8

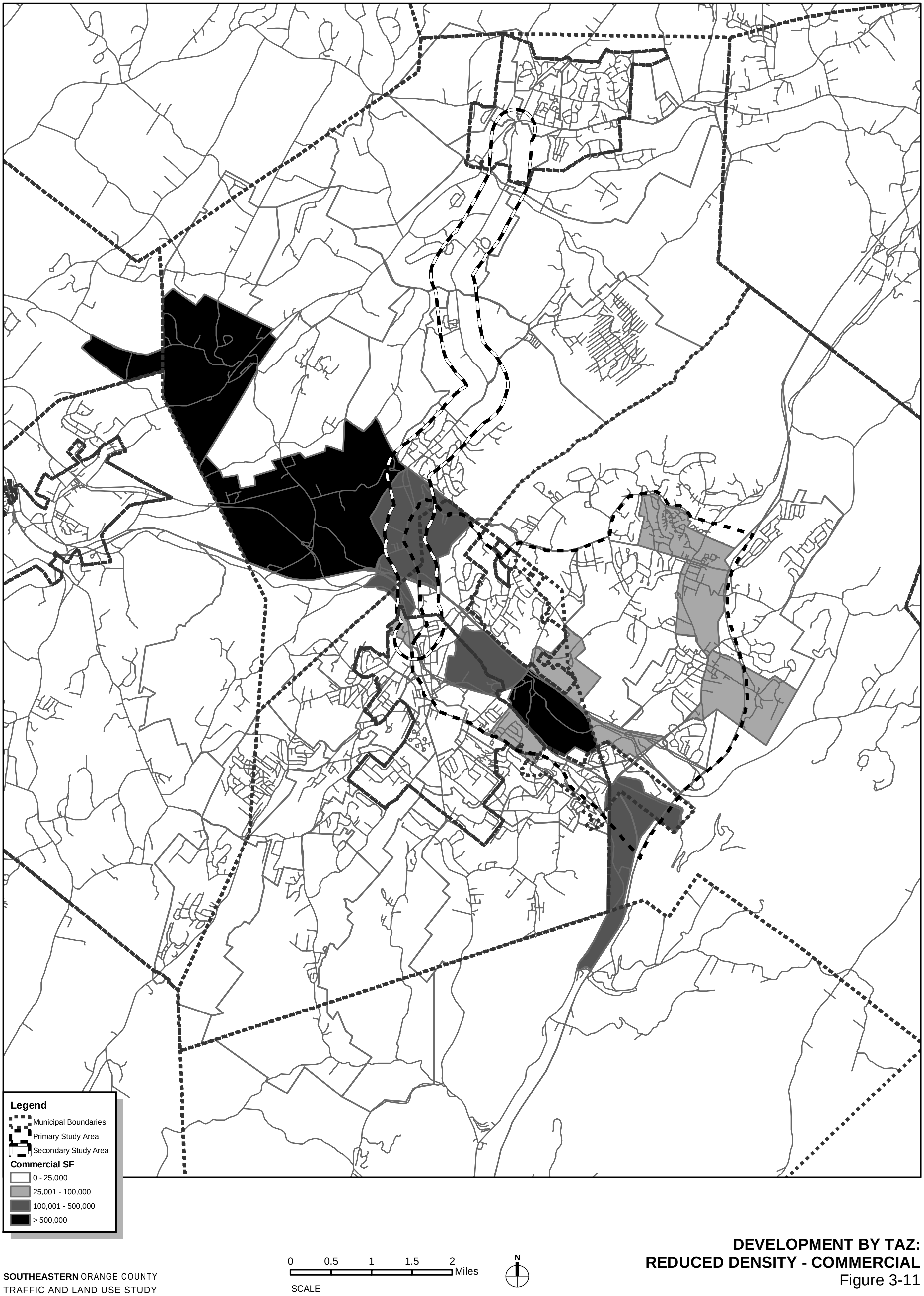


SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

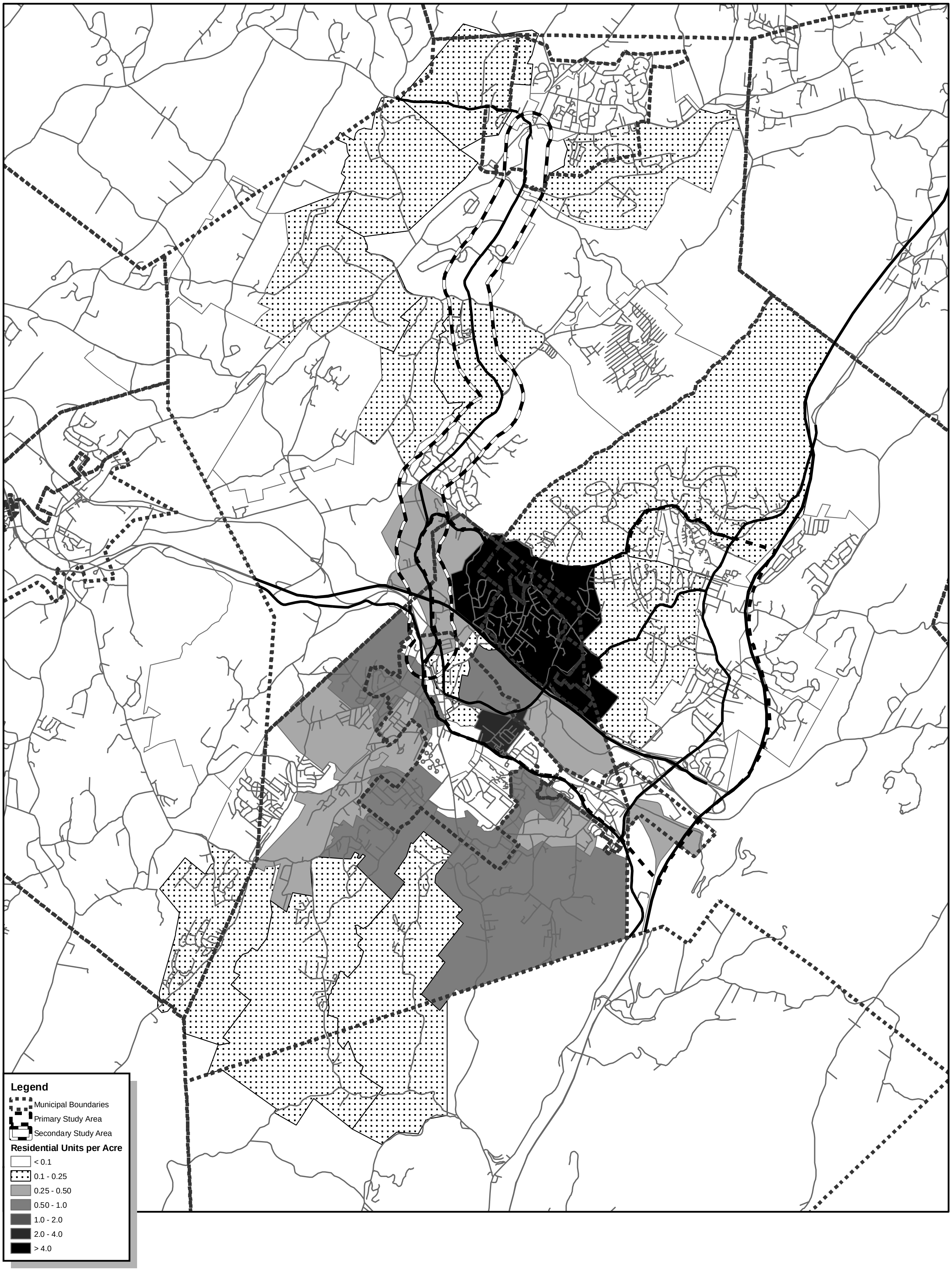
DEVELOPMENT BY TAZ:
VILLAGE CENTER - COMMERCIAL
Figure 3-9



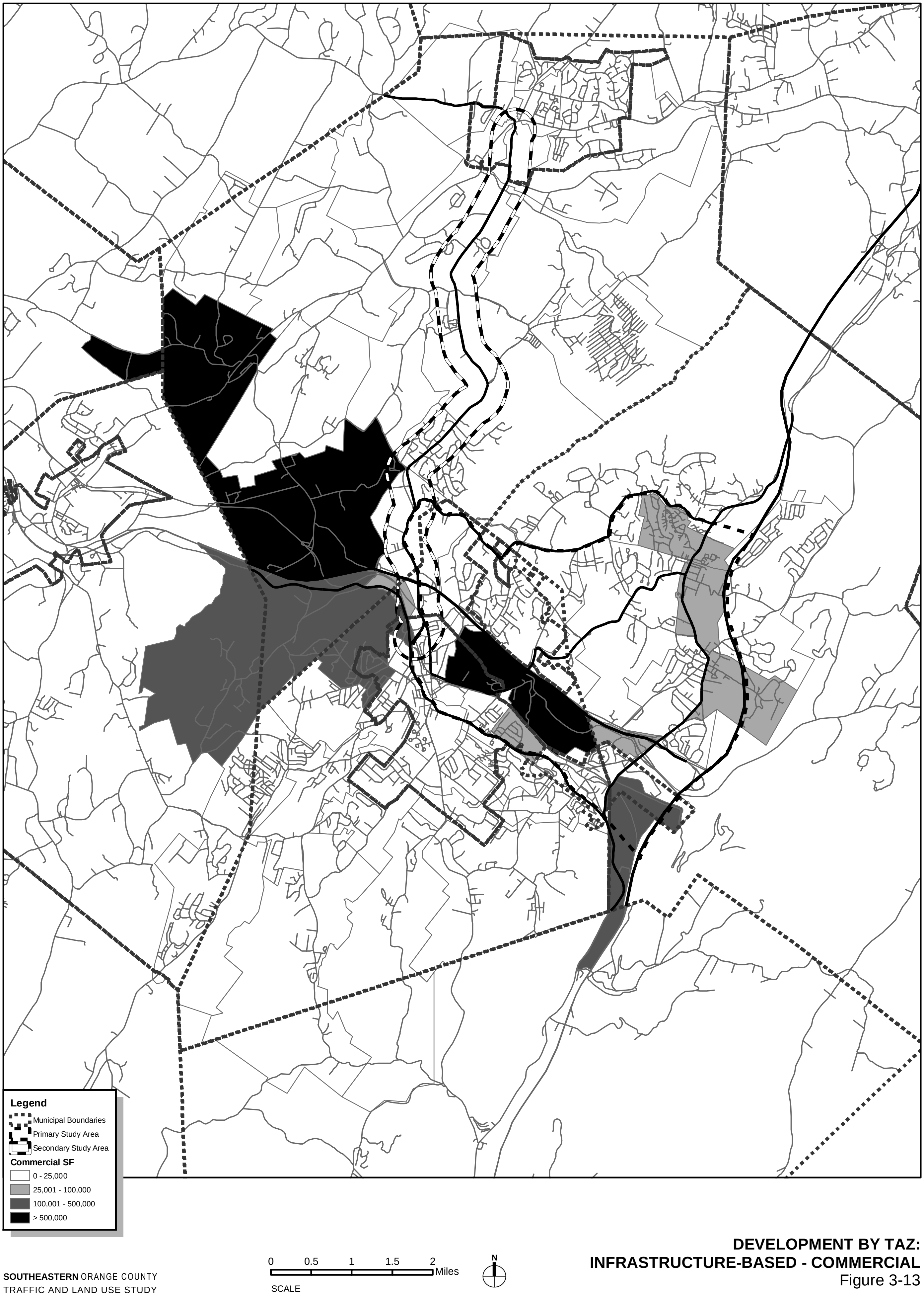
DEVELOPMENT BY TAZ:
REDUCED DENSITY - RESIDENTIAL
Figure 3-10



DEVELOPMENT BY TAZ:
REDUCED DENSITY - COMMERCIAL
Figure 3-11



DEVELOPMENT BY TAZ:
INFRASTRUCTURE-BASED - RESIDENTIAL
Figure 3-12



SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

DEVELOPMENT BY TAZ:
INFRASTRUCTURE-BASED - COMMERCIAL
Figure 3-13

A. INTRODUCTION

Chapter 3 of this report identified the methodology and results of the land use development scenarios and the improvements considered in the transportation scenarios. This chapter summarizes the results of the traffic analysis that evaluates corridor specific conditions based on future growth.

B. METHODOLOGY

Based upon the land use development projections, trip generation values, and trip distribution patterns, traffic was assigned to the roadway network depending on: a) the amount of development, and b) the likely path that vehicles generated by that development would take within the roadway network. T-MODEL2, a multi-dimensional traffic model, was used to model the entire Study Area network. Orange County Department of Planning maintains a fully developed model of the entire County, which was updated and refined to include all known proposed development and transportation improvement projects that are currently under consideration within the Study Area boundaries. This updated model became the basis for the No-Build or "Null" condition, since these projects will be progressed independent of the study findings. The development associated with the three land use scenarios and the infrastructure improvements included in the three transportation scenarios were used as inputs to model future conditions within the study area.

The results of T-MODEL2 are reported in the number of vehicles during the modeled peak hour (in this case the PM peak hour) on any one link (roadway segment between key intersections) within the network. The output volumes from the T-MODEL2 runs were then inserted into a second traffic modeling software, Synchro, to analyze traffic operations along the project corridors and calculate the Level of Service (LOS) at corridor intersections. Synchro is a comprehensive software package designed to model and optimize traffic signal timings. Utilizing the methods of the 2000 Highway Capacity Manual, the program calculates the capacity and delays at each individual intersection and evaluates the timing plans and operations in a system of coordinated traffic signals.

C. T-MODEL2 ANALYSIS RESULTS

T-MODEL2 analyses were completed for both the 2020 analysis year and for full land use build-out to provide an overall picture of traffic conditions within the study area. As shown in Figure 3-5, the amount of development for the build-out condition proposed under each of the three land use scenarios is substantially lower than for the "Existing Zoning" condition. The majority of reduced development potential is in the amount of commercial space in the Reduced Density, Village Center, and Infrastructure Based Zoning scenarios, which is almost one-third of the amount allowed by the Existing Zoning scenario. The level of residential development within the study area is fairly consistent with each of the development alternatives accounting for approximately 5,000 to 8,000 new single and multi-family units. Residential build-out under the Existing Zoning scenario would result in approximately 7,200 new single and multi-family units.

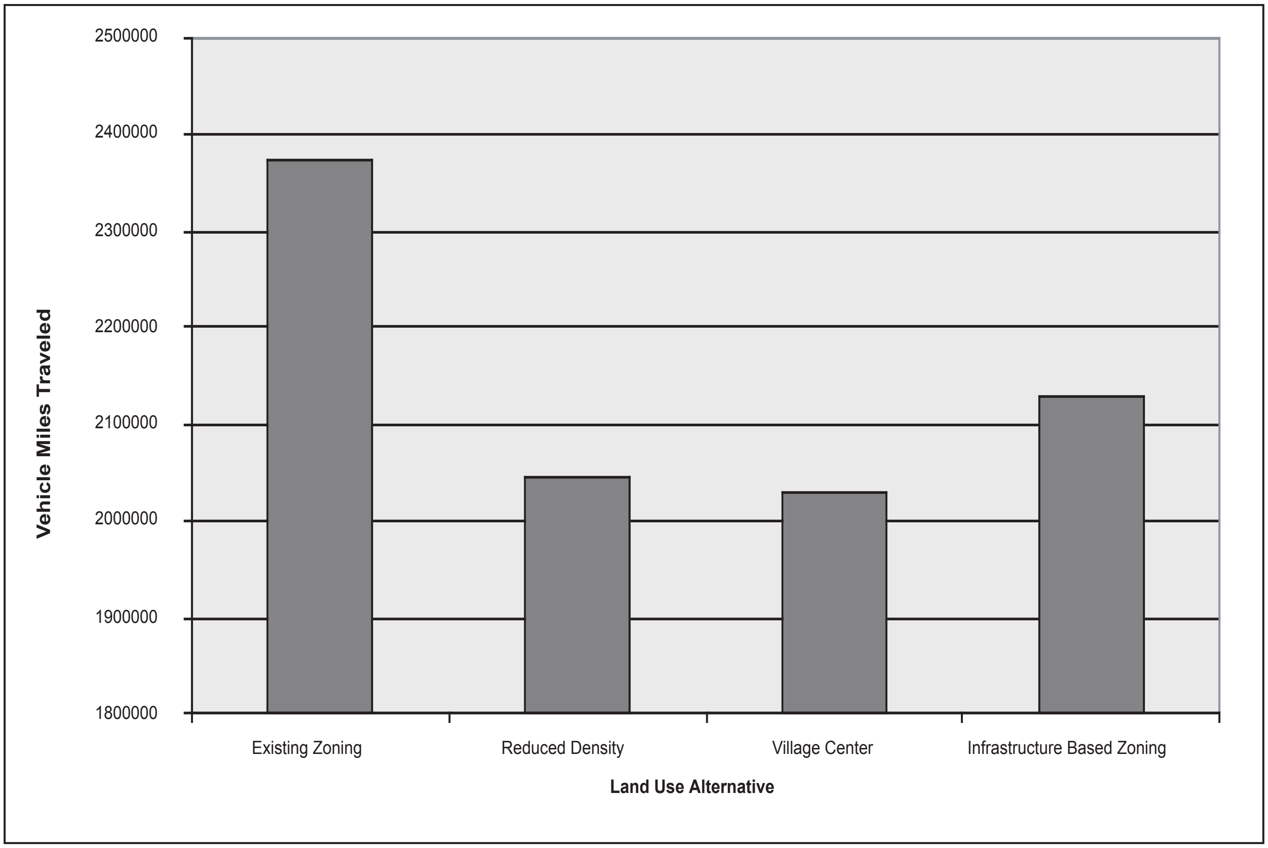
The amount of development in each Transportation Analysis Zone (TAZ) was input into the TMODEL2 program for each land use scenario and the study area network was modified to include the transportation improvements included in each of the transportation scenarios. The reduction in the amount of allowable development in the three land use alternatives has a direct impact on the number of Vehicle Miles Traveled under the full build-out condition. Vehicle Miles Traveled, or VMT, is a measure of the total distance of vehicle operation within a transportation system during a fixed amount of time and is a value used to compare the effectiveness of different transportation and land use solutions. Chart 4-1 presents VMT within the project study area during the PM peak hour period under the full build-out condition. Implementation of any of the land use scenarios other than the Existing Zoning scenario would result in an almost 20 percent reduction in VMT over the Existing Zoning scenario, with both the Reduced Density and Village Center scenarios producing the largest reduction in VMT, and the Infrastructure Based Zoning scenario having a slightly smaller reduction. Vehicle Hours of Delay (VHD) is a comparative measure of the congestion within the transportation system and is calculated by taking the difference between the expected and actual travel times through the network. The change in land use resulting from the three development patterns results in a marked decrease in VHD as compared to the development under The Existing Zoning Scenario For the full build-out condition, VHD would decrease by over 70 percent from the levels expected under The No-Build transportation scenario. Chart 4-1 compares VHD between the No-Build Alternative, which is at over 700,000 hours of delay, to the VHD expected from the various combinations of transportation and land use scenarios. All of the transportation/land use combinations would result in less than 200,000 hours of delay, with the Village Center/Traffic Management System and Village Center/Roadway Focused Investment schemes having less than 150,000 hours of delay.

D. LEVEL OF SERVICE ANALYSIS

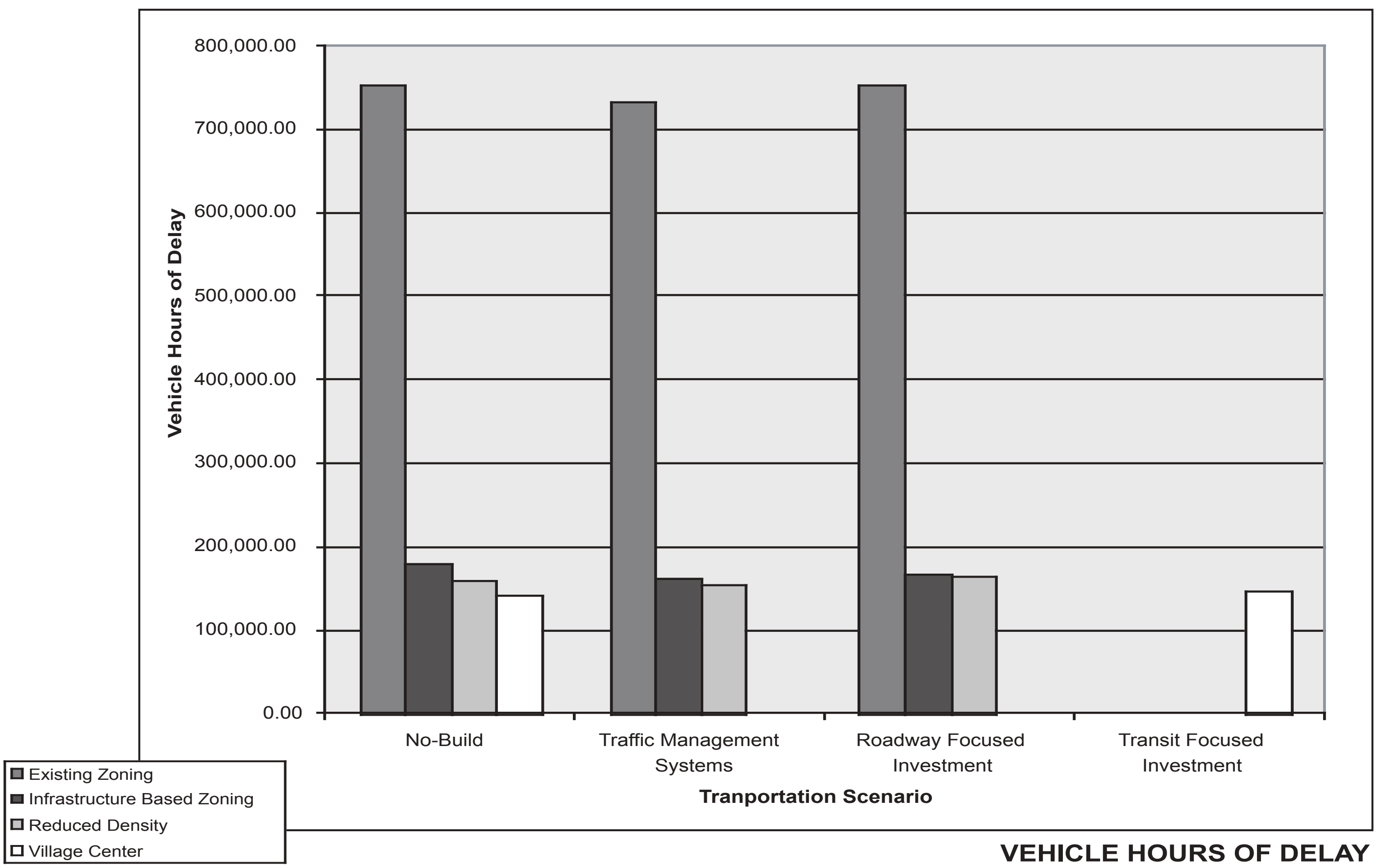
Based upon the T-MODEL2 results, it was determined that the 14 modeling runs identified in Chapter 3 could be narrowed down to five different conditions for purposes of Synchro analysis. Specifically, it was found that the Infrastructure Based Zoning scenario did not constrain development as much as had been anticipated and that the Reduced Density Zoning scenario was a more likely approximate of the lower range of potential land use development. It was also determined that the Transit Focused Investment scenario should only be analyzed with the Village Center land use scenario.

Thus, five different conditions were analyzed using Synchro to evaluate the range of potential operating conditions within the roadway network:

- Modeling Run No. 1)—Build-out under Existing Zoning with Current traffic improvements; and
- Modeling Run No. 2)—Land use build-out under Existing Zoning with Transportation Management Systems improvements; and
- Modeling Run No. 3)—Land use build-out under Reduced Density Zoning with Transportation Management Systems improvements; and



BUILD-OUT CONDITIONS



VEHICLE HOURS OF DELAY

VMT and VHD Analysis

Chart 4-1

- Modeling Run No. 4)—Land use build-out under Reduced Density Zoning with Roadway Focused Investment improvements; and
- Modeling Run No. 5)—Land use build-out under Existing Zoning with Roadway Focused Investment improvements.

Modeling Run (MR) No. 1 analyzes the effect of select traffic improvements (improvements to signalization on Route 32, improvements to CR 105, conversion of Route 17 to I-86, the County bus initiative, and improvements to the parking and bus access at the Harriman Train Station) for traffic generated only by existing conditions and pending projects. This modeling run answers whether current planned improvements to the roadway network can handle existing and near-term development.

MR No. 2 analyzes what will happen if land use development continues at its current pace and current pattern and no significant roadway infrastructure changes are made beyond access management improvements and signal timing optimizations along key corridors.

MR No. 3 shows the effect of modifying the land use pattern by reducing density, but not making any significant roadway infrastructure changes. This modeling run can be compared directly to MR No. 2 to see if a change in land use would make a significant difference.

MR No. 4 analyzes the effect of reducing overall land use density and making significant roadway infrastructure investments.

MR No. 5 can be used as a comparison with MR No. 4 to show what would happen if the same transportation improvements were made but land use allowed to proceed under existing zoning.

Each of the five modeling runs was performed for the full build-out and horizon year (2020) conditions. Table 4-1 compares the Level of Service on NYS Route 17M for the five modeling runs under the full build-out condition. With no improvements to the existing roadway, the intersections between NYS Route 208 and Still Road would operate at LOS F with both the NYS Route 17M and the local road approaches having significant amounts of delay. With NYS Route 17M operating at its capacity and unable to process the peak hour demand for this roadway, traffic on the major feeder roads, like Lake Street/Road, Stage Road, and Still Road would back up through multiple signal cycles. The access management, signal phasing modifications, and rear service road improvements proposed under the TMS transportation scenario would generally improve conditions along NYS Route 17M; however, there would still be some residual congestion on the Lakes Road, Stage Road, and Still Road approaches. Only the widening of NYS Route 17M to two lanes in each direction in the Roadway Focused Investment Scenario would provide service levels of D or better at the signalized intersections along NYS Route 17M. Table 4-2 compares LOS on NYS Route 17M for the 2020 analysis year.

Table 4-3 compares the Level of Service on NYS Route 32 for the five modeling runs under the full build out condition. With no improvements to the existing roadway the majority of the approaches to the intersections between Larkin Drive/US Route 6 and Woodbury Common would operate at LOS E/F. The signal timing and phasing modifications in the TMS transportation scenario do improve conditions at some intersections, with only the Nininger Road and NYS Route 17 Eastbound off-ramp intersections operating at LOS E/F during the peak hour periods. The interchange improvements at Route 17 Exit 131 and the construction of the new NYS Route 17 westbound C-D Road, which are part of the Roadway Focused Investment

Scenario, result in all of the intersections operating at LOS D or better during the peak hour period. Table 4-4 compares LOS on NYS Route 32 for the 2020 analysis year.

Table 4-5 compares the Level of Service on NYS Route 208 for the five modeling runs under the full build out condition. Table 4-6 compares LOS on NYS Route 208 for the 2020 analysis year.

E. SELECT LINK ANALYSIS

A Select Link Analysis (SLA) was performed to evaluate how the larger transportation improvement projects included in the Roadway Focused Investment Scenario would affect travel patterns throughout the project study area. The SLA is a component of T-MODEL2, which isolates a particular link in the roadway network and identifies the origins and destinations of the traffic using the roadway feature. This tool is particularly useful in identifying the most cost-effective capital improvements to pursue, while making sure that any resulting shifts in travel patterns would not adversely impact adjacent roadway segments. The SLA also helps to identify additional improvements required to address intersections or sections of the roadway network where poor operating levels of service persist, even with capital improvements.

Six locations were selected for this analysis:

- SL1: Route 17 westbound off-ramp to Route 32
- SL2: Cornwall Interchange – northbound off-ramp
- SL3: CR 105 Interchange/Collector-Distributor Road off-ramp
- SL4: Bailey Farm Road/Route 17M Bypass
- SL5: Route 208 Bypass
- SL6: Larkin Drive Extension

One of the key findings from the SLA was the importance of the NYS Route 17 (Future I-86) corridor's ability to process traffic through the study area and its impact on the adjacent roadway network. The TMODEL2 runs showed that NYS Route 17 would reach its capacity prior to the 2020 analysis year and that traffic would use alternative routes to bypass the congested links of roadway. The New York State Thruway, NYS Route 32, County Route 105, and many of the smaller local roadways in the Towns of Monroe and Woodbury would be the recipients of this overflow traffic. To account for this factor each select link was evaluated with the current capacity on NYS Route 17 (two lanes in each direction) and with NYS Route 17 widened to 3 lanes in each direction. Figures 4-1 to 4-2 show traffic flow for each of the six select links analyzed with the existing two lanes in each direction on Route 17 and with Route 17 widened to three lanes in each direction.

SL1: ROUTE 17 WESTBOUND OFF-RAMP TO ROUTE 32

A SLA was performed on the NYS Route 17 westbound off-ramp to help determine this traffic's impact on NYS Route 32 through the Hamlets of Central Valley and Highland Mills. With the Roadway Focused Investment improvements in place but with no widening of NYS Route 17, 849 vehicles in the PM peak hour would exit Route 17 westbound at the off-ramp to Route 32. Of those 849 vehicles, 52 percent (441 vehicles) travel south on Route 32 with the remaining 48 percent (398) traveling north towards the two downtown areas. Almost all of these 398 vehicles travel through Central Valley, where approximately 1/3 of the vehicles (131) turn right on Smith

Table 4-1
Route 17M Corridor
Full Build-out Weekday PM Peak Hour

Intersection	Node No.	Control	Dir	Existing Conditions Delay (sec/veh)	Existing Conditions LOS	Build-out w/ Existing Zoning and Transportation Management Systems Delay (sec/veh)	Build-out w/ Existing Zoning and Transportation Management Systems LOS	Build-out w/ Reduced Density Zoning and Transportation Management Systems Delay (sec/veh)	Build-out w/ Reduced Density Zoning and Transportation Management Systems LOS	Build-out w/ Reduced Density Zoning and Roadway Focused Investment Delay (sec/veh)	Build-out w/ Reduced Density Zoning and Roadway Focused Investment LOS
Route 17M & Route 208	1	Signalized	WB	30.7	C	21.6	C	107.1	F	7.6	A
			NB	17.6	B	**	F	17.0	B	9.2	A
			SB	33.7	C	**	F	109.9	F	11.2	B
			Int	**29.1**	**C**	**	**F**	**93.8**	**F**	**9.5**	**A**
Route 17M & Shop Rite Parking Lot	2	Signalized	EB	16.2	B	217.5	F	15.3	B	7.7	A
			NB	7.8	A	63.8	E	14.4	B	10.7	B
			SB	33.3	C	225.4	F	24.5	C	20.1	C
			Int	**13.8**	**B**	**168.6**	**F**	**16.1**	**D**	**10.3**	**B**
Route 17M & Lake Street / Lake Road (CR 19)	6	Signalized	EB	33.4	C	41.6	D	36.6	D	24.6	C
			WB	60.4	E	56.7	E	69.5	E	40.3	D
			NB	44.0	D	170.0	F	44.8	D	59.6	E
			SB	29.6	C	**	F	70.2	E	36.4	D
			Int	**9.2**	**D**	**	**F**	**56.8**	**E**	**39.9**	**D**
Route 17M & Stage Road	9	Signalized	EB	8.9	A	76.6	E	173.3	F	46.9	D
			WB	13.4	B	164.6	F	**	F	51.1	D
			NB	39.4	D	290.3	F	**	F	46.2	D
			SB	26.3	C	**	F	19.2	B	71.6	E
			Int	**17.0**	**B**	**11.1**	**F**	**	**F**	**59.0**	**D**
Route 17M & Freeland Street (CR40) / Still Road (CR 19)	12	Signalized	EB	51.1	D	95.9	F	90.8	F	20.0	B
			WB	59.3	E	95.1	F	167.4	F	30.1	C
			NB	32.5	C	**	F	140.3	F	27.9	C
			SB	25.6	C	232.2	F	39.7	D	24.2	C
			Int	**43.7**	**D**	**214.3**	**F**	**118.4**	**F**	**26.2**	**C**
Route 17M & Kmart Entrance	17	Signalized	EB	18.3	B	30.5	C	6.5	A	6.2	A
			WB	7.1	A	71.7	E	22.3	C	7.6	A
			NB	23.4	C	33.1	C	54.6	D	23.5	C
			SB	23.9	C	37.8	D	34.3	C	20.2	C
			Int	**13.3**	**B**	**50.4**	**D**	**18.8**	**B**	**8.5**	**A**
Route 17M & North Main Street	18	Signalized	EB	4.7	A	8.6	A	11.8	B	8.6	A
			WB	0.0	A	0.0	A	0.0	A	0.0	A
			SB	22.6	C	269.8	F	125.6	F	**	F
			Int	**7.3**	**A**	**80.7**	**F**	**30.6**	**D**	**101.1**	**F**

Table 4-2
Route 17M Corridor
2020 Weekday PM Peak Hour

Intersection	Node No.	Control	Dir	No Build Conditions with Optimizations Delay (sec/veh)	LOS	Build-out w/ Existing Zoning and Transportation Management Systems Delay (sec/veh)	LOS	Build-out w/ Reduced Density Zoning and Transportation Management Systems Delay (sec/veh)	LOS	Build-out w/ Reduced Density Zoning and Roadway Focused Investment Delay (sec/veh)	LOS	Build-out w/ Existing Zoning and Roadway Focused Investment Delay (sec/veh)	LOS
Route 17M & Route 208	1	Signalized	WB	20.9	C	47.1	D	21.8	C	18.3	B	45.7	D
			NB	11.4	B	14.5	B	13.2	B	12.6	B	14.6	B
			SB	20.9	C	39.8	D	22.5	C	18.7	B	31.9	C
			Int	**19.1**	**B**	**39.2**	**D**	**20.7**	**C**	**17.5**	**B**	**34.1**	**C**
Route 17M & Shop Rite Parking Lot	2	Signalized	EB	142.2	F	69.1	E	122.6	F	241.5	F	347.5	F
			NB	9.8	A	9.6	A	9.8	A	17.8	B	25.6	C
			SB	10.6	B	10.7	B	10.1	B	20.6	C	27.6	C
			Int	**25.0**	**C**	**14.2**	**B**	**19.6**	**B**	**41.4**	**D**	**57.1**	**E**
Route 17M & Lake Street / Lake Road (CR 19)	6	Signalized	EB	35.8	D	54.3	D	37.6	D	107.9	F	80.5	F
			WB	44.7	D	51.4	D	53.9	D	71.6	E	94.4	F
			NB	30.5	C	51.5	D	48.8	D	77.2	E	86.9	F
			SB	34.1	C	62.9	E	57.4	E	72.7	E	66.1	E
			Int	**36.9**	**D**	**54.5**	**D**	**49.2**	**D**	**82.9**	**F**	**84.0**	**F**
Route 17M & Stage Road	9	Signalized	EB	4.4	A	8.2	A	2.6	A	5.9	A	8.0	A
			WB	8.9	A	6.1	A	15.9	B	16.6	B	34.4	C
			NB	27.3	C	28.1	C	41.3	D	36.4	D	32.5	C
			SB	54.4	D	34.3	C	88.9	F	65.8	E	46.9	D
			Int	**18.0**	**B**	**14.6**	**B**	**24.3**	**C**	**21.3**	**C**	**26.7**	**C**
Route 17M & Freeland Street (CR40) / Still Road (CR 19)	12	Signalized	EB	21.7	C	34.2	C	37.6	D	18.3	B	47.2	D
			WB	79.7	E	132.5	F	142.4	F	35.4	D	100.0	F
			NB	51.1	D	50.8	D	50.4	D	52.6	D	62.3	E
			SB	39.8	D	51.2	D	34.2	C	49.9	D	69.4	E
			Int	**50.2**	**D**	**71.0**	**E**	**74.9**	**E**	**37.6**	**D**	**71.6**	**E**
Route 17M & Kmart Entrance	17	Signalized	EB	8.7	A	7.5	A	8.0	A	8.1	A	9.1	A
			WB	14.5	B	14.8	B	20.2	C	16.2	B	21.1	C
			NB	41.1	D	161.3	F	59.0	E	55.4	E	61.0	E
			SB	37.4	D	58.9	E	36.9	D	40.8	D	36.9	D
			Int	**14.3**	**B**	**23.1**	**C**	**18.9**	**B**	**16.5**	**B**	**19.6**	**B**
Route 17M & North Main Street	18	Signalized	EB	15.5	B	17.4	B	17.8	B	22.5	C	27.0	C
			WB	5.2	A	6.9	A	7.4	A	5.0	A	41.2	D
			SB	193.7	F	70.5	E	66.6	E	290.8	F	215.6	F
			Int	**53.6**	**D**	**24.2**	**C**	**24.6**	**C**	**82.9**	**F**	**78.4**	**E**
Route 17M & Church Street	21	Signalized	EB	7.3	A	7.3	A	6.9	A	5.9	A	6.5	A
			WB	19.0	B	20.7	C	18.6	B	14.4	B	21.4	C
			NB	15.7	B	18.6	B	16.9	B	18.2	B	23.3	C
			SB	25.5	C	30.1	C	28.9	C	22.4	C	33.3	C
			Int	**18.4**	**B**	**20.6**	**C**	**19.4**	**B**	**15.3**	**B**	**21.5**	**C**
Route 17M & Route 17	25	Signalized	EB	7.5	A	9.0	A	6.6	A	6.4	A	8.5	A
			NB	16.3	B	16.9	B	12.0	B	12.2	B	18.9	B
			SB	40.9	D	41.3	D	29.9	C	20.0	C	54.3	D
			Int	**23.5**	**C**	**24.2**	**C**	**18.0**	**B**	**14.3**	**B**	**29.0**	**C**

Table 4-3
Route 17 and Route 32 Corridor
Full Build-out Weekday PM Peak Hour

Intersection	Node No.	Control	Dir	Existing Conditions Delay (sec/veh)	Existing Conditions LOS	Build-out w/ Existing Zoning and Transportation Management Systems Delay (sec/veh)	LOS	Build-out w/ Reduced Density Zoning and Transportation Management Systems Delay (sec/veh)	LOS	Build-out w/ Reduced Density Zoning and Roadway Focussed Investment Delay (sec/veh)	LOS
Route 17 & Larkin Drive / Route 6 On-ramp	12	Signalized	EB	44.1	D	174.4	F	93.6	F	54.7	D
			NB	**	F	91.9	F	50.2	D	43.4	D
			SB	227.7	F	31.3	C	25.0	C	27.3	C
			Int	**296.5**	**F**	**79.8**	**E**	**47.8**	**D**	**39.4**	**D**
Route 17 & Route 6 Off-ramp	11	Signalized	WB	49.6	D	91.0	F	57.6	F	54.7	D
			NB	48.2	D	9.3	A	5.5	D	4.1	D
			SB	60.2	F	11.3	B	7.6	C	7.6	C
			Int	**53.8**	**D**	**16.5**	**B**	**10.1**	**D**	**8.1**	**D**
Route 17 & Melody Lane / Woodbury Center	10	Signalized	EB	**	F	**	F	51.8	D	77.3	E
			WB	63.9	E	**	F	78.0	D	67.2	E
			NB	133.4	F	41.7	D	35.6	D	56.7	E
			SB	246.6	F	137.8	F	14.3	B	30.3	C
			Int	**188.4**	**F**	**117.7**	**F**	**31.6**	**C**	**51.5**	**D**
Route 32 & Route 17 EB On/Off -ramps	9	Signalized	EB	49.5	D	158.8	F	76.0	E	Intersection Eliminated by Construction of loop ramp at Locey Lane	
			NB	**	F	121.5	F	61.4	E		
			SB	168.5	F	**	F	43.7	D		
			Int	**206.0**	**F**	**159.3**	**F**	**57.8**	**E**		
Route 32 & Route 17 WB Off-ramp / Nininger Road	7	Signalized	EB	165.5	F	**	F	127.3	F	82.6	F
			WB	**	F	**	F	**	F	67.4	E
			NB	41.5	D	174.3	F	50.8	D	15.9	B
			SB	18.7	B	44.3	D	24.4	C	26.3	C
			Int	**191.1**	**F**	**184.8**	**F**	**171.4**	**F**	**43.7**	**D**
Route 32 & Woodbury Common South	6	Signalized	EB	43.4	D	53.8	D	47.1	C	47.1	D
			WB	45.7	D	50.1	D	44.8	C	45.1	D
			NB	120.5	F	72.9	E	22.6	C	9.7	A
			SB	22.3	C	10.0	A	9.4	A	10.2	B
			Int	**78.4**	**E**	**50.9**	**D**	**23.6**	**C**	**16.8**	**B**
Route 32 & Woodbury Common North	5	Signalized	WB	46.0	D	98.7	F	67.4	E	52.7	D
			NB	94.6	F	14.0	B	7.2	A	5.0	A
			SB	16.6	B	14.5	B	14.7	B	11.4	B
			Int	**66.2**	**E**	**14.3**	**B**	**15.3**	**B**	**11.8**	**B**
Route 32 & Edgewood Drive / Estrada Road	4	Unsignalized	EB	48.0	E	**	F	185.4	F	54.3	D
			WB	**	F	191.2	F	37.9	D	49.2	D
			NB	0.3	A	**	F	**	F	131.4	F
			SB	0.6	A	15.3	B	10.0	B	7.7	A
			Int	**73.0**	**F**	**297.4**	**F**	**163.3**	**F**	**83.0**	**F**
Route 32 & Smith Clove Road (CR 9)	3	Signalized	WB	21.8	C	222.2	F	58.8	E	63.1	E
			NB	8.0	A	2.6	A	3.8	A	7.5	A
			SB	12.5	B	**	F	8.2	A	12.4	B
			Int	**13.4**	**B**	**239.7**	**F**	**10.6**	**B**	**16.6**	**B**
Route 32 & CR 105	2	Signalized	EB	25.5	C	119.4	F	29.1	C	25.9	C
			NB	4.1	A	33.8	C	10.5	B	7.9	A
			SB	7.9	A	7.9	A	9.4	A	7.9	A
			Int	**9.2**	**A**	**48.6**	**D**	**12.8**	**B**	**10.2**	**B**
Route 32 & Seven Springs / Ridge Road (CR 44)	1	Unsignalized	EB	16.2	C	**	F	159.4	F	53.0	D

Note:
"*" - Indicates a delay value that exceeds what can be displayed by Synchro

Table 4-4
Route 17 and Route 32 Corridor
2020 Weekday PM Peak Hour

Intersection	Node No.	Control	Dir	No Build Conditions with Optimizations Delay (sec/veh)	No Build Conditions with Optimizations LOS	Build-out w/ Existing Zoning and Transportation Management Systems Delay (sec/veh)	Build-out w/ Existing Zoning and Transportation Management Systems LOS	Build-out w/ Reduced Density Zoning and Transportation Management Systems Delay (sec/veh)	Build-out w/ Reduced Density Zoning and Transportation Management Systems LOS
Route 17 & Larkin Drive / Route 6 On-ramp	12	Signalized	EB	110.7	F	88.9	F	93.2	F
			NB	40.1	D	33.0	C	40.2	D
			SB	70.9	E	45.2	D	43.1	D
			Int	**65.6**	**E**	**46.5**	**D**	**49.9**	**D**
Route 17 & Route 6 Off-ramp	11	Signalized	WB	76.1	E	70.0	E	74.0	E
			NB	5.7	A	5.6	A	4.5	A
			SB	3.3	A	3.2	A	2.8	A
			Int	**12.0**	**B**	**11.7**	**B**	**11.9**	**B**
Route 17 & Melody Lane / Woodbury Center	10	Signalized	EB	102.4	F	84.2	F	106.5	F
			WB	380.7	F	408.4	F	308.5	F
			NB	30.6	C	33.1	C	38.2	D
			SB	23.5	C	19.7	B	14.1	D
			Int	**78.3**	**E**	**80.8**	**F**	**69.4**	**E**
Route 32 & Route 17 EB On/Off -ramps	9	Signalized	EB	290.3	F	283.5	F	347.8	F
			NB	69.9	E	67.2	E	74.3	E
			SB	35.7	D	32.1	C	18.5	B
			Int	**97.5**	**F**	**94.0**	**F**	**104.2**	**F**
Route 32 & Route 17 WB Off-ramp / Nininger Road	7	Signalized	EB	280.3	F	399.6	F	264.9	F
			WB	78.1	E	105.5	F	57.9	E
			NB	38.2	D	32.7	C	41.2	D
			SB	26.1	C	24.6	C	29.5	C
			Int	**68.1**	**E**	**87.1**	**F**	**61.5**	**E**
Route 32 & Woodbury Common South	6	Signalized	EB	55.7	E	55.7	E	63.4	E
			WB	49.3	D	48.3	D	52.9	D
			NB	6.8	A	7.3	A	6.0	A
			SB	9.8	A	9.9	A	10.2	B
			Int	**16.0**	**B**	**15.8**	**B**	**17.1**	**B**
Route 32 & Woodbury Common North	5	Signalized	WB	61.3	E	65.7	E	60.1	E
			NB	5.0	A	5.3	A	3.5	A
			SB	10.0	B	11.1	B	8.5	A
			Int	**13.2**	**B**	**14.0**	**B**	**12.3**	**B**
Route 32 & Edgewood Drive / Estrada Road	4	Unsignalized	EB	70.6	E	107.6	F	80.4	F
			WB	107.3	F	84.3	F	47.6	D
			NB	210.7	F	338.2	F	202.5	F
			SB	7.6	A	14.4	B	14.8	B
			Int	**13.2**	**B**	**14.0**	**B**	**12.3**	**B**
Route 32 & Smith Clove Road (CR 9)	3	Signalized	WB	55.9	E	74.7	E	49.6	D
			NB	3.8	A	3.6	A	2.9	A
			SB	10.9	B	15.4	B	7.2	A
			Int	**12.2**	**B**	**14.2**	**B**	**8.7**	**A**
Route 32 & CR 105	2	Signalized	EB	31.6	C	47.9	D	46.9	D
			NB	6.4	A	6.0	A	9.5	A
			SB	5.7	A	4.8	A	6.7	A
			Int	**9.9**	**A**	**11.2**	**B**	**12.8**	**B**
Route 32 & Seven Springs / Ridge Road (CR 44)	1	Unsignalized	EB	153.3	F	172.2	F	54.3	F

Note:
"*" - Indicates a delay value that exceeds what can be displayed by Synchro

Table 4-5
Route 208
Full Build-out Weekday PM Peak Hour

Intersection	Node No.	Control	Dir	Existing Conditons Delay (sec/veh)	Existing Conditons LOS	Build-out w/ Existing Zoning and Transportation Management Systems Delay (sec/veh)	Build-out w/ Existing Zoning and Transportation Management Systems LOS	Build-out w/ Reduced Density Zoning and Transportation Management Systems Delay (sec/veh)	Build-out w/ Reduced Density Zoning and Transportation Management Systems LOS	Build-out w/ Reduced Density Zoning and Roadway Focused Investment Delay (sec/veh)	Build-out w/ Reduced Density Zoning and Roadway Focused Investment LOS
Route 208 & North Main Street (CR 105)	4	Signalized	EB	30.4	C	**	F	**	F	146.6	F
			WB	42.0	D	40.0	D	40.0	D	21.2	C
			NB	31.7	C	41.3	D	41.3	D	18.9	B
			SB	40.9	C	40.9	D	40.9	D	17.8	B
			Int	**31.7**	**C**	**	**F**	**	**F**	**120.0**	**F**
Route 208 & Route 17 EB Ramps	3	Signalized	WB	50.3	D	51.0	D	34.9	C	47.8	D
			NB	82.2	F	13.0	D	14.8	B	21.9	C
			SB	12.5	B	**	F	**	F	116.4	F
			Int	**50.1**	**D**	**	**F**	**	**F**	**68.1**	**E**
Route 208 & Route 17 WB Ramps	2	Signalized	EB	27.5	C	36.9	D	31.3	C	23.6	C
			WB	96.2	F	**	F	182.6	F	18.4	B
			NB	7.1	A	64.2	E	21.3	C	8.4	A
			SB	**	A	**	F	42.8	D	10.3	B
			Int	**	**C**	**	**F**	**44.7**	**D**	**11.7**	**B**
Route 208 & Mountain Road (CR 44)	1	Unsignalized	WB	54.7	F	**	F	**	F	**	F

Table 4-6
Route 208
2020 Weekday PM Peak Hour

Intersection	Node No.	Control	Dir	No Build Conditions with Optimizations Delay (sec/veh)	LOS	Build-out w/ Existing Zoning and Transportation Management Systems Delay (sec/veh)	LOS	Build-out w/ Reduced Density Zoning and Transportation Management Systems Delay (sec/veh)	LOS	Build-out w/ Reduced Density Zoning and Roadway Focused Investment Delay (sec/veh)	LOS	Build-out w/ Existing Zoning and Roadway Focused Investment Delay (sec/veh)	LOS
Route 208 & North Main Street (CR 105)	4	Signalized	EB	2792.6	F	3744.1	F	3575.4	F	2895.3	F	3196.2	F
			WB	38.4	D	32.0	C	31.1	C	25.0	C	32.0	C
			NB	28.4	C	44.6	D	23.1	C	22.4	C	29.5	C
			SB	234.1	F	320.3	F	62.8	E	17.8	B	18.8	B
			Int	**1152.8**	**F**	**1755.4**	**F**	**1822.5**	**F**	**1813.3**	**F**	**1766.6**	**F**
Route 208 & Route 17 EB Ramps	3	Signalized	WB	157.3	F	188.6	F	160.7	F	151.6	F	137.3	F
			NB	6.7	A	11.6	B	8.1	A	6.4	A	7.4	A
			SB	276.1	F	672.9	F	439.0	F	241.8	F	374.8	F
			Int	**157.0**	**F**	**336.7**	**F**	**222.5**	**F**	**129.8**	**F**	**184.6**	**F**
Route 208 & Route 17 WB Ramps	2	Signalized	EB	32.4	C	35.8	D	25.0	C	73.7	E	112.5	F
			WB	124.4	F	140.9	F	91.1	F	21.8	C	39.2	D
			NB	12.3	B	13.3	B	12.4	B	5.4	A	6.7	A
			SB	92.9	F	116.8	F	50.0	D	15.0	B	30.3	C
			Int	**68.8**	**E**	**80.4**	**F**	**41.7**	**D**	**22.0**	**C**	**35.7**	**D**
Route 208 & Mountain Road (CR 44)	1	Unsignalized	WB					567.7	F	439.0	F		

Clove Road. The remaining 2/3 (226) of the traffic flow continue north into Highland Mills (See Figure 4-1).

If NYS Route 17 were to be widened, significantly fewer vehicles (760) would exit Route 17 at the Route 32 off-ramp, a reduction of 10.5 percent resulting in approximately 75 fewer cars on Route 32 through Central Valley during the PM peak hour period (see Figure 4-2).

SL2: CORNWALL INTERCHANGE

This SLA was conducted to determine how much traffic would be diverted from NYS Route 32 if a new interchange were constructed at the northern end of the study area. While almost 900 vehicles are projected to use the new northbound exit ramp of the Cornwall Interchange during the PM peak hour period, more than half of these vehicles (500) are diverted trips attempting to avoid congested conditions on NYS Route 17 (See Figure 4-3). If NYS Route 17 were to be widened, use of the new Interchange would be substantially lower and it is expected that the Cornwall Interchange would divert approximately 200 vehicles from NYS Route 32 and Smith Clove Road during the peak hour periods (See Figure 4-4).

SL3: CR 105 INTERCHANGE/ NYS ROUTE 17 WESTBOUND COLLECTOR DISTRIBUTOR ROADWAY

The construction of a new interchange to CR 105 from a parallel westbound collector-distributor road to NYS Route 17 would result in significant reductions in demand at the intersection of NYS Route 32 and Nininger Road. Without increasing the capacity of NYS Route 17, the new C-D road is expected to carry almost 1,500 vehicles per hour (vph) during the peak periods, with almost 1/3 of this traffic using the C-D road to bypass congestion on NYS Route 17 (See Figure 4-5). Peak hour volumes on the C-D road and through the interchange would decrease to a more manageable level, approximately 970 vph, if NYS Route 17 were widened to three lanes in each direction (See Figure 4-6). In addition, almost 600 vehicles would be diverted from the NYS Route 32 corridor during the peak hour period alleviating congestion at the intersections immediately surrounding the off-ramp connection.

SL4: BAILEY FARM ROAD/ROUTE 17M BYPASS

The Bailey Farm Road/Route 17M Bypass would connect NYS Route 17M to Bailey Farm Road, which is at the back end of the Harriman Business Park commercial development. This new road is expected to carry approximately 400 vph in each direction during the peak hour periods. Almost half of this traffic would be diverted trips from Larkin Drive with the remaining vehicles being diverted from North Main Street, River Road, and the local roadways in the Village of Harriman (see Figure 4-7). Traffic demand for this road is only marginally affected by capacity constraints on NYS Route 17 (see Figure 4-8).

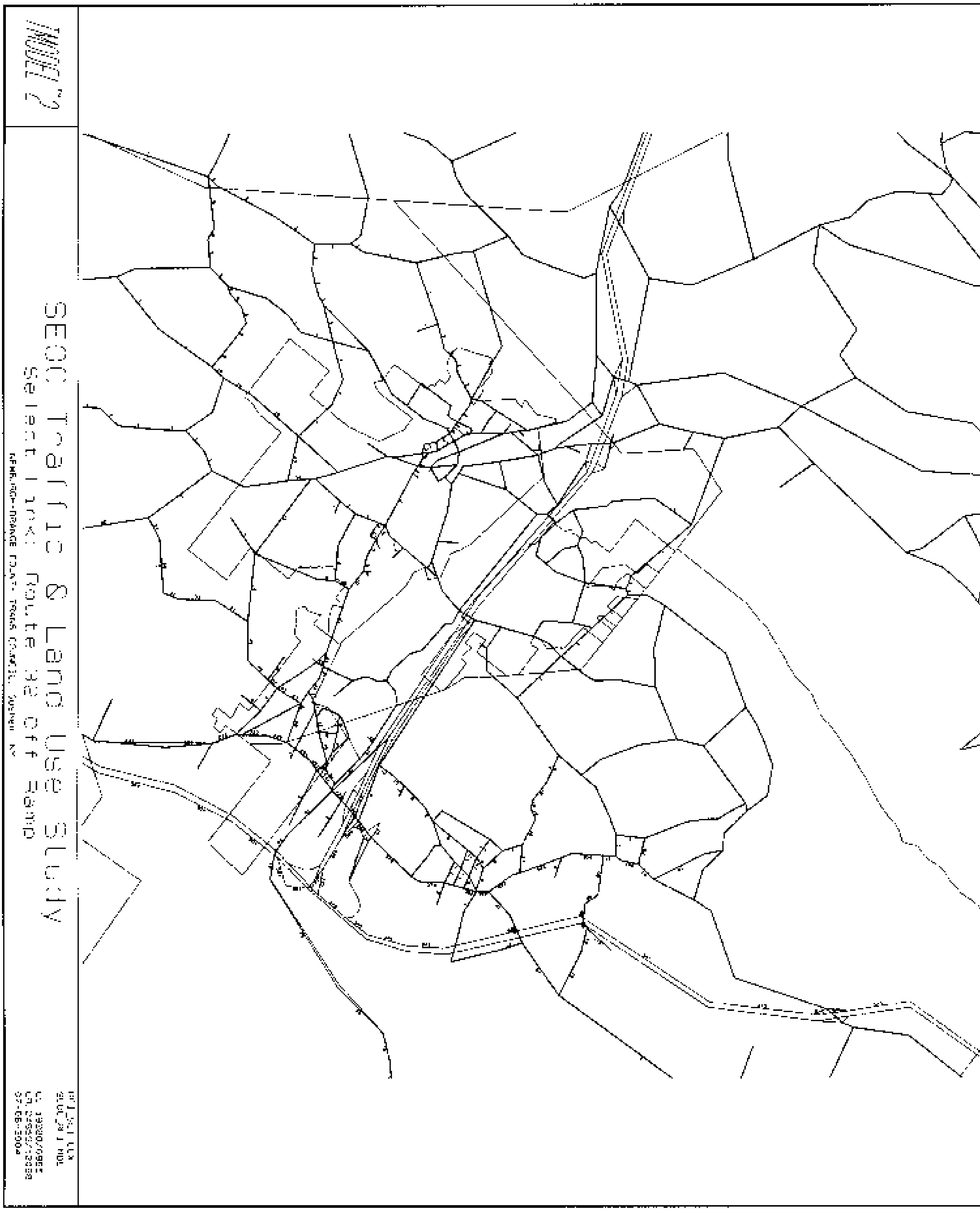
SL5: ROUTE 208 BYPASS

The Route 208 bypass would connect NYS Route 94 in Blooming Grove to NYS Route 17 near the Museum Village Interchange in Monroe. The new road would parallel and be located to the west of the existing NYS Route 208 alignment. This limited-access two-way road would divert approximately 300 to 400 vehicles from NYS Route 208 with origins and destinations in Washingtonville, Blooming Grove, Monroe, and Chester (see Figure 4-9). Traffic demand for this road is only marginally affected by capacity constraints on NYS Route 17 (see Figure 4-10).

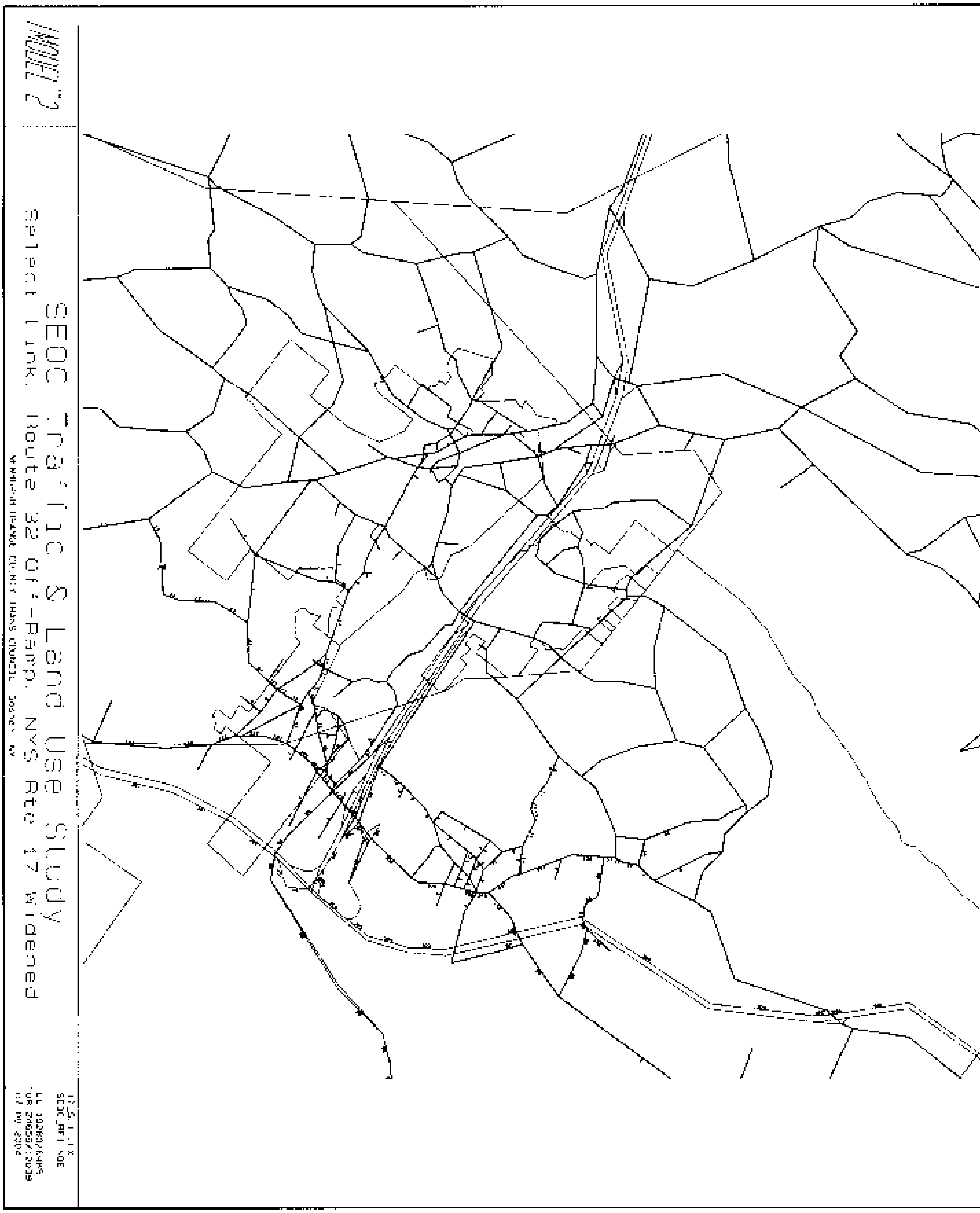
This bypass road would, however, address significant safety issues along the length of Route 208 from NYS Route 17 to Washingtonville.

SL6: LARKIN DRIVE EXTENSION

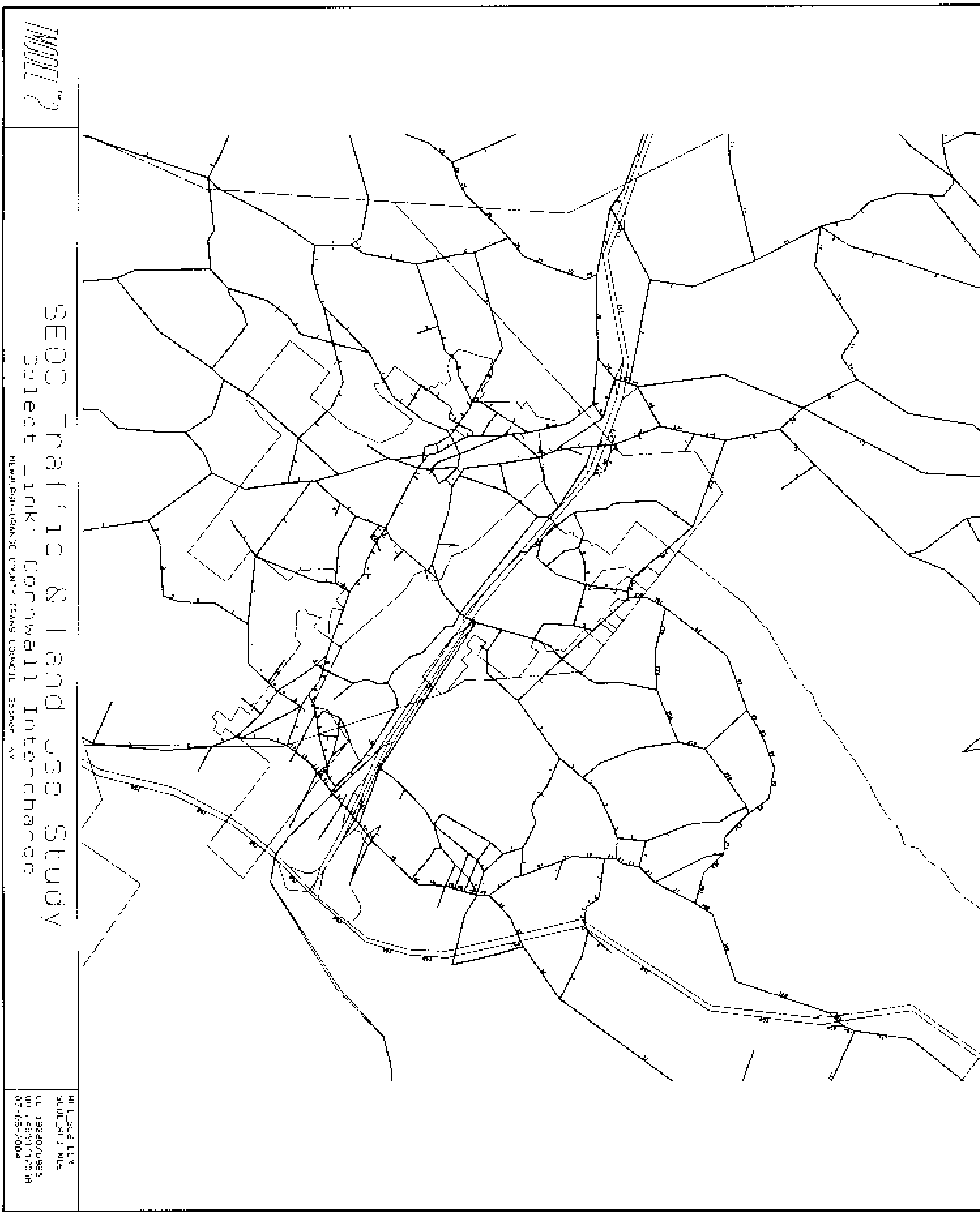
The Larkin Drive extension would connect NYS Route 208 with CR 105 and would act as the northern continuation of the existing Larkin Drive alignment. This new two-way Town road would provide an alternative means of access to the commercial centers surrounding the NYS Route 32 corridor without having to travel through the Villages of Monroe and Harriman. Without capacity improvements to NYS Route 17, a two-way volume of 1,400 vph is expected during the peak hour periods, with most of this traffic diverting from CR 105, Forest Road, and Spring Street in Monroe (see Figure 4-11). The two way volume on the Larkin Drive extension would drop to approximately 1,200 vph during the peak hour periods if a third lane in each direction is added to NYS Route 17 (see Figure 4-12).✷



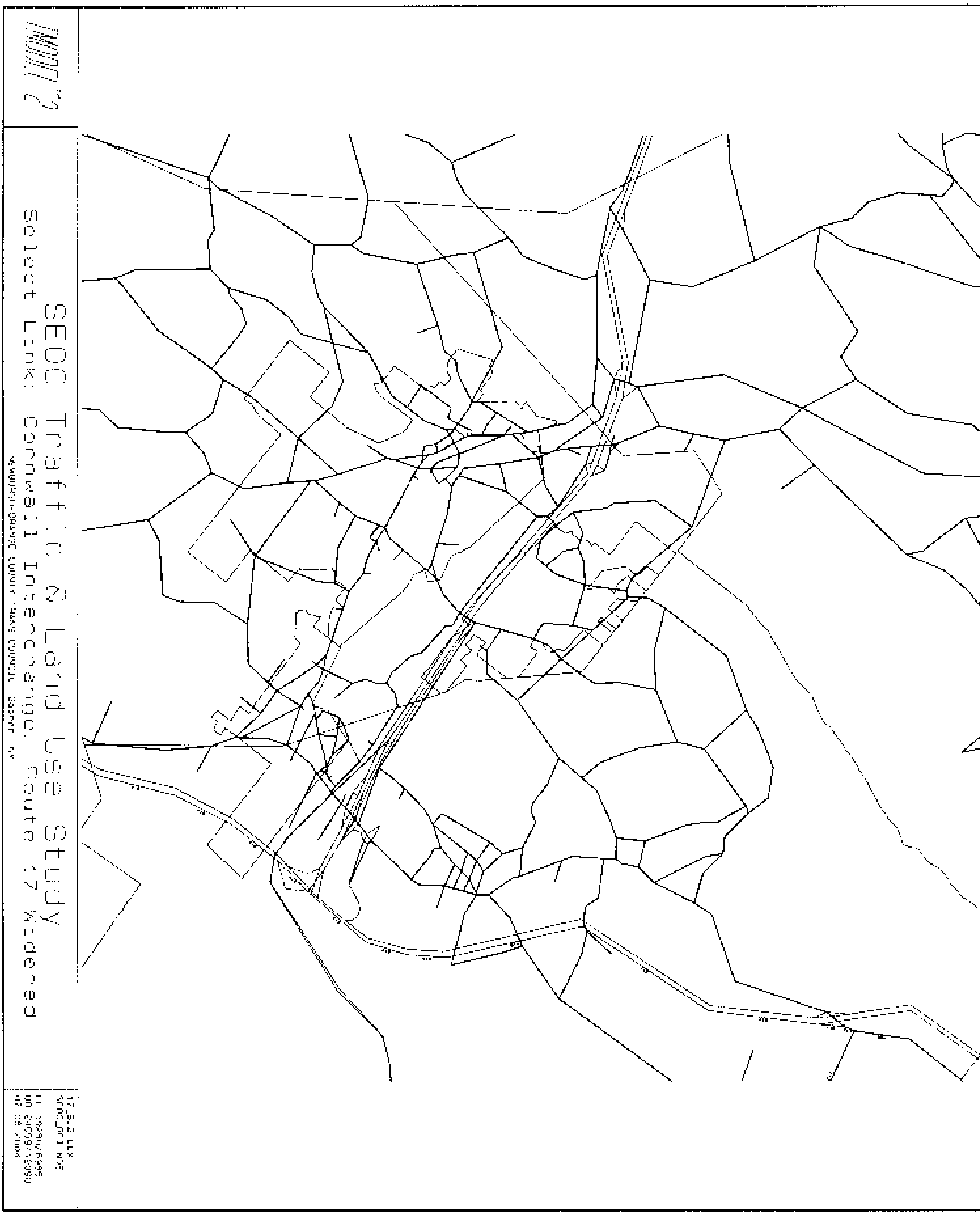
SL1: Route 17 Westbound Off-Ramp to Route 32
Figure 4-1



SL1: Route 17 Westbound Off-Ramp to Route 32
With Widened Route 17
Figure 4-2

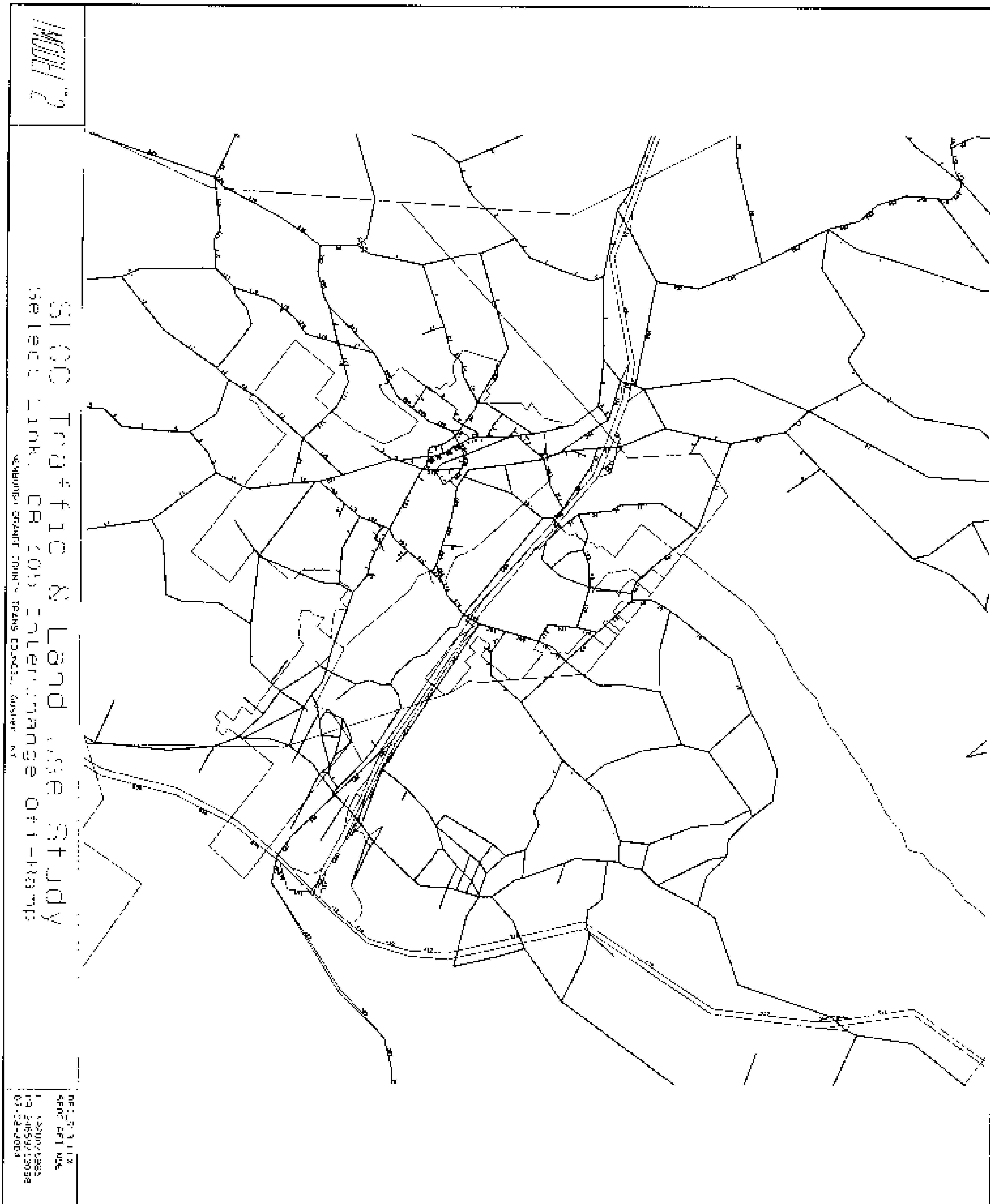


SL2: Cornwall Interchange - Northbound Off-Ramp
Figure 4 3

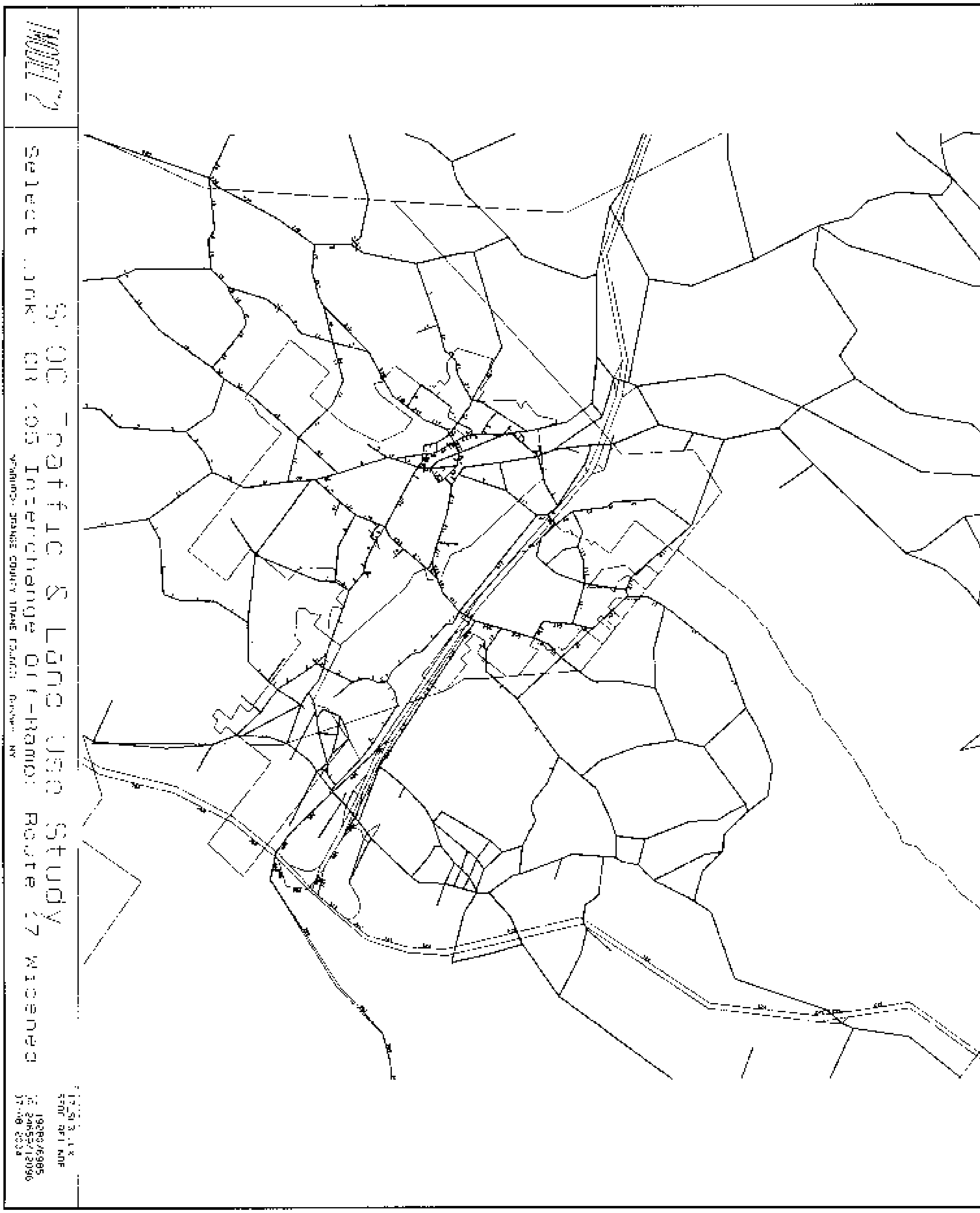


SL2: Cornwall Interchange - Northbound Off-Ramp With Widened Route 17

Figure 4-4



SL3: CR 105 Interchange/Collector-Distributor Road Off-Ramp
Figure 4-5



SOUTHEASTERN ORANGE COUNTY
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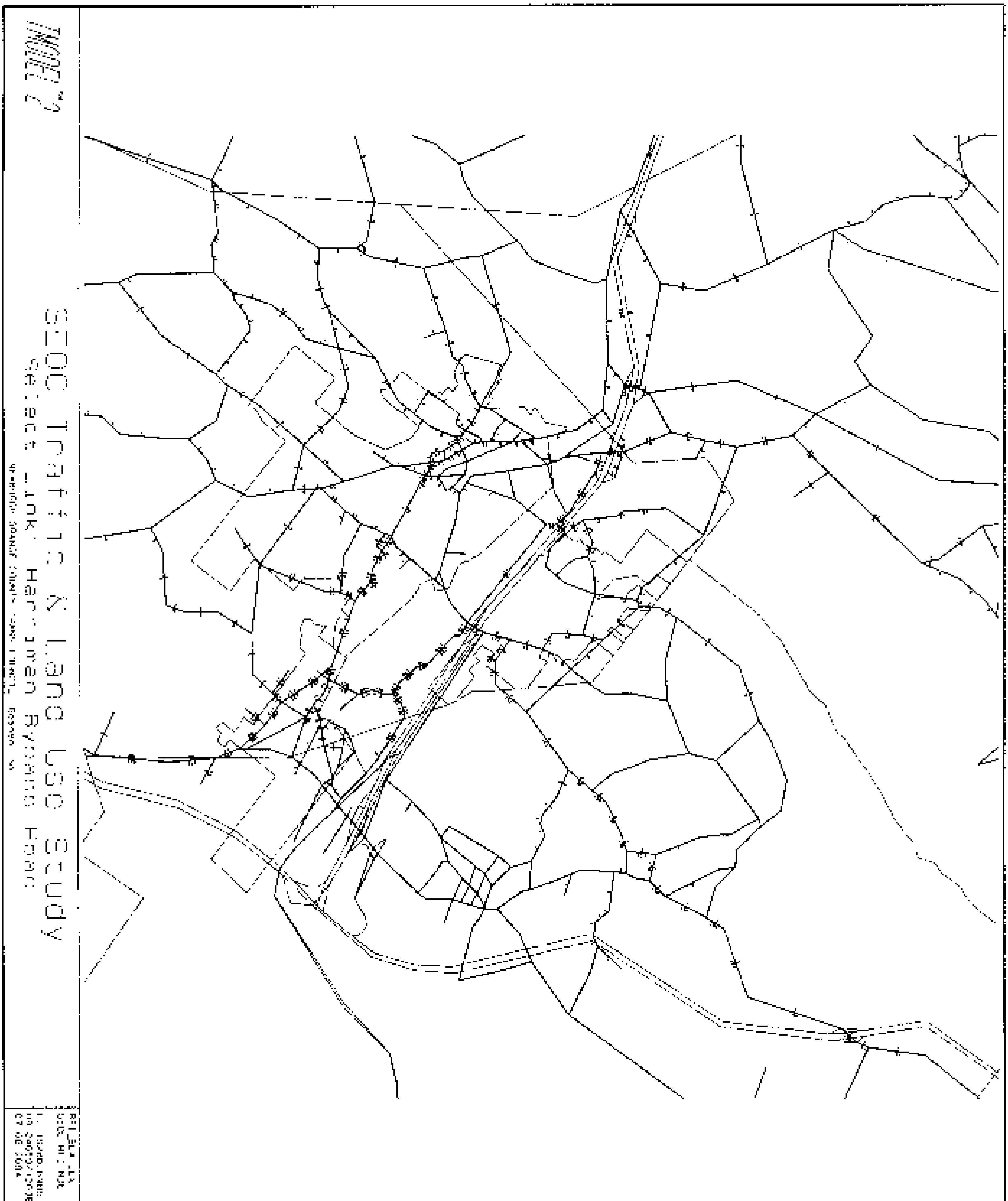
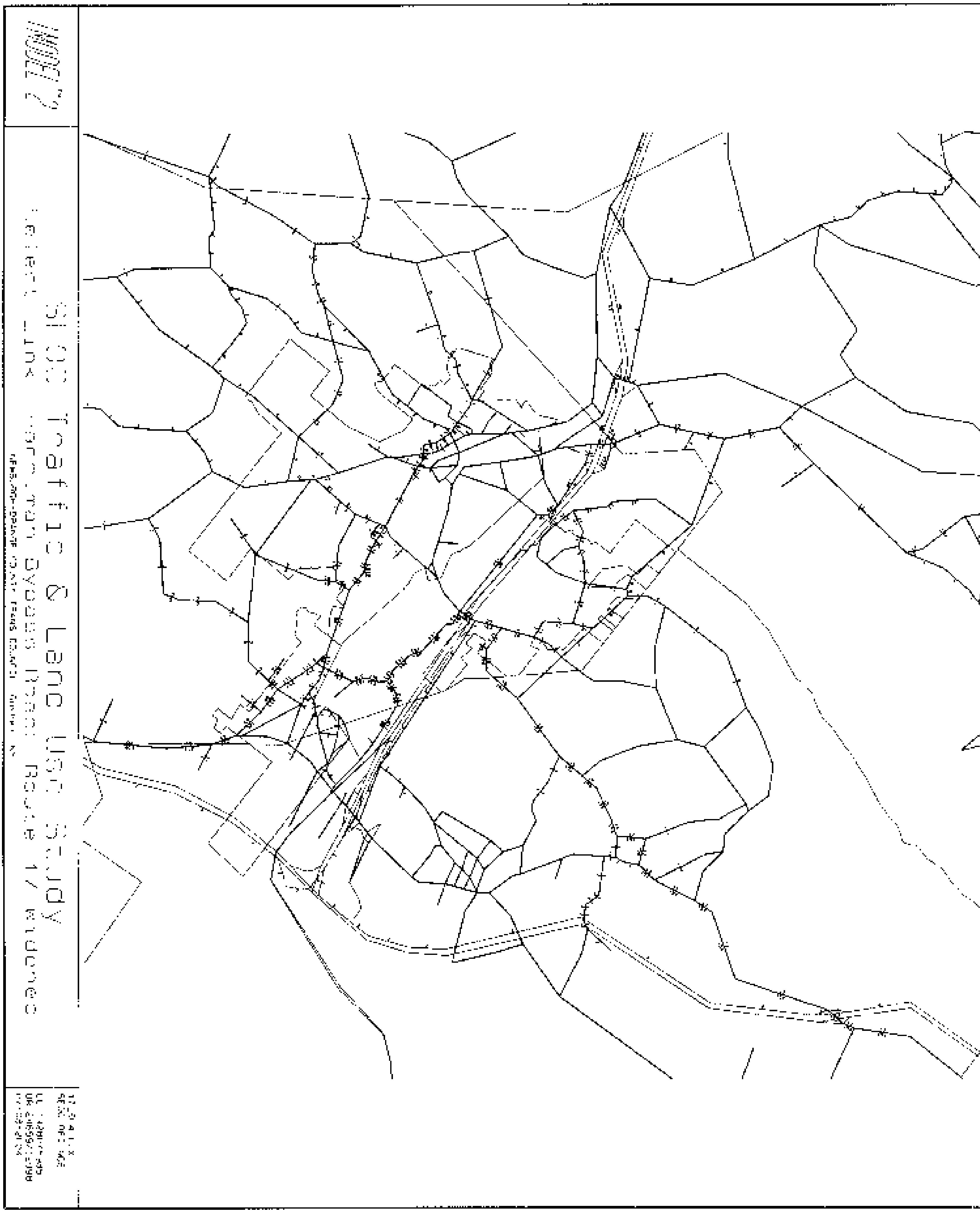
SL3: CR 105 Interchange/Collector-Distributor Road Off-Ramp With Widened Route 17

Figure 4-6

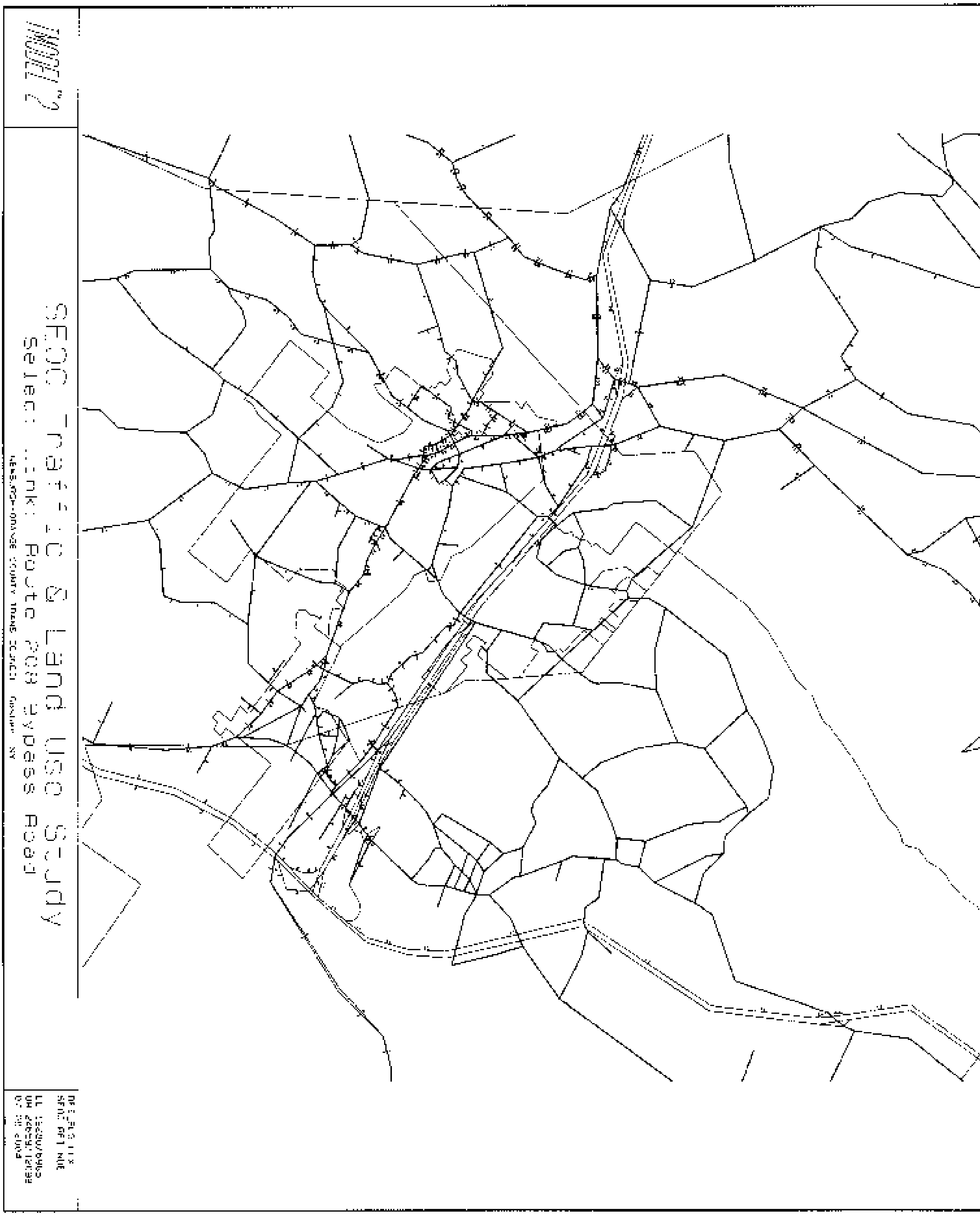


SL4: Bailey Farm Road/Route 17M Bypass
Figure 4-7

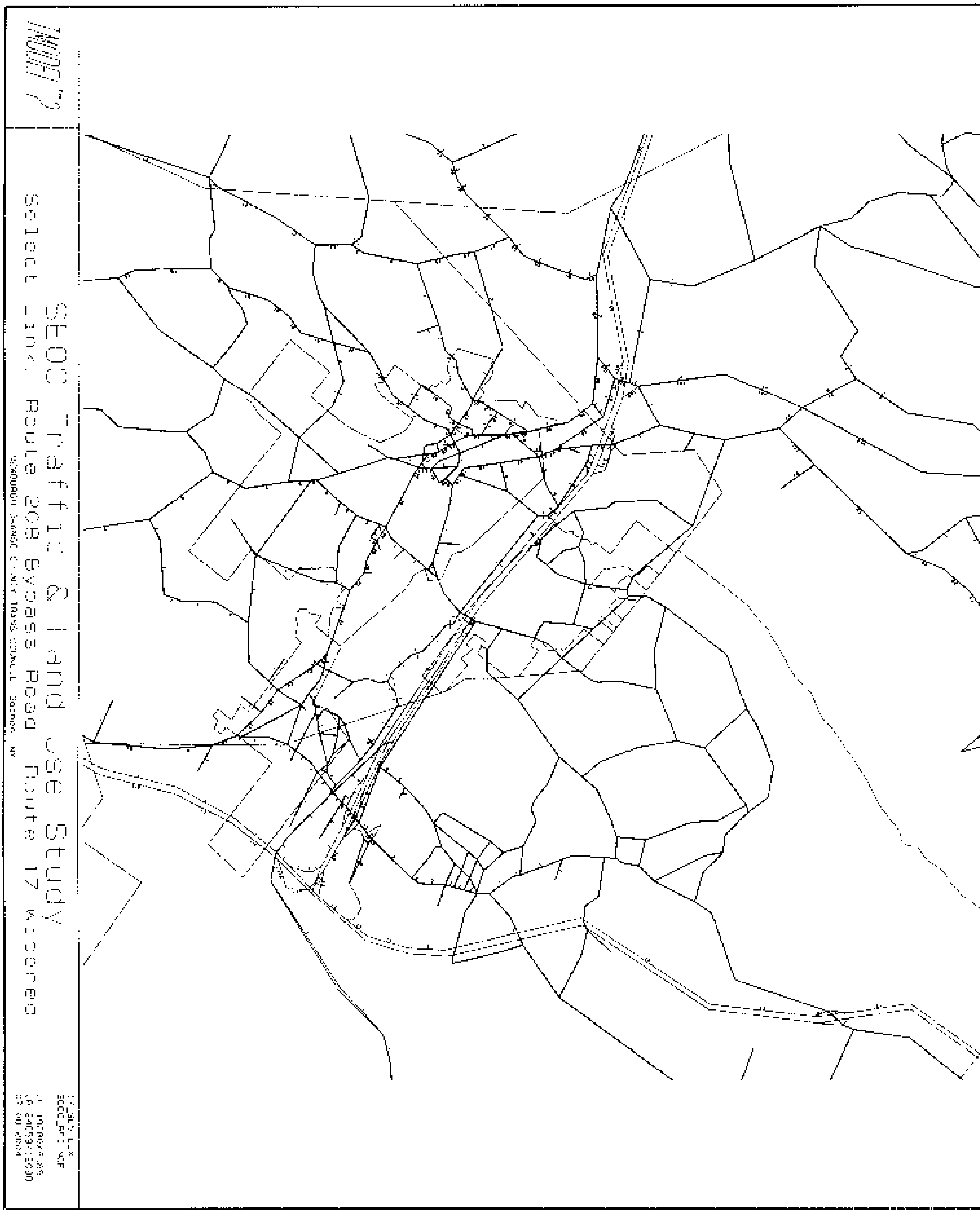


SL4: Balley Farm Road/Route 17M Bypass
With Widened Route 17

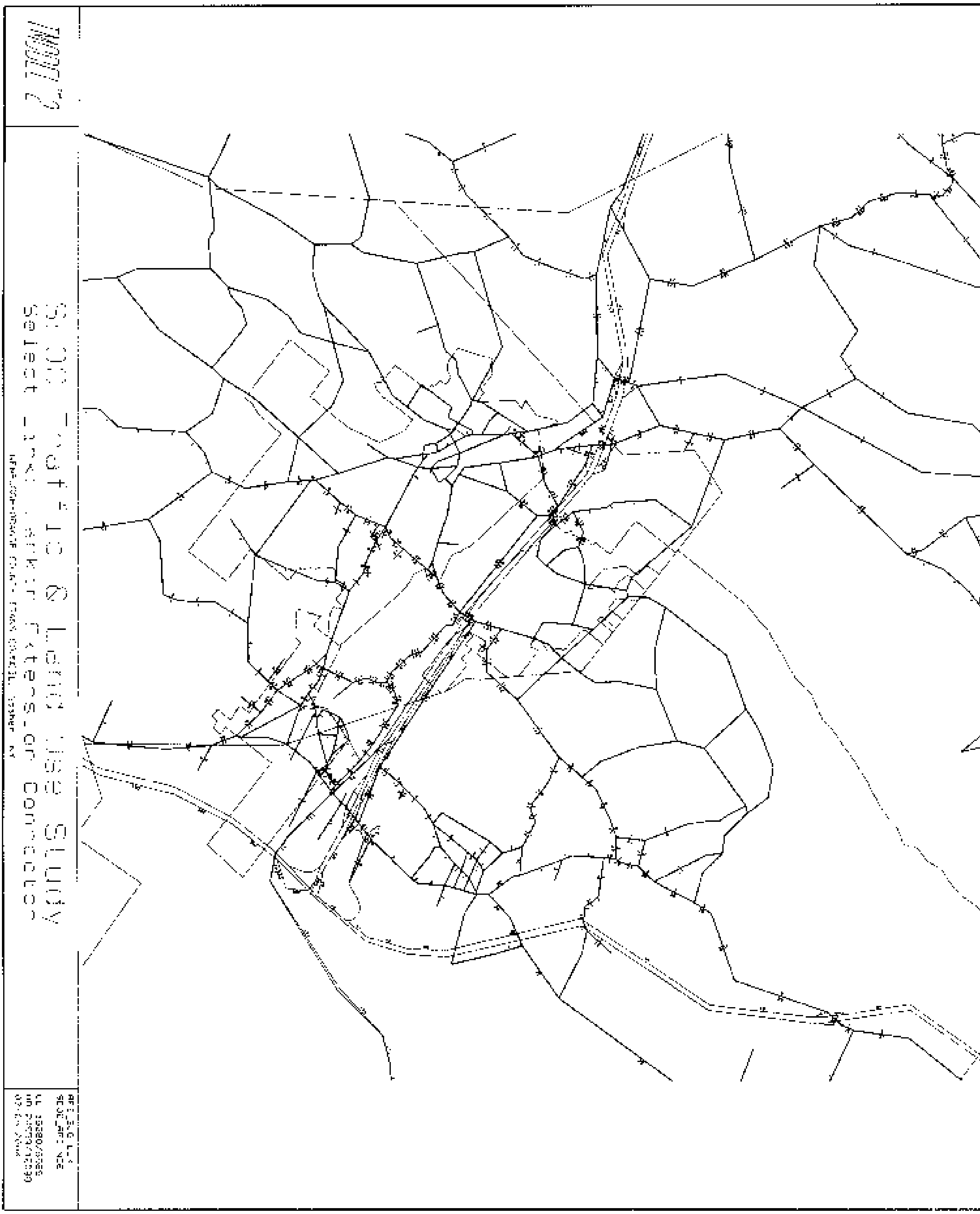
Figure 4-8



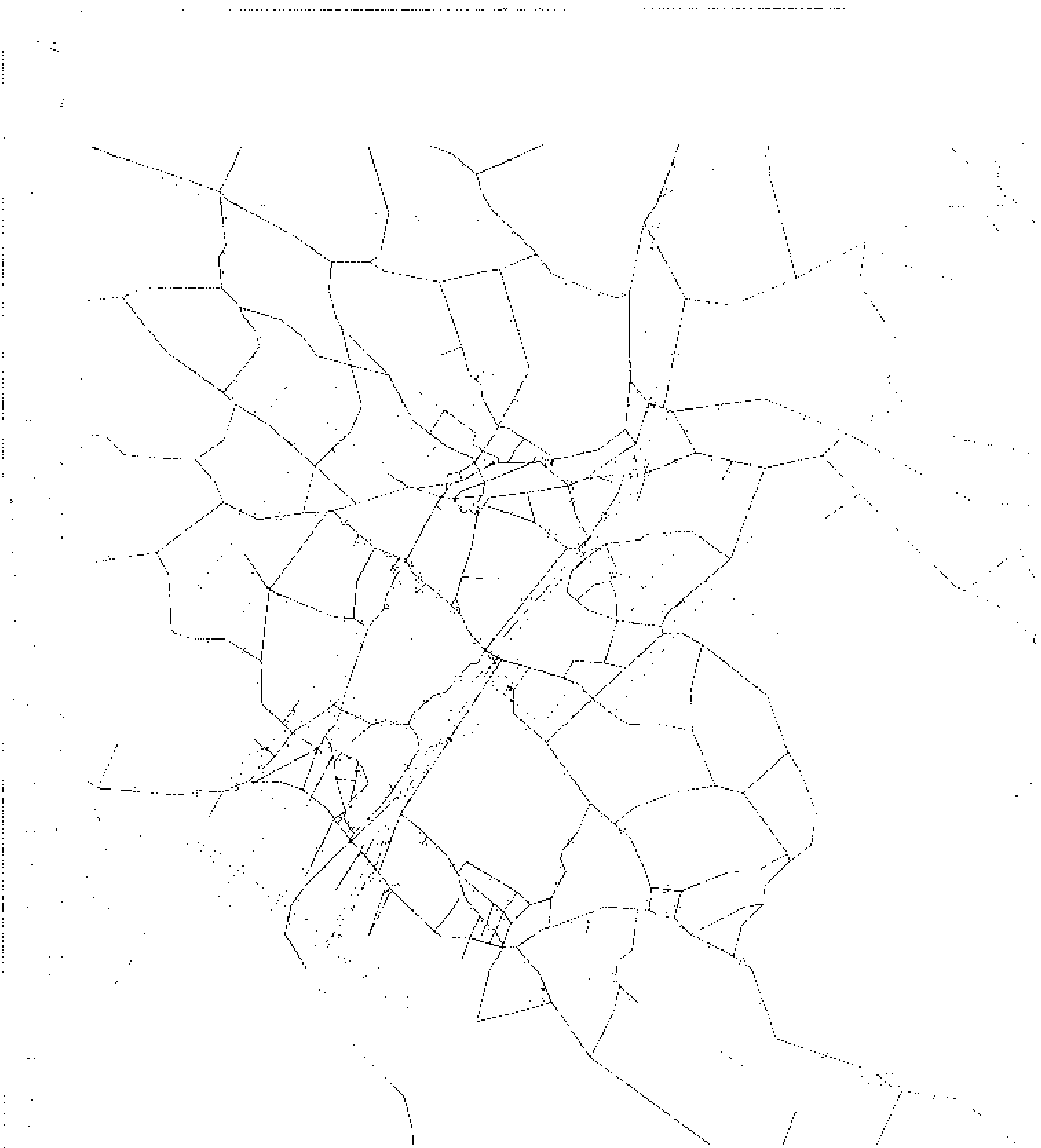
SL5: Route 208 Bypass
Figure 4-9



SL5: Route 208 Bypass
With Widened Route 17
Figure 4-10



SL6: Larkin Drive Extension
Figure 4-11



SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

SL6: Larkin Drive Extension
With Widened Route 17
Figure 4-12

A. INTRODUCTION

This chapter sets forth general and community-specific recommendations based upon the analysis of traffic and land use conditions within the Study Area. Recommendations are presented generally (as they apply to the whole Study Area), to each community, and to each road corridor.

B. GENERAL RECOMMENDATIONS

The project Scope of Work (and the SEOC study survey and the Public Outreach and Visioning sessions) identified the following issues to be addressed in the Traffic and Land Use Study:

- The impact of accelerating commercial and residential development in and adjacent to the Study Area.
- Access to and from development along State Routes 17M, 208, 6/17, 32, and County Route 105.
- Access to and from Woodbury Common, Harriman Commons, Woodbury Centre, and shopping along the Route 32 corridor.
- Location of short term transportation management strategies (0-3 years) to address the impact of trips being generated by existing and approved development, as well as from growth of through-traffic in the Study Area.
- Location of freight/truck mobility issues to commercial and industrial sites in the Study Area including the impact of truck traffic traveling through the Study Area on Route 32 from the Thruway at Exit 16 (Harriman/Woodbury). Alternative truck routes are to be identified.
- Conversion of NYS Route 6/17 to I-86.
- Effect of recommendations within the Orange County Transit Improvement Study completed in the Study Area.
- Development of trip generation management guidelines based upon alternative development scenarios for use by the communities within the Study Area to preserve transportation capacity.

In addition, the Scope identified several issues or concepts that have a more generic, or global, application within the study area. These are addressed below.

UTILIZATION AND SAFETY OF BIKE AND PEDESTRIAN FACILITIES

With the exception of the Heritage Trail, there are no specific bike or pedestrian facilities that provide convenient and safe access to and from residential centers, shopping, parks employment, and transit facilities. Connectivity between new residential subdivisions, schools, parks, and downtown/shopping areas should be included as a goal in each community comprehensive plan and should be implemented as new development projects are reviewed. Bikeways can be integrated into road improvement projects as either separate facilities (e.g. bikeway parallel to a road) or as a shared roadway with either a full-size, dedicated bike-lane or a wider travel lane to be shared by cars and bicycles. NYSDOT, Orange County, and each community should look for opportunities to include bicycle and pedestrian facilities in new development.

TRIP GENERATION MANAGEMENT GUIDELINES

Safe and efficient transportation systems can contribute greatly to a healthy quality of life and economy. Trip and access management are essential components of transportation planning that seek to improve traffic flows and pedestrian walkability on both downtown and suburban arterial roadways. Traffic management combines design components with policy decisions to encourage an optimal balance between the road network and surrounding areas. Access management refers to the control of access to properties abutting the roadway allowing for a reduction in traffic congestion, an increase in public safety, and the improvement of the appearance and quality of the built environment. As communities within Southeastern Orange County continue to make growth management decisions, they can utilize and employ the techniques described below to enhance regional transportation systems.

In order to achieve these objectives, there are a number of recommended policy and design guidelines that can serve to improve the livability of the villages and towns in the study area. It is important that these improvements be both site-specific as well as regional in approach. Planning for transportation alternatives involves evaluation of changes needed at large and small scales.

TRAFFIC MANAGEMENT

Traffic management involves finding a balance between the many users of both village and suburban roadways. When making design and policy decisions, it is important to accommodate motorists, pedestrians, and bicyclists while considering surrounding land use and development. It is first necessary to identify and understand the nature of the problems on a street to develop effective solutions. Streets within a downtown village area will require different treatment than suburban arterial roads. Suburban roadways usually have greater traffic speeds, infrequent sidewalks and pedestrian crossings, shoulders, no on-street parking, and are sometimes median-divided. These characteristics discourage pedestrian activity and make vehicular use necessary for mobility, thereby increasing traffic. Several techniques are available to reduce vehicle trips and auto dependency. These techniques are described below and are further discussed under the heading “Sustainable Development Guidelines.”

Trip Management

Different land use measures provide the opportunity for living, working, and shopping in closer proximity, reducing travel/time distance, and increasing the attractiveness of walking, biking, and public transit. For instance, mixed-use and cluster development can help encourage consolidation of trips. Developments should be designed to encourage pedestrian activity by including smaller set-backs, requirements for parking behind buildings, and building sidewalks that provide connections from the development to residential areas. Future traffic generation can be controlled through established traffic impact thresholds for new development under SEQRA.

Communities should also encourage alternative modes of transportation that can be made possible by more compact and clustered developments.

Bicycle and Pedestrian Facilities

Bicycle and pedestrian facilities are defined as improvements and provisions that seek to accommodate and encourage bicycling and walking. These include parking facilities, mapping, bikeways, sidewalks, multi-use paths, and shared roadways. Shared lanes and shoulders allow bicycles and vehicles to share a lane on a road that is designated as open to bicycle travel or walking in suburban or rural areas. Bike lanes identify a portion of roadway designated for preferential or exclusive use of bicycles by striping, signing and pavement markings. Multi-use paths are physically separated from motorized vehicular traffic by an open space or barrier. They may be within the roadway right-of-way or within an independent right of way. Providing separate facilities or bike lanes for bicycles offers safer travel for bicyclists. However, bike lanes may be more expensive and may require additional pavement and right-of-way along existing streets. Separated facilities require an entirely different right-of-way and additional costs of construction and maintenance.

Pedestrian facilities are provided for the exclusive use of, or safety and convenience of pedestrians. These facilities can include sidewalks, walkways, signs, signals, illumination, and seating areas. There are a number of techniques that can be implemented to help accommodate the needs of both pedestrians and vehicular traffic including signalized crossings, bump-outs, pedestrian refuges, pavement marking and signage, and transit connections.

In a downtown area, sidewalks are the most important design element to encourage pedestrian walkability. Oftentimes sidewalks are secondary to consideration of road width and parking. However, it is important to design sidewalks in downtown areas to allow for passing pedestrian traffic and also include places for seating, trees, bus shelters and other appropriate amenities. Unlike streets, sidewalks can become social gathering places, serving to enliven downtown areas.

Traffic Calming

There are a multitude of traffic calming measures that improve safety by managing vehicular speed and raising driver awareness while maintaining the operational capacity of the roadway. Communities can consider pedestrian refuges, entrance gateways, streetscaping, and the careful placement and design of crosswalks. With pedestrian refuges, pedestrians do not have to wait to cross the entire roadway because they can stand on the island between travel directions at intersections or mid-block. When properly designed, median treatments improve the appearance of the roadway. Entrance gateways may be defined by landscaping and signage and help foster a sense of place. Streetscaping also buffers property from traffic, and can give the impression of traveling at greater speeds, causing vehicular traffic to maintain speeds that allow safe pedestrian activity. Pedestrian crossings should be located apart from signalized intersections to alert motorists to the continuing presence of pedestrians. Crosswalks should be highly visible through the use of effective signing and marketing, pavements texture/materials or other techniques that will communicate to drivers the possibility of pedestrians. A strategy that is widely used and successful in Europe is to completely segregate transit from traffic-calmed areas as long as walking distances are adequate to serve the traffic-calmed places, typically where the shopping is located.

There are other opportunities for design improvements that include neckdowns, nubs, bulb-outs, bus bulbs, bump-outs and curb extensions. Bulbs and neckdowns are sidewalk extensions in selected areas that provide a haven for pedestrians waiting to cross the street, shorten the crossing distance, and can function as entry points (see Figure 5-1). Bus bump-outs prevent traffic from coming up from behind the bus while passengers board. This helps protect passengers and slows traffic on the rest of the street. These design elements, when formed using sculpture and attractive planting can enhance the appearance of the street.

Village Center Treatments

Transportation facilities also define the function and character of a village center. One characteristic of a village center is the use of street facing retail with little or no setback from sidewalks. This provides a friendlier, more secure atmosphere to pedestrians than buildings which are set far back behind parking lots. Automobile parking can be moved to a central municipal lot with pedestrian walkways connecting to businesses or to a privately owned lot located behind the buildings.

Another key transportation element in village centers is the use of signage. Signage in village centers can go beyond traffic control and regular street signs. An example is gateway signing to inform drivers and pedestrians that they have arrived at the village center. Information and guide signs can be provide directions to certain key destinations, such as historic sites, cultural centers, colleges, town halls, major retail groups, transit stations, etc. Directory information can be given at the pedestrian level, which includes maps showing all major and even some minor destinations within the village center. Finally, the identity for the center is often translated into a symbol or logo, which is reproduced in the directional signing, including perhaps even the street signs. Also, a consistent signage system design can be reflected in all signs throughout the village.

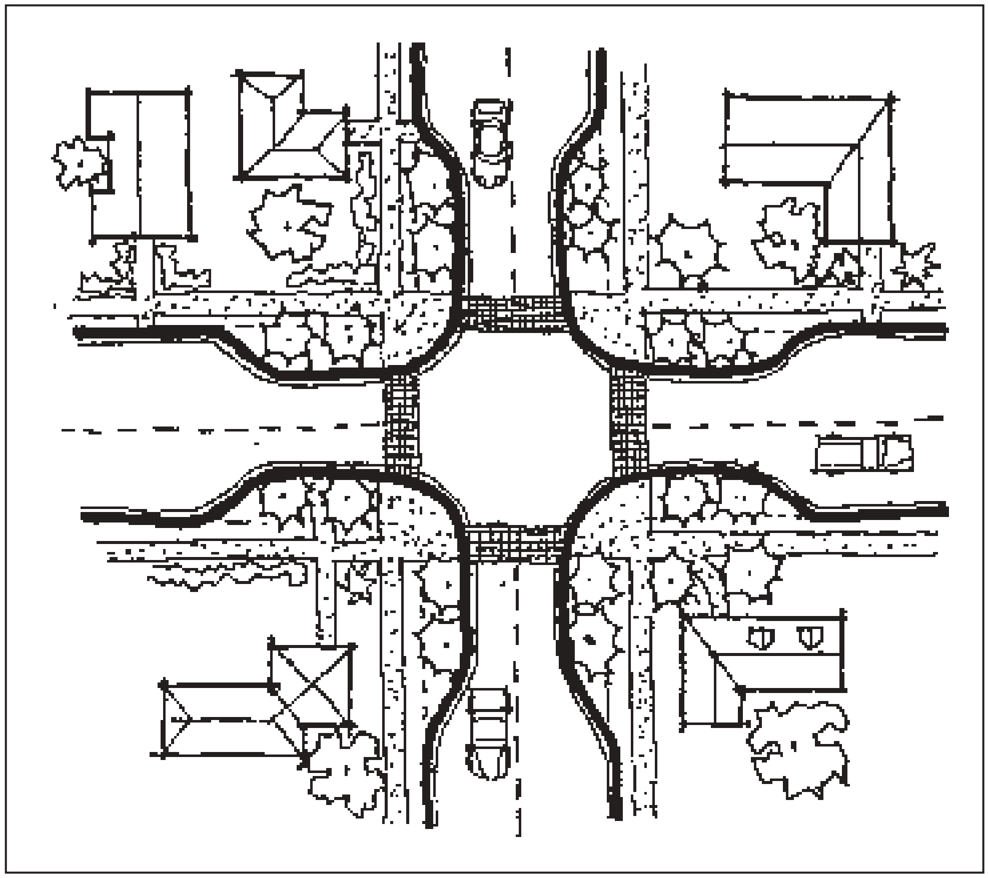
ACCESS MANAGEMENT

Access management seeks to decrease congestion and provide for smoother traffic flow by integrating transportation and land use strategies. Traffic benefits include an increase in safety, increased capacity, shorter travel times, and bike and pedestrian friendliness. These improvements can help accommodate growth and development, increase safe and efficient roadway access, and benefit the market area.

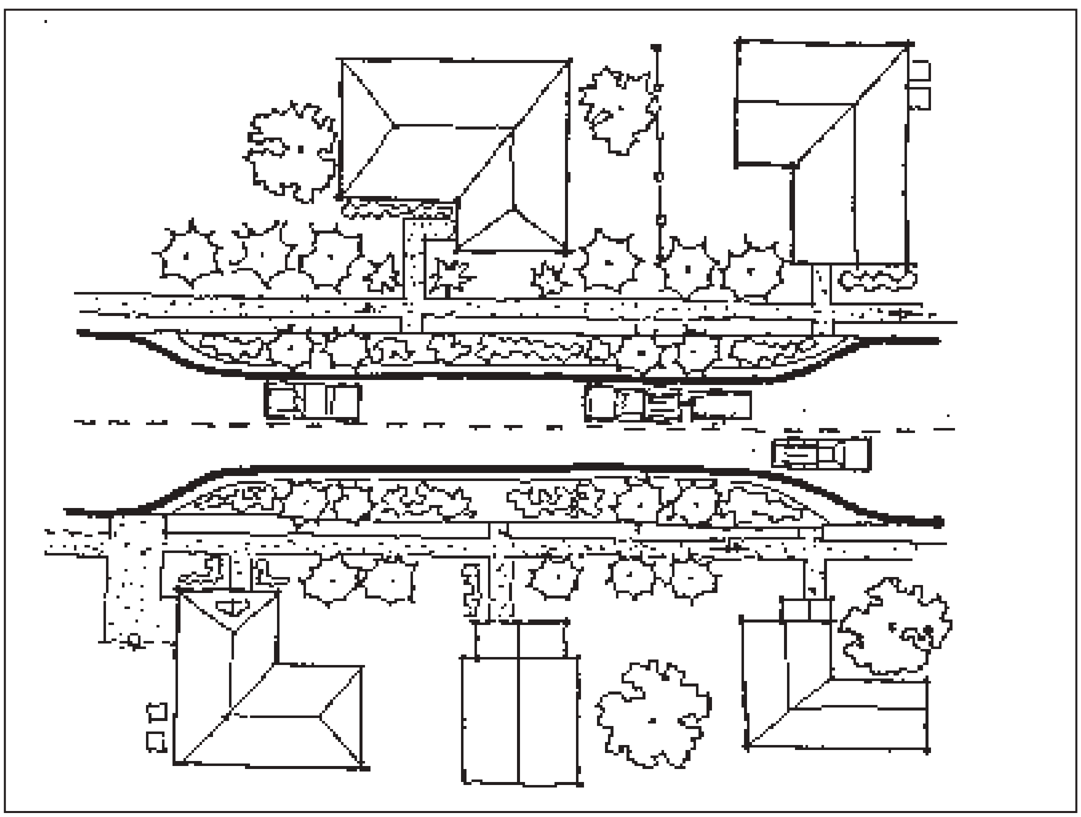
Key objectives in access management include limiting the number of conflicts, separating conflicts, and removing or restricting turning movements from through traffic. In order to achieve these objectives a combination of design and policy guidelines are recommended. Most importantly, success will depend upon the development of partnerships between transportation agencies and local communities. Key elements of access management that can be considered include an interconnected street network, connections between adjacent properties, limited driveway openings, shared driveways, intersection spacing and traffic signal spacing, center medians, and convenient circulation and connection for motorists, bicyclists, and pedestrians. Further discussion of the techniques described below is provided under the heading “Sustainable Development Guidelines.”

Interconnected Street Network

Village Centers should be connected externally to surrounding residential areas, transit facilities, employment centers, etc. They should also provide for internal connectivity to facilitate walking trips between land uses. Centers should apply the concept of parking in one location to access several different destinations. It is important in a planned village center to have walkways and paths, which connect all of the features. Internal to external connectivity will also help



Bulbout



Neckdown

Traffic Calming Devices

Figure 5-1

pedestrians and vehicles access the center. Multi-use paths, sidewalks, and transit routes that enter the center can facilitate optimal circulation. Transit stops should be located to achieve accessibility by transit riders.

Rear access roads can help reduce conflicts between through traffic and turning traffic. These roads run parallel to the mainline route to provide alternative property access to reduce turning movements on the mainline route. The rear access road connects with the arterial road via a cross road which can serve to increase land value and reduce road construction costs for individual properties.

Street circulation within developments is also important with respect to internal access as well as connection to external roadways. To promote the best circulation, internal roadways should be designed with respect to highway access points rather than buildings. To do this, the street network should be designed from the arterial or highway access inward to provide for optimal circulation. The internal roads should include safe and efficient pedestrian access to/from the buildings.

Driveway Access and Design

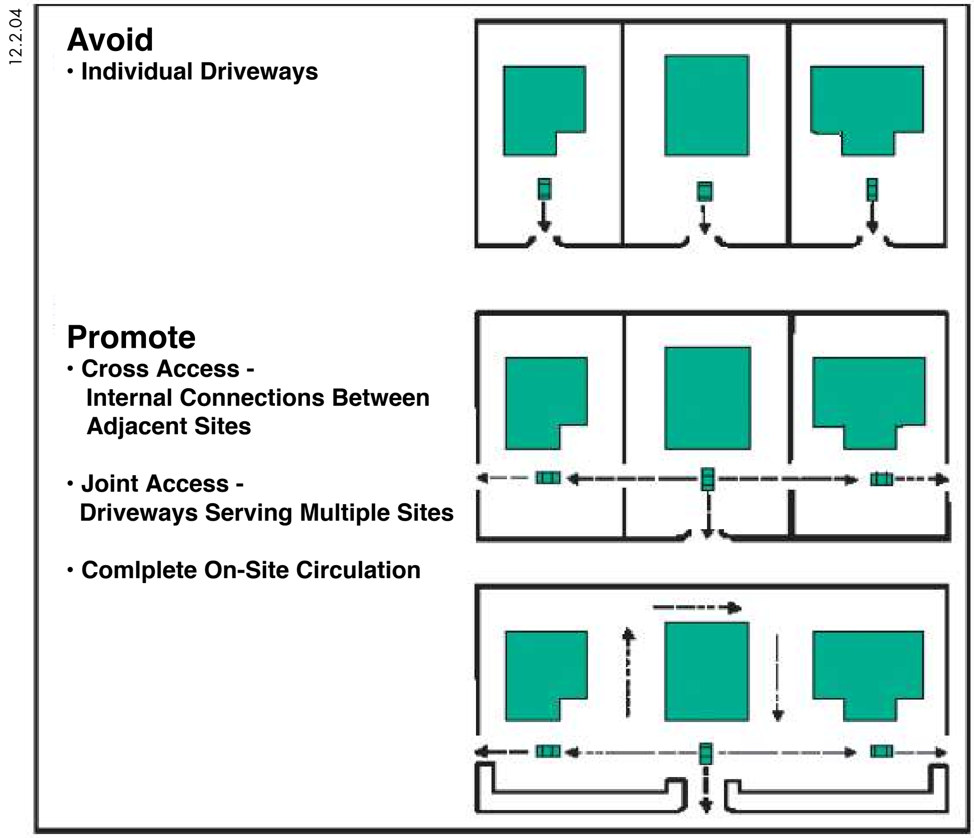
Better street connectivity can also be achieved through the use of shared driveways when two or more adjacent properties use the same driveway. This design practice helps reduce traffic accidents associated with turning traffic and will improve traffic flow on the main road. Figure 5-2 compares good and bad access management techniques and driveway spacing. Legally, shared driveways can be created through cross or joint access wherein one ore more property owners have the legal right to access a driveway that runs through an adjacent property or where two property owners legally share access along a common property line.

Driveway spacing is important for maintaining safety on arterial roads. In general, it is better to limit the number of driveways accessed from a main road as well as increase the distance between driveways in order to minimize potential conflicts. Adequate spacing will depend on traffic and engineering conditions, local development and existing land use. Since New York State has not established driveway spacing standards, such decisions are left to each municipality’s discretion. Generally, as the posted speed limit on a roadway rises, minimum spacing between driveways should also increase to maintain safety and smooth traffic flow. Consideration should also be given to the number of peak hour trips generated by the use on a particular parcel. Based on driveway spacing standards used in some municipalities, the Center for Transportation Research and Education (CTRE) at Iowa State University has identified the spacing guidelines shown in Table 5-1 as good practice. To account for uses with a higher traffic generation, a factor of 50 percent was applied was applied to CTRE numbers.

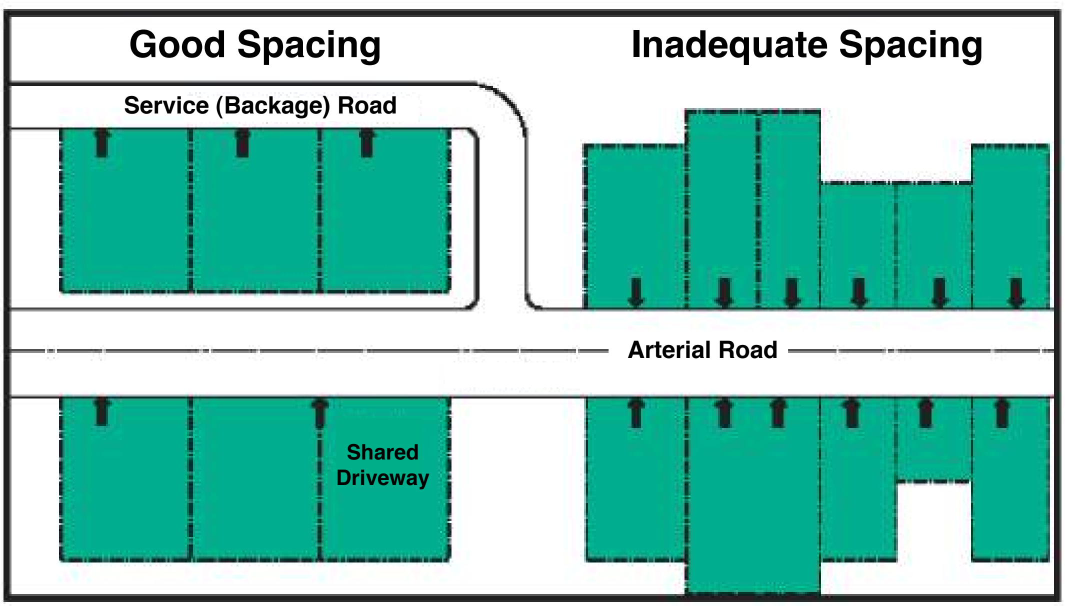
Consideration should also be given to proved adequate distance between an intersection and an adjacent driveway along an arterial road. If too short, this distance, also referred to as corner clearance, could result in traffic flow problems, an increase in collisions, and driver confusion. Corner clearances should be the same as driveway spacing requirements but will depend on site conditions.

Intersections and Traffic Signaling

Adequate spacing between intersections will help to minimize the risk of accidents, and decrease the chance of congestion and traffic delays. However, it is also important to provide a street network that is efficient for motorists, bicycles, and pedestrians. Spacing will depend on the type and function of the street. For instance, there should be more space between intersections on



Driveway Sharing



Driveway Spacing

IMAGE SOURCE: Center for Transportation Research and Education's "Access Management Toolkit"

Access Management Techniques
Figure 5-2

Table 5-1
Recommended Minimum Driveway Spacing on Arterial Roads

Posted Speed limit (mph)	Minimum Centerline to Centerline Driveway Spacing (feet)	Minimum Centerline to Centerline Driveway Spacing for parcels with > 100 PHT*
25	85	125
30	125	185
35	150	225
40	185	275
45	230	345
50	275	410

Notes: *PHT = Peak Hour Trips, based on multiplying by a factor of 50 percent, rounded to nearest 5 feet

Sources: Center for Transportation Research and Education, Iowa State University, AKRF, Inc.

freeways (1 to 2 miles minimum) than on arterial roads (between 0.5 and 1 mile or greater). On rural roads, where vehicle speeds may be high, intersections should be at least one-half mile apart.

Similarly, traffic signals at intersections should be placed with consideration for the type of road and area land use. Too many traffic signals within close proximity of each other may increase traffic delays and queues. Changes in signalization and other design elements at intersections can improve traffic efficiency. Coordinated traffic signals that define a progression of traffic flow can manage speed and reduce driver frustration by defining a smooth flow of traffic avoiding bottle-necks and inducing gaps from side street traffic.

Roadway Design and Aesthetics

Physical medians can help prevent accidents caused by crossover traffic, reduce headlight glare distraction, and separate left-turning traffic from through lanes when combined with left-turn lanes. Medians may be particularly effective in suburban arterial areas. Types of median treatments may include raised medians, flush medians, or two-way left turn lanes.

Raised medians provide physical barriers to traffic, pedestrian refuges, and serve a traffic calming function. Plantings offer an opportunity to enhance corridor aesthetics. Flush medians offer many of the same advantages of raised medians but do not provide the physical barrier to vehicular encroachment. Painted or paved medians will require additional maintenance effort to retain their effectiveness.

In locations with frequent driveways serving adjoining property, two-way left turn lanes provide space for left turning vehicles to wait for a gap without interfering with through traffic traveling in both directions. These lanes are usually used where access management techniques are unable to limit or appropriately space the number of driveways. They are often located in areas of commercial development, and can be combined with either 2 or 4 through lanes. Two-way left turn lanes can, however, result in confusion and accidents when vehicles traveling in opposite directions make left turns at the same locations.

Access management strategies also present an opportunity for aesthetic improvements. Oftentimes, management techniques, like adding an additional two-way-left turn lane can increase the amount of concrete and asphalt. For this reason, it is important that unique aesthetic treatments be incorporated to enhance the attractiveness of a corridor. These treatments can include landscaping on raised medians, pavement textures and designs on medians and parking areas, planting street trees and other vegetation, and adding uniform and well-designed street lights.

Finally, access management reduces vehicle dependency by providing a safer pedestrian environment. Pedestrians will benefit from a decrease in the number of commercial and private driveways and safer street crossings on roads with medians. In addition, pedestrians can enjoy other amenities such as benches, transit shelters, and pedestrian-scale lighting that can be incorporated into many projects to encourage pedestrian activity and reduce auto dependency.

Implementation

Implementation of comprehensive access management strategies will involve careful study and coordination between local, regional, and state agencies. According to the United States Transportation Research Board Committee on Access Management, there are five key elements to consider: First, roadways should be logically classified according to their function; second, roadways should be designed and planned according to function; third, acceptable levels of access should be identified for each roadway in order to apply spacing and signaling criteria; fourth, appropriate geometric design criteria and traffic engineering analysis should be applied at each access point; finally, policies, regulations, and permitting procedures should be established to carry out program objectives.

STRATEGIES TO REDUCE SINGLE-OCCUPANT VEHICLE (SOV) TRIPS

Several strategies for reducing the number of single-occupant vehicles (SOV) trips within the roadway network exist. Each of the strategies relies principally on provision of increased transit service or on incentives to encourage car-pooling. Car-pool services and park-and-ride lots can create enough of an incentive to increase the number of car-pools. Guaranteed ride home programs that offer a stranded car-pool participant a ride home have also been successful. Satellite parking facilities and shuttle bus service between those facilities and the Metro-North train stations would remove vehicles from the roadway network closer to their source, especially since the Harriman train station is at the eastern, and most congested, end of the study area. Finally, enhanced service on local and county dial-a-bus or Main Line trolley runs would remove SOVs from the roadway, although predominantly during the afternoon shopping periods and not the morning or evening rush hours.

SUSTAINABLE DEVELOPMENT GUIDELINES

This section summarizes some of the typical aspects of sustainable development and demonstrates how sustainable development strategies can be used in various neighborhoods throughout the study area to reduce growing congestion on roadways while continuing to promote economic growth.

The concept of “sustainable development” encompasses a suite of techniques that address the interrelationship of land use planning, transportation planning, and economic development. Sustainable development strategies facilitate the creation of economically viable communities while minimizing environmental impacts such as traffic and depletion of land resources which are usually consequences of sprawl development. Sprawl development is usually characterized by a broad separation of uses on large lots which results in auto dependency and heavy traffic along commercial corridors. Sustainable development minimizes traffic impacts by integrating traffic and land use planning to develop a built environment that minimizes the need for vehicle trips and reduces distance of vehicle trips that are required. The key to sustainable development is simultaneous implementation of multiple traffic and land use measures to address problems instead of addressing a traffic or land use issue separately to correct an existing problem. By employing sustainable development strategies, traffic is managed by reducing the need for vehicle trips before development occurs instead of developing solutions to remedy traffic problems caused by previous poor land use planning.

In addition to preventing adverse environmental impacts, sustainable development strategies can also result in numerous benefits to a community's local economy, quality of life, and overall visual appearance.

CHARACTERISTICS OF SUSTAINABLE DEVELOPMENT

Mixed-Use

One of the key aspects of sustainable development is development of mixed-use neighborhoods. Mixed-use developments cluster different land uses such as retail, residential, and institutional into areas within close proximity. Ideally the different land uses would be placed in close enough proximity so as to make walking between several different land uses safe and feasible.

Mixed-use developments can include multi-story buildings with ground floor retail or service uses and top floor residential uses or varying land uses that are adjacent to each other in a relatively dense environment. Mixed-use development is typical in villages where zoning regulations allow multiple land uses in a single area. Advantages of mixed-use development include easier access to goods and services and an overall improvement to community character and aesthetics.

Resource Conservation

Another characteristic of sustainable development is resource management. Through clustering of land uses, both land and energy resources are conserved. Although land uses are relatively densely clustered in some locations, overall land consumption is minimized. This provides for an overall increase in open space with larger individual tracts of open space. Figure 5-3 shows how different subdivision plans can result in increased open space while maintaining equal or greater numbers of housing units. Cluster plans can also preserve the most environmentally sensitive portions of a study area. Common measures taken under sustainable development include redevelopment of already disturbed land and preservation of undisturbed land. These measures provide residents with valuable open space, help preserve water resources and protect various animal species living in the region.

Sustainable development can also result in significantly reduced energy consumption. Sustainable development promotes use of environmentally friendly buildings that reduce energy consumption through use of better insulating materials for heating and cooling purposes and use renewable resources to reduce depletion of forests and other natural resources. Energy use is also minimized by reducing the number of vehicle trips required and reducing the length of those trips. Higher densities and mixed use development reduce the need for some vehicle trips as walking is made possible, thereby reducing energy consumption.

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SOURCE: Arendt, Randall, *Rural by Design*, APA Planners Press, 1994.

Conservation Subdivision
Figure 5-3

Transportation

One of the most important aspects of sustainable development is transportation and mobility. Sustainable development provides those who live, work, and play in sustainable communities with various modes of transportation. These modes can include (but are not limited to) walking, cycling, buses, light rail, and private auto.

While most suburban communities have densities that are too low to support effective and efficient public transit, sustainable development promotes and allows public transit by increasing density and clustering various uses around transportation nodes. Increased use of public transportation reduces the number of vehicles that use area roadways and provides opportunities for those without access to automobiles to get to various goods and services in the region. Adding public transportation to suburban communities is ineffective since it would be inconvenient to residents because of the large distances that would need to be traveled.

Pedestrian mobility is also made possible through increased density and mixed-use development. If different land uses (i.e. residential and retail) are in close enough proximity where walking is possible, vehicle trips are eliminated. Safe pedestrian mobility requires certain infrastructure such as sidewalks and crosswalks. For longer travel distances, cycling can also be an efficient transportation option. Cycling opportunities are enhanced by certain infrastructure such as bike lanes or hard shoulders. Transportation throughout a community can be further enhanced by use of intermodal facilities. An example of such a facility is a bus stop with adjacent bicycle racks. The overall benefit is reduced congestion on area roadways, and improved mobility.

SUSTAINABLE DEVELOPMENT IN THE STUDY AREA

This section summarizes how existing development patterns may shape the study area and how use of sustainable development strategies and access management techniques can be employed in the study area to reduce traffic congestion, enhance mobility, improve community character, reduce energy consumption, and preserve open space.

Commercial Development

Several locations in Orange County are likely to experience additional development pressure in the near future. One example where additional development may occur is on Route 17M between the Village of Monroe and Still Road. Figures 5-4 to 5-9 were generated utilizing ArcScene software and aerial photography. The figures show existing and potential future conditions looking west on Route 17M. The AcrScene figures are intended to illustrate what different types of development may look like and are not intended to show actual or proposed conditions with respect to architectural styles, dimensions, or locations.

Figure 5-4 shows how the area is currently developed with two traffic lanes and multiple curb cuts for vehicular access to each of the properties along the roadway. The existing development pattern with individual curb cuts for each lot results in congestion and queuing each time a motorist attempts to make a left-hand turn with oncoming traffic. Some parcels also have large paved areas along the roadway resulting in uncontrolled and at times chaotic entry and exit onto the private property.

One possible solution to this problem is widening of the existing roadway. While additional travel lanes may ease congestion by allowing for some vehicles to pass other vehicles making turns, current patterns of land development in the area are likely to result in additional growth in the area with a significant increase in vehicles traveling along the roadway. The additional

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Commercial Strip: Existing Conditions
Figure 5-4

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Commercial Strip:
Sprawl Development with Widened Road
Figure 5-5

12.2.04

Commercial Strip:
Sprawl Development with Median
Figure 5-6

12.2.04

Commercial Strip:
Village Center Development with Existing Road
Figure 5-7

12.2.04

Commercial Strip:
Village Center Development with Widened Road
Figure 5-8

12.2.04

Commercial Strip:
Village Center Development with Median
Figure 5-9

growth and traffic will likely offset many benefits of widening of the roadway. Figure 5-5 shows what the same area may look like in several years under existing land use regulations with a widened roadway. Even with multiple travel lanes, the continued use of multiple curb cuts will result in increase congestion with vehicles stopping to make left turns and reducing speed to make right turns. Future development under existing land use regulations would likely result in retail developments similar to the Home Depot, Wal-mart, and BJ's Wholesale club near Route 32. These uses would likely generate significant amounts of traffic and would cause congestion to continue or worsen, even if the road is widened.

In addition, problems associated with traffic, existing development patterns can also have impacts on the character of the study area and transportation options available to residents. A landscaped center median as shown in Figure 5-6 may make future development more appealing, but traffic problems would likely persist and the area would still take the shape of a commercial corridor as opposed to neighborhood.

In addition to traffic problems, the existing development pattern will continue to make access to many locations difficult or impossible without use of a private automobile. Sidewalks are rarely built under such development patterns and are likely to be underutilized even if they are built due to the excessive travel distances between uses. Lack of crosswalks is also likely to discourage pedestrian activity because of safety concerns.

Sustainable development and modification of land use regulations is another way to address increasing traffic congestion in the study area while creating an economically viable and pedestrian friendly community. Figures 5-7 and 5-8 show what the Route 17M corridor may look like with modified land use regulations with the existing roadway and with a widened roadway. The modified land use regulations can require reduced setbacks, rear parking lots, and higher density. Incentives can also be offered to promote shared parking areas and driveways.

Some of the existing development in the study area is likely to remain in its current location for several years but numerous other existing buildings throughout the study area are likely to be redeveloped as part of large projects. Sustainable development strategies can be used to guide development and prevent traffic from becoming worse.

As existing buildings are replaced and land is redeveloped, driveways and vehicular access can be modified to reduce traffic impacts. Figure 5-7 and 5-8 show how the Route 17M corridor may look if regulations require or provide incentives for parking to be placed at the rear of buildings with shared driveway access. In this example six buildings share a single parking lot with two curb cuts. By using fewer curb cuts the number of possible turning movements is reduced and traffic impacts are minimized.

Additional benefits could be gained through construction of sidewalks that allow easy pedestrian access to several different buildings without making a vehicle trip. If adequate pedestrian infrastructure is provided, people can walk to several local uses after parking their vehicles in a single central location. This can reduce turning movements on the roadway by eliminating the need for people to enter the road solely for the purpose of traveling between parking lots of different uses.

Although lower speed limits may be required to ensure pedestrian safety, fewer turning movements through fewer curb cuts would generally result in traffic flowing more smoothly while higher densities and improved pedestrian facilities eliminate the need for many vehicle trips entirely.

Neighborhood character would also benefit from the use of sustainable development strategies. By clustering uses into a denser, village center development pattern, a better sense of community can be created in various portions of the study area. In some parts of the study area, people can only identify certain buildings or retail uses to describe locations. If village center development occurs, people would be able to identify themselves with a specific neighborhood or community.

A widened road that is not properly designed can negatively affect neighborhood character even if sustainable development strategies are adopted but it may be necessary to adequately accommodate all existing and future traffic flow. Negative impacts can be mitigated through treatments such as trees and a landscaped median. The trees can serve as a buffer between the sidewalk and the roadway to create a more aesthetically pleasing and pedestrian friendly environment. A parking lane on either side of the road can also buffer pedestrians from traffic flow along the roadway and provide pedestrians with a feeling of safety. Figure 5-9 shows what the area may look like with trees and a landscaped median.

Land use regulations that promote higher densities could also make public transportation a more feasible alternative as transit stops could be placed in central locations where walking from bus stops to buildings in the neighborhood is possible and safe. Well defined crosswalks can be constructed to provide safe places for pedestrians to cross the streets. Figures 5-7 to 5-9 show well defined crosswalks constructed from pavers. Intermodal options such bicycle racks or bus routes that serve commuter railroad stations could further enhance public transportation opportunities.

Streetscape Improvements

Several locations throughout the study area that are already developed can also be enhanced through streetscape improvements. Figures 5-10 and 5-11 show areas on Route 32 where streetscape improvements have already been recommended. Improvements can include (but are not limited to) larger sidewalks, building façade improvements, landscaping burying utility lines, improved lighting fixtures, signage, decorative pavements and crosswalks, bulb-outs and bollards.

Village Infill

One option for additional development that should be examined is village infill development. Village infill development can occur at several locations throughout the study area including the intersection of Route 17M and Lake Road in the Monroe. Figure 5-12 is a rendering of potential improvements at this location. The figure shows different design improvements that can enhance the appearance of the area and improve the vibrant mixed-use character of this area in the Village. Improvements include sidewalk and crosswalk improvements, new aesthetically pleasing and pedestrian friendly lighting fixtures, rear parking lots, and streetscape improvements to enhance pedestrian safety. Infill development takes advantage of vacant or underutilized properties within Village areas to complete or “fill in” an existing development pattern.

Rural Crossroads

In some locations throughout the study area, especially where two main roads intersect, higher density mixed-use development should be considered. An example of a potential rural crossroads development is at Route 208 and Mountain Lodge Road in Blooming Grove (see Figure 5-13). Several vacant or underutilized parcels at this location provide the potential for reconfigured medium-density mixed-use development. As shown in Figure 5-13, the

Streetscape Improvements: Central Valley
Figure 5-10

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**Streetscape Improvements:
Central Valley**
Figure 5-11

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Village Infill Development
Figure 5-12

12.2.04

Crossroads Development
Figure 5-13

development can include two-story buildings with ground-floor retail and second-floor office or residential space. To create a pedestrian friendly environment, buildings are placed along the street with minimal setbacks and rear parking lots. The pedestrian environment is also enhanced with well-marked crosswalks and improved lighting. Rural crossroads development mimics older, traditional patterns where a combination of small-scale uses developed organically over time at locations where travel patterns intersect. General stores and post offices are examples of how this pattern existed in the past. (See, for example, the intersection of Route 94 and Tuthill Road in Blooming Grove).

Development of rural crossroads can have favorable impacts on future traffic conditions. Benefits can include reduced congestion on roadways through reduction of the number and length of vehicle trips by providing local retail opportunities for goods and services that can serve adjoining residential areas. Some vehicle trips can be eliminated entirely by facilitating pedestrian mobility between the residential areas and rural crossroads.

Residential Development

Better development strategies can also be implemented in residential neighborhoods. These strategies can include increased road connectivity and medium density housing to promote neighborhood design, preserve open space, and encourage walking.

Figure 5-14 is an ArcScene image based on conditions at Route 208 at Merriewold Lane. The image is not intended to depict actual conditions in the area but shows the current housing density and conditions adjacent to a vacant parcel that may be subject to future development if environmental conditions are appropriate.

Figure 5-15 shows how the area might be developed if typical development patterns continue. The depicted development includes four new cul-de-sac roadways that connect to Route 208. Each of these roadways provide a new conflict point on Route 208 and would result in possible queuing and delays at four new locations when left hand turns are made. Furthermore no neighborhood feeling is fostered since it is not possible to walk between houses on different roads without traveling onto Route 208. Such pedestrian activity would not be likely since it would require large walking distances. Furthermore, the lack of sidewalks and high speeds of motorists on Route 208 would make such pedestrian activity dangerous. The use of 2 acre lots results in a large amount of land consumption with a relatively small number of residential units and undesirable pedestrian activity.

Figure 5-16 shows how the same area could be developed using lot sizes of approximately ¼-acre to ½-acre and interconnected roadways with access to Route 208 from existing roadways. This development pattern serves to minimize the number of turning movements on the arterial roadway while providing connections to surrounding homes in the community. A vegetative buffer along Route 208 serves to reduce traffic and noise disturbance to local residents and provides motorists with the feeling of traveling on a more rural road without visual distractions that can slow down traffic. The smaller lot sizes and interconnected roads place residents into a more defined “neighborhood” and allow them to safely walk to neighboring houses. With smaller lot sizes, more units can be built or portions of the development can be reserved for open space with a reduced number of houses.

12.2.04

Residential Development: Existing Conditions
Figure 5-14

12.2.04

SOUTHEASTERN ORANGE COUNTY
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Residential Development: Large Lots

Figure 5-15

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SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

Residential Development: Conservation Subdivision
Figure 5-16

C. LAND USE RECOMMENDATIONS

This analysis clearly indicates that the existing zoning and pattern of growth within the study area is not sustainable and that the towns and villages need to make some change to better guide new development. The Village Center concept described in this report, which emphasizes mixed-use and higher densities, is considered a preferred approach; but any other zoning modifications that reduce overall levels of development and direct new growth toward existing built areas would be an improvement over the existing zoning. This section identifies specific land use recommendations for each of the towns and villages in the study area.

TOWN OF WOODBURY

- Continue updating the Town Comprehensive Plan and land development regulations (e.g., zoning, subdivision, wetland protection). Include the Village Center concept in the Comprehensive Plan to focus development in the Highland Mils and Central Valley areas.
- Use the Official Map language of New York State Town Law §270 to identify the transportation improvements and open spaces recommended by this study or the comprehensive plan for Woodbury. Once established on the Official Map of a municipality, transportation improvements (or planned open spaces) must be recognized when evaluating new land use changes or can be implemented in phases by private property owners making improvements on their land.
- Incorporate access management language into the zoning code and plan review standards to properly manage driveway spacing, shared parking, rear access between adjoining properties, and interconnections between commercial properties for pedestrians.
- Establish a Transportation Improvement District (TID)[1] to finance transportation improvements within the area roughly defined as the land Lands Town of Monroe line on the west and Interstate 87 on the east extending from the Metro-North Harriman Train Station to the south to and including the Woodbury Common outlet center to the north (see Figure 5-17).
- Redevelop area bounded roughly by Smith Clove Road, Estrada Road, the railroad tracks, and Route 32 with a mix of residential, retail, and office space. Integrate public parking with private parking to create a defined hamlet center of higher density (roughly 8 dwelling units per acre).
- Provide enhanced pedestrian amenities such as sidewalks, crosswalks with pedestrian signals, and landscaping to create a defined hamlet center.
- Develop the area north of the Harriman Train Station with a mix of residential and office uses. Establish vehicular and pedestrian connections into the Village of Harriman where appropriate.

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[1] A TID requires enaction of enabling legislation by the NYS Legislature and preparation of a Map, Plan, and Report identifying the boundaries of the TID, proposed transportation improvements and mechanisms for funding improvements, and relevant data identifying the need for such improvements.

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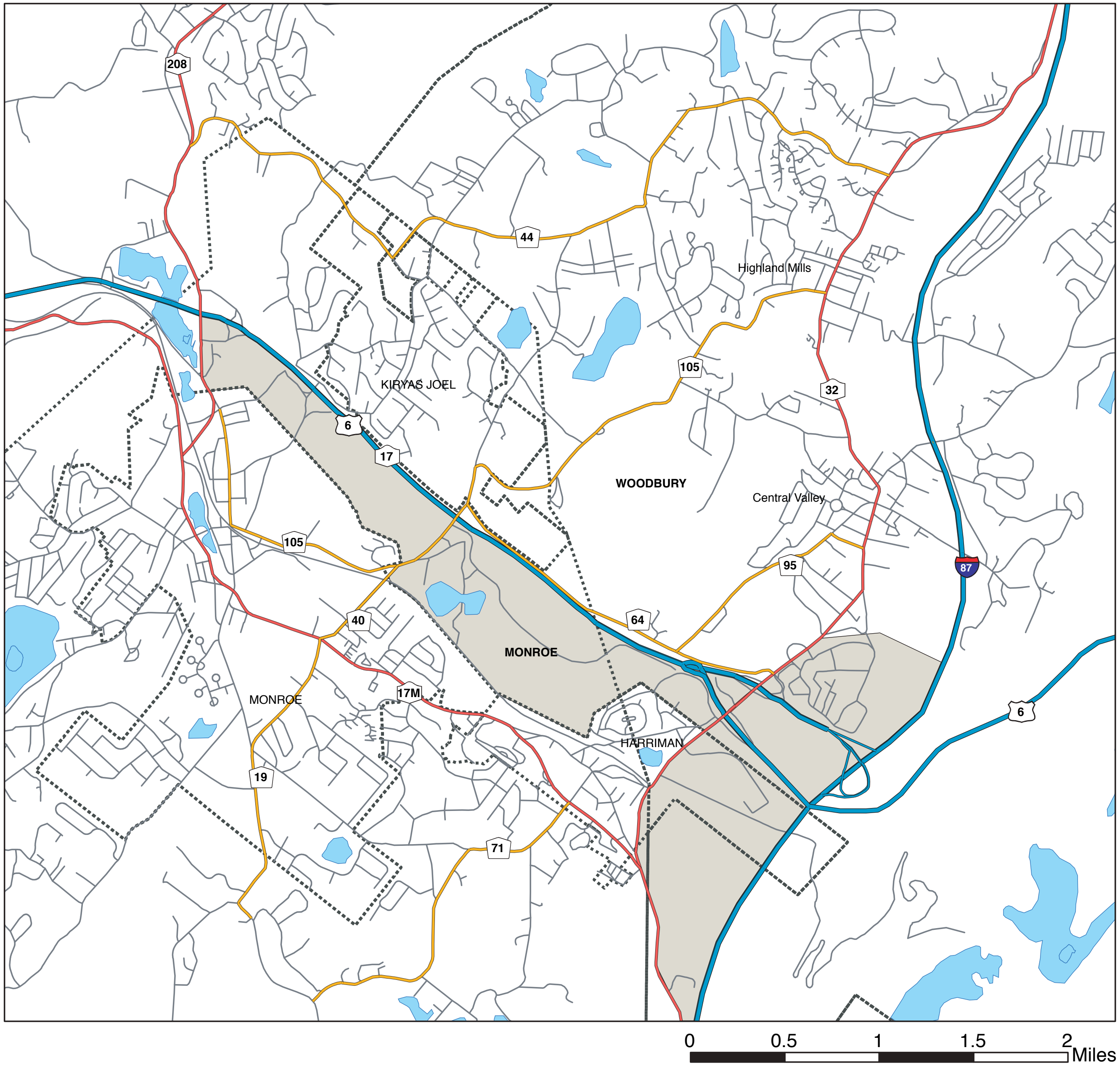


Legend

TRANSPORTATION IMPROVEMENT DISTRICT

MUNICIPAL BOUNDARIES

LAKES

ROADS

INTERSTATES/ US HIGHWAYS

STATE HIGHWAYS

COUNTY HIGHWAYS

OTHER ROADS

SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY

Transportation Improvement District

Figure 5-17

- Identify select locations along Route 32 in Highland Mills for increased residential density (up to 8 dwelling units per acre) and mixed-use infill development. Such development must be compatible with the adjoining single-family residential areas and the environmental constraints (predominantly wetlands).
- Reduce permitted intensity of residential development on land located along the north side of Dunderberg Road/Nininger Road and minimize the number of permitted curb-cuts onto the new collector-distributor road. Coordinate low-density residential development with ridgeline protection provisions (see below).
- Adopt Conservation Subdivision regulations Town-wide to base development on the suitability of lands to handle septic systems and development on steep slopes and ridgelines.
- Adopt Ridgeline Protection regulations to minimize residential development on the upper portions of significant ridgelines. Prohibit excessive clearing or grading activities within the regulated Ridgeline to protect near-field and far-field views of the ridges.
- Consider possible road connections between subdivisions to reduce the number of vehicles utilizing collector roads.
- Retain the existing hotel and gas station on Route 32 where the new loop ramp is proposed between southbound Route 32 and eastbound Route 17/6.
- Enter into an Intermunicipal Agreement with the Town of Monroe and Village of Harriman for creation of a Transportation Improvement District (see above).

TOWN OF MONROE

- Continue updating the Town Comprehensive Plan and land development regulations (e.g., zoning, subdivision, wetland protection). Include the Village Center concept in the Comprehensive Plan to focus development toward the Village of Monroe.
- Use the Official Map language of New York State Town Law §270 to identify the transportation improvements and open spaces recommended by this study or the Comprehensive Plan for Monroe. Once established on the Official Map of a municipality, transportation improvements (or planned open spaces) must be recognized when evaluating new land use changes or can be implemented in phases by private property owners making improvements on their land.
- Incorporate access management language into the zoning code and plan review standards to properly manage driveway spacing, shared parking, rear access between adjoining properties, and interconnections between commercial properties for pedestrians.
- Establish a Transportation Improvement District (TID) to finance transportation improvements within the area roughly defined as between Forest Avenue on the west and the Town of Woodbury line on the east, NYS Route 17 on the north, and the Village of Monroe line on the south (see Figure 5-17).
- Reduce residential density on lands outside the Village of Monroe. Adopt Conservation Subdivision regulations and Transfer of Development Rights to minimize future traffic congestion in areas outside of the Village and encourage pedestrian trips between the Town and the Village.

- Rezone lands along the proposed Larkin Drive extension from Light Industrial (LI) to office park (also consider senior housing senior housing). Develop strong design guidelines to ensure adequate site design and buffering between Route 17 and new uses. Minimize curb-cuts onto the Larkin Drive extension to two points of connection to new uses. Provide interior connections between different uses to limit vehicular use of Larkin Drive extension. Consider landscaped median along length of Larkin Drive extension to enhance visual appeal of new development.
- Enter into an Intermunicipal Agreement with the Town of Woodbury and Village of Harriman for creation of a Transportation Improvement District (see above).

TOWN OF BLOOMING GROVE

- Continue updating the Town Comprehensive Plan and land development regulations (e.g., zoning, subdivision, wetland protection). Include the Village Center concept in the Comprehensive Plan to focus development at strategic locations along Route 208 and near the Village of Washingtonville.
- Use the Official Map language of New York State Town Law §270 to identify the transportation improvements and open spaces recommended by this study or the Comprehensive Plan. Once established on the Official Map of a municipality, transportation improvements (or planned open spaces) must be recognized when evaluating new land use changes or can be implemented in phases by private property owners making improvements on their land.
- Incorporate access management language into the zoning code and plan review standards to properly manage driveway spacing, shared parking, rear access between adjoining properties, and interconnections between commercial properties for pedestrians.
- Consider medium-density housing (4 to 8 dwelling units per acre) and small-scale commercial retail/office on the east side of Route 208 near Clove Road.
- Enhance the existing commercial uses at Worley Heights to form more of a hamlet focus.
- Focus new commercial uses along Route 17M and lower portions of Route 208. Reduce the extent of the ORI zoning district in the Oxford Depot area.
- Consider Conservation Subdivision and/or Transfer of Development Rights program to direct new residential development toward areas of existing development (and wastewater infrastructure) and allow for more vehicular and pedestrian connections between subdivisions and hamlet areas.

VILLAGE OF HARRIMAN

- Update the Village Comprehensive Plan and land development regulations (e.g., zoning, subdivision, wetland protection). Include the Village Center concept in the Comprehensive Plan to focus development within the existing village pattern.
- Use the Official Map language of New York State Village Law §7-724 to identify the transportation improvements and open spaces recommended by this study or the Comprehensive Plan for Harriman. Once established on the Official Map of a municipality, transportation improvements and open spaces must be recognized when evaluating new land

use changes or can be implemented in phases by private property owners making improvements on their land.

- Incorporate access management language into the zoning code and plan review standards to properly manage driveway spacing, shared parking, rear access between adjoining properties, and interconnections between commercial properties for pedestrians.
- Integrate vehicular and pedestrian connections with potential future mixed-use development north of Harriman Train Station (see recommendations for Town of Woodbury, above) into existing roadway network.
- Establish a Transportation Improvement District (TID) to finance transportation improvements within the area roughly defined as those lands east of Route 17 as described above in the Town of Woodbury (see Figure 5-17).
- Enter into an Intermunicipal Agreement with the Town of Woodbury and Town of Monroe for creation of a Transportation Improvement District (see above).

VILLAGE OF MONROE

- Continue updating the Village Comprehensive Plan and land development regulations (e.g., zoning, subdivision, wetland protection). Include the Village Center concept in the Comprehensive Plan to focus development within the existing village center
- Use the Official Map language of New York State Village Law §7-724 to identify the transportation improvements and open spaces recommended by this study or the Comprehensive Plan. Once established on the Official Map of a municipality, transportation improvements (or planned open spaces) must be recognized when evaluating new land use changes or can be implemented in phases by private property owners making improvements on their land.
- Incorporate access management language into the zoning code and plan review standards to properly manage driveway spacing, shared parking, rear access between adjoining properties, and interconnections between commercial properties for pedestrians.
- Conduct a design charrette for the redevelopment of the large block bordered by Lake Street, Stage Road, and Mill Pond Parkway. Consider higher density residential and mix of office and retail uses. Include provisions for public space (joint Village/Town office space or library), shared parking, and open space.
- Conduct a Route 17M Corridor Management Plan and design charrette to further evaluate the potential effects of widening.
- Consider creating a more pedestrian-scale/pedestrian-friendly retail node along Route 17M east of Stage Road.

VILLAGE OF KIRYAS JOEL

- Continue updating the Village Comprehensive Plan and land development regulations (e.g., zoning, subdivision, wetland protection). Include the Village Center concept in the Comprehensive Plan to focus development within the existing village center.
- Use the Official Map language of New York State Village Law §7-724 to identify the transportation improvements and open spaces recommended by this study or the

Comprehensive Plan. Once established on the Official Map of a municipality, transportation improvements (or planned open spaces) must be recognized when evaluating new land use changes or can be implemented in phases by private property owners making improvements on their land.

- Incorporate access management language into the zoning code and plan review standards to properly manage driveway spacing, shared parking, rear access between adjoining properties, and interconnections between commercial properties for pedestrians.
- Enhance facilities for pedestrians within the Village.
- Create a park-and-ride at the intersection of Bakertown Road and CR 105.

D. TRANSPORTATION RECOMMENDATIONS

Based on the results of the T-Model2, Synchro, and Select Link Analysis, a number of transportation improvements would benefit traffic flow and mobility within the Study Area. Some of these projects are easily implemented while others require greater capital investment, community acceptance, and detailed study. Improvements are organized below according to their "feasibility." "Feasibility" is determined by a combination of an analysis of available financing versus potential traffic benefits, environmental constraints, land use compatibility, and community consensus. Potential locations or alignments for improvements are shown in Figure 5-18.

EARLY ACTION ITEMS

By virtue of the initial analysis and findings of this study, Orange County was able to advance certain "Early Action Items" to relieve congestion and address safety issues at the following locations:

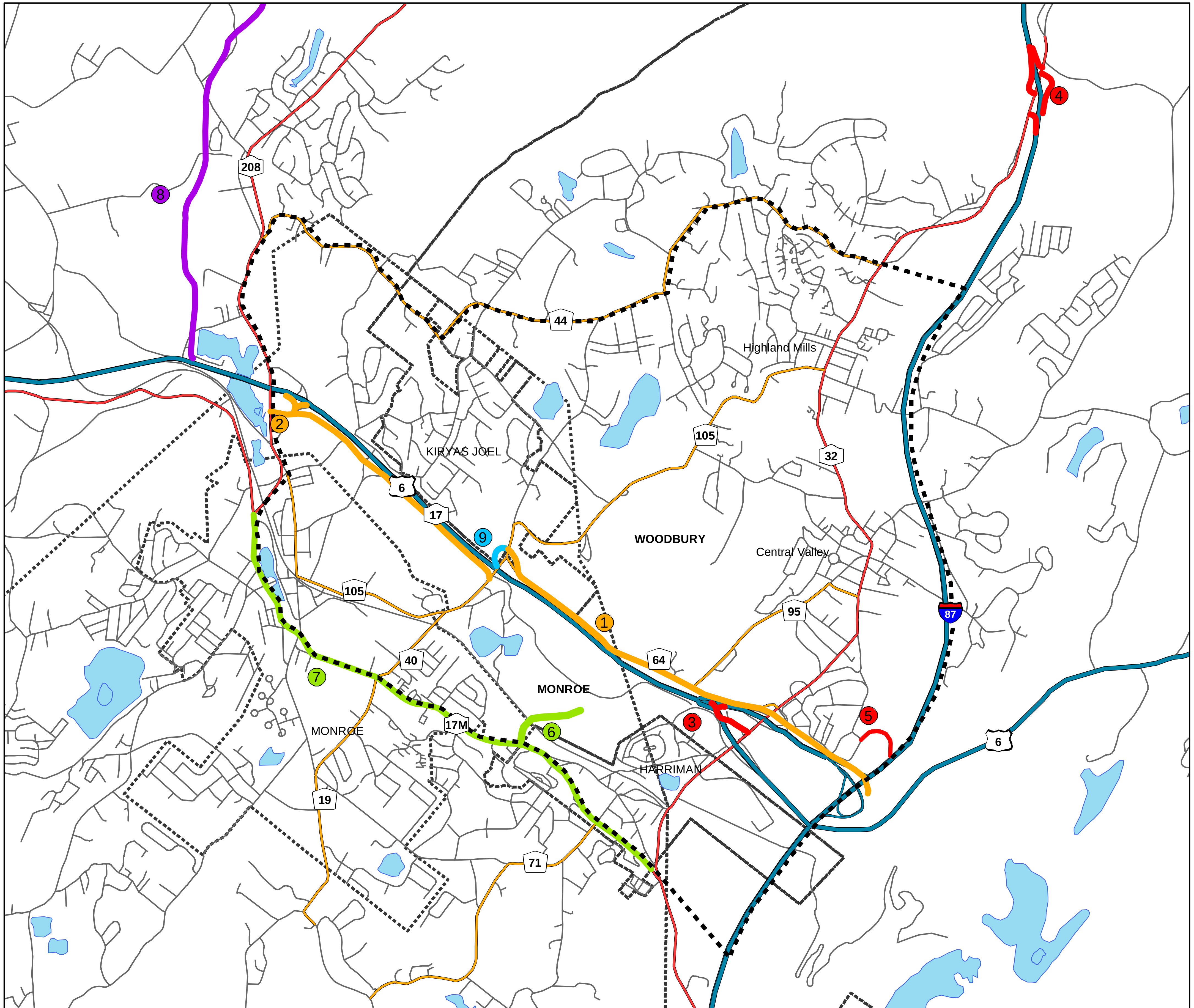
- Synchronization of traffic signals on Route 32 near Woodbury Common and Route 6/17.
- Widening of NYS Thruway off-ramp from Harriman toll plaza to Route 32.
- New Traffic signal at the intersection of CR 105 and Dunderberg Road[1]

In addition, the study identified other actions that can be implemented very quickly by Orange County:

- Establishment of consistent speed limits on Route 32
- Reduced speed limit (from 55 MPH to 45 MPH) on Route 17 Harriman near the old Railroad Bridge.
- Realignment of dangerous curve at the corner of Bakerstown Road and CR 105
- New turning lanes on SR 32 at CR 105.
- Advancement and refinement of SR 32 streetscape, parking and traffic improvements through central Valley by NYSDOT (see Figure 5-10)

[1] Identified as mitigation for development at Harriman Business Park

SOUTHEASTERN ORANGE COUNTY
TRAFFIC AND LAND USE STUDY



Legend

Primary Study Area

Municipal Boundaries

Transportation Improvements

Route 17

1 Route 17 Collector Distributor Road

2 Larkin Drive Extension

Route 32

3 Route 17 Loop Ramp

4 Cornwall Interchange

5 Woodbury Common Ramp

Route 17M

6 Bailey Farm Connector

7 Widen Route 17M

Route 208

8 Route 208 Bypass

Route 105 Improvements

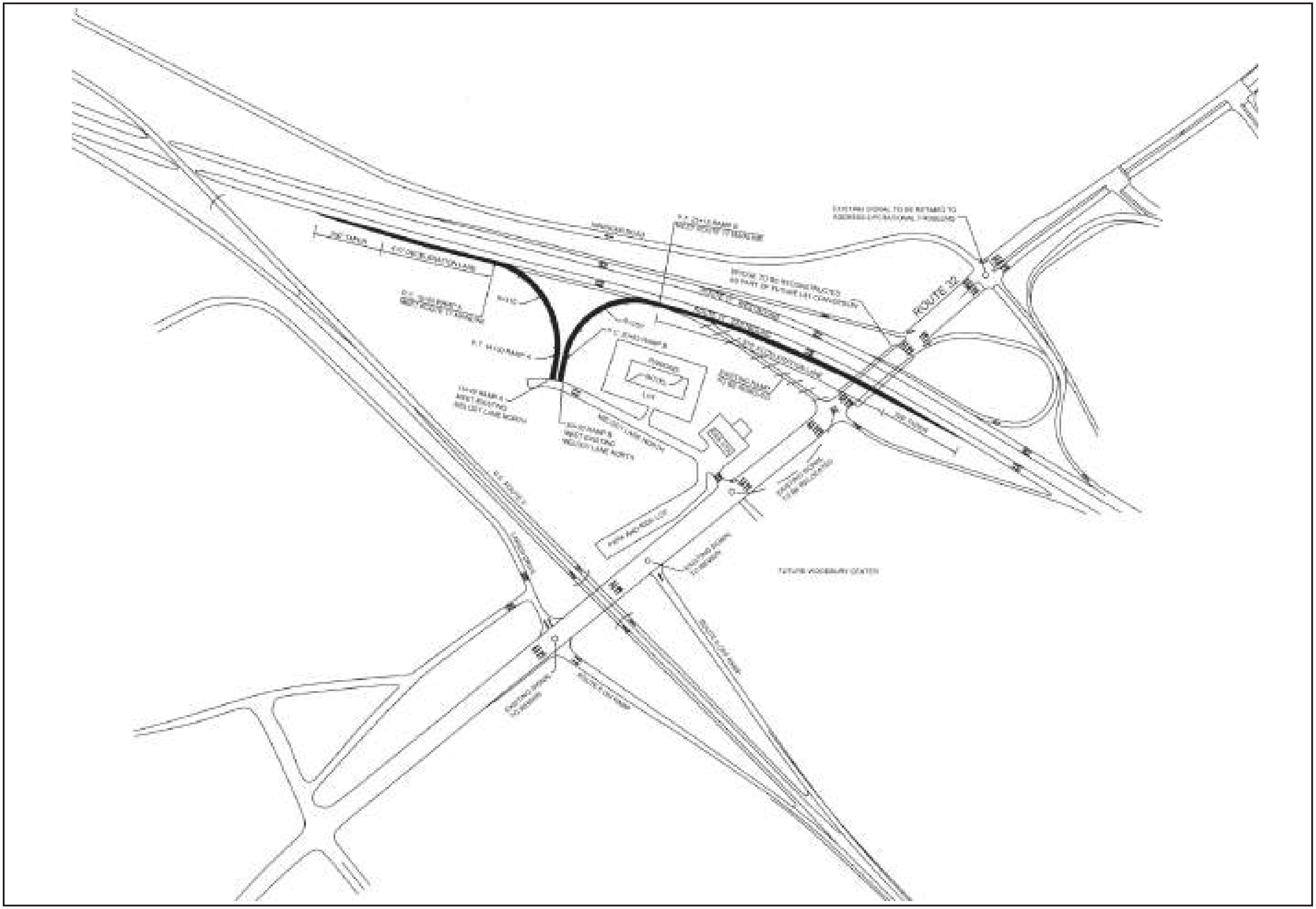
9 Ramp to CR 105

0 0.25 0.5 0.75 1 Miles

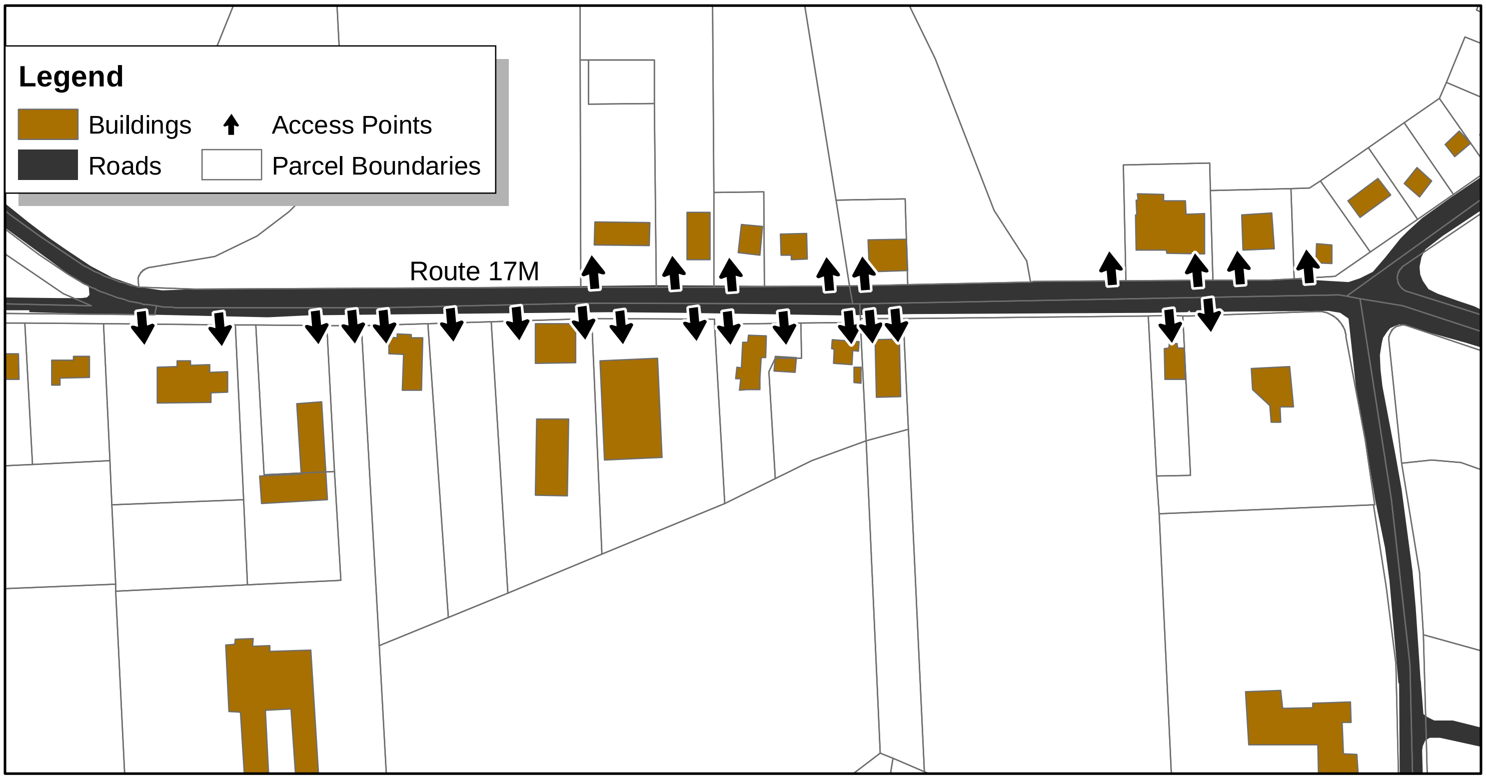
N

TRANSPORTATION IMPROVEMENTS

Figure 5-18



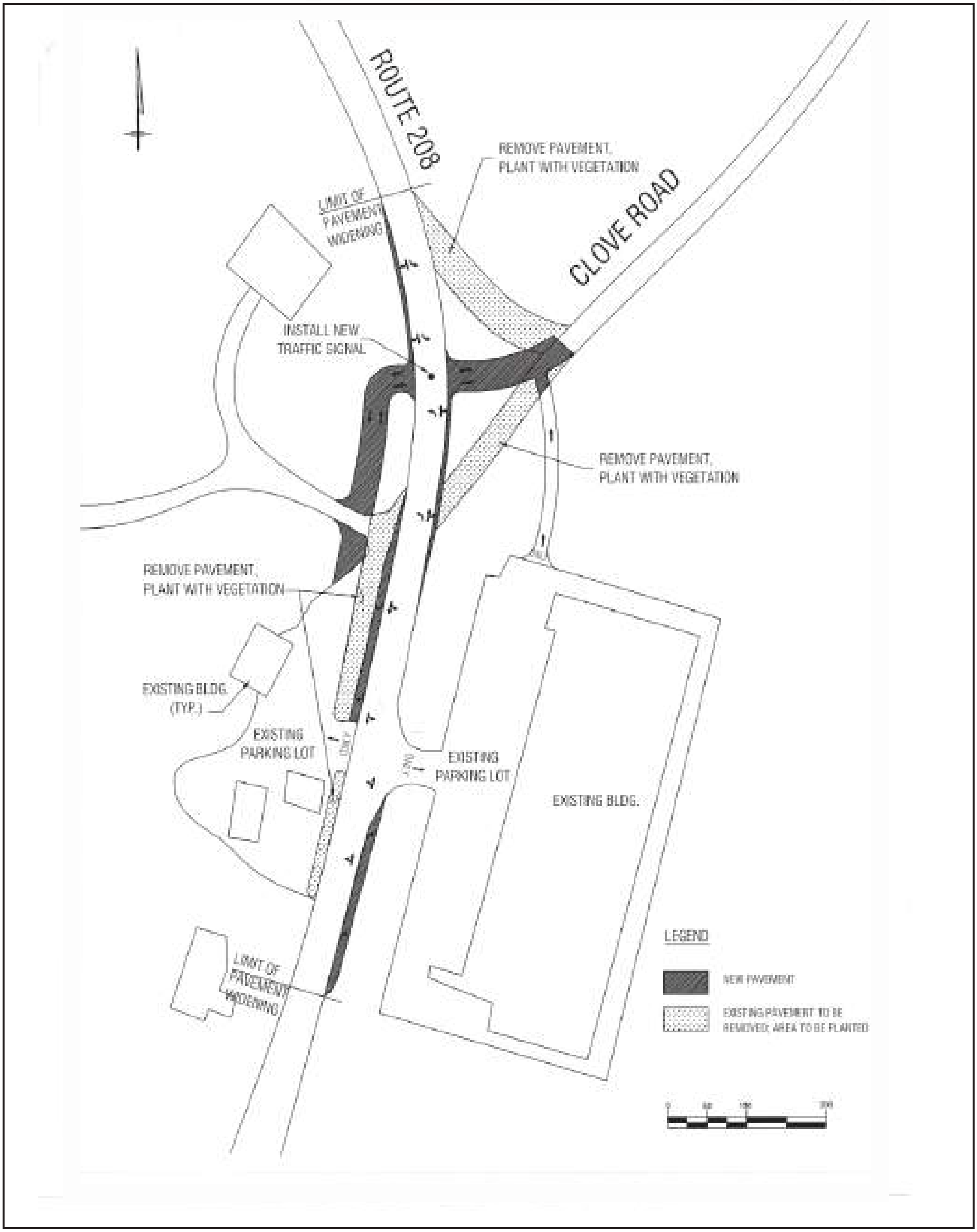
Transportation Improvements:
Route 32 Loop Ramp
Figure 5-19



Existing Condition

Proposed Access Management

Transporation Improvements
Route 17M Access Management
Figure 5-20



Transportation Improvements:
Route 208 and Clove Road
Figure 5-21

HIGH FEASIBILITY PROJECTS

- Route 32 Loop Ramp to Route 17 (see Figure 5-19)
- Additional capacity on Route 17
- Larkin Drive Extension (Route 208 to CR 105)
- Access Management, Driveway Consolidation, and Rear Service Roads on Route 17M (see Figure 5-20)
- Traffic Calming on Residential Streets
- Reduce speed limits along Route 17 south of Route 6.
- Safety improvements along Route 208 including realignment of Clove Road intersection (see Figure 5-21)
- Park and Rides with Improved Bus Scheduling
- Expanded Transit Service
- Facilitate expansion of existing privately-operated jitney service between the Harriman train station and Woodbury Common to include more connections to weekend trains.
- Replace Stop sign at southbound CR 105 and Spring Street with Yield sign.
- Implementation of a Transportation Improvement District in the Towns of Woodbury and Monroe and the Village of Harriman.
- Re-route intermunicipal bus-line down Route 17M (off of Freeland and Larkin) into the Village.

MID-LEVEL FEASIBILITY PROJECTS

- Collector-Distributor road between I-87 and CR 105 along Dunderberg/Nininger Road north of Route 17
- CR 105 Interchange
- Widening of Route 17M
- Route 208 Bypass Roadway
- EZ Pass Ramp from Woodbury Common to I-87 southbound
- Remove railroad overpass on Route 17 south of Nepara

LOW FEASIBILITY PROJECTS

- Bailey Farm Road/Route 17M bypass connector in vicinity of North Main Street
- Additional Travel Lanes on CR 105, Route 208, Route 32
- New Thruway Interchange between Exit 16 and Exit 17
- Additional Transit Hubs. Metro-North Railroad would consider providing additional weekend service to a privately financed station at Woodbury Common.

Two large projects listed as low feasibility were found to provide some improvements to traffic flow but would require additional detailed studies: Creation of a new intermodal transportation facility at Woodbury Common, and a new Thruway interchange between Exits 16 and 17.

The creation of a new intermodal transportation facility at Woodbury Common serving primarily regional bus service could alleviate some pressure on the Route 32 network during weekend hours. Coach USA/ShortLine currently makes a stop at Woodbury Common for its New York to Binghamton service. This route can also be used by riders within Orange County. Charter buses from New York City currently bring tourists and day-shoppers to Woodbury Common. Enhanced service, especially to shoppers, may make bus access to Woodbury Common more attractive thereby reducing the number of vehicles using the roadway network, especially on weekends. Linking Woodbury Common with Harriman Common and Woodbury Centre, while possible, may not attract large ridership as the markets serving each of these large shopping centers is essentially different (specialty shopping versus convenience/discount shopping).

With respect to commuter bus or rail service, provision of an enhanced regional bus facility or a new Metro-North Railroad station at Woodbury Common would remove a portion of the southbound AM peak hour traffic from Route 32 between Nininger Road and Route 17M now bound for the Harriman station. Similarly, a portion of the northbound PM peak hour traffic on Route 32 between Nininger Road and Route 17M may be reduced as well. Weekend train service aimed at shoppers has the potential to also reduce automobile traffic along Route 32 at this critical location. , Additional detailed analysis would be necessary to determine the full benefit derived from an enhanced regional bus facility or a new Metro North Railroad station on traffic operations along Route 32 and the region.

A new Thruway interchange between Exits 16 and 17 was studied to determine if significant volumes would be diverted off of Route 32, but the model revealed that relatively few vehicles took advantage of this route to points north of Woodbury. A more specific study of an additional interchange would have to be completed to determine the exact extent of any benefit. ✷

A. INTRODUCTION

This chapter provides additional background information with respect to the specific implementation strategies and techniques that should be pursued by the County and each of the involved municipalities to apply the recommendations outlined in Chapter 5. The County and each of the study area municipalities have specific roles in implementing the recommendations of this plan while making use of programs available to facilitate the implementation process.

B. COUNTY ROLE

The County should continue it its leadership role and promote further cooperation and action among all stakeholders, especially the involved municipalities, to continue implementation of the recommendations in this document and to identify new actions that may result in reduced congestion and more appropriate development alternatives.

The County should also make efforts to identify areas where additional early action items may be appropriate. In addition to implementing those early action items listed in Chapter 5, the County should make efforts to identify areas where additional improvements may alleviate traffic congestion and improve safety conditions. These actions may include additional signal timing improvements, new traffic signals, pedestrian safety improvements, and other roadway modifications.

The County should continue to serve as a facilitator between the municipalities and New York State Department of Transportation, Metro-North Railroad, and New York State Thruway Authority with respect to transportation and transit improvements and funding opportunities.

C. MUNICIPALITY ROLES

Each municipality in the study area must also take an active role in implementing the recommendations set forth in this document. To ensure that these recommendations are realized, each municipality should continue to update local plans and zoning codes to guide future development to occur in locations and manners that minimize traffic impacts as suggested in this document.

Municipalities should also make greater use of the State Environmental Quality Review Act (SEQRA) process to evaluate potential environmental impacts of proposed actions. By carefully analyzing potential impacts of certain actions in topics such as land use, natural resources, and traffic and transportation, each municipality can identify and avoid actions that may contribute to increased congestion on roadways while promoting those actions that will enhance the quality of life in the study area.

Local municipalities should also solicit additional guidance from the County by referring certain actions to the County Planning Department where required under General Municipal Law §239-

m or §239-n or where an action may be of County or regional concern. Through use of §239-m/n referrals, municipalities can use the resources available at the County to ensure that new development proceeds in a manner consistent with local and regional plans, including this study.

D. OFFICIAL MAPS

The Official Map is another tool that can be used to implement the recommendations discussed in Chapter 5 of this document. According to General Municipal Law §239-e (and Town Law § 270 and Village Law § 7-724), the purpose of the official map is "to conserve and promote the public health, safety and general welfare." The Official Map can be created by a local legislative body to show existing and planned (paper) streets. Any future subdivisions of a property or site development must conform to any utility and roadway rights-of-way shown on the official map. Furthermore, once a street is mapped no building can be constructed within the right-of-way unless the owner demonstrates hardship or is issued a variance.

If a parcel is subdivided and a subdivision plat is submitted using rights-of-way shown on the official map, the owner is assumed, but not required to dedicate the roadway to the public. If the roadway is dedicated to public use, the municipality must take on maintenance of the roadway. In order to prevent the roadway from being dedicated to the public, the owner must express interest in maintaining ownership of the roadway or the municipality must refuse to take on ownership.

Before a building permit is issued, the owner of the land must assume all responsibility to improve the road and make it suitable for public use before it is dedicated to the municipality since the property is still in private ownership. A building permit can be denied if a roadway is not deemed suitable for a development by the municipality. If the roadway is not formally dedicated to the municipality, no public utilities can be installed by the municipality.

E. TRANSPORTATION IMPROVEMENT DISTRICT

Any town may establish a special improvement district to provide improvements, services, or both to property owners within the district. One such district that may be established is a Transportation Improvement District (TID). The enabling legislation that allows municipalities within the study area to establish a TID is found in Article 12-A of Town Law which outlines the necessary steps for establishing the improvement district. Of specific interest to the municipalities at this point are the provisions in §209-c of Town Law Article 12-A that state "[t]he establishment or extension of an improvement district shall be based upon a map, plan and report prepared in such manner and in such details as determined by the town board and such map, plan and report shall be filed in the office of the town clerk." This set of documents: the map, plan, and report, are the critical elements for implementing the TID. This study contains much of the documentation and background information that would be required to prepare the map, plan, and report for formal implementation of a TID.

THE MAP

The map that is prepared for a TID does not need to be a survey of each individual parcel. Instead, the map may be a compilation of tax maps that clearly define which tax parcels are included in the TID and which parcels would benefit from the creation of the TID. This information can be supplemented by information on current ownership to ensure that it is clear where the boundary lies. Figure 5-17 shows the approximate boundaries for a possible TID.

THE REPORT

The report provides the background planning and traffic engineering information that leads to the conclusions contained in the plan. The TID report should be based on the most recent analyses, traffic counts, and analysis methodology available. Furthermore, updated land use build-outs should be used to determine what improvements will be required within the TID.

THE PLAN

The plan would include information on the improvements proposed, the maximum amount proposed to be expended for the improvement, and the proposed method of financing the improvements. The list of improvements would specifically define what transportation system measures are being considered (e.g., signalization, widening, re-striping) for specific locations within the TID. An estimate of construction costs for each improvement would be based on standard estimates and adjusted based on knowledge of specific conditions in the field. This study identifies key transportation improvements that could be made. More specific study would be required to develop more detailed design and construction plans and cost estimates for any transportation improvements to be included in the TID plan.

IMPLEMENTATION AND FINANCING

Improvements within the TID may be implemented through a combination of Federal, State, and local funding. As such the municipalities in which the TID is located may levy an additional assessment on property owners. The amounts of the additional assessments must be allocated equitably between all property owners within the district. Typically each property’s assessment is determined based on trip generation rates for projected development on each parcel; however other factors including the benefit from the improvements, the property size, or the property’s proximity to the improvements may be considered. A property can benefit from an improvement even if it is not directly adjacent to that improvement and can therefore be assessed for improvements at the discretion of the municipalities.

Following a duly-noticed public hearing and formal resolutions adopting the TID by each municipality, each municipal Clerk is to file a certified copy of the order with the County Clerk and Office of the State Department of Audit and Control. Any person aggrieved by the final order then has 30 days from the date the order was filed with the county clerk to commence a proceeding to review the final order.

F. TRANSPORTATION IMPROVEMENT PROGRAM

Many of the highway and transit improvements recommended in this study are eligible for federal funding under the Transportation Equity Act for the 21st Century (TEA-21) – the successor to the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. Each year, NYSDOT prepares a Transportation Improvement Program (TIP) that lists all capital and non-capital projects proposed for federal funding and large regional projects that require action by the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA). For TIP approval, Federal Law requires the following:

- Certification of a Statewide Planning Process
- Certification of a Metropolitan Transportation Planning Process
- Conformity to the Clean Air Act Amendments of 1990

- Conformity to the State Energy Plan
- Description of Public Planning Process for improvements described
- Statement asserting consistency with the Statewide Transportation
- Statement asserting consistency with the Orange County Transportation Council's Long-Range Plan
- Inclusion of TIP in the State Transportation Improvement Program (STIP).
- Demonstration of Fiscal Constraint
- List of TIPs with necessary fiscal data for three years

The STIP requires a cooperative process between the State, local governments, and local transportation providers. The STIP process begins by soliciting projects from area agencies that are eligible to sponsor federal-aid projects. As a Metropolitan Planning Organization (MPO) the Orange County Transportation Council, would identify potential projects for funding in a Transportation Improvement Plan (TIP). Upon submission of all MPO TIPs, candidate projects are evaluated based on available funding and eligibility for federal funding. The selected projects are then placed into a draft STIP and made available for public review and air quality compliance review. After these steps, the STIP is approved by MPO members. Additional details on the STIP process are available in *New York State Department of Transportation Statewide Transportation Improvement Program Summary for Federal Fiscal Years October 1, 2003 – September 30, 2006.*

G. MEASURING SUCCESS

As the recommendations of this study are implemented, it is important to develop ways to measure success. Any measurement of success should be based on the goals and recommendations set forth in this study. Although success is not easily quantifiable, there are ways to determine which new actions, policies, and procedures are proving most successful in realizing the goals of the County, municipalities, and other stakeholders within the study area. What makes measuring success even more difficult is that most of the significant changes that may take place would take place over an extended period of time and would not be immediately obvious.

There are some methods of measuring success that are somewhat quantifiable. For example, the total number of vehicle trips can be examined and compared to the total population over time. Future traffic counts can also identify improvements to levels of service at certain intersections. Since the population of the study area is expanding so rapidly, problems of traffic congestion should not be expected to be entirely alleviated. While some specific locations may see reduced traffic congestion as a result of specific improvements, the overall vehicular traffic in the study area will likely not be reduced.

Other actions that can lead to significant improvements are land use based. Land use changes that foster greater pedestrian, bicycle, and transit use will lead to the most significant positive traffic impacts over time. By using some of the land use strategies discussed in this document, the total number of vehicle trips would be lower than for the same number of dwelling units and retail space under the existing development pattern. The success of these actions can be measured by having meetings with the County and study area municipalities to discuss development projects and determine how well completed projects are working to reduce vehicle trips and congestion.

The Community Advisory Group and Technical Committee that formed out of the original Southeastern Orange County Traffic Task Force and oversaw the preparation of this study should continue to meet on a regular basis (perhaps quarterly) to review recent municipal and agency actions to determine how well the recommendations in this study are being followed. Periodic review of implementation will allow the stakeholders to continue the vital communication on issues that affect a large, and growing, portion of Orange County. An annual report should be prepared by the stakeholders for review by the Orange County Legislature to identify any recommendation transportation improvements or County actions that can be implemented in the following year. ✷