Southern Lancaster County

Sub-Area Planning Study

Prepared for the Virginia Department of Transportation

May 2009

Final Report

DISCLAIMER

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Study Purpose

In recent years, the areas in and around the towns of White Stone, Kilmarnock, and Irvington in southern Lancaster County have been experiencing considerable development pressures, primarily related to the waterfront residential development of full and part-time homes, and supporting retail services. Traffic growth on the main roads in the area has been increasing yearly. Thru traffic on the primary routes of Route 3 and Route 200 must travel through the business sections of the towns, as there are few alternative routes. This thru traffic includes lumber trucks and interstate hauling trucks. Concerns have been expressed regarding the capacity of the Norris Bridge (built in 1957), which carries Route 3 across the Rappahannock River.

Many undeveloped and low density sections within Southern Lancaster are beginning to experience additional development, bringing greater traffic volumes. Higher density development is anticipated in the future, so existing traffic concerns are expected to grow. The purpose of this study was to determine what improvements are necessary to facilitate the movement of traffic, including automobile, pedestrian, and bicycle, through the study area while minimizing impacts to existing private property. The approximate cost of such improvements was also estimated.

This was a preliminary planning study aimed at identifying potential future roadway improvements. Construction funding has not been secured, and additional planning may be required before any recommendation can be implemented.

Study Steps

This study had the following tasks:

- Assessment of Existing Conditions
- Projections of traffic if no roadway improvements are made
- Traffic forecasts for potential new developments
- Identification of deficiencies and strategies/alternatives for overcoming them
- Evaluation of strategies/alternatives
- Sharing of study progress with stakeholders and public
- Documentation of preferred subarea plan

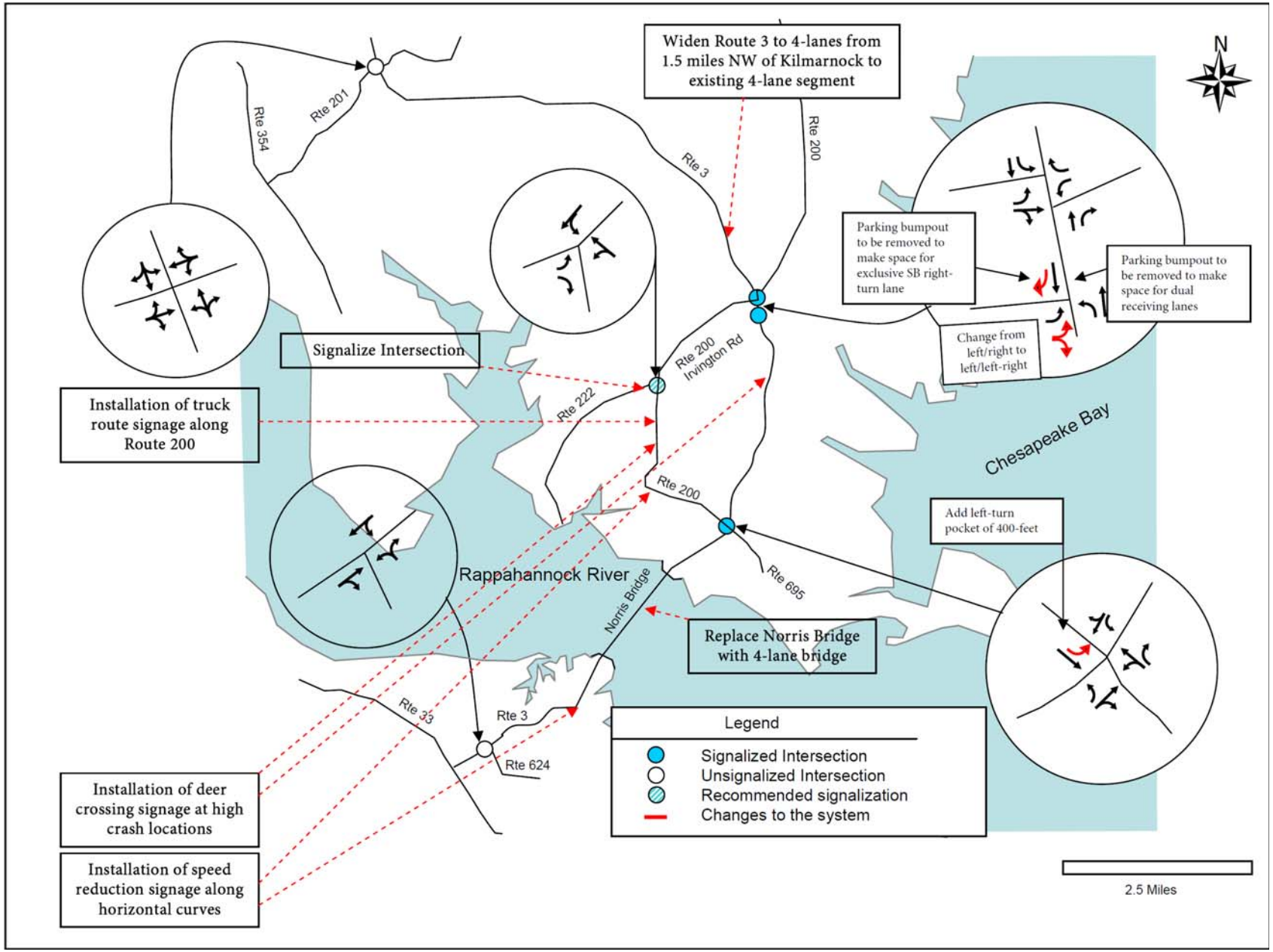
Recommendations

Specific attention was paid to recommendations that were low-cost and contained within existing right-of-way. Recommendations include:

- Channelization of lanes at signalized intersections and minor signal modifications.
- Installation of signage for designation of truck route and cautionary signs for deer and sight distance.
- Widening of Route 3 from two lanes to four lanes from 1.5 miles NW of Kilmarnock connecting to the existing 4-lane section 4.8 miles NW of Kilmarnock.
- Replacement of the Norris Bridge with a 4-lane span bridge.

Figure ES-1 shows the recommended improvements within the study area.

FIGURE ES-1: RECOMMENDED IMPROVEMENTS



INTRODUCTION

Purpose

In recent years, the areas in and around the towns of White Stone, Kilmarnock, and Irvington in southern Lancaster County have been experiencing considerable development pressures, primarily related to the waterfront residential development of full and part-time homes, and supporting retail services. Traffic growth on the main roads in this area has been approximately one percent annually. Through traffic on the Primary Routes 3 and Route 200 must travel through the business sections of these towns, as there are few alternative routes. This through traffic includes lumber trucks and interstate hauling trucks. The towns and the County are concerned about the safety of its residents, many of whom are senior citizens, using the business areas, whether walking across the street or driving into the traffic stream. Two of the towns are implementing Enhancement Grant funded streetscape projects that will help to calm traffic in their business areas. Concerns have also been expressed about the capacity of the Norris Bridge, which carries Route 3 across the Rappahannock River, to safely accommodate increasing future traffic volumes.

The purpose of the study was to examine existing and future conditions on the Primary Routes and other major roads within the study area, to identify existing and future transportation deficiencies, and to recommend improvement strategies.

Study Area

The study area for this project encompasses the roadway network connecting southern Lancaster County, which contains the towns of Kilmarnock, White Stone, Irvington, and northern Middlesex County, Virginia. These two counties are separated by the Norris Bridge which spans the Rappahannock River. The analysis includes the assessment of six intersections, which are located along Route 3 and Route 200, from the intersection of Route 3 and Route 201 to the intersection of Route 3 and Route 624. These two intersections represent the northern and southern limits of the study area, depicted in **Figure 1**, and are separated by a distance of 21 miles. The geometry of the study area intersections included in the assessment of traffic operations is shown in **Figure 2**.

There are two main roadways within the study area:

Route 3 (Mary Ball Road/Historyland Highway) is a rural principal arterial that runs primarily north-south through the study area. Its primary function is to provide mobility between the Towns of Kilmarnock and White Stone and connectivity throughout the study area. Route 3 is a mainly undivided two lane facility, except for two segments. Between the Towns of Kilmarnock and White Stone, and just north of Kilmarnock, Route 3 transitions to a four-lane divided highway. The speed limit along Route 3 varies throughout the study area, but follows a basic pattern. Between the different towns the speed limit is 55 mph; just outside of the towns the speed limit lowers to 35 mph; and within the town limits the speed limit is 25 mph. The speed limit for the Norris Bridge is 45 mph. The land use along Route 3 is primarily residential, agricultural, and undeveloped between towns, and mainly commercial within town limits.

Route 200 (Irvington Road/Jessie Ball Dupont Memorial Highway) is a primary arterial that runs primarily north-south through the study area. It forms a loop connecting the Towns of Kilmarnock, Irvington, and White Stone. Route 200 is an undivided two-lane facility within the study area. The speed limit along Route 200 varies throughout the study area, but follows a pattern similar to Route 3. The land use along Route 200 is primarily residential, agricultural, and undeveloped between the towns, and mainly commercial within town limits.

FIGURE 1: STUDY AREA LOCATION

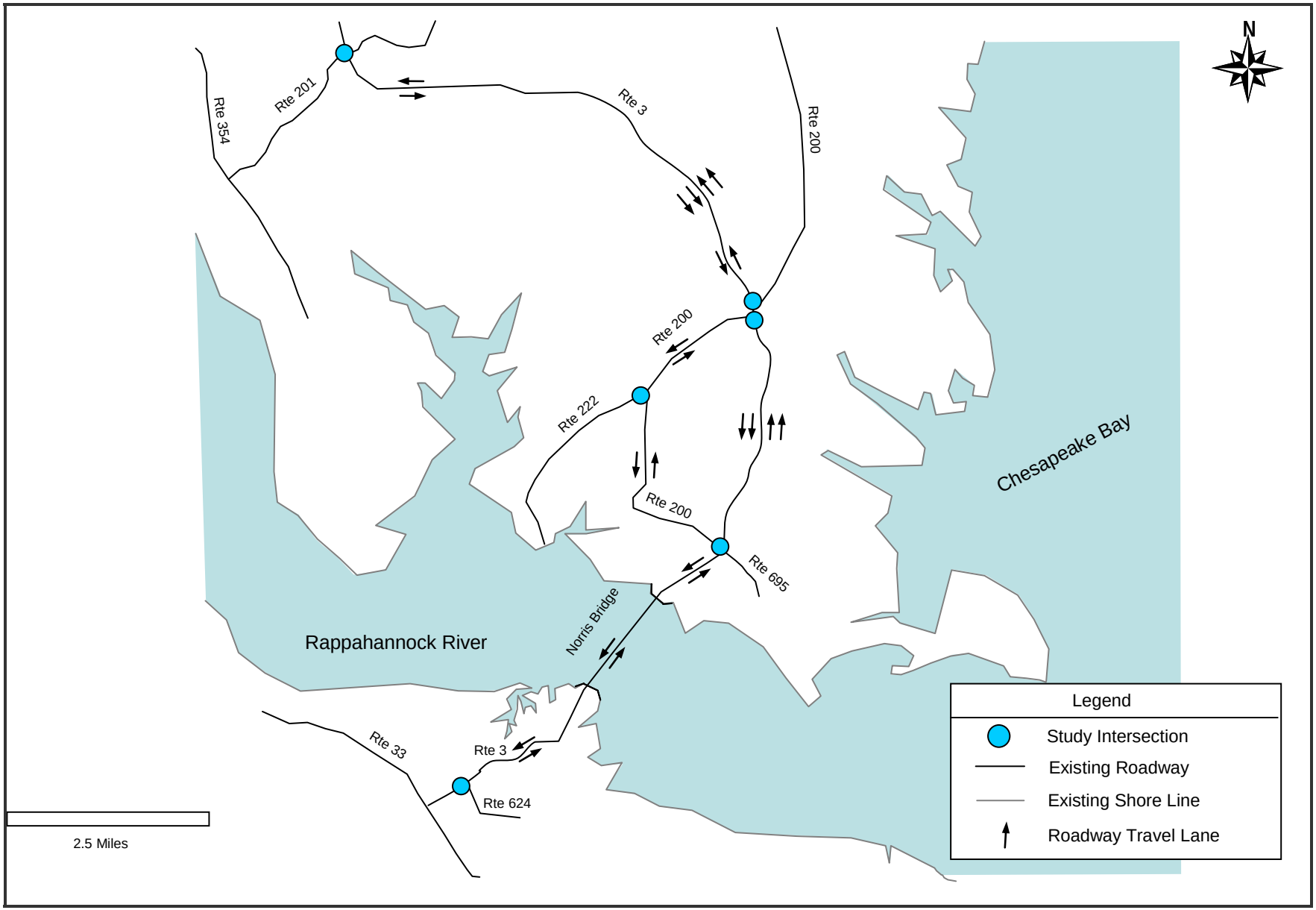
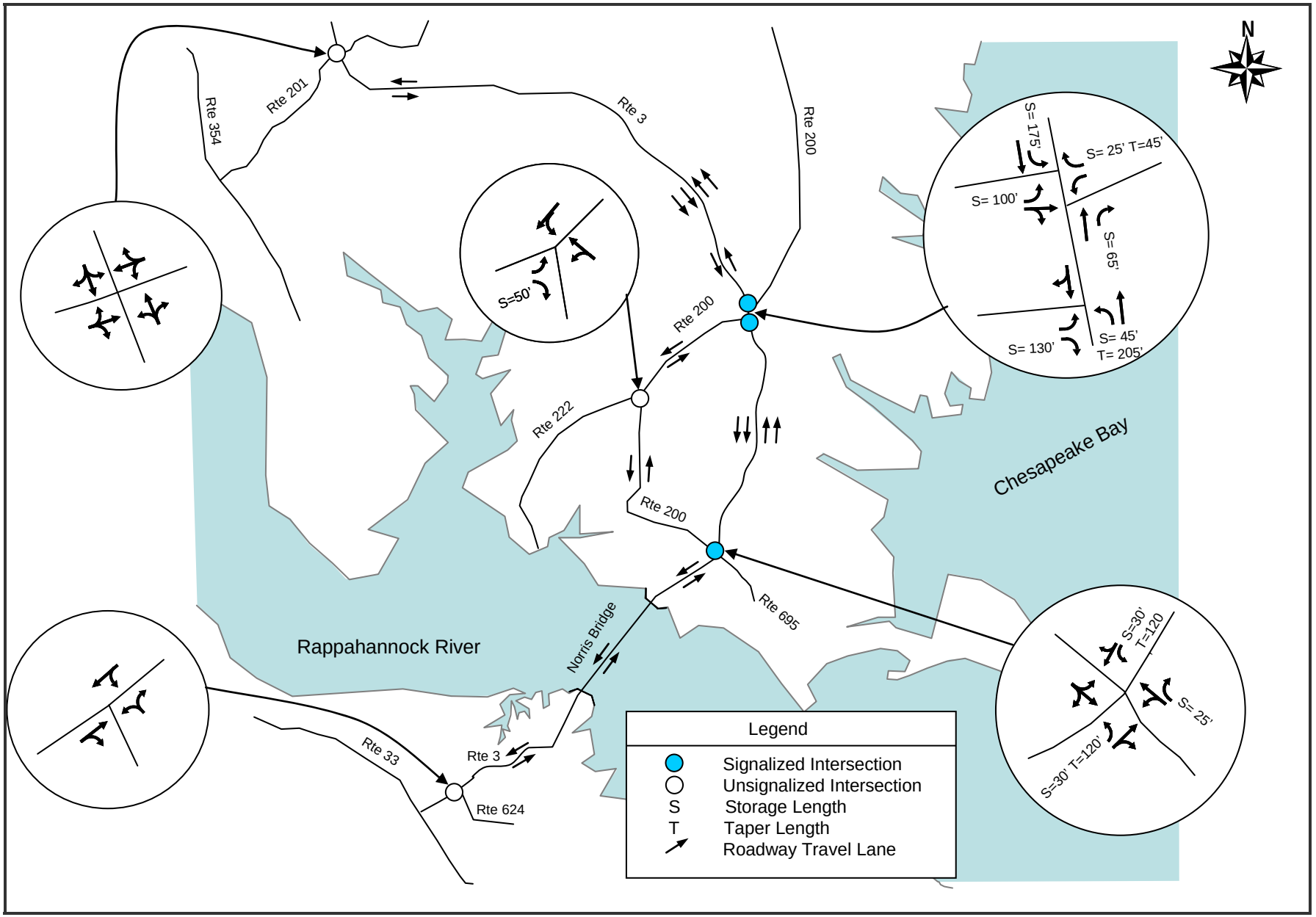


FIGURE 2: EXISTING GEOMETRY



EXISTING CONDITIONS

A. Data Collected

1. Traffic Counts

The Study Team conducted turning movement counts for six intersections throughout the study area during the AM peak period (7:00-9:00 AM) and PM peak period (4:00-6:00 PM). Detailed intersection movement count worksheets are provided in **Appendix A**. Counts were conducted during the weeks of July 21st and 29th on Tuesday, Wednesday, and Thursday. The locations of the turning movement counts are as follows:

1. Route 3 @ Route 200 N – Kilmarnock
2. Route 3 @ Route 200 S/Irvington Road – Kilmarnock
3. Route 3 @ Route 200/Route 695 – White Stone
4. Route 200 @ Route 222 – Irvington
5. Route 3 @ Route 624 – Middlesex County
6. Route 3 @ Route 201 – Lively

In addition to turning movement counts, the Study Team conducted vehicle classification counts for a period of 72 hours between July 22nd and 24th at the following six locations:

1. Route 3 (north of Kilmarnock)
2. Route 200 (north of Kilmarnock)
3. Route 3 (between White Stone and Norris Bridge)
4. Route 3 (between Kilmarnock and White Stone)
5. Route 200 (between Kilmarnock and Route 222)
6. Route 354 (south of Route 201)

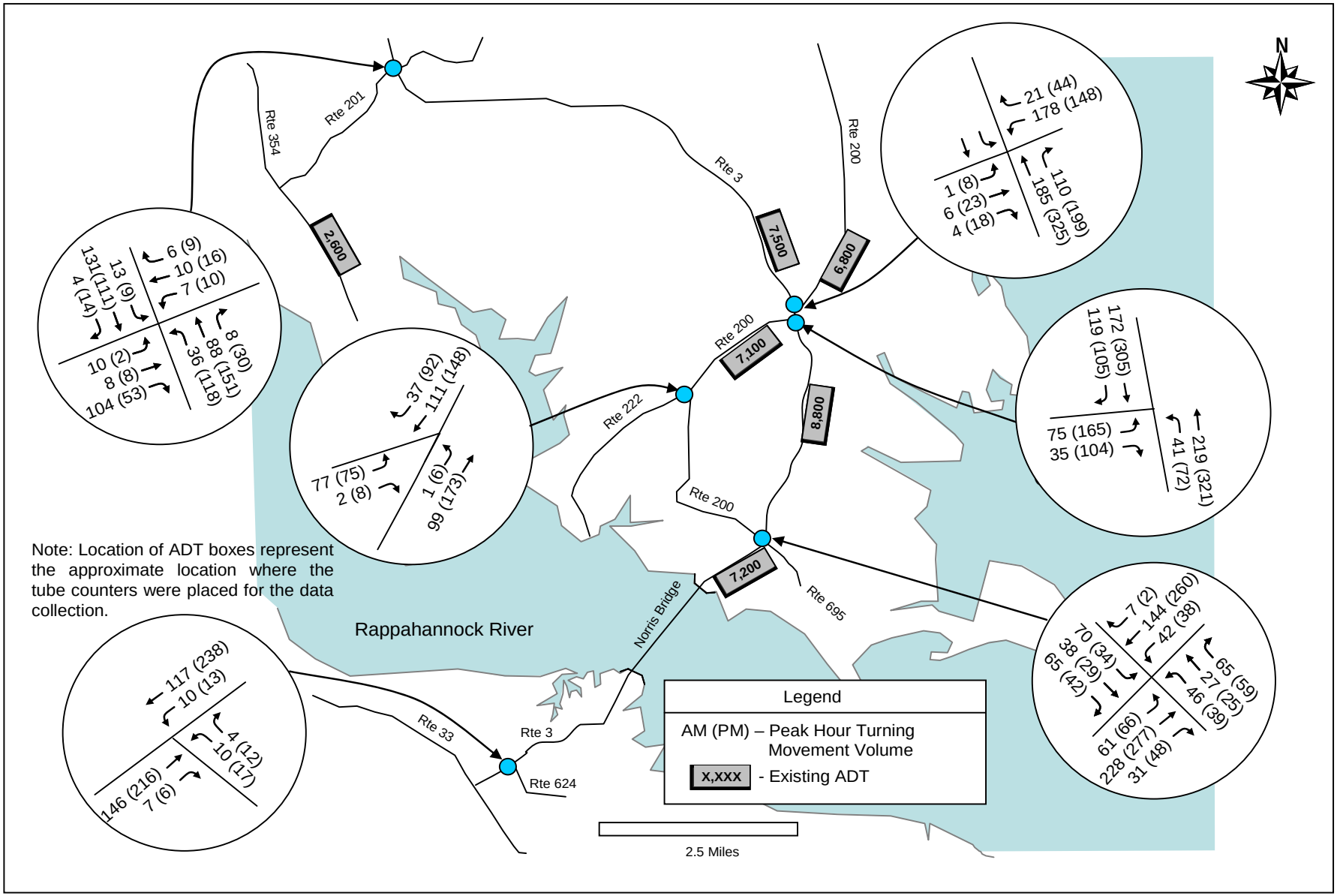
The data collected in the vehicle classification counts was used to determine the percentage of trucks that use the roadway facilities during the peak hours and throughout the day. As shown in **Table 1**, Route 3 is heavily used by trucks. Additionally, AM peak truck percentages are generally higher than PM peak truck percentages due to delivery schedules for businesses.

TABLE 1: TRUCK PERCENTAGES FROM 72-HOUR CONTINUOUS COUNTS

Location		Peak Hour Truck %		Daily Truck %
		AM	PM	
1	Route 3 north of Kilmarnock – northbound	14.5	5.7	8.5
	Route 3 north of Kilmarnock – southbound	7.7	5.4	6.8
2	Route 200 North of Kilmarnock – eastbound	11.4	3.9	7.6
	Route 200 North of Kilmarnock – westbound	7.4	11.5	8.3
3	Route 3 between White Stone and Norris Bridge – northbound	11.5	6.7	10.9
	Route 3 between White Stone and Norris Bridge - southbound	15.1	8.1	10.9
4	Route 3 between Kilmarnock and White Stone – northbound	12.2	13.2	13.4
	Route 3 between Kilmarnock and White Stone - southbound	22.5	15.3	19.1
5	Route 200 between Kilmarnock and Route 222 – northbound	7.4	5.4	6.2
	Route 200 between Kilmarnock and Route 222 – southbound	8.0	8.6	8.1
6	Route 354 south of Route 201 – northbound	6.1	9.8	7.3
	Route 354 south of Route 201 – southbound	11.1	4.2	7.2

A map of all count locations, ADT link volumes, and peak hour turning volumes are shown in **Figure 3**. NOTE: the counts as shown in Figure 3 are raw, unbalanced counts representing the peak hour for each intersection singularly and not the peak hour for the system as a whole. By providing peak hours for each individual intersection a worst case scenario is depicted.

FIGURE 3: TRAFFIC COUNT LOCATIONS, LINK ADT VOLUMES, PEAK HOUR TURNING VOLUMES



NOTE: With respect to the intersections of Route 3 and Route 200, there are other streets intersecting Route 3 between the two intersections of Route 200 resulting in a net loss/gain of vehicle not shown in these counts. This net loss/gain can be seen in each of the count timeframes as shown in **Appendix A**.

2. Historical Volumes

The historical traffic volumes for the study area were compiled for the years of 1975-1990 and 1995-2007[1]. Annual Average Daily Traffic (AADT) volumes were provided by the Virginia Department of Transportation (VDOT) for both timeframes. For the purpose of highlighting the trends in traffic growth over the previous 30 years, the growth rates for four major roadways in the study area were computed for five-year periods. This was done by averaging growth rate for all major segments of these roadways for five-year periods. The results of this analysis can be found in **Table 2**.

TABLE 2: ANNUAL GROWTH RATES BASED ON HISTORICAL VOLUME INFORMATION

	Growth Rate per year based on AADT[1]						Average growth rate[1]
Roadway	1975-1980	1980-1985	1985-1990		1995-2000	2000-2007	1975-2007
Route 3	4.1%	-0.6%	7.0%		6%	0.45%	3.2%
Route 200	3.4%	-0.6%	1.5%		4%	1.4%	1.9%
Route 201	3.4%	-2.0%	3.8%		3%	0.2%	1.8%
Route 354	7.0%	-3.8%	3.8%		5%	-0.2%	2.2%

Source: Average Daily Traffic Volumes on Interstate, Arterial and Primary Routes, VDOT
NOTE: the growth rates shown above represent the growth per year over the span of years.

It can be seen that the study area experienced considerable growth between 1975 and 1980, but this five-year period was followed by a period of significant decline throughout the area. From 1985 to 1990, traffic growth in the area rebounded. The most notable increase is for Route 3, which functions as a north-south connection to the Richmond and the Hampton Roads Metropolitan Areas. This may be reflective of growth in these areas.

For the timeframe of 1995-2000, the area experienced continuous growth, with a more even distribution of growth among the four major roadways. Still, Route 3 shows the greatest increase in traffic, which is reflective of its regional significance. Since 2000 the region has grown at a more stable rate. During this period, Route 200 experienced growth in average daily traffic of 10 percent. From this data, it can be anticipated that that the region will continue to grow, albeit at a more stable rate ranging from 0% to 1.5% per year growth.

3. Crash Data

The traffic crash data from year 2003 to year 2007 were analyzed for Lancaster County. **Table 3** summarizes the total crashes on the major roads in Lancaster County by severity and collision type. The severity levels include fatality, injury, and property damage only. The collision types include fixed object in road and off road, rear end, side swipe in same direction and opposite direction, angle, head on, collision with pedestrian or bicycle, and other miscellaneous collisions. **Figure 4** shows the locations with fatal crashes from Year 2003 to Year 2007 in Lancaster County while **Figure 5** shows the intersections with 5 or more crashes during the same period. Fatalities usually occur on straightaway segments where speeds are increased. **Appendix B** provides a detailed description of each crash within the study area.

[1] Between 1990 and 1995, VDOT disaggregated the roadway segments upon which VDOT estimates traffic volumes. Therefore, a direct comparison between 1990 to 1995 traffic volumes could not be provided.

TABLE 3: LANCASTER COUNTY CRASH CLASSIFICATION BY TYPE AND SEVERITY (2003 – 2007)

Route	Total Crashes	Fatalities	Injuries	Property Damage Only (PDO)	Fixed Object	Rear End	Sideswipe	Angle	Head on	Pedestrian/ Bicycle	MISC
Rt 3	316	5	106	205	47	76	36	75	1	1	80
Rt 200	106	1	38	67	8	18	11	44	2	0	23
Rt 201	28	1	11	16	7	3	4	1	0	1	12
Rt 222	22	0	7	15	7	2	3	4	0	0	6
Rt 354	47	2	16	29	21	0	5	5	0	0	16
Rt 624	4	0	3	1	4	0	0	0	0	0	0
Rt 695	20	0	8	12	8	2	3	1	0	0	6

4. Field Observations

Field observations were conducted by the Study Team to observe traffic during peak periods, assess peak period traffic patterns and conditions, document land use in the study area, and identify any possible constraints to the project.

Traffic at all study intersections was observed from 7:00-9:00 AM and 4:30-6:30 PM on July 24, 2008. During both observation periods, no major operational problems were observed at the study intersections.

There were capacity issues at the intersection of Route 3 and Route 200/695 in White Stone during the PM peak hour. During observations, the southbound left turn movement experienced two instances of residual queuing. However, this appeared to be related to the short cycle length rather than heavy traffic demand. There were no major delays or residual queuing observed at the other signalized intersections during the AM or PM peak periods. The field observations indicated that all unsignalized intersections handle existing traffic demand without any major delays or queuing.

The land uses in the study area are mainly undeveloped, agricultural, or residential throughout the study area. Within the town limits of Kilmarnock, White Stone, and Irvington the land use is predominately commercial.

FIGURE 4: FATAL CRASHES IN LANCASTER COUNTY FROM YEARS 2003 TO 2007

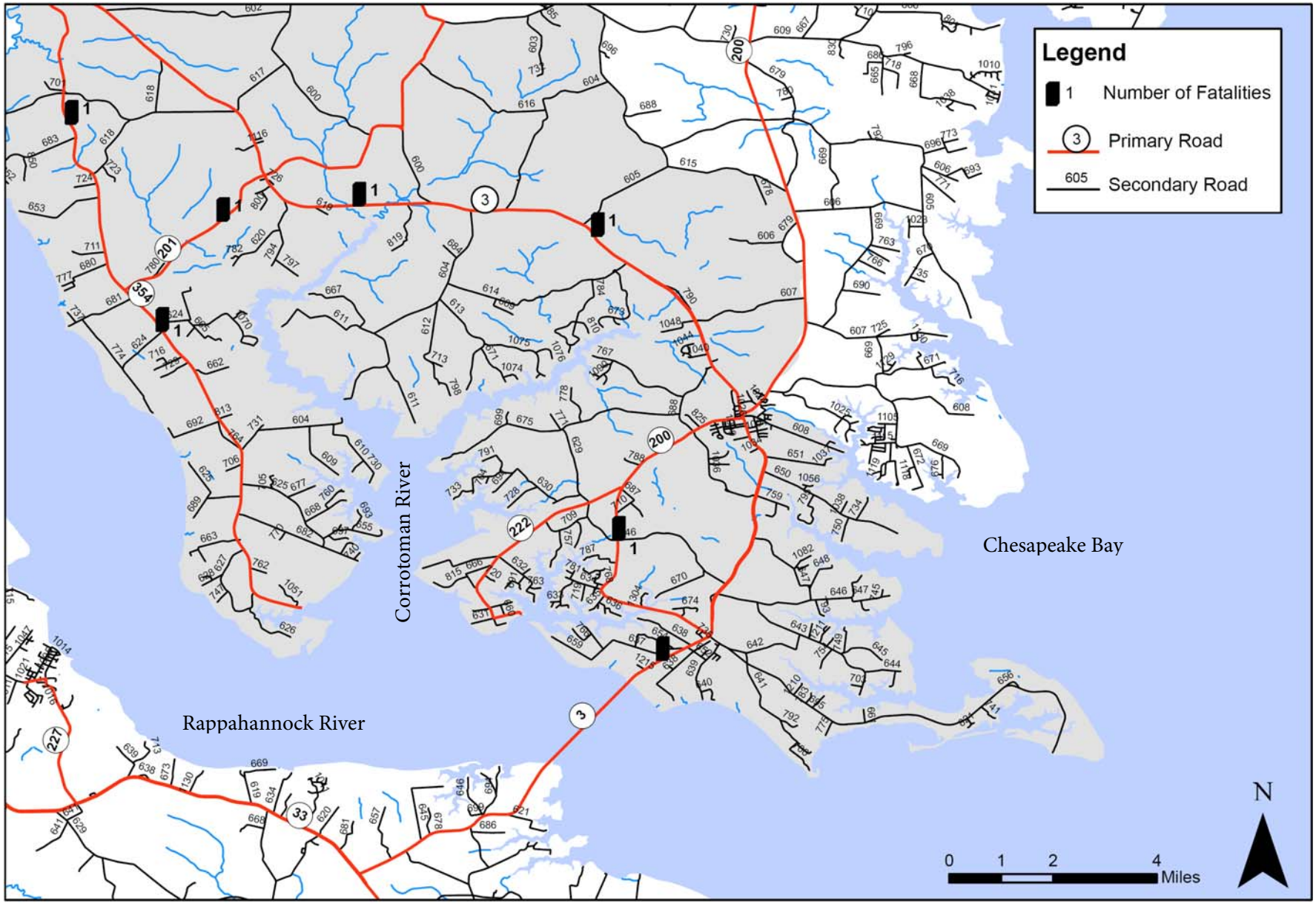
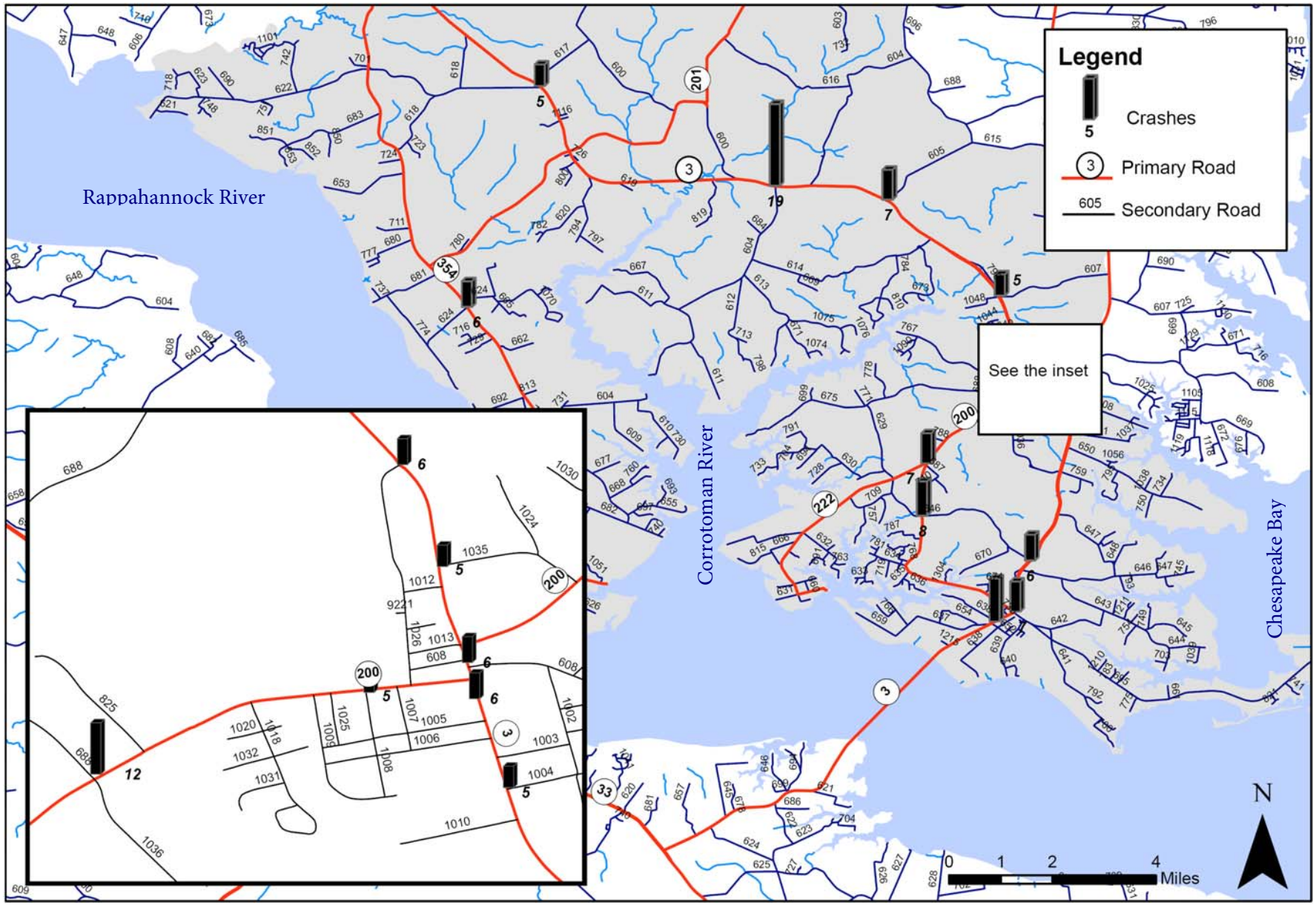


FIGURE 5: INTERSECTIONS IN LANCASTER COUNTY WITH 5 OR MORE CRASHES FOR YEARS 2003 TO 2007



5. Past Studies

- Route 3 Corridor Study

  In the year 1988 the Virginia Department of Transportation completed a study on the Route 3 Corridor from Route 301 on the Northern Neck to Route 14 on the Middle Peninsula, which included the Route 3 section in Lancaster County. In the study, the immediate needs and priorities for implementing long range improvements to the Route 3 Corridor as well as conceptual designs for specific improvements were identified. Recommendations within the study area included:

  - Construct turn lanes and provide commercial entrance controls at the intersections of Route 3/Route 617 and Route 3/Route 622
  - Install a signal at Route 3/Route 1026 (School Street) within the Town of Kilmarnock
  - Widen and reconstruct Route 3 to 4-lanes between Kilmarnock and White Stone
  - Provide a traffic signal on Route 3 at the Town of White Stone
  - Initiate an engineering study for the Robert O. Norris Bridge to determine deficiencies and rehabilitation costs
  - Widen pavement and provide adequate shoulders along Route 3 in Middlesex County
  - Construct turn lanes at the intersection of Route 3/Route 622
  - Construct a right-turn lane at the intersection of Route 3/Route 33 (Harmony Village)
  - Widen Route 3/33 to four lanes from Route 707 to Hartfield

  All recommendations listed above have been implemented with the exception of widening pavement and providing adequate shoulders along Route 3 in Middlesex County.

- Wal-Mart Supercenter Traffic Impact Assessment

  In 2006 a traffic impact study was conducted for the newly built Wal-Mart supermarket center on Route 3 in Kilmarnock, VA. In the study the trip generation of the new Wal-Mart was projected, and the required road improvements were analyzed.

6. Norris Bridge

The Norris Bridge was designed in 1953 and completed construction in 1957 at a cost of $15 million. The bridge is 22-feet wide with 11-foot lanes in each direction. No shoulders or sidewalks exist. The length of the bridge is slightly less than 1.9 miles in length with grades of 2.6% (SB from Lancaster County to crown – climb) to 3.0% (SB crown to Middlesex County – descent). The most recent inspection of the bridge (August 2007) rated the bridge at a 5 in three key areas: Deck Condition (riding surface), Superstructure (supports beneath the driving surface), and Substructure (foundation and supporting posts and piers). A rating of "5" equates to a "fair condition"[2]. The overall bridge sufficiency rating was calculated at 45.2 where a rating of 80 or less results in improvements being eligible for federal bridge rehabilitation funding; a rating of 50 or less results in improvements being eligible for federal bridge replacement.

The Norris Bridge is rated as functionally obsolete. A functionally obsolete bridge is one that was built to standards that are not used today. It should be noted that functionally obsolete bridges are not automatically rated as structurally deficient nor are they inherently unsafe. Functionally obsolete bridges are those that do not have adequate lane widths, shoulder widths, or vertical clearances to

[2] A "fair condition" is one where all primary structural elements are sound but may have some minor section loss (due to corrosion), cracking, spalling (deterioration of concrete surface) or scour (erosion of soil).

serve current traffic demand, or those that are occasionally flooded. A functionally obsolete bridge is similar to an older house. A house built in 1950 might be perfectly acceptable to live in, but it does not meet all of today's building codes. Yet when it comes time to consider upgrading that house or making improvements, the owner must look at ways to bring the structure up to current standards.

In October 2007, VDOT restricted the use of the Norris Bridge by trucks based on ultrasonic testing completed after the collapse of the Minnesota Bridge. This testing showed abnormalities within two pins. VDOT lowered the posted weight limit to three tons, routing heavier trucks through Tappahannock. Work commenced to replace the pin and was completed in November 2007, and the restrictions were lifted.

Replacement of the bridge with a new, four-lane bridge with 10-foot shoulders and minimal width sidewalks is estimated at $230 million[3].

Currently there are three projects related to the Norris Bridge that are being undertaken by VDOT:

- Painting of the steel structure, a 3-yar project estimated at 28 million for the first phase currently underway.
- Removal of the concrete overlay and replacement with asphalt mix – request for proposals (RFP) was let in December 2008. Preliminary estimates for work total $4 million.
- Repair of Structural Steel as necessary – request for proposals (RFP) was let in February 2009. Preliminary estimates for work total $5 million.

7. Bicycle Facilities

Based on information contained in the Counties Comprehensive Plan(s), Route 3 is a designated Bicycle Route[4]. Bicyclists are allowed on the Norris Bridge but must travel in the travel lane with vehicles due to the absence of shoulders and sidewalks on the bridge. Additionally, Route 33 in Lancaster County is also designated as a bicycle route. Lancaster County does not have any bicycle facilities designated but denotes that the area is "ripe for trail development" and states that the potential for the creation of a trail capitalizing on the utility corridor with possible ties to the Potomac Heritage National Scenic Trail be examined[5].

The Northern Neck Tourism Council has developed four bicycle tours in the vicinity (see **Appendix C**) highlighting the history and scenery of the area. One tour is located within the study area: Tour 2 – Christ Church to Windmill Point Loop is located at the southern end of Lancaster County. The tour takes bicyclists from Christ Church thru Irvington following Route 200 to White Stone, continuing on Route 695 through Palmer and Foxwells to Fleets Island and Westland. The Tour is an 11-mile, one-way trip.

B. Traffic Operations

1. Intersection Level of Service

Level of Service (LOS) is an estimate of the performance efficiency and quality of an intersection or roadway as established by the Transportation Research Board's (TRB) *Highway Capacity Manual* (2000) (HCM) methodology. The TRB methodology measures the degree of delay at an intersection using the letter rating "A" for the least amount of congestion and the letter rating "F" for the most amount of

[3] See preliminary estimate of probable cost section later in the report for details of estimate.
[4] Middlesex County, Virginia Designated Bicycle Routes, Middlesex County Comprehensive Plan
[5] Lancaster County Comprehensive Plan – Page 6-5

congestion, as shown in **Table 4** and **Figure 6**. For future conditions, given the rural nature of Southern Lancaster County, a LOS of "C" or better[6] is the acceptable threshold for the major intersections included in the study area. If the LOS falls below the allowable threshold, improvements are required to improve the capacity of the intersection or roadway section in question.

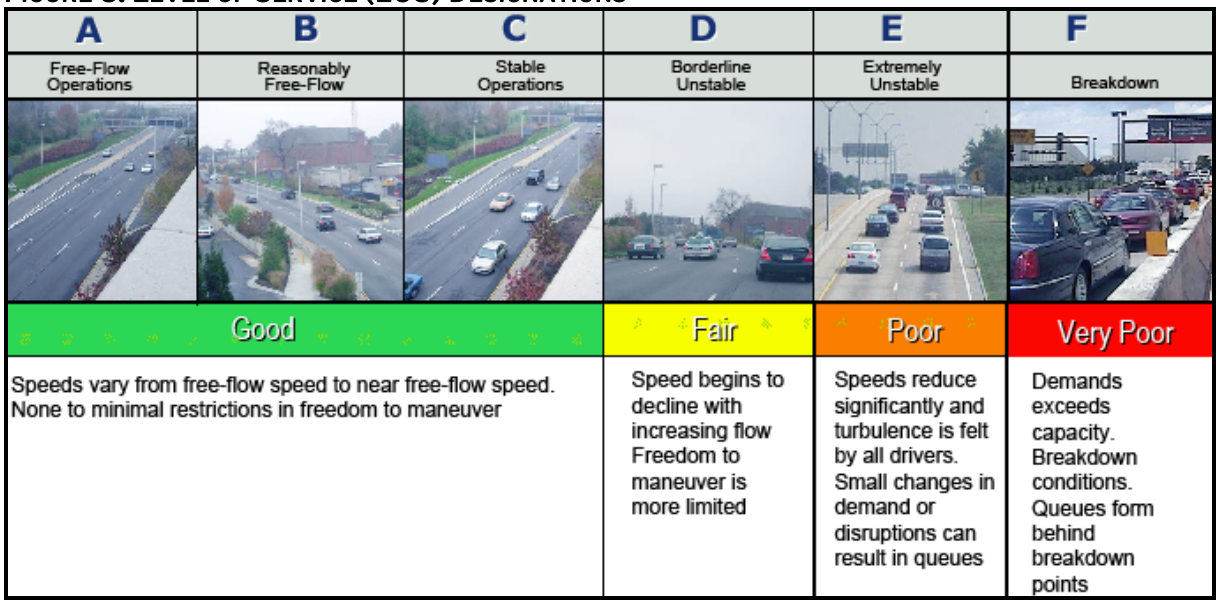
The average control delay per vehicle for the signalized study intersections was estimated for each lane group and aggregated for each approach, as well as the intersection as a whole. The LOS criteria for signalized intersections are listed in **Table 4**.

TABLE 4: LEVEL OF SERVICE (LOS) STANDARDS FOR INTERSECTIONS

Level of Service	Signalized Intersections	Unsignalized Intersections	Intersection Capacity Rate*	Expected Delay to Minor Street Traffic
A	delay ≤ 10 seconds	delay < 10 seconds	> 50%	Little or no delay
B	10 seconds < delay ≤ 20 seconds	10 seconds < delay ≤ 15 seconds	50%-60%	Short traffic delay
C	20 seconds < delay ≤ 35 seconds	15 seconds < delay ≤ 25 seconds	60%-75%	Average traffic delay
D	35 seconds < delay ≤ 55 seconds	25 seconds < delay ≤ 35 seconds	75%-85%	Long traffic delay
E	55 seconds < delay ≤ 80 seconds	35 seconds < delay ≤ 50 seconds	85%-95%	Very long traffic delay
F	80 seconds < delay	50 seconds < delay	95%+	Even longer traffic delays

Source: Highway Capacity Manual, 2000, page 10-16 and 17-32
* Intersection Capacity Rates are calculated within the Synchro Traffic Simulation software.

FIGURE 6: LEVEL OF SERVICE (LOS) DESIGNATIONS



For the analysis of the study network, various assumptions have been applied based on the data collection process, information provided by the appropriate agencies, and VDOT's Traffic Impact Analysis Regulations. These assumptions are as follows:

- *Terrain* – The terrain is assumed to be "level" based on field observations.
- *Lanes* - Twelve-foot wide lanes were assumed per the Traffic Impact Analysis Regulations.

[6] Some rural jurisdictions are designating LOS "D" as acceptable for future year analysis.

- *Parking and Bus Activity* – There is assumed to be no parking or bus activity on the study corridors based on field observations.
- *Heavy Vehicle* Factor –For the segment analysis, classification counts, including the percentage of trucks within the stream of traffic, were taken and used in the calculations. Where appropriate, these percentages were used in the intersection analysis.
- *Area Type* – Non-center of business district was used per the Traffic Impact Analysis Regulations.

The results of the analysis of existing conditions reveal that all study intersections operate at overall acceptable levels of service during both peak periods. There are no instances of LOS "E" or "F" on any approaches, which would be deemed unacceptable. There are instances of LOS "D" for singular movements which fall below the threshold, but in likelihood since not all intersections were analyzed, as congestion occurs, traffic finds the fastest path and these locations with singular movements of LOS "D" occur, traffic patterns are likely to disperse through the system finding the fastest path. At signalized intersections, the current signal timing parameters give commensurate consideration to the mainline through movement, which results in proportionately higher average side street delays. This is reflected in the delay for the side street approaches at the intersections of Route 3 at Route 200 N and Route 3 at Route 200 S, which have LOS "D".

The results of the intersection level of service analysis are found on **Table 5** as well as depicted on **Figure 7**. It should be noted that although all intersections operate at overall levels of service of "C" or better, there may be instances where there are geometric limitations (westbound at Route 695/Route 200/Route 3), or storage lengths for movements are short (northbound left lane at Route 3/Route 695/Route 200, eastbound Route 200/Route 222, eastbound left lane Route 3/Route 200N), which result in additional delays to intersecting streets.

TABLE 5: EXISTING (2008) INTERSECTION LEVEL OF SERVICE AND DELAY

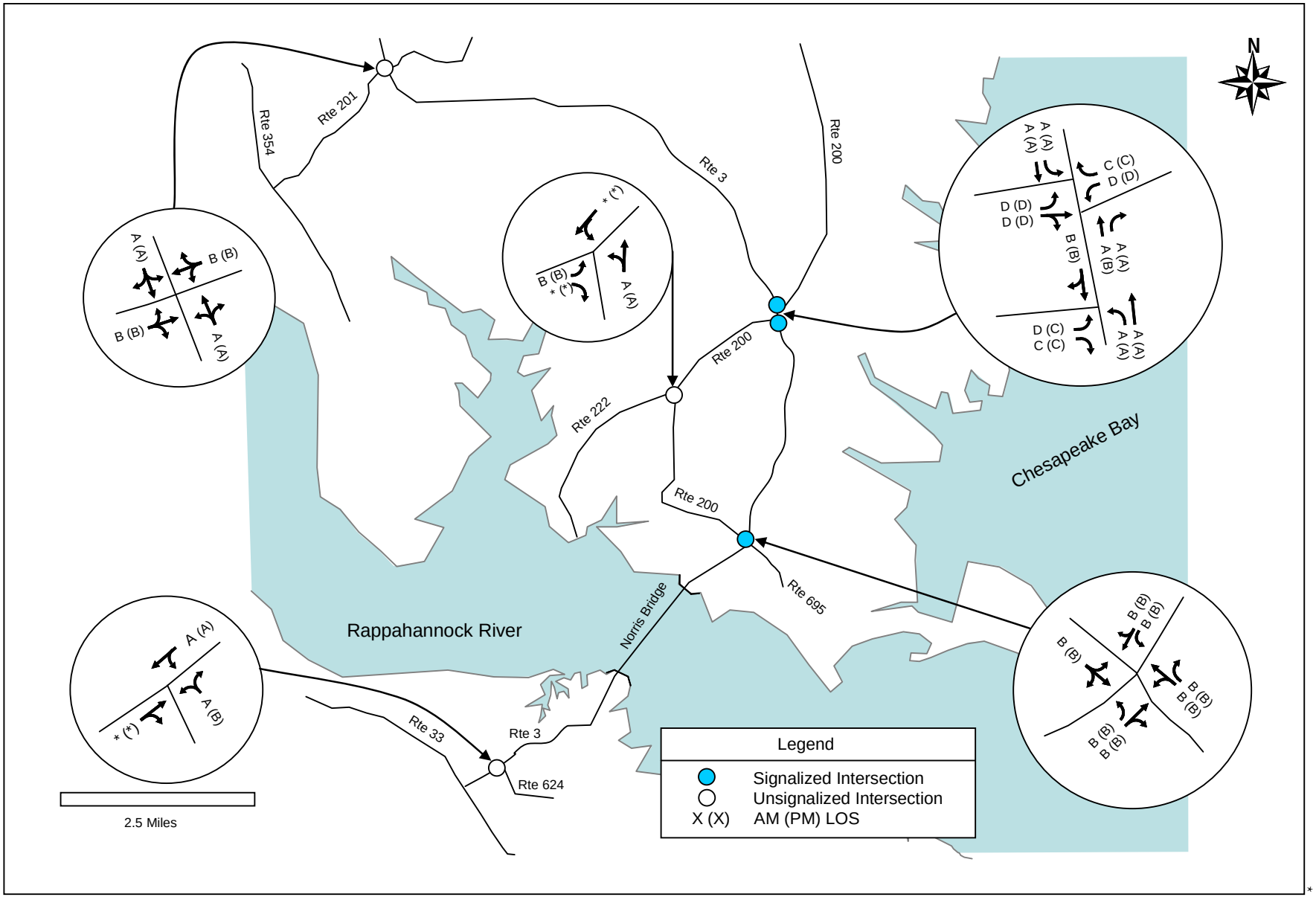
Intersection	Type of Control	Movement Approach	2008 Existing AM		2008 Existing PM	
			Level of Service	Delay (sec/veh)	Level of Service	Delay (sec/veh)
Route 3 at Route 200 N	Signalized	***Intersection Overall***	***B***	***17.0***	***B***	***15.1***
		EBL	D	39.1	D	36.0
		EBTR	D	42.5	D	37.3
		EB Approach	D	42.2	D	37.1
		WBL	D	41.9	D	38.0
		WBR	C	29.0	C	29.7
		WB Approach	D	40.5	D	36.1
		NBT	A	7.9	B	11.4
		NBR	A	4.8	A	7.0
		NB Approach	A	6.7	A	9.7
		SBL	A	5.6	A	7.0
		SBT	A	6.2	A	8.8
		SB Approach	A	6.2	A	8.7
Route 3 at Route 200 S (Irvington Road)	Signalized	***Intersection Overall***	***B***	***12.1***	***B***	***14.6***
		EBL	D	35.2	C	31.9
		EBR	C	31.3	C	26.7
		EB Approach	C	34.0	C	29.9
		NBL	A	2.9	A	5.6
		NBT	A	3.3	A	5.9
		NB Approach	A	3.2	A	5.8
		SBTR	B	11.7	B	13.1
		SB Approach	B	11.7	B	13.1
Route 3 at Route 200/ Route 695	Signalized	***Intersection Overall***	***B***	***14.8***	***B***	***14.5***
		EBLTR	B	19.6	B	17.7
		EB Approach	B	19.6	B	17.7
		WBLT	B	17.9	B	17.5
		WBR	B	16.7	B	16.6
		WB Approach	B	17.3	B	17.1
		NBL	B	11.5	B	11.9
		NBTR	B	13.3	B	14.2
		NB Approach	B	12.9	B	13.8
		SBL	B	11.3	B	11.4
		SBTR	B	12.0	B	13.3
		SB Approach	B	11.8	B	13.1
Route 3 at Route 201	Unsignalized	EBLTR	B	10.2	B	10.3
		WBLTR	B	11.7	B	14.4
		NBLTR	A	2.2	A	3.5
		SBLTR	A	0.7	A	0.6
Route 200 at Route 222	Unsignalized	EBL	B	10.5	B	11.8
		EBR	~		~	
		NBLT	A	0.1	A	0.3
		SBTR	~		~	
Route 3 at Route 624	Unsignalized	WBLR	A	9.9	B	11.4
		NBTR	~		~	
		SBLT	~		A	0.5

(~) The Highway Capacity Manual methodology does not provide LOS or delay values for movements without conflicts.

denotes movement that is anticipated to operate below threshold levels.

NOTE: NBL – northbound left movement, NBT – northbound thru movement, NBR – northbound right movement

FIGURE 7: EXISTING (2008) LEVEL OF SERVICE



The Highway Capacity Manual methodology does not provide LOS for movements that do not have conflicts.

2. Highway Level of Service

Capacity analyses of the highway segments for the existing scenario were completed using methodologies defined in the 2000 Highway Capacity Manual (HCM). Methods for two-lane highways and multilane highways were both used. The software program HCS2000 was used to perform the analyses.

For two-lane highways, operating conditions away from intersections are evaluated in terms of levels of service (LOS). Level of service is based upon two performance measures: percent of time following and average travel speed. Percent of time following represents the freedom to maneuver and the overall comfort of travel. Average travel speed reflects the mobility of the two-lane highway.

Two-lane highways are categorized into two classes for analysis, Class I and II. A Class I roadway is one in which motorists expect to travel at relatively high speeds. Class I facilities generally are major routes that provide daily commuter routes. A Class II roadway is one in which motorists do not necessarily expect to travel at high speeds. Class II roadways are most often access routes to Class I facilities and often serve short trips or the beginning and ending portions of longer trips. For the purpose of this study, Class II facilities were deemed any segment of roadway within or just on the outside of a town limit, and a Class I facility was deemed any segment of roadway connecting towns.

For Class I facilities LOS is based upon both performance measures, percent of time following and average travel speed; both criteria must be met to achieve a particular LOS. For Class II facilities LOS is only based upon percent of time following. The LOS criteria for a Class I and Class II facility is shown in **Table 6**.

TABLE 6: LEVEL OF SERVICE FOR TWO-LANE HIGHWAYS IN CLASS I AND CLASS II FACILITIES

	Class I		Class II
LOS	Percent Time Following	Average Travel Speed (mi/h)	Percent Time Following
A	% following $\leq$ 35	speed >55	% following $\leq$ 40
B	35 < % following $\leq$ 50	50<speed$\leq$55	40< % following $\leq$ 55
C	50 < % following $\leq$ 65	45<speed$\leq$50	55 < % following $\leq$ 70
D	65 < % following $\leq$ 80	40<speed$\leq$45	70 < % following $\leq$ 85
E	% following >80	speed$\leq$40	% following >85

In both cases, above LOS "F" is achieved when the flow rate exceeds the segment capacity.

For the analysis of the two-lane segments, various assumptions have been applied based on the data collection process, information provided by the appropriate agencies, and Highway Capacity Manual guidelines. These assumptions are as follows:

- 6 ft shoulder length
- 12 ft lane width
- 0.88 peak hour factor (for rural areas)
- 35 percent no-passing zones (except on Norris Bridge)
- 8 access points per mile
- 4 percent recreational vehicles

As stated previously, the percentages of trucks and buses as well as directional trip distribution was acquired from the manual counts taken in association with this project and compared to the 2007 Virginia Department of Transportation (VDOT) average annual daily traffic (AADT) worksheets for Lancaster County.

For multi-lane highways, operating conditions at intersections are evaluated in terms of levels of service (LOS). Level of service is based upon three performance measures: density (pc/mi/ln), mean

passenger car speed (mi/h), and volume to capacity ratio. Each of these measures indicates how well the highway will accommodate traffic flow. LOS "F" is characterized by highly unstable and variable traffic flow. Prediction of accurate flow rate, density, and speed at LOS "F" is difficult. The LOS criteria for a multi-lane highway are shown in **Table 7**.

TABLE 7: LEVEL OF SERVICE FOR MULTI-LANE HIGHWAYS

		LOS				
Free-Flow Speed	Criteria	A	B	C	D	E
60 mi/h	Maximum density (pc/mi/ln)	11	18	26	35	40
	Average Speed (mi/h)	60.0	60.0	59.4	56.7	55.0
	Maximum volume to capacity ratio (v/c)	0.30	0.49	0.70	0.9	1.0
	Maximum service flow rate (pc/h/ln)	660	1080	1550	1980	2200
55 mi/h	Maximum density (pc/mi/ln)	11	18	26	35	41
	Average Speed (mi/h)	55.0	55.0	54.9	52.9	51.2
	Maximum volume to capacity ratio (v/c)	0.29	0.47	0.68	0.88	1.0
	Maximum service flow rate (pc/h/ln)	600	990	1430	1850	2100
50 mi/h	Maximum density (pc/mi/ln)	11	18	26	35	43
	Average Speed (mi/h)	50.0	50.0	50.0	48.9	47.5
	Maximum volume to capacity ratio (v/c)	0.28	0.45	0.65	0.86	1.0
	Maximum service flow rate (pc/h/ln)	550	900	1300	1710	2000
45 mi/h	Maximum density (pc/mi/ln)	11	18	26	35	45
	Average Speed (mi/h)	45.0	45.0	45.0	44.4	42.2
	Maximum volume to capacity ratio (v/c)	0.26	0.43	0.62	0.82	1.0
	Maximum service flow rate (pc/h/ln)	490	810	1170	1550	1900

The results of the analysis of existing conditions, summarized in **Figures 8** and **9,** reveal that all but one highway segment operates at acceptable levels of service. The roadway segment on Route 3 between the start of the Norris Bridge in Middlesex County and the intersection of Route 3 at Route 200/Route 695 in the Town of White Stone operates at LOS "E" during the PM peak hour. Due to the lower speed limit (45 mph) on the Norris Bridge and no ability to pass slower moving cars, the mobility of the segment is significantly limited in comparison to the rest of the roadway network. All other roadway segments have acceptable levels of service.

The results of the highway segment level of service analysis are found on **Figure 8** and **Figure 9**. The Norris Bridge operates at LOS D in the AM peak and LOS E in the PM peak; both levels are below the threshold for this area resulting in congestion and delay to users.

C. Environmental Constraints

Lancaster County is located in an environment-sensitive area. The Chesapeake Bay is to the east of Lancaster County and the Rappahannock River is the southern border of the County. Other tidal water bodies flow through the County on the way to the Bay and River including Lancaster Creek, the Corrotoman River (Western and Eastern Branches), Carters Creek, Indian Creek, Dymer Creek, Tabbs Creek, Antipoison Creek, and/or branches off of these. Other environmental physical constraints for transportation planning, such as schools, hospitals, and solid waste sites in the study area, were identified and are shown in **Figure 10**. In addition, **Appendix D** provides the NEPA planning matrix describing environmental concerns related to the project.

FIGURE 8: EXISTING (2008) AM HIGHWAY LEVEL OF SERVICE

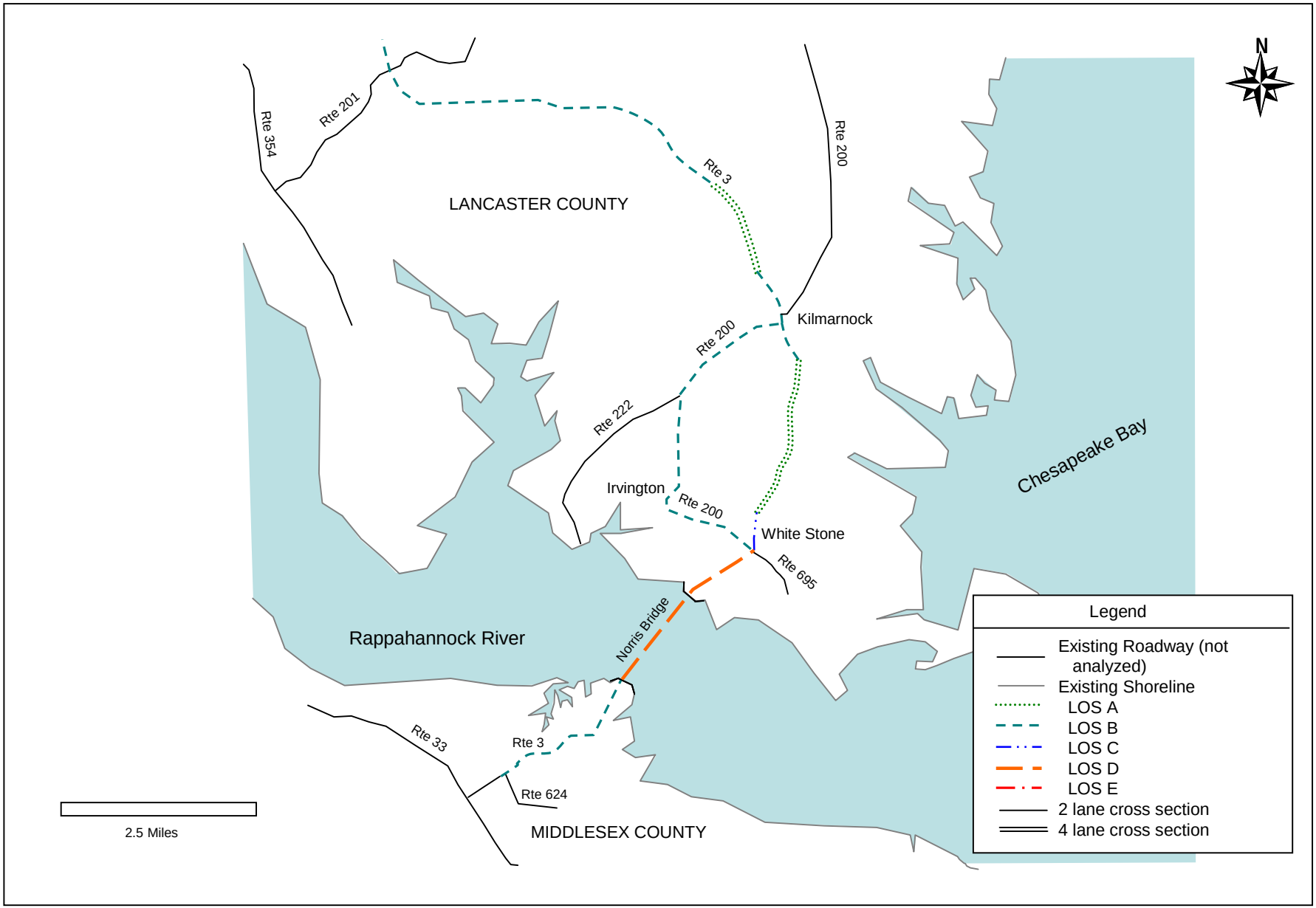


FIGURE 9: EXISTING (2008) PM HIGHWAY LEVEL OF SERVICE

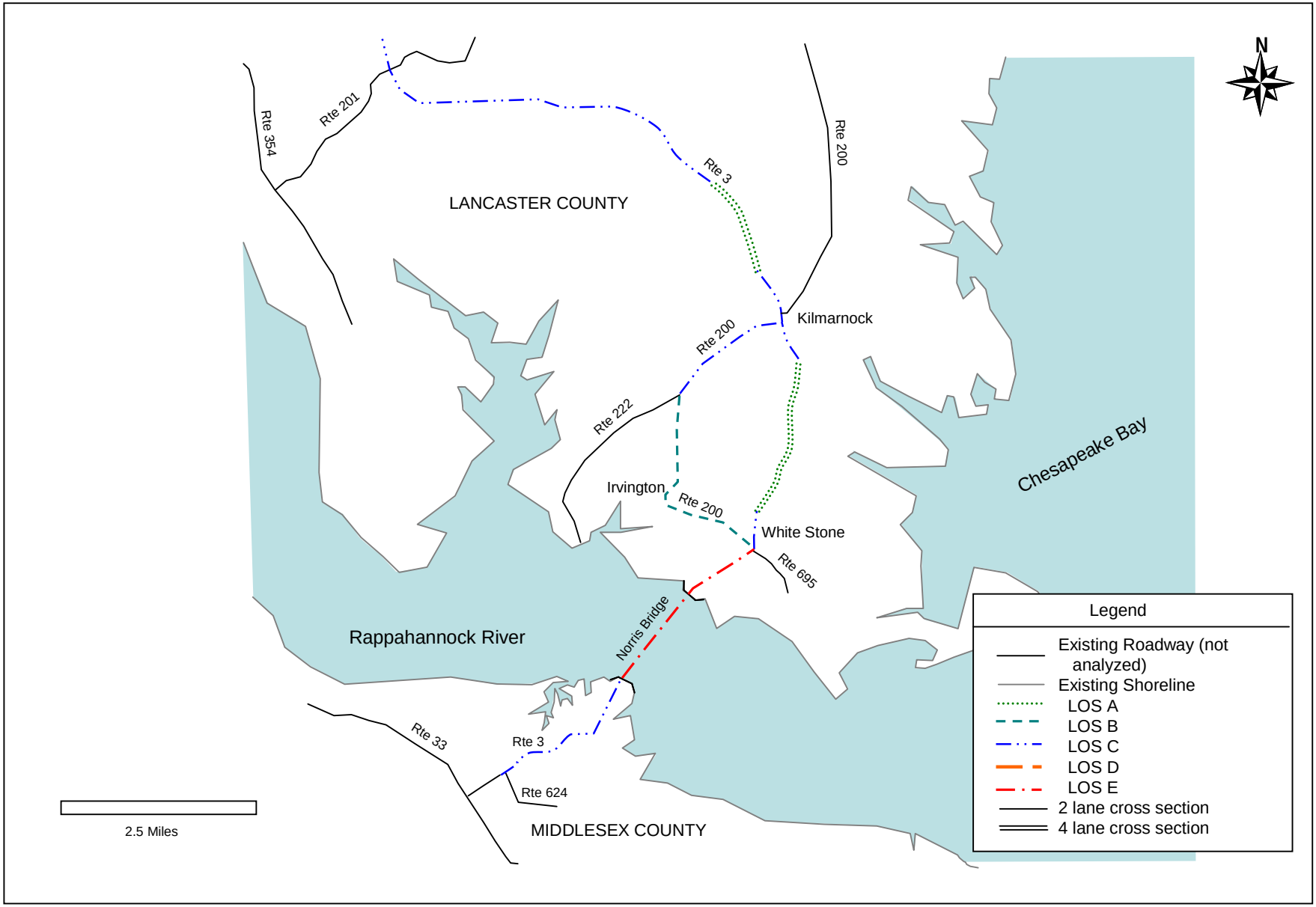
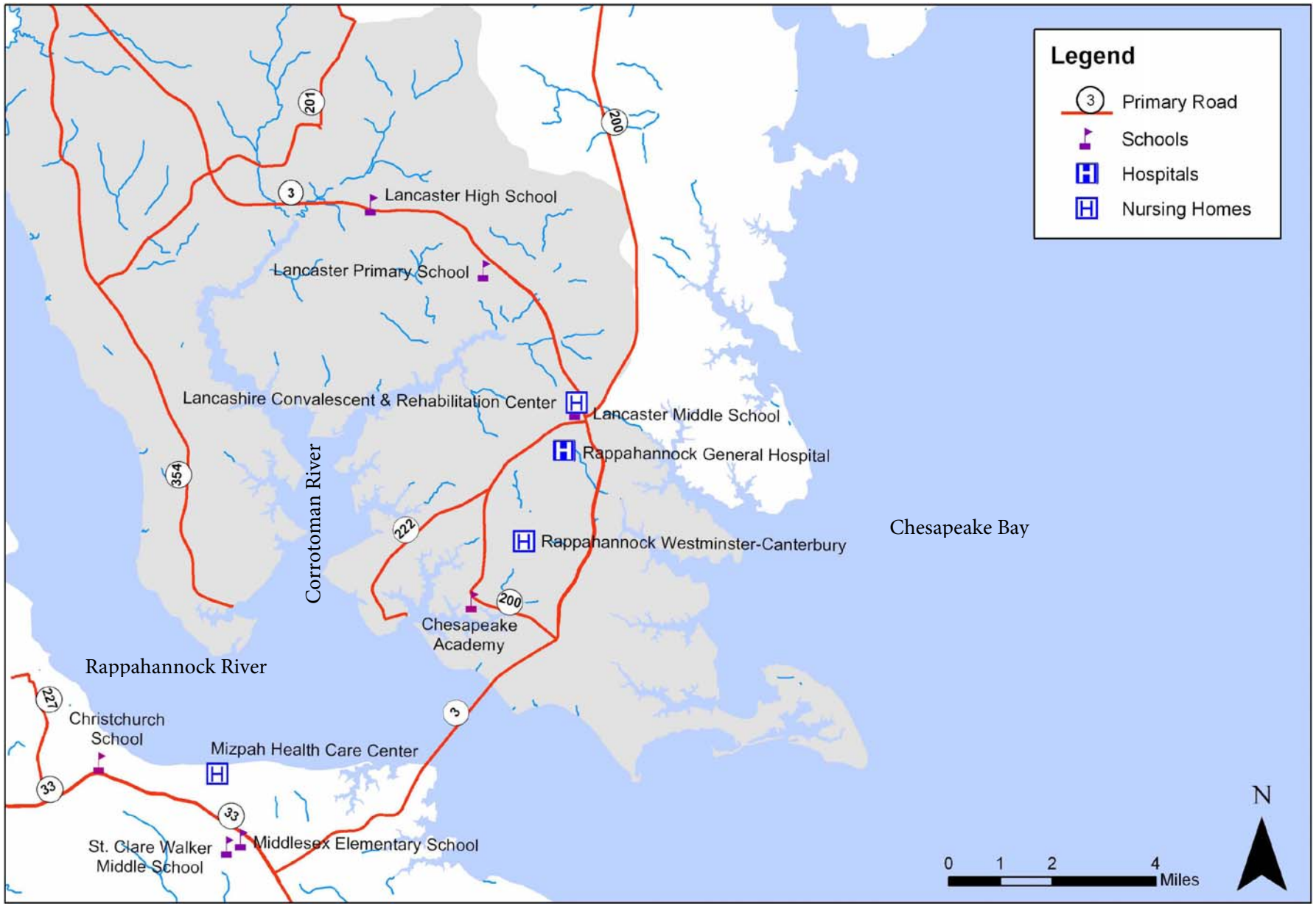


FIGURE 10: LANCASTER COUNTY PHYSICAL FACTORS THAT INFLUENCE/CONSTRAIN DEVELOPMENT



FUTURE TRAFFIC OPERATIONS

A. Background (No-build) Traffic

Using the existing traffic count data, summarized in the Existing Conditions section of this report, traffic was grown to simulate no-build conditions in the 2030 year timeframe. **Table 8** lists the assumptions that were included in the no-build model.

TABLE 8: BACKGROUND (NO-BUILD) ASSUMPTIONS

	Assumption
1	Background traffic was grown at 0.4% per year based on historical data.
2	No other changes to the existing street system will be made.

Background traffic volumes in 2030 were estimated for the study area based on the assumption that background traffic volumes would increase 0.4 percent annually. The growth factor of 0.4 percent per year was based on historic data and projected average annual population and labor forecasts. The background traffic projections to year 2030 are shown in **Figure 11**.

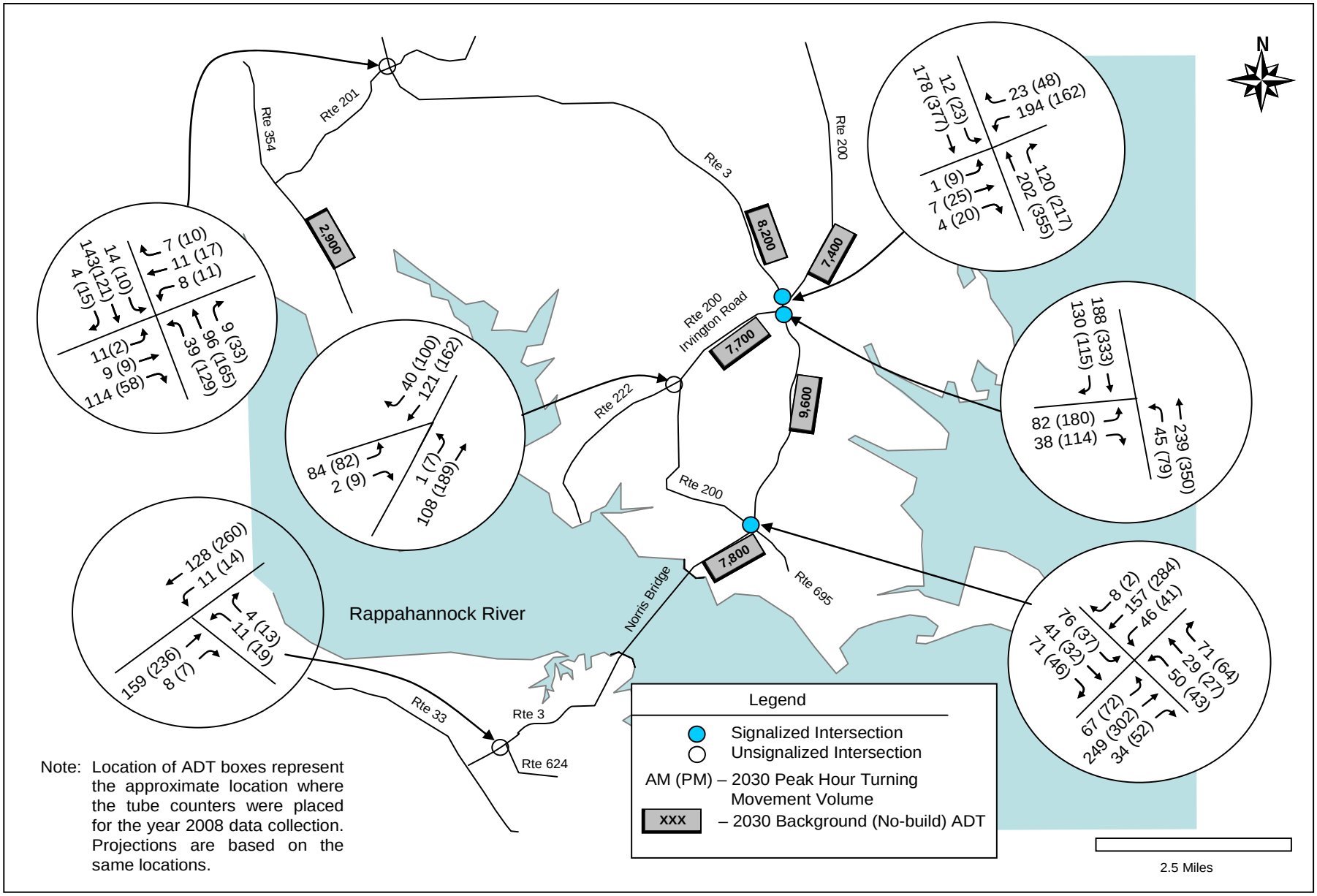
B. Future Developments and Traffic Volumes

The analysis conducted for the future year conditions assumed that certain land uses and developments would exist by 2030. Information on future developments was supplied by the governing jurisdictions (Lancaster County, Town of Kilmarnock, Town of Irvington, Town of White Stone, and Northumberland County) and is summarized in **Table 9.** The locations of these developments are shown in **Figure 12**.

The Institute of Transportation Engineers *Trip Generation Manual*[7] was used to calculate the vehicular trips expected to be generated by the different types of development shown in **Table 9** and the resulting trips are shown in the same table. The trips generated by the future developments shown in **Table 9** were distributed over the study area to obtain the additional road traffic (See **Appendix E** for AM/PM peak hour trip distributions and assignments for the future developments). These new traffic volumes were added to the background traffic shown in **Figure 11** to obtain the 2030 Build traffic as shown in **Figure 13**. The daily traffic volumes in **Figure 13** were estimated assuming the K-factor (peak hour traffic to daily traffic ratio) would not change in the future.

[7] ITE's *Trip Generation* (7th Edition, 2000)

FIGURE 11: 2030 BACKGROUND (NO-BUILD) TRAFFIC PROJECTIONS



Note: Location of ADT boxes represent the approximate location where the tube counters were placed for the year 2008 data collection. Projections are based on the same locations.

TABLE 9: TRIP GENERATION FOR KNOWN DEVELOPMENTS

#	Development	ITE Code*	Quantity		Peak Hour Vehicular Trips**			
					Weekday AM		Weekday PM	
			Units	Acres	Enter	Exit	Enter	Exit
1	Golden Eagle Condominium Development	LRC/T	400	--	67	201	181	131
2	Overlook on W. Br. Corrotoman River	DSFD	11	44	2	6	7	4
3	Hills Quarter on King Carter Golf Course	DSFD	297	--	56	167	189	111
4	High Banks on Rappahannock River	DSFD	16	17	3	9	10	6
5	Western Branch Preserve on Western Branch Corrotoman River	DSFD	41	225	8	23	26	15
6	Chase's Farm on Duton's Pond	DSFD	107	247	20	60	68	40
7	Chinn's Mill Wood on Chinns Mill Pond	DSFD	64	1,137	12	36	41	24
8	Tides Lodge Condos	HRC/T	66	22	4	18	16	10
9	The Tartan/Highlands Development on Tartan	DSFD	91	165	17	51	58	34
10	Windmill Point Resort Condos on Chesapeake Bay	HRC/T	200	40	13	55	47	29
11	Waterman's Wharf on Antipoisin Creek	DSFD	13	33	2	7	8	5
12	Glenwood Development on Carter Creek	DSFD	15	37	3	8	10	6
13	Taylor Creek Park on Taylor Creek	DSFD	16	22	3	9	10	6
14	The Harbour on Indian Creek	DSFD	24	42	5	14	15	9
15	Covewoods on Eastern Branch Corrotoman River	DSFD	6	52	1	3	4	2
16	Sloop Pointe on Rappahannock River	DSFD	18	22	3	10	11	7
17	Courthouse landing on Western Branch	DSFD	14	219	3	8	9	5
18	River Village on Rappahannock River	DSFD	21	45	4	12	13	8
19	Stonegate on Misquito Creek	DSFD	12	20	2	7	8	4
20	Whitehall Farms Subdivision on Rappahannock River	DSFD	10	48	2	6	6	4
21	Bridge Point Subdivision on Rappahannock River	DSFD	8	--	2	5	5	3
22	Millburn Subdivision off Rt 3	DSFD	28	33	5	16	18	10
23	Riverie Development on Carters Creek	DSFD	10	9	2	6	6	4
24	The village on Carters Creek	DSFD	5	8	1	3	3	2
25	Irvington Farms Development	DSFD	17	--	3	10	11	6
26	Grace Hill Estates	LRC/T	66	38	11	33	30	22
27	Crossroads at the Chesapeake	LRC/T	128	29	21	64	58	42
28	"Kilmarnock Glen" – Northern Neck LLC – School St.	LRC/T	423	--	71	213	191	139
29	"Seastar LLC" – Chase Rd.	DSFD	19	--	4	11	12	7
30	"Springwood" – Our Northern Neck LLC – Black Stump Rd.	DSFD	40	--	8	23	25	15
31	"Rolling Hills" – East Church St.	DSFD	20	--	4	11	13	7
32	"Tartan Village II" – South Main St.	DSFD	19	--	4	11	12	7
33	Commercial development at White Stone	CD	9,000 sq feet		6	4	16	18
34	Residential development at Irvington	LRC/T	25	2	4	13	11	8
35	Kings Grant	DSFD	575	740	108	323	366	215
	TOTAL				**482**	**1,454**	**1,516**	**964**

Source: Southern Lancaster County, Town of Kilmarnock, Town of Irvington, Town of White Stone, and Middlesex County Planning Departments

*DSFD – Detached Single Family Dwelling (code 210); LRC/T – Low Rise Condo/Townhome (code 231); HRC/T – High Rise Condo/Townhome (code 232) CD – Commercial Development/Shopping Center (code 820)

**Peak hour vehicular trips are based on rates shown in Trip Generation (7th edition – 2000) for the peak hour on the adjacent street.

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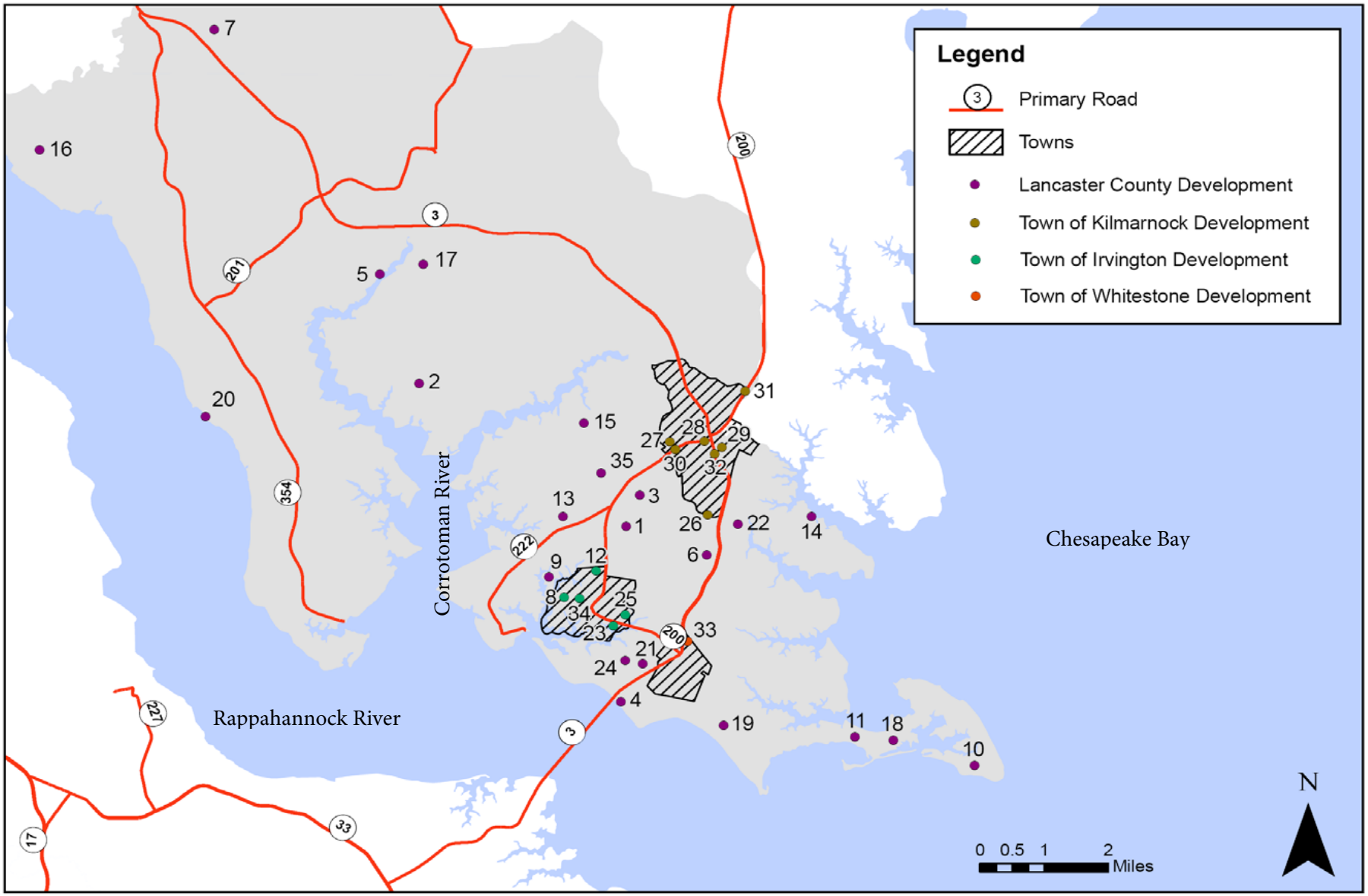
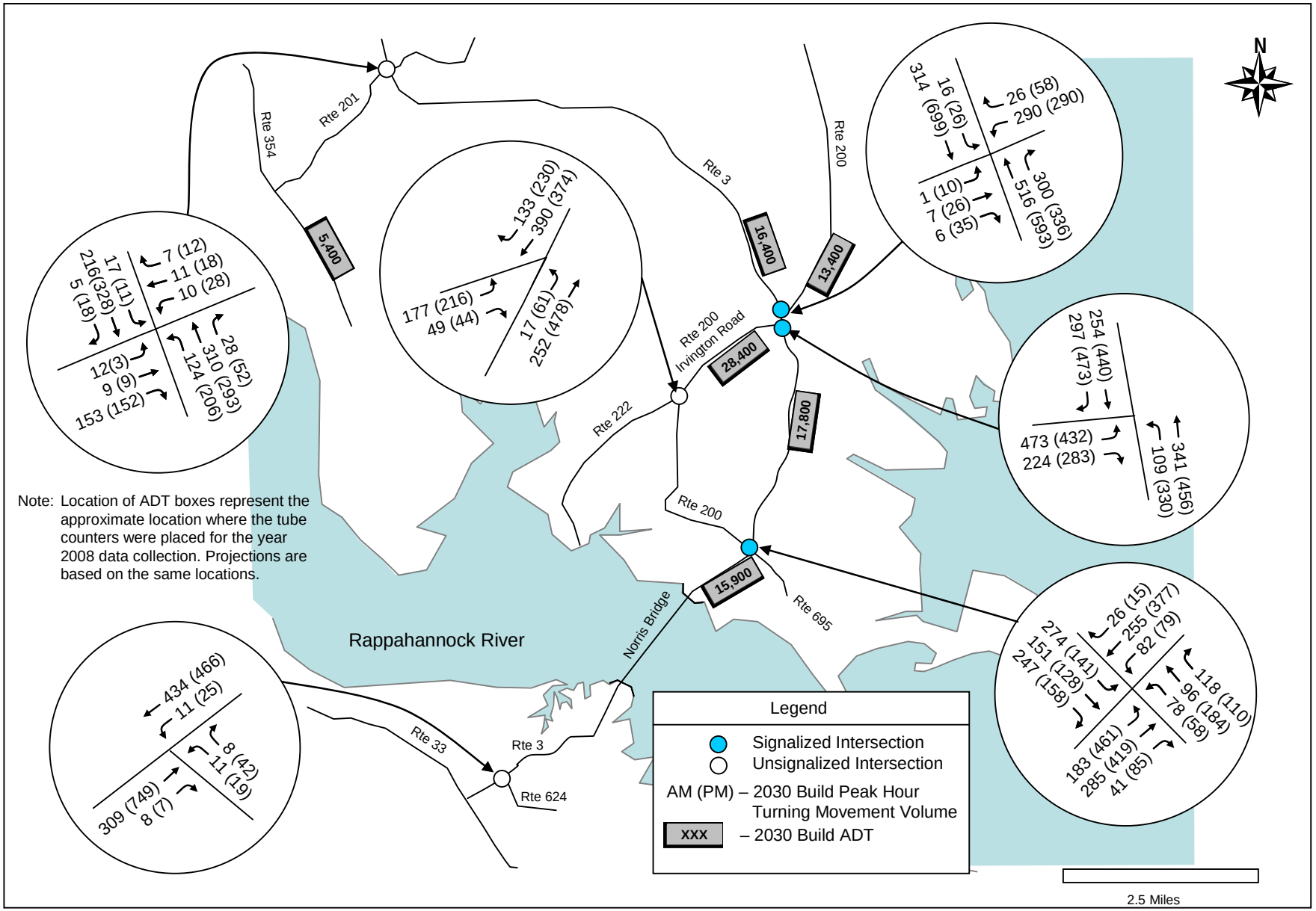
FIGURE 12: LOCATIONS OF KNOWN DEVELOPMENT



Note: Information for each number development shown on this graphic is presented on **Table 9**.

FIGURE 13: 2030 BUILD TRAFFIC VOLUME PROJECTIONS



C. Traffic Operations without Mitigation

As stated before, Level of Service (LOS) is an estimate of the performance efficiency and quality of an intersection or roadway as established by the Transportation Research Board's (TRB) *Highway Capacity Manual* (2000) (HCM) methodology. The TRB methodology measures the degree of delay at an intersection using the letter rating "A" for the least amount of congestion and the letter rating "F" for the most amount of congestion. For future conditions, given the rural nature of Southern Lancaster County, a LOS of "C" or better[8] is the acceptable threshold for the major intersections included in the study area. If the LOS falls below the allowable threshold, improvements are required to improve the capacity of the intersection or roadway section in question.

The analysis tool used in conjunction with the LOS calculations for the intersection was the traffic micro-simulation model Synchro 7 with HCS outputs. Segment LOS calculations were completed with HCS software.

It should be noted that during the analysis of 2030 Build without mitigation measures, it was assumed traffic signal timing was optimized to allow for the optimum timing of the signals and the best thru-put of vehicles. The traffic operations of the intersections were summarized in **Table 10**. The Level of Service for the 2030 Build scenario intersections and highway segments is shown in **Figure 14**.

As shown in **Table 10** and **Figure 14,** the operation of some individual movements at specific intersections is anticipated to deteriorate to LOS D, E or F during the peak hours. Because many rural areas are accepting LOS D as their threshold in the future analysis, the majority of the alternatives analyzed deal with movements operating at LOS E and F. During the AM peak hour only the northbound left turn lane movement at Route 3/Route 200/Route 695 is anticipated to operate at LOS E. In the PM peak hour the following movements are anticipated to operate at LOS E or F:

- Intersection of Route 3 and Route 200 South:
  - Eastbound left-turn
  - Northbound left-turn
  - Southbound approach
- Intersection of Route 3 and Route 200/Route 695:
  - Eastbound approach
  - Northbound left-turn
- Intersection of Route 3 and Route 201:
  - Westbound approach
- Intersection of Route 200 and Route 222:
  - Eastbound approach

For roadway segments, the LOS for most segments will deteriorate with the anticipated grown traffic, but continue to operate at Level of Service C or better. The roadway segment on Route 3 between the Norris Bridge in Middlesex County and the intersection of Route 3 at Route 200/Route 695 in the town of White Stone is anticipated to operate at LOS E during the AM peak hour, which is a change from 2008 existing conditions of LOS D. In the PM peak hour analysis, this segment is anticipated to continue to operate as it did in 2008 (existing) at LOS E. The roadway segment on Route 3 south of the Route 3/Route 624 intersection is anticipated to operate at LOS E during the future year PM peak hour.

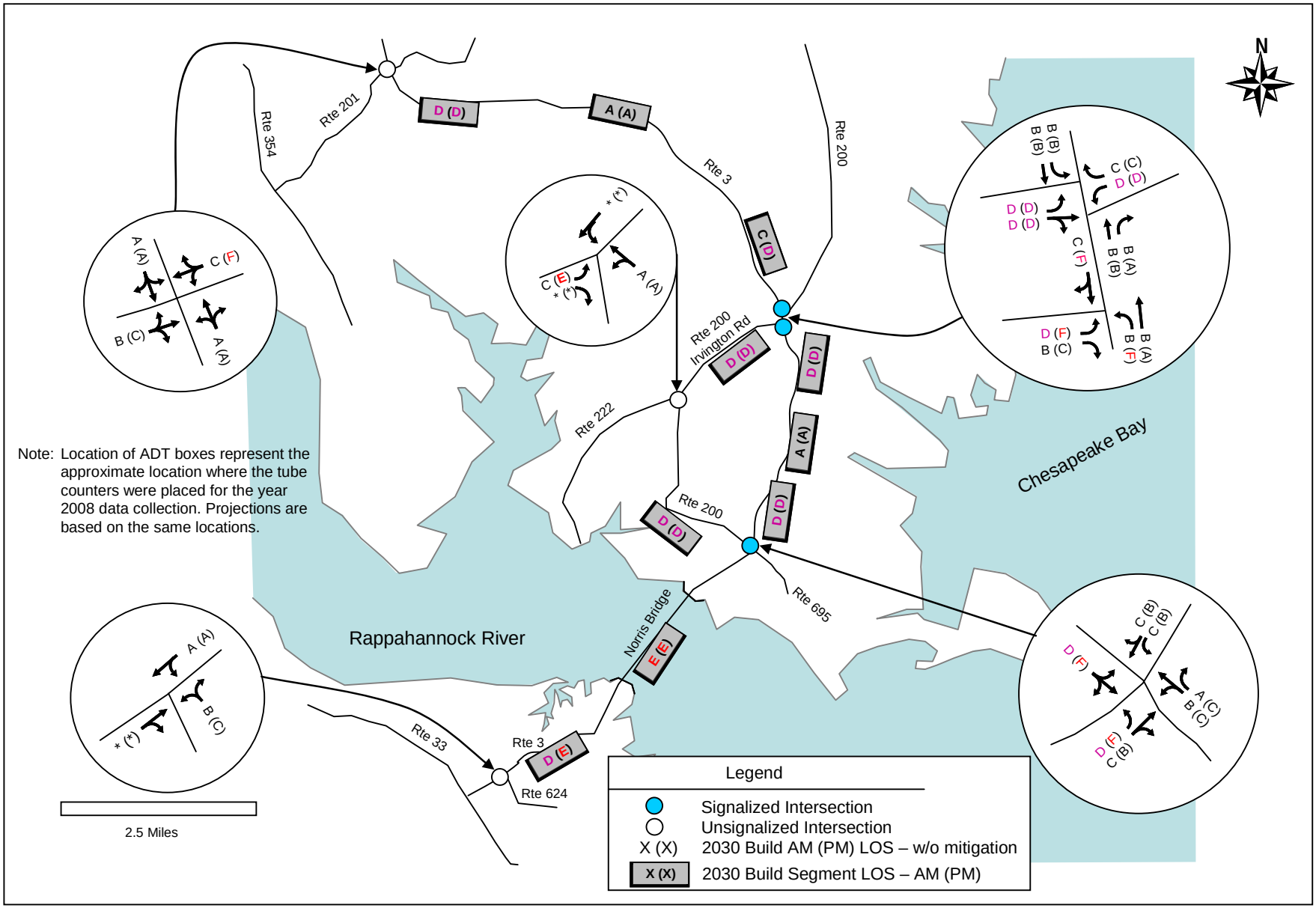
[8] Some rural jurisdictions are designating LOS "D" as acceptable for future year analysis.

TABLE 10: 2030 BUILD INTERSECTION LEVEL OF SERVICE AND DELAY (WITHOUT MITIGATION)

Intersection	Type of Control	Movement Approach	2030 Build without Mitigation			
			AM Peak Hour		PM Peak Hour	
			Level of Service	Delay (sec/veh)	Level of Service	Delay (sec/veh)
Route 3 at Route 200 N	Signalized	***Intersection Overall***	***C***	***20.5***	***C***	***23.9***
		EBL	D	37.4	D	35.1
		EBTR	D	38.5	D	36.4
		EB Approach	D	38.4	D	36.2
		WBL	D	45.3	D	45.9
		WBR	C	24.5	C	25.3
		WB Approach	D	43.6	D	42.5
		NBT	B	16.6	C	21.3
		NBR	B	12.5	A	9.4
		NB Approach	B	15.1	B	17.0
		SBL	B	10.6	B	13.8
		SBT	B	11.2	B	23.0
		SB Approach	B	11.1	B	22.6
Route 3 at Route 200 S (Irvington Road)	Signalized	***Intersection Overall***	***C***	***26.6***	***F***	***102.7***
		EBL	D	46.2	F	140.2
		EBR	C	20.3	C	27.4
		EB Approach	D	37.9	F	95.6
		NBL	B	14.5	F	152.1
		NBT	B	11.9	A	8.6
		NB Approach	B	12.5	E	68.8
		SBTR	C	23.8	F	137.5
		SB Approach	C	23.8	F	137.5
Route 3 at Route 200/ Route 695	Signalized	***Intersection Overall***	***C***	***32.9***	***E***	***60.6***
		EBLTR	D	38.8	F	165.0
		EB Approach	D	38.8	F	165.0
		WBLT	B	10.8	C	30.6
		WBR	A	8.7	C	21.6
		WB Approach	A	10.0	C	27.8
		NBL	E	55.9	F	89.6
		NBTR	C	31.4	B	13.8
		NB Approach	D	40.2	D	50.1
		SBL	C	31.5	B	11.2
		SBTR	C	29.5	B	12.4
		SB Approach	C	30.0	B	12.2
Route 3 at Route 201	Unsignalized	EBLTR	B	13.5	C	15.3
		WBLTR	C	24.1	F	68.8
		NBLTR	A	2.9	A	4.6
		SBLTR	A	0.7	A	0.4
Route 200 at Route 222	Unsignalized	EBL	D	25.5	F	203.0
		EBR	~		~	
		NBLT	A	0.7	A	1.9
		SBTR	~		~	
Route 3 at Route 624	Unsignalized	WBLR	B	13.5	C	23.7
		NBTR	~		~	
		SBLT	~		A	0.9

(~) The Highway Capacity Manual methodology does not provide LOS or delay values for movements without conflicts.
NOTE: NBL – northbound left movement, NBT – northbound thru movement, NBR – northbound right movement
denotes movement that is anticipated to operate below

FIGURE 14: 2030 BUILD LEVEL OF SERVICE (WITHOUT MITIGATION)



*The Highway Capacity Manual methodology does not provide LOS for movements that do not have conflicts.

RECOMMENDED IMPROVEMENTS

Previous analysis shows that traffic signal optimization alone cannot accommodate the added traffic due to background growth and new land developments. **Figure 14** shows the intersections and segments forecasted to operate at LOS "D" or worse. These intersections and segments were reviewed for possible improvements and mitigation[9].

To mitigate these deficient movements and segments, options were analyzed. Specific attention was paid to low-cost mitigation measures.

A. Intersection Improvements

Based on iterative analysis of the future build traffic conditions, a number of roadway improvements are recommended to best accommodate projected traffic volumes. The following are detailed descriptions of the recommended roadway improvements at intersections:

1. **Route 3/Route 200 S (Irvington Road)**

   Without road improvements, the eastbound left-turn, northbound left-turn, and southbound thru/right are projected to operate at LOS F during the PM peak hour. Recommended roadway improvements include:

   - Remove the bumpout and parking spaces on southbound Route 3 to provide an exclusive southbound right-turn lane;
   - Change the eastbound lane stripping from the existing left and right to left and shared left-right; and
   - Remove the bumpout and parking located on northbound Route 3 to provided receiving lanes for dual left-turn from north/eastbound Route 200.

2. **Route 3/Route 200 N**

   This intersection is anticipated to operate at overall LOS C during both AM and PM peak hours with signal optimization; thus no road improvements at this intersection are needed.

3. **Route 3/Route 695/Route 200**

   Without road improvements, the northbound left-turn is anticipated to operate at LOS F in the PM peak hour resulting in a queue length longer than the storage length. The eastbound left/thru/right will operate at LOS F in the PM peak hour. Recommended roadway improvements include:

   - Due to the high eastbound left turns, change lane configuration to include a left-turn pocket with length of 400-feet.
   - Change northbound left signal from permitted to protected and permitted.

4. **Route 3/Route 201 (Lively)**

   During the PM peak hour, westbound traffic is projected to operate at LOS F with average delay of 68 seconds per vehicle and a 95th percentile queue length of 64-feet (approximately three car

[9] The recommendations shown in this report are the recommendations of the consultant based on mitigating the impacts of traffic on the system. Individual governing body implementation of these recommendations is not guaranteed.

lengths) without road improvement. This delay is caused by the reduced number of gaps available due to the increased thru traffic. The projected westbound traffic is very low (28/18/12 vehicles per hour for left-turn/thru/right-turn movements respectively. The intersection does not meet the peak hour warrant for installation of a signal and will likely not meet the 4-hour or 8-hour warrant due to the limited volume on this roadway. Traffic signalization is not recommended for this intersection. Delay for these vehicles will be born or users will seek out alternative routes. However, it is recommended that a signal warrant study be conducted in five years to reassess the need for signalization at this intersection.

5. **Route 222/Route 200**

   Without road improvement, during the PM peak hour, the eastbound left-turn movement is projected to operate at LOS F. Due to the large amount of eastbound left-turning traffic; a peak hour signal warrant is met. The installation of a signal at this location is recommended. The signalization of this intersection will also help reduce traffic accidents given the steep slope and curvature of Route 222.

With the above roadway improvements, the operation of the intersections will be improved. The resulting traffic operation LOS and delays are summarized in **Table 11** and **Figure 15**. As shown in **Table 11**, all signalized intersections are anticipated to operate at overall LOS C or better, with all individual turning movements located at signalized intersections operating at LOS D or better.

B. Highway Segment Improvements

For the operation of roadway segments, the analysis results show that the segment on Route 3 from the intersection of Route 3 at Route 200/Route 695 to the intersection of Route 3 at Route 624 is anticipated to operate at LOS E during the PM peak hour, and the segment of Route 3 from the intersection with Route 200/Route 695 to Norris Bridge will operate at LOS E during the AM peak if no roadway improvements are provided.

Route 3 and Route 200 are two-lane and four-lane highways with a functional classification as rural minor arterials; both routes were designed to link cities and towns with a high level of mobility. For the two-lane highway, the level of service is defined by the percent time spent following and average travel speed, which is affected by No Passing zones, density of access points, shoulder width, and heavy vehicle percentages. For four-lane highway segments, the level of service is defined by density, average speed, maximum volume to capacity ratio, and traffic flow rate. To improve the highway segment operation, the following measures were considered:

- Install through truck route signs on Harris Road and James B. Jones Highway to move trucks from Route 3 through Kilmarnock to an alternative route.
- Replace the Norris Bridge with a new four-lane facility.
- For new development, ensure all roadside objects are located at least 12 feet from the roadway.
- As development occurs and improvements to the infrastructure system occur, widen the area roadways to include 6-foot shoulders on either side for safety improvements.
- As development occurs, consolidate access points along Route 3 to provide a safer environment along Route 3 while also allowing for maximum use of roadway by vehicles with minimal conflict points. At new access points, provide a dual left-turn lane in the middle of the road.
- As improvements to the roadway network are completed, reconfigure areas with multiple horizontal curves to include passing lanes.

- Extend and widen Route 3 to four lanes from 1.5 miles NW of Kilmarnock to 4.8 miles NW of Kilmarnock[10].
- Conduct an additional study related to a Route 3 bypass providing an alternative alignment from Route 3 near the Norris Bridge connecting to Route 3 near Hartfield. This would provide a more direct connection between the two locations and minimize backtracking of vehicles along Route 3[11]. Due to the length and location of the bypass, analysis is beyond the study area boundaries for this study. A separate study should be conducted to determine the feasibility of the proposed bypass. Cost for a feasibility study to determine the need for a bypass is not included in this study. Further, cost for the construction of a bypass is not included in this study.
- Conduct an additional study related to the proposed Kilmarnock/Whitestone bypass[12]. This connector would extend from North Main Street near James B Jones Memorial Highway around the east side of Kilmarnock crossing Church Street and Waverly Avenue connecting back into Route 3 approximately one-half mile below the present southern town line near Fleet's Bay Road. This connector would provide an alternative to the existing route to avoid the downtown area therefore removing much congestion caused by through traffic as well as provide an anchor for new development in the area. A separate study should be conducted to determine the feasibility of the proposed bypass. Cost for a feasibility study to determine the need for a bypass is not included in this study. Further, cost for the construction of a bypass is not included in this study.

As development continues, improvements to the roadway network will be needed. For this project, the first recommendation above regarding through truck route signs would be paid for with county/city funds (installation of truck route signs). The remaining recommendations should be included in development regulations and paid, at least partially, by developers.

C. Norris Bridge Improvements

As stated above, it is recommended that a new bridge be built to replace the existing, functionally obsolete bridge. Levels of service in both the AM and PM peak hours show below threshold levels in the existing and future analysis (2008 analysis shows a LOS D in the AM peak hour and a LOS E in the PM peak hour). The projections show the level of service dropping from LOS D to LOS E in the AM peak hour and remaining at LOS E in the PM peak hour. With the results of the most recent sufficiency rating, federal and state funds can be allocated to the construction of a newer, wider, and safer bridge.

Based on the deficiency of Norris Bridge, the following improvements are recommended:

- Widen to a four-lane bridge.
- Introduce context sensitive solutions in the bridge design (i.e., color-treated concrete, light fixtures).
- A new bridge should have a minimum of 10-feet of lateral clearance on each side of the roadway.
- Sidewalks should be placed along one or both sides of the bridge with physical separators between the sidewalk and the roadway.

[10] This recommendation was included in the Lancaster County Comprehensive Plan.
[11] This recommendation was included in the Middlesex County Comprehensive Plan.
[12] This recommendation was included in the Town of Kilmarnock Comprehensive Plan (page 4-6).

D. Traffic Safety Improvements

Based on the analysis of the crash data from 2003 to 2007 for Lancaster County, the following patterns were identified:

- Approximately 30% of total crashes were related to deer.
- There were two pedestrian crashes along Route 3.
- Approximately 8% of the reported crashes were during the "Darkness-Not Lighted" conditions.
- At the intersection of Route 3 and Route 200 (White Stone) there were five angle and five property damage crashes. This intersection has a "tight" horizontal curve on its southbound (Route 3) approach.

Based on the analysis, the following countermeasures are recommended:

- Install deer warning signs at the locations where deer-related crashes have occurred. As development increases, installation of lighting along certain routes may be necessary to improve driver visibility.
- Review high crash locations on a yearly basis to determine if traffic calming measures are necessary.
- Add advisory speed reduction signage at vertical and horizontal curves including locations along Route 200 and Route 3.
- The traffic analysis indicates that signalization for the intersection of Route 200 at Route 222 is warranted. The signalization of this intersection will decrease the moving conflicts thus improving the safety.

With the above four types of improvements (Intersection, Highway Segment, Norris Bridge, and Traffic Safety) the associated analysis provide the basis for the recommendations, **Figure 16** shows the final recommendations of the study.

TABLE 11: 2030 BUILD INTERSECTION LEVEL OF SERVICE AND DELAY (WITH MITIGATION)

Intersection	Type of Control	Movement Approach	2030 Build with Mitigation			
			AM Peak Hour		PM Peak Hour	
			Level of Service	Delay (Sec/Veh)	Level of Service	Delay (Sec/Veh)
Route 3 at Route 200 N	Signalized	***Intersection Overall***	***B***	***18.2***	***C***	***30.0***
		EBL	C	25.9	C	34.6
		EBTR	C	26.5	D	35.3
		EB Approach	C	26.5	D	35.1
		WBL	C	29.5	C	33.7
		WBR	B	17.3	C	23.0
		WB Approach	C	29.3	C	33.3
		NBT	C	20.0	D	39.3
		NBR	A	2.0	A	4.1
		NB Approach	B	15.2	C	29.1
		SBL	B	11.2	B	16.0
		SBT	B	14.3	C	30.0
		SB Approach	B	14.2	C	29.5
Route 3 at Route 200 S (Irvington Road)	Signalized	***Intersection Overall***	***C***	***20.2***	***C***	***21.6***
		EB Approach	C	26.8	D	37.2
		NBL	A	9.1	B	15.3
		NBT	B	11.0	A	9.0
		NB Approach	B	10.5	B	11.6
		SBT	B	13.7	B	16.3
		SBR	C	24.7	B	19.4
		SB Approach	C	19.6	B	17.9
Route 3 at Route 200/Route 695	Signalized	***Intersection Overall***	***C***	***21.8***	***C***	***31.5***
		EBL	C	27.1	D	43.3
		EBT	C	21.2	C	30.7
		EB Approach	C	23.6	C	34.9
		WBLT	C	21.1	D	52.0
		WBR	B	15.5	C	24.1
		WB Approach	B	18.8	D	43.3
		NBL	B	18.8	C	34.3
		NBTR	B	17.0	B	11.6
		NB Approach	B	17.7	C	22.4
		SBL	C	23.8	C	26.3
		SBTR	C	27.7	D	40.5
		SB Approach	C	26.8	D	38.1
Route 3 at Route 201	Unsignalized	EBLTR	B	13.5	C	15.3
		WBLTR	C	24.1	F	68.8
		NBLTR	A	2.9	A	4.6
		SBLTR	A	0.7	A	0.4
Route 200 at Route 222	Signalized	***Intersection Overall***	***A***	***7.7***	***A***	***9.1***
		EBL	B	14.7	B	15.8
		EBR	B	12.5	B	12.7
		EB Approach	B	14.3	B	15.3
		NBLT	A	4.9	A	7.7
		SBTR	A	6.3	A	7.7
Route 3 at Route 624	Unsignalized	WBLR	B	13.5	C	23.7
		NBTR	~		~	
		SBLT	~		A	0.9

(~) The Highway Capacity Manual methodology does not provide LOS or delay values for movements without conflicts.

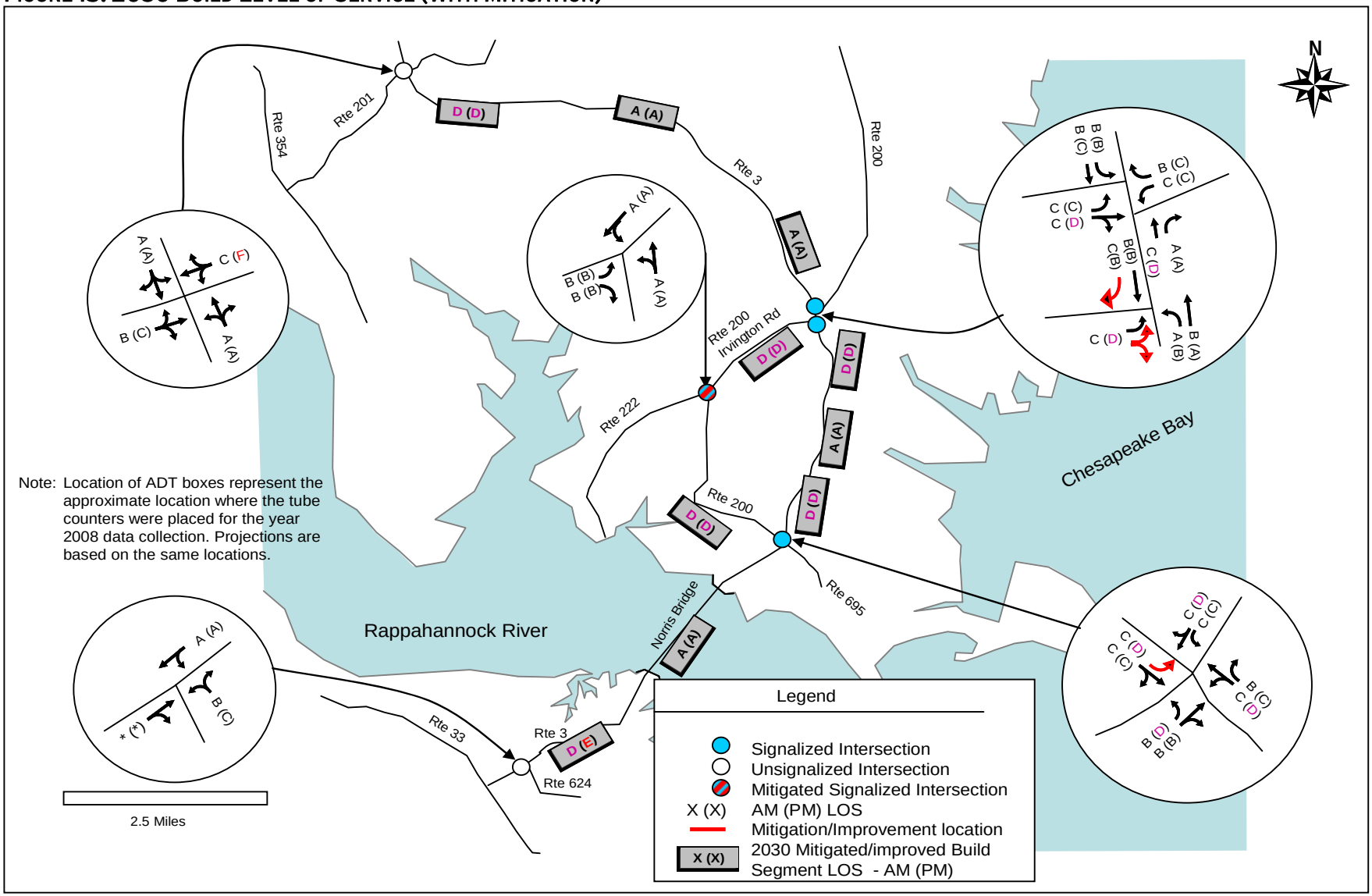
NOTE: NBL – northbound left movement, NBT – northbound thru movement, NBR – northbound right movement

denotes movement that improved with the mitigation measures from Build scenario to above threshold levels

denotes movement that remained below threshold levels, but note that overall intersection LOS is within threshold levels

denotes movement that deteriorated below threshold levels with mitigation, but note that overall intersection LOS is within threshold levels

FIGURE 15: 2030 BUILD LEVEL OF SERVICE (WITH MITIGATION)

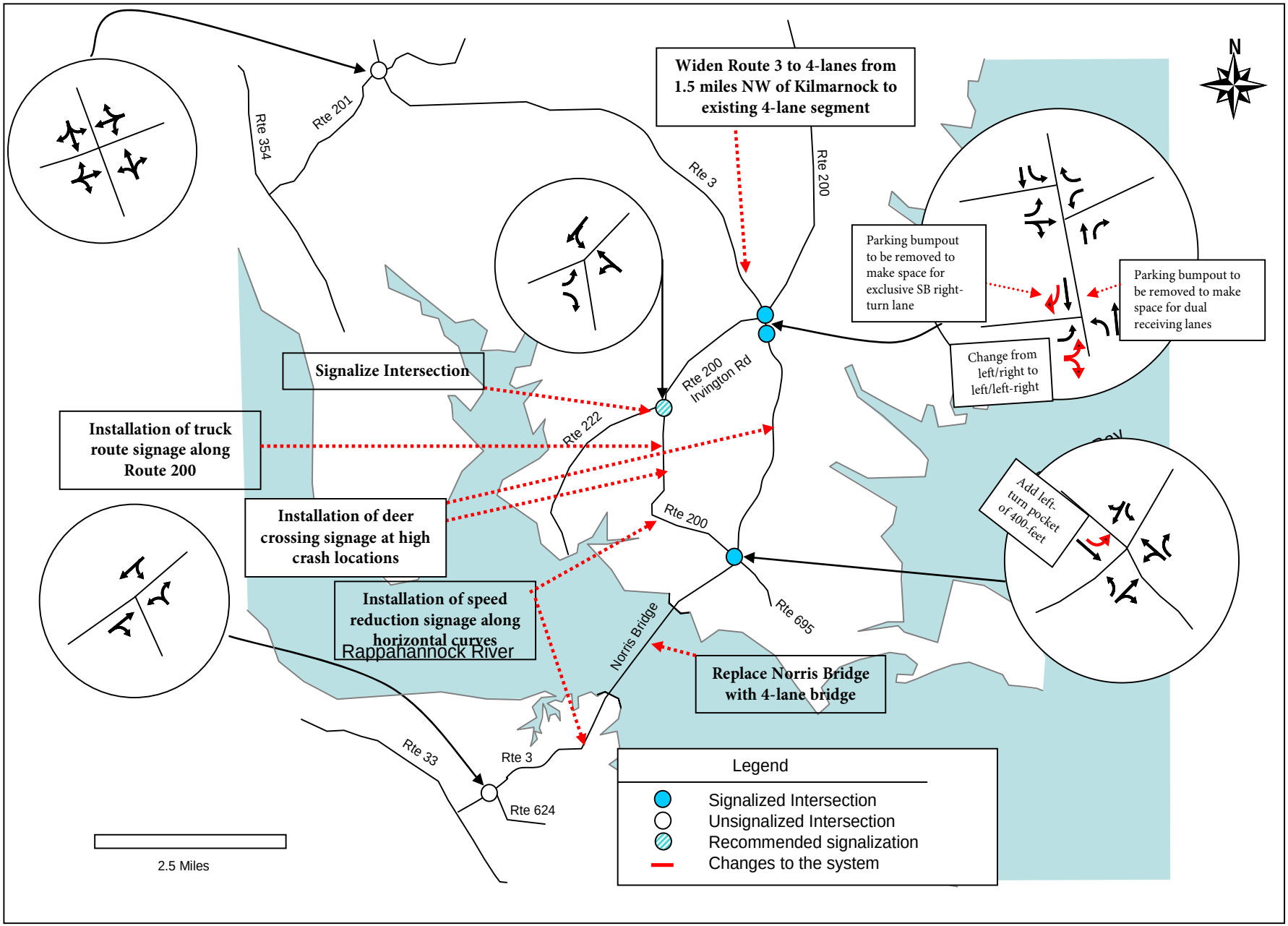


*The Highway Capacity Manual methodology does not provide LOS for movements that do not have conflicts.

NOTE: highway segment on Route 3 north of Route 624 (anticipated to operate at LOS D in the AM and LOS E in the PM) is outside the Lancaster County boundaries. Widening this roadway should be studied by Middlesex County.

Locations with LOS D are anticipated to be acceptable in the 2030 timeframe as many rural areas are accepting a segment LOS of "D". It should also be noted that only the main arterials were analyzed in the study, and all development traffic were loaded on the main arterials producing a worst-case scenario. In reality, traffic will utilize all routes to normalize traffic, time, and distance to their maximum effect.

FIGURE 16: RECOMMENDED IMPROVEMENTS



PRELIMINARY COST ESTIMATE

Based on the recommendations previously discussed, **Table 12** shows the recommended improvements and preliminary cost estimates anticipated for implementation.

TABLE 12: PRELIMINARY ESTIMATES OF COSTS FOR RECOMMENDED IMPROVEMENTS

	Location	Recommended Improvement	Preliminary Estimate of Costs
1	Intersection of Route 200 at Route 222	Signalize this intersection.	$200,000 to $250,000
2	Intersection of Route 3 at Route 200 (White Stone)	Provide eastbound left-turn pocket and replace signal heads.	$125,000
3	Route 3 between Route 200 N and Route 200 S	Remove bumpout and parking spaces on both sides of the street.	$50,000
4	Norris Bridge	Replace existing bridge with new, wider bridge to accommodate pedestrian/bicycle usage as well as four lanes of traffic.	$230,000,000
5	Route 3	Widen roadway from two to four lanes from 1.5 miles NW of Kilmarnock to 4.8 miles NW of Kilmarnock (3.3 miles in length)	$15,500,000 *
6	Harris Road/James B. Jones Highway/Route 3	Install truck route signs along Harris Road and James B. Jones Highway as well as truck route wayfinding signs along Route 3.	$100 each, 10 total, $1,000
7	At various locations along Route 3 and Route 200	Install deer signage along major crash segments.	$100 each, 10 total, $1,000
8	At various locations along Route 3 and Route 200	Speed reduction signage for horizontal curve sections.	$100 each, 10 total, $1,000
		TOTAL	**$245,928,000+**
		Total without Norris Bridge Replacement	**$15,928,000+**

Source: VDOT PCES (Project Cost Estimating System)

*Cost does not include acquisition of right-of-way and relocation of utilities. Cost estimate includes widening of existing two lanes to a four-lane facility with a depressed median to include one additional lane in each direction and 6-foot shoulders. Average cost assumed at $4.7 million per mile.

Cost for Norris Bridge Replacement is based on $310 per square foot and a width of 74-feet (48-feet of travel width and 10-foot shoulders on either side with a 6-foot median barrier). Bicycles and pedestrians would be accommodated within the 10-foot shoulder area

+ Estimate is based on a higher range, so figures reflect a worst case scenario.

APPENDIX A: TRAFFIC COUNT DATA

This appendix contains AM and PM peak hour manual traffic counts.

NOTE: 72-hours of classification counts were completed at the following locations and available from Lancaster County:

Location 1	Route 3 North of Kilmarnock – northbound Route 3 North of Kilmarnock – southbound
Location 2	Route 200 North of Kilmarnock – eastbound Route 200 North of Kilmarnock – westbound
Location 3	Route 3 between White Stone and Norris Bridge – northbound Route 3 between White Stone and Norris Bridge - southbound
Location 4	Route 3 between Kilmarnock and White Stone – northbound Route 3 between Kilmarnock and White Stone - southbound
Location 5	Route 200 between Kilmarnock and Route 222 – northbound Route 200 between Kilmarnock and Route 222 – southbound
Location 6	Route 354 south of Route 201 – northbound Route 354 south of Route 201 – southbound

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File Name : rte 3 at rte 200 and rte 695
Site Code : 00006462
Start Date : 7/24/2008
Page No : 1

Groups Printed- Unshifted

	Rappahannock Dr (Route 3) From North				Chesapeake Dr (Rte 695) From East				Rappahannock Dr (Route 3) From South				Chesapeake Dr (Rte 200) From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
06:00 AM	4	13	2	0	3	2	5	0	1	18	2	0	11	9	13	0	0	83	83
06:15 AM	6	29	2	0	8	1	8	0	6	27	3	0	13	12	15	0	0	130	130
06:30 AM	6	46	1	0	3	1	9	0	5	44	4	0	8	12	16	0	0	155	155
06:45 AM	3	54	2	0	6	2	13	0	9	61	3	0	12	10	12	0	0	187	187
Total	19	142	7	0	20	6	35	0	21	150	12	0	44	43	56	0	0	555	555
07:00 AM	7	40	2	0	6	1	15	0	16	48	10	0	20	7	19	2	2	191	193
07:15 AM	9	31	3	2	17	11	18	0	6	41	7	0	18	9	21	0	2	191	193
07:30 AM	13	39	1	0	12	8	12	0	15	63	3	0	18	12	14	0	0	210	210
07:45 AM	13	34	1	1	11	7	20	0	24	76	11	0	14	10	11	1	2	232	234
Total	42	144	7	3	46	27	65	0	61	228	31	0	70	38	65	3	6	824	830
*** BREAK ***																			
04:30 PM	10	59	0	0	14	2	15	0	23	73	12	0	9	7	16	0	0	240	240
04:45 PM	14	61	0	0	5	4	12	0	19	61	12	0	12	6	13	0	0	219	219
Total	24	120	0	0	19	6	27	0	42	134	24	0	21	13	29	0	0	459	459
05:00 PM	6	76	0	0	12	10	11	0	11	86	9	0	6	9	5	2	2	241	243
05:15 PM	8	64	2	1	8	9	21	0	13	57	15	0	7	7	8	0	1	219	220
05:30 PM	10	69	1	0	9	3	17	0	15	69	21	0	6	6	9	0	0	235	235
05:45 PM	12	61	3	2	5	5	15	0	18	59	13	0	4	7	7	2	4	209	213
Total	36	270	6	3	34	27	64	0	57	271	58	0	23	29	29	4	7	904	911
06:00 PM	6	58	2	0	7	7	9	0	12	57	8	1	5	7	7	0	1	185	186
06:15 PM	6	55	0	0	9	2	11	0	12	61	5	0	8	11	11	0	0	191	191
Grand Total	133	789	22	6	135	75	211	0	205	901	138	1	171	141	197	7	14	3118	3132
Apprch %	14.1	83.6	2.3		32.1	17.8	50.1		16.5	72.4	11.1		33.6	27.7	38.7				
Total %	4.3	25.3	0.7		4.3	2.4	6.8		6.6	28.9	4.4		5.5	4.5	6.3		0.4	99.6	

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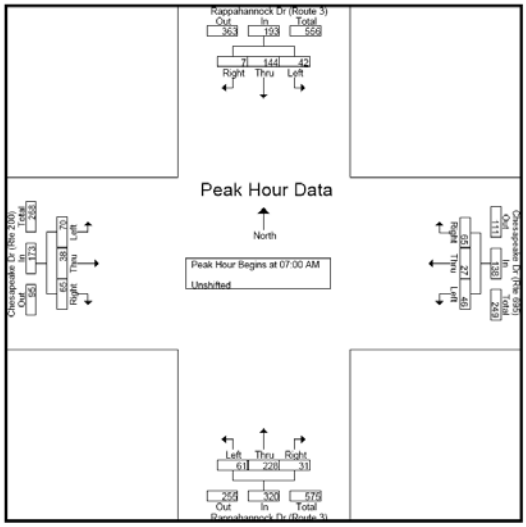
	Rappahannock Dr (Route 3) From North				Chesapeake Dr (Rte 695) From East				Rappahannock Dr (Route 3) From South				Chesapeake Dr (Rte 200) From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	7	40	2	49	6	1	15	22	16	48	10	74	20	7	19	46	191
07:15 AM	9	31	3	43	17	11	18	46	6	41	7	54	18	9	21	48	191
07:30 AM	13	39	1	53	12	8	12	32	15	63	3	81	18	12	14	44	210
07:45 AM	13	34	1	48	11	7	20	38	24	76	11	111	14	10	11	35	232
Total Volume	42	144	7	193	46	27	65	138	61	228	31	320	70	38	65	173	824
% App. Total	21.8	74.6	3.6		33.3	19.6	47.1		19.1	71.2	9.7		40.5	22	37.6		
PHF	.808	.900	.583	.910	.676	.614	.813	.750	.635	.750	.705	.721	.875	.792	.774	.901	.888



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Site Code : 00006462
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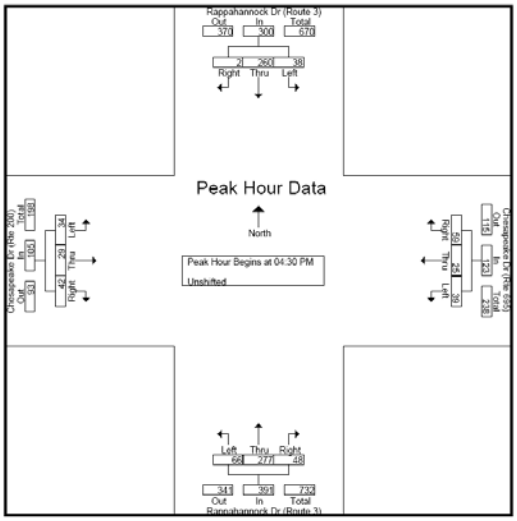
	Rappahannock Dr (Route 3) From North				Chesapeake Dr (Rte 695) From East				Rappahannock Dr (Route 3) From South				Chesapeake Dr (Rte 200) From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	10	59	0	69	14	2	15	31	23	73	12	108	9	7	16	32	240
04:45 PM	14	61	0	75	5	4	12	21	19	61	12	92	12	6	13	31	219
05:00 PM	6	76	0	82	12	10	11	33	11	86	9	106	6	9	5	20	241
05:15 PM	8	64	2	74	8	9	21	38	13	57	15	85	7	7	8	22	219
Total Volume	38	260	2	300	39	25	59	123	66	277	48	391	34	29	42	105	919
% App. Total	12.7	86.7	0.7		31.7	20.3	48		16.9	70.8	12.3		32.4	27.6	40		
PHF	.679	.855	.250	.915	.696	.625	.702	.809	.717	.805	.800	.905	.708	.806	.656	.820	.953



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File Name : Rte 3 at Rte 200 North
Site Code : 00000011
Start Date : 7/23/2008
Page No : 1

Groups Printed- Unshifted

	N Market St (Rte 3) From North				E Church St (Rte 200) From East				S Market St (Rte 3) From South				W Church St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
06:00 AM	0	12	0	0	27	0	3	0	0	15	8	0	0	0	0	0	0	65	65
06:15 AM	4	20	0	0	20	0	0	0	0	24	11	0	0	0	0	0	0	79	79
06:30 AM	4	25	0	0	34	0	4	0	0	24	19	0	0	0	0	0	0	110	110
06:45 AM	2	48	0	0	56	0	3	0	0	51	15	0	1	0	0	0	0	176	176
Total	10	105	0	0	137	0	10	0	0	114	53	0	1	0	0	0	0	430	430
07:00 AM	5	42	0	0	24	0	2	0	0	45	11	1	0	0	0	1	2	129	131
07:15 AM	3	40	0	0	45	0	4	2	0	27	26	2	0	0	0	1	5	145	150
07:30 AM	3	34	0	0	46	0	5	0	0	37	29	0	1	2	3	0	0	160	160
07:45 AM	0	47	0	0	63	0	10	0	0	76	44	1	0	4	1	0	1	245	246
Total	11	163	0	0	178	0	21	2	0	185	110	4	1	6	4	2	8	679	687
*** BREAK ***																			
04:30 PM	9	86	0	1	35	0	6	1	0	71	46	1	4	4	3	3	6	264	270
04:45 PM	2	85	0	0	33	0	14	0	0	74	31	0	2	5	5	9	9	251	260
Total	11	171	0	1	68	0	20	1	0	145	77	1	6	9	8	12	15	515	530
05:00 PM	4	99	0	0	44	0	16	1	0	94	63	0	1	8	5	0	1	334	335
05:15 PM	6	75	0	0	36	0	8	6	0	86	59	0	1	6	5	0	6	282	288
05:30 PM	5	85	0	0	23	0	4	3	0	68	32	0	2	2	3	0	3	224	227
05:45 PM	4	66	0	1	27	0	9	1	0	70	29	3	0	0	2	8	13	207	220
Total	19	325	0	1	130	0	37	11	0	318	183	3	4	16	15	8	23	1047	1070
06:00 PM	4	63	0	0	26	0	10	0	0	63	37	2	0	1	2	0	2	206	208
06:15 PM	7	46	0	1	25	0	7	0	0	56	38	0	0	2	5	0	1	186	187
Grand Total	62	873	0	3	564	0	105	14	0	881	498	10	12	34	34	22	49	3063	3112
Apprch %	6.6	93.4	0		84.3	0	15.7		0	63.9	36.1		15	42.5	42.5				
Total %	2	28.5	0		18.4	0	3.4		0	28.8	16.3		0.4	1.1	1.1		1.6	98.4	

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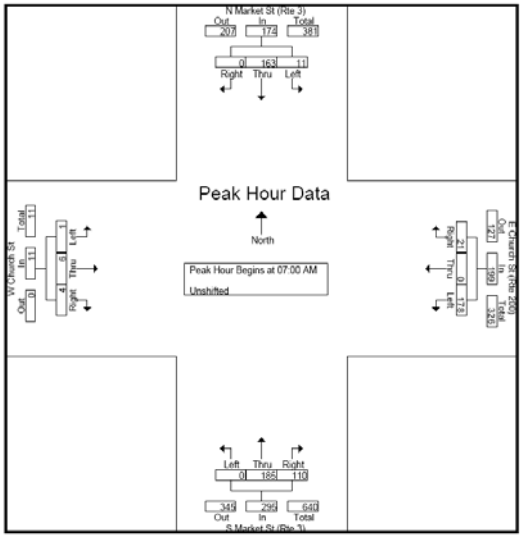
	N Market St (Rte 3) From North				E Church St (Rte 200) From East				S Market St (Rte 3) From South				W Church St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	5	42	0	47	24	0	2	26	0	45	11	56	0	0	0	0	129
07:15 AM	3	40	0	43	45	0	4	49	0	27	26	53	0	0	0	0	145
07:30 AM	3	34	0	37	46	0	5	51	0	37	29	66	1	2	3	6	160
07:45 AM	0	47	0	47	63	0	10	73	0	76	44	120	0	4	1	5	245
Total Volume	11	163	0	174	178	0	21	199	0	185	110	295	1	6	4	11	679
% App. Total	6.3	93.7	0		89.4	0	10.6		0	62.7	37.3		9.1	54.5	36.4		
PHF	.550	.867	.000	.926	.706	.000	.525	.682	.000	.609	.625	.615	.250	.375	.333	.458	.693



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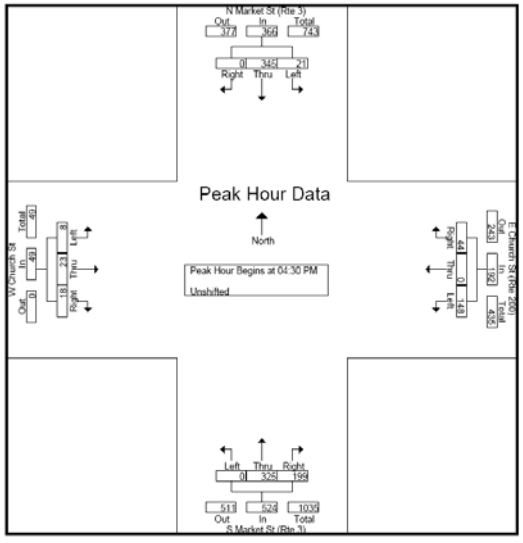
File Name : Rte 3 at Rte 200 North
Site Code : 00000011
Start Date : 7/23/2008
Page No : 3

	N Market St (Rte 3) From North				E Church St (Rte 200) From East				S Market St (Rte 3) From South				W Church St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	9	86	0	95	35	0	6	41	0	71	46	117	4	4	3	11	264
04:45 PM	2	85	0	87	33	0	14	47	0	74	31	105	2	5	5	12	251
05:00 PM	4	99	0	103	44	0	16	60	0	94	63	157	1	8	5	14	334
05:15 PM	6	75	0	81	36	0	8	44	0	86	59	145	1	6	5	12	282
Total Volume	21	345	0	366	148	0	44	192	0	325	199	524	8	23	18	49	1131
% App. Total	5.7	94.3	0		77.1	0	22.9		0	62	38		16.3	46.9	36.7		
PHF	.583	.871	.000	.888	.841	.000	.688	.800	.000	.864	.790	.834	.500	.719	.900	.875	.847



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File Name : rte 3 at rte 200 south
Site Code : 00000011
Start Date : 7/22/2008
Page No : 1

Groups Printed- Unshifted

	Main Street (Rte 3) From North				From East				S Main Street (Rte 3) From South				Irvington Rd (Rte 200) From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
06:00 AM	0	16	7	0	0	0	0	0	0	14	0	0	10	0	1	0	0	48	48
06:15 AM	0	33	10	0	0	0	0	0	9	32	0	0	3	0	4	0	0	91	91
06:30 AM	0	28	24	0	0	0	0	0	2	27	0	0	7	0	6	0	0	94	94
06:45 AM	0	41	22	0	0	0	0	0	9	56	0	0	13	0	6	1	1	147	148
Total	0	118	63	0	0	0	0	0	20	129	0	0	33	0	17	1	1	380	381
07:00 AM	0	42	24	0	0	0	0	0	7	48	0	0	13	0	7	0	0	141	141
07:15 AM	0	48	31	0	0	0	0	0	8	54	0	0	10	0	7	1	1	158	159
07:30 AM	0	37	23	0	0	0	0	0	12	58	0	0	27	0	8	0	0	165	165
07:45 AM	0	45	41	0	0	0	0	0	14	59	0	0	25	0	13	2	2	197	199
Total	0	172	119	0	0	0	0	0	41	219	0	0	75	0	35	3	3	661	664
*** BREAK ***																			
04:30 PM	0	81	32	1	0	0	0	0	22	89	0	1	32	0	35	2	4	291	295
04:45 PM	0	68	28	3	0	0	0	0	14	87	0	0	50	0	27	7	10	274	284
Total	0	149	60	4	0	0	0	0	36	176	0	1	82	0	62	9	14	565	579
05:00 PM	0	76	27	3	0	0	0	0	23	72	0	0	50	0	20	5	8	268	276
05:15 PM	0	80	18	1	0	0	0	0	13	73	0	0	33	0	22	0	1	239	240
05:30 PM	0	75	24	1	0	0	0	0	18	79	0	0	29	0	18	3	4	243	247
05:45 PM	0	45	27	0	0	0	0	0	11	58	0	0	30	0	14	1	1	185	186
Total	0	276	96	5	0	0	0	0	65	282	0	0	142	0	74	9	14	935	949
06:00 PM	0	49	24	1	0	0	0	0	9	62	0	0	32	0	17	2	3	193	196
06:15 PM	0	41	19	0	0	0	0	0	8	67	0	0	45	0	11	1	1	191	192
Grand Total	0	805	381	10	0	0	0	0	179	935	0	1	409	0	216	25	36	2925	2961
Apprch %	0	67.9	32.1		0	0	0		16.1	83.9	0		65.4	0	34.6				
Total %	0	27.5	13		0	0	0		6.1	32	0		14	0	7.4		1.2	98.8	

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File Name : rte 3 at rte 200 south
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703-914-4850

File Name : rte 3 at rte 200 south
Site Code : 00000011
Start Date : 7/22/2008
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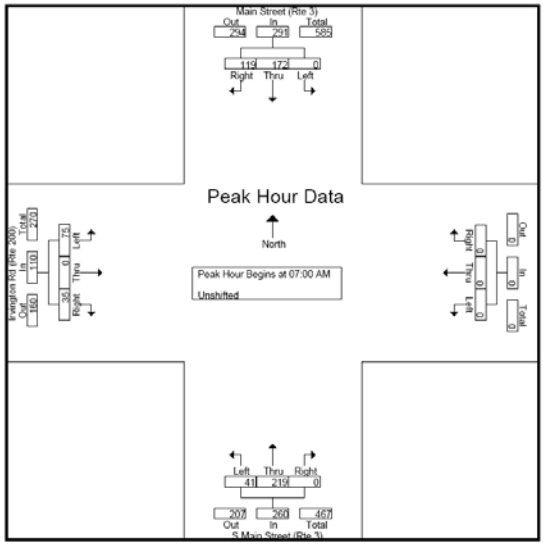
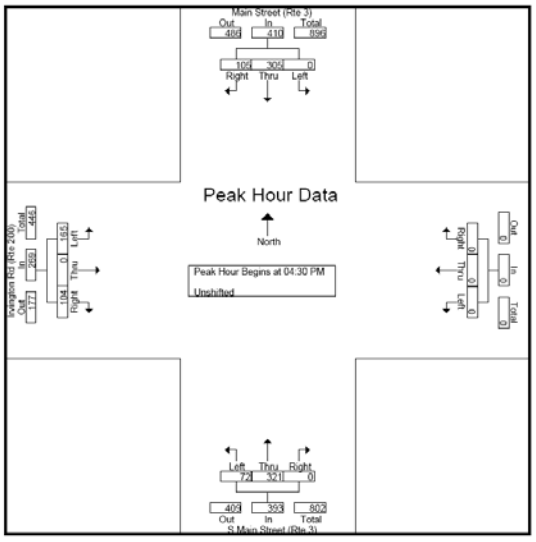
	Main Street (Rte 3) From North				From East				S Main Street (Rte 3) From South				Irvington Rd (Rte 200) From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	42	24	66	0	0	0	0	7	48	0	55	13	0	7	20	141
07:15 AM	0	48	31	79	0	0	0	0	8	54	0	62	10	0	7	17	158
07:30 AM	0	37	23	60	0	0	0	0	12	58	0	70	27	0	8	35	165
07:45 AM	0	45	41	86	0	0	0	0	14	59	0	73	25	0	13	38	197
Total Volume	0	172	119	291	0	0	0	0	41	219	0	260	75	0	35	110	661
% App. Total	0	59.1	40.9		0	0	0		15.8	84.2	0		68.2	0	31.8		
PHF	.000	.896	.726	.846	.000	.000	.000	.000	.732	.928	.000	.890	.694	.000	.673	.724	.839

	Main Street (Rte 3) From North				From East				S Main Street (Rte 3) From South				Irvington Rd (Rte 200) From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	81	32	113	0	0	0	0	22	89	0	111	32	0	35	67	291
04:45 PM	0	68	28	96	0	0	0	0	14	87	0	101	50	0	27	77	274
05:00 PM	0	76	27	103	0	0	0	0	23	72	0	95	50	0	20	70	268
05:15 PM	0	80	18	98	0	0	0	0	13	73	0	86	33	0	22	55	239
Total Volume	0	305	105	410	0	0	0	0	72	321	0	393	165	0	104	269	1072
% App. Total	0	74.4	25.6		0	0	0		18.3	81.7	0		61.3	0	38.7		
PHF	.000	.941	.820	.907	.000	.000	.000	.000	.783	.902	.000	.885	.825	.000	.743	.873	.921





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File Name : Rte3 at Rte 201
Site Code : 00000033
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Groups Printed- Unshifted

	Mary Ball Rd (Rte 3) From North				White Chapel Rd (Rte 201) From East				Mary Ball Rd (Rte 3) From South				Mary Ball Rd (Rte 3) From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
06:00 AM	1	13	1	0	0	1	0	0	1	11	2	0	1	1	4	0	0	36	36
06:15 AM	2	25	0	0	1	0	1	0	2	16	0	0	0	0	8	0	0	55	55
06:30 AM	0	33	1	0	3	1	2	0	8	19	0	0	0	2	22	0	0	91	91
06:45 AM	2	28	1	0	2	1	1	0	12	16	3	0	5	4	12	0	0	87	87
Total	5	99	3	0	6	3	4	0	23	62	5	0	6	7	46	0	0	269	269
07:00 AM	2	21	0	0	2	1	1	0	6	22	1	1	1	1	24	0	1	82	83
07:15 AM	1	38	0	0	1	5	0	0	9	19	3	0	1	2	19	0	0	98	98
07:30 AM	3	34	3	0	1	3	1	0	11	25	4	0	4	3	32	0	0	124	124
07:45 AM	7	38	1	1	3	1	4	0	10	22	0	1	4	2	29	0	2	121	123
Total	13	131	4	1	7	10	6	0	36	88	8	2	10	8	104	0	3	425	428
*** BREAK ***																			
04:30 PM	2	27	3	0	3	3	4	0	15	39	9	1	1	1	8	0	1	115	116
04:45 PM	4	27	4	0	4	5	2	1	22	40	3	0	1	3	8	0	1	123	124
Total	6	54	7	0	7	8	6	1	37	79	12	1	2	4	16	0	2	238	240
05:00 PM	1	33	5	0	2	1	4	0	36	38	10	0	0	1	17	0	0	148	148
05:15 PM	4	29	3	0	0	6	3	0	31	42	9	0	0	2	13	0	0	142	142
05:30 PM	0	22	2	0	4	4	0	0	29	31	8	0	1	2	15	0	0	118	118
05:45 PM	4	19	2	0	3	5	3	0	24	41	7	0	1	2	5	0	0	116	116
Total	9	103	12	0	9	16	10	0	120	152	34	0	2	7	50	0	0	524	524
06:00 PM	1	20	1	0	2	0	1	0	23	38	5	0	4	1	8	0	0	104	104
06:15 PM	4	20	1	0	6	1	4	0	16	24	4	0	1	2	14	0	0	97	97
Grand Total	38	427	28	1	37	38	31	1	255	443	68	3	25	29	238	0	5	1657	1662
Apprch %	7.7	86.6	5.7		34.9	35.8	29.2		33.3	57.8	8.9		8.6	9.9	81.5				
Total %	2.3	25.8	1.7		2.2	2.3	1.9		15.4	26.7	4.1		1.5	1.8	14.4		0.3	99.7	

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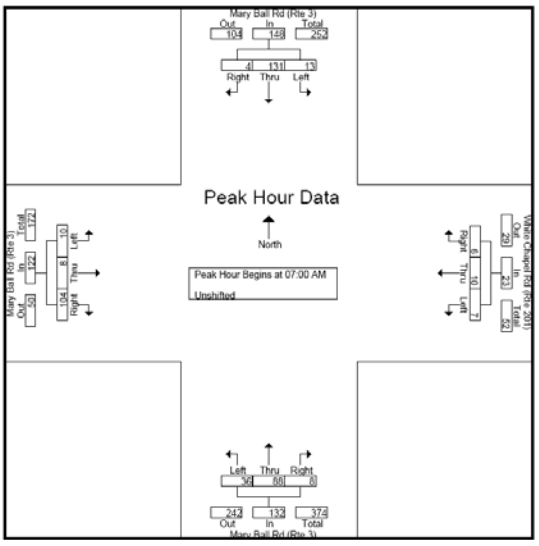
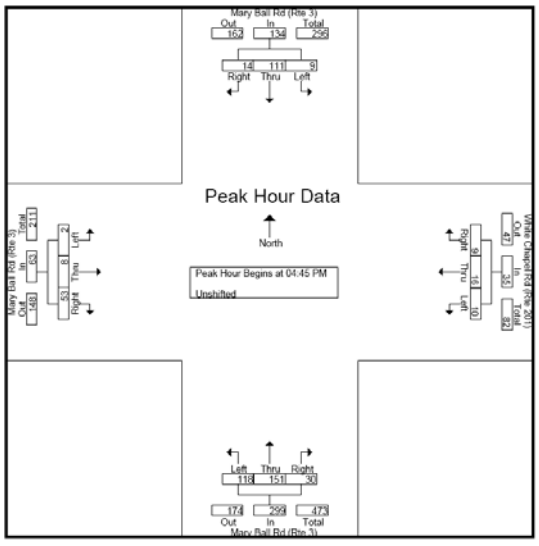
	Mary Ball Rd (Rte 3) From North				White Chapel Rd (Rte 201) From East				Mary Ball Rd (Rte 3) From South				Mary Ball Rd (Rte 3) From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	2	21	0	23	2	1	1	4	6	22	1	29	1	1	24	26	82
07:15 AM	1	38	0	39	1	5	0	6	9	19	3	31	1	2	19	22	98
07:30 AM	3	34	3	40	1	3	1	5	11	25	4	40	4	3	32	39	124
07:45 AM	7	38	1	46	3	1	4	8	10	22	0	32	4	2	29	35	121
Total Volume	13	131	4	148	7	10	6	23	36	88	8	132	10	8	104	122	425
% App. Total	8.8	88.5	2.7		30.4	43.5	26.1		27.3	66.7	6.1		8.2	6.6	85.2		
PHF	.464	.862	.333	.804	.583	.500	.375	.719	.818	.880	.500	.825	.625	.667	.813	.782	.857

	Mary Ball Rd (Rte 3) From North				White Chapel Rd (Rte 201) From East				Mary Ball Rd (Rte 3) From South				Mary Ball Rd (Rte 3) From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	4	27	4	35	4	5	2	11	22	40	3	65	1	3	8	12	123
05:00 PM	1	33	5	39	2	1	4	7	36	38	10	84	0	1	17	18	148
05:15 PM	4	29	3	36	0	6	3	9	31	42	9	82	0	2	13	15	142
05:30 PM	0	22	2	24	4	4	0	8	29	31	8	68	1	2	15	18	118
Total Volume	9	111	14	134	10	16	9	35	118	151	30	299	2	8	53	63	531
% App. Total	6.7	82.8	10.4		28.6	45.7	25.7		39.5	50.5	10		3.2	12.7	84.1		
PHF	.563	.841	.700	.859	.625	.667	.563	.795	.819	.899	.750	.890	.500	.667	.779	.875	.897





MCV Associates, Inc.
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File Name : rte 3 and rte 624
Site Code : 00000033
Start Date : 7/23/2008
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Groups Printed- Unshifted

	Greys Point Road (Route 3) From North				Syringa Road (Rte 624) From East				Greys Point Road (Route 3) From South				From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
06:00 AM	1	26	0	0	0	0	0	0	0	15	1	0	0	0	0	0	0	43	43
06:15 AM	0	15	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	27	27
06:30 AM	0	31	0	0	1	0	0	0	0	17	0	0	0	0	0	0	0	49	49
06:45 AM	0	24	0	0	1	0	0	0	0	28	1	0	0	0	0	0	0	54	54
Total	1	96	0	0	2	0	0	0	0	72	2	0	0	0	0	0	0	173	173
07:00 AM	0	13	0	0	1	0	0	0	0	24	1	0	0	0	0	0	0	39	39
07:15 AM	0	35	0	0	3	0	2	0	0	29	2	0	0	0	0	0	0	71	71
07:30 AM	0	32	0	0	3	0	0	0	0	54	3	0	0	0	0	0	0	92	92
07:45 AM	0	37	0	0	3	0	2	0	0	39	1	0	0	0	0	0	0	82	82
Total	0	117	0	0	10	0	4	0	0	146	7	0	0	0	0	0	0	284	284
*** BREAK ***																			
04:30 PM	6	52	0	0	3	0	3	0	0	40	2	0	0	0	0	0	0	106	106
04:45 PM	5	46	0	0	4	0	5	0	0	54	1	0	0	0	0	0	0	115	115
Total	11	98	0	0	7	0	8	0	0	94	3	0	0	0	0	0	0	221	221
05:00 PM	1	66	0	0	5	0	2	0	0	66	2	0	0	0	0	0	0	142	142
05:15 PM	3	61	0	0	2	0	3	0	0	48	2	0	0	0	0	0	0	119	119
05:30 PM	4	65	0	0	6	0	2	0	0	48	1	0	0	0	0	0	0	126	126
05:45 PM	4	38	0	0	1	0	2	0	0	43	5	0	0	0	0	0	0	93	93
Total	12	230	0	0	14	0	9	0	0	205	10	0	0	0	0	0	0	480	480
06:00 PM	3	24	0	0	3	0	1	0	0	34	5	0	0	0	0	0	0	70	70
06:15 PM	3	23	0	0	4	0	2	0	0	38	2	0	0	0	0	0	0	72	72
Grand Total	30	588	0	0	40	0	24	0	0	589	29	0	0	0	0	0	0	1300	1300
Apprch %	4.9	95.1	0		62.5	0	37.5		0	95.3	4.7		0	0	0				
										15.3	2.2		0	0	0		0	100	

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File Name : rte 3 and rte 624
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File Name : rte 3 and rte 624
Site Code : 00000033
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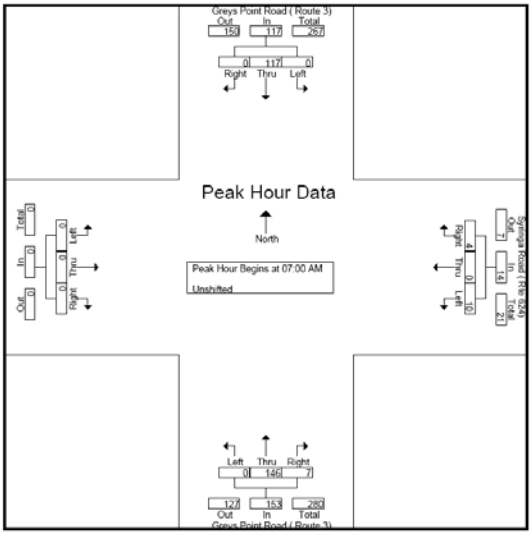
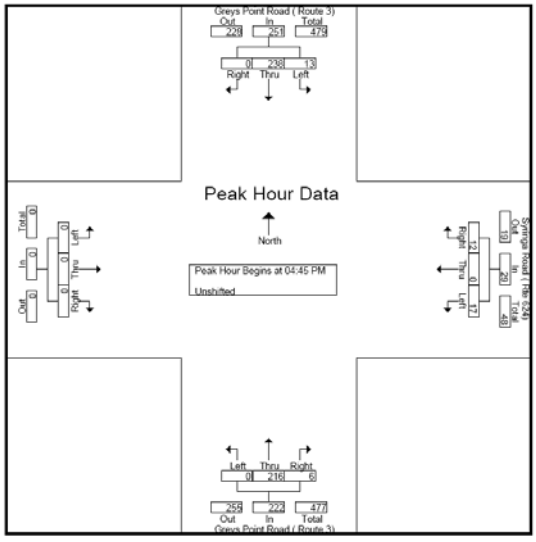
	Greys Point Road (Route 3) From North				Syringa Road (Rte 624) From East				Greys Point Road (Route 3) From South				From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	13	0	13	1	0	0	1	0	24	1	25	0	0	0	0	39
07:15 AM	0	35	0	35	3	0	2	5	0	29	2	31	0	0	0	0	71
07:30 AM	0	32	0	32	3	0	0	3	0	54	3	57	0	0	0	0	92
07:45 AM	0	37	0	37	3	0	2	5	0	39	1	40	0	0	0	0	82
Total Volume	0	117	0	117	10	0	4	14	0	146	7	153	0	0	0	0	284
% App. Total	0	100	0		71.4	0	28.6		0	95.4	4.6		0	0	0		
PHF	.000	.791	.000	.791	.833	.000	.500	.700	.000	.676	.583	.671	.000	.000	.000	.000	.772

	Greys Point Road (Route 3) From North				Syringa Road (Rte 624) From East				Greys Point Road (Route 3) From South				From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	5	46	0	51	4	0	5	9	0	54	1	55	0	0	0	0	115
05:00 PM	1	66	0	67	5	0	2	7	0	66	2	68	0	0	0	0	142
05:15 PM	3	61	0	64	2	0	3	5	0	48	2	50	0	0	0	0	119
05:30 PM	4	65	0	69	6	0	2	8	0	48	1	49	0	0	0	0	126
Total Volume	13	238	0	251	17	0	12	29	0	216	6	222	0	0	0	0	502
% App. Total	5.2	94.8	0		58.6	0	41.4		0	97.3	2.7		0	0	0		
PHF	.650	.902	.000	.909	.708	.000	.600	.806	.000	.818	.750	.816	.000	.000	.000	.000	.884





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703-914-4850

File Name : rte 200 at rte 222
Site Code : 00000055
Start Date : 7/29/2008
Page No : 1

Groups Printed- Unshifted

	Irvington Rd (Rte 200) From North				Wilson Ln (Rte 687) From East				Irvington Rd (Rte 200) From South				Weems Rd (Rte 222) From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
06:00 AM	0	9	1	0	0	0	1	0	0	4	0	0	16	0	0	0	0	31	31
06:15 AM	0	4	4	0	0	0	0	0	1	7	0	0	7	0	0	0	0	23	23
06:30 AM	3	15	6	0	0	0	0	0	0	8	0	0	14	0	0	0	0	46	46
06:45 AM	3	33	9	0	0	0	9	0	1	16	0	0	16	0	1	0	0	88	88
Total	6	61	20	0	0	0	10	0	2	35	0	0	53	0	1	0	0	188	188
07:00 AM	1	24	6	0	1	0	2	0	0	20	0	0	13	0	1	0	0	68	68
07:15 AM	1	30	13	0	0	0	2	0	0	14	0	0	22	0	1	0	0	83	83
07:30 AM	1	26	10	0	0	0	3	0	0	23	0	0	22	0	0	0	0	85	85
07:45 AM	2	31	8	0	0	0	2	0	1	42	0	0	20	0	0	0	0	106	106
Total	5	111	37	0	1	0	9	0	1	99	0	0	77	0	2	0	0	342	342
*** BREAK ***																			
04:30 PM	5	34	20	0	0	0	5	0	1	47	0	0	19	0	2	0	0	133	133
04:45 PM	5	27	22	0	0	0	3	0	0	41	0	0	10	0	3	0	0	111	111
Total	10	61	42	0	0	0	8	0	1	88	0	0	29	0	5	0	0	244	244
05:00 PM	4	37	27	0	1	0	3	0	4	43	0	0	17	0	2	0	0	138	138
05:15 PM	5	50	23	0	0	0	7	0	1	42	0	0	29	0	1	0	0	158	158
05:30 PM	4	26	28	0	0	0	4	0	4	42	0	0	15	0	1	0	0	124	124
05:45 PM	1	35	28	0	0	0	3	0	1	31	0	0	20	0	0	0	0	119	119
Total	14	148	106	0	1	0	17	0	10	158	0	0	81	0	4	0	0	539	539
06:00 PM	0	21	20	0	0	0	4	0	0	26	0	0	15	0	1	0	0	87	87
06:15 PM	0	24	21	0	0	0	1	0	0	18	0	0	13	0	1	0	0	78	78
Grand Total	35	426	246	0	2	0	49	0	14	424	0	0	268	0	14	0	0	1478	1478
Apprch %	5	60.3	34.8		3.9	0	96.1		3.2	96.8	0		95	0	5				
Total %	2.4	28.8	16.6		0.1	0	3.3		0.9	28.7	0		18.1	0	0.9		0	100	

MCV Associates, Inc.
4605-C Pinecrest Office Park Dr
Alexandria, VA 22312
703-914-4850

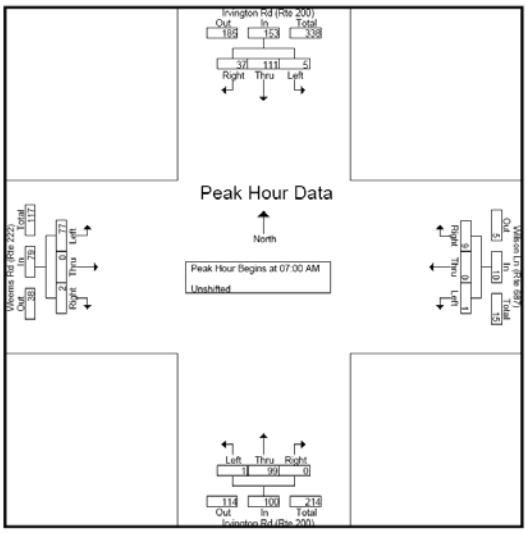
File Name : rte 200 at rte 222
Site Code : 00000055
Start Date : 7/29/2008
Page No : 2

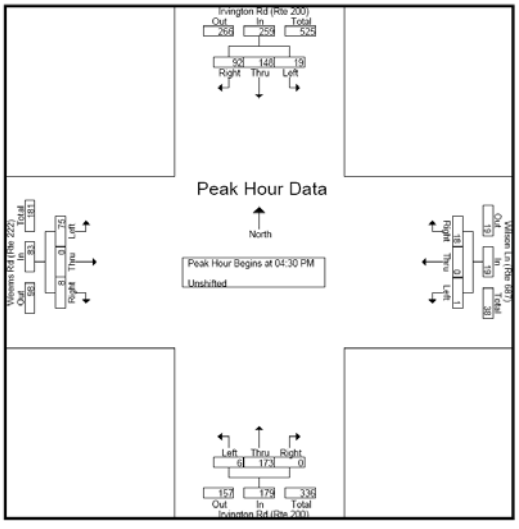
MCV Associates, Inc.
4605-C Pinecrest Office Park Dr
Alexandria, VA 22312
703-914-4850

File Name : rte 200 at rte 222
Site Code : 00000055
Start Date : 7/29/2008
Page No : 3

	Irvington Rd (Rte 200) From North				Wilson Ln (Rte 687) From East				Irvington Rd (Rte 200) From South				Weems Rd (Rte 222) From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	1	24	6	31	1	0	2	3	0	20	0	20	13	0	1	14	68
07:15 AM	1	30	13	44	0	0	2	2	0	14	0	14	22	0	1	23	83
07:30 AM	1	26	10	37	0	0	3	3	0	23	0	23	22	0	0	22	85
07:45 AM	2	31	8	41	0	0	2	2	1	42	0	43	20	0	0	20	106
Total Volume	5	111	37	153	1	0	9	10	1	99	0	100	77	0	2	79	342
% App. Total	3.3	72.5	24.2		10	0	90		1	99	0		97.5	0	2.5		
PHF	.625	.895	.712	.869	.250	.000	.750	.833	.250	.589	.000	.581	.875	.000	.500	.859	.807

	Irvington Rd (Rte 200) From North				Wilson Ln (Rte 687) From East				Irvington Rd (Rte 200) From South				Weems Rd (Rte 222) From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	5	34	20	59	0	0	5	5	1	47	0	48	19	0	2	21	133
04:45 PM	5	27	22	54	0	0	3	3	0	41	0	41	10	0	3	13	111
05:00 PM	4	37	27	68	1	0	3	4	4	43	0	47	17	0	2	19	138
05:15 PM	5	50	23	78	0	0	7	7	1	42	0	43	29	0	1	30	158
Total Volume	19	148	92	259	1	0	18	19	6	173	0	179	75	0	8	83	540
% App. Total	7.3	57.1	35.5		5.3	0	94.7		3.4	96.6	0		90.4	0	9.6		
PHF	.950	.740	.852	.830	.250	.000	.643	.679	.375	.920	.000	.932	.647	.000	.667	.692	.854





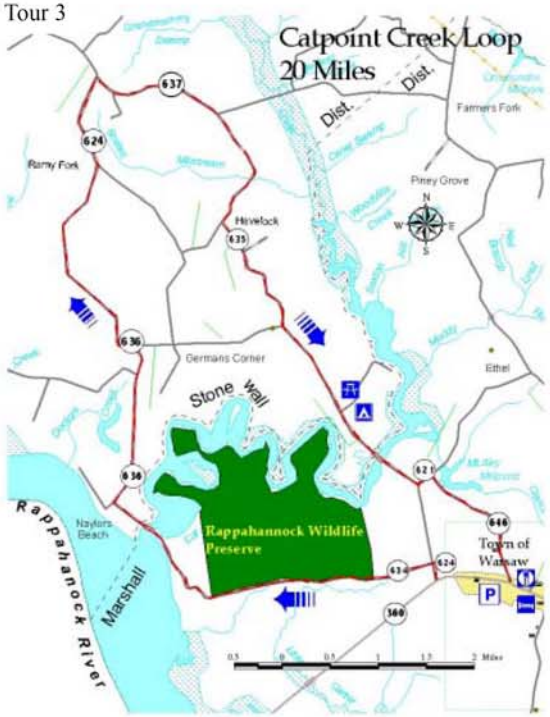
APPENDIX B: DETAILED LANCASTER COUNTY CRASH DATA FOR YEARS 2003 TO 2007

Route	Location	Total Crashes	Fatalities	Injuries	PDO	FO/OR	RE	SS/SD	Angle	Head on	Ped/Byc	MISC
	@ Rt 354	2			2	1			1			
	MP 105.8 to 108.6	11	2	2	7	2	1	1	2			5
	@ Rt 617	5		3	2		1	1	3			
	MP 109.5 to 110.7	10		2	8	4		2				4
	@ Rt 201	3		2	1		1		1			1
	MP 110.8 to 111.2	5		1	4		3		1			1
	@ Rt 620	3		2	1		2	1				
	MP 111.5 to 114.1	23	1	7	15	5	6	1	4			7
	@ Rt 604	19		11	8	2	9	1	4			3
	MP 114.3 to 115.9	21		6	15	5	7	1	2			6
	@ Rt 605	7		3	4	1	2		1			3
	MP 116.1 TO 116.8	8	1	2	5		3	1	1			3
	@ Rt 614	3		1	2	1			2			
	MP 117.2 to 118.4	15		2	13	4	2	2	1			6
	@ Rt 607	5		2	3		1		4			
	MP 118.7 to 119.3	13		5	8	3	1	3	1			5
	@ Rt 1043	3		1	2		1	2				
	@ Rt 688	3		2	1			1	1			1
	MP 119.6 to 120.1	17		6	11		4	3	10			
	@ Rt 1026	6		2	4		4		1			1
Rt 3	MP 120.2 to 120.3	5		1	4	1	3		1			
	@ Rt 1035	5		2	3		2		2			1
	@ Rt 1012	4			4		1		3			
	@ Rt 200 North	3			3			1	1			1
	@ Rt 608	6		2	4	1	1	1	2			1
	@ Rt 200 South	6			6			3	3			
	@ Rt 1005	4		3	1	1			1		1	1
	@ Rt 1006	4		1	3		2		2			
	@ Rt 1003	2			2		1	1				
	@ Rt 1004	5		2	3		4					1
	@ Rt 1010	3		1	2		2	1				
	MP 121.1 to 122.2	16		5	11	3	1	3	2			7
	@ Rt 759	3		3					3			
	MP 122.4 to 124.1	15		5	10	3	1	1	1			9
	@ Rt 646	6		3	3	1			2			3
	MP 124.4 to 125.1	12		3	9	4	2	1	2			3
	@ Rt 200 White Stone	7		2	5	1	1		5			
	@ Rt 735	3		2	1	1			1			1
	@ Rt 638	10		3	7	1	5	2	2			
	@ Rt 637	4		1	3	1			2			1
	MP 125.7 to 126.6	11	1	5	5	1	2	2		1		5
	MP 0.0 to 2.9	14		4	10	2	1	2	4	1		4
	@ Rt 646	8	1	5	2				7	1		
	MP 3.3 to 4.0	7		4	3	1	2	1				3
	@ Rt 222	7		2	5		2		4			1
	MP 4.2 to 4.3	4		1	3	1		1				2
	@ Rt 788	3		2	1		3					
	MP 5.0 to 5.5	8		3	5		1	3				4
Rt 200	@ Rt 688	12		5	7				12			
	MP 5.6 to 6.1	4		1	3	2			1			1
	@ Rt 1007	3			3				3			
	@ Rt 1026	5		1	4		1		4			
	@ Rt 3	4		1	3			3	1			
	MP 6.6 to7.1	9		1	8	1	4	1	2			1
	@ Rt 608	3		2	1		1		2			
	MP 7.2 to 9.1	15		6	9	1	3		4			7
	MP 0.0 to 3.0	13	1	6	6	4	2	1				6
Rt 201	@ Rt 3	4			4		1	3				
	MP 3.7 to 8.8	11		5	6	3			1		1	6
	MP 1.6 to 1.7	2		1	1	1						1
	@ Rt 632	3		1	2	3						
Rt 222	MP 1.9 to 3.3	8		3	5	3	1	1				3
	@ Rt 630	4		1	3				3			1
	MP 3.8 to 4.2	5		1	4		1	2	1			1
	MP 0.0 to 3.7	10		1	9	5			2			3
	@ Rt 764	3		2	1	1		1				1
Rt 354	MP 3.8 to 6.2	11	1	4	6	5		2				4
	@ Rt 624	6		3	3	2		2	1			1
	MP 6.8 to 13.5	17	1	6	10	8			2			7
Rt 624	MP 1.0 to 2.2	4		3	1	4						
Rt 695	MP 0.0 to 6.0	20		8	12	8	2	3	1			6

APPENDIX C: BICYCLE TOURS

You begin in the town of Warsaw, where in 1823, the citizens of Richmond Courthouse renamed their town in support of Poland's struggle for independence. Ride carefully on 360, as it is a main thoroughfare to the Northern Neck. From the moment you leave 360, the lure of the River will beckon. With the Tayloe Unit of the Rappahannock River Valley National Wildlife Refuge to the North and the river facing, your immersion into an unchanged landscape will begin. While crossing the Cat Point Creek bridge, you may wish to stop and admire the beauty of the Rappahannock. It is at this point, in years gone by, sailing ships would "cat " (to hang away from the ship for immediate deployment) their anchors in order to proceed around the bends upstream, hence the name of the creek. During the winter, the marsh acts as a major resting ground for migratory wildfowl. In the summer you will, no doubt, hear the piercing shrieks of the now abundant osprey, which make their living feeding upon the fish of the river. With a little luck, you may also witness one of the nesting bald eagles that call the refuge home. As you continue, follow the marked trail on the map, through hardwood and pine forests, fields of winter wheat, corn, soybeans and sorghum. The rhythm is timeless, and you will not wish to return home. Should that prove to be the case, stop by Heritage Park Resort for the night. They normally have ample campsites or small cabins at a reasonable fee.

Tour 3



Published by the Northern Neck Planning District Commission with financial assistance provided by the Virginia Department of Transportation. .

Bicycle Heritage Tour of The Northern Neck

Traveling a Timeless Land

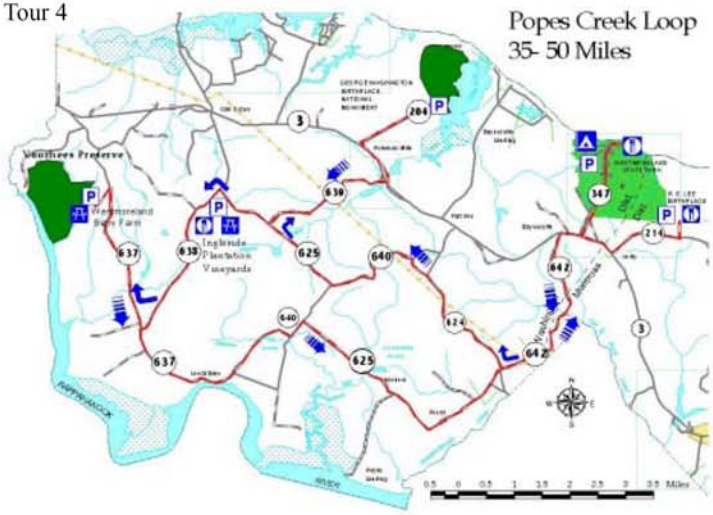
Come ride with us through this splendid land ...by fishing villages and groves of ancient trees, uncluttered highways and fields that have been farmed for centuries. We're slower down here and we like it that way. You will too.

Within this brochure are four relatively easy bicycle trails which best represent the essence of the Northern Neck. Our natural areas, strong ties to the water, picturesque farms, and of course, our history…..which is your history as well.

These tours highlight the rich history of the region, from the time John Smith set foot upon our shore through the troubling times of our Nation's birth to the present. While the area's historic sites, natural areas and communities help us to understand the past, they are also a vital part of our future. For more information contact:

Northern Neck Tourism Council
800-393-6180
nntc@northernneck.org
http://www.northernneck.org

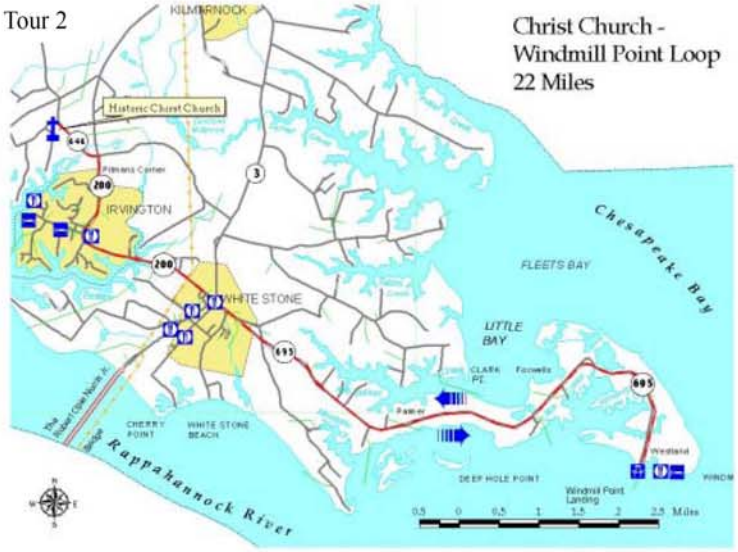
Tour 4



Begin at our first Presidents Birthplace, one of the finest National Parks in the system. The plantation at Popes Creek is managed as colonial living farm and maintains livestock and cultivation techniques reflective of the colonial era. From the birthplace you pedal the tree-covered passages towards the Rappahannock River, turn left on 638 and follow the signs to Ingleside Plantation Vineyard. If you are so inclined, take the tour offered, if not, continue onward to Westmoreland Berry Farm. From the hill of the farm take a break, look across the berry bushes to the Rappahannock. Pressing on, you will ride past the Leedstown landing, where two years prior to the Declaration of Independence, the residents passed the Leedstown Resolves as a result of His Majesty's high taxation. Later this spot become an important steamboat landing. Continue to Westmoreland State Park, and camp for the night, or over to General Robert E Lee's birthplace, Stratford. Here you can gaze across the Potomac River to St. Mary's County, Maryland, eat a hearty lunch at the restaurant and walk the remarkably preserved grounds. From this home came the only brothers, Richard Henry Lee and Francis Lightfoot Lee, to have signed the Declaration of Independence. Your return trip will take you through undulating fields and stately forests, where little has changed through the years.

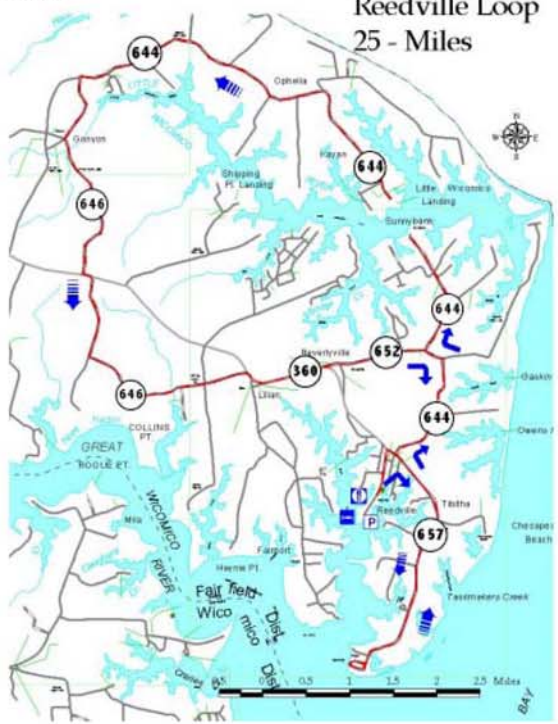
Begin at Christ Church where the docents are eager to guide you through the church and around the grounds. Completed in 1735, Christ Church is a shining example of the construction techniques and architecture of its time. From the church it is a short ride to the town of Irvington, which is framed by the northern and eastern branches of Carters Creek. While in town you can observe the progress of the pilothouse restoration for the steamboat Potomac (The only known pilothouse from that bygone era). The town is host to several shops, a bed and breakfast, a newly opened restaurant and the renowned Tides Inn. A farmers market takes place every other weekend throughout the summer and fall. Following route 200 you will soon find yourself in White Stone, where if your nose is working, you can search out the freshly baked bread from the corner market. If in the mood, you can walk down the sidewalk and buy some cheese and wine for a picnic at Windmill Point. Riding east on 695 you will catch glimpses of both the Rappahannock River and Antipoison Creek (Reputedly named by Capt John Smith while recovering from a nasty encounter with a stingray) As you pass through Palmer and Foxwells, consider that the fishermen from these villages have traditionally caught the bait fish for crab pots from their pound nets. An example of a pound net can be observed from Windmill Point. Arriving at Fleets Island and Westland, you can gaze across the river or out to the Bay, but don't expect to see the Eastern Shore, for it is twenty five miles across. After a rest, you may cycle back to Christ Church.

Tour 2



Begin in the town of Reedville, where many of the stately homes built by menhaden steamer captains stand watch along Main Street. Be sure to visit the Fisherman's Museum while you are here, in order to better appreciate the relationship between the bay and the Menhaden Industry. Also in town is a working marine railway, where, on any given day in the spring, you might observe work done to many of the traditional craft used to harvest the resources of the Chesapeake Bay. Heading out of town, you periodically catch a glimpse of the Bay through the fields, and, due to the proximity of Smith Point Light, might see a ship passing close by as it heads from Baltimore to the Virginia Capes, at the mouth of the Bay. Now you are heading to the village of Fleeton. During the summer months you will better appreciate the heavy scent in the air if you have visited the Fisherman's Museum (some have called it the smell of money). Once to Fleeton make a U turn and retrace you path, turning right at 644. Continue until lands end, where you will encounter the Sunnybank ferry, one of two free ferries operated by VDOT on the Northern Neck. Be advised, however, the ferry does not operate on Sundays. Once across, follow the highlighted map through the fields and forests as you skirt the Little Wicomico River on you way back to Reedville.

Tour 1



APPENDIX D: LINKING PLANNING AND NEPA MATRIX

January 7th, 2009

Project Description	**Route**	Route 3, Route 200, other minor routes
	Project Description	Analyze anticipated traffic growth in southern Lancaster County. Identify capacity and safety improvements.
	From	Within Lancaster County and extending into Middlesex County (Route 3) and Northumberland County (Route 200)
	To	
	Proposed Typical Section	Not yet determined
	Length (miles)	21 miles along Route 3 10 miles along Route 200
	Cost	Preliminary cost estimate of $8,678k without the replacement/widening of the Norris Bridge ($158,678k with the replacement/widening of the Norris Bridge)
Purpose	**Summary of Project Purpose**	Improve intersections and highway segments to level of service to C or better, address geometric deficiencies, add capacity where required, improve safety along highway segments.
Needs	**Existing LOS / show base year**	2008 AM Peak Hour LOS D (or better) 2008 PM Peak Hour LOS E (or better)
	Forecasted LOS - Build and No build / show years	2030 Build with Mitigation AM Peak Hour LOS C (or better) 2030 Build with Mitigation PM Peak Hour LOS C (or better)
	Existing year AADT	Route 3 – ranges from 7,200 to 8,800 within study area (2008) Route 200 – ranges from 6,800 to 7,100 within study area (2008)
	Future Year AADT	Route 3 – ranges from 14,400 to 15,900 within the study area (2030) Route 200 – ranges from 13,400 to 26,400 within the study area (2030)
	Existing Volume to Capacity Ratio	Varies depending on location and peak hour. For signalized intersections it ranges from 0.34 to 0.73 in the AM peak hour and 0.39 to 0.64 in the PM peak hour
	Capacity (C), Roadway (R) or Safety Deficiency (S), Route Continuity (RC), Transportation Demand (TD), Modal Connectivity (MC)	C, R, S, TD
Environmental Issues	**Environmental Concerns**	Wetlands, Streams, Agricultural Lands, Cultural Resources
Alternatives	**Alternatives Considered**	Various alternatives were considered including adding additional travel lanes, widening for turn lanes at intersections, and signalizing Route 200/Route 222. Safety improvements along the corridor were also considered.
History	**Project History**	Corridor was studied as part of the Route 3 Corridor Study (1988)

APPENDIX E: BACKGROUND (NO-BUILD) & BUILD TRAFFIC AND DISTRIBUTIONS

Using the developments as listed in **Table 2** and shown in **Figure 2**, the developments have been arranged and distributed to the network in the following groups based on geography.

Group 1:

2	Overlook on W. Br. Corrotoman River
5	Western Branch Preserve on W. Br. Corrotoman River
17	Courthouse Landing on Western Branch

AM Enter	AM Exit	PM Enter	PM Exit
12	37	42	25

Group2:

4	High Banks on Rappahannock River
21	Bridge Point Subdivision on Rappahannock River
24	The village on Carters Creek

AM Enter	AM Exit	PM Enter	PM Exit
5	16	18	11

Group 3:

10	Windmill Point Resort Condos on Chesapeake Bay
11	Waterman's Wharf on Antipoisin Creek
18	River Village on Rappahannock River
19	Stonegate on Misquito Creek

AM Enter	AM Exit	PM Enter	PM Exit
22	81	76	46

Group 4

3	Hills Quarter on King Carter Golf Course
15	Covewoods on E. Br. Corrotoman River
27	Crossroads at the Chesapeake
28	"Kilmarnock Glen" – Northern Neck LLC – School St.
30	"Springwood" – Our Northern Neck LLC – Black Stump Rd.
35	Kings Gate development (90%)

AM Enter	AM Exit	PM Enter	PM Exit
254	761	797	502

Group 5

1	Golden Eagle Condominium Development
8	Tides Lodge Condos
12	Glenwood Development on Carter Creek
23	Riverie Development on Carters Creek
25	Irvington Farms Development
34	Residential development @ Irvington

AM Enter	AM Exit	PM Enter	PM Exit
83	255	235	164

Group 6

6	Chase's Farm on Duton's Pond
14	The Harbour on Indian Creek
22	Millburn Subdivision off Rt 3
26	Grace Hill Estates
29	"Seastar LLC" – Chase Rd.
32	"Tartan Village II" – South Main St.
33	Commercial development @ White Stone (9,000 sf)

AM Enter	AM Exit	PM Enter	PM Exit
54	148	171	113

Group 7

9	The Tartan/Highlands Development on Tartan
13	Taylor Creek Park on Taylor Creek
35	Kings Gate development (10%)

AM Enter	AM Exit	PM Enter	PM Exit
31	93	105	61

Group 8

7	Chinn's Mill Wood on Chinns Mill Pond
16	Sloop Pointe on Rappahannock River

AM Enter	AM Exit	PM Enter	PM Exit
15	46	52	31

Group 9

20	Whitehall Farms Subdivision on Rappahannock River

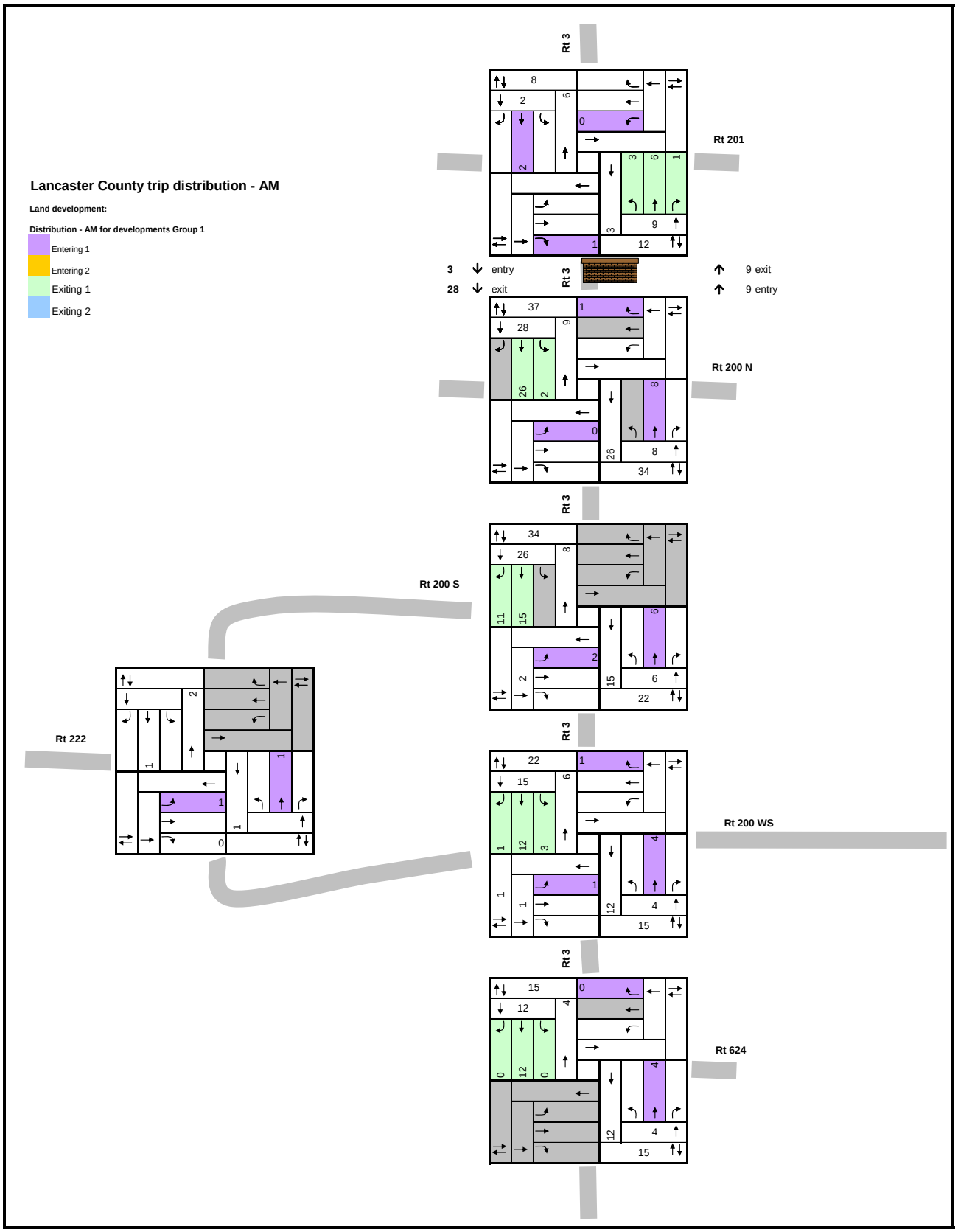
AM Enter	AM Exit	PM Enter	PM Exit
2	6	6	4

Group 10

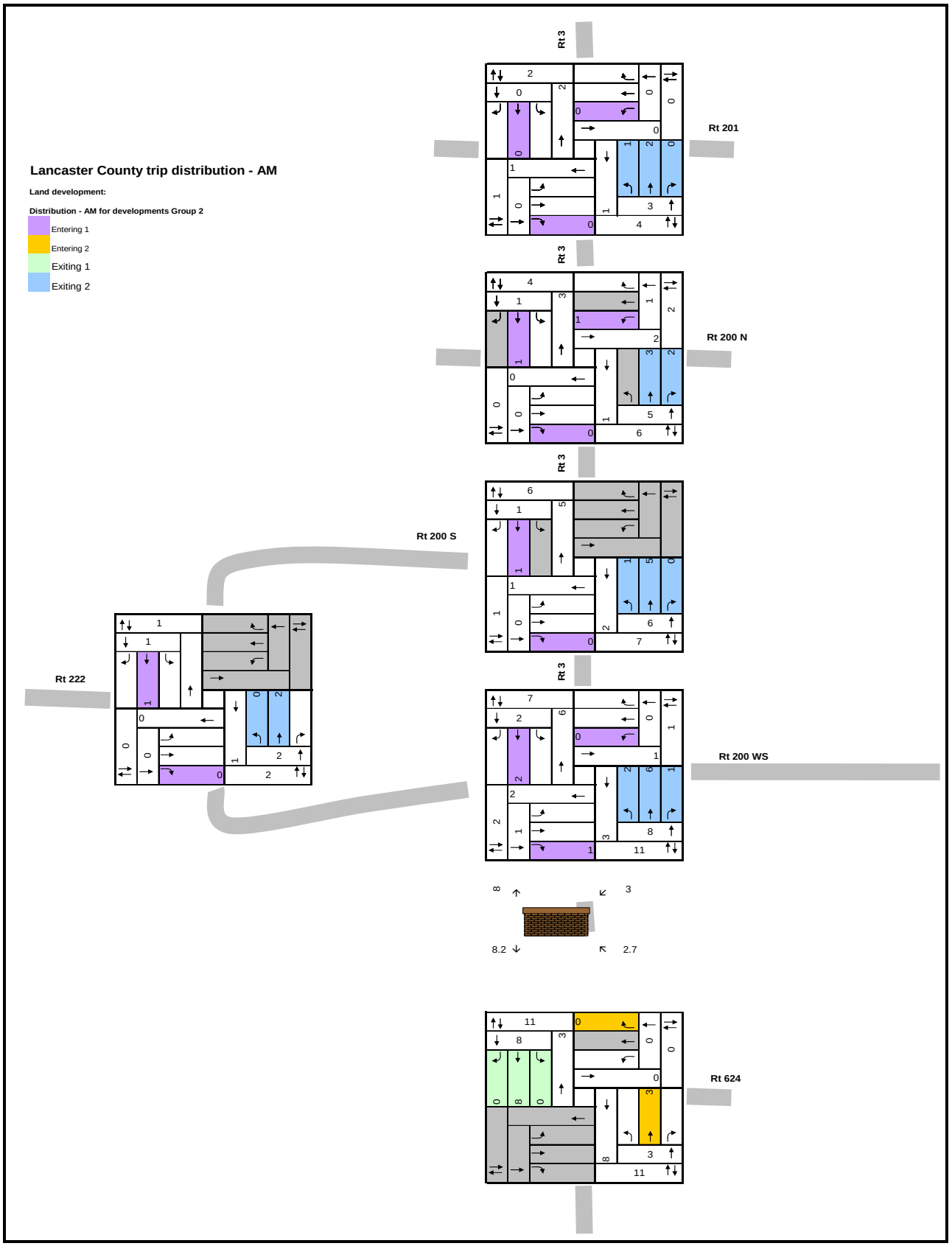
31	"Rolling Hills" – East Church St.

AM Enter	AM Exit	PM Enter	PM Exit
4	11	13	7

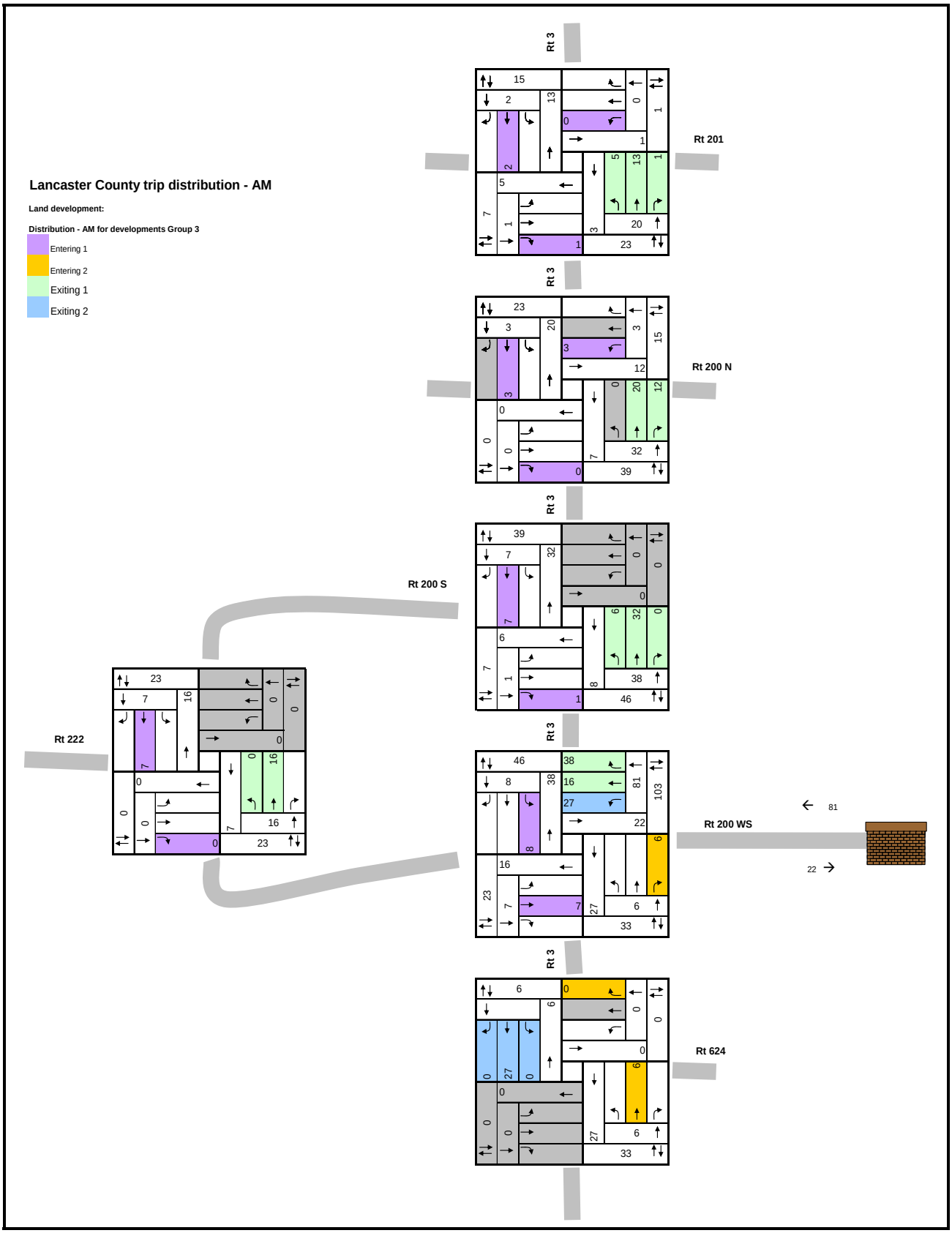
Trip distribution and assignment - Group 1 - AM



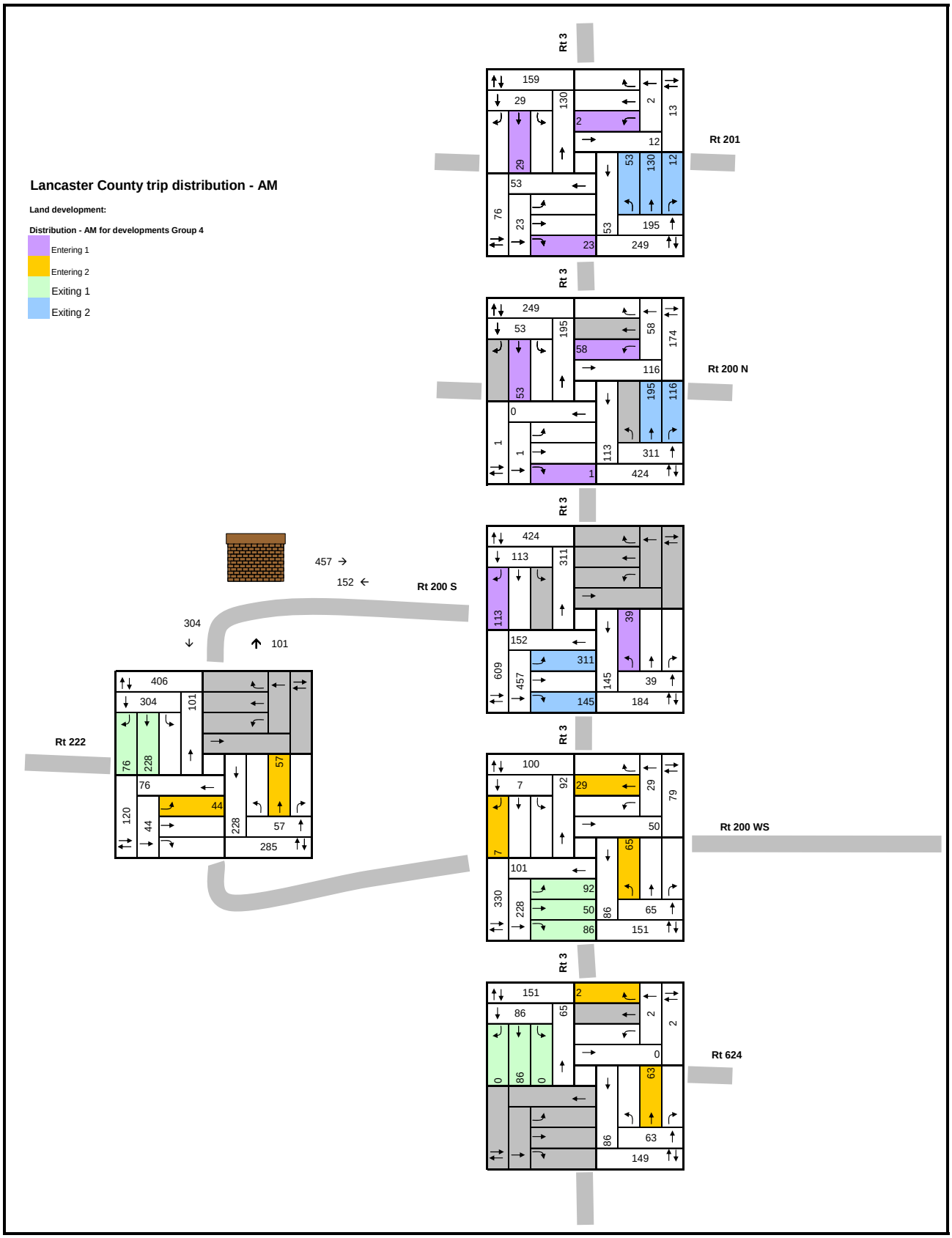
Trip distribution and assignment - Group 2 - AM



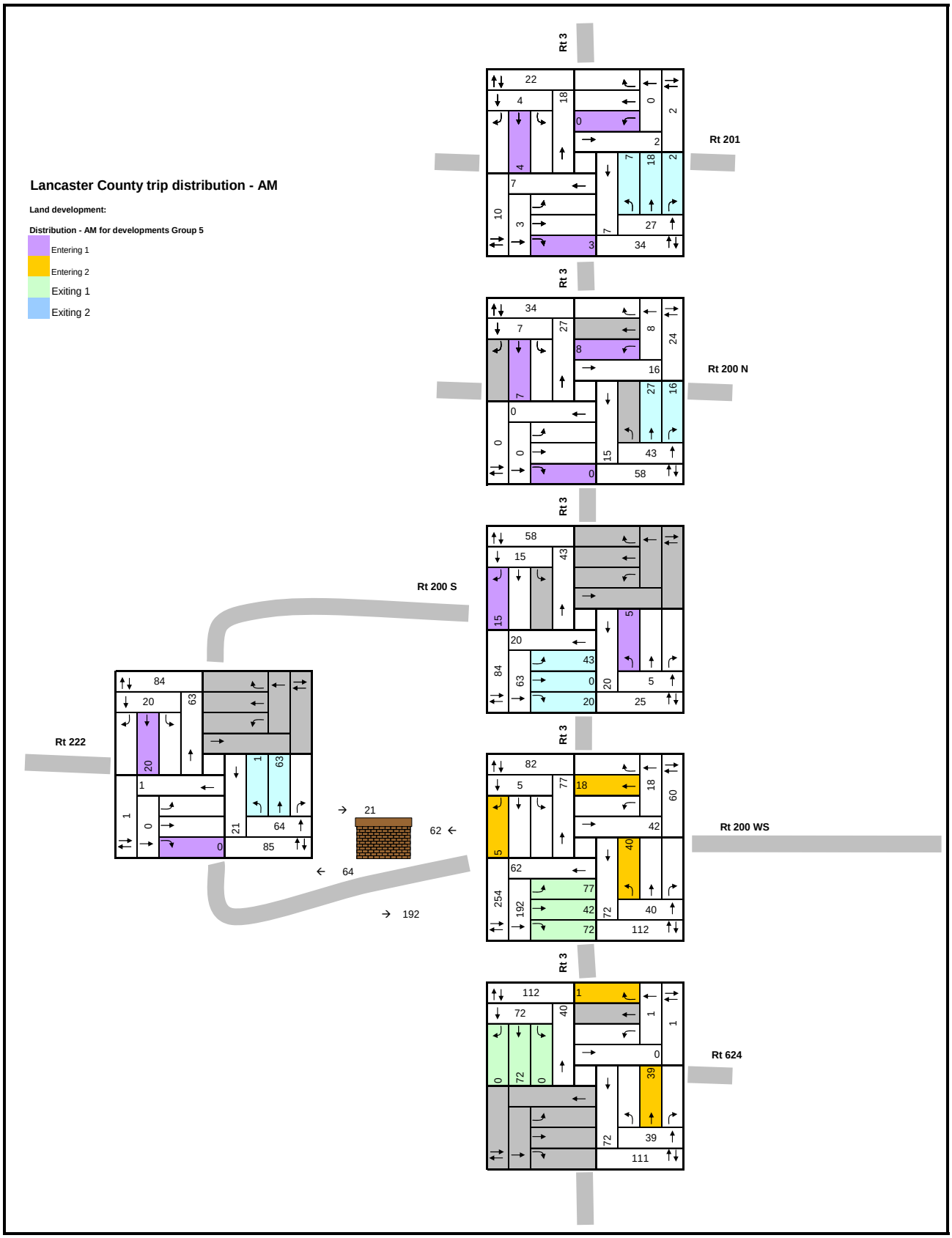
Trip distribution and assignment - Group 3 - AM



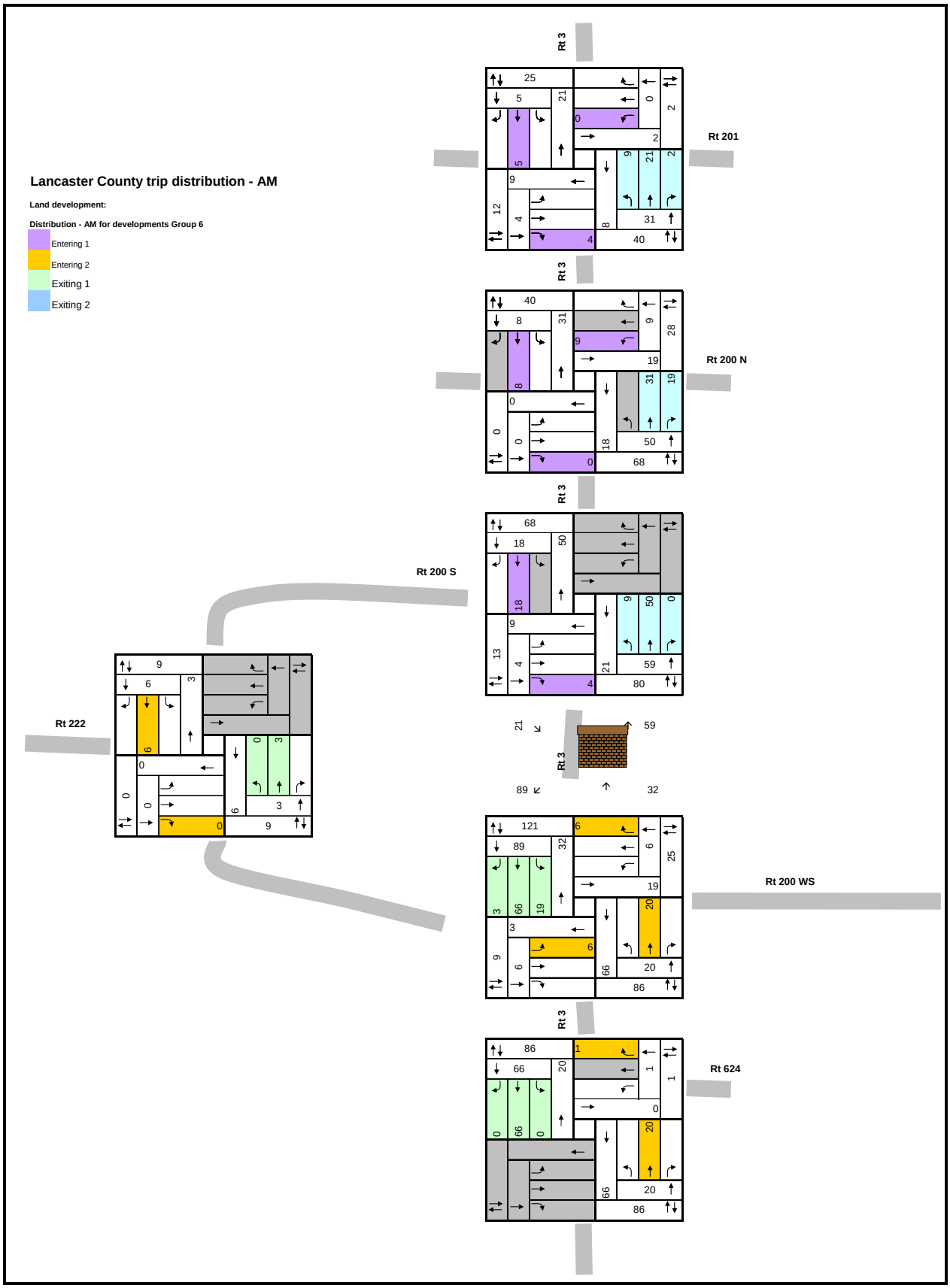
Trip distribution and assignment - Group 4 - AM



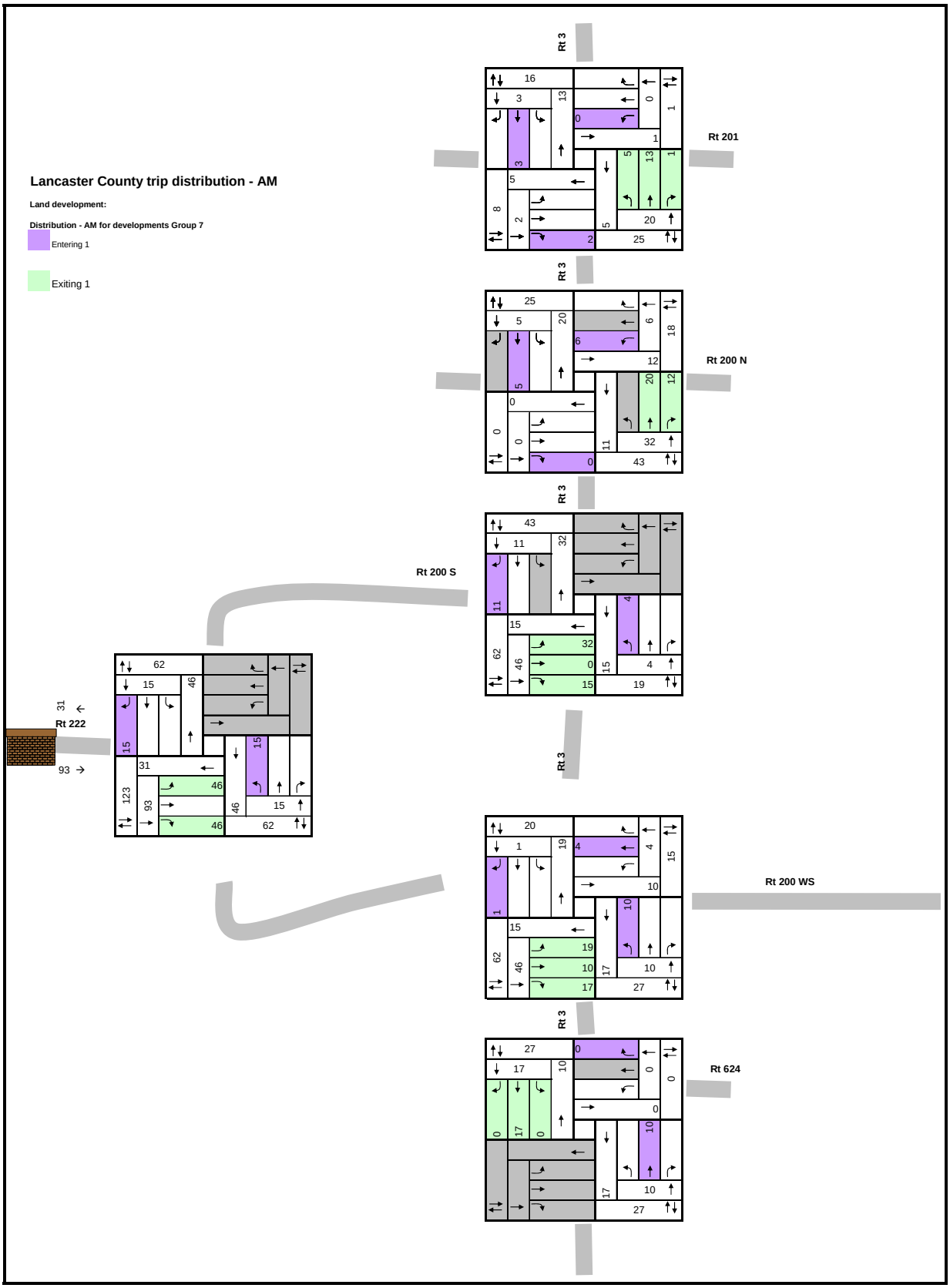
Trip distribution and assignment - Group 5 - AM



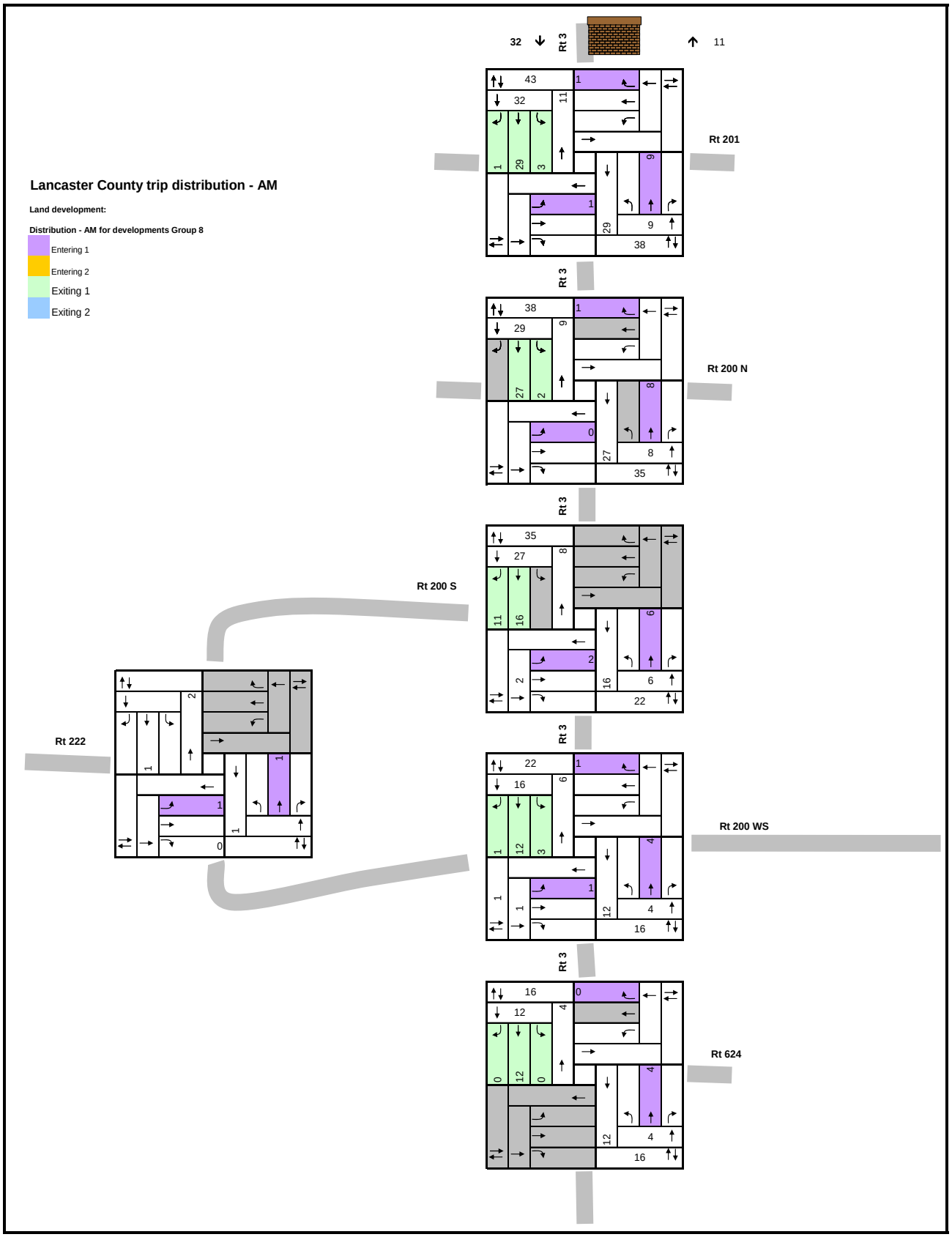
Trip distribution and assignment - Group 6 - AM



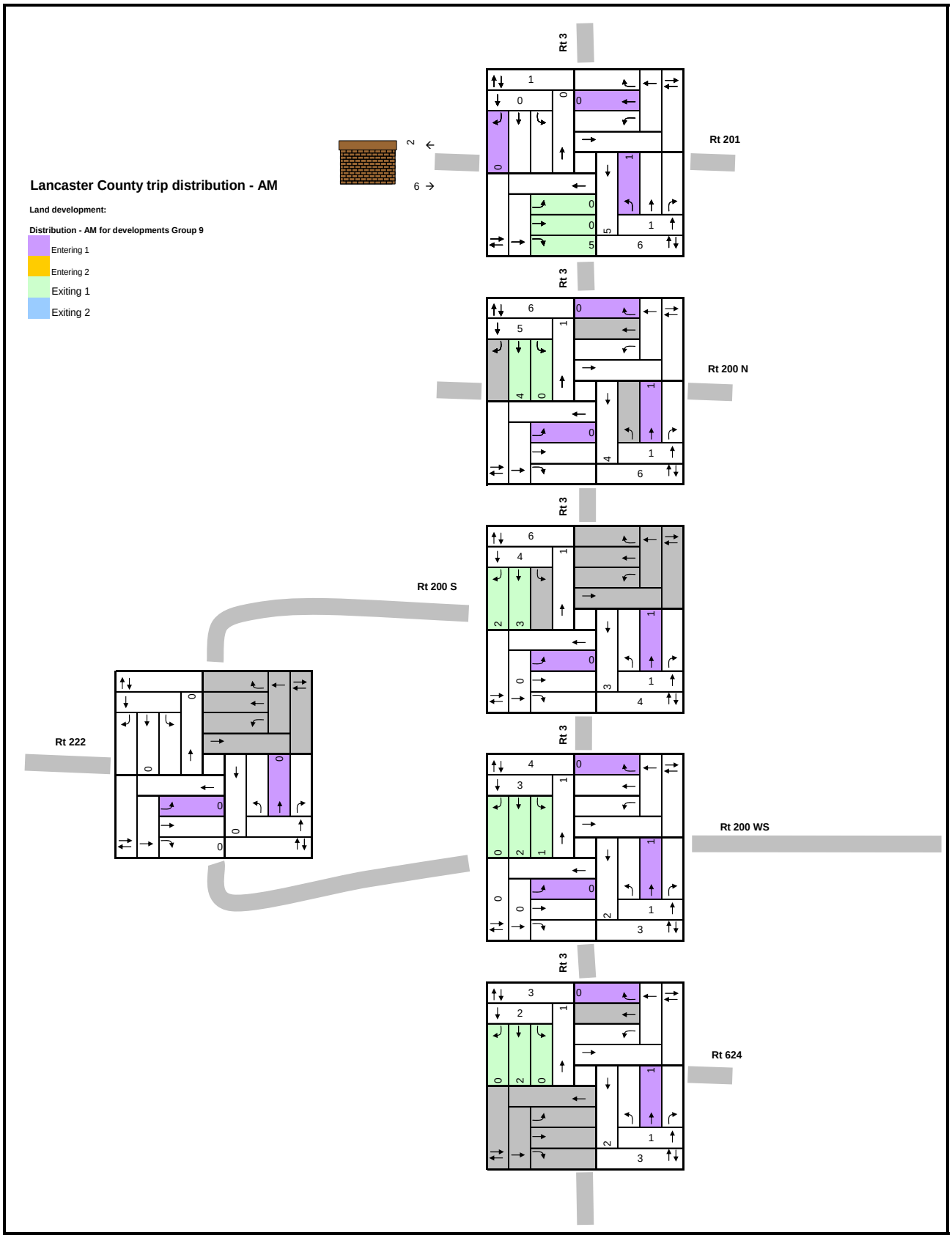
Trip distribution and assignment - Group 7 - AM



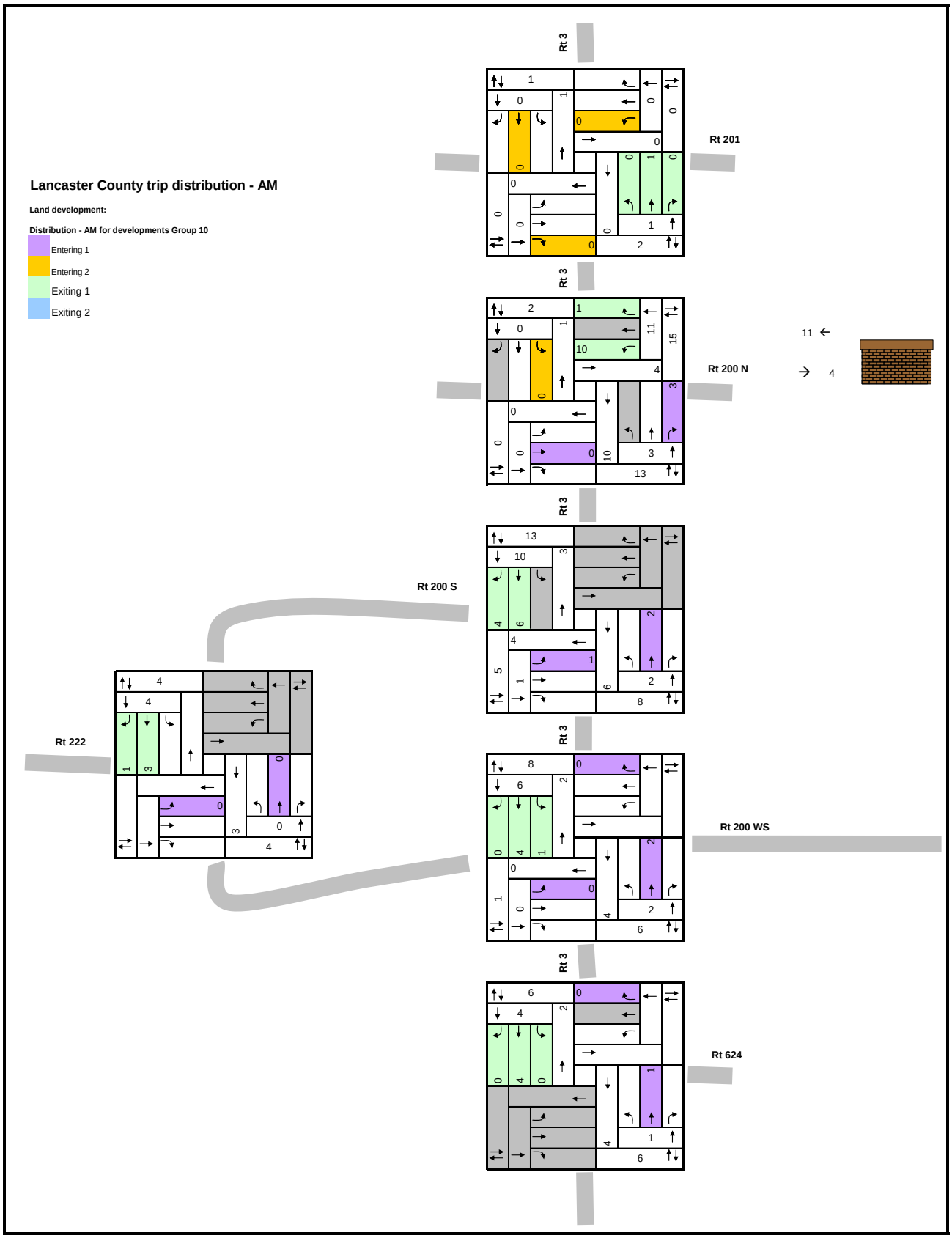
Trip distribution and assignment - Group 8 - AM



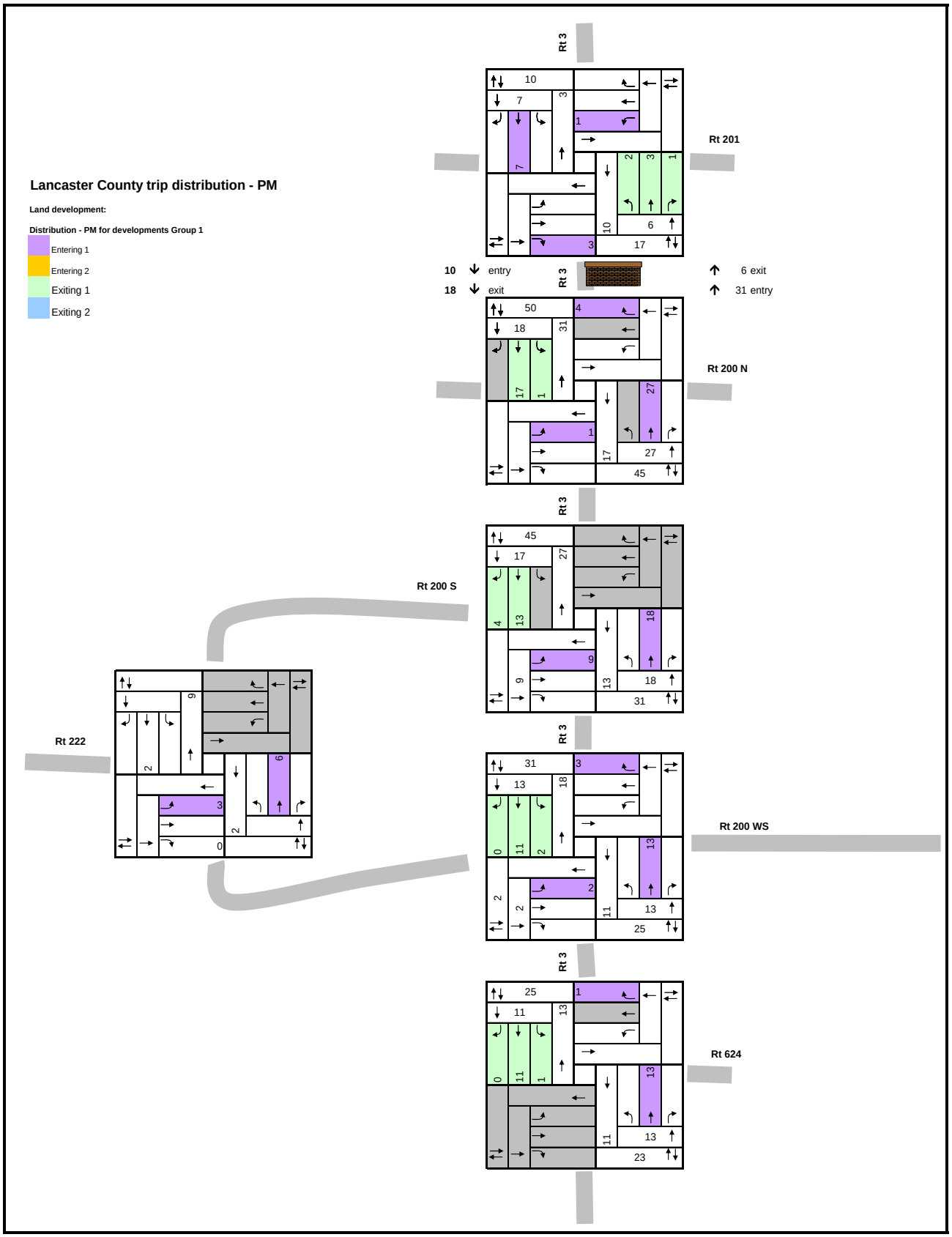
Trip distribution and assignment - Group 9 - AM



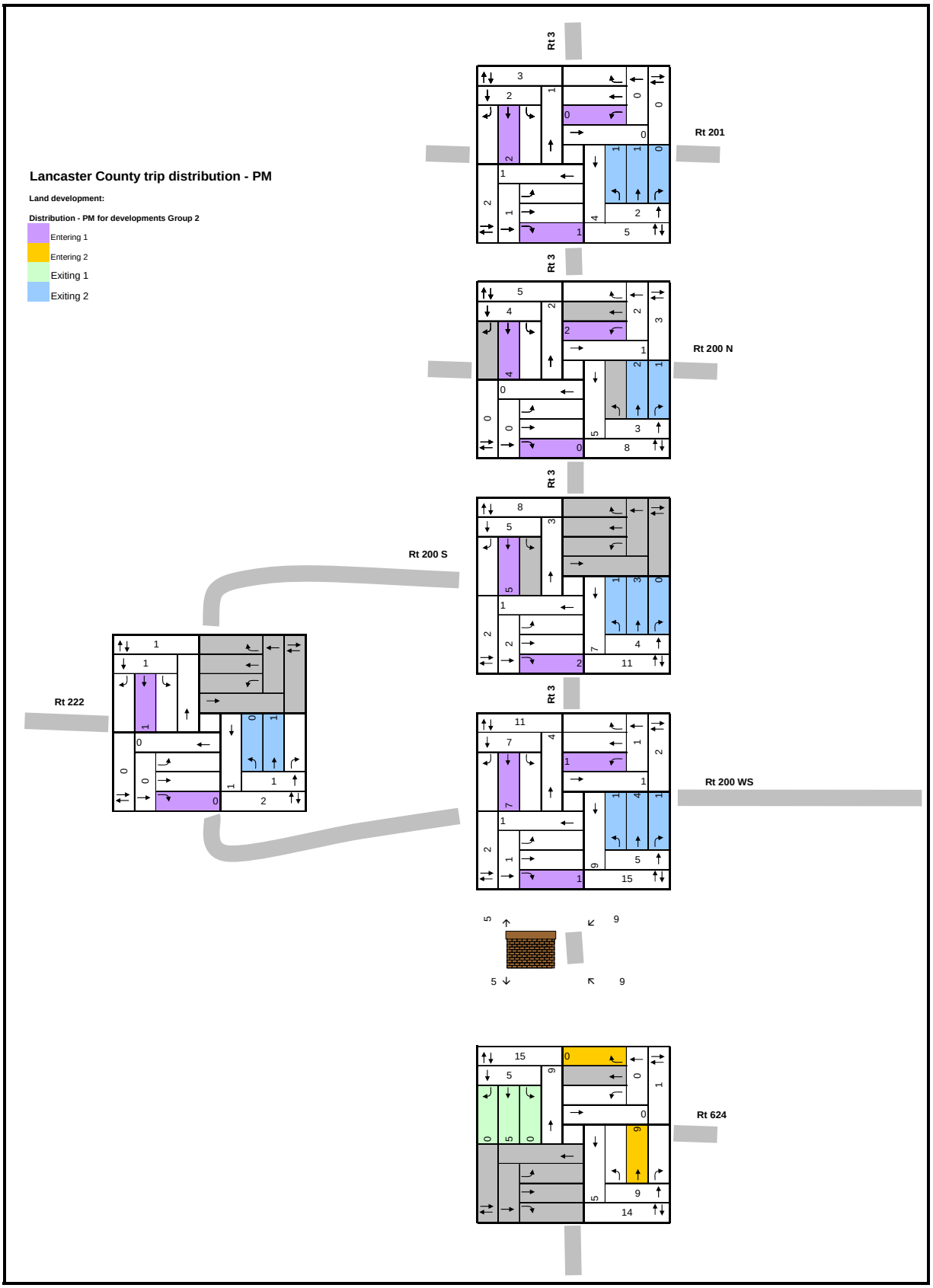
Trip distribution and assignment - Group 10 - AM



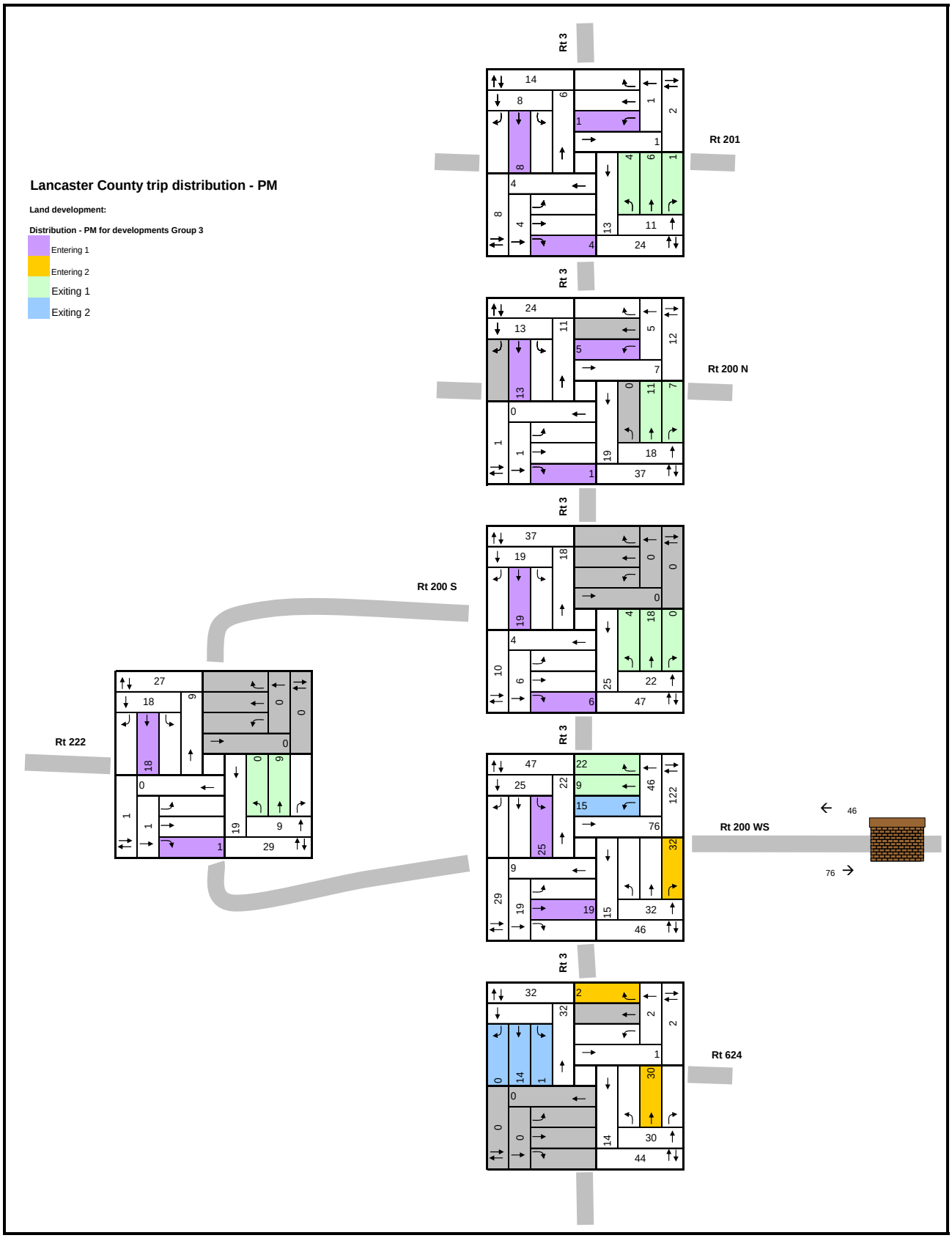
Trip distribution and assignment - Group 1 - PM



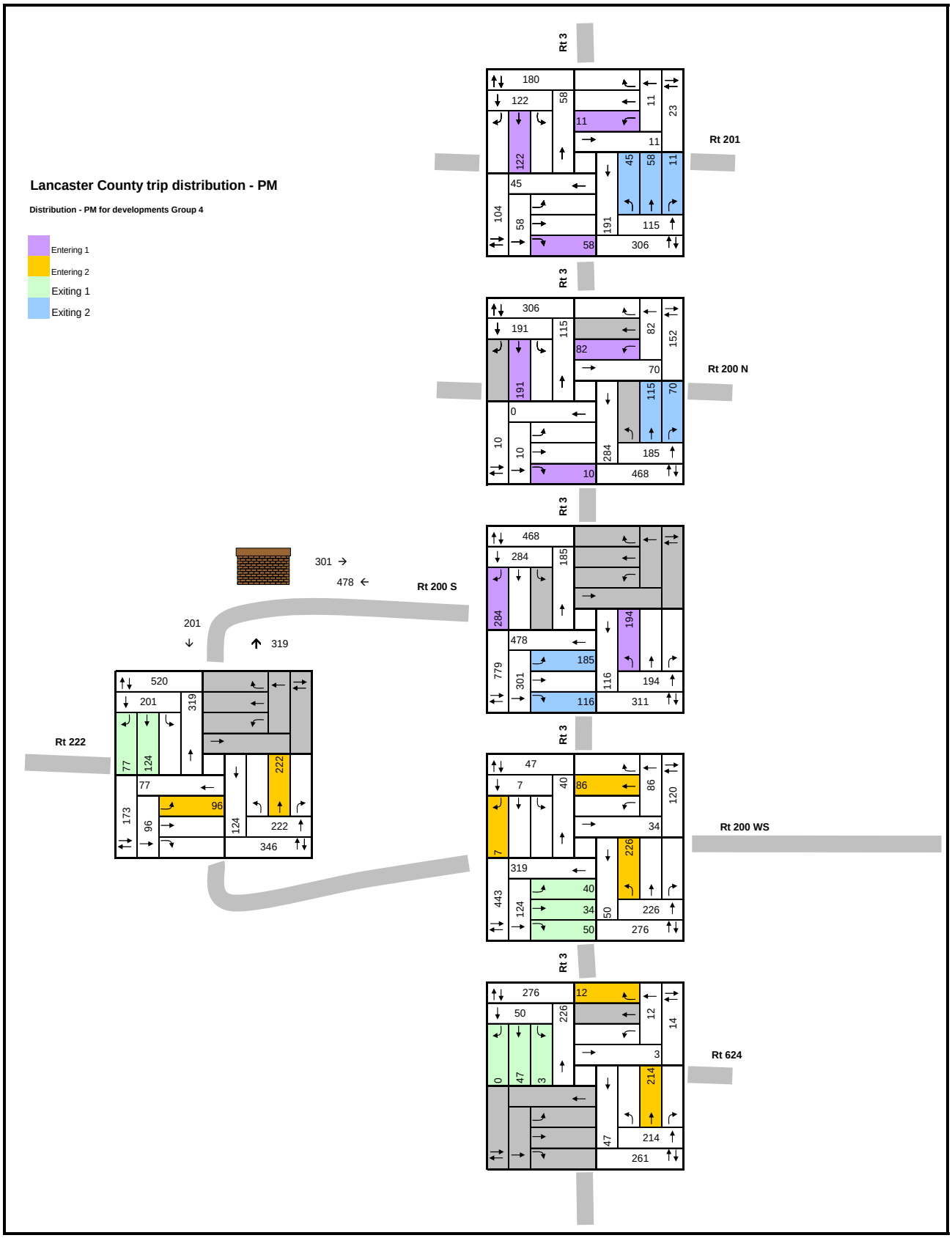
Trip distribution and assignment - Group 2 - PM



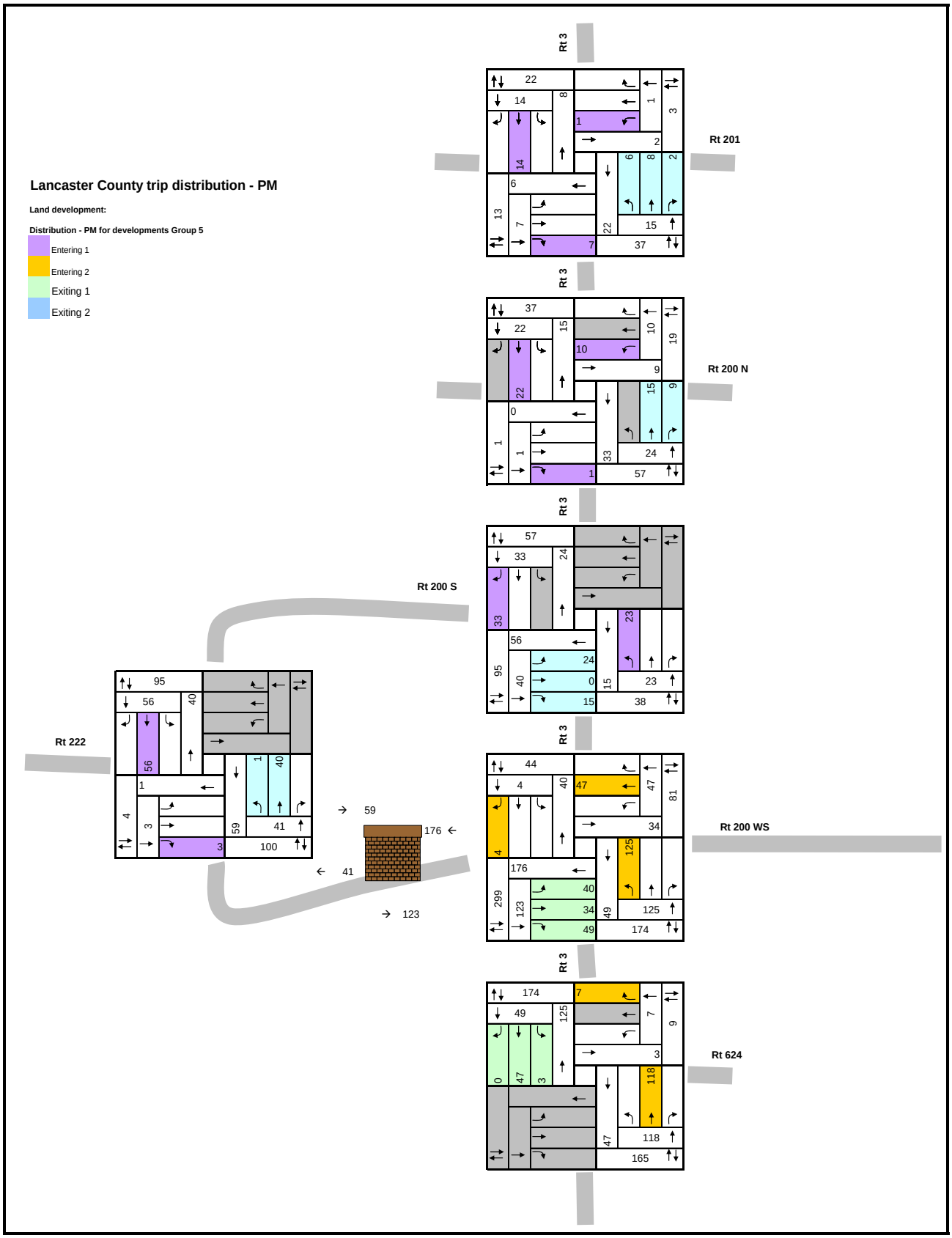
Trip distribution and assignment - Group 3 - PM



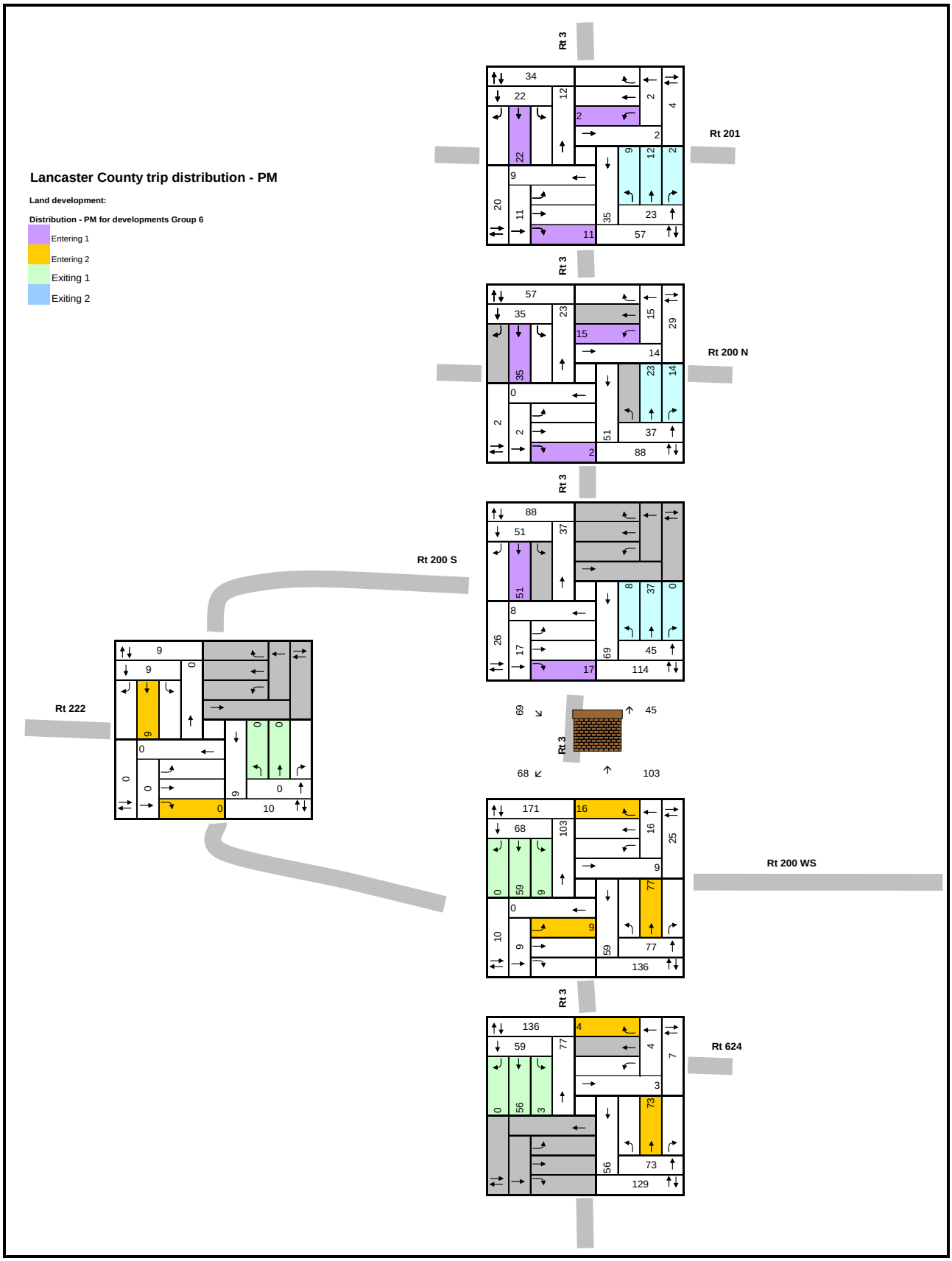
Trip distribution and assignment - Group 4 - PM



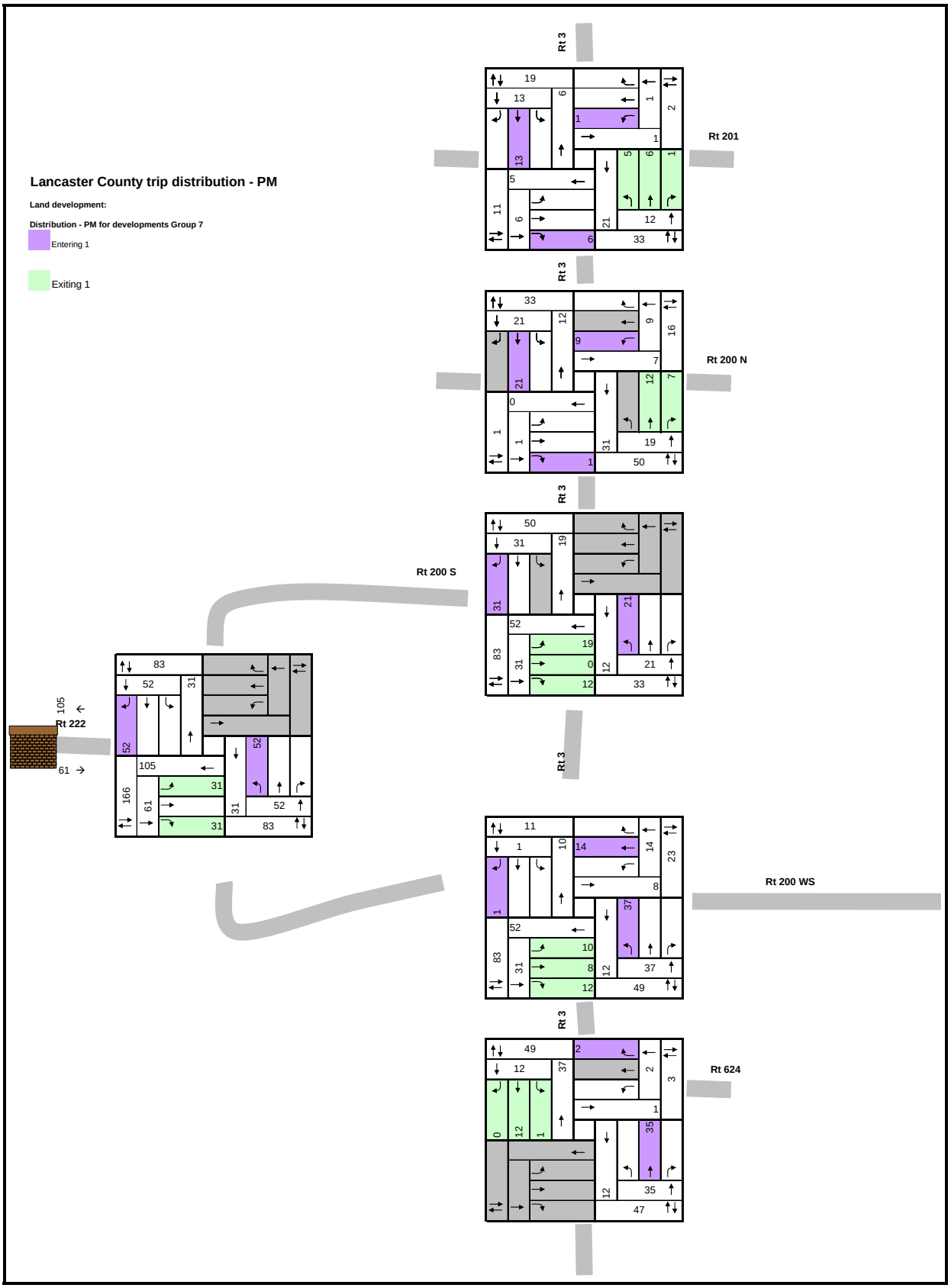
Trip distribution and assignment - Group 5 - PM



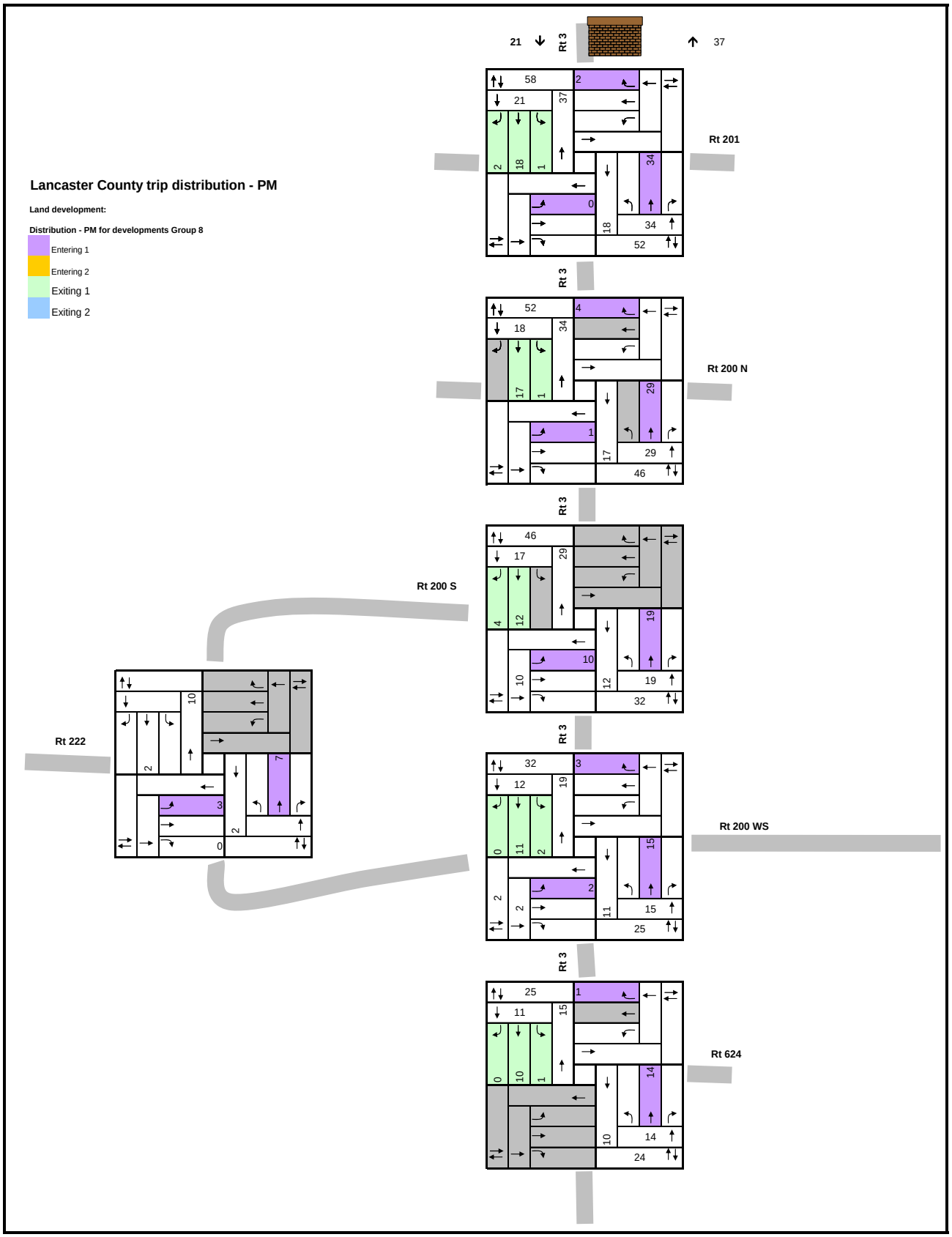
Trip distribution and assignment - Group 6 - PM



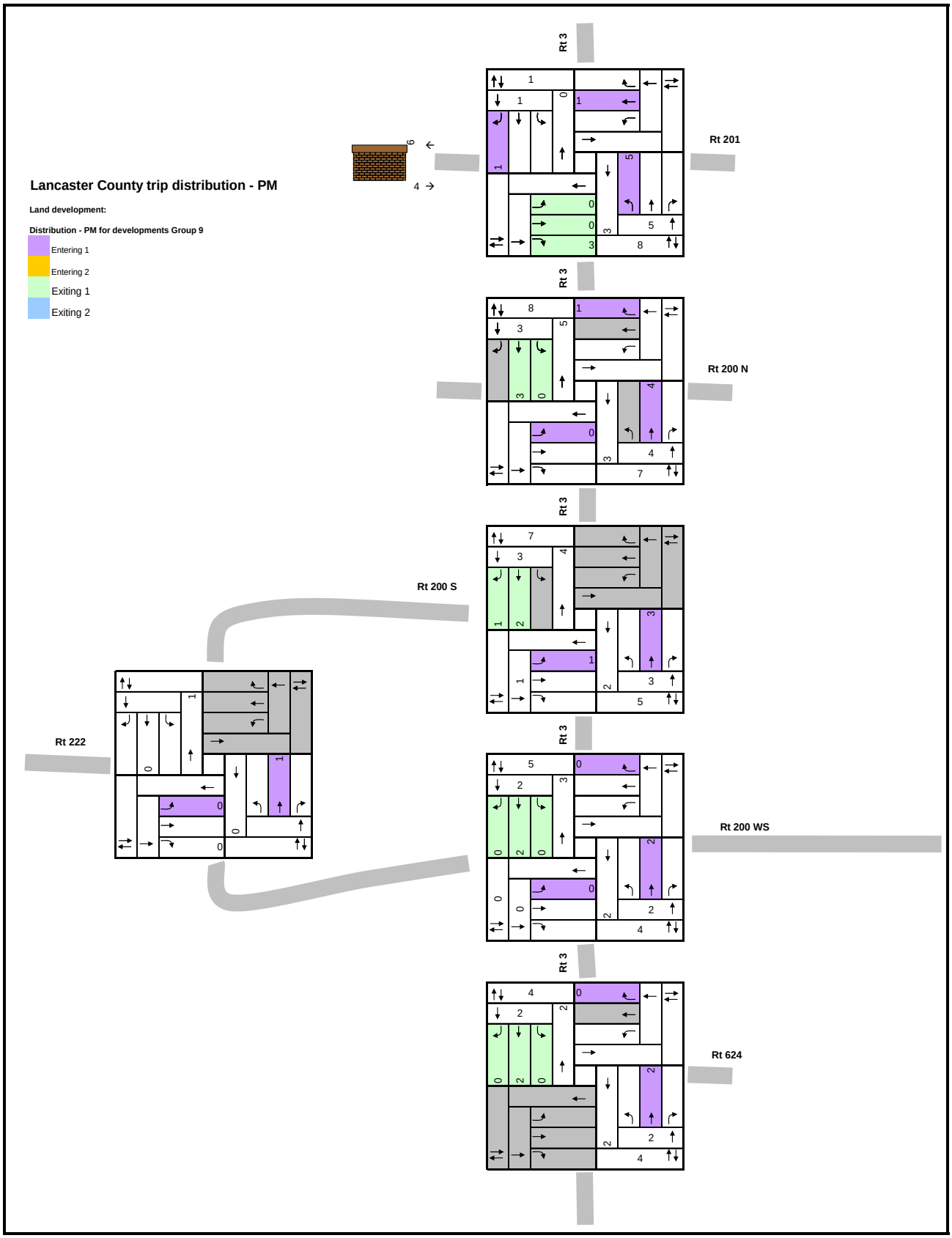
Trip distribution and assignment - Group 7 - PM



Trip distribution and assignment - Group 8 - PM



Trip distribution and assignment - Group 9 - PM



Trip distribution and assignment - Group 10 - PM