River Bend Nuclear Station
Unit 3

Combined License Application

Part 5: Emergency Plan

(Supplemental Information Part 1)

Revision 0
September 2008

Contents:

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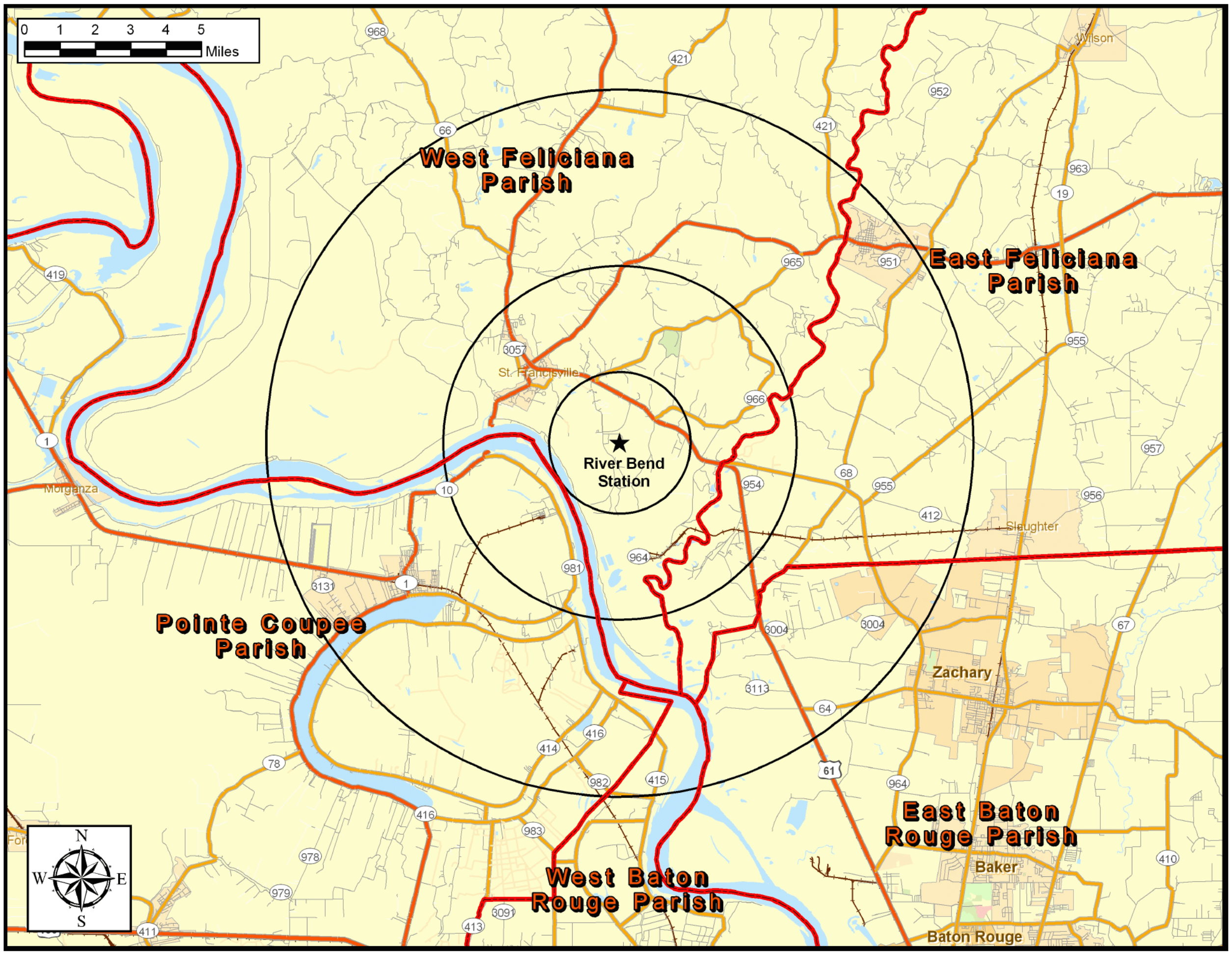
River Bend Station

Development of Evacuation Time Estimates



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May, 2008 **Final Report** **KLD TR – 422**

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EXECUTIVE SUMMARY

This report describes the analyses undertaken and the results obtained by a study to develop Evacuation Time Estimates (ETE) for the River Bend Station (RBS) located near St. Francisville, Louisiana. ETE are part of the required planning basis and provide RBS and State and local governments with site-specific information needed for Protective Action decision-making.

In the performance of this effort, all available prior documentation relevant to ETE was reviewed. Other guidance is provided by documents published by Federal Government agencies. Most important of these are:

- Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, NUREG 0654/FEMA-REP-1, Rev. 2, November 1980.
- Analysis of Techniques for Estimating Evacuation Times for Emergency Planning Zones, NUREG/CR-1745, November 1980.
- Development of Evacuation Time Estimates for Nuclear Power Plants, NUREG/CR-6863, January 2005.

Overview of Project Activities

This project began in September, 2007 and extended over a period of 8 months. The major activities performed are briefly described in chronological sequence:

- Attended "kick-off" meetings with Entergy personnel and emergency management personnel representing state and local governments.
- Reviewed prior ETE reports prepared for RBS and accessed U.S. Census Bureau data files for the year 2000. Studied Geographical Information Systems (GIS) maps of the area in the vicinity of RBS, then conducted a detailed field survey of the highway network.
- Synthesized this information to create an analysis network representing the highway system topology and capacities within the Emergency Planning Zone (EPZ), plus a "Shadow" area extending 15 miles radially from the plant.
- Designed and sponsored a telephone survey of residents within the EPZ to gather focused data needed for this ETE study that were not contained within the census database. The survey instrument was reviewed and modified by State and Parish personnel prior to conducting the survey.
- The traffic demand and trip-generation rates of evacuating vehicles were estimated from the gathered data. The trip generation rates reflected the estimated mobilization time (i.e., the time required by evacuees to prepare for the evacuation trip) computed using the results of the telephone survey of EPZ residents.

- Following Federal guidelines, the EPZ is subdivided into 18 Protective Action Sections (PAS). These PAS are then grouped within circular areas or “keyhole” configurations (circles plus radial sectors) that define a total of 27 Evacuation Regions.
- The time-varying external circumstances are represented as Evacuation Scenarios, each described in terms of the following factors: (1) Season (Summer, Winter); (2) Day of Week (Midweek, Weekend); (3) Time of Day (Midday, Evening); and (4) Weather (Good, Rain). One special event scenario involving construction of a new unit at the RBS site was considered.
- The Planning Basis for the calculation of ETE is:
  - A rapidly escalating accident at RBS that quickly assumes the status of General Emergency such that the advisory to evacuate is virtually coincident with the siren alert.
  - While an unlikely accident scenario, this planning basis will yield ETE, measured as the elapsed time from the advisory to evacuate until the last vehicle exits the impacted Region, that represent “upper bound” estimates. This conservative Planning Basis is applicable for all initiating events.
- If the emergency occurs while schools are in session, the ETE study assumes that the children will be evacuated by bus directly to specified Reception Centers located outside the EPZ. Parents, relatives, and neighbors are advised to not pick up their children at school prior to the arrival of the buses dispatched for that purpose. The ETE for school children are calculated separately.
- Evacuees who do not have access to a private vehicle will either ride-share with relatives, friends or neighbors, or be evacuated by buses provided as specified in the Parish evacuation plans. Those in special facilities will likewise be evacuated with public transit, as needed: bus, van, or ambulance, as required. Separate ETE are calculated for the transit-dependent evacuees and for those evacuated from special facilities.

<u>Computation of ETE</u>

A total of 297 ETE were computed for the evacuation of the general public. Each ETE quantifies the aggregate evacuation time estimated for the population within one of the 27 Evacuation Regions to completely evacuate from that Region, under the circumstances defined for one of the 11 Evacuation Scenarios (27 x 11 = 297). Separate ETE are calculated for transit-dependent evacuees, including school children for applicable scenarios.

Except for Region R03, which is the evacuation of the entire EPZ, only a portion of the people within the EPZ would be advised to evacuate. That is, the advisory to evacuate applies only to those people occupying the specified impacted region. It is assumed that 100 percent of the people within the impacted region will evacuate in response to this advisory. The people occupying the remainder of the EPZ outside the impacted region may be advised to take shelter.

The computation of ETE assumes that a portion of the population within the EPZ but outside the impacted region, will elect to “voluntarily” evacuate. In addition, a portion of the population in the “Shadow” region beyond the EPZ that extends a distance of 15 miles from RBS, will also elect to evacuate. These voluntary evacuees could impede those who are evacuating from within the impacted region. The impedance that could be caused by voluntary evacuees is considered in the computation of ETE for the impacted region.

The computational procedure is outlined as follows:

- A link-node representation of the highway network is coded. Each link represents a unidirectional length of highway; each node usually represents an intersection or merge point. The capacity of each link is estimated based on the field survey observations and on established procedures.
- The evacuation trips are generated at locations called “zonal centroids” located within the EPZ. The trip generation rates vary over time reflecting the mobilization process, and from one location (centroid) to another depending on population density and on whether a centroid is within, or outside, the impacted area.
- The computer models compute the routing patterns for evacuating vehicles that are compliant with federal guidelines (outbound relative to the location of RBS), then simulate the traffic flow movements over space and time. This simulation process estimates the rate that traffic flow exits the impacted region.
- The ETE statistics provide the elapsed times for 50 percent, 90 percent, 95 percent and 100 percent, respectively, of the population within the impacted region, to evacuate from within the impacted region. These statistics are presented in tabular and graphical formats.

Traffic Management

This study includes the development of a comprehensive traffic management plan designed to expedite the evacuation of people from within an impacted region. This plan, which was reviewed with State and local law enforcement personnel, is also designed to control access into the EPZ after returning commuters have rejoined their families.

The plan is documented in the form of detailed schematics specifying: (1) the directions of evacuation travel to be facilitated, and other traffic movements to be discouraged; (2) the traffic control personnel and equipment needed (cones, barricades) and their deployment; (3) the locations of these "Traffic Control Points" (TCP); (4) the priority assigned to each traffic control point indicating its relative importance and how soon it should be manned relative to others; and (5) the number of traffic control personnel required.

Selected Results

A compilation of selected information is presented on the following pages in the form of Figures and Tables extracted from the body of the report; these are described below.

- Figure 3-1 displays a map of the RBS site showing the layout of the 18 PAS that comprise, in aggregate, the Emergency Planning Zone (EPZ). The permanent resident population for each PAS is also displayed in this figure.
- Table 3-1 presents the estimates of permanent resident population in each PAS based on the 2000 Census data. Extrapolation to the year 2008 reflects population growth rates in each Parish derived from census data.
- Table 6-1 defines each of the 27 Evacuation Regions in terms of their respective groups of PAS.
- Table 6-2 lists the 11 Evacuation Scenarios.
- Tables 7-1C and 7-1D are compilations of ETE. These data are the times needed to *clear the indicated regions* of 95 and 100 percent of the population occupying these regions, respectively. These computed ETE include consideration of mobilization time and of estimated voluntary evacuations from other regions within the EPZ and from the shadow region. **The ETE closely mirror the trip generation rate (mobilization time). It is recommended that decision makers reference Table 7-1C which lists the time needed to evacuate 95 percent of the population, when preparing recommended protective actions. The ETE for the 100th percentile of population exceeds the 95th percentile by as much as 40% due to the relatively few stragglers in the EPZ who take longer to mobilize.**
- Table 8-6A presents ETE for the schoolchildren in good weather.
- Table 8-7 presents ETE for the transit-dependent population.

Conclusion

This report presents the methodological details supporting the results obtained and recommendations for consideration by local emergency responders.

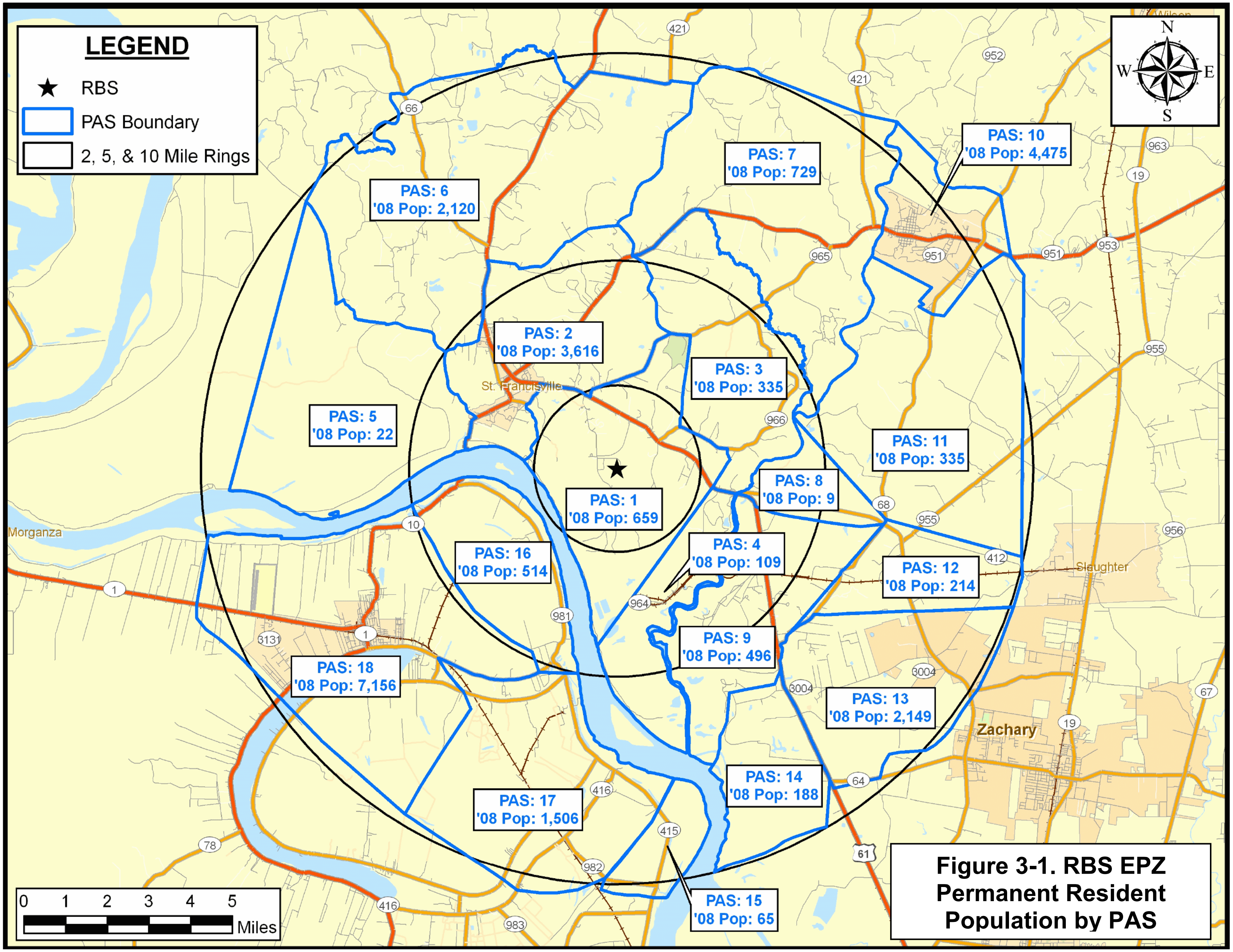

Figure 3-1. RBS EPZ Permanent Resident Population by PAS

Table 3-1. EPZ Permanent Resident Population		
PAS	**2000 Population**	**2008 Population**
1	636	659
2	3,490	3,616
3	324	335
4	105	109
5	21	22
6	2,048	2,120
7	704	729
8	8	9
9	459	496
10	4,151	4,475
11	311	335
12	198	214
13	2,040	2,149
14	180	188
15	62	65
16	576	514
17	1,682	1,506
18	8,005	7,156
TOTAL	**25,000**	**24,697**
Change in Population:		**-1.2 %**

Note: The yearly population growth rates for each Parish were estimated from available census data (Year 2000 thru Year 2006) on the US Census Bureau website. These rates were used to extrapolate the population of each PAS from the 2000 Census data to the Year 2008.

Parish	WFP	EFP	PCP	EBRP	WBRP
Growth Rate	0.44%	0.96%	-1.40%	0.65%	0.68%

Table 6-1. Description of Evacuation Regions

Region	Description	PAS 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
R01	2 mile ring	■																	
R02	5-mile ring	■	■	■	■				■	■							■		
R03	Full EPZ	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Evacuate 2 mile ring and 5 miles downwind

Region	Wind Direction Towards:	PAS 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
R04	N, NNE	■	■	■															
R05	NE	■		■															
R06	ENE	■		■					■										
R07	E, ESE	■		■	■				■	■									
R08	SE, SSE	■			■					■									
R09	S	■			■					■							■		
R10	SSW	■			■												■		
R11	SW, WSW	■															■		
R12	W	■	■														■		
R13	WNW, NW, NNW	■	■																

Evacuate 5 mile ring and downwind to EPZ boundary

Region	Wind Direction Towards:	PAS 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
R14	N	■	■	■	■		■	■	■	■							■		
R15	NNE	■	■	■	■		■	■	■	■	■						■		
R16	NE, ENE	■	■	■	■			■	■	■	■	■					■		
R17	E	■	■	■	■			■	■	■	■	■	■	■			■		
R18	ESE	■	■	■	■				■	■		■	■	■	■		■		
R19	SE	■	■	■	■				■	■			■	■	■	■	■		
R20	SSE	■	■	■	■				■	■				■	■	■	■	■	
R21	S	■	■	■	■				■	■					■	■	■	■	■
R22	SSW	■	■	■	■				■	■						■	■	■	■
R23	SW	■	■	■	■				■	■							■	■	■
R24	WSW	■	■	■	■	■			■	■							■	■	■
R25	W	■	■	■	■	■	■		■	■							■		■
R26	WNW, NW	■	■	■	■	■	■		■	■							■		
R27	NNW	■	■	■	■	■	■	■	■	■							■		

Table 6-2. Evacuation Scenario Definitions					
Scenario	**Season**	**Day of Week**	**Time of Day**	**Weather**	**Special**
1	Summer	Midweek	Midday	Good	None
2	Summer	Midweek	Midday	Rain	None
3	Summer	Weekend	Midday	Good	None
4	Summer	Weekend	Midday	Rain	None
5	Summer	Midweek, Weekend	Evening	Good	None
6	Winter	Midweek	Midday	Good	None
7	Winter	Midweek	Midday	Rain	None
8	Winter	Weekend	Midday	Good	None
9	Winter	Weekend	Midday	Rain	None
10	Winter	Midweek, Weekend	Evening	Good	None
11	Winter	Weekend	Midday	Good	New Plant Construction

Table 7-1C Time To Clear The Indicated Area of 95 Percent of the Affected Population

	Summer		Summer		Summer		Winter		Winter		Winter		Winter
	Midweek		Weekend		Midweek Weekend		Midweek		Weekend		Midweek Weekend		Weekend
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	Scenario:	(11)
	Midday		Midday		Evening		Midday		Midday		Evening		Midday
Region Wind Towards:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Towards:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Towards:	New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ													
R01 2-mile ring	2:10	2:10	1:50	1:55	2:10	R01 2-mile ring	2:10	2:10	1:50	1:50	2:00	R01 2-mile ring	2:50
R02 5-mile ring	3:10	3:10	2:30	2:30	3:00	R02 5-mile ring	3:10	3:10	2:30	2:35	2:50	R02 5-mile ring	3:00
R03 Entire EPZ	3:40	3:50	3:10	3:20	3:20	R03 Entire EPZ	3:40	3:40	3:10	3:20	3:20	R03 Entire EPZ	3:10
2-Mile Ring and Downwind to 5 Miles													
R04 N, NNE	3:10	3:10	2:30	2:30	2:50	R04 N, NNE	3:10	3:10	2:25	2:35	2:50	R04 N, NNE	2:50
R05 NE	2:30	2:30	2:00	2:00	2:20	R05 NE	2:30	2:30	2:00	2:00	2:20	R05 NE	2:50
R06 ENE	2:30	2:30	2:00	2:00	2:20	R06 ENE	2:30	2:30	2:00	2:00	2:20	R06 ENE	2:50
R07 E, ESE	2:40	2:40	2:10	2:10	2:30	R07 E, ESE	2:40	2:40	2:10	2:10	2:20	R07 E, ESE	3:00
R08 SE, SSE	2:30	2:30	2:00	2:00	2:20	R08 SE, SSE	2:30	2:30	2:00	2:00	2:20	R08 SE, SSE	2:50
R09 S	2:40	2:40	2:10	2:10	2:20	R09 S	2:40	2:40	2:00	2:00	2:20	R09 S	2:50
R10 SSW	2:30	2:30	2:00	2:00	2:20	R10 SSW	2:30	2:30	2:00	2:00	2:20	R10 SSW	2:50
R11 SW, WSW	2:30	2:30	2:00	2:00	2:20	R11 SW, WSW	2:20	2:20	1:50	1:55	2:10	R11 SW, WSW	2:50
R12 W	3:10	3:10	2:30	2:30	2:50	R12 W	3:10	3:10	2:25	2:35	2:50	R12 W	2:50
R13 WNW, NW, NNW	3:00	3:00	2:20	2:20	2:50	R13 WNW, NW, NNW	3:00	3:00	2:25	2:35	2:40	R13 WNW, NW, NNW	2:50
5-Mile Ring and Downwind to EPZ Boundary													
R14 N	3:30	3:30	2:50	2:50	3:00	R14 N	3:30	3:30	2:40	2:40	3:00	R14 N	3:00
R15 NNE	3:40	3:40	3:00	3:10	3:10	R15 NNE	3:40	3:40	3:10	3:20	3:10	R15 NNE	3:10
R16 NE, ENE	3:40	3:40	3:00	3:10	3:10	R16 NE, ENE	3:30	3:30	3:10	3:20	3:10	R16 NE, ENE	3:10
R17 E	3:40	3:40	3:00	3:10	3:10	R17 E	3:40	3:40	3:10	3:20	3:10	R17 E	3:10
R18 ESE	3:20	3:20	2:40	2:40	3:10	R18 ESE	3:20	3:20	2:40	2:40	3:00	R18 ESE	3:00
R19 SE	3:20	3:20	2:40	2:40	3:00	R19 SE	3:20	3:20	2:30	2:40	3:00	R19 SE	3:00
R20 SSE	3:20	3:20	2:40	2:40	3:00	R20 SSE	3:20	3:20	2:30	2:40	3:00	R20 SSE	3:00
R21 S	3:40	3:40	3:00	3:00	3:10	R21 S	3:40	3:40	3:00	3:00	3:10	R21 S	3:00
R22 SSW	3:40	3:40	3:00	3:00	3:10	R22 SSW	3:40	3:40	3:00	3:00	3:10	R22 SSW	3:00
R23 SW	3:40	3:40	3:00	3:00	3:10	R23 SW	3:40	3:40	3:00	3:00	3:10	R23 SW	3:00
R24 WSW	3:40	3:40	3:00	3:00	3:10	R24 WSW	3:40	3:40	3:00	3:00	3:10	R24 WSW	3:00
R25 W	3:40	3:40	3:00	3:00	3:10	R25 W	3:40	3:40	3:00	3:00	3:10	R25 W	3:00
R26 WNW, NW	3:30	3:30	2:50	2:50	3:00	R26 WNW, NW	3:20	3:20	2:40	2:40	3:00	R26 WNW, NW	3:00
R27 NNW	3:30	3:30	2:50	2:50	3:00	R27 NNW	3:30	3:30	2:40	2:40	3:00	R27 NNW	3:00

Table 7-1D Time To Clear The Indicated Area of 100 Percent of the Affected Population

	Summer		Summer		Summer		Winter		Winter		Winter		Winter
	Midweek		Weekend		Midweek Weekend		Midweek		Weekend		Midweek Weekend		Weekend
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	Scenario:	(11)
	Midday		Midday		Evening		Midday		Midday		Evening		Midday
Region Wind Towards:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Towards:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Towards:	New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ													
R01 2-mile ring	5:20	5:20	5:00	5:00	5:00	R01 2-mile ring	5:20	5:20	5:00	5:00	5:00	R01 2-mile ring	5:00
R02 5-mile ring	5:30	5:30	5:10	5:10	5:10	R02 5-mile ring	5:30	5:30	5:10	5:10	5:20	R02 5-mile ring	5:10
R03 Entire EPZ	5:40	5:40	5:30	5:30	5:30	R03 Entire EPZ	5:40	5:40	5:30	5:30	5:30	R03 Entire EPZ	5:30
2-Mile Ring and Downwind to 5 Miles													
R04 N, NNE	5:30	5:30	5:10	5:10	5:10	R04 N, NNE	5:30	5:30	5:10	5:10	5:20	R04 N, NNE	5:10
R05 NE	5:30	5:30	5:00	5:00	5:00	R05 NE	5:30	5:30	5:00	5:00	5:00	R05 NE	5:00
R06 ENE	5:30	5:30	5:00	5:00	5:00	R06 ENE	5:30	5:30	5:00	5:00	5:00	R06 ENE	5:00
R07 E, ESE	5:30	5:30	5:00	5:00	5:00	R07 E, ESE	5:30	5:30	5:00	5:00	5:00	R07 E, ESE	5:00
R08 SE, SSE	5:30	5:30	5:00	5:00	5:00	R08 SE, SSE	5:30	5:30	5:00	5:00	5:00	R08 SE, SSE	5:00
R09 S	5:30	5:30	5:00	5:00	5:00	R09 S	5:30	5:30	5:00	5:00	5:00	R09 S	5:00
R10 SSW	5:30	5:30	5:00	5:00	5:00	R10 SSW	5:30	5:30	5:00	5:00	5:00	R10 SSW	5:00
R11 SW, WSW	5:30	5:30	5:00	5:00	5:00	R11 SW, WSW	5:30	5:30	5:00	5:00	5:00	R11 SW, WSW	5:00
R12 W	5:30	5:30	5:10	5:10	5:10	R12 W	5:30	5:30	5:10	5:10	5:20	R12 W	5:10
R13 WNW, NW, NNW	5:30	5:30	5:10	5:10	5:10	R13 WNW, NW, NNW	5:30	5:30	5:10	5:10	5:20	R13 WNW, NW, NNW	5:10
5-Mile Ring and Downwind to EPZ Boundary													
R14 N	5:30	5:30	5:20	5:20	5:20	R14 N	5:30	5:30	5:20	5:30	5:30	R14 N	5:20
R15 NNE	5:40	5:40	5:30	5:30	5:30	R15 NNE	5:40	5:40	5:30	5:30	5:30	R15 NNE	5:30
R16 NE, ENE	5:40	5:40	5:20	5:20	5:20	R16 NE, ENE	5:40	5:40	5:20	5:20	5:20	R16 NE, ENE	5:20
R17 E	5:40	5:40	5:20	5:20	5:20	R17 E	5:40	5:40	5:20	5:20	5:30	R17 E	5:20
R18 ESE	5:30	5:30	5:20	5:20	5:20	R18 ESE	5:30	5:30	5:20	5:20	5:20	R18 ESE	5:20
R19 SE	5:30	5:40	5:10	5:10	5:10	R19 SE	5:30	5:40	5:10	5:10	5:20	R19 SE	5:10
R20 SSE	5:30	5:30	5:10	5:10	5:10	R20 SSE	5:30	5:30	5:10	5:10	5:20	R20 SSE	5:10
R21 S	5:30	5:40	5:20	5:20	5:20	R21 S	5:30	5:40	5:20	5:20	5:20	R21 S	5:20
R22 SSW	5:30	5:40	5:20	5:20	5:20	R22 SSW	5:30	5:40	5:20	5:20	5:20	R22 SSW	5:20
R23 SW	5:30	5:40	5:20	5:20	5:20	R23 SW	5:30	5:40	5:20	5:20	5:20	R23 SW	5:20
R24 WSW	5:30	5:40	5:30	5:30	5:20	R24 WSW	5:30	5:40	5:20	5:20	5:20	R24 WSW	5:20
R25 W	5:30	5:30	5:20	5:30	5:30	R25 W	5:30	5:40	5:30	5:30	5:30	R25 W	5:30
R26 WNW, NW	5:30	5:30	5:20	5:30	5:30	R26 WNW, NW	5:30	5:30	5:30	5:30	5:20	R26 WNW, NW	5:30
R27 NNW	5:30	5:30	5:20	5:30	5:30	R27 NNW	5:40	5:40	5:30	5:30	5:20	R27 NNW	5:30

Table 8-6A. School Evacuation Time Estimates - Good Weather								
School	**Driver Mobilization Time(min)**	**Loading Time (min)**	**Dist. to EPZ Boundary (mi.)**	**Travel Time to EPZ Boundary (min)**	**ETE (hr:min)**	**Dist. EPZ Boundary to R.C. (mi.)**	**Travel Time EPZ Boundary to RC (min)**	**ETE to R.C. (hr:min)**
West Feliciana Parish Schools								
Bains Elementary School	90	5	14.0	24	**2:00**	32.5	49	**2:50**
Bains Lower Elementary School	90	5	14.0	24	**2:00**	32.5	49	**2:50**
West Feliciana High School	90	5	14.0	24	**2:00**	32.5	49	**2:50**
West Feliciana Middle School	90	5	14.0	24	**2:00**	32.5	49	**2:50**
East Feliciana Parish Schools								
Quad Area-Jackson Head Start	90	5	3.1	5	**1:45**	32.5	49	**2:30**
Jackson Elementary, Middle, and High Schools	90	5	1.1	2	**1:40**	32.5	49	**2:30**
Jackson Christian Academy	90	5	0.6	1	**1:40**	32.5	49	**2:25**
Louisiana Technical College - Folkes Campus	90	5	0.6	1	**1:40**	32.5	49	**2:25**
East Baton Rouge Parish Schools								
Port Hudson Head Start	90	5	2.2	4	**1:40**	16.9	25	**2:05**
Pointe Coupee Parish Schools								
Rougon Elementary School	90	5	0.1	1	**1:40**	23.9	36	**2:15**
Rosenwald Elementary School	90	5	3.3	6	**1:45**	33.8	51	**2:35**
Catholic Elementary, Middle and High Schools	90	5	2.0	3	**1:40**	33.8	51	**2:30**
False River Academy	90	5	1.4	2	**1:40**	33.8	51	**2:30**
Louisiana Technical College - Jumonville Campus	90	5	0.9	2	**1:40**	33.8	51	**2:30**
				Average for EPZ:	**1:45**		**Average:**	**2:30**

Table 8-7. Transit Dependent Evacuation Time Estimates														
Route Number	Total Buses	Single Wave Evacuation					Second Wave Evacuation							
		Mobilization (min)	Route Length (mi.)	Route Travel Time (min)	Pick-up Time (min)	ETE (hr:min)	Mobilization (min)	Unload Time (min)	Driver Rest (min)	Travel Time Back to Route Start (min)	Route Travel Time (min)	Pick-up Time (min)	ETE (hr:min)
Good Weather													
1	10	90	15.8	27	15	**2:15**	150	5	10	47	27	15	**4:15**
2	10	90	19.2	33	15	**2:20**	150	5	10	47	33	15	**4:20**
3	10	90	11.5	20	15	**2:05**	150	5	10	47	20	15	**4:10**
Average for EPZ:						**2:15**	**Average for EPZ:**						**4:15**
Rain													
1	10	100	15.8	36	20	**2:40**	175	5	10	52	36	20	**5:00**
2	10	100	19.2	43	20	**2:45**	175	5	10	52	43	20	**5:05**
3	10	100	11.5	26	20	**2:30**	175	5	10	52	26	20	**4:50**
Average for EPZ:						**2:40**	**Average for EPZ:**						**5:00**

1. INTRODUCTION

This report describes the analyses undertaken and the results obtained by a study to update the existing Evacuation Time Estimates (ETE) for the River Bend Station (RBS), located near St. Francisville, Louisiana. Evacuation time estimates are part of the required planning basis and provide State and local governments with site-specific information needed for Protective Action decision-making.

In the performance of this effort, all available prior documentation relevant to Evacuation Time Estimates was reviewed.

Other guidance is provided by documents published by Federal Government agencies. Most important of these are:

- Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, NUREG 0654/FEMA-REP-1, Rev. 2, November 1980.

- Analysis of Techniques for Estimating Evacuation Times for Emergency Planning Zones, NUREG/CR-1745, November 1980.

- Development of Evacuation Time Estimates for Nuclear Power Plants, NUREG/CR-6863, January 2005.

We wish to express our appreciation to all the directors and staff members of the West Feliciana, East Feliciana, Pointe Coupee, East Baton Rouge and West Baton Rouge Parishes emergency management agencies and local and state law enforcement and planning agencies, who provided valued guidance and contributed information contained in this report.

1.1 Overview of the ETE Update Process

The following outline presents a brief description of the work effort in chronological sequence:

1. Information Gathering:
    - Defined the scope of work in discussion with representatives of Entergy Nuclear.
    - Reviewed existing reports describing past evacuation studies.
    - Attended meetings with emergency planners from the five EPZ Parishes to identify issues to be addressed.

- Conducted a detailed field survey of the EPZ highway system and of area traffic conditions.
- Obtained demographic data from census and state agencies.
- Conducted a random sample telephone survey of EPZ residents.
- Conducted a data collection effort to identify and describe schools, special facilities, major employers, transportation providers, and other important sources of information.

2. Estimated distributions of Trip Generation times representing the time required by various population groups (permanent residents, employees, and transients) to prepare (mobilize) for the evacuation trip. These estimates are primarily based upon the random sample telephone survey.
3. Defined Evacuation Scenarios. These scenarios reflect the variation in demand, trip generation distribution and in highway capacities, associated with different seasons, day of week, time of day and weather conditions.
4. Defined a traffic management strategy. Traffic control is applied at specified Traffic Control Points (TCP) located within the Emergency Planning Zone (EPZ), and at Access Control Points (ACP) located on the periphery of the EPZ. Local and state police personnel have reviewed all traffic control plans.
5. Defined Evacuation Areas or Regions. The EPZ is partitioned into Protective Action Sections (PAS) which serve as a basis for the ETE analysis presented herein. Evacuation "Regions" are comprised of contiguous PAS for which ETE are calculated. The configuration of these Regions reflects the fact that the wind can take any direction and that the radial extent of the impacted area depends on accident-related circumstances. Each Region, other than those that approximate circular areas, approximates a "key-hole" configuration within the EPZ as required by NUREG/CR-6863.
6. Estimated demand for transit services for persons at "Special Facilities" and for transit-dependent persons at home.
7. Prepared the input streams for the IDYNEV system.
    - Estimated the traffic demand, based on the available information derived from Census data, from prior studies, from data provided by local and state agencies and from the telephone survey.

- Applied the procedures specified in the 2000 Highway Capacity Manual (HCM[1]) to the data acquired during the field survey, to estimate the capacity of all highway segments comprising the evacuation routes.

- Developed the link-node representation of the evacuation network, which is used as the basis for the computer analysis that calculates the ETE.

- Calculated the evacuating traffic demands for each Region and for each Evacuation Scenario. Considered the effects on demand of "voluntary evacuation" and of the "shadow effect".

- Represented the traffic management strategy.

- Specified the candidate destinations of evacuation travel consistent with outbound movement relative to the location of the RBS.

- Prepared the input stream for the IDYNEV System.

- Executed the IDYNEV models to provide the estimates of evacuation routing and ETE.

8. Generated a complete set of ETE for all specified Evacuation Regions and Scenarios.
9. Documented ETE in formats responsive to the cited NUREG reports.
10. Calculated the ETE for all transit activities including those for special facilities (schools, health-related facilities, etc.) and for the transit-dependent population.

Steps 4, 7 and 8 are iterated as described in Appendix D.

1.2 The River Bend Station Site Location

The River Bend Station is located near St. Francisville, Louisiana approximately 24 miles northwest of Baton Rouge, Louisiana. The Emergency Planning Zone (EPZ) consists of parts of five Parishes: West Feliciana Parish (WFP), East Feliciana Parish (EFP), Pointe Coupee Parish (PCP), West Baton Rouge Parish (WBRP), and East Baton Rouge Parish (EBRP). Figure 1-1 displays the area surrounding the River Bend Station. This map identifies the communities in the area and the major roads.

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[1] Highway Capacity Manual (HCM2000), Transportation Research Board, National Research Council, 2000.

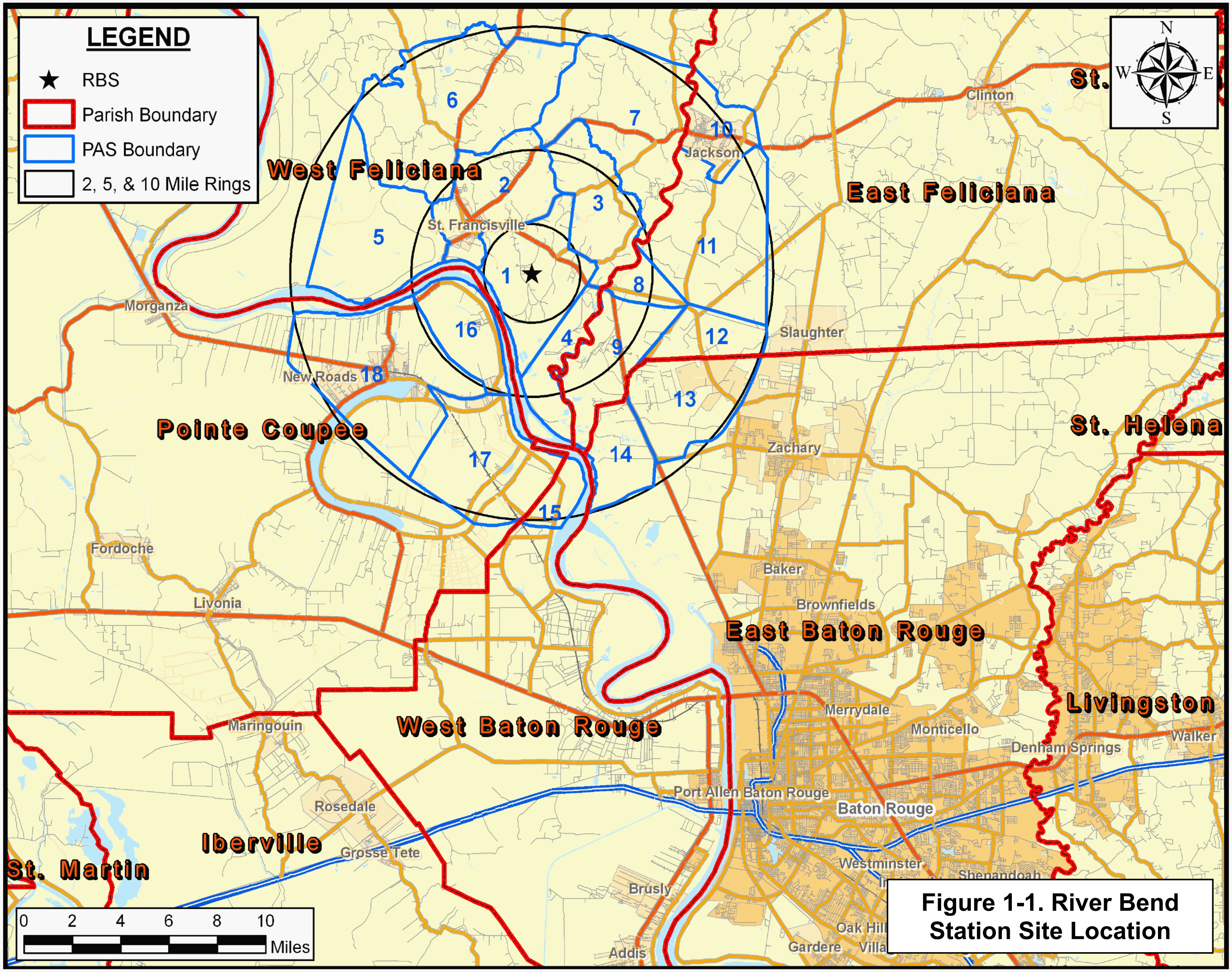


Figure 1-1. River Bend Station Site Location

1.3 Preliminary Activities

Since this plan constitutes an update of an existing document, it was necessary to review the prior process and findings. These activities are described below.

Literature Review

KLD Associates was provided with copies of documents describing past studies and analyses leading to the development of emergency plans and of the ETE. We also obtained supporting documents from a variety of sources, which contained information needed to form the database used for conducting evacuation analyses.

Field Surveys of the Highway Network

KLD personnel drove the entire highway system within the EPZ and for some distance outside. The characteristics of each section of highway were recorded. These characteristics include:

• Number of lanes	• Posted speed
• Pavement Width	• Actual free speed
• Shoulder type & width	• Abutting land use
• Intersection configuration	• Control devices
• Lane channelization	• Interchange geometries
• Geometrics: Curves, grades	• Street parking
• Unusual characteristics: Narrow bridges, sharp curves, poor pavement, flood warning signs, inadequate delineations, etc.	

The data were then transcribed; this information was referenced while preparing the input stream for the IDYNEV System. Key highway locations were video archived.

Telephone Survey

A telephone survey was undertaken to gather information needed for the evacuation study. Appendix F presents the survey instrument, the procedures used and tabulations of data compiled from the survey returns.

These data were utilized to develop estimates of vehicle occupancy during an evacuation and to estimate elements of the mobilization process. This database was also referenced to estimate the number of transit-dependent residents.

Developing the Evacuation Time Estimates

The overall study procedure is outlined in Appendix D. Demographic data were obtained from several sources, as detailed later in this report. These data were analyzed and converted into vehicle demand data.

Highway capacity was estimated for each highway segment based on the field surveys and on the principles specified in the 2000 Highway Capacity Manual (HCM). The link-node representation of the physical highway network was developed using Geographic Information System (GIS) mapping software and the observations obtained from the field survey. This network representation of "links" and "nodes" is shown in Figure 1-2.

Analytical Tools

The IDYNEV System that was employed for this study is comprised of several integrated computer models. One of these is the PC-DYNEV (DYnamic NEtwork EVacuation) macroscopic simulation model that was developed by KLD under contract with the Federal Emergency Management Agency (FEMA).

IDYNEV consists of three submodels:

- A macroscopic traffic simulation model (for details, see Appendix C).
- An intersection capacity model (for details, see Highway Research Record No. 772, Transportation Research Board, 1980, papers by Lieberman and McShane & Lieberman).
- A dynamic, node-centric routing model that adjusts the "base" routing in the event of an imbalance in the levels of congestion on the outbound links.

Another model of the IDYNEV System is the TRAD (TRaffic Assignment and Distribution) model. This model integrates an equilibrium assignment model with a trip distribution algorithm to compute origin-destination volumes and paths of travel designed to minimize travel time. For details, see Appendix B.

Still another software product developed by KLD, named UNITES (UNIfied Transportation Engineering System) was used to expedite data entry.

The procedure for applying the IDYNEV System within the framework of developing an update to an ETE is outlined in Appendix D. Appendix A is a glossary of terms.

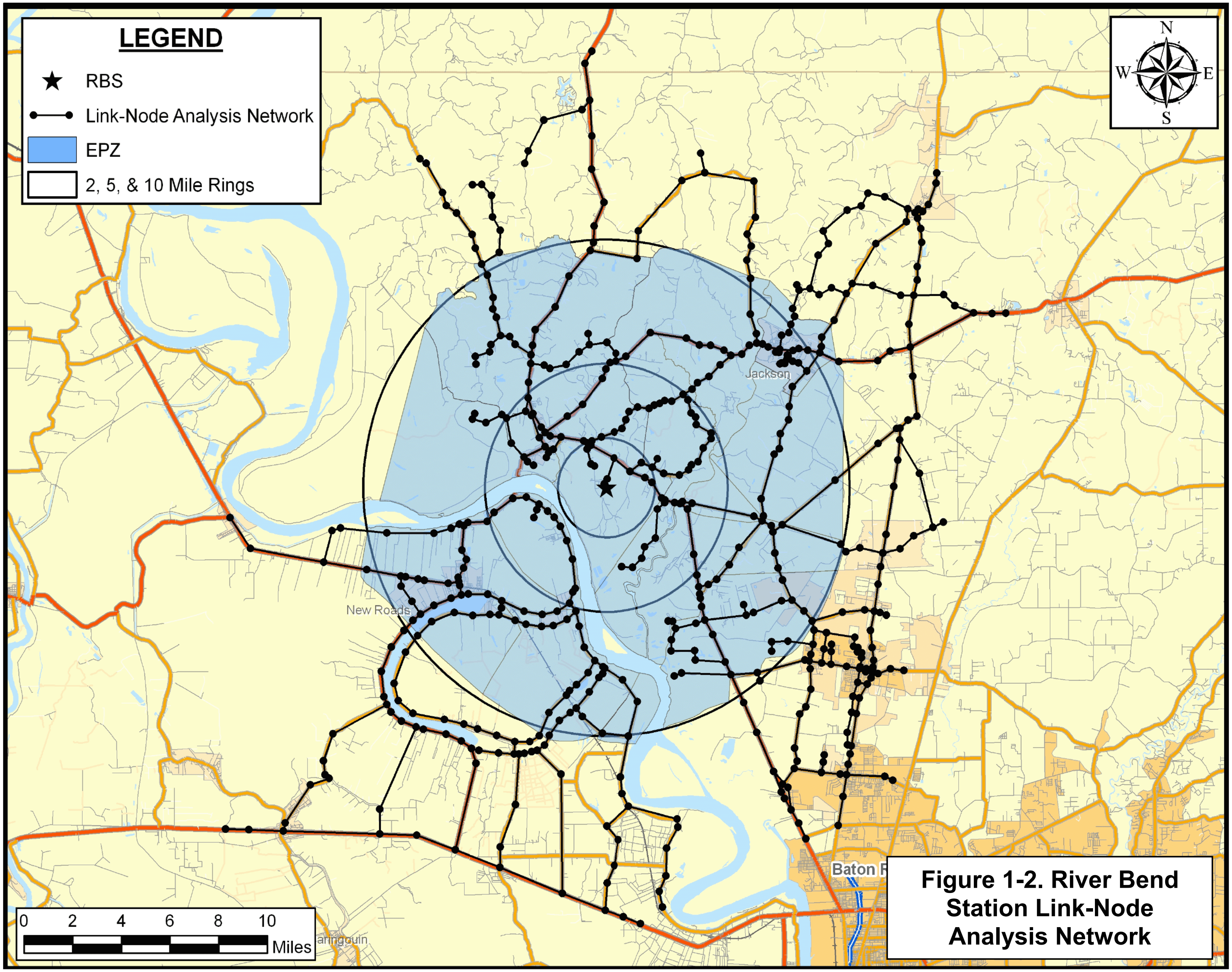


Figure 1-2. River Bend Station Link-Node Analysis Network

The evacuation analysis procedures are based upon the need to:

- Route traffic along paths of travel that will expedite their travel from their respective points of origin to points outside the EPZ
- Restrict movement toward RBS to the extent practicable, and disperse traffic demand so as to avoid focusing demand on a limited number of highways
- Move traffic in directions that are generally outbound, relative to the location of RBS.

A set of candidate destination nodes on the periphery of the EPZ is specified for each traffic origin (or centroid) within the EPZ. The TRAD model produces output that identifies the "best" traffic routing, subject to the design conditions outlined above. In addition to this information, rough estimates of travel time are provided, together with turn-movement data required by the PC-DYNEV simulation model.

The simulation model is then executed to provide a detailed description of traffic operations on the evacuation network. This description enables the analyst to identify bottlenecks and to develop countermeasures that are designed to expedite the movement of vehicles. The outputs of this model are the volume of traffic, expressed as vehicles/hour, that exit the Evacuation Region along the various highways (links) that cross the Region boundaries. These outputs are exported into a spreadsheet used to document the ETE. Section 7 presents a further description of this process along with the ETE Tables.

As outlined in Appendix D, this procedure consists of an iterative design-analysis-redesign sequence of activities. If properly done, this procedure converges to yield an evacuation plan which best services the evacuating public.

1.4 Comparison with Prior ETE Study

Table 1-1 presents a comparison of the present ETE study with the 2004 study. The major factors contributing to the differences between the ETE values obtained in this study and those of the previous study can be summarized as follows:

- Vehicle occupancy and Trip-generation rates are based on the results of a telephone survey of EPZ residents.
- Voluntary and shadow evacuation are considered.
- The highway representation is far more detailed.
- Many more evacuation cases considered, responsive to NUREG/CR-6863.

Table 1-1. ETE Study Comparisons		
Topic	**Treatment**	
	Previous ETE Study	**Current ETE Study**
Resident Population Basis	ArcGIS Software using 2000 US Census blocks; area ratio method used. Population = 24,939	ArcGIS Software using 2000 US Census blocks; block centroid method used; population extrapolated to 2008. Population = 24,697
Resident Population Vehicle Occupancy	2.72 persons/household. 1 vehicle per household. Or, 1 vehicle for every 2.72 residents.	2.52 persons/household, 1.53 evacuating vehicles/household yielding: 1.65 persons/vehicle
Employee Population	1 Employee/vehicle. 2 Transients/vehicle.	Employees treated as separate population group. Employee estimates based on information provided about major employers in EPZ by the Parish emergency management staff and by direct phone calls to major employers. 1.01 employees/vehicle based on phone survey results.
Voluntary evacuation from within EPZ in areas outside region to be evacuated	Not considered	50 percent of population within the circular portion of the region; 35 percent, in annular ring between the circle and the EPZ boundary (See Figure 2-1).
Shadow Evacuation	Not considered.	30% of people outside of the EPZ within the shadow area (See Figure 7-2).
Network Size	213 links; 180 nodes.	690 Links; 530 Nodes.

Table 1-1. ETE Study Comparisons (cont.)		
Roadway Geometric Data	Field surveys conducted in 2003.	Field surveys conducted in 2007. Major intersections were video archived. GIS shape-files of signal locations and roadway characteristics created from data acquired during road survey. Road capacities based on 2000 HCM.
School Evacuation	Direct evacuation to designated Reception Center/Host School.	Direct evacuation to designated Reception Center/Host School.
Transit Dependent Population	Not considered.	Defined as households with 0 vehicles + households with 1 vehicle with commuters who do not return home + households with 2 vehicles with commuters who do not return home. Telephone survey results used to estimate transit dependent population.
Ridesharing	Not considered.	50 percent of transit dependent persons will ride out with a neighbor of friend.
Trip Generation for Evacuation	No vehicles within the first 15 minutes. Linear distribution thereafter. Permanent Residents leave between 15 and 150 minutes. [15% between 15-75 min; 70% between 75-120 min; 15% between 120-150 min] Employees and transients leave between 15 and 45 minutes. Special Facilities will be evacuated between 15 and 75 minutes. All times measured from the advisory to evacuate.	Based on residential telephone survey of specific pre-trip mobilization activities: Residents with commuters returning leave between 30 and 330 minutes. Residents without commuters returning leave between 15 and 300 minutes. Employees and transients leave between 15 and 150 minutes. All times measured from the advisory to evacuate.

Table 1-1. ETE Study Comparisons (cont.)		
Weather	Fair and Adverse. The capacity of each link in the network is reduced by 20% for adverse weather.	Normal or Rain. The capacity and free flow speed of all links in the network are reduced by 10% in the event of rain.
Modeling	NetVac2 model.	IDYNEV System: TRAD and PC-DYNEV.
Special Events	None considered.	One considered – Construction of new unit at RBS site.
Evacuation Cases	27 Regions (referred to as 'Scenarios' in the report) and 4 scenarios (day and night under fair and adverse weather conditions) with 80 unique cases	27 Regions (central sector wind direction and each adjacent sector technique used) and 11 Scenarios producing 297 unique cases.
Evacuation Time Estimates Reporting	ETE reported for 90th and 100th percentile for general population, special facilities and special needs persons for each Parish.	ETE reported for 50th, 90th, 95th, and 100th percentile population. Results presented by Region and Scenario.
Evacuation Time Estimates for the entire EPZ, 100th percentile.	Peak day Normal Weather = 3:56 Peak day Adverse Weather = 4:29	Winter Weekend Midday (Peak) Good weather = 5:30 Winter Weekend Midday Rain = 5:30
Sensitivity Studies	Not considered.	Performed sensitivity studies with varying mobilization times and shadow evacuation percentages.

2. STUDY ESTIMATES AND ASSUMPTIONS

This section presents the estimates and assumptions utilized in the development of the evacuation time estimates.

2.1 Data Estimates

1. Population estimates are based upon Census 2000 data, projected to year 2008. Parish-specific projections are based upon growth rates estimated by comparing the 2000 census data and 2006 census estimates. Estimates of employees who commute into the EPZ to work are based upon employment data provided by parish emergency management officials.
2. Population estimates at special facilities are based on data provided by parish emergency management offices.
3. Roadway capacity estimates are based on field surveys and the application of Highway Capacity Manual 2000[1].
4. Population mobilization times are based on a statistical analysis of data acquired from the telephone survey.
5. The relationship between resident population and evacuating vehicles is developed from the telephone survey. The average values of 2.52 persons per household and 1.53 evacuating vehicles per household are used.
6. The relationship between persons and vehicles for special facilities is as follows:
    a. Parks/Recreational: Varies depending on site (See Appendix E)
    b. Employees: 1.01 employees per vehicle (telephone survey results)
7. Evacuation Time Estimates (ETE) are presented for the evacuation of the 100th percentile of population for each Region and for each Scenario, and for the 2-mile, 5-mile and 10-mile distances. ETE are presented in tabular format and graphically, showing the values of ETE associated with the 50th, 90th and 95th percentiles of population. An Evacuation Region is defined as a group of Protective Action Sections (PAS) that is issued the advisory to evacuate.

[1] Highway Capacity Manual (HCM2000), Transportation Research Board, National Research Council, 2000.

2.2 Study Methodological Assumptions

1. The Evacuation Time is defined as the elapsed time from the advisory to evacuate issued to persons within a specific Region of the EPZ, and the time that Region is clear of the indicated percentile of people.
2. The ETE are computed and presented in a format compliant with the guidance in the cited NUREG documentation. The ETE for each evacuation area ("Region" comprised of included PAS) is presented in both statistical and graphical formats.
3. Evacuation movements (paths of travel) are generally outbound relative to the power station to the extent permitted by the highway network, as computed by the computer models. All available evacuation routes are used in the analysis.
4. Regions are defined by the underlying "keyhole" or circular configurations as specified in NUREG/CR-6863. These Regions, as defined, display irregular boundaries reflecting the geography of the PAS included within these underlying configurations.
5. Voluntary evacuation is considered as indicated in the accompanying Figure 2-1. Within the circle defined by the distance to be evacuated but outside the Evacuation Region, 50 percent of the people not advised to evacuate are assumed to evacuate within the same time-frame. In the annular area between the circle defined by the central "key-hole" of the Evacuation Region and the EPZ boundary, it is assumed that 35 percent of people will voluntarily evacuate. In the area between the EPZ boundary and a 15-mile annular area centered at the plant (the "shadow region"), it will be assumed that 30 percent of the people will evacuate voluntarily. Sensitivity studies explored the effect on ETE, of increasing the percentage of voluntary evacuees in this area. (See Appendix I.)
6. A total of 11 "Scenarios" representing different seasons, time of day, day of week and weather are considered. One special event scenario is studied: the construction period for a new unit at the River Bend Station site. These Scenarios are tabulated on the following page.
7. The models of the IDYNEV System have been recognized as state of the art by the Atomic Safety and Licensing Board (ASLB) in past hearings. (Sources: Atomic Safety & Licensing Board Hearings on Seabrook and Shoreham; Urbanik[2]).

[2] Urbanik, T., et. al. Benchmark Study of the IDYNEV Evacuation Time Estimate Computer Code, NUREG/CR-4873, Nuclear Regulatory Commission, June, 1988

Scenario	Season	Day of Week	Time of Day	Weather	Special
1	Summer	Midweek	Midday	Good	None
2	Summer	Midweek	Midday	Rain	None
3	Summer	Weekend	Midday	Good	None
4	Summer	Weekend	Midday	Rain	None
5	Summer	Midweek, Weekend	Evening	Good	None
6	Winter	Midweek	Midday	Good	None
7	Winter	Midweek	Midday	Rain	None
8	Winter	Weekend	Midday	Good	None
9	Winter	Weekend	Midday	Rain	None
10	Winter	Midweek, Weekend	Evening	Good	None
11	Winter	Weekend	Midday	Good	New Plant Construction

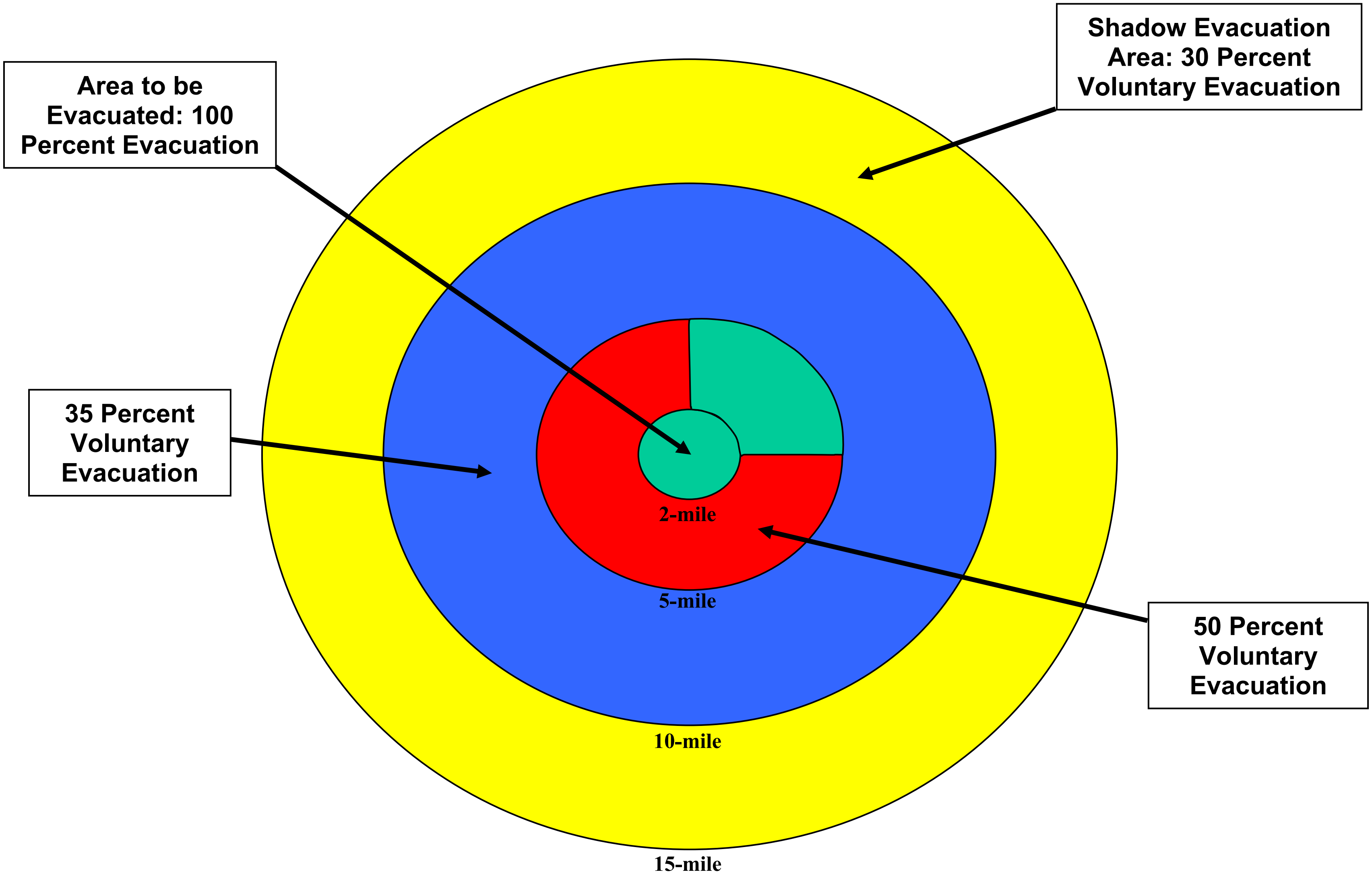


Figure 2-1. Voluntary Evacuation Methodology

2.3 Study Assumptions

1. The Planning Basis Assumption for the calculation of ETE is a rapidly escalating accident that requires evacuation, and includes the following:
   a. The advisory to evacuate is announced coincident with the siren notification.
   b. Mobilization of the general population will commence within 10 minutes after advisory to evacuate.
   c. ETE are measured relative to advisory to evacuate.
2. It is assumed that everyone within the group of PAS forming a Region that is issued an advisory to evacuate will, in fact, respond in general accord with the planned routes.
3. It is further assumed that:
   a. Schools may be evacuated prior to notification of the general public.
   b. 59 percent of households in the EPZ have at least 1 commuter; 65 percent of those households will await the return of a commuter before beginning their evacuation trip, based on the telephone survey results.
4. A portion of the population outside the evacuated Region will elect to evacuate even though not advised to do so ("voluntary evacuation"). See Figure 2-1.
5. The ETE will also include consideration of "through" (External-External) trips during the time that such traffic is permitted to enter the evacuated Region. "Normal" traffic flow is assumed to be present within the EPZ at the start of the emergency.
6. Access Control Points (ACP) will be staffed within approximately 90 minutes following the siren notifications, to divert traffic attempting to enter the EPZ. Earlier activation of ACP locations could delay returning commuters. It is assumed that no vehicles will enter the EPZ after this 90 minute mobilization time period.
7. Traffic Control Points (TCP) within the EPZ will be staffed over time, beginning at the advisory to evacuate. Their number and location will depend on the Region to be evacuated and personnel resources available. It is assumed that drivers will act rationally, travel in the directions identified in the plan (as documented in the public information material), and obey all control devices and traffic guides.

8. Buses will be used to transport those without access to private vehicles:
   a. If schools are in session, transport (buses) will evacuate students directly to the assigned Reception Centers.
   b. School children, if school is in session, are given priority in assigning transit vehicles.
   c. Bus mobilization time is considered in ETE calculations.
   d. Analysis of the number of required “waves” of transit vehicles used for evacuation is presented.
9. It is reasonable to assume that some of the transit-dependent people within the EPZ will ride-share with family, neighbors, and friends, thus reducing the demand for buses. We assume that the percentage of people who rideshare is 50 percent. This assumption is based upon reported experience for other emergencies[3] which cites previous evacuation experience. The remaining transit-dependent portion of the general population will be evacuated to Reception Centers by bus.
10. In the case of rain, it is assumed that the rain begins prior to, or at about the same time as the evacuation advisory is issued. No weather-related reduction in the number of transients who may be present in the EPZ is assumed. Adverse weather scenarios affect roadway capacity and free flow highway speeds. The factors assumed for the ETE study are:

Scenario	Highway Capacity*	Free Flow Speed*	Mobilization Time
Rain	90%	90%	No Effect
*Adverse weather capacity and speed values are given as a percentage of good weather conditions. Roads are assumed to be passable.			

11. School buses used to transport students are assumed to have the capacity to transport 70 children per bus for elementary schools, and 50 children per bus for middle and high schools. Transit buses used to transport the transit-dependent general population are assumed to transport an average of 30 people per bus.
12. A new bridge is being constructed across the Mississippi River connecting the Pointe Coupeé and West Feliciana Parishes, just south of the River Bend Station location. We assume this bridge is not used during the evacuation. People from Pointe Coupeé would have to travel toward the plant if they were to use the bridge to evacuate. People from West Feliciana would use US HWY 61, a high capacity road that provides direct

[3] Institute for Environmental Studies, University of Toronto, THE MISSISSAUGA EVACUATION FINAL REPORT, June 1981. The report indicates that 6,600 people of a transit-dependent population of 8,600 people shared rides with other residents; a ride share rate of 76% (Page 5-10).

access to the Reception Centers. Hence, our assumption that the bridge would not be used during the evacuation is valid. The bridge was not included in the analysis network.

13. It is assumed that the correctional facilities within the EPZ will be evacuated on special buses with a capacity of 40 people per bus. It is also assumed that some staff (1 staff person per 5 inmates) is also present on the buses to guard them. The remaining staff will evacuate by personal vehicles.

14. The construction activity proposed for the new unit would start around 2012 with an active work force of 3,150 workers. A maximum shift of 1,575 workers (half the active work force) will be present at the site, even during the peak of the construction activity in 2014. The plant will be operational by 2017. Since the population in Pointe Coupeé Parish is declining, we do not extrapolate the population estimates to the construction time frame for the special event scenario. The population in 2017 is assumed to be equal to that in 2008.

3. DEMAND ESTIMATION

The estimates of demand, expressed in terms of people and vehicles, constitute a critical element in developing an evacuation plan. These estimates consist of three components:

1. An estimate of population within the Emergency Planning Zone (EPZ), stratified into groups (resident, employee, transient).
2. An estimate, for each population group, of mean occupancy per evacuating vehicle. This estimate is used to determine the number of evacuating vehicles.
3. An estimate of potential double-counting of vehicles.

Appendix E presents much of the source material for the population estimates. Our primary source of population data, the 2000 Census, however, is not adequate for directly estimating some transient groups.

Throughout the year, vacationers and tourists enter the EPZ. These non-residents may dwell within the EPZ for a short period (e.g. a few days or one or two weeks), or may enter and leave within one day. Estimates of the size of these population components must be obtained, so that the associated number of evacuating vehicles can be ascertained.

The potential for double-counting people and vehicles must be addressed. For example:

- A resident who works and shops within the EPZ could be counted as a resident, again as an employee and once again as a shopper.
- A visitor who stays at a hotel and spends time at a park, then goes shopping could be counted three times.

Furthermore, the number of vehicles at a location depends on time of day. For example, motel parking lots may be full at dawn and empty at noon. Similarly, parking lots at area parks, which are full at noon, may be almost empty at dawn. It is clearly wrong to estimate counts of vehicles by simply adding up the capacities of different types of parking facilities, without considering such factors.

Analysis of the population characteristics of the River Bend Station (RBS) EPZ indicates the need to identify three distinct groups:

- Permanent residents - people who are year-round residents of the EPZ.
- Transients - people who reside outside of the EPZ, who enter the area for a specific purpose (e.g., boating, camping) and then leave the area.
- Commuter-Employees - people who reside outside the EPZ and commute to businesses within the EPZ on a daily basis.

The RBS EPZ has been subdivided into 18 Protective Action Sections (PAS) as shown in Figure 3-1. Estimates of the population and number of evacuating vehicles for each of the population groups are presented for each PAS and by polar coordinate representation (population rose). The population estimates for each PAS are displayed in Figure 3-1.

Permanent Residents

The primary source for estimating permanent population is the latest U.S. Census data. The average household size (2.52 persons/household) and the number of evacuating vehicles per household (1.53 vehicles/household) were adapted from the telephone survey results.

Comparing census estimates available for the year 2006, with those for 2000, it is possible to estimate the rate of population change over time and to project the year 2000 resident population to a 2008 base year. The rate of population change was found for each parish in the EPZ and applied to project population growth to 2008. The data in Table 3-1 show that the EPZ population has decreased by 1.2 percent over the last 8 years.

Permanent resident population and vehicle estimates for 2008 are presented in Table 3-2. Table 3-3 presents the permanent resident population in each PAS by age. Figures 3-2 and 3-3 present the permanent resident population and permanent resident vehicle estimates by sector and distance from the RBS. This “rose” was constructed using GIS software.

Construction

A “special event” scenario (Scenario 11) which represents a typical winter, weekend, midday with construction workers on-site at the time of the emergency, was considered. The peak construction period – based on discussions with Entergy – would be in the year 2014, with an active workforce estimate of 3,150 workers. A maximum of 1,575 workers (half the active work force) will be present at the site during the peak shift in 2014. An average vehicle occupancy of 1.01 workers per vehicle (adapted from telephone survey results) was used to convert workers to vehicles –1,559 total vehicles.

The existing roadway system was used for the construction scenario; no roadway improvements were considered. Since the population in Pointe Coupee Parish is declining, the extrapolated population in 2014 would be lower than in 2008. We conservatively assume that the permanent resident and shadow populations in 2014 are the same as those in 2008.

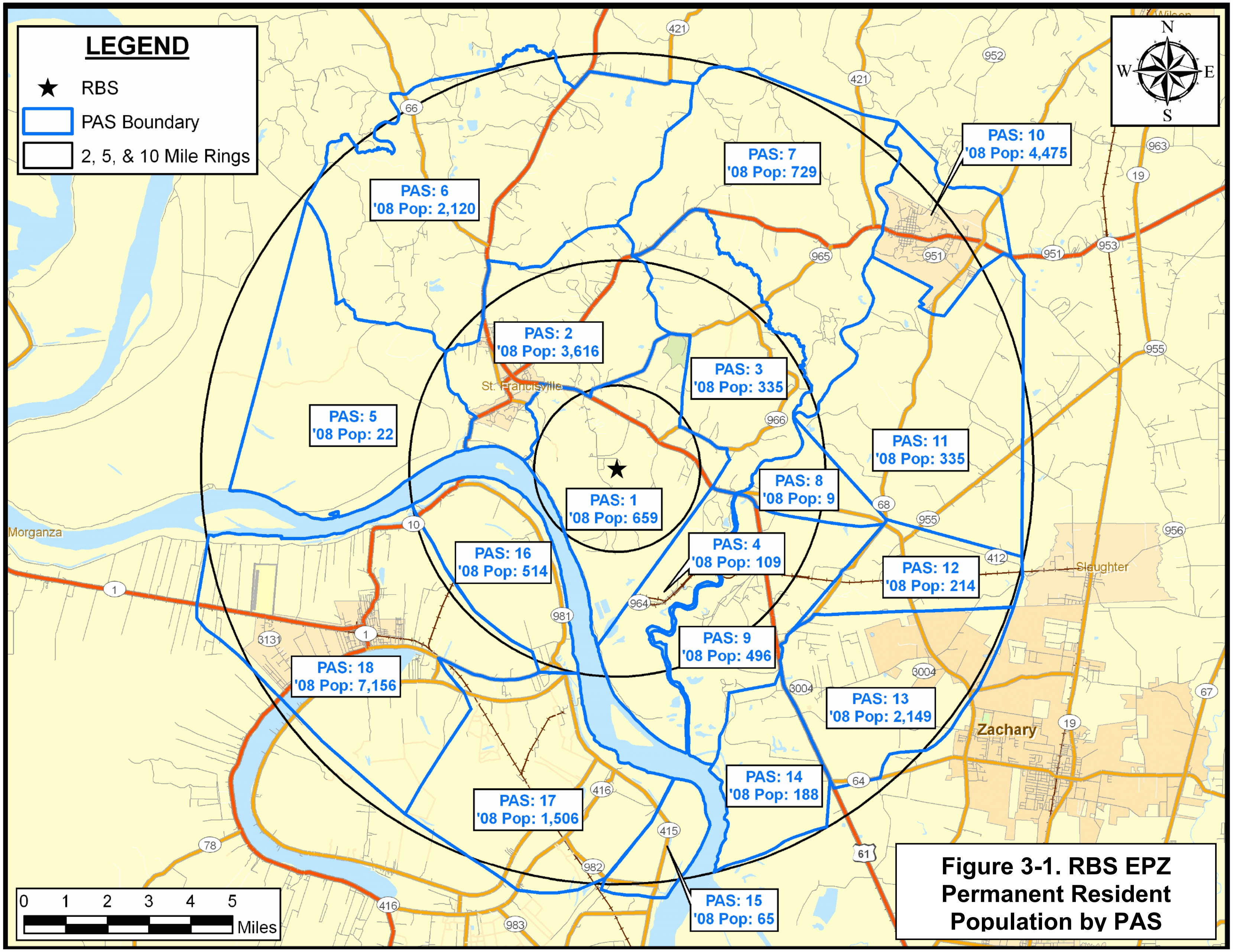


Figure 3-1. RBS EPZ Permanent Resident Population by PAS

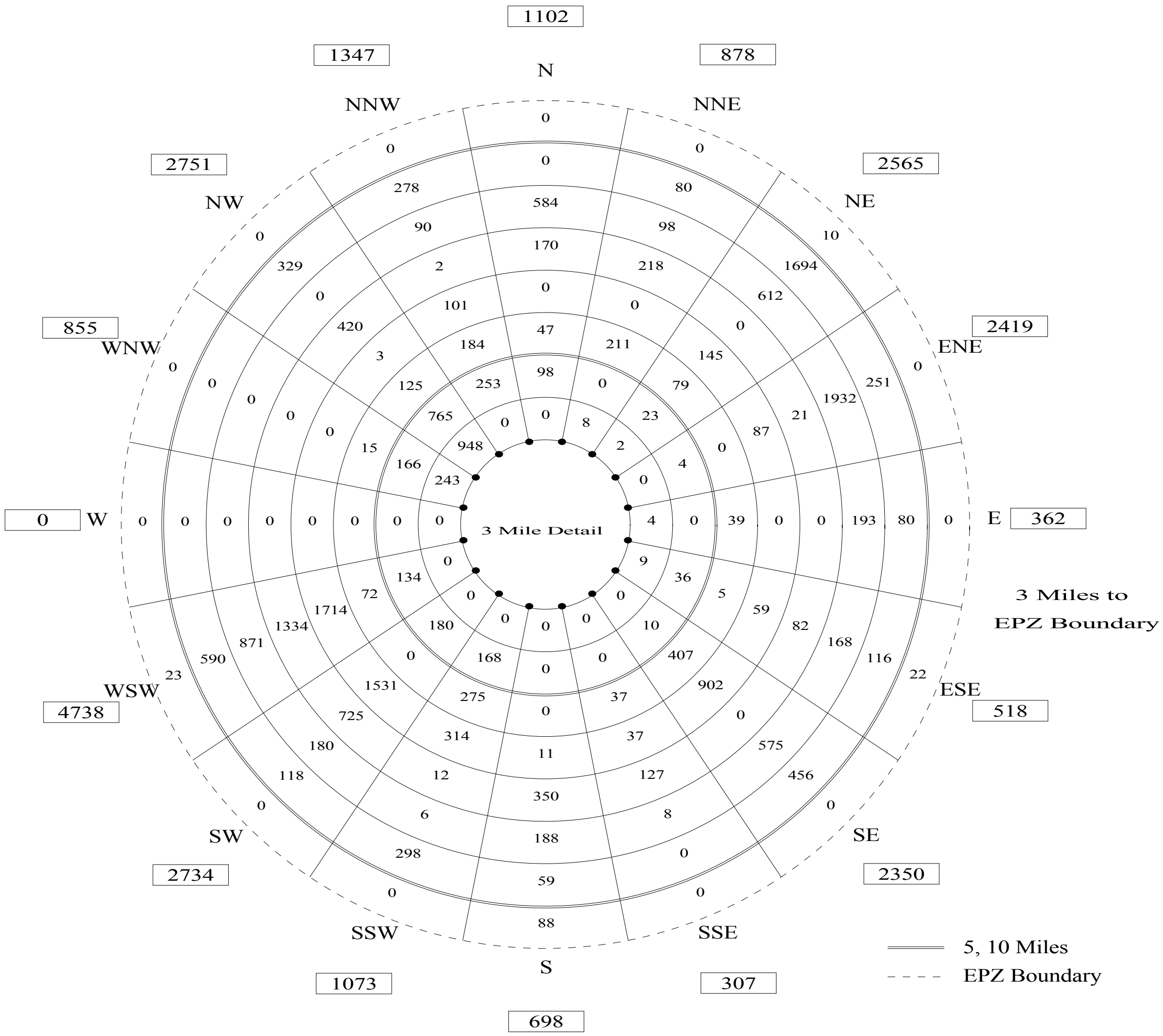
Table 3-1. EPZ Permanent Resident Population		
PAS	**2000 Population**	**2008 Population**
1	636	659
2	3,490	3,616
3	324	335
4	105	109
5	21	22
6	2,048	2,120
7	704	729
8	8	9
9	459	496
10	4,151	4,475
11	311	335
12	198	214
13	2,040	2,149
14	180	188
15	62	65
16	576	514
17	1,682	1,506
18	8,005	7,156
TOTAL	**25,000**	**24,697**
Change in Population:		**-1.2 %**

Note: The yearly population growth rates for each Parish were estimated from available census data (Year 2000 thru Year 2006) on the US Census Bureau website. These rates were used to extrapolate the population of each PAS from the 2000 Census data to the Year 2008.

Parish	WFP	EFP	PCP	EBRP	WBRP
Growth Rate	0.44%	0.96%	-1.40%	0.65%	0.68%

Table 3-2. Permanent Resident Population and Vehicles by PAS		
PAS	**2008 Population**	**2008 Vehicles**
1	659	398
2	3,616	2,195
3	335	203
4	109	66
5	22	13
6	2,120	1,287
7	729	442
8	9	5
9	496	301
10	4,475	2,718
11	335	204
12	214	130
13	2,149	1,305
14	188	114
15	65	40
16	514	312
17	1,506	914
18	7,156	4,343
TOTAL	**24,697**	**14,990**

Table 3-3. Permanent Resident Population by Age					
PAS	Age Group				Total Population (2008)
	Under 5	Between 5 & 17	Between 18 & 64	65 & Above	
1	50	151	391	67	659
2	277	846	2,087	406	3,616
3	21	80	203	31	335
4	6	24	78	1	109
5	1	1	17	3	22
6	150	535	1,258	177	2,120
7	41	169	435	84	729
8	1	0	5	3	9
9	36	90	323	47	496
10	213	463	3,507	292	4,475
11	20	58	217	40	335
12	5	52	134	23	214
13	139	524	1,309	177	2,149
14	8	49	118	13	188
15	3	12	47	3	65
16	29	112	340	33	514
17	95	285	944	182	1,506
18	498	1,485	4,016	1,157	7,156
TOTAL	1,593	4,936	15,429	2,739	24,697



Resident Population			
Miles	Ring Subtotal	Total Miles	Cumulative Total
0-1	54	0-1	54
1-2	323	0-2	377
2-3	1411	0-3	1788
3-4	1214	0-4	3002
4-5	1837	0-5	4839
5-6	1496	0-6	6335
6-7	4904	0-7	11239
7-8	3461	0-8	14700
8-9	5505	0-9	20205
9-10	4349	0-10	24554
10-EPZ	143	0-EPZ	24697

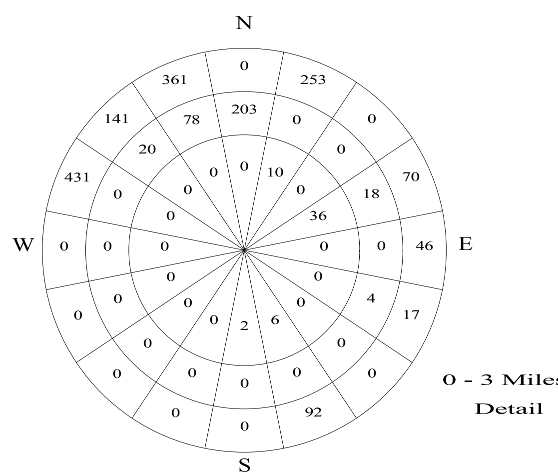
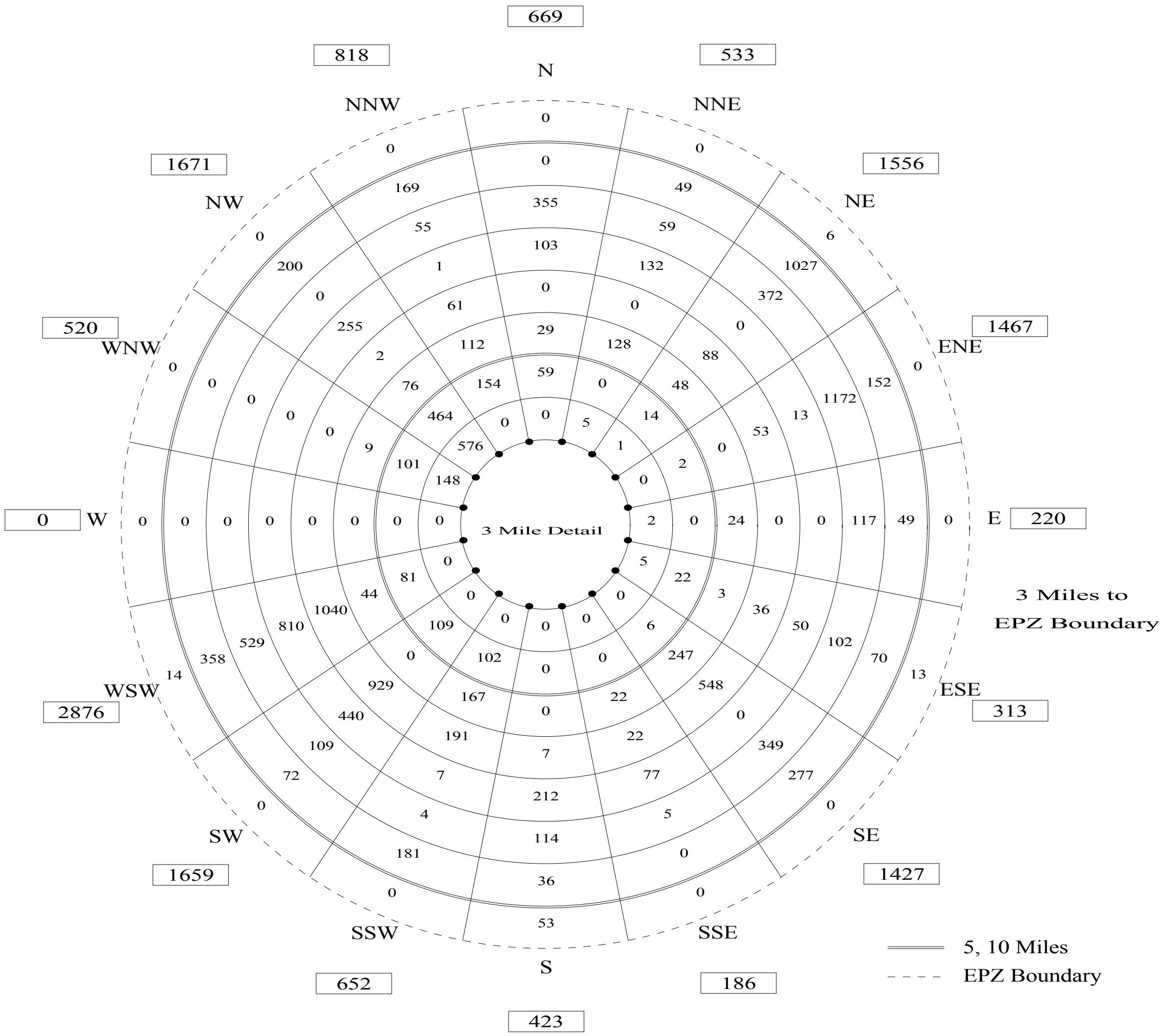


Figure 3-2. Permanent Residents by Sector



Resident Vehicles			
Miles	Ring Subtotal	Total Miles	Cumulative Total
0-1	33	0-1	33
1-2	195	0-2	228
2-3	857	0-3	1085
3-4	737	0-4	1822
4-5	1114	0-5	2936
5-6	909	0-6	3845
6-7	2977	0-7	6822
7-8	2100	0-8	8922
8-9	3342	0-9	12264
9-10	2640	0-10	14904
10-EPZ	86	0-EPZ	14990

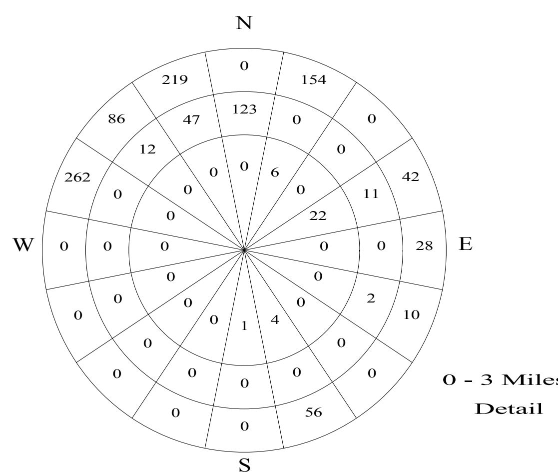


Figure 3-3. Permanent Resident Vehicles by Sector

Transient Population

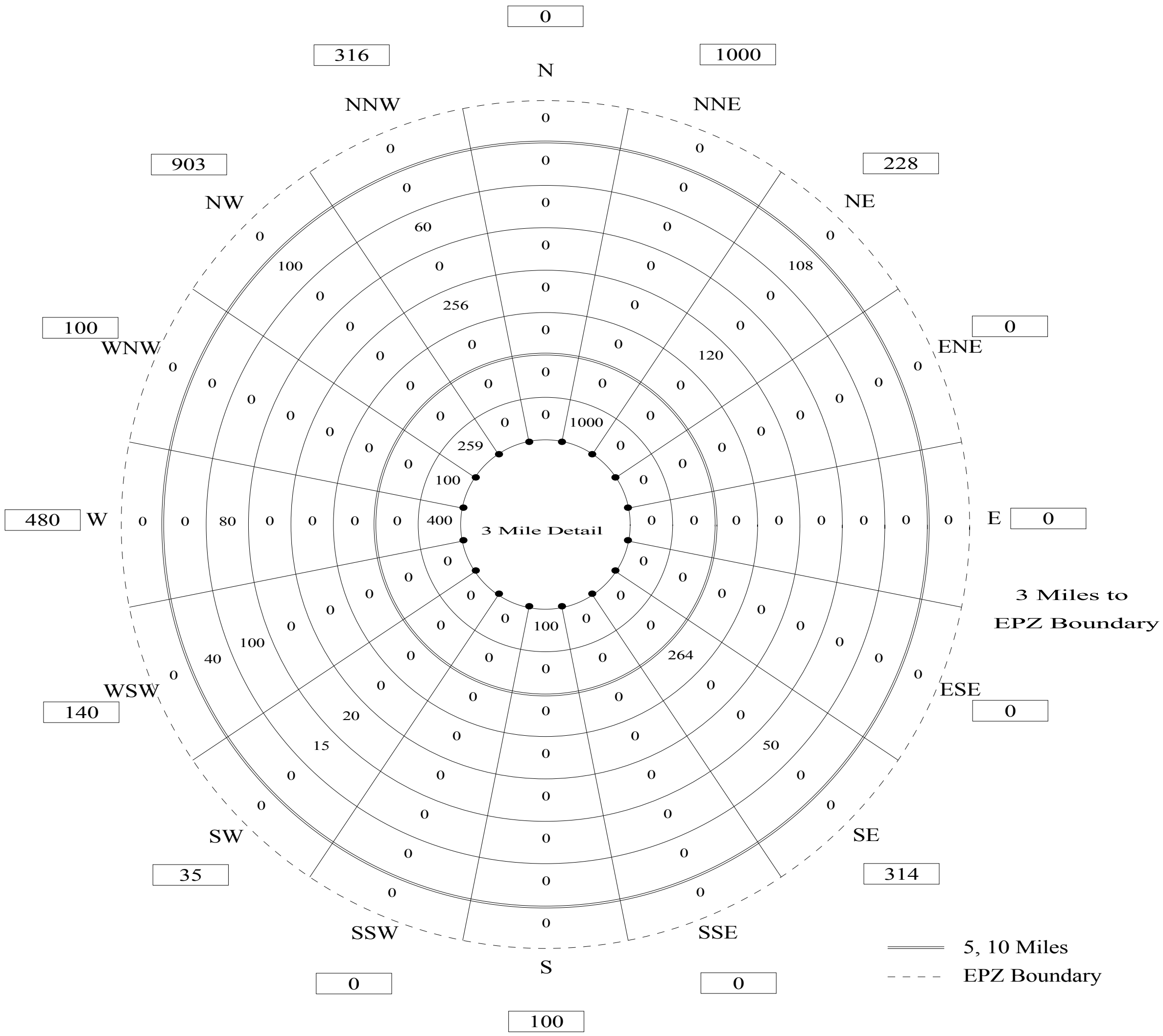
Transient population groups are defined as those people who are not permanent residents and who enter the EPZ for a specific purpose (shopping, recreation). Transients may spend less than one day or stay overnight or longer at rented apartments, camping facilities, hotels and motels.

Estimates of the peak attendance at these transient facilities were obtained from the previous study report. Internet searches and telephone calls were also used to obtain more detailed information about these facilities and supplement the data provided. The peak transient population within the RBS EPZ is estimated as 3,616 people evacuating in 1,165 vehicles. As in the previous report, some of the transients travel by van (capacity = 12 people) to visit some of the recreational/historical sites within the EPZ. Those transients arriving in St. Francisville on the River Boats are picked up by chartered buses and taken on tours of the nearby historic areas. We assume 40 passengers per bus for these transients.

There are 10 lodging facilities in the EPZ. Appendix E details the hotel data obtained. The peak attendance at the hotels and motels is estimated as 334 people evacuating in 200 vehicles (Assumed 1.65 people per car, the same as the number of residents per vehicle as obtained from the telephone survey – except for Pointe Coupee Bed & Breakfast which indicated typically 2 transient vehicles are present during peak times).

Appendix E includes more details on the transient estimates and a map of the recreational areas and lodging facilities.

Table 3-4. Summary of Transients by PAS								
	Transients				Transient Vehicles			
PAS	Hotels	Recreational Areas	Historical Sites	Total	Hotels	Recreational Areas	Historical Sites	Total
1	16	628	1,000	1,644	10	314	84	408
2	109	400	250	759	66	20	125	211
3				0				0
4				0				0
5		80		80		40		40
6	6	410		416	4	100		104
7	120			120	73			73
8				0				0
9			264	264			132	132
10	8		100	108	5		50	55
11				0				0
12				0				0
13		50		50		50		50
14				0				0
15				0				0
16				0				0
17				0				0
18	75	100		175	42	50		92
TOTAL	**334**	**1,668**	**1,614**	**3,616**	**200**	**574**	**391**	**1,165**



Transient Population			
Miles	Ring Subtotal	Total Miles	Cumulative Total
0-1	0	0-1	0
1-2	544	0-2	544
2-3	0	0-3	544
3-4	1859	0-4	2403
4-5	0	0-5	2403
5-6	264	0-6	2667
6-7	376	0-7	3043
7-8	20	0-8	3063
8-9	305	0-9	3368
9-10	248	0-10	3616
10-EPZ	0	0-EPZ	3616

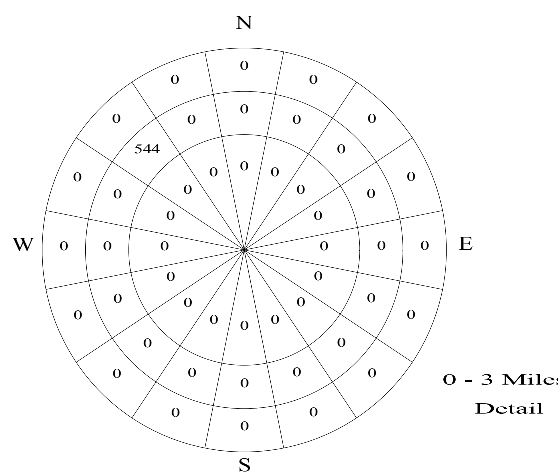
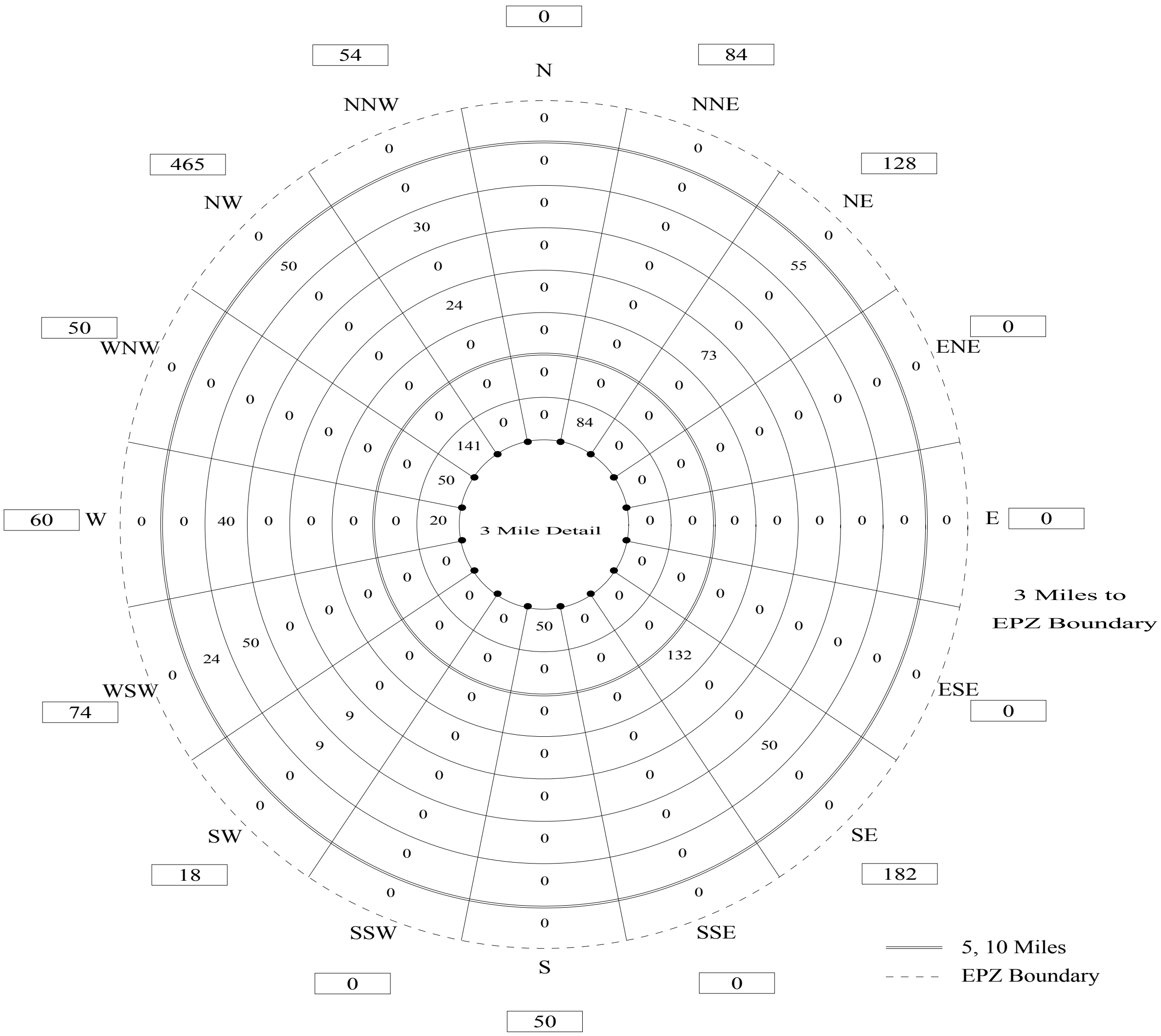


Figure 3-4. Transient Population by Sector



Transient Vehicles			
Miles	Ring Subtotal	Total Miles	Cumulative Total
0-1	0	0-1	0
1-2	274	0-2	274
2-3	0	0-3	274
3-4	345	0-4	619
4-5	0	0-5	619
5-6	132	0-6	751
6-7	97	0-7	848
7-8	9	0-8	857
8-9	179	0-9	1036
9-10	129	0-10	1165
10-EPZ	0	0-EPZ	1165

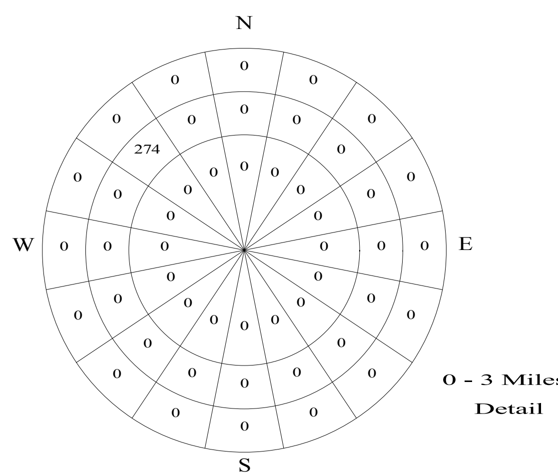


Figure 3-5. Transient Vehicles by Sector

Employees

Employees who work within the EPZ fall into two categories:

- Those who live and work in the EPZ
- Those who live outside of the EPZ and commute to jobs within the EPZ.

Those of the first category are already counted as part of the permanent resident population. To avoid double counting, we focus on those commuting employees who will evacuate along with the permanent resident population.

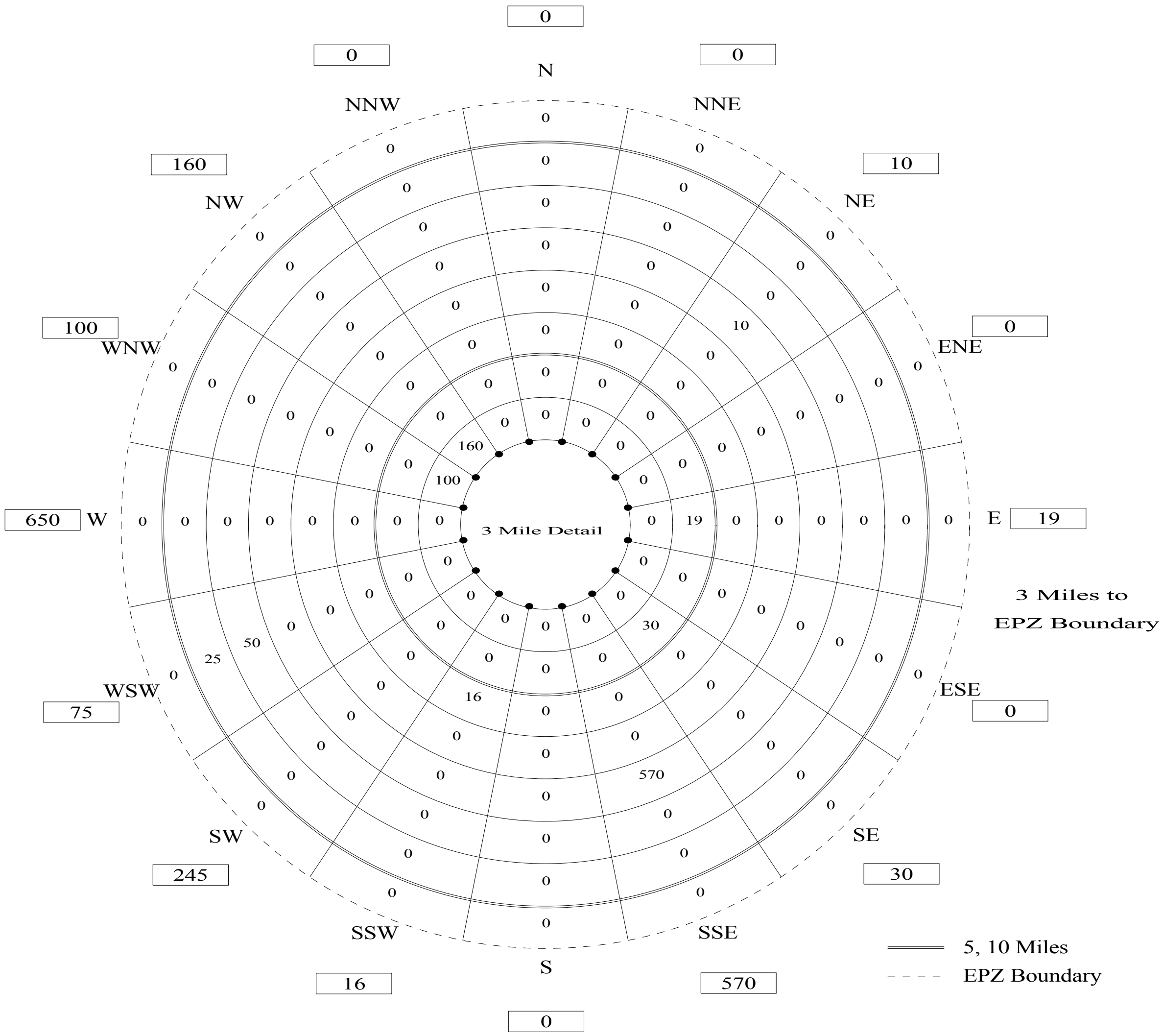
Data for major employers in the EPZ was obtained from previous study reports. Internet searches and telephone calls were also used to obtain more detailed information about these facilities and supplement the data provided. The locations of these facilities were mapped using GIS software. The GIS map was overlaid with the evacuation analysis network and employees were loaded onto appropriate links. The map of major employers in the EPZ can be seen in Appendix E.

An occupancy 1.01 persons per employee-vehicle (some carpooling) obtained from the telephone survey was used to determine the number of evacuating employee vehicles.

Table 3-5 presents non-EPZ resident employees and vehicle estimates by PAS. Figures 3-6 and 3-7 present these data by sector.

Table 3-5. Summary of Non-EPZ Employees by PAS		
PAS	**Total Employees**	**Employee Vehicles**
1	650	644
2	260	257
3	0	0
4	0	0
5	0	0
6	0	0
7	10	10
8	19	19
9	30	30
10	0	0
11	0	0
12	0	0
13	0	0
14	570	565
15	0	0
16	245	243
17	16	16
18	75	75
TOTAL	**1,875**	**1,859**

*NOTE: The number of employees/car (1.01) is obtained from the telephone survey. This is used to estimate the total employee vehicles.



Employees			
Miles	Ring Subtotal	Total Miles	Cumulative Total
0-1	650	0-1	650
1-2	0	0-2	650
2-3	245	0-3	895
3-4	260	0-4	1155
4-5	49	0-5	1204
5-6	16	0-6	1220
6-7	0	0-7	1220
7-8	580	0-8	1800
8-9	50	0-9	1850
9-10	25	0-10	1875
10-EPZ	0	0-EPZ	1875

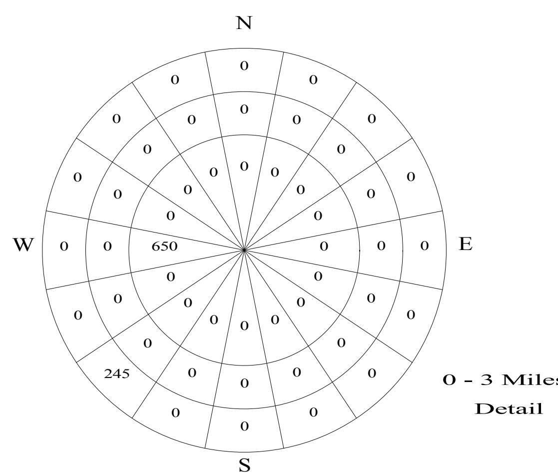
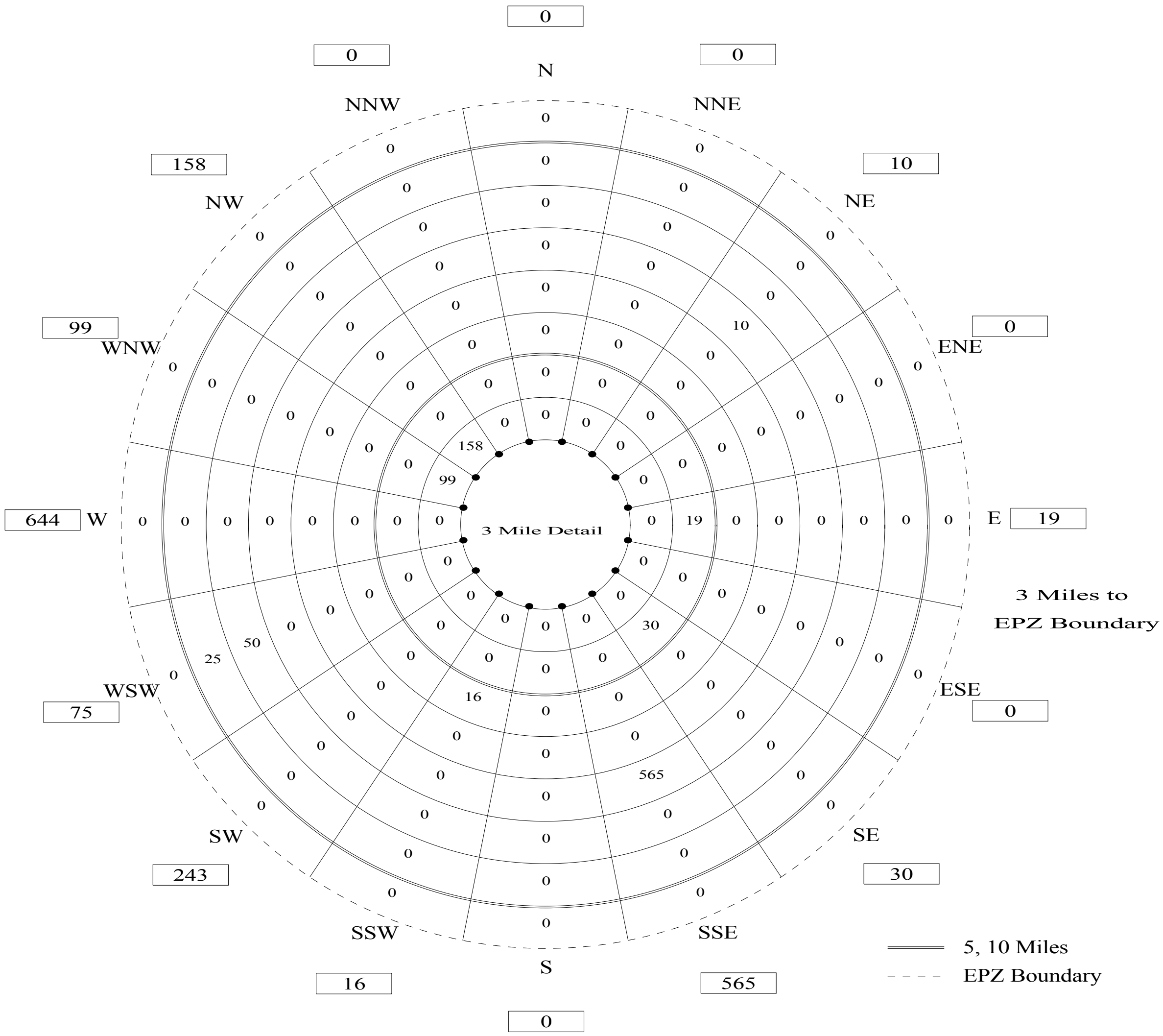


Figure 3-6. Employee Population by Sector



Employee Vehicles			
Miles	Ring Subtotal	Total Miles	Cumulative Total
0-1	644	0-1	644
1-2	0	0-2	644
2-3	243	0-3	887
3-4	257	0-4	1144
4-5	49	0-5	1193
5-6	16	0-6	1209
6-7	0	0-7	1209
7-8	575	0-8	1784
8-9	50	0-9	1834
9-10	25	0-10	1859
10-EPZ	0	0-EPZ	1859

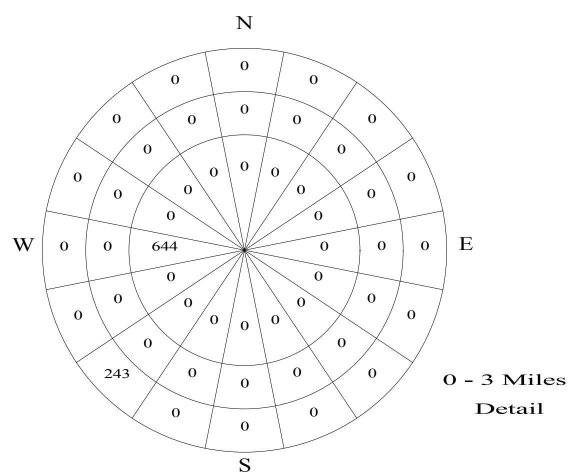


Figure 3-7. Employee Vehicles by Sector

Special Facilities

Chapter 8 details the evacuation of special facilities. Evacuation time estimates were developed separately for medical facilities, schools, correctional facilities and the transit dependent population.

1. Medical Facilities:

   The number and type of evacuating vehicles that need to be provided depends on the patients' states of health. Buses can transport up to 40 people; vans, up to 12 people; ambulances, up to 2 people (patients).

2. Schools

   The number of evacuating vehicles that need to be provided and the evacuation time estimates for each school are evaluated. School buses are assumed to transport 70 children/bus for elementary schools; and 50 children/bus for middle and high schools.

3. Correctional Facilities

   It is assumed that 1 staff person is required for every 5 inmates to guard and escort them to a secure host facility. The remaining staff would evacuate using their personal vehicles. Buses are assumed to transport 40 people for correctional facilities.

4. Transit Dependents

   Bus routes designed to service the transit dependent portion of the population are detailed in Chapter 8. These routes are used to provide evacuation time estimates. These buses are assumed to transport 30 passengers/bus. Buses should circulate in areas with high population density (Jackson, New Roads and St. Francisville). School buses may also be used if they have already completed the evacuation of school children.

Pass-Through Demand

Vehicles will be traveling through the EPZ (external-external trips) at the time of an accident. After the advisory to evacuate is announced, these through travelers will also evacuate. These through vehicles are assumed to travel on the major routes through the EPZ (e.g. US Hwy 61) at a volume of 300 vehicles per lane. It is assumed that this traffic will continue to enter the EPZ during the first 90 minutes following the advisory to evacuate. We estimate approximately 3,300 vehicles per hour enter the EPZ as pass-through trips during this period.

4. ESTIMATION OF HIGHWAY CAPACITY

The ability of the road network to service vehicle demand is a major factor in determining how rapidly an evacuation can be completed. The capacity of a road is defined as the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point or uniform section of a lane of roadway during a given time period under prevailing roadway, traffic and control conditions (From the 2000 Highway Capacity Manual).

In discussing capacity, different operating conditions have been assigned alphabetical designations, A through F, to reflect the range of traffic operational characteristics. These designations have been termed "Levels of Service" (LOS). For example, LOS A connotes free-flow and high-speed operating conditions; LOS F represents a forced flow condition. LOS E describes traffic operating at or near capacity.

Because of the effect of weather on the capacity of a roadway, it is necessary to adjust capacity figures to represent the prevailing conditions during inclement weather. Based on limited empirical data, weather conditions such as heavy rain reduce the values of free speed and of highway capacity by approximately 10 percent. Over the last decade new studies have been made on the effects of rain on traffic capacity. These studies indicate a range of effects between 5 and 20 percent depending on wind speed and precipitation rates.

Given the rural character of the EPZ, congestion arising from evacuation is not likely to exist. Nonetheless, estimates of roadway capacity must be determined with great care. Because of its importance, a brief discussion of the major factors that influence highway capacity is presented in this section.

Capacity Estimations on Approaches to Intersections

At-grade intersections are apt to become the first bottleneck locations under local heavy traffic volume conditions. This characteristic reflects the need to allocate access time to the respective competing traffic streams by exerting some form of control. During evacuation, control at critical intersections will often be provided by traffic control personnel assigned for that purpose, whose directions may supersede traffic control devices. The Traffic Management Plan identifies these locations (called Traffic Control Points, TCP) and the management procedures applied.

The per-lane capacity of an approach to a signalized intersection can be expressed (simplistically) in the following form:

$$Q_{cap,m} = \left(\frac{3600}{h_m}\right) \bullet \left[\frac{G-L}{C}\right]_m = \left(\frac{3600}{h_m}\right) \bullet P_m$$

where:

$Qcap,m$	=	Capacity of a single lane of traffic on an approach, which executes movement, *m*, upon entering the intersection; vehicles per hour (vph)
h_m	=	Mean queue discharge headway of vehicles on this lane that are executing movement, *m*; seconds per vehicle
G	=	The mean duration of GREEN time servicing vehicles that are executing movement, *m*, for each signal cycle; seconds
L	=	The mean "lost time" for each signal phase servicing movement, *m*; seconds
C	=	The duration of each signal cycle; seconds
P_m	=	The proportion of GREEN time allocated for vehicles executing movement, *m*, from this lane. This value is specified as part of the control treatment.
m	=	The movement executed by vehicles after they enter the intersection: through, left-turn, right-turn, diagonal.

The turn-movement-specific mean discharge headway h_m, depends in a complex way upon many factors: roadway geometrics, turn percentages, the extent of conflicting traffic streams, the control treatment, and others. A primary factor is the value of "saturation queue discharge headway", h_{sat}, which applies to through vehicles that are not impeded by other conflicting traffic streams. This value, itself, depends upon many factors including motorist behavior. Formally, we can write,

$$h_m = f_m (h_{sat}, F_1, F_2, ...)$$

where:

h_{sat}	=	Saturation discharge headway for through vehicles; seconds per vehicle
F_1, F_2	=	The various known factors influencing h_m
$f_m (\cdot)$	=	Complex function relating h_m to the known (or estimated) values of $h_{sat}, F_1, F_2, \ldots$

The estimation of h_m for specified values of $h_{sat}, F_1, F_2, ...$ is undertaken within the PC-DYNEV simulation model and within the TRAD model by a mathematical model[1]. The resulting values for h_m always satisfy the condition:

$$h_m \geq h_{sat}$$

1 Lieberman, E., "Determining Lateral Deployment of Traffic on an Approach to an Intersection", McShane, W. & Lieberman, E., "Service Rates of Mixed Traffic on the far Left Lane of an Approach". Both papers appear in Transportation Research Record 772, 1980.

That is, the turn-movement-specific discharge headways are always greater than, or equal to the saturation discharge headway for through vehicles. These headways (or its inverse equivalent, "saturation flow rate"), may be determined by observation or using the procedures of the Highway Capacity Manual.

Capacity Estimation Along Sections of Highway

The capacity of highway sections -- as distinct from approaches to intersections -- is a function of roadway geometrics, traffic composition (e.g. percent heavy trucks and buses in the traffic stream) and, of course, motorist behavior. There is a fundamental relationship which relates service volume (i.e. the number of vehicles serviced within a uniform highway section in a given time period) to traffic density. Figure 4-1 describes this relationship.

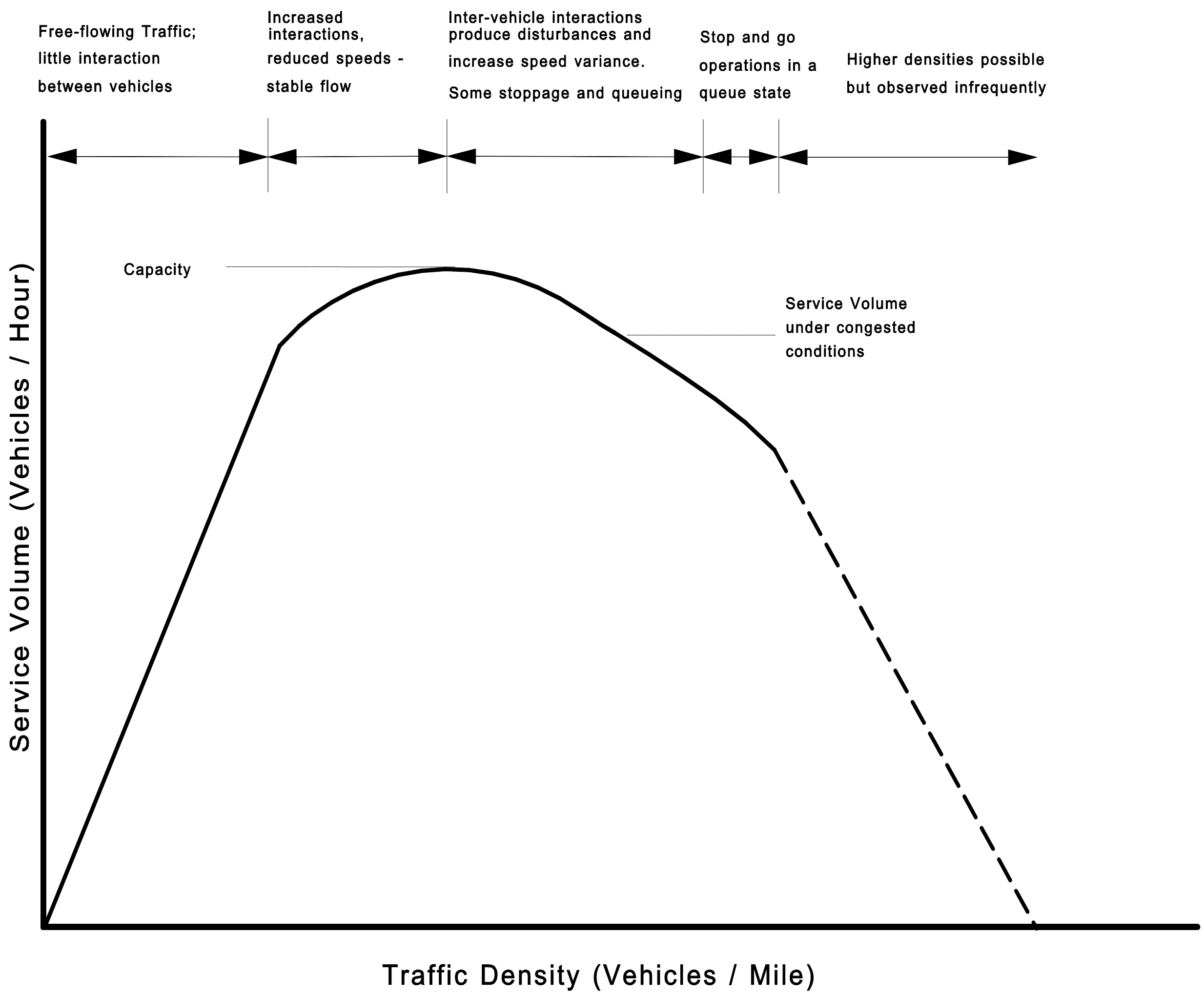


Figure 4-1. Fundamental Relationship Between Volume and Density

As indicated, there are two flow regimes: (1) Free Flow (left side of curve); and (2) Forced Flow (right side of curve). In the Free Flow regime, the traffic demand is fully serviced; this service volume increases as demand volume and density increase, until the service volume attains its maximum value, which is the capacity of the highway section. As traffic demand and the resulting highway density increase beyond this "critical" value, the rate at which traffic can be serviced (i.e. the service volume) can actually <u>decline</u> below capacity. Therefore, in order to realistically represent traffic performance during congested conditions (i.e. when demand exceeds capacity), it is necessary to estimate the service volume, V_F, under congested conditions.

The value of V_F can be expressed as:

$$V_F = R \times \text{Capacity}$$

where R = Reduction factor which is less than unity.

Based on empirical data collected on freeways, we have employed a value of R=0.85. It is important to mention that some investigators, on analyzing data collected on freeways, conclude that little reduction in capacity occurs even when traffic is operating at Level of Service, *F*. While there is conflicting evidence on this subject, we adopt a conservative approach and use a value of capacity, V_F, that is applied during LOS F conditions; V_F, is lower than the specified capacity.

The estimated value of capacity is based primarily upon the type of facility and on roadway geometrics. Sections of roadway with adverse geometrics are characterized by lower free-flow speeds and lane capacity.

The procedure used here was to estimate "section" capacity, V_E, based on observations made traveling over each section of the evacuation network, by the posted speed limits and travel behavior of other motorists and by reference to the 2000 Highway Capacity Manual. It was then determined for each highway section, represented as a network link, whether its capacity would be limited by the "section-specific" service volume, V_E, or by the intersection-specific capacity. For each link, the model selects the lower value of capacity.

<u>Application to the River Bend Station EPZ</u>

As part of the development of the RBS EPZ traffic network, an estimate of roadway capacity is required. The source material for the capacity estimates presented herein is contained in:

> 2000 Highway Capacity Manual (HCM)
> Transportation Research Board
> National Research Council
> Washington, D.C.

The highway system in the RBS EPZ consists primarily of two categories of roads and, of course, intersections:

- Local roads
- Multi-lane Highways (e.g., US Hwy 61)

Each of these classifications will be discussed.

Local Roads

Ref: HCM Chapter 20

Two lane roads (one-lane each direction) comprise the majority of roads within the EPZ. The per-lane capacity of a two-lane highway is estimated at 1700 passenger cars per hour (pc/h). This estimate is essentially independent of the directional distribution of traffic volume except that, for extended distances, the two-way capacity will not exceed 3200 pc/h. The HCM procedures then estimate Level of Service and Average Travel Speed. The evacuation simulation model accepts the specified value of capacity as input and computes average speed based on the time-varying demand: capacity relations.

Based on the field survey and on expected traffic operations associated with evacuation scenarios:

- Most sections of two-lane roads within the EPZ are classified as “Class I”, with "level terrain"; some are “rolling terrain”.
- “Class II” highways are mostly those within city limits.

Multi-Lane Highway

Ref: HCM Chapter 21

Exhibit 21-23 (in the HCM) presents a set of curves that indicates a per-lane capacity of approximately 2100 pc/h, for free-speeds of 55-60 mph. Based on observation, the multi-lane highways within the EPZ service traffic with free-speeds in this range. The actual time-varying speeds computed by the simulation model reflect the demand:capacity relationship and the impact of control at intersections.

Intersections

Ref: HCM Chapters 16, 17

Procedures for estimating capacity and LOS for approaches to intersections are presented in Chapters 16 (signalized intersections) and 17 (un-signalized intersections). These are the two longest chapters in the HCM 2000, reflecting the complexity of these procedures. The simulation logic is likewise complex, but different; as stated on page 31-21 of the HCM2000: "Assumptions and complex theories are used in the simulation model to represent the real-world dynamic traffic environment."

5. ESTIMATION OF TRIP GENERATION TIME

Federal Government guidelines (see NUREG 0654, Appendix 4) specify that the planner estimate the distributions of elapsed times associated with mobilization activities undertaken by the public to prepare for the evacuation trip. The elapsed time associated with each activity is represented as a statistical distribution reflecting differences between members of the public. The quantification of these activity-based distributions relies largely on the results of the telephone survey (Appendix F). We define the sum of these distributions of elapsed times as the Trip Generation Time Distribution.

Background

In general, an accident at a nuclear power station is characterized by the following Emergency Action Classification Levels (see Appendix 1 of NUREG 0654 for details):

1. Unusual Event
2. Alert
3. Site Area Emergency
4. General Emergency

At each level, the Federal guidelines specify a set of Actions to be undertaken by the Licensee, and by State and Local offsite authorities. As a Planning Basis, we will adopt a conservative posture, in accord with Federal Regulations, that a rapidly escalating accident will be considered in calculating the Trip Generation Time. We will assume:

a. The advisory to evacuate will be announced coincident with the emergency notification.
b. Mobilization of the general population will commence up to 10 minutes after the alert notification.
c. Evacuation Time Estimates (ETEs) are measured relative to the advisory to evacuate.
d. Schools will be evacuated prior to the advisory to evacuate; if circumstances permit.

We emphasize that the adoption of this planning basis is not a representation that these events will occur at the River Bend Station (RBS) within the indicated time frame. Rather, these assumptions are necessary in order to:

- Establish a temporal framework for estimating the Trip Generation distribution as recommended in Appendix 4 of NUREG 0654.

- Identify temporal points of reference that uniquely define "Clear Time" and ETE.

It is more likely that a longer time will elapse between the various classes of an emergency at RBS and that the advisory to evacuate is announced somewhat later than the siren alert.

For example, suppose one hour elapses from the siren alert to the advisory to evacuate. In this case, it is reasonable to expect some degree of spontaneous evacuation by the public during this one-hour period. As a result, the population within the Emergency Planning Zone (EPZ) will be lower when the advisory to evacuate is announced, than at the time of the General Emergency. Thus, the time needed to evacuate the EPZ, after the advisory to evacuate will be less than the estimates presented in this report.

The notification process consists of two events:

- Transmitting information (e.g. using sirens, tone alerts, EAS broadcasts, loudspeakers).
- Receiving and correctly interpreting the information that is transmitted.

The peak population within the EPZ approximates 30,000 (permanent residents, employees and transients) persons who are deployed over an area of approximately 314 square miles and engaged in a wide variety of activities. It must be anticipated that some time will elapse between the transmission and receipt of the information advising the public of an accident.

The amount of elapsed time will vary from one individual to the next depending where that person is, what that person is doing, and related factors. Furthermore, some persons who will be directly involved with the evacuation process may be outside the EPZ at the time that the emergency is declared. These people may be commuters, shoppers and other travelers who reside within the EPZ and who will return to join the other household members upon receiving notification of an emergency.

As indicated in NUREG 0654, the estimated elapsed times for the receipt of notification can be expressed as a distribution reflecting the different notification times for different people within, and outside, the EPZ. By using time distributions, it is also possible to distinguish between different population groups and different day-of-week and time-of-day scenarios, so that accurate ETEs may be obtained.

For example, people at home or at work within the EPZ will be notified by siren and/or radio. Those well outside the EPZ will be notified by telephone, radio, TV and word-of-mouth, with potentially longer time lags. Furthermore, the spatial distribution of the EPZ population will differ with time of day - families will be united in the evenings, but dispersed during the day. In this respect, weekends will also differ from weekdays.

Fundamental Considerations

The environment leading up to the time that people begin their evacuation trips consists of a sequence of events and activities. Each event (other than the first) occurs at an instant in time and is the outcome of an activity.

Activities are undertaken over a period of time. Activities may be in "series" (i.e. to undertake an activity implies the completion of all preceding activities) or may be in parallel (two or more activities may take place over the same period of time). Activities conducted in series are functionally dependent on the completion of prior activities; activities conducted in parallel are functionally independent of one-another. The relevant events associated with the public's preparation for evacuation are:

Event Number	Event Description
1	No accident condition
2	Awareness of accident situation
3	Depart place of work or elsewhere, to return home
4	Arrive (or be at) home
5	Begin evacuation trip to leave the area

Associated with each sequence of events are one or more activities, as outlined below:

Event Sequence	Activity	Distribution
$1 \rightarrow 2$	Public receives notification information	1
$2 \rightarrow 3$	Prepare to leave work	2
$2,3 \rightarrow 4$	Travel home*	3
$2,4 \rightarrow 5$	Prepare to leave for evacuation trip	4

*If already at home, this is a null (no-time-consumed) activity.

These relationships are shown graphically in Figure 5-1.

An employee who lives outside the EPZ will follow sequence (d) of Figure 5-1; a resident of the EPZ who is at work, and will return home before beginning the evacuation trip will follow sequence (a) of Figure 5-1. Note that event 5, "Leave to evacuate the area," is conditional either on event 2 or on event 4. That is, activity 2 → 5 by a resident at home can be undertaken in parallel with activities 2 → 3, 3 → 4 and 4 → 5 by a commuter returning to that home, as shown in Figure 5-1 (a). Specifically, one adult member of a household can prepare to leave home (i.e. secure the home, pack clothing, etc.), while others are traveling home from work. In this instance, the household members would be able to evacuate sooner than if such trip preparation were deferred until all household members had returned home. For this study, we adopt the conservative posture that all activities will occur in sequence.

It is seen from Figure 5-1, that the Trip Generation time (i.e. the total elapsed time from Event 1 to Event 5) depends on the scenario and will vary from one household to the next. Furthermore, Event 5 depends, in a complicated way, on the time distributions of all activities preceding that event. That is, to estimate the time distribution of Event 5, we must obtain estimates of the time distributions of all preceding events.

Estimated Time Distributions of Activities Preceding Event 5

The time distribution of an event is obtained by "summing" the time distributions of all prior contributing activities. (This "summing" process is quite different than an algebraic sum since we are operating on distributions – not scalar numbers.)

Time Distribution No. 1, Notification Process: Activity 1 → 2

It is reasonable to expect that 85 percent of those within the EPZ will be aware of the accident within 30 minutes with the remainder notified within the following 20 minutes. The notification distribution is given below:

Distribution No. 1, Notification Time: Activity 1 → 2

Elapsed Time (Minutes)	Percent of Population Notified	Elapsed Time (Minutes)	Percent of Population Notified
0	0	30	85
5	7	35	90
10	13	40	95
15	26	45	98
20	46	50	100
25	65		

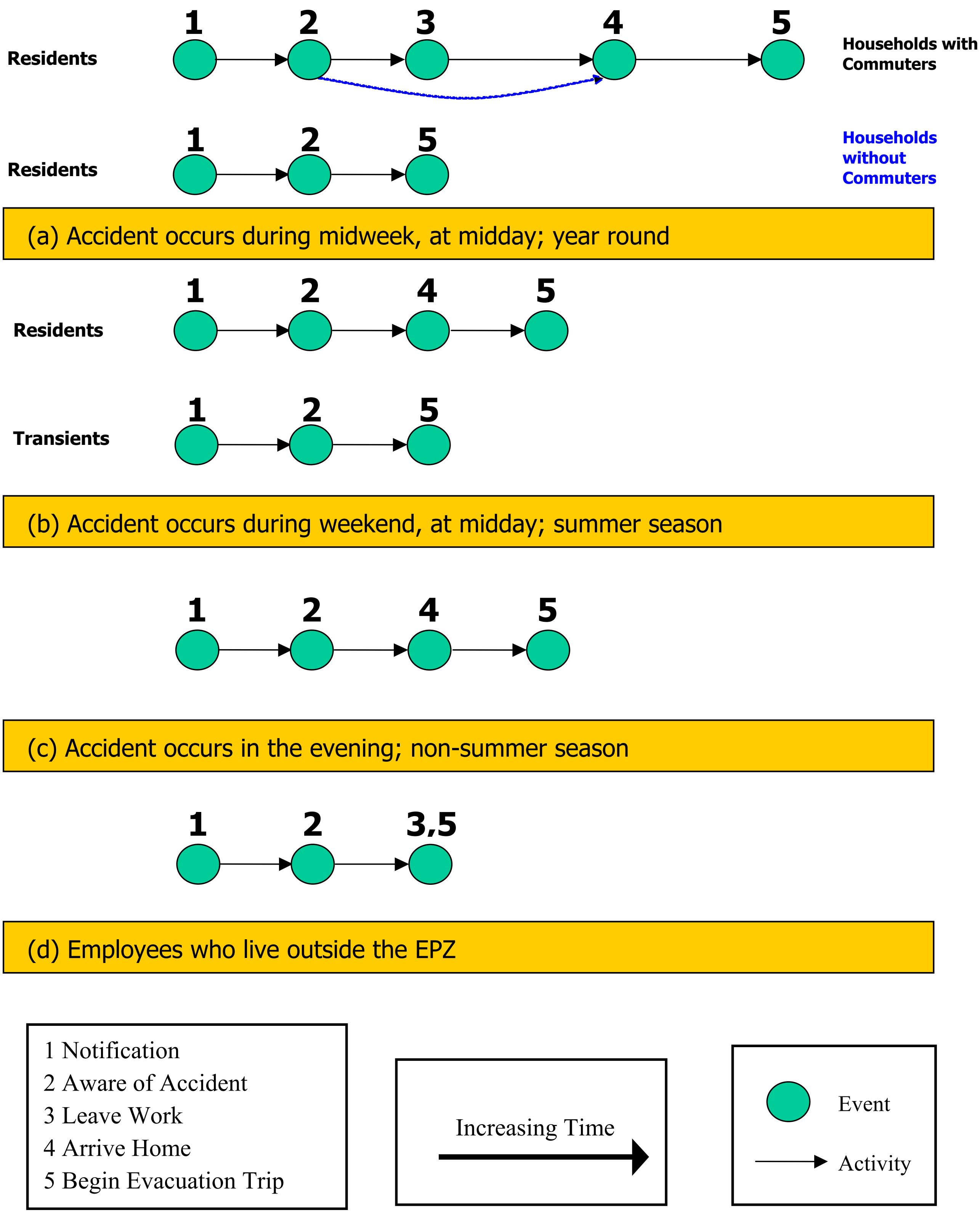


Figure 5-1. Events and Activities Preceding the Evacuation Trip

Distribution No. 2, Prepare to Leave Work: Activity 2 $\rightarrow$ 3

It is reasonable to expect that the vast majority of business enterprises within the EPZ will elect to shut down following notification and most employees would leave work quickly. Commuters, who work outside the EPZ could, in all probability, also leave quickly since facilities outside the EPZ would remain open and other personnel would remain. Personnel or farmers responsible for equipment or livestock would require additional time to secure their facility. The distribution of Activity 2 → 3 reflects data obtained by the telephone survey. This distribution is plotted in Figure 5-2 and listed below.

Elapsed Time (Minutes)	Cumulative Percent Employees Leaving Work	Elapsed Time (Minutes)	Cumulative Percent Employees Leaving Work
0	0	80	97
5	32	85	98
10	46	90	98
15	57	95	98
20	64	100	98
25	70	105	99
30	78	110	99
35	81	115	99
40	83	120	99
45	86	125	99
50	88	130	99
55	90	135	99
60	91	140	99
65	93	145	99
70	95	150	100
75	97		

NOTE: The survey data was normalized to distribute the "Don't know" response

Distribution No. 3, Travel Home: Activity 3 $\rightarrow$ 4

These data are provided directly by the telephone survey. This distribution is plotted in Figure 5-2 and listed below.

Elapsed Time (Minutes)	Cumulative Percent Returning Home	Elapsed Time (Minutes)	Cumulative Percent Returning Home
0	0	65	96
5	16	70	96
10	31	75	97
15	40	80	98
20	50	85	98
25	53	90	99
30	68	95	99
35	75	100	99
40	82	105	99
45	87	110	100
50	89	115	100
55	93	120	100
60	95		

NOTE: The survey data was normalized to distribute the "Don't know" response

Distribution No. 4, Prepare to Leave Home: Activity 2, 4 $\rightarrow$ 5

These data are provided directly by the telephone survey. This distribution is plotted in Figure 5-2 and listed below.

Elapsed Time (Minutes)	Cumulative Pct. Ready to Evacuate
0	0
15	24
30	55
45	62
60	77
75	83
90	85
105	88
120	92
135	94
150	94
165	95
180	96
195	97
210	97
225	97
240	98
255	98
270	98
285	98
300	99
315	99
330	100

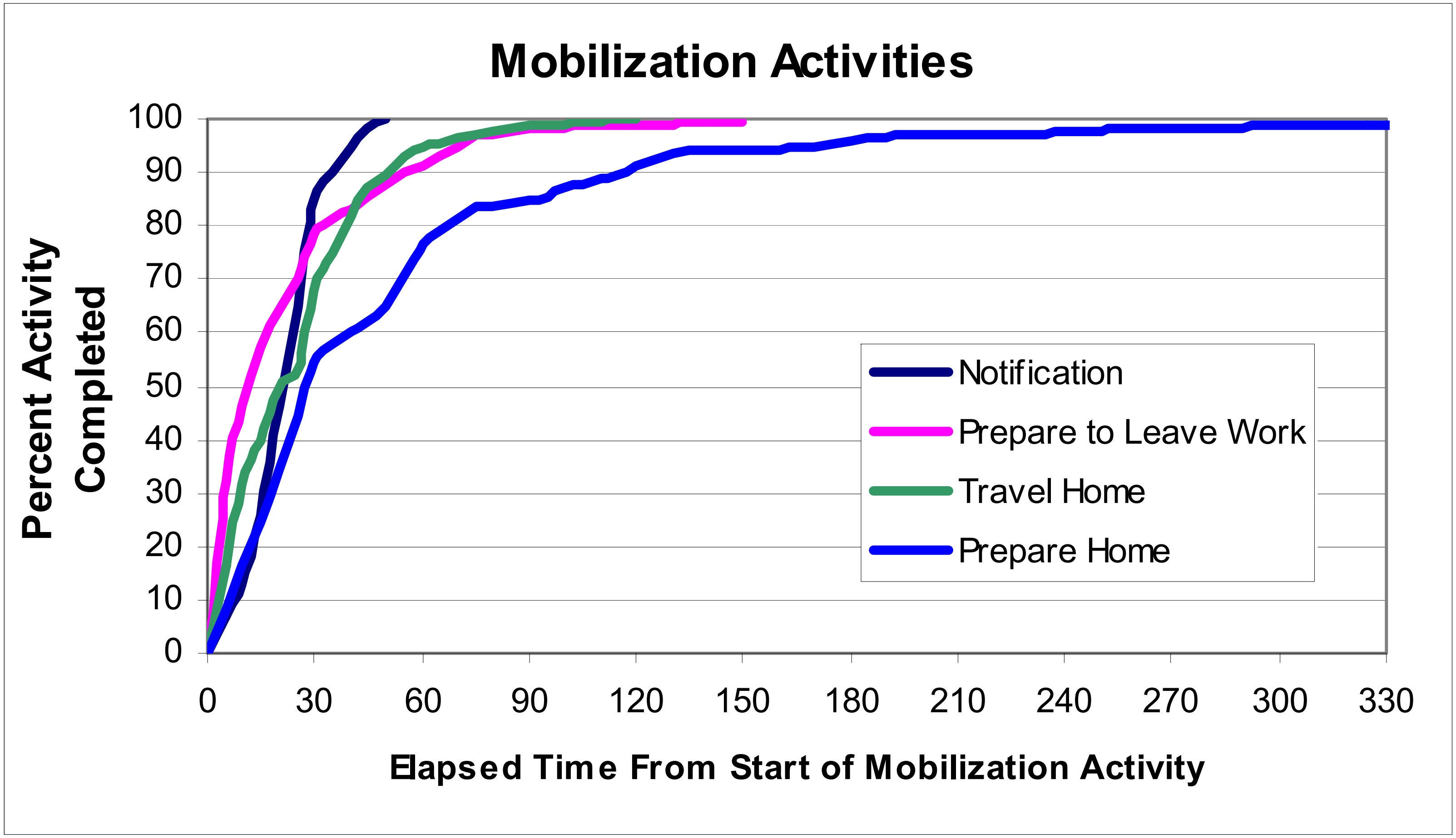


Figure 5-2. Evacuation Mobilization Activities

Calculation of Trip Generation Time Distribution

The time distributions for each of the mobilization activities presented herein must be combined to form the appropriate Trip Generation Distributions. We assume that the stated events take place in sequence such that all preceding events must be completed before the current event can occur. For example, if a household awaits the return of a commuter, the work-to-home trip (Activity 3 $\rightarrow$ 4) must precede Activity 4 $\rightarrow$ 5.

To calculate the time distribution of an event that is dependent on two sequential activities, it is necessary to "sum" the distributions associated with these prior activities. The distribution summing algorithm is applied repeatedly as shown to form the required distribution. As an outcome of this procedure, new time distributions are formed; we assign "letter" designations to these intermediate distributions to describe the procedure.

Apply "Summing" Algorithm To:	**Distribution Obtained**	**Event Defined**
Distributions 1 and 2	Distribution A	Event 3
Distributions A and 3	Distribution B	Event 4
Distributions B and 4	Distribution C	Event 5
Distributions 1 and 4	Distribution D	Event 5

Distributions A through D are described below.

Distribution	Description
A	Time distribution of commuters departing place of work (Event 3). Also applies to employees who work within the EPZ who live outside, and to Transients within the EPZ.
B	Time distribution of commuters arriving home.
C	Time distribution of residents with commuters leaving home to begin the evacuation trip.
D	Time distribution of residents without commuters returning home to begin the evacuation trip.

Figure 5-3 presents the combined trip generation distributions designated A, C, and D. These distributions are presented on the same time scale. The PC-DYNEV simulation model is designed to accept varying rates of vehicle trip generation for each origin centroid, expressed in the form of histograms. These histograms, which represent Distributions A, C, and D, properly displaced with respect to one another, are tabulated in Table 5-1 (Distribution B, Arrive Home, omitted for clarity).

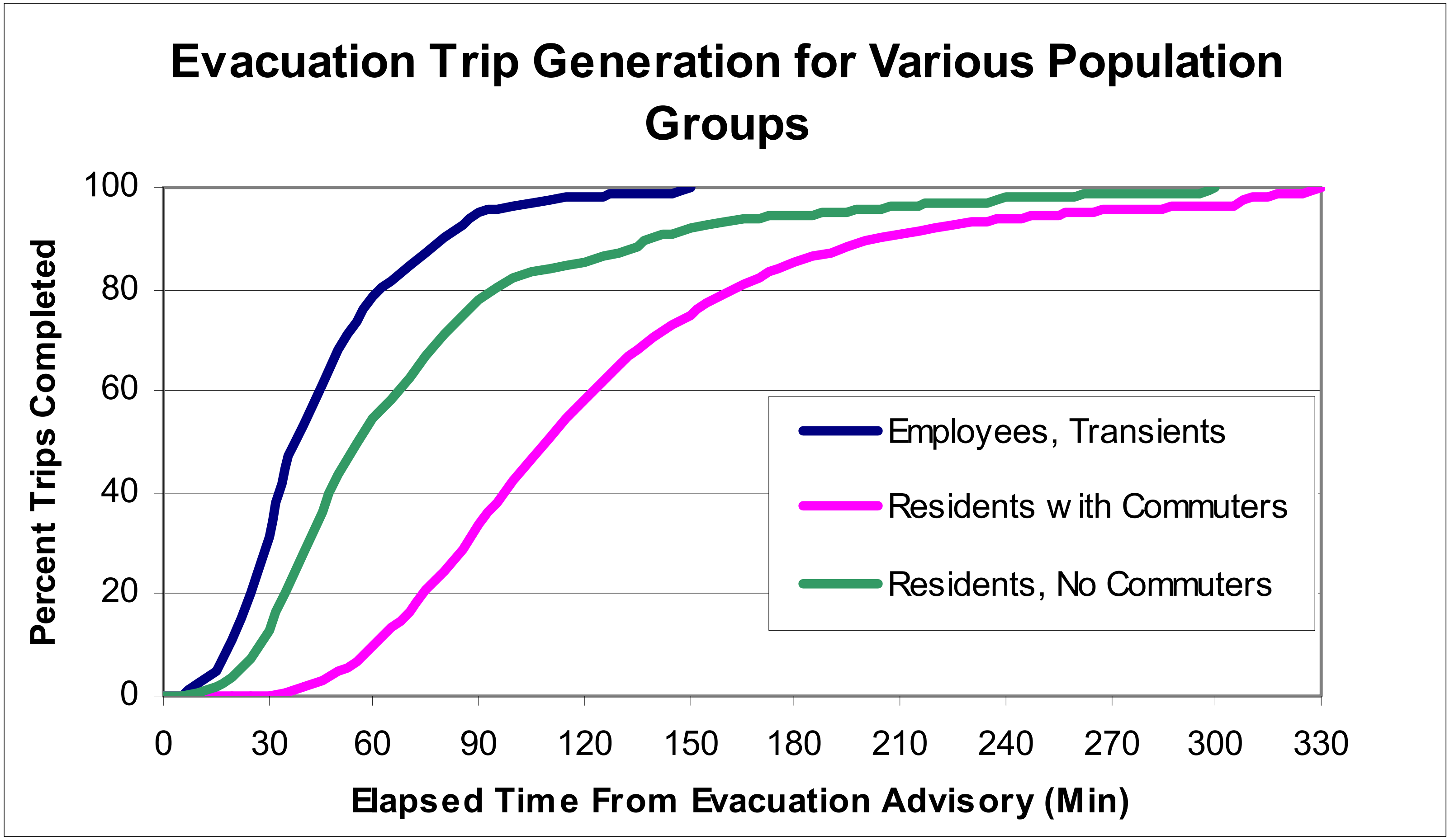


Figure 5-3. Comparison of Trip Generation Distributions

Table 5-1. Trip Generation Time Histograms for the EPZ Population						
Time Period	Duration (Min)	Percent of Total Trips Generated Within Indicated Time Period				
		Residents With Commuters (Distribution C)	Residents Without Commuters (Distribution D)	Employees (Distribution A)	Transients (Distribution A)
1	15	0	2	5	5
2	15	0	11	26	26
3	30	10	42	47	47
4	30	24	23	17	17
5	30	24	7	3	3
6	30	17	7	2	2
7	30	10	2	0	0
8	60	9	4	0	0
9	60	3	2	0	0
10	30	3	0	0	0
11	600	0	0	0	0

6. DEMAND ESTIMATION FOR EVACUATION SCENARIOS

An evacuation "case" defines a combination of Evacuation Region and Evacuation Scenario. The definitions of "Region" and "Scenario" are as follows:

Region: A grouping of contiguous evacuation PAS (Protective Action Sections), that forms either a "keyhole" sector-based area, or a circular area within the EPZ, that must be evacuated in response to a radiological emergency.

Scenario: A combination of circumstances, including time of day, day of week, season, and weather conditions. Scenarios define the number of people in each of the affected population groups and their respective mobilization time distributions.

A total of 27 Regions were defined which encompass all the groupings of PAS considered. These Regions are defined in Table 6-1. The PAS configurations are identified in Figure 6-1. Each keyhole sector-based area consists of a circular area centered at the River Bend Station (RBS), and three adjoining sectors, each with a central angle of 22.5 degrees. These sectors extend to a distance of 5 miles from RBS (Regions R04 to R13), or to the EPZ boundary (Regions R14 to R27). The azimuth of the central sector defines the orientation of these Regions.

A total of 11 Scenarios were evaluated for all Regions. Thus, there are a total of 11x27=297 evacuation cases. Table 6-2 is a description of all Scenarios.

Each combination of region and scenario implies a specific population to be evacuated. Table 6-3 presents the percentage of each population group assumed to evacuate for each scenario. Table 6-4 presents the vehicle counts for each scenario.

Table 6-1. Description of Evacuation Regions																			
		PAS																	
Region	Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
R01	2 mile ring	■																	
R02	5-mile ring	■	■	■	■				■	■							■		
R03	Full EPZ	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Evacuate 2 mile ring and 5 miles downwind																			
		PAS																	
Region	Wind Direction Towards:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
R04	N, NNE	■	■	■															
R05	NE	■		■															
R06	ENE	■		■					■										
R07	E, ESE	■		■	■				■	■									
R08	SE, SSE	■			■					■									
R09	S	■			■					■							■		
R10	SSW	■			■												■		
R11	SW, WSW	■															■		
R12	W	■	■														■		
R13	WNW, NW, NNW	■	■																
Evacuate 5 mile ring and downwind to EPZ boundary																			
		PAS																	
Region	Wind Direction Towards:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
R14	N	■	■	■	■		■	■	■	■							■		
R15	NNE	■	■	■	■		■	■	■	■	■						■		
R16	NE, ENE	■	■	■	■			■	■	■	■	■					■		
R17	E	■	■	■	■			■	■	■	■	■	■	■			■		
R18	ESE	■	■	■	■				■	■		■	■	■	■		■		
R19	SE	■	■	■	■				■	■			■	■	■	■	■		
R20	SSE	■	■	■	■				■	■				■	■	■	■	■	
R21	S	■	■	■	■				■	■					■	■	■	■	■
R22	SSW	■	■	■	■				■	■						■	■	■	■
R23	SW	■	■	■	■				■	■							■	■	■
R24	WSW	■	■	■	■	■			■	■							■	■	■
R25	W	■	■	■	■	■	■		■	■							■		■
R26	WNW, NW	■	■	■	■	■	■		■	■							■		
R27	NNW	■	■	■	■	■	■	■	■	■							■		

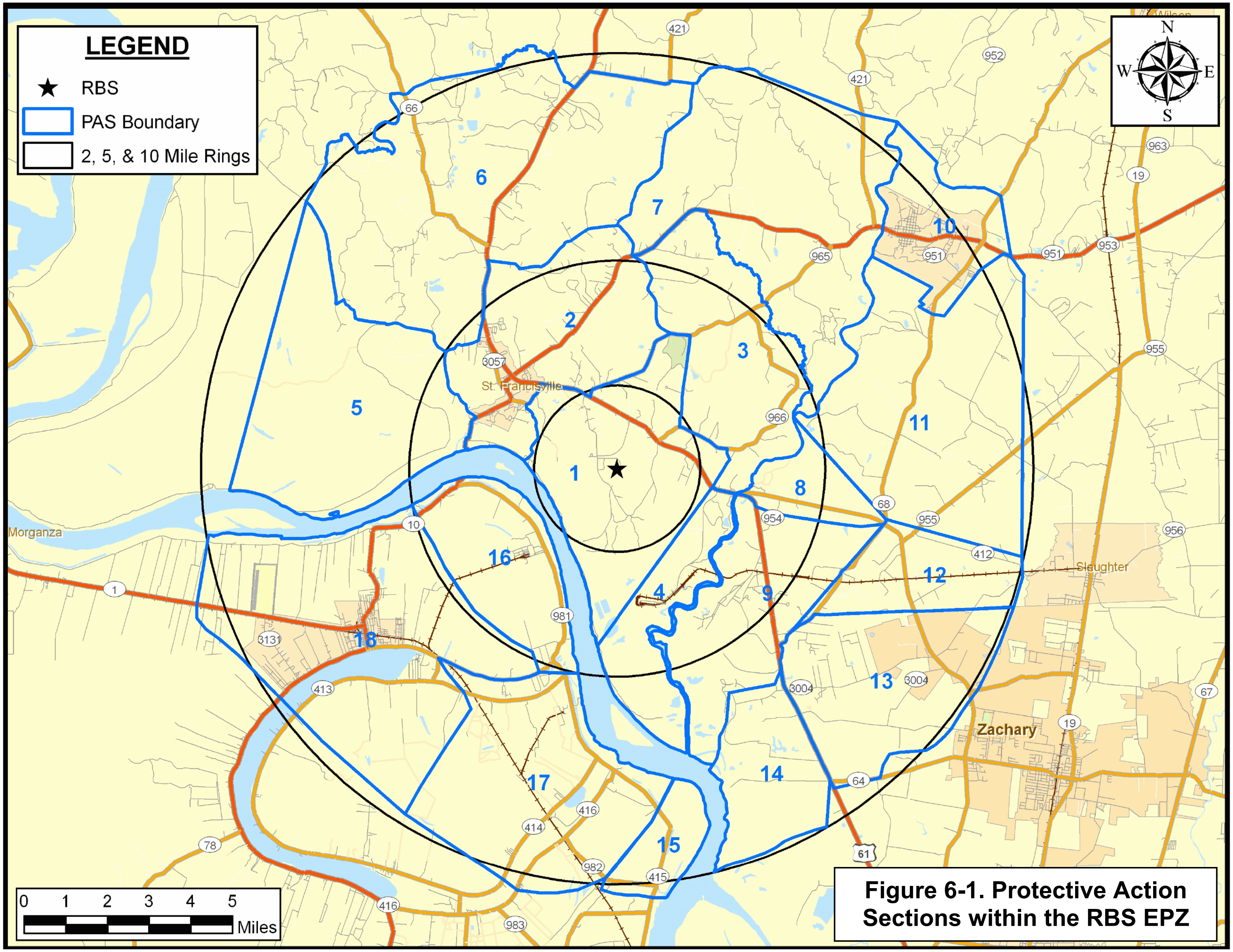


Figure 6-1. Protective Action Sections within the RBS EPZ

Table 6-2. Evacuation Scenario Definitions					
Scenario	**Season**	**Day of Week**	**Time of Day**	**Weather**	**Special**
1	Summer	Midweek	Midday	Good	None
2	Summer	Midweek	Midday	Rain	None
3	Summer	Weekend	Midday	Good	None
4	Summer	Weekend	Midday	Rain	None
5	Summer	Midweek, Weekend	Evening	Good	None
6	Winter	Midweek	Midday	Good	None
7	Winter	Midweek	Midday	Rain	None
8	Winter	Weekend	Midday	Good	None
9	Winter	Weekend	Midday	Rain	None
10	Winter	Midweek, Weekend	Evening	Good	None
11	Winter	Weekend	Midday	Good	New Plant Construction

Note: Schools are assumed to be in session for the Winter season (midweek, midday).

Table 6-3. Percent of Population Groups Evacuating for Various Scenarios

Scenarios	Residents With Commuters in Household	Residents With No Commuters in Household	Employees	Transients	Shadow	Special Events	School Buses	Transit Buses	External Through Traffic
1	59%	41%	96%	10%	34%	0%	10%	100%	100%
2	59%	41%	96%	10%	34%	0%	10%	100%	100%
3	6%	94%	75%	15%	33%	0%	0%	100%	100%
4	6%	94%	75%	15%	33%	0%	0%	100%	100%
5	6%	94%	10%	5%	30%	0%	0%	100%	60%
6	59%	41%	100%	50%	34%	0%	100%	100%	100%
7	59%	41%	100%	50%	34%	0%	100%	100%	100%
8	6%	94%	75%	100%	33%	0%	0%	100%	100%
9	6%	94%	75%	100%	33%	0%	0%	100%	100%
10	6%	94%	10%	50%	30%	0%	0%	100%	60%
11	6%	94%	75%	100%	33%	100%	0%	100%	100%

Resident Households With Commuters .... Households of EPZ residents who await the return of commuters prior to beginning the evacuation trip.

Resident Households With No Commuters .... Households of EPZ residents who do not have commuters or will not await the return of commuters prior to beginning the evacuation trip.

Employees .... EPZ employees who live outside of the EPZ.

Transients .... People who are in the EPZ at the time of an emergency for recreational or other (non-employment) purposes.

Shadow .... Residents and employees in the shadow region (outside of the EPZ) who will spontaneously decide to relocate during the evacuation. The basis for the values shown is a 30% relocation of shadow residents along with a proportional percentage of shadow employees. The percentage of shadow employees is computed using the scenario-specific ratio of EPZ employees to residents.

Special Events .... Additional vehicles in the RBS area during the construction phase of the new unit.

School and Transit Buses .... Vehicle-equivalents present on the road during evacuation servicing schools and transit-dependent people (1 bus is equivalent to 2 passenger vehicles), respectively.

External Through Traffic .... Traffic on local highways and major arterial roads at the start of the evacuation. This traffic is stopped by access control approximately 90 minutes after the evacuation begins.

Table 6-4. Vehicle Estimates By Scenario										
Scenarios	**Residents with Commuters**	**Residents without Commuters**	**Employees**	**Transients**	**Shadow**	**Special Events**	**School Buses**	**Transit Buses**	**External Traffic**	**Total Scenario Vehicles**
1	8,822	6,168	1,785	117	6,174	-	22	60	3,300	26,448
2	8,822	6,168	1,785	117	6,174	-	22	60	3,300	26,448
3	882	14,108	1,394	175	6,030	-	-	60	3,300	25,949
4	882	14,108	1,394	175	6,030	-	-	60	3,300	25,949
5	882	14,108	186	58	5,586	-	-	60	1,980	22,860
6	8,822	6,168	1,859	583	6,202	-	218	60	3,300	27,212
7	8,822	6,168	1,859	583	6,202	-	218	60	3,300	27,212
8	882	14,108	1,394	1,165	6,030	-	-	60	3,300	26,939
9	882	14,108	1,394	1,165	6,030	-	-	60	3,300	26,939
10	882	14,108	186	583	5,586	-	-	60	1,980	23,385
11*	882	14,108	1,394	1,165	6,030	1,559	-	60	3,300	28,498

***Permanent Resident population and Shadow population are assumed to be the same during the peak construction period (2014) as they are in 2008, due to limited population change within the EPZ.**

7. GENERAL POPULATION EVACUATION TIME ESTIMATES (ETE)

This section presents the current results of the computer analyses using the IDYNEV System described in Appendices B, C and D. These results cover 27 regions within the RBS EPZ and the 11 Evacuation Scenarios discussed in Section 6.

The ETE for all Evacuation Cases are presented in Tables 7-1A through 7-1D. **These tables present the estimated times to clear the indicated population percentages from the Evacuation Regions for all Evacuation Scenarios.** The tabulated values of ETE are obtained from the PC-DYNEV simulation model outputs of vehicles exiting the specified evacuation areas. These data are generated at 10-minute intervals, then interpolated to the nearest 5 minutes.

7.1 Voluntary Evacuation and Shadow Evacuation

We define "voluntary evacuees" as people who are within the EPZ in Protective Action Section (PAS) located outside the Evacuation Region, for which an advisory to evacuate *has not* been issued, yet who nevertheless elect to evacuate. We define "shadow evacuation" as the movement of people from areas *outside* the EPZ for whom no protective action recommendation has been issued. Both voluntary and shadow evacuation are assumed to take place over the same time frame as the evacuation from within the impacted Evacuation Region.

The ETE for the RBS addresses the issue of voluntary evacuees as discussed in Section 2.2 and displayed in Figure 7-1 (same as Figure 2-1). Figure 7-2 presents the area identified as the Shadow Evacuation Region. This region extends radially from the boundary of the EPZ to a distance of 15 miles from RBS.

Traffic generated within this Shadow Evacuation Region, traveling away from the RBS location, has the potential for impeding evacuating vehicles from within the Evacuation Region. We assume that the traffic volumes emitted within the Shadow Evacuation Region correspond to 30 percent of the residents there plus a proportionate number of employees in that region. All ETE calculations include this shadow traffic movement.

7.2 Patterns of Traffic Congestion During Evacuation

Figures 7-3 through 7-5 illustrate the patterns of traffic congestion that arise for the case when the entire EPZ (Region R03) is advised to evacuate during the winter, midweek, midday period under good weather conditions (Scenario 6).

Traffic congestion, as the term is used here, is defined as Level of Service (LOS) F. LOS F is defined as follows (2000 HCM):

> Level of Service F is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount that can traverse the point. Queues form behind such locations. Operations within the queue are characterized by

stop-and-go waves, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level of Service F is used to describe the operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases operating conditions of vehicles or pedestrians discharged from the queue may be quite good. Nevertheless, it is the point at which arrival flow exceeds discharge flow, which causes the queue to form, and Level of Service F is an appropriate designation for such points.

This definition is general and conceptual in nature, and applies primarily to uninterrupted flow. Levels of Service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them.

All highway "links" which experience LOS F at the indicated times are delineated in these Figures by a red line; all others are lightly indicated. Congestion develops in areas with concentrations of population and at traffic bottlenecks. Figure 7-3 indicates that by one hour after the advisory to evacuate (ATE), congestion develops eastbound on LA Highway 10 in Jackson, which is about 10 miles from the plant location. Congestion also exists westbound on LA Highway 1/10 leaving New Roads. Congestion is also observed northbound on US Highway 61 in St. Francisville. Limited congestion exists on the approaches to US Highway 190 in Pointe Coupee Parish. Similar congestion patterns are observed at 2 hours after the ATE as seen in Figure 7-4. The congestion west of New Roads, the congestion within St. Francisville and the congestion on the approaches to US Highway 190 all dissipate at approximately 2 hours and 15 minutes.

The final congestion path to clear is the traffic eastbound on LA Highway 10 leaving Jackson. Much of this congestion is outside the EPZ as seen in Figure 7-5. This congestion clears at 3 hours and 40 minutes after the ATE. As indicated in Figure 7-5, most of the highway network in the EPZ is operating at LOS A at 3 hours after the ATE. The absence of congestion on network links (white colored links) implies that traffic demand there has decreased below the roadway capacity for a period of time sufficient to dissipate any traffic queues. It does not necessarily imply that traffic has completely cleared from these roadway sections.

A new bridge is being constructed across the Mississippi River just southwest of the RBS location. The bridge connects West Feliciana Parish and Pointe Coupee Parish. We assume that no traffic uses this bridge during evacuation for the following reasons:

- The residents from Pointe Coupee Parish would have to travel toward RBS if they were to use the bridge for evacuation; this exposes evacuees to increased risk and is not advisable.
- The residents from West Feliciana Parish will likely travel southbound on US Highway 61 which is a high-speed, high capacity road traveling away from the RBS and provides direct access to the Reception Centers.

Sensitivity studies were performed with varying mobilization times and various shadow population evacuation rates. The results are presented in Appendix I, and show that the ETE closely mirror the mobilization time.

7.3 Evacuation Rates

Evacuation is a continuous process, as implied by Figures 7-3 through 7-5. Another format for displaying the dynamics of evacuation is depicted in Figure 7-6. This plot indicates the rate at which traffic flows out of the indicated areas for the case of an evacuation of the entire EPZ (Region R03) under the indicated conditions. Appendix J presents these plots for all Evacuation Scenarios for Region R03.

As indicated in Figure 7-6, there is typically a long "tail" to these distributions. Vehicles evacuate an area slowly at the beginning, as people respond to the advisory to evacuate at different rates. Then traffic demand builds rapidly (slopes of curves increase). When the system becomes congested, traffic exits the EPZ at rates somewhat below capacity until some evacuation routes have cleared. As more routes clear, the aggregate rate of egress slows since many vehicles have already left the EPZ. Towards the end of the process, relatively few evacuation routes service the remaining demand. It is reasonable to expect that some evacuees may delay or lengthen their mobilization activities and evacuate at a later time as a result; **these ETE estimates do not (and should not) be distorted to account for these relatively few stragglers**.

This decline in aggregate flow rate, towards the end of the process, is characterized by these curves flattening and gradually becoming horizontal. Ideally, it would be desirable to fully saturate all evacuation routes equally so that all will service traffic near capacity levels and all will clear at the same time. For this ideal situation, all curves would retain the same slope until the end – thus minimizing evacuation time. In the real world, this ideal is generally unattainable reflecting the variation in population density and in highway capacity over the EPZ.

7.4 Guidance on Using ETE Tables

Tables 7-1A through 7-1D present the ETE values for all 27 Evacuation Regions and all 11 Evacuation Scenarios. They are organized as follows:

Table	Contents
7-1A	ETE represents the elapsed time required for 50 percent of the population within a Region, to evacuate from that Region.
7-1B	ETE represents the elapsed time required for 90 percent of the population within a Region, to evacuate from that Region.
7-1C	ETE represents the elapsed time required for 95 percent of the population within a Region, to evacuate from that Region.
7-1D	ETE represents the elapsed time required for 100 percent of the population within a Region, to evacuate from that Region.

The user first determines the percentile of population for which the ETE is sought. The applicable value of ETE within the chosen Table may then be identified using the following procedure:

1. Identify the applicable **Scenario**:

- The Season
  - Summer (schools not in session)
  - Winter (also Autumn and Spring)
- The Day of Week
  - Midweek (work-day)
  - Weekend, Holiday
- The Time of Day
  - Midday (work and commuting hours)
  - Evening
- Weather Condition
  - Good Weather
  - Rain
- Special Event (if any)
  - New Plant Construction

While these Scenarios are designed, in aggregate, to represent conditions throughout the year, some further clarification is warranted:

- The conditions of a summer evening (either midweek or weekend) and rain are not explicitly identified in Tables 7-1A through 7-1D. For these conditions, Scenario (4) applies.

- The conditions of a winter evening (either midweek or weekend) and rain are not explicitly identified in Tables 7-1A through 7-1D. For these conditions, Scenario (9) applies.
- The seasons are defined as follows:
  - Summer implies that public schools are not in session.
  - Winter, Spring and Autumn imply that public schools are in session.
- Time of Day: Midday implies the time over which most commuters are at work.

2. With the Scenario (and column in the Table) identified, now identify the **Evacuation Region**:
   - Determine the projected azimuth direction of the plume (coincident with the wind direction). This direction is expressed in terms of compass orientation: *towards* N, NNE, NE, …
   - Determine the distance that the Evacuation Region will extend from RBS. The applicable distances and their associated candidate Regions are given below:
     - 2 Miles (Region R01)
     - 5 Miles (Regions R02 and R04 through R13)
     - to EPZ Boundary (Regions R03 and R14 through R27)
   - Enter Table 7-2 and identify the applicable group of candidate Regions based on the wind direction and on the distance that the selected Region extends from RBS. Select the Evacuation Region identifier in that row from the first column of the Table.

3. Determine the **ETE for the Scenario** identified in Step 1 and the Region identified in Step 2, as follows:
   - The columns of Table 7-1 are labeled with the Scenario numbers. Identify the proper column in the selected Table using the Scenario number determined in Step 1.
   - Identify the row in this table that provides ETE values for the Region identified in Step 2.
   - The unique data cell defined by the column and row so determined contains the desired value of ETE expressed in Hours:Minutes.

<u>Example</u>

It is desired to identify the ETE for the following conditions:

- Sunday, August 10th at 4:00 AM.
- It is raining.
- Wind direction is towards the northeast (NE).
- Wind speed is such that the distance to be evacuated is judged to be 10 miles (to EPZ boundary).
- The desired ETE is that value needed to evacuate 95 percent of the population from within the impacted Region.

Table 7-1C is applicable because the 95th-percentile population is desired. Proceed as follows:

1. Identify the Scenario as summer, weekend, evening and raining. Entering Table 7-1C, it is seen that there is no match for these descriptors. However, the clarification given above assigns this combination of circumstances to Scenario 4.

2. Enter Table 7-2 and locate the group entitled “Evacuate 5-Mile Ring and Downwind to EPZ Boundary”. Under “Wind Direction Towards:”, identify the NE (northeast) azimuth and read REGION R16 in the first column of that row.

3. Enter Table 7-1C to locate the data cell containing the value of ETE for Scenario 4 and Region R16. This data cell is in column (4) and in the row for Region R16; it contains the ETE value of **3:10**.

Table 7-1A Time To Clear The Indicated Area of 50 Percent of the Affected Population

	Summer		Summer		Summer		Winter		Winter		Winter		Winter
	Midweek		Weekend		Midweek Weekend		Midweek		Weekend		Midweek Weekend		Weekend
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	Scenario:	(11)
Region Wind Towards:	Midday		Midday		Evening	Region Wind Towards:	Midday		Midday		Evening	Region Wind Towards:	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather		Good Weather	Rain	Good Weather	Rain	Good Weather		New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ													
R01 2-mile ring	1:00	1:00	0:55	1:00	1:00	R01 2-mile ring	1:00	1:00	0:55	0:55	1:00	R01 2-mile ring	1:05
R02 5-mile ring	1:15	1:15	1:05	1:05	1:05	R02 5-mile ring	1:15	1:15	1:05	1:10	1:05	R02 5-mile ring	1:15
R03 Entire EPZ	1:25	1:30	1:15	1:20	1:15	R03 Entire EPZ	1:30	1:30	1:20	1:25	1:15	R03 Entire EPZ	1:25
2-Mile Ring and Downwind to 5 Miles													
R04 N, NNE	1:10	1:15	1:05	1:05	1:05	R04 N, NNE	1:10	1:15	1:05	1:10	1:05	R04 N, NNE	1:15
R05 NE	1:05	1:05	1:00	1:00	1:00	R05 NE	1:00	1:05	0:55	1:00	1:00	R05 NE	1:10
R06 ENE	1:05	1:05	1:00	1:00	1:00	R06 ENE	1:05	1:05	1:00	1:00	1:00	R06 ENE	1:10
R07 E, ESE	1:10	1:10	1:00	1:00	1:00	R07 E, ESE	1:05	1:05	1:00	1:00	1:00	R07 E, ESE	1:10
R08 SE, SSE	1:05	1:05	1:00	1:00	1:00	R08 SE, SSE	1:05	1:05	1:00	1:00	1:00	R08 SE, SSE	1:10
R09 S	1:05	1:05	1:00	1:00	1:00	R09 S	1:05	1:05	1:00	1:00	1:00	R09 S	1:10
R10 SSW	1:00	1:05	0:55	1:00	1:00	R10 SSW	1:00	1:00	0:55	0:55	1:00	R10 SSW	1:05
R11 SW, WSW	1:00	1:00	0:55	1:00	1:00	R11 SW, WSW	1:00	1:00	0:55	0:55	1:00	R11 SW, WSW	1:05
R12 W	1:10	1:15	1:05	1:05	1:05	R12 W	1:10	1:15	1:05	1:10	1:05	R12 W	1:15
R13 WNW, NW, NNW	1:10	1:15	1:05	1:05	1:05	R13 WNW, NW, NNW	1:10	1:15	1:05	1:10	1:05	R13 WNW, NW, NNW	1:15
5-Mile Ring and Downwind to EPZ Boundary													
R14 N	1:20	1:20	1:10	1:10	1:05	R14 N	1:20	1:20	1:10	1:15	1:10	R14 N	1:15
R15 NNE	1:25	1:30	1:15	1:20	1:15	R15 NNE	1:25	1:30	1:20	1:25	1:15	R15 NNE	1:25
R16 NE, ENE	1:25	1:30	1:15	1:20	1:15	R16 NE, ENE	1:25	1:30	1:20	1:25	1:15	R16 NE, ENE	1:25
R17 E	1:25	1:30	1:15	1:20	1:15	R17 E	1:25	1:30	1:20	1:25	1:15	R17 E	1:25
R18 ESE	1:15	1:20	1:05	1:05	1:05	R18 ESE	1:15	1:20	1:05	1:10	1:05	R18 ESE	1:15
R19 SE	1:15	1:20	1:05	1:05	1:05	R19 SE	1:15	1:20	1:05	1:10	1:05	R19 SE	1:15
R20 SSE	1:15	1:20	1:05	1:05	1:05	R20 SSE	1:15	1:20	1:05	1:10	1:05	R20 SSE	1:15
R21 S	1:20	1:25	1:10	1:10	1:10	R21 S	1:20	1:25	1:10	1:15	1:10	R21 S	1:15
R22 SSW	1:20	1:25	1:10	1:10	1:10	R22 SSW	1:25	1:25	1:10	1:15	1:10	R22 SSW	1:15
R23 SW	1:20	1:25	1:10	1:10	1:10	R23 SW	1:25	1:25	1:10	1:15	1:10	R23 SW	1:15
R24 WSW	1:20	1:25	1:10	1:10	1:10	R24 WSW	1:25	1:25	1:10	1:15	1:10	R24 WSW	1:15
R25 W	1:25	1:25	1:10	1:15	1:10	R25 W	1:25	1:25	1:10	1:15	1:10	R25 W	1:15
R26 WNW, NW	1:15	1:20	1:05	1:10	1:05	R26 WNW, NW	1:20	1:20	1:05	1:10	1:05	R26 WNW, NW	1:15
R27 NNW	1:20	1:20	1:10	1:10	1:05	R27 NNW	1:20	1:20	1:10	1:15	1:10	R27 NNW	1:15

Table 7-1B Time To Clear The Indicated Area of 90 Percent of the Affected Population

	Summer		Summer		Summer		Winter		Winter		Winter		Winter
	Midweek		Weekend		Midweek Weekend		Midweek		Weekend		Midweek Weekend		Weekend
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	Scenario:	(11)
Region Wind Towards:	Midday		Midday		Evening	Region Wind Towards:	Midday		Midday		Evening	Region Wind Towards:	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather		Good Weather	Rain	Good Weather	Rain	Good Weather		New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ													
R01 2-mile ring	1:50	1:50	1:45	1:45	1:45	R01 2-mile ring	1:45	1:50	1:40	1:45	1:45	R01 2-mile ring	2:20
R02 5-mile ring	2:30	2:30	2:00	2:10	2:10	R02 5-mile ring	2:30	2:30	2:10	2:20	2:10	R02 5-mile ring	2:30
R03 Entire EPZ	3:00	3:05	2:40	2:50	2:40	R03 Entire EPZ	3:00	3:10	2:45	2:55	2:50	R03 Entire EPZ	2:50
2-Mile Ring and Downwind to 5 Miles													
R04 N, NNE	2:20	2:20	2:00	2:10	2:10	R04 N, NNE	2:20	2:25	2:10	2:20	2:10	R04 N, NNE	2:25
R05 NE	1:55	1:55	1:45	1:45	1:50	R05 NE	1:55	1:55	1:45	1:45	1:50	R05 NE	2:30
R06 ENE	1:55	2:00	1:45	1:50	1:50	R06 ENE	1:55	1:55	1:45	1:45	1:50	R06 ENE	2:30
R07 E, ESE	2:00	2:00	1:50	1:50	1:55	R07 E, ESE	2:00	2:00	1:50	1:50	1:50	R07 E, ESE	2:30
R08 SE, SSE	2:00	2:00	1:45	1:50	1:50	R08 SE, SSE	1:55	1:55	1:45	1:50	1:50	R08 SE, SSE	2:30
R09 S	2:00	2:00	1:50	1:50	1:55	R09 S	2:00	2:00	1:45	1:50	1:50	R09 S	2:30
R10 SSW	1:55	1:55	1:45	1:45	1:50	R10 SSW	1:50	1:55	1:45	1:45	1:50	R10 SSW	2:30
R11 SW, WSW	1:50	1:55	1:45	1:45	1:50	R11 SW, WSW	1:50	1:55	1:40	1:45	1:45	R11 SW, WSW	2:20
R12 W	2:20	2:20	2:00	2:10	2:10	R12 W	2:20	2:25	2:10	2:20	2:00	R12 W	2:25
R13 WNW, NW, NNW	2:20	2:20	2:00	2:10	2:10	R13 WNW, NW, NNW	2:20	2:25	2:10	2:20	2:00	R13 WNW, NW, NNW	2:25
5-Mile Ring and Downwind to EPZ Boundary													
R14 N	2:40	2:40	2:10	2:20	2:20	R14 N	2:40	2:40	2:20	2:25	2:20	R14 N	2:30
R15 NNE	2:50	3:05	2:40	2:50	2:40	R15 NNE	3:00	3:10	2:40	3:00	2:50	R15 NNE	2:50
R16 NE, ENE	2:50	3:05	2:40	2:50	2:40	R16 NE, ENE	3:00	3:10	2:45	2:55	2:50	R16 NE, ENE	2:50
R17 E	2:50	3:05	2:40	2:50	2:40	R17 E	3:00	3:10	2:45	2:55	2:50	R17 E	2:50
R18 ESE	2:30	2:40	2:05	2:10	2:20	R18 ESE	2:30	2:30	2:10	2:20	2:10	R18 ESE	2:30
R19 SE	2:30	2:30	2:05	2:10	2:20	R19 SE	2:30	2:30	2:10	2:20	2:10	R19 SE	2:30
R20 SSE	2:30	2:40	2:05	2:10	2:20	R20 SSE	2:30	2:30	2:10	2:20	2:10	R20 SSE	2:30
R21 S	2:50	2:50	2:15	2:20	2:20	R21 S	2:50	2:50	2:20	2:30	2:20	R21 S	2:30
R22 SSW	2:50	2:50	2:15	2:20	2:20	R22 SSW	2:50	2:50	2:20	2:30	2:20	R22 SSW	2:30
R23 SW	2:50	2:50	2:15	2:20	2:20	R23 SW	2:50	2:50	2:20	2:30	2:20	R23 SW	2:30
R24 WSW	2:50	2:50	2:15	2:20	2:20	R24 WSW	2:50	2:50	2:20	2:30	2:20	R24 WSW	2:30
R25 W	2:50	2:50	2:20	2:25	2:20	R25 W	2:50	2:50	2:20	2:30	2:20	R25 W	2:30
R26 WNW, NW	2:40	2:40	2:10	2:20	2:20	R26 WNW, NW	2:30	2:40	2:20	2:30	2:10	R26 WNW, NW	2:30
R27 NNW	2:40	2:40	2:10	2:20	2:20	R27 NNW	2:40	2:40	2:20	2:30	2:20	R27 NNW	2:30

Table 7-1C Time To Clear The Indicated Area of 95 Percent of the Affected Population

	Summer		Summer		Summer		Winter		Winter		Winter		Winter
	Midweek		Weekend		Midweek Weekend		Midweek		Weekend		Midweek Weekend		Weekend
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	Scenario:	(11)
Region Wind Towards:	Midday		Midday		Evening	Region Wind Towards:	Midday		Midday		Evening	Region Wind Towards:	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather		Good Weather	Rain	Good Weather	Rain	Good Weather		New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ													
R01 2-mile ring	2:10	2:10	1:50	1:55	2:10	R01 2-mile ring	2:10	2:10	1:50	1:50	2:00	R01 2-mile ring	2:50
R02 5-mile ring	3:10	3:10	2:30	2:30	3:00	R02 5-mile ring	3:10	3:10	2:30	2:35	2:50	R02 5-mile ring	3:00
R03 Entire EPZ	3:40	3:50	3:10	3:20	3:20	R03 Entire EPZ	3:40	3:40	3:10	3:20	3:20	R03 Entire EPZ	3:10
2-Mile Ring and Downwind to 5 Miles													
R04 N, NNE	3:10	3:10	2:30	2:30	2:50	R04 N, NNE	3:10	3:10	2:25	2:35	2:50	R04 N, NNE	2:50
R05 NE	2:30	2:30	2:00	2:00	2:20	R05 NE	2:30	2:30	2:00	2:00	2:20	R05 NE	2:50
R06 ENE	2:30	2:30	2:00	2:00	2:20	R06 ENE	2:30	2:30	2:00	2:00	2:20	R06 ENE	2:50
R07 E, ESE	2:40	2:40	2:10	2:10	2:30	R07 E, ESE	2:40	2:40	2:10	2:10	2:20	R07 E, ESE	3:00
R08 SE, SSE	2:30	2:30	2:00	2:00	2:20	R08 SE, SSE	2:30	2:30	2:00	2:00	2:20	R08 SE, SSE	2:50
R09 S	2:40	2:40	2:10	2:10	2:20	R09 S	2:40	2:40	2:00	2:00	2:20	R09 S	2:50
R10 SSW	2:30	2:30	2:00	2:00	2:20	R10 SSW	2:30	2:30	2:00	2:00	2:20	R10 SSW	2:50
R11 SW, WSW	2:30	2:30	2:00	2:00	2:20	R11 SW, WSW	2:20	2:20	1:50	1:55	2:10	R11 SW, WSW	2:50
R12 W	3:10	3:10	2:30	2:30	2:50	R12 W	3:10	3:10	2:25	2:35	2:50	R12 W	2:50
R13 WNW, NW, NNW	3:00	3:00	2:20	2:20	2:50	R13 WNW, NW, NNW	3:00	3:00	2:25	2:35	2:40	R13 WNW, NW, NNW	2:50
5-Mile Ring and Downwind to EPZ Boundary													
R14 N	3:30	3:30	2:50	2:50	3:00	R14 N	3:30	3:30	2:40	2:40	3:00	R14 N	3:00
R15 NNE	3:40	3:40	3:00	3:10	3:10	R15 NNE	3:40	3:40	3:10	3:20	3:10	R15 NNE	3:10
R16 NE, ENE	3:40	3:40	3:00	3:10	3:10	R16 NE, ENE	3:30	3:30	3:10	3:20	3:10	R16 NE, ENE	3:10
R17 E	3:40	3:40	3:00	3:10	3:10	R17 E	3:40	3:40	3:10	3:20	3:10	R17 E	3:10
R18 ESE	3:20	3:20	2:40	2:40	3:10	R18 ESE	3:20	3:20	2:40	2:40	3:00	R18 ESE	3:00
R19 SE	3:20	3:20	2:40	2:40	3:00	R19 SE	3:20	3:20	2:30	2:40	3:00	R19 SE	3:00
R20 SSE	3:20	3:20	2:40	2:40	3:00	R20 SSE	3:20	3:20	2:30	2:40	3:00	R20 SSE	3:00
R21 S	3:40	3:40	3:00	3:00	3:10	R21 S	3:40	3:40	3:00	3:00	3:10	R21 S	3:00
R22 SSW	3:40	3:40	3:00	3:00	3:10	R22 SSW	3:40	3:40	3:00	3:00	3:10	R22 SSW	3:00
R23 SW	3:40	3:40	3:00	3:00	3:10	R23 SW	3:40	3:40	3:00	3:00	3:10	R23 SW	3:00
R24 WSW	3:40	3:40	3:00	3:00	3:10	R24 WSW	3:40	3:40	3:00	3:00	3:10	R24 WSW	3:00
R25 W	3:40	3:40	3:00	3:00	3:10	R25 W	3:40	3:40	3:00	3:00	3:10	R25 W	3:00
R26 WNW, NW	3:30	3:30	2:50	2:50	3:00	R26 WNW, NW	3:20	3:20	2:40	2:40	3:00	R26 WNW, NW	3:00
R27 NNW	3:30	3:30	2:50	2:50	3:00	R27 NNW	3:30	3:30	2:40	2:40	3:00	R27 NNW	3:00

Table 7-1D Time To Clear The Indicated Area of 100 Percent of the Affected Population

	Summer		Summer		Summer		Winter		Winter		Winter		Winter
	Midweek		Weekend		Midweek Weekend		Midweek		Weekend		Midweek Weekend		Weekend
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	Scenario:	(11)
	Midday		Midday		Evening		Midday		Midday		Evening		Midday
Region Wind Towards:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Towards:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Towards:	New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ													
R01 2-mile ring	5:20	5:20	5:00	5:00	5:00	R01 2-mile ring	5:20	5:20	5:00	5:00	5:00	R01 2-mile ring	5:00
R02 5-mile ring	5:30	5:30	5:10	5:10	5:10	R02 5-mile ring	5:30	5:30	5:10	5:10	5:20	R02 5-mile ring	5:10
R03 Entire EPZ	5:40	5:40	5:30	5:30	5:30	R03 Entire EPZ	5:40	5:40	5:30	5:30	5:30	R03 Entire EPZ	5:30
2-Mile Ring and Downwind to 5 Miles													
R04 N, NNE	5:30	5:30	5:10	5:10	5:10	R04 N, NNE	5:30	5:30	5:10	5:10	5:20	R04 N, NNE	5:10
R05 NE	5:30	5:30	5:00	5:00	5:00	R05 NE	5:30	5:30	5:00	5:00	5:00	R05 NE	5:00
R06 ENE	5:30	5:30	5:00	5:00	5:00	R06 ENE	5:30	5:30	5:00	5:00	5:00	R06 ENE	5:00
R07 E, ESE	5:30	5:30	5:00	5:00	5:00	R07 E, ESE	5:30	5:30	5:00	5:00	5:00	R07 E, ESE	5:00
R08 SE, SSE	5:30	5:30	5:00	5:00	5:00	R08 SE, SSE	5:30	5:30	5:00	5:00	5:00	R08 SE, SSE	5:00
R09 S	5:30	5:30	5:00	5:00	5:00	R09 S	5:30	5:30	5:00	5:00	5:00	R09 S	5:00
R10 SSW	5:30	5:30	5:00	5:00	5:00	R10 SSW	5:30	5:30	5:00	5:00	5:00	R10 SSW	5:00
R11 SW, WSW	5:30	5:30	5:00	5:00	5:00	R11 SW, WSW	5:30	5:30	5:00	5:00	5:00	R11 SW, WSW	5:00
R12 W	5:30	5:30	5:10	5:10	5:10	R12 W	5:30	5:30	5:10	5:10	5:20	R12 W	5:10
R13 WNW, NW, NNW	5:30	5:30	5:10	5:10	5:10	R13 WNW, NW, NNW	5:30	5:30	5:10	5:10	5:20	R13 WNW, NW, NNW	5:10
5-Mile Ring and Downwind to EPZ Boundary													
R14 N	5:30	5:30	5:20	5:20	5:20	R14 N	5:30	5:30	5:20	5:30	5:30	R14 N	5:20
R15 NNE	5:40	5:40	5:30	5:30	5:30	R15 NNE	5:40	5:40	5:30	5:30	5:30	R15 NNE	5:30
R16 NE, ENE	5:40	5:40	5:20	5:20	5:20	R16 NE, ENE	5:40	5:40	5:20	5:20	5:20	R16 NE, ENE	5:20
R17 E	5:40	5:40	5:20	5:20	5:20	R17 E	5:40	5:40	5:20	5:20	5:30	R17 E	5:20
R18 ESE	5:30	5:30	5:20	5:20	5:20	R18 ESE	5:30	5:30	5:20	5:20	5:20	R18 ESE	5:20
R19 SE	5:30	5:40	5:10	5:10	5:10	R19 SE	5:30	5:40	5:10	5:10	5:20	R19 SE	5:10
R20 SSE	5:30	5:30	5:10	5:10	5:10	R20 SSE	5:30	5:30	5:10	5:10	5:20	R20 SSE	5:10
R21 S	5:30	5:40	5:20	5:20	5:20	R21 S	5:30	5:40	5:20	5:20	5:20	R21 S	5:20
R22 SSW	5:30	5:40	5:20	5:20	5:20	R22 SSW	5:30	5:40	5:20	5:20	5:20	R22 SSW	5:20
R23 SW	5:30	5:40	5:20	5:20	5:20	R23 SW	5:30	5:40	5:20	5:20	5:20	R23 SW	5:20
R24 WSW	5:30	5:40	5:30	5:30	5:20	R24 WSW	5:30	5:40	5:20	5:20	5:20	R24 WSW	5:20
R25 W	5:30	5:30	5:20	5:30	5:30	R25 W	5:30	5:40	5:30	5:30	5:30	R25 W	5:30
R26 WNW, NW	5:30	5:30	5:20	5:30	5:30	R26 WNW, NW	5:30	5:30	5:30	5:30	5:20	R26 WNW, NW	5:30
R27 NNW	5:30	5:30	5:20	5:30	5:30	R27 NNW	5:40	5:40	5:30	5:30	5:20	R27 NNW	5:30

Table 7-2. Description of Evacuation Regions

Region	Description	PAS 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
R01	2 mile ring	■																	
R02	5-mile ring	■	■	■	■				■	■							■		
R03	Full EPZ	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Evacuate 2 mile ring and 5 miles downwind																			
Region	**Wind Direction Towards:**	**PAS 1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
R04	N, NNE	■	■	■															
R05	NE	■		■															
R06	ENE	■		■					■										
R07	E, ESE	■		■	■				■	■									
R08	SE, SSE	■			■					■									
R09	S	■			■					■							■		
R10	SSW	■			■												■		
R11	SW, WSW	■															■		
R12	W	■	■														■		
R13	WNW, NW, NNW	■	■																
Evacuate 5 mile ring and downwind to EPZ boundary																			
Region	**Wind Direction Towards:**	**PAS 1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
R14	N	■	■	■	■		■	■	■	■							■		
R15	NNE	■	■	■	■		■	■	■	■	■						■		
R16	NE, ENE	■	■	■	■			■	■	■	■	■					■		
R17	E	■	■	■	■			■	■	■	■	■	■	■			■		
R18	ESE	■	■	■	■				■	■		■	■	■	■		■		
R19	SE	■	■	■	■				■	■			■	■	■	■	■		
R20	SSE	■	■	■	■				■	■				■	■	■	■	■	
R21	S	■	■	■	■				■	■					■	■	■	■	■
R22	SSW	■	■	■	■				■	■						■	■	■	■
R23	SW	■	■	■	■				■	■							■	■	■
R24	WSW	■	■	■	■	■			■	■							■	■	■
R25	W	■	■	■	■	■	■		■	■							■		■
R26	WNW, NW	■	■	■	■	■	■		■	■							■		
R27	NNW	■	■	■	■	■	■	■	■	■							■		

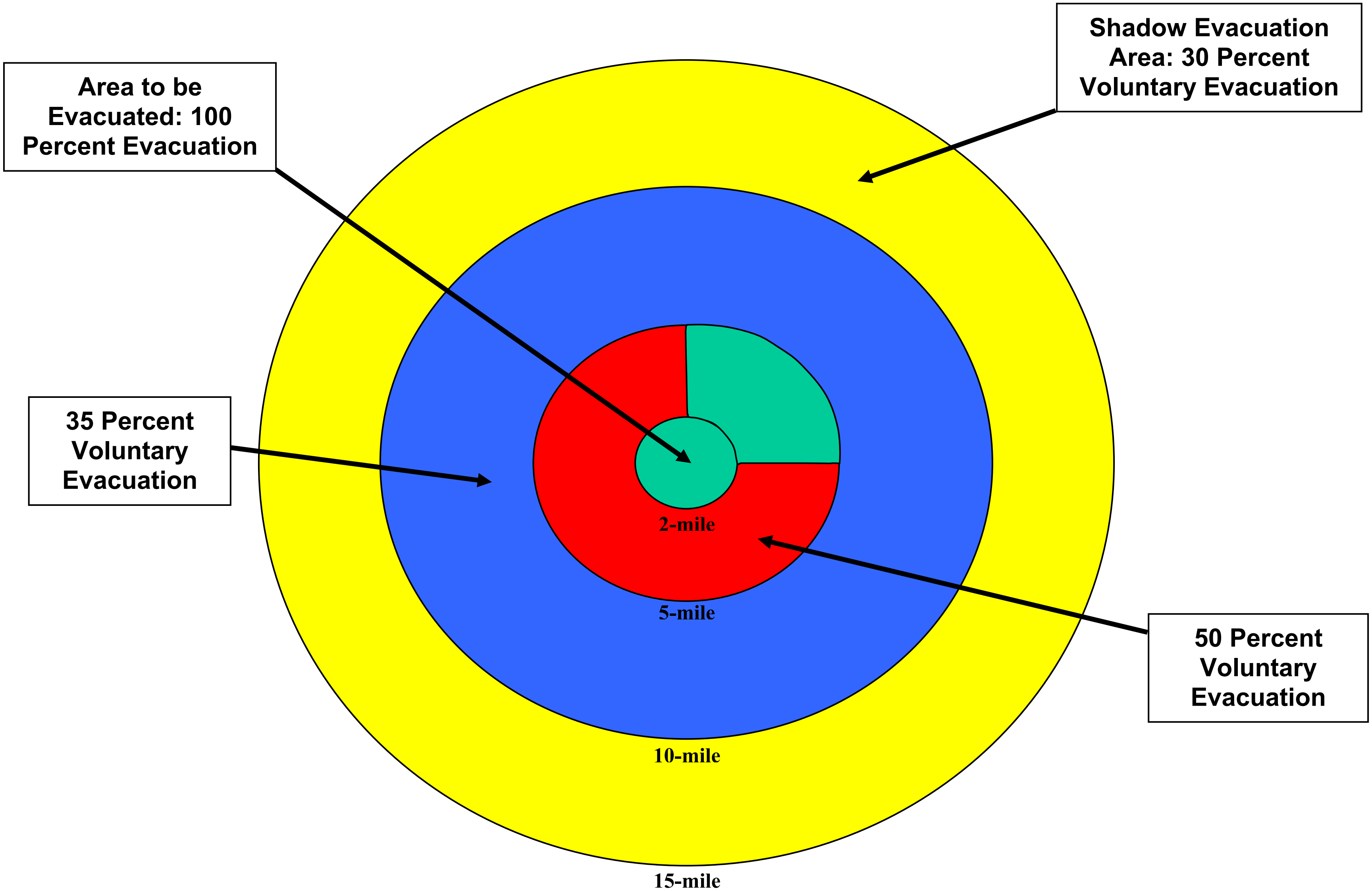


Figure 7-1. Assumed Evacuation Response

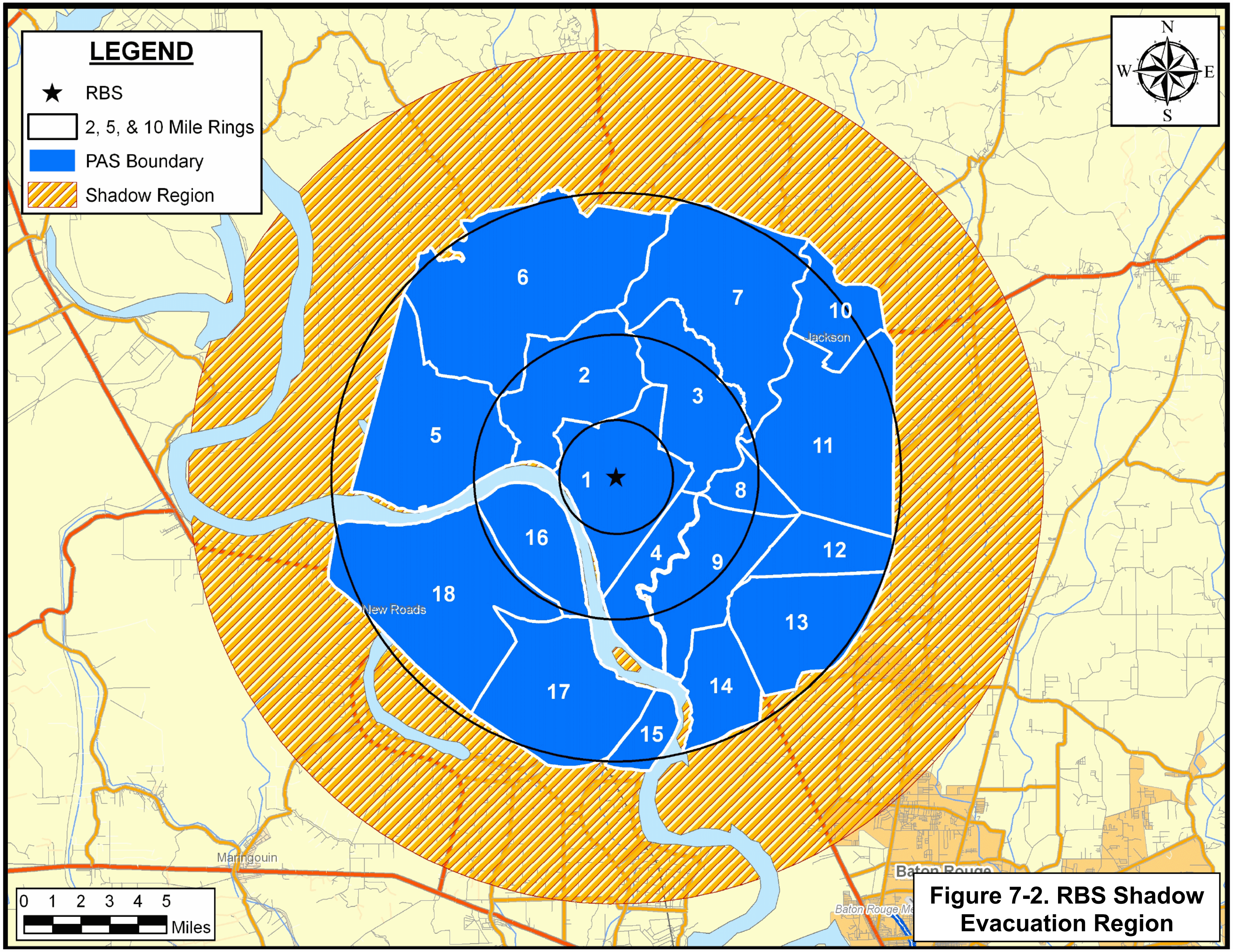


Figure 7-2. RBS Shadow Evacuation Region

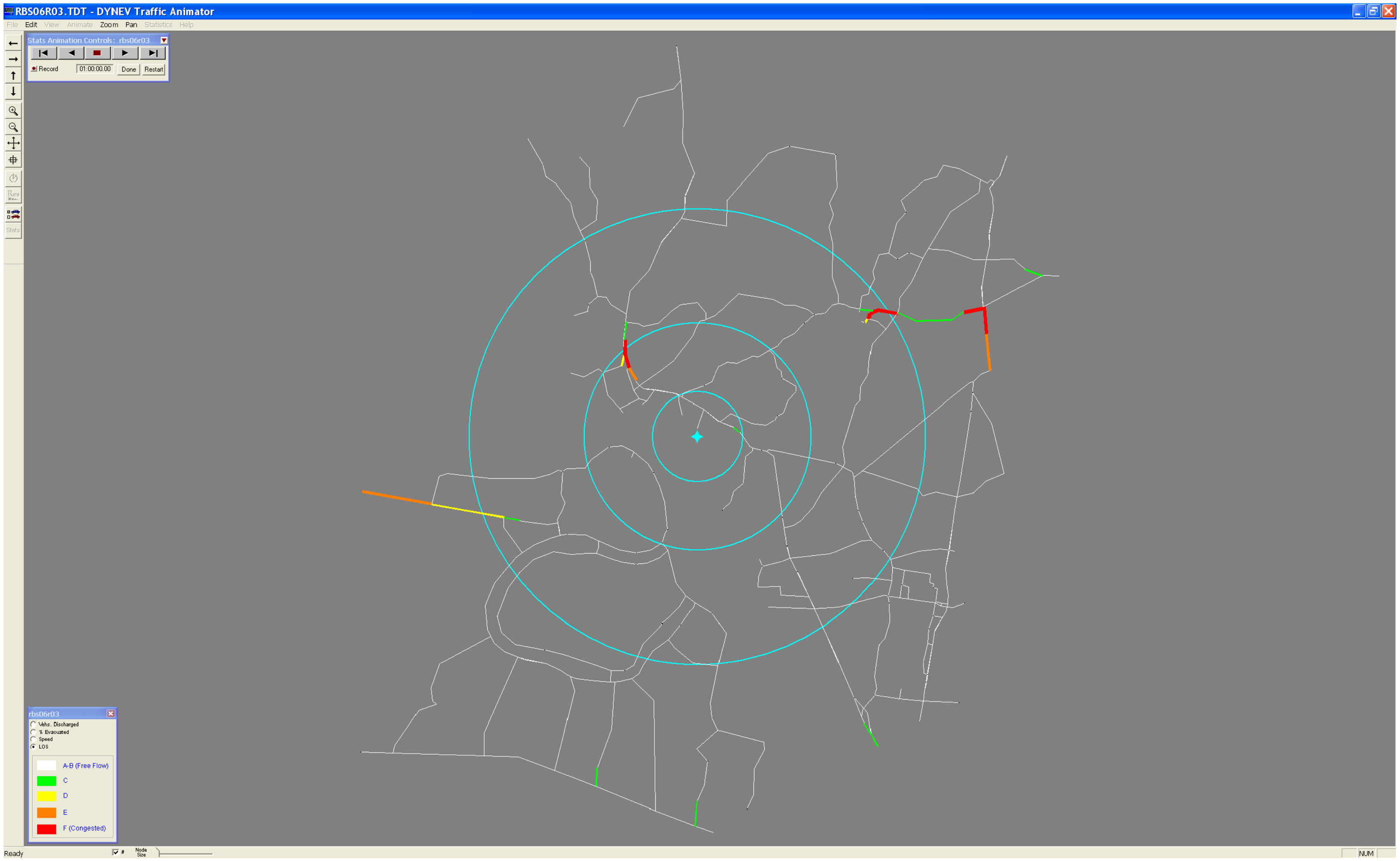


Figure 7-3. Congestion Patterns at 1 Hour after the Evacuation Advisory

Figure 7-4 Congestion Patterns at 2 Hours after the Evacuation Advisory

Figure 7-5 Congestion Patterns at 3 Hours after the Evacuation Advisory

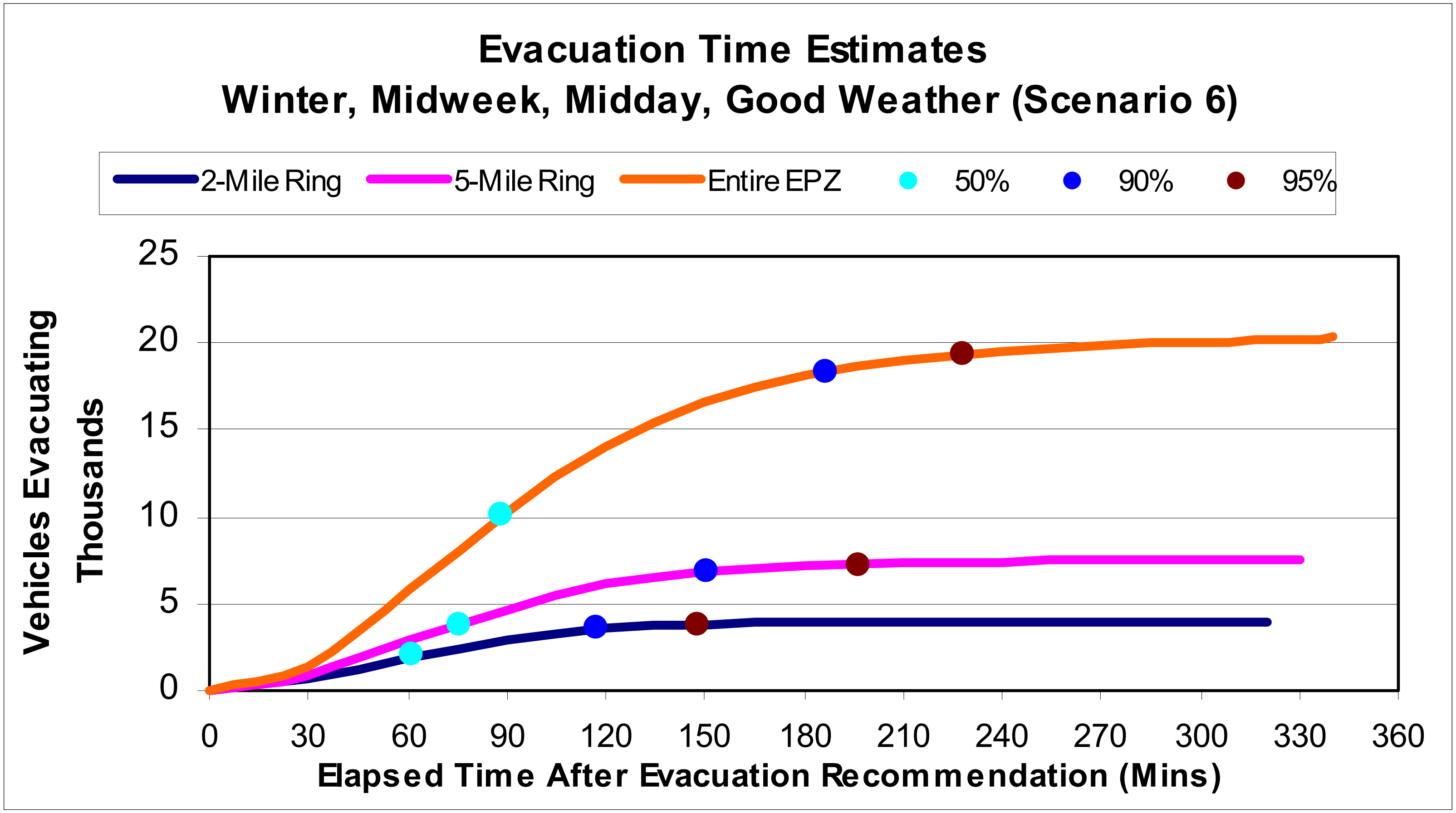


Figure 7-6. Evacuation Time Estimates for RBS
Winter, Midweek, Midday, Good Weather
Evacuation of Region R03 (Entire EPZ)

8. TRANSIT-DEPENDENT AND SPECIAL FACILITY EVACUATION TIME ESTIMATES

This section details the analyses applied and the results obtained in the form of evacuation time estimates for transit vehicles (buses). The demand for transit service reflects the needs of two population groups: (1) residents, employees and transients with no vehicles available; and (2) residents of special facilities such as schools, health-support facilities, institutions and child-care facilities.

These transit vehicles merge into and become a part of the general evacuation traffic environment that is comprised mostly of "passenger cars" (pc's). The presence of each transit vehicle in the evacuating traffic stream is represented within the modeling paradigm described in Appendix D as equivalent to two pc's. This equivalence factor represents the longer size and more sluggish operating characteristics of a transit vehicle relative to those of a pc.

Transit vehicles must be mobilized in preparation for their respective evacuation missions. Specifically:

- Bus drivers must be alerted
- They must travel to the bus depot
- They must be briefed there and assigned to a route or facility

These activities consume time. Based on experience at other suburban plants, it is estimated that bus mobilization time will average approximately 90 minutes extending from the advisory to evacuate to the time when buses arrive at their respective assignments.

During this mobilization period, other mobilization activities are taking place. One of these is the action taken by parents, neighbors, relatives and friends to pick up children from school prior to the arrival of buses, so that they may join their families. Virtually all studies of evacuations have concluded that this "bonding" process of uniting family members is universally prevalent during emergencies and should be anticipated in the planning process. Many emergency plans, however, call for parents to pick up children at host schools or Reception Centers to speed the evacuation of the school children in the event that buses need to return to the EPZ and evacuate transit dependents. We provide estimates of buses under the assumption that no children will be picked up at school by their parents as an upper bound estimate of the transit vehicles needed.

The procedure is:

- Estimate demand for transit service
- Estimate time to perform all transit functions
- Estimate route travel times to the EPZ boundary and to the school Reception Centers

8.1 Transit-Dependent People - Demand Estimate

The telephone survey (see Appendix F) results were used to estimate the portion of the population requiring transit service:

- Those persons in households that do not have a vehicle available.
- Those persons in households that do have vehicle(s) that would not be available at the time the evacuation is advised.

In the latter group, the vehicle(s) may be used by a commuter(s) who does not return (or is not expected to return) home to evacuate the household.

Table 8-1 presents estimates of transit-dependent people. Note:

- Estimates of persons requiring transit vehicles include school children. For those evacuation scenarios where children are at school when an evacuation is advised, separate transportation is provided for the school children. The actual need for transit vehicles by residents is thereby less than the given estimates. However, we will not reduce our estimates of transit vehicles since it would add to the complexity of the implementation procedures.
- It is reasonable and appropriate to consider that many transit-dependent persons will evacuate by ride-sharing with neighbors, friends or family. For example, nearly 80 percent of those who evacuated from Mississauga, Ontario who did not use their own cars, shared a ride with neighbors or friends. Other documents report that approximately 70 percent of transit-dependent persons were evacuated via ride-sharing. **We will adopt a conservative estimate that 50 percent of transit-dependent persons will ride-share.**

The estimated number of bus trips needed to service transit-dependent persons is based on an estimate of average bus occupancy of 30 persons at the conclusion of the bus run. Transit vehicle seating capacities typically equal or exceed 60 children (equivalent to 40 adults). If transit vehicle evacuees are two-thirds adults and one-third children, then the number of “adult seats” taken by 30 persons is 20 + (2/3 x10) = 27. On this basis, the average load factor anticipated is (27/40) x 100 = 68 percent. Thus, if the actual demand for service exceeds the estimates of Table 8-1 by 50 percent, the demand for service can still be accommodated by the available bus seating capacity.

Table 8-1 indicates that there are 1,784 people who do not have their own means of transportation. Based on our assumption that 50% of them ride-share with their neighbors, transportation must be provided for 892 people. Therefore, a total of 30 bus runs are required to transport this population to Reception Centers.

To illustrate this estimation procedure, we calculate the number of persons, P, requiring public transit or ride-share, and the number of buses, B, required for the RBS EPZ:

$$P = 9{,}800 \times [(0.068 \times 1.89) + (0.243 \times (1.77 - 1) \times 0.59 \times 0.36) + (0.447 \times (2.69 - 2) \times (0.59 \times 0.36)^2)]$$
$$P = 9{,}800 \times (0.1822) = 1{,}784$$
$$B = (0.5 \times P) \div 30 = 30$$

These calculations are explained as follows:

- All members (1.89 avg.) of households (HH) with no vehicles (6.8%) will evacuate by public transit or ride-share. The term 9,800 (number of households) x 0.068 x 1.89, accounts for these people.
- The members of HH with 1 vehicle away (24.3%), who are at home, equal (1.77-1). The number of HH where the commuter will not return home is equal to (9,800 x 0.243 x 0.59 x 0.36), as 59% of EPZ households have a commuter, 36% of which would not return home in the event of an emergency. The number of persons who will evacuate by public transit or ride-share is equal to the product of these two terms.
- The members of HH with 2 vehicles that are away (44.7%), who are at home, equal (2.69 – 2). The number of HH where neither commuter will return home is equal to 9,800 x 0.447 x $(0.59 \times 0.36)^2$. The number of persons who will evacuate by public transit or ride-share is equal to the product of these two terms.
- Households with 3 or more vehicles are assumed to have no need for transit vehicles.
- The total number of persons requiring public transit is the sum of such people in HH with no vehicles, or with 1 or 2 vehicles that are away from home.

8.2 School Population – Transit Demand

Table 8-2 presents the school population and transportation requirements for the direct evacuation of all schools within the EPZ. The column in Table 8-2 entitled “# of Buses Required” specifies the number of buses required for each school under the following set of assumptions and estimates:

- No students will be picked up by their parents prior to the arrival of the buses.
- Bus capacity, expressed in students per bus, is set to 70 for primary schools and 50 for middle and high schools.
- Those staff members who do not accompany the students will evacuate in their private vehicles.

- No allowance is made for student absenteeism which is in the neighborhood of 3 percent, daily.

We recommend that the Parishes introduce procedures whereby the schools are contacted prior to the dispatch of buses from the depot (approximately one hour after the advisory to evacuate), to ascertain the current estimate of students to be evacuated. In this way, the number of buses dispatched to the schools will reflect the actual number needed. Some parents will likely pick up their children at school, although they are asked to pick children up at the Reception Facilities. Those buses originally allocated to evacuate school children that are not needed due to children being picked up by their parents, can be gainfully assigned to service other facilities or those persons who do not have access to private vehicles or to ride-sharing.

Table 8-3 presents a list of the Reception Facilities for each school in the EPZ. Those students not picked up by their parents prior to the arrival of the buses, will be transported to these centers where they will be subsequently retrieved by their respective families.

8.3 Medical Facility Demand

Table 8-4 presents the census of medical facilities in the EPZ. Approximately 858 people have been identified as being treated in these facilities. This census indicates the number of ambulatory and non-ambulatory patients. The transportation requirements for this group are also presented. The vehicular demand estimates assume 30 ambulatory patients per bus, 12 ambulatory patients per van and 2 non-ambulatory patients per ambulance-trip. All the patients will be evacuated to the Baton Rouge General Medical Center, except those patients at the East Louisiana State Hospital. The East Louisiana State Hospital houses forensics patients; they will be evacuated to another state facility capable of caring for these patients, as per state plans.

8.4 Correctional Facility Demand

Table 8-5 presents the census of correctional facilities in the EPZ. There are three correctional facilities inside the RBS EPZ with a total of 1,714 inmates. We assume that 1 guard is required per every 5 inmates to transport them to a safe and guarded location. These transport buses are assumed to carry about 40 people per trip. The remaining staff would evacuate by their personal vehicles. Hence, the number of trips from Dixon Correctional Institute can be estimated as:

Total demand = 1,520 (total inmates) + 1,520/5 (number of guards required) = 1,824 people.

Total number of buses required = 1,824 / 40 = 46.

8.5 Evacuation Time Estimates for Transit-Dependent People

Parish bus resources are assigned to evacuating school children as the first priority in the event of an emergency. In the event that the allocation of buses dispatched from the depots to the various facilities and to the bus routes is somewhat "inefficient", or if there is a shortfall of available drivers, then there may be a need for some buses to return to the EPZ from the Reception Center after completing their first evacuation trip, to complete a "second wave" of providing transport service to evacuees. For this reason, the ETE will be calculated for both a one wave transit evacuation and for two waves. Of course, if the impacted Evacuation Region is other than R03 (the entire EPZ), then there will likely be ample transit resources relative to demand in the impacted Region and this discussion of a second wave would likely not apply.

Once school evacuation needs are satisfied, subsequent assignments of buses to service the transit-dependent should be sensitive to their mobilization time. Clearly, the buses should be dispatched after people have completed their mobilization activities and are in a position to board the buses when they arrive at the pick-up points.

Evacuation Time Estimates for Transit Trips were developed using both good weather and adverse weather conditions. Figure 8-1 presents the chronology of events relevant to transit operations. The elapsed time for each activity will now be discussed with reference to Figure 8-1.

Activity: Mobilize Drivers (A→B→C)

Mobilization is the elapsed time from the advisory to evacuate to the time when the buses arrive at the facility to be evacuated. It is assumed that for a rapidly escalating radiological emergency with no observable indication before the fact, drivers would likely require 90 minutes to be contacted, to travel to the depot, be briefed, and to travel to the transit-dependent facilities. Mobilization time is slightly longer – 100 minutes – when raining, to account for slower travel speeds.

Activity: Board Passengers (C→D)

Studies have shown that passengers can board a bus at headways of 2-4 seconds (Ref. HCM2000 Page 27-27). Therefore, the total dwell time to service passengers boarding a bus to capacity at a single stop (e.g., at a school) is about 5 minutes. A loading time of 10 minutes will be used for rain scenarios. For multiple stops along a pick-up route we must allow for the additional delay associated with stopping and starting at each pick-up point. This additional delay to service passengers expands this estimate of boarding time to 15 minutes in good weather, and 20 minutes in rain.

Activity: Travel to EPZ Boundary (D→E)

School Evacuation

The distance from a school to the EPZ boundary is measured using Geographical Information Systems (GIS) software along the most likely route out of the EPZ. The travel times to the EPZ boundary are based on evacuation speeds computed by the model. The average speed output by the simulation model (PC-DYNEV) for an evacuation of the full EPZ under Scenario 6 (good weather – school in session) conditions at 90 minutes (mobilization time) is 35.0 mph, while the average speed for an evacuation of the full EPZ under Scenario 7 conditions (Rain) is 26.7 mph. The travel time from the EPZ boundary to the Reception Center was computed assuming the same average speeds.

Tables 8-6A (good weather) and 8-6B (rain) present the following evacuation time estimates (rounded up to the nearest 5 minutes) for schools in the EPZ: (1) The elapsed time from the advisory to evacuate until the bus exits the EPZ; and (2) The elapsed time until the bus reaches the School Reception Center. The evacuation time out of the EPZ can be computed as the sum of travel times associated with Activities A→B→C, C→D, and D→E (For example: 90 min. + 5 + 24 = 2:00, rounded to the nearest 5 minutes, for West Feliciana High School, with good weather). The evacuation time to the School Reception Center is determined by adding the time associated with Activity E→F (discussed below), to this EPZ evacuation time.

Evacuation of Transit-Dependent Population

The buses dispatched from the depots to service the transit-dependent evacuees will be scheduled so that they arrive at their respective routes after their passengers have completed their mobilization. As indicated in Section 5, about 80 percent of the transit dependent evacuees (households without commuters from Table 5-1) will have completed their mobilization activities when the buses begin their routes, 90 minutes after the advisory to evacuate (ATE).

If the parishes have surplus buses after dispatching buses to evacuate schools, those additional buses will be used to evacuate the transit dependents. Otherwise, those buses evacuating schools will return to the EPZ to pick up the transit dependents after completing the school evacuations – a “second-wave evacuation”. The buses servicing the transit-dependent evacuees will travel along their pick-up routes, then proceed out of the EPZ. Figure 8-2 maps the proposed bus pick-up routes.

The parishes keep up to date records of all the transit dependent and special needs population within the EPZ. These estimates indicate that nearly all of the transit dependent population within the EPZ resides within the major population centers – Jackson, New Roads, and St. Francisville. The parishes send vehicles to pick up the transit dependent persons identified in their database. If needed, a bus would be dispatched to service those people who live in close proximity to one another.

The bus routes identified in Figure 8-2 were designed to service the major population areas within the EPZ. *These routes have been created in order to estimate ETE for the transit-dependent population. They do not imply that these routes will be used by the parishes or that they must be used by the parishes in the event of an emergency at RBS.*

Table 8-7 presents the transit-dependent population evacuation time estimates for each route obtained using the procedures outlined above.

<u>Activity: Travel to School Reception Centers (E→F)</u>

The distances from the EPZ boundary to the Reception Centers are measured using GIS software along the most likely route from the EPZ to the Reception Center. For a one-wave evacuation, this travel time outside the EPZ does not contribute to the ETE. For a two-wave evacuation, the ETE for buses must be considered separately, since it could exceed the ETE for the general public. It is assumed that travel speeds are somewhat higher outside of the EPZ as congestion is likely to be less pronounced. Average travel speeds (from the EPZ boundary to the reception centers) of 40 mph and 36 mph (10% lower) are used for good weather and rain, respectively.

<u>Activity: Passengers Leave Bus (F→G)</u>

Passengers can de-board within 5 minutes. The driver takes a 10 minute break.

<u>Activity: Bus Returns to Route for Second Wave Evacuation (G→C)</u>

The buses assigned to return to the EPZ to perform a “second wave” evacuation of transit-dependent evacuees will be those that evacuated the school children, since those will be the earliest buses available. The travel time back to the EPZ is equal to the average travel time from the EPZ boundary to the Reception Centers for those buses evacuating the school children. Upon returning to the EPZ, the bus travels its route and picks up transit-dependent evacuees along the route.

Bus Route Descriptions

Route 1

Buses on this route will circulate within New Roads and pick up those evacuees needing transportation. Once the bus is full, it will proceed southbound on Louisiana Highway 1 out of the EPZ. Ten buses will be allocated to Route 1.

Route 2

Buses on this route will circulate within St. Francisville and pick up those evacuees needing transportation. Once the bus is full, it will proceed eastbound on Louisiana Highway 10 out of the EPZ so as to not travel closer to RBS. Ten buses will be allocated to Route 2.

Route 3

Buses on this route will circulate within Jackson and pick up those evacuees needing transportation. Once the bus is full, it will also proceed eastbound on Louisiana Highway 10 out of the EPZ. Ten buses will be allocated to Route 3.

The ETE for good weather and rain for all routes and buses are given in Table 8-7. The travel times were computed using the average speed output by PC-DYNEV – 35.0 mph for good weather and 26.7 mph for rain.

The second-wave ETE for Bus Route Number 3 are computed as follows for good weather:

- Bus arrives at reception center at 2:30 in good weather (average of “ETE to RC (min)” column in Table 8-6A).
- Bus discharges passengers (5 minutes) and driver takes a 10-minute break: 15 minutes.
- Bus returns to EPZ: 47 minutes (average of “Travel time EPZ Boundary to RC” column in Table 8-6A).
- Bus completes pick-ups along route and departs EPZ: 15 minutes + (11.5 miles @ 35.0 mph) = 35 minutes.
- Bus exits EPZ at time 2:30 + 0:15 + 0:47 + 0:35 = 4:10 (rounded up to nearest 5 minutes) after the advisory to evacuate.

The ETE for the completion of the second wave are also given in Table 8-7.

Evacuation of Medical Facilities

The bus operations for this group are similar to those for school evacuation except:

- Buses are assigned on the basis of 25-30 patients to allow for staff to accompany the patients.
- The passenger loading time will be longer at approximately 30 minutes per facility (35 minutes in rain) to account for the time to move patients from inside the facility to the vehicles.

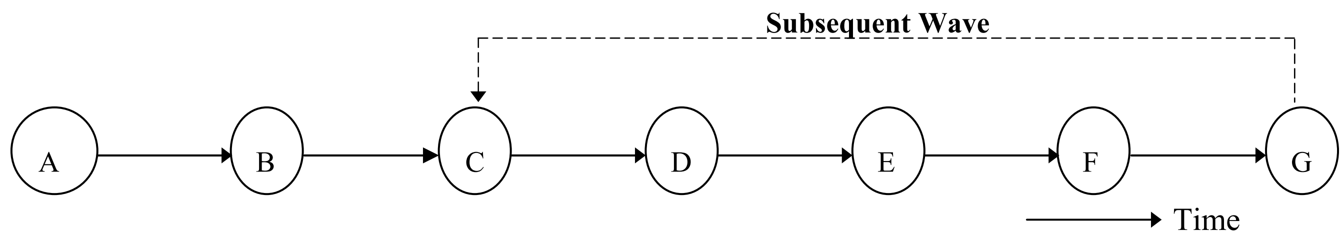
As is done for the schools, it is estimated that mobilization time averages 90 minutes. In the event there is a shortfall of transit vehicles for a "first-wave" evacuation, then buses used to evacuate schools will also have to return to evacuate the special facilities. The school ETE to the Reception Centers is approximately 2:30 on average, and about 30 minutes of additional inbound travel time to the special facility from the Reception Center would be required. It follows, therefore, that about 90 minutes would have to be added to the calculated ETE for special facilities, in the event they are evacuated as a "second wave."

Table 8-4 indicates the number of bus/van runs and ambulance runs needed for the entire EPZ. The ETE for the medical facilities are calculated and shown in Table 8-8A and 8-8B. The average ETE for the medical facilities for single wave and two wave evacuations do not exceed the general population ETE.

Correctional Facilities

It is assumed that the Louisiana Department of Public Safety and Corrections will provide the buses needed to transport inmates. The inmates will be transported to a nearby correctional facility outside of the EPZ that has enough capacity to handle the influx of inmates. The buses will most likely travel in a police-escorted convoy to ensure the safety of the public. We estimate that it will take 2:30 for buses to arrive at the correctional facilities in good weather – 15 minutes longer in rain. The average speed of traffic output by PC-DYNEV at these times is 30.5 mph for good weather and 25.8 mph for rain.

Loading time will be similar to that for medical facilities (30 minutes in good weather, 35 minutes in rain) as extra security precautions will be taken when moving the inmates from the facility to the buses. Tables 8-9A and 8-9B present the ETE for correctional facilities in good weather and rain, respectively. These ETE are also less than those of the general population.



Event

A	Advisory to Evacuate
B	Bus Dispatched from Depot
C	Bus Arrives at Facility/Pick-up Route
D	Bus Departs for Reception Center
E	Bus Exits Region
F	Bus Arrives at School Reception Center
G	Bus Available for “Second Wave” Evacuation Service

Activity

A→B	Driver Mobilization
B→C	Travel to Facility or to Pick-up Route
C→D	Passengers Board the Bus
D→E	Bus Travels Towards Region Boundary
E→F	Bus Travels Towards School Reception Center Outside the EPZ.
F→G	Passengers Leave Bus; Driver Takes a Break

Figure 8-1. Chronology of Transit Evacuation Operations

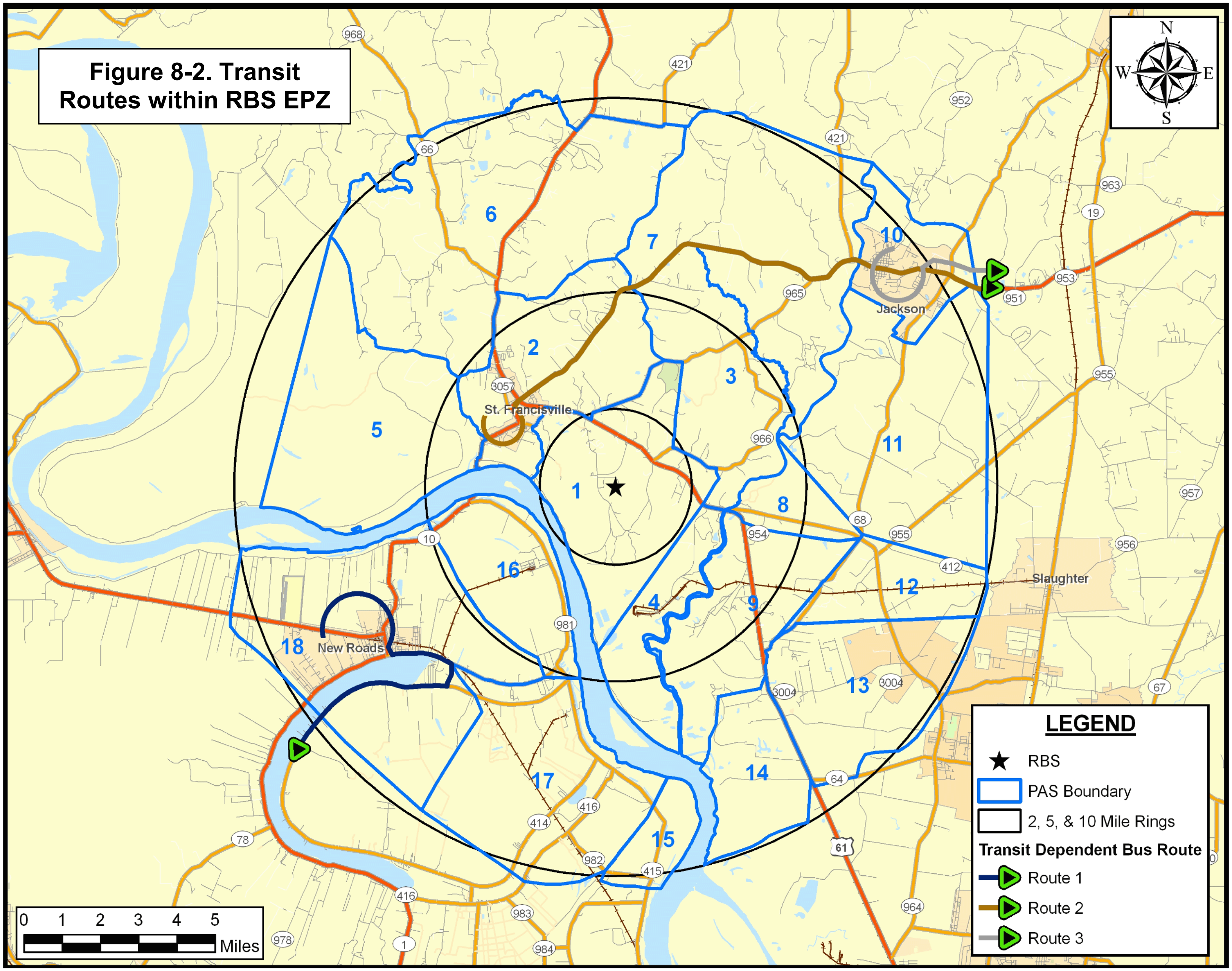


Figure 8-2. Transit Routes within RBS EPZ
N
E
S
W
St. Francisville
Jackson
New Roads
Slaughter
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
0 1 2 3 4 5
Miles
LEGEND
RBS
PAS Boundary
2, 5, & 10 Mile Rings
Transit Dependent Bus Route
Route 1
Route 2
Route 3

Table 8-1. Transit Dependent Population Estimates			
Facility Name	River Bend Station		
2008 EPZ Estimated Population	24,697		
Survey Average Household Size	2.52		
2008 EPZ Estimated Households	9,800		
Survey Percent Households With Commuters	59%		
Survey Percent Households With Non-Returning Commuters	36%		
No. of Vehicles in the Household	**0**	**1**	**2**
Survey Average Household Size	1.89	1.77	2.69
Survey Percent Households	6.8%	24.3%	44.7%
People Requiring Transport	1259	389	136
Total People Requiring Transport	1,784 (=1259+389+136)		
Estimated Ridesharing Percentage	50%		
People Requiring Public Transit	892		
Percent of Population Requiring Public Transit	3.6%		
Transit Buses Required (30 passengers/bus)	30		

*See Section 8.1 for details of the calculations.

Table 8-2. School Population Demand Estimates						
PAS	**Direction**	**Distance (Miles)**	**School Name**	**Enrollment**	**Staff**	**# of Buses Required**
West Feliciana Parish						
2	NNW	5.5	Bains Elementary School	644	60	10
2	NNW	5.5	Bains Lower Elementary School	440	31	7
2	NNW	5.7	West Feliciana High School	622	55	13
2	NNW	5.7	West Feliciana Middle School	550	73	11
			WFP Total	**2,256**	**219**	**41**
East Feliciana Parish						
10	NE	9.0	Quad Area-Jackson Head Start	97	15	2
10	ENE	10.1	Jackson Elementary, Middle, and High Schools	940	105	19
10	ENE	10.4	Jackson Christian Academy	14	3	1
10	ENE	10.7	Louisiana Technical College - Folkes Campus	80	10	2
			EFP Total	**1,131**	**133**	**24**
East Baton Rouge Parish						
13	SE	7.3	Port Hudson Head Start	111	17	2
			EBRP Total	**111**	**17**	**2**
Pointe Coupee Parish						
17	SSW	10.4	Rougon Elementary School	490	65	7
18	WSW	7.0	Rosenwald Elementary School	490	65	7
18	SW	7.6	Catholic Elementary, Middle and High Schools	733	80	15
18	WSW	8.5	False River Academy	470	50	10
18	WSW	9.2	Louisiana Technical College - Jumonville Campus	150	14	3
			PCP Total	**2,333**	**274**	**42**
			Total:	**5,831**	**643**	**109**

Table 8-3. Reception Facilities for Schools

PAS	School Name	Reception Facility
West Feliciana Parish		
2	Bains Elementary School	Baton Rouge River Center
2	Bains Lower Elementary School	Baton Rouge River Center
2	West Feliciana High School	Baton Rouge River Center
2	West Feliciana Middle School	Baton Rouge River Center
East Feliciana Parish		
10	Quad Area-Jackson Head Start	Baton Rouge River Center
10	Jackson Elementary, Middle, and High Schools	Baton Rouge River Center
10	Jackson Christian Academy	Baton Rouge River Center
10	Louisiana Technical College - Folkes Campus	Baton Rouge River Center
East Baton Rouge Parish		
13	Port Hudson Head Start	Baton Rouge River Center
Pointe Coupee Parish		
17	Rougon Elementary School	LSU Field House
18	Rosenwald Elementary School	LSU Field House
18	Catholic Elementary, Middle and High Schools	LSU Field House
18	False River Academy	LSU Field House
18	Louisiana Technical College - Jumonville Campus	LSU Field House

Table 8-4. Medical Facilities Demand Estimation

PAS	Direction	Distance (Miles)	Name	Municipality	Staff	Ambulatory Patients	Buses/ Vans	Non-Ambulatory Patients	Ambul-ances
West Feliciana Parish									
2	NW	2.7	West Feliciana Parish Hospital	St. Francisville	23	12	1 Van	3	2
7	NNE	6.0	St. Francisville Country Manor	St. Francisville	40	44	1 Bus, 2 Vans	84	42
WFP Total					***63***	***56***	***1 Bus, 3 Vans***	***87***	***44***
East Feliciana Parish									
10	NE	8.7	FMCNA Felicianas Dialysis Center	Jackson	13	44	1 Bus, 2 Vans	2	1
10	NE	9.0	East Louisiana State Hospital	Jackson	600	586	19 Buses, 2 Vans	5	3
EFP Total					***613***	***630***	***20 Buses, 4 Vans***	***7***	***4***
Pointe Coupee Parish									
18	WSW	9.1	Pointe Coupee General Hospital	New Roads	170	14	2 Vans	14	7
18	WSW	9.1	Lakeview Manor Nursing Home	New Roads	35	85	3 Buses	25	13
18	WSW	9.3	Pointe Coupee Nursing Home	New Roads	17	73	2 Buses, 1 Van	5	3
PCP Total					***222***	***172***	***5 buses, 3 Vans***	***44***	***23***
Total:					**898**	**858**	**26 Buses, 10 Vans**	**138**	**71**

NOTES:
2 Non-ambulatory patients per ambulance.
30 Ambulatory patients per bus or 12 ambulatory patients per van.

Table 8-5. Correctional Facilities Demand Estimation							
PAS	**Direction**	**Distance (Miles)**	**Name**	**Municipality**	**Inmates**	**Staff**	**Buses Needed**
West Feliciana Parish							
2	WNW	3.4	West Feliciana Parish Jail	St. Francisville	44	12	**2**
				WFP Total	***44***	***12***	***2***
East Feliciana Parish							
11	ENE	8.2	Dixon Correctional Institute	Jackson	1,520	550	46
				EBRP Total	***1,520***	***550***	***46***
Pointe Coupee Parish							
16	W	3.1	Point Coupee Parish Jail	New Roads	150	8	5
				PCP Total	***150***	***8***	***5***
				Entire EPZ Total:	**1,714**	**570**	**53**

Table 8-6A. School Evacuation Time Estimates - Good Weather								
School	**Driver Mobilization Time(min)**	**Loading Time (min)**	**Dist. to EPZ Boundary (mi.)**	**Travel Time to EPZ Boundary (min)**	**ETE (hr:min)**	**Dist. EPZ Boundary to R.C. (mi.)**	**Travel Time EPZ Boundary to RC (min)**	**ETE to R.C. (hr:min)**
West Feliciana Parish Schools								
Bains Elementary School	90	5	14.0[1]	24	**2:00**	32.5	49	**2:50**
Bains Lower Elementary School	90	5	14.0	24	**2:00**	32.5	49	**2:50**
West Feliciana High School	90	5	14.0	24	**2:00**	32.5	49	**2:50**
West Feliciana Middle School	90	5	14.0	24	**2:00**	32.5	49	**2:50**
East Feliciana Parish Schools								
Quad Area-Jackson Head Start	90	5	3.1	5	**1:45**	32.5	49	**2:30**
Jackson Elementary, Middle, and High Schools	90	5	1.1	2	**1:40**	32.5	49	**2:30**
Jackson Christian Academy	90	5	0.6	1	**1:40**	32.5	49	**2:25**
Louisiana Technical College - Folkes Campus	90	5	0.6	1	**1:40**	32.5	49	**2:25**
East Baton Rouge Parish Schools								
Port Hudson Head Start	90	5	2.2	4	**1:40**	16.9	25	**2:05**
Pointe Coupee Parish Schools								
Rougon Elementary School	90	5	0.1	1	**1:40**	23.9	36	**2:15**
Rosenwald Elementary School	90	5	3.3	6	**1:45**	33.8	51	**2:35**
Catholic Elementary, Middle and High Schools	90	5	2.0	3	**1:40**	33.8	51	**2:30**
False River Academy	90	5	1.4	2	**1:40**	33.8	51	**2:30**
Louisiana Technical College - Jumonville Campus	90	5	0.9	2	**1:40**	33.8	51	**2:30**
				Average for EPZ:	**1:45**		**Average:**	**2:30**

[1] West Feliciana Schools evacuate eastbound on Bains Road to Louisiana Highway 10, then east on Highway 10 to Louisiana Highway 19, and then south on Highway 19 to the Reception Center. The buses traverse this route so as to not travel towards River Bend Station.

Table 8-6B. School Evacuation Time Estimates - Rain								
School	**Driver Mobilization Time(min)**	**Loading Time (min)**	**Dist. to EPZ Boundary (mi.)**	**Travel Time to EPZ Boundary (min)**	**ETE (hr:min)**	**Dist. EPZ Boundary to R.C. (mi.)**	**Travel Time EPZ Boundary to RC (min)**	**ETE to R.C. (hr:min)**
West Feliciana Parish Schools								
Bains Elementary School	100	10	14.0	31	**2:25**	32.5	54	**3:20**
Bains Lower Elementary School	100	10	14.0	31	**2:25**	32.5	54	**3:20**
West Feliciana High School	100	10	14.0	31	**2:25**	32.5	54	**3:20**
West Feliciana Middle School	100	10	14.0	31	**2:25**	32.5	54	**3:20**
East Feliciana Parish Schools								
Quad Area-Jackson Head Start	100	10	3.1	7	**2:00**	32.5	54	**2:55**
Jackson Elementary, Middle, and High Schools	100	10	1.1	2	**1:55**	32.5	54	**2:50**
Jackson Christian Academy	90	5	0.6	1	**1:40**	32.5	54	**2:35**
Louisiana Technical College - Folkes Campus	100	10	0.6	1	**1:55**	32.5	54	**2:50**
East Baton Rouge Parish Schools								
Port Hudson Head Start	100	10	2.2	5	**1:55**	16.9	28	**2:25**
Pointe Coupee Parish Schools								
Rougon Elementary School	90	5	0.1	1	**1:40**	23.9	40	**2:20**
Rosenwald Elementary School	100	10	3.3	7	**2:00**	33.8	56	**2:55**
Catholic Elementary, Middle and High Schools	100	10	2.0	4	**1:55**	33.8	56	**2:55**
False River Academy	100	10	1.4	3	**1:55**	33.8	56	**2:50**
Louisiana Technical College - Jumonville Campus	100	10	0.9	2	**1:55**	33.8	56	**2:50**
				Average for EPZ:	**2:00**		**Average:**	**2:55**

Table 8-7. Transit Dependent Evacuation Time Estimates														
Route Number	Total Buses	Single Wave Evacuation					Second Wave Evacuation							
		Mobilization (min)	Route Length (mi.)	Route Travel Time (min)	Pick-up Time (min)	ETE (hr:min)	Mobilization (min)	Unload Time (min)	Driver Rest (min)	Travel Time Back to Route Start (min)	Route Travel Time (min)	Pick-up Time (min)	ETE (hr:min)
Good Weather													
1	10	90	15.8	27	15	**2:15**	150	5	10	47	27	15	**4:15**
2	10	90	19.2	33	15	**2:20**	150	5	10	47	33	15	**4:20**
3	10	90	11.5	20	15	**2:05**	150	5	10	47	20	15	**4:10**
Average for EPZ:						**2:15**	**Average for EPZ:**						**4:15**
Rain													
1	10	100	15.8	36	20	**2:40**	175	5	10	52	36	20	**5:00**
2	10	100	19.2	43	20	**2:45**	175	5	10	52	43	20	**5:05**
3	10	100	11.5	26	20	**2:30**	175	5	10	52	26	20	**4:50**
Average for EPZ:						**2:40**	**Average for EPZ:**						**5:00**

Table 8-8A. Evacuation Time Estimates for Ambulatory Patients at Medical Facilities GOOD WEATHER					
Medical Facility	**Driver Mobilization Time(min)**	**Loading Time (min)**	**Dist. to EPZ Boundary (mi.)**	**Travel Time to EPZ Boundary (min)**	**ETE (hr:min)**
West Feliciana Parish					
West Feliciana Parish Hospital[2]	90	30	14.8	27	**2:30**
St. Francisville Country Manor	90	30	8.9	16	**2:20**
East Feliciana Parish					
FMCNA Felicianas Dialysis Center	90	30	2.9	5	**2:05**
East Louisiana State Hospital	90	30	2.3	4	**2:05**
Pointe Coupee Parish					
Pointe Coupee General Hospital	90	30	0.7	1	**2:05**
Lakeview Manor Nursing Home	90	30	0.9	2	**2:05**
Pointe Coupee Nursing Home	90	30	1.9	4	**2:05**
				Average for EPZ:	**2:10**

[2] West Feliciana Parish Hospital evacuates north on US Highway 61, then east on Louisiana Highway 10 through Jackson and out of the EPZ. The buses traverse this route so as to not travel towards River Bend Station.

Table 8-8B. Evacuation Time Estimates for Ambulatory Patients at Medical Facilities RAIN					
Medical Facility	**Driver Mobilization Time(min)**	**Loading Time (min)**	**Dist. to EPZ Boundary (mi.)**	**Travel Time to EPZ Boundary (min)**	**ETE (hr:min)**
West Feliciana Parish					
West Feliciana Parish Hospital	100	35	14.8	35	**2:50**
St. Francisville Country Manor	100	35	8.9	21	**2:40**
East Feliciana Parish					
FMCNA Felicianas Dialysis Center	100	35	2.9	7	**2:25**
East Louisiana State Hospital	100	35	2.3	5	**2:20**
Pointe Coupee Parish					
Pointe Coupee General Hospital	100	35	0.7	2	**2:20**
Lakeview Manor Nursing Home	100	35	0.9	2	**2:20**
Pointe Coupee Nursing Home	100	35	1.9	4	**2:20**
				Average for EPZ:	**2:25**

Table 8-9A. Correctional Facilities Evacuation Time Estimates - Good Weather					
Facility	**Driver Mobilization Time(min)**	**Loading Time (min)**	**Dist. to EPZ Boundary (mi.)**	**Travel Time to EPZ Boundary (min)**	**ETE (hr:min)**
West Feliciana Parish					
West Feliciana Parish Jail	150	30	15.2	30	**3:30**
East Feliciana Parish					
Dixon Correctional Institute	150	30	2.8	6	**3:10**
Pointe Coupee Parish					
Pointe Coupee Parish Jail	150	30	8.5	17	**3:20**
				Average for EPZ:	**3:20**

Table 8-9B. Correctional Facilities Evacuation Time Estimates - Rain					
Facility	**Driver Mobilization Time(min)**	**Loading Time (min)**	**Dist. to EPZ Boundary (mi.)**	**Travel Time to EPZ Boundary (min)**	**ETE (hr:min)**
West Feliciana Parish					
West Feliciana Parish	165	35	15.2	35	**3:55**
East Feliciana Parish					
Dixon Correctional Institute	165	35	2.8	7	**3:30**
Pointe Coupee Parish					
Pointe Coupee Parish Jail	165	35	8.5	20	**3:40**
				Average for EPZ:	**3:40**

9. TRAFFIC MANAGEMENT STRATEGY

This section presents the current traffic control and management strategy that is designed to expedite the movement of evacuating traffic. The resources required to implement this strategy include:

- Personnel with the capabilities of performing the planned control functions of traffic guides (preferably, not necessarily, law enforcement officers).
- Traffic Control Devices to assist these personnel in the performance of their tasks. These devices should comply with the guidance of the Manual of Uniform Traffic Control Devices (MUTCD) published by the Federal Highway Administration (FHWA) of the U.S.D.O.T. All state and most parish transportation agencies have access to the MUTCD (also available online). Applicable devices include, with reference to the MUTCD:
  - Traffic Barriers: Chapter 6F, section 6F.61, 62 and Figure 6F-4.
  - Traffic Cones: Chapter 3F and section 6F.56.
  - Signs: Chapter 2I
- A plan that defines all necessary details and is documented in a format that is readily understood by those assigned to perform traffic control.

The functions to be performed in the field are:

1. Facilitate evacuating traffic movements that serve to expedite travel out of the EPZ along routes that the analysis has found to be most effective.
2. Discourage traffic movements that permit evacuating vehicles to travel in a direction which takes them significantly closer to the power station, or which interferes with the efficient flow of other evacuees.

We employ the terms "facilitate" and "discourage" rather than "enforce" and "prohibit" to indicate the need for flexibility in performing the traffic control function. There are always legitimate reasons for a driver to prefer a direction other than that indicated. For example:

- A driver may be traveling home from work or from another location, to join other family members preliminary to evacuating.
- An evacuating driver may be taking a detour from the evacuation route in order to pick up a relative, or other evacuees.
- The driver may be an emergency worker en route to perform an important activity.

The implementation of a plan must also be flexible enough for the application of sound judgment by the traffic guide.

The traffic management strategy is the outcome of the following process:

1. A field survey of these critical locations.

   The schematics describing traffic control, which are presented in Appendix G, are based on data collected during field surveys, upon large-scale maps, and on overhead photos.
2. Computer analysis of the evacuation traffic flow environment.

   This analysis identifies the best routing and those locations that experience pronounced congestion.
3. Consultation with emergency management and enforcement personnel.

   Trained personnel who are experienced in controlling traffic and are aware of the likely evacuation traffic patterns have extensively reviewed these control tactics.
4. Prioritization of TCPs.

   Application of traffic control at some TCPs will have a more pronounced influence on expediting traffic movements than at other TCPs. For example, TCPs controlling traffic originating from areas in close proximity to the power station could have a more beneficial effect on minimizing potential exposure to radioactivity than those TCPs located far from the power station. Thus, during the mobilization of personnel to respond to the emergency situation, those TCPs which are assigned a higher priority, should be manned earlier. These priorities have been developed in conjunction with parish emergency management representatives and law enforcement personnel.

The control tactic at each TCP is presented in each schematic that appears in Appendix G.

Traffic control guides at key intersections throughout the EPZ serve as fixed point surveillance for accidents or other problems that may arise during the evacuation which could reduce capacity and extend the ETE. Traffic control guides also provide needed route guidance to those evacuees who may not be familiar with the area and the roadway system (i.e. transients), and to those residents who are uncertain of the proper direction of travel.

Manpower and equipment shortages are likely to occur in an emergency situation. The parishes and the police will require assistance from the Department of Transportation (DOT) in providing and transporting equipment. It is recommended that the parishes and the DOT develop joint emergency response implementation procedures to ensure that sufficient resources are available in a timely manner in the event of an emergency.

The use of Intelligent Transportation Systems (ITS) technologies can reduce manpower and equipment needs, while still facilitating the evacuation process. Dynamic Message Signs (DMS) can be placed within the EPZ to provide information to travelers regarding traffic conditions, route selection, and Reception Center information. DMS can also be placed outside of the EPZ to warn motorists to avoid using routes that may conflict with the flow of evacuees away from the power station. Highway Advisory Radio (HAR) can be used to broadcast information to evacuees en route through their vehicle stereo systems. Automated Traveler Information Systems (ATIS) can also be used to provide evacuees with information. Internet websites can provide traffic and evacuation route information before the evacuee begins his trip, while on board navigation systems (GPS units), cell phones, and pagers can be used to provide information en route. These are only several examples of how ITS technologies can benefit the evacuation process.

Chapter 2I of the MUTCD presents guidance on Emergency Management signing. Specifically, the Evacuation Route sign, EM-1 on page 2I-3, with the word “Hurricane” removed, could be installed selectively within the EPZ, if considered advisable by local and state authorities. Similar comments apply to sign EM-3 which identifies TCP locations.

10. EVACUATION ROUTES

Evacuation routes are composed of two distinct components:

- Routing from a PAS being evacuated to the boundary of the Evacuation Region and thence out of the Emergency Planning Zone (EPZ).

- Routing of evacuees from the EPZ boundary to the Reception Centers.

Evacuees should be routed within the EPZ in such a way as to *minimize their exposure to risk*. This primary requirement is met by routing traffic to move *away* from the location of the RBS, to the extent practicable, and by delineating evacuation routes that expedite the movement of evacuating vehicles. This latter objective is addressed by developing evacuation routes to achieve a balancing of traffic demand relative to the available highway capacity to the extent possible, subject to satisfying the primary requirement noted above. This is achieved by carefully specifying candidate destinations for all origin centroids where evacuation trips are generated, and applying the TRAD model effectively. See Appendices A-D for further discussion.

The routing of evacuees from the EPZ boundary to the Reception Centers should be responsive to several considerations:

- Minimize the amount of travel outside the EPZ, from the points where these routes cross the EPZ boundary, to the Reception Centers.

- Relate the anticipated volume of traffic destined to the Reception Center, to the capacity of the Reception Center facility.

Figure 10-1 presents a map showing the general population Reception Centers. The major evacuation routes for the five parishes within the EPZ are presented in Figures 10-2 through 10-4.

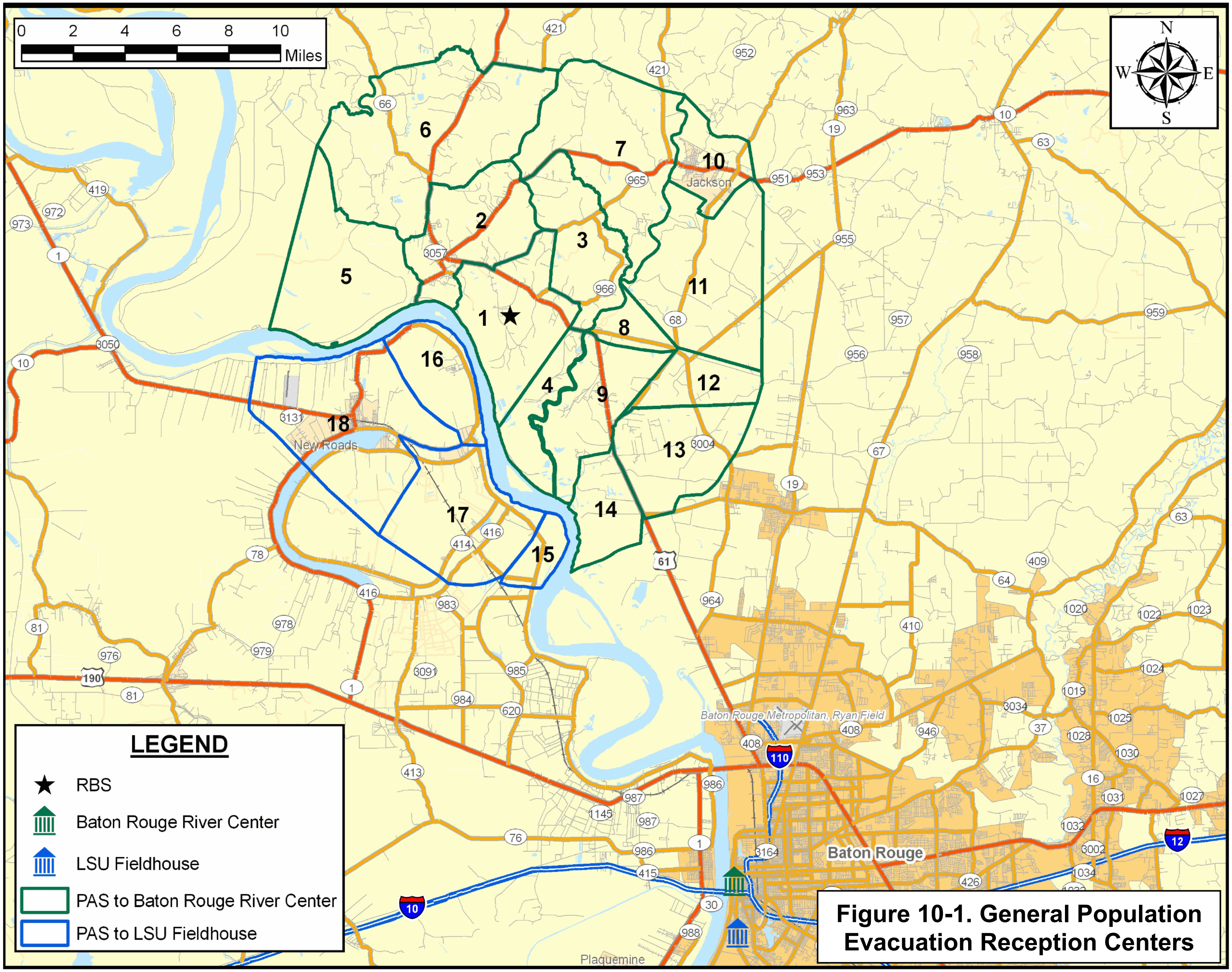


Figure 10-1. General Population Evacuation Reception Centers

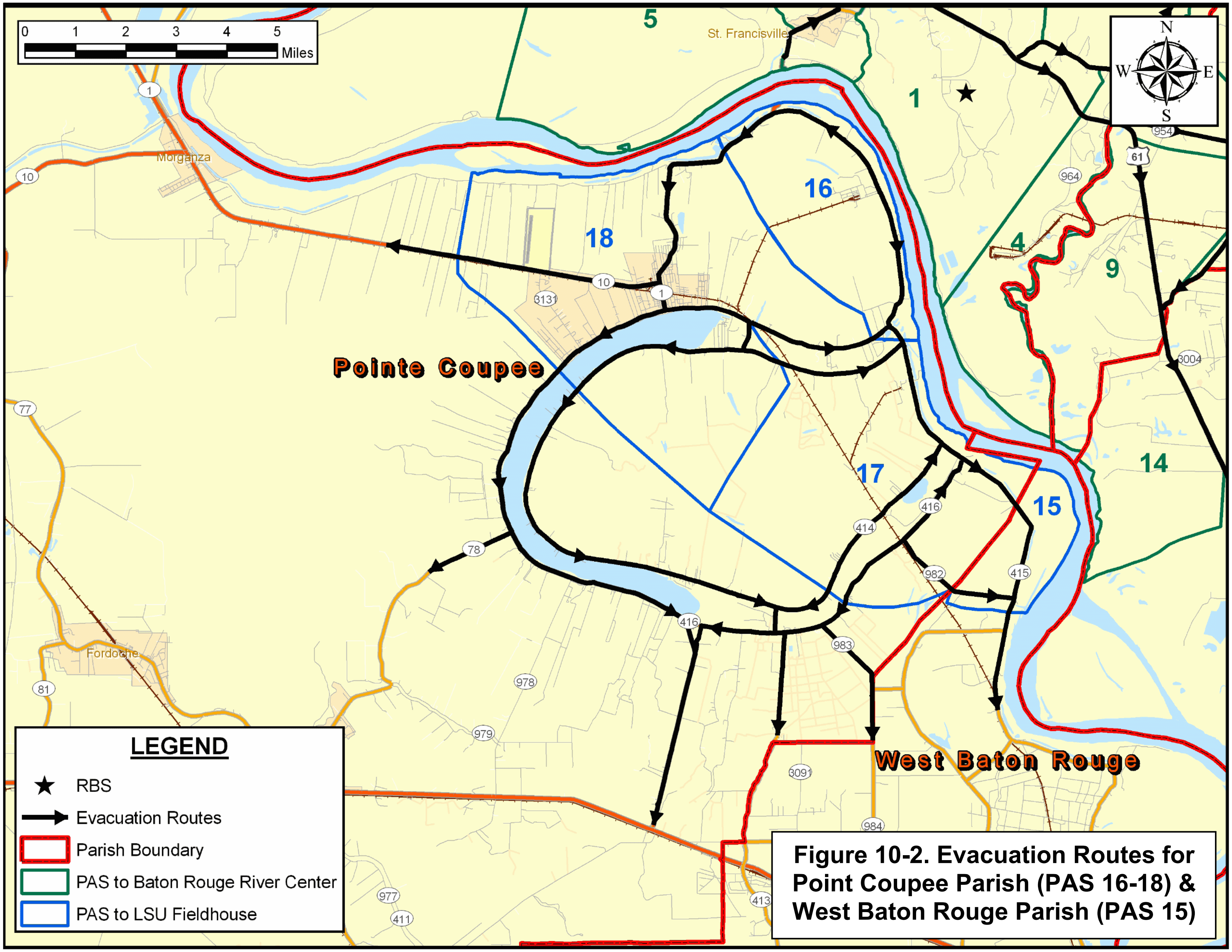


Figure 10-2. Evacuation Routes for Point Coupee Parish (PAS 16-18) & West Baton Rouge Parish (PAS 15)

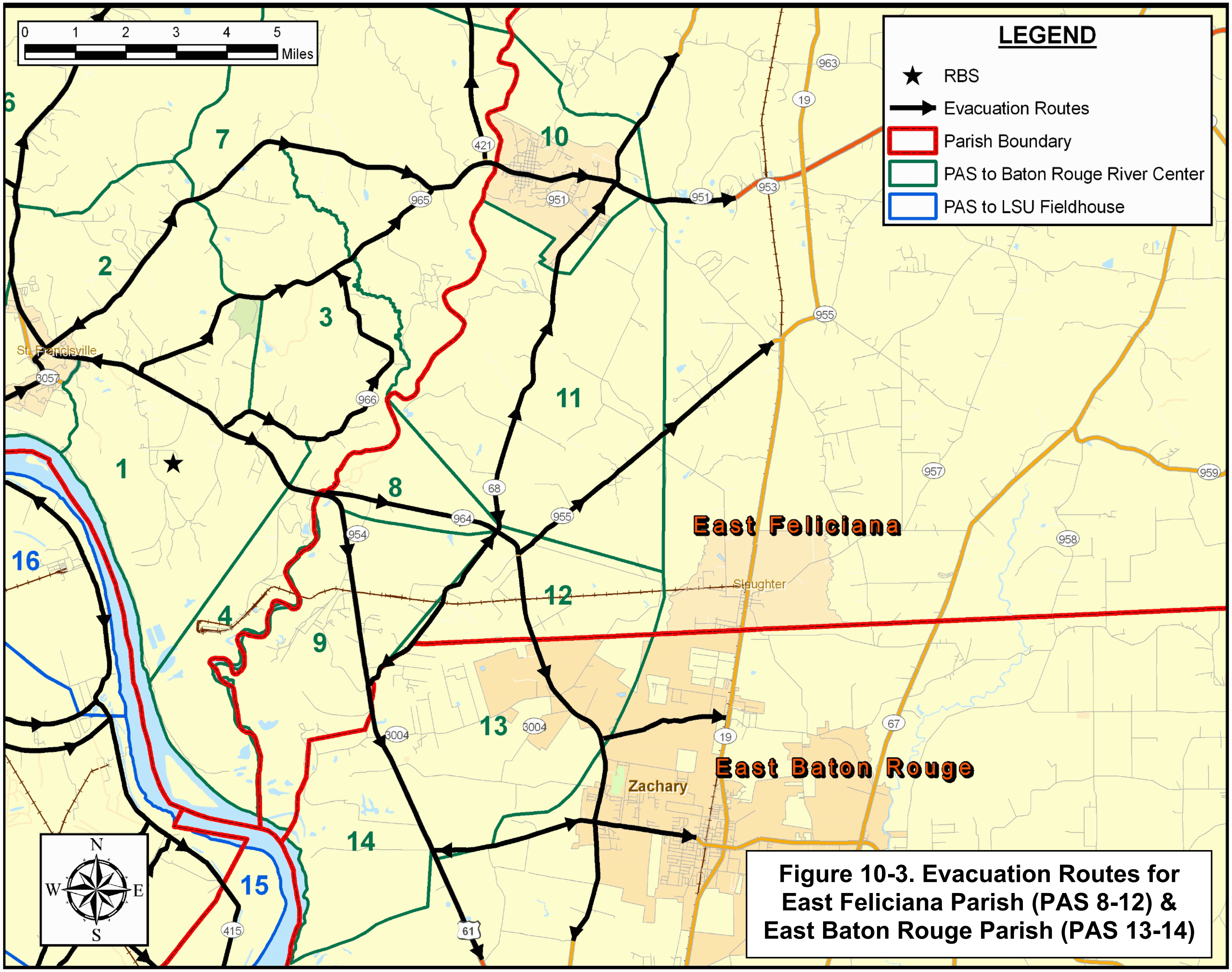


Figure 10-3. Evacuation Routes for East Feliciana Parish (PAS 8-12) & East Baton Rouge Parish (PAS 13-14)

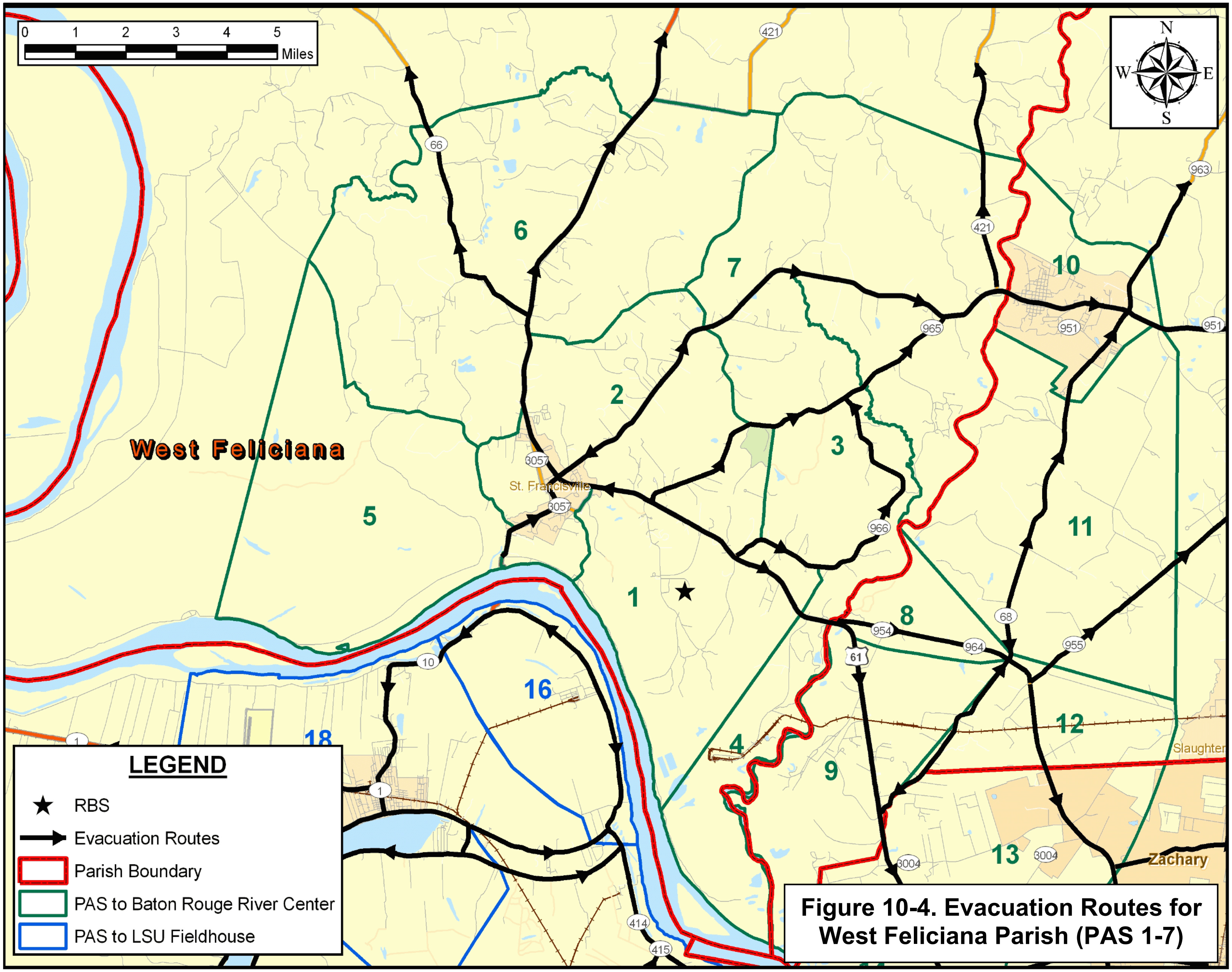


Figure 10-4. Evacuation Routes for West Feliciana Parish (PAS 1-7)

11. SURVEILLANCE OF EVACUATION OPERATIONS

There is a need for surveillance of traffic operations during the evacuation. There is also a need to clear any blockage of roadways arising from accidents or vehicle disablement. Surveillance can take several forms.

1. Traffic control personnel, located at Traffic Control and Access Control points, provide fixed-point surveillance.
2. Ground patrols may be undertaken along well-defined paths to ensure coverage of those highways that serve as major evacuation routes.
3. Aerial surveillance of evacuation operations may also be conducted using helicopter or fixed-wing aircraft.
4. Cellular phone calls (if cellular coverage exists) from motorists may also provide direct field reports of road blockages.

These concurrent surveillance procedures are designed to provide coverage of the entire EPZ as well as the area around its periphery. It is the responsibility of the Parishes to support an emergency response system that can receive messages from the field and be in a position to respond to any reported problems in a timely manner. This coverage should quickly identify, and expedite the response to any blockage caused by a disabled vehicle.

Tow Vehicles

In a low-speed traffic environment, any vehicle disablement is likely to arise due to a low-speed collision, mechanical failure or the exhaustion of its fuel supply. In any case, the disabled vehicle can be pushed onto the shoulder, thereby restoring traffic flow. Past experience in other emergencies indicates that evacuees who are leaving an area often perform activities such as pushing a disabled vehicle to the side of the road without prompting.

While the need for tow vehicles is expected to be low under the circumstances described above, it is still prudent to be prepared for such a need. Tow trucks with a supply of gasoline may be deployed at strategic locations within, or just outside, the EPZ. These locations should be selected so that:

- They permit access to key, heavily loaded, evacuation routes.
- Responding tow trucks would most likely travel counter-flow relative to evacuating traffic.

12. CONFIRMATION TIME

It is necessary to confirm that the evacuation process is effective in the sense that the public is complying with the advisory to evacuate. Although the Parishes may use their own procedures for confirmation, we suggest an alternative or complementary approach.

The procedure we suggest employs a stratified random sample and a telephone survey. The size of the sample is dependent on the expected number of households that do not comply with the advisory to evacuate. We believe it is reasonable to assume, for the purpose of estimating sample size that at least 80 percent of the population within the EPZ will comply with the advisory to evacuate. On this basis, an analysis could be undertaken (see Table 12-1) to yield an estimated sample size of approximately 300.

The confirmation process should start at about 3½ hours after the advisory to evacuate, which is when 90 percent of evacuees have completed their mobilization activities. At this time, virtually all evacuees will have departed on their respective trips and the local telephone system will be largely free of traffic.

As indicated in Table 12-1, approximately 7-1/2 person hours are needed to complete the telephone survey. If six people are assigned to this task, each dialing a different set of telephone exchanges (e.g., each person can be assigned a different set of Protective Action Sections), then the confirmation process will extend over a time frame of about 75 minutes. Thus, the confirmation should be completed well before the evacuated area is cleared. Of course, fewer people would be needed for this survey if the Evacuation Region were only a portion of the EPZ. Use of modern automated computer controlled dialing equipment can significantly reduce the manpower requirements and the time required to undertake this type of confirmation survey.

Should the number of telephone responses (i.e., people still at home) exceed 20 percent, then the telephone survey should be repeated after an hour's interval until the confirmation process is completed.

TABLE 12-1
ESTIMATED NUMBER OF TELEPHONE CALLS REQUIRED
FOR CONFIRMATION OF EVACUATION

Problem Definition

Estimate number of phone calls, n, needed to ascertain the proportion, F of households that have not evacuated.

Reference: Burstein, H., Attribute Sampling, McGraw Hill, 1971

Given:

No. of households plus other facilities, N, within the EPZ (est.) = 9,800
Est. proportion, F, of households that have not evacuated = 0.20
Allowable error margin, e: 0.05
Confidence level, α: 0.95 (implies A = 1.96)

Applying Table 10 of cited reference,

$$p = F + e = 0.25; \; q = 1 - p = 0.75$$

$$n = \frac{A^2 pq + e}{e^2} = 308$$

Finite population correction:

$$n_F = \frac{nN}{n + N - 1} = 299$$

Thus, some 300 telephone calls will confirm that approximately 20 percent of the population has not evacuated. If only 10 percent of the population does not comply with the advisory to evacuate, then the required sample size, n_F = 211.

Est. Person Hours to complete 300 telephone calls

Assume: Time to dial using touch-tone (random selection of listed numbers): 30 seconds
Time for 6 rings (no answer): 36 seconds
Time for 4 rings plus short conversation: 60 sec.
Interval between calls: 20 sec.

Person Hours: 300[30+20+0.8(36)+0.2(60)]/3600 = 7.6

13. RECOMMENDATIONS

The following recommendations are offered:

1. Intelligent Transportation Systems (ITS) such as Dynamic Message Signs (DMS), Highway Advisory Radio (HAR), Automated Traveler Information Systems (ATIS), etc. should be used to facilitate the evacuation process (See Section 9). The placement of additional signage should consider evacuation needs.
2. Parishes should implement procedures whereby schools are contacted prior to dispatch of buses from the depots to obtain an accurate count of students needing transportation and the number of buses required (See Section 8).
3. Parishes should work with the Department of Transportation to have equipment needed for traffic control duties mobilized in a timely manner should an evacuation be advised (See Section 9).
4. Parishes should establish strategic locations to position tow trucks in the event of a disabled vehicle during the evacuation process (See Section 11) and should encourage gas stations to remain open during the evacuation.
5. Parishes should establish a system to confirm that the advisory to evacuate is being adhered to (see the approach suggested by KLD in Section 12).
6. Examination of the ETE in Appendix J shows that the ETE for 100 percent of the population is significantly longer than for 95 percent of the population. Specifically, the additional time needed for the last 5 percent of the population to evacuate can be as much as 40 percent longer than the time needed to evacuate 95 percent of the population for the full EPZ. This non-linearity reflects the fact that relatively few stragglers require significantly more time to mobilize (i.e. prepare for the evacuation trip) than their neighbors. **This leads to two recommendations:**
    - **The public outreach (information) program should emphasize the need for evacuees to minimize the time needed to prepare to evacuate (secure the home, assemble needed clothes, medicines, etc.).**
    - **The decision makers should reference Table J-1C which lists the time needed to evacuate 95 percent of the population, when preparing recommended protective actions.**

APPENDIX A

Glossary of Traffic Engineering Terms

APPENDIX A: GLOSSARY OF TRAFFIC ENGINEERING TERMS

Term	Definition
Link	A network link represents a specific, one-directional section of roadway. A link has both physical (length, number of lanes, topology, etc.) and operational (turn movement percentages, service rate, free-flow speed) characteristics.
Measures of Effectiveness	Statistics describing traffic operations on a roadway network.
Node	A network node generally represents an intersection of network links. A node has control characteristics, i.e., the allocation of service time to each approach link.
Origin	A location attached to a network link, within the EPZ or shadow area, where trips are generated at a specified rate in vehicles per hour (vph). These trips enter the roadway system to travel to their respective destinations.
Network	A graphical representation of the geometric topology of a physical roadway system, which is comprised of directional links and nodes.
Prevailing roadway and traffic conditions	Relates to the physical features of the roadway, the nature (e.g., composition) of traffic on the roadway and the ambient conditions (weather, visibility, pavement conditions, etc.)
Service Rate	Maximum rate at which vehicles, executing a specific turn maneuver, can be discharged from a section of roadway at the prevailing conditions, expressed in vehicles per second (vps) or vehicles per hour (vph).
Service Volume	Maximum number of vehicles which can pass over a section of roadway in one direction during a specified time period with operating conditions at a specified Level of Service. (The Service Volume at the upper bound of Level of Service, E, equals Capacity.) Service Volume is usually expressed as vehicles per hour (vph).
Signal Cycle Length	The total elapsed time to display all signal indications, in sequence. The cycle length is expressed in seconds.
Signal Interval	A single combination of signal indications. The interval duration is expressed in seconds. A signal phase is comprised of a sequence of signal intervals.
Signal Phase	A set of signal indications (and intervals) which services a particular combination of traffic movements on selected approaches to the intersection. The phase duration is expressed in seconds.

Term	Definition
Traffic (Trip) Assignment	A process of assigning traffic to paths of travel in such a way as to satisfy all trip objectives (i.e., the desire of each vehicle to travel from a specified origin in the network to a specified destination) and to optimize some stated objective or combination of objectives. In general, the objective is stated in terms of minimizing a generalized "cost". For example, "cost" may be expressed in terms of travel time.
Traffic Density	The number of vehicles that occupy one lane of a roadway section of specified length at a point of time, expressed as vehicles per mile (vpm).
Traffic (Trip) Distribution	A process for determining the destinations of all traffic generated at the origins. The result often takes the form of a Trip Table, which is a matrix of origin-destination traffic volumes.
Traffic Simulation	A computer model designed to replicate the real-world operation of vehicles on a roadway network, so as to provide statistics describing traffic performance. These statistics are called Measures of Effectiveness.
Traffic Volume	The number of vehicles that pass over a section of roadway in one direction, expressed in vehicles per hour (vph). Where applicable, traffic volume may be stratified by turn movement.
Travel Mode	Distinguishes between private auto, bus, rail, pedestrian and air travel modes.
Trip Table or Origin-Destination Matrix	A rectangular matrix or table, whose entries contain the number of trips generated at each specified origin, during a specified time period, that are attracted to (and travel toward) each of its specified destinations. These values are expressed in vehicles per hour (vph) or in vehicles.
Turning Capacity	The capacity associated with that component of the traffic stream which executes a specified turn maneuver from an approach at an intersection.

<u>APPENDIX B</u>

Traffic Assignment and Distribution Model

APPENDIX B: TRAFFIC ASSIGNMENT AND DISTRIBUTION MODEL

This section describes the integrated trip assignment and distribution model named TRAD that is expressly designed for use in analyzing evacuation scenarios. This model employs equilibrium traffic assignment principles and is one of the models of the I-DYNEV System.

To apply TRAD, the analyst must specify the highway network, link capacity information, the volume of traffic generated at all origin centroids, a set of accessible candidate destination nodes on the periphery of the EPZ for each origin, and the approach capacity to each destination node. TRAD calculates the optimal trip distribution and the optimal trip assignment (i.e., routing) of the traffic generated at each origin node, traveling to the associated set of candidate destination nodes, so as to minimize evacuee travel times.

Overview of Integrated Assignment and Distribution Model

The underlying premise is that the selection of destinations and routes is intrinsically coupled in an evacuation scenario. That is, people in vehicles seek to travel out of an area of potential risk as rapidly as possible by selecting the “best” route. The model is designed to identify these “best” routes in a manner that distributes vehicles from origins to destinations and routes them over the highway network, in a consistent and optimal manner.

The approach we adopt is to extend the basic equilibrium assignment methodology to embrace the distribution process, as well. That is, the selection of destination nodes by travelers from each origin node, and the selection of the connecting paths of travel, are both determined by the integrated model. This determination is subject to specified capacity constraints, so as to satisfy the stated objective function. This objective function is the statement of the User Optimization Principle by Wardrop.

To accomplish this integration, we leave the equilibrium assignment model intact, changing only the form of the objective function. It will also be necessary to create a "fictional" augmentation of the highway network. This augmentation will consist of Pseudo-Links and Pseudo-Nodes, so configured as to embed an equilibrium Distribution Model within the fabric of the Assignment Model.

Specification of TRAD Model Inputs

The user must specify, for each origin node, the average hourly traffic volume generated, as well as a set of candidate accessible destinations. A destination is “accessible” to traffic originating at an origin node if there is at least one path connecting the origin to the destination node. There must be at least one destination node specified for each origin centroid. The number of trips generated at the origin node, which are distributed to each specified, accessible destination node within this set, is determined by the model in a way as to satisfy the network-wide objective function (Wardrop's Principle).

The user must also specify the total number of trips which can be accommodated by each destination node. This value reflects the capacities of the road(s) immediately servicing the destination node. Clearly, we require that the total number of trips traveling to a destination, j, from all origin nodes, i, should not exceed the capacities of the approaches to destination node, j. By summing over all destination nodes, this constraint also states that the total trips generated at all origin nodes should not exceed the total capacity to accommodate these trips at all of the specified destinations.

In summary, the user must specify the total trips generated at each of the origin nodes, the maximum number of trips that can be accommodated by each of the specified destination nodes and the highway network attributes which include the traffic control tactics. The TRAD model includes a function which expresses travel time on each network link in terms of traffic volume and link capacity. This function drives the underlying trip distribution and trip assignment decision-making process. Thus, the TRAD model satisfies the objectives of evacuees to select destination nodes and travel paths to minimize evacuation travel time. As such, this integrated model is classified as a behavioral model.

At the outset, it may appear that we have an intractable problem:

- If TRAD retains the basic assignment algorithm, it must be provided a Trip Table as input.
- On the other hand, if the distribution model is embedded within the assignment model, rather than preceding it, a Trip Table is not available as input.

The resolution of this problem is as follows:

1. The software constructs an "augmentation" network that allows the user to specify the volume for each origin node and a set of candidate destinations on the periphery of the EPZ. The allocation of trips from the origin node to each candidate destination node is not specified and is determined internally by the model.
2. Each [real] link of the highway network is calibrated by relating speed to the volume:capacity (v/c) ratio.
3. The software constructs pseudo-links which service the assigned volumes, A_j, traveling to the destination nodes, j, in the augmented network.

This analysis network is comprised of three sub-networks:

1. The real highway sub-network, which consists of "Class I" Links and Nodes.
2. A sub-network of "Class II" Pseudo-Links which acts as an interface between the highway sub-network and the network augmentation.
3. The sub-network of "Class III" Pseudo-Links and Nodes which comprises the network augmentation described above.

The need for these Class II links will become clear later. The classifications are described below:

Class I Links and Nodes

These links and nodes represent the physical highway network: sections of highway and intersections. Trips generated at each Origin [Centroid] Node are assigned to a specified Class I link via a "connector" link. These connector links are transparent to the user and offer no impedance to the traveler; they represent the aggregation of local streets which service the centroidal generated trips and feed them onto the highway network. The real-world destination nodes are part of this network. The immediate approaches to these destination nodes are Class I links.

Class II Links

These pseudo-links are constructed so as to connect each specified destination node with its Class III Pseudo-Node (P-N) counterpart on a one-to-one basis. The capacities of these Class II links are set equal to the capacities at their respective destination nodes.

Class III Links and Nodes

Class III links and nodes form the augmentation to the basic network. These Pseudo-Links provide paths from the Class II links servicing traffic traveling from the specified [real] destination nodes, to the Super-Nodes which represent the user-specified set of destination nodes associated with each origin node.

Each Class of links provides a different function:

- Class I links represent the physical highway network. As such, each link has a finite capacity, a finite length and an estimated travel time for free-flowing vehicles. The nodes generally represent intersections, interchanges and, possibly, changes in link geometry. The topology of the Class I network represents that of the physical highway system.
- The Class II links represent the interface between the real highway sub-network and the augmentation sub-network. These pseudo-links are needed

to represent the specified maximum number of vehicles that can be accommodated by each destination node. Instead of explicitly assigning a capacity limitation to the destination nodes, we assign the capacity limitation of the Class II Pseudo-Links. This approach is much more suitable, computationally.

- The topology of the network augmentation (i.e., Class III Links and Nodes) is designed so that all traffic from an origin node can only travel to the single "Super-Node" by flowing through its set of real destination nodes, thence along the links of the augmented network.

The Class II Pseudo-Links and the network augmentation of Class III Pseudo-Nodes and Links represent logical constructs of fictitious links created internally by the model that allows the user to specify the identity of all destination nodes in each origin-based set, without specifying the distribution of traffic volumes from the origin to each destination node in that set.

Calculation of Capacities and Impedances

Each class of links exhibits different properties. Specifically, the relationship between travel impedance (which is expressed in terms of travel time) and both volume and capacity will differ:

- For Class I links, the capacity represents the physical limitation of the highway sections. Travel impedance is functionally expressed by relating travel time with respect to the traffic volume-link capacity relationship.
- For Class II links, link capacity represents the maximum number of vehicles that can be accommodated at the [real] destination nodes that form the upstream nodes of each Class II link. Since Class II links are Pseudo-Links, there should be virtually no difference in impedance to traffic along Class II links when the assigned traffic volume on these links is below their respective capacities. That is, the assignment of traffic should not be influenced by differences in travel impedance on those Class II links where the assigned volumes do not exceed their respective capacities.
- For Class III links, both capacity and impedance have no meaning. Since the Class II links limit the number of vehicles entering the Class III sub-network at all entry points (i.e., at the Class II Pseudo-Nodes) and since all these links are Pseudo-Links, it follows that the Class III network is, by definition, an un-capacitated network.

Specification of the Objective Function

It is computationally convenient to be able to specify a single impedance (or "cost") function relating the travel time on a link, to its capacity and assigned traffic volume, for all classes of links. To achieve this, we will adopt the following form based on the original "BPR Formula":

$$T = T_o\{\alpha[1 + a_1(\frac{v}{c})^{b_1}] + \beta[1 + a_2(\frac{v}{c})^{b_2}]\} + I$$

Where, as for the present traffic assignment model in TRAD,

T	=	Link travel time, sec.
T_o	=	Unimpeded link travel time, sec.
V	=	Traffic volume on the link, veh/hr
C	=	Link capacity, veh/hr
a_i, b_i	=	Calibration parameters
α, ß	=	Coefficients defined below
I	=	Impedance term, expressed in seconds, which could represent turning penalties or any other factor which is justified in the user's opinion

The assignment of coefficients varies according to the Class in which a link belongs:

Class	**α**	**ß**	**T_o**
I	1	0	L/U_f
II	0	1	W
III	0	0	1

Here, L is a highway link length and U_f is the free-flow speed of traffic on a highway link. The values of a_1 and b_1, which are applicable only for Class I links, are based on experimental data:

$a_1 = 0.8$ $\quad\quad$ $b_1 = 5.0$

The values of a_2 and b_2, which are applicable for each Class II link, are based upon the absolute requirement that the upstream destination node can service no more traffic than the user-specified value of the maximum destination node "capacity." In addition, these parameters must be chosen so that these Pseudo-Links all offer the same impedance to traffic when their assigned volumes are less than their respective specified maximum attractions. The weighting factor, W, is computed internally by the software.

Of course, it is still possible for the assignment algorithm within TRAD to distribute more traffic to a destination node than that node can accommodate. For emergency planning purposes, this is a desirable model feature. Such a result will be flagged by the model to alert the user to the fact that some factor is strongly motivating travelers to move to that destination node, despite its capacity limitations. This factor can take many forms: inadequate highway capacity to other destinations, improper specification of candidate destinations for some of the origins, or some other design inadequacy. The planner can respond by modifying the control tactics, changing the origin-destination distribution pattern, providing more capacity at the overloaded destinations, etc.

APPENDIX C

Traffic Simulation Model: PC-DYNEV

APPENDIX C: TRAFFIC SIMULATION MODEL: PC-DYNEV

A model, named PC-DYNEV, is an adaptation of the TRAFLO Level II simulation model, developed by KLD for the Federal Highway Administration (FHWA). Extensions in scope were introduced to expand the model's domain of application to include all types of highway facilities, to represent the evacuation traffic environment and to increase its computational efficiency. This model produces the extensive set of output Measures of Effectiveness (MOE) shown in Table C-1.

The traffic stream is described internally in the form of statistical flow profiles. These profiles, expressed internally as statistical histograms, describe the platoon structure of the traffic stream on each network link. The simulation logic identifies five types of histograms:

- The ENTRY histogram which describes the platoon flow at the upstream end of the subject link. This histogram is simply an aggregation of the appropriate OUTPUT turn-movement-specific histograms of all feeder links.
- The INPUT histograms which describe the platoon flow pattern arriving at the stop line. These are obtained by first disaggregating the ENTRY histogram into turn-movement-specific component ENTRY histograms. Each such component is modified to account for the platoon dispersion which results as traffic traverses the link. The resulting INPUT histograms reflect the specified turn percentages for the subject link.
- The SERVICE histogram which describes the service rates for each turn movement. These service rates reflect the type of control device servicing traffic on this approach; if it is a signal, then this histogram reflects the specified movement-specific signal phasing. A separate model estimates service rates for each turn movement, given that the control is GO.

These data are provided for each network link and are also aggregated over the entire network.

- The QUEUE histograms that describe the time-varying ebb and growth of the queue formation at the stop line. These histograms are derived from the interaction of the respective IN histograms with the SERVICE histograms.
- The OUT histograms that describe the pattern of traffic discharging from the subject link. Each of the IN histograms is transformed into an OUT histogram by the control applied to the subject link. Each of these OUT histograms is added into the (aggregate) ENTRY histogram of its receiving link. This approach provides the model with the ability to identify the characteristics of each turn-movement-specific component of the traffic stream. Each component is serviced at a different saturation flow rate as is the case in the real world. The logic recognizes when one component of the traffic flow encounters saturation conditions even if the others do not.

Algorithms provide estimates of delay and stops reflecting the interaction of the IN histograms with the SERVICE histograms. The logic also provides for properly treating spillback conditions reflecting queues extending from its host link, into its upstream feeder links.

A valuable feature is the ability to internally generate functions that relate mean speed to density on each link, given user-specified estimates of free-flow speed and saturation service rates for each link. Such relationships are essential in order to simulate traffic operations on freeways and rural roads, where signal control does not exist or where its effect is not the dominant factor in impeding traffic flow.

All traffic simulation models are data-intensive. Table C-2 outlines the input data elements. This input describes:

- Topology of the roadway system
- Geometrics of each roadway component
- Channelization of traffic on each roadway component
- Motorist behavior that, in aggregate, determines the operational performance of vehicles in the system
- Specification of the traffic control devices and their operational characteristics
- Traffic volumes entering and leaving the roadway system
- Traffic composition.

To provide an efficient framework for defining these specifications, the physical environment is represented as a network. The unidirectional links of the network generally represent roadway components: either urban streets or freeway segments. The nodes of the network generally represent urban intersections or points along the freeway where a geometric property changes (e.g. a lane drop, change in grade or ramp).

Figure C-1 is an example of a small network representation. The freeway is defined by the sequence of links, (20, 21), (21, 22), (22, 23). Links (8001, 19) and (3, 8011) are Entry and Exit links, respectively. An arterial extends from node 3 to node 19 and is partially subsumed within a grid network. Note that links (21, 22) and (17, 19) are grade-separated.

Table C-1. Measures of Effectiveness Output by PC-DYNEV	
Measure	**Units**
Travel	Vehicle-Miles and Vehicle-Trips
Moving Time	Vehicle-Minutes
Delay Time	Vehicle-Minutes
Total Travel Time	Vehicle-Minutes
Efficiency: Moving Time/Total Travel Time	Percent
Mean Travel Time per Vehicle	Seconds
Mean Delay per Vehicle	Seconds
Mean Delay per Vehicle-Mile	Seconds/Mile
Mean Speed	Miles/Hour
Mean Occupancy	Vehicles
Mean Saturation	Percent
Vehicle Stops	Percent

Table C-2. Input Requirements for the PC-DYNEV Model

<u>GEOMETRICS</u>

- Links defined by upstream and downstream node numbers
- Link lengths
- Number of lanes (up to 6)
- Turn pockets
- Grade
- Network topology defined in terms of target nodes for each receiving link

<u>TRAFFIC VOLUMES</u>

- On all entry links and sink/source nodes stratified by vehicle type: auto, car pool, bus, truck
- Link-specific turn movements

<u>TRAFFIC CONTROL SPECIFICATIONS</u>

- Traffic signals: link-specific, turn movement specific
- Signal control treated as fixed time
- Stop and Yield signs
- Right-turn-on-red (RTOR)
- Route diversion specifications
- Turn restrictions
- Lane control (e.g. lane closure, movement-specific)

<u>DRIVER'S AND OPERATIONS CHARACTERISTICS</u>

- Drivers (vehicle-specific) response mechanisms: free-flow speed, aggressiveness, discharge headway
- Link-specific mean speed for free-flowing (unimpeded) traffic
- Vehicle-type operational characteristics: acceleration, deceleration
- Such factors as bus route designation, bus station location, dwell time, headway, etc.

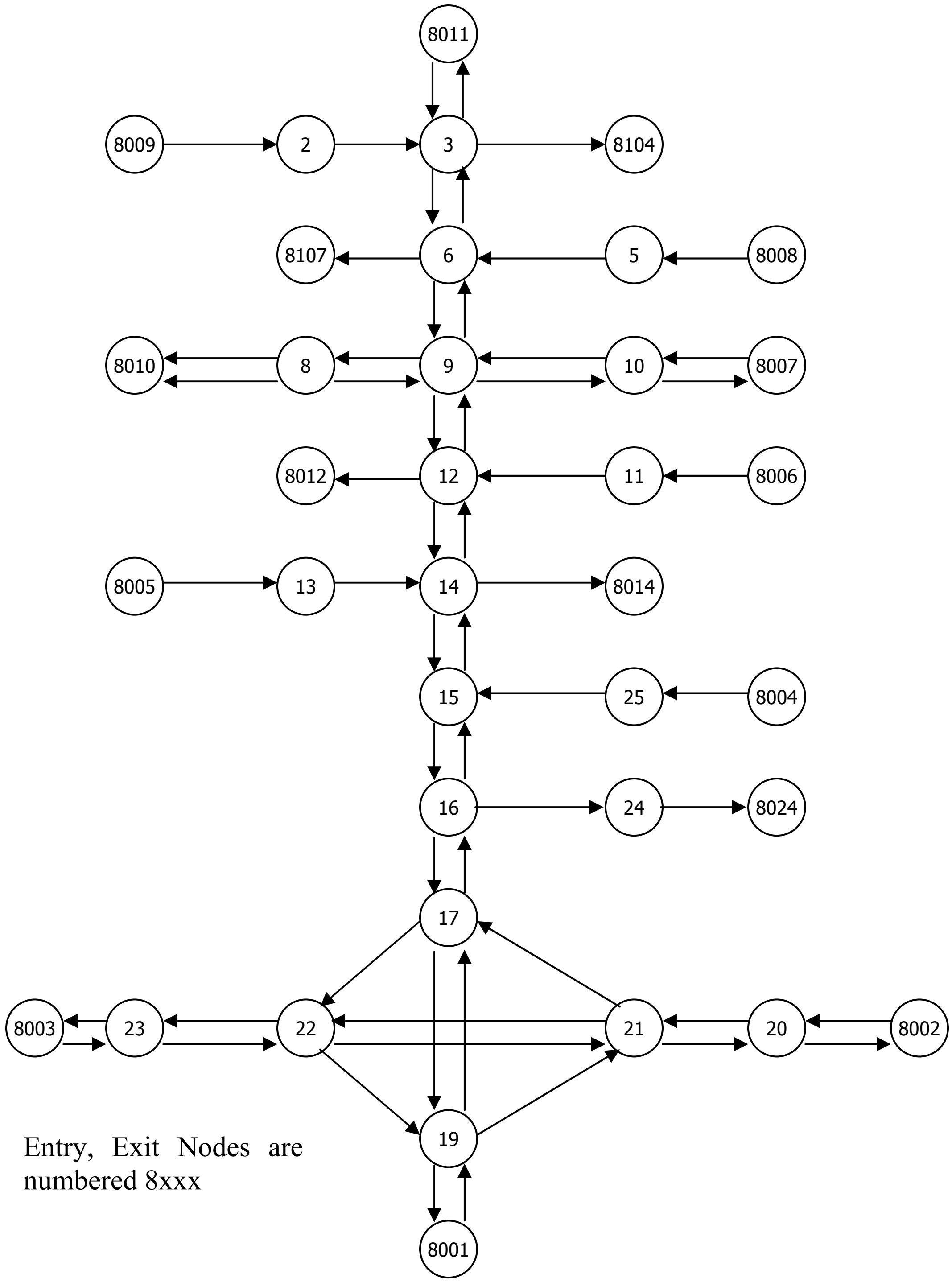


Figure C-1: Representative Analysis Network

APPENDIX D

Detailed Description of Study Procedure

APPENDIX D: DETAILED DESCRIPTION OF STUDY PROCEDURE

This appendix describes the activities that were performed to compute accurate Evacuation Time Estimates (ETE). The individual steps of this effort are represented as a flow diagram in Figure D-1. Each numbered step in the description that follows corresponds to the numbered element in this flow diagram.

Step 1.
The first activity is to obtain data defining the spatial distribution and demographic characteristics of the population within the Emergency Planning Zone (EPZ). These data were obtained from U.S. Census files and from results of a telephone survey conducted within the EPZ. Employee and transient population data were obtained from local sources of information, from telephone calls to individual facilities and from previous study reports.

Step 2.
The next activity is to examine large-scale maps of the EPZ in both hard-copy form and using Geographical Information System (GIS) software. These maps were used to identify the analysis highway network and the access roads from each residential and employment development to the adjoining elements of this network. This information is used to plan a field survey of the highway system and later, to assign generated evacuation trips to the correct destinations at the periphery of the EPZ.

Step 3.
The next step is to conduct a physical survey of the roadway system. The purpose of this survey is to determine the geometric properties of the highway elements, the channelization of lanes on each section of roadway, whether there are any turn restrictions or special treatment of traffic at intersections, the type and functioning of traffic control devices and to make the necessary observations needed to estimate realistic values of roadway capacity.

Step 4.
With this information, develop the evacuation network representation of the physical roadway system.

Step 5.
With the network drawn, proceed to estimate the capacities of each link and to locate the origin centroids where trips would be generated during the evacuation process.

Step 6.
With this information at hand, the data were entered into the computer to create the input stream for the TRaffic Assignment and Distribution (TRAD) model. This model was designed to be compatible with the PC-DYNEV traffic simulation model used later in the project; the input stream required for one model is entirely compatible with the input stream required by the other. Using a software system developed by KLD named UNITES, the data entry activity is performed interactively directly on the computer.

Step 7.
The TRAD model contains software that performs diagnostic testing of the input stream. These assist the user in identifying and correcting errors in the input stream.

Step 8.
After creating the input stream, execute the TRAD model to compute evacuating traffic routing patterns consistent with the guidelines of NUREG 0654, Appendix 4. The TRAD model also provides estimates of traffic loading on each highway link as well as rough estimates of operational performance.

Step 9.
Critically examine the statistics produced by the TRAD model. This is a labor-intensive activity, requiring the direct participation of skilled engineers who possess the necessary practical experience to interpret the results and to determine the causes of any problems reflected in the results.

Essentially, the approach is to identify those "hot spots" in the network that represent locations where congested conditions are pronounced and to identify the cause of this congestion. This cause can take many forms, either as excess demand due to improper routing, as a shortfall of capacity, or as a quantitative error in the way the physical system was represented in the input stream. This examination leads to one of two conclusions:

- The results are as satisfactory as could be expected at this stage of the analysis process; or
- The input stream must be modified accordingly.

This decision requires, of course, the application of the user's judgment based upon the results obtained in previous applications of the TRAD model and a comparison of the results of this last case with the previous ones. If the results are satisfactory in the opinion of the user, then the process continues with Step 12. Otherwise, proceed to Step 10.

Step 10.
There are many "treatments" available to the user in resolving such problems. These treatments range from decisions to reroute the traffic by imposing turn restrictions where they can produce significant improvements in capacity, changing the control treatment at critical intersections so as to provide improved service for one or more movements, or in prescribing specific treatments for channelizing the flow so as to expedite the movement of traffic along major roadway systems or changing the trip table. Such "treatments" take the form of modifications to the original input stream.

Step 11.
As noted above, the changes to the input stream must be implemented to reflect the modifications undertaken in Step 10. At the completion of this activity, the process returns to Step 8 where the TRAD model is again executed.

Step 12.
The output of the TRAD model includes the computed turn movements for each link. These data are required – and – accessed by the PC-DYNEV simulation model. This step completes the specification of the PC-DYNEV input stream.

Step 13.
After the PC-DYNEV input stream has been debugged, the simulation model is executed to provide detailed estimates, expressed as statistical Measures of Effectiveness (MOE), which describe the detailed performance of traffic operations on each link of the network.

Step 14.
In this step, the detailed output of the simulation model is examined to identify whether problems exist on the network. The results of the simulation model are extremely detailed and far more accurately describe traffic operations than those provided by the TRAD model. Thus, it is possible to identify the cause of any problems by carefully studying the output.

Again, one can implement corrective treatments designed to expedite the flow of traffic on the network in the event that the results are considered to be less efficient than is possible to achieve. If input changes are needed, the analysis process proceeds to Step 15. On the other hand, if the results are satisfactory, then one can decide whether to return to Step 8 to again execute the TRAD model and repeat the whole process, or to accept the simulation results. If there were no changes indicated by the activities of Step 14, because the results were satisfactory, we can then proceed to document them in Step 17. Otherwise, return to Step 8 to determine the effects of the changes implemented in Step 14 on the optimal routing patterns over the network. This determination can be ascertained by executing the TRAD model.

Step 15.
This activity implements the changes in control treatments or in the assignment of destinations associated with one or more origins in order to improve the representation of traffic flow over the network. These treatments can also include the consideration of adding roadway segments to the existing analysis network to improve the representation of the physical system.

Step 16.
Once the treatments have been identified, it is necessary to modify the simulation model input stream accordingly. At the completion of this effort, the procedure returns to Step 13 to execute the simulation model again.

Step 17.
The simulation results are analyzed, tabulated and graphed. The results are then documented, as required.

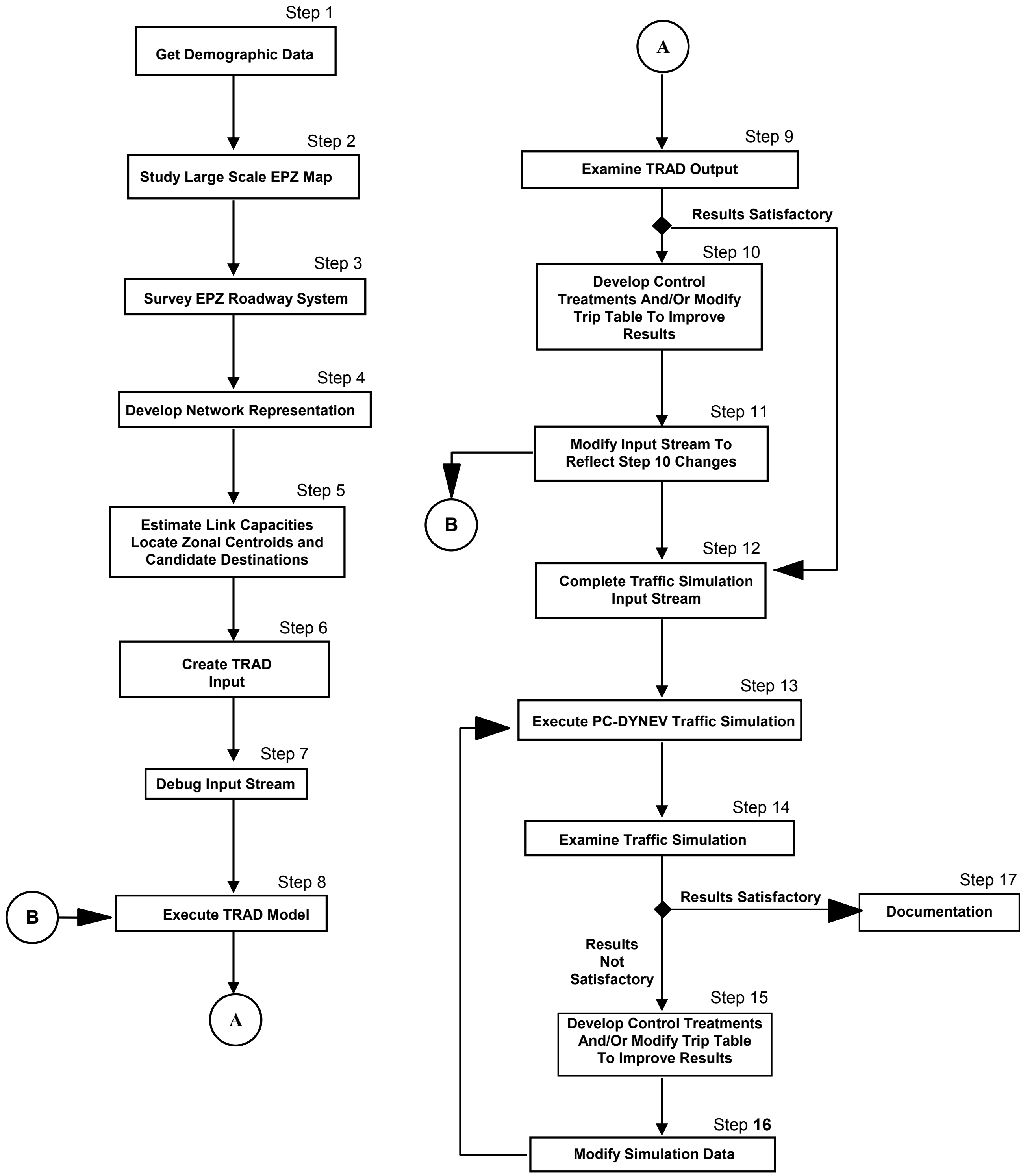


Figure D-1. Flow Diagram of Activities

APPENDIX E

Special Facility Data

APPENDIX E: SPECIAL FACILITY DATA

The following tables list population information, as of May 2008, for special facilities within the River Bend Station (RBS) EPZ. Special facilities are defined as schools, day care centers, hospitals and other medical care facilities, correctional institutions, and major employers. Transient population data is included in the tables for state parks, parish parks, hotels and motels, recreational areas and historical sites. Each table is grouped by parish. The location of the facility is defined by its straight-line distance (miles) and direction (magnetic bearing) from the RBS.

Table E-1. Schools Within the RBS EPZ								
PAS	**Direction**	**Distance (Miles)**	**Name**	**Street Address**	**Municipality**	**Phone**	**Enrollment**	**Staff**
West Feliciana Parish								
2	NNW	5.5	Bains Elementary School	9792 Bains Rd	St. Francisville	(225) 635 3272	644	60
2	NNW	5.5	Bains Lower Elementary School	9794 Bains Rd	St. Francisville	(225) 635 4696	440	31
2	NNW	5.7	West Feliciana High School	8604 Highway 61 N	St. Francisville	(225) 635 4561	622	55
2	NNW	5.7	West Feliciana Middle School	9559 Bains Rd	St. Francisville	(225) 635 3898	550	73
						WFP Total	***2,256***	***219***
East Feliciana Parish								
10	NE	9.0	Quad Area-Jackson Head Start	3531 Cottage Street	Jackson	(225) 634 3026	97	15
10	ENE	10.1	Jackson Elementary, Middle, and High School	3501 LA Hwy 10	Jackson	(225) 634 5933	940	105
10	ENE	10.4	Jackson Christian Academy	3718 LA Hwy 10	Jackson	(225) 634 5005	14	3
10	ENE	10.7	Louisiana Technical College - Folkes Campus	3337 LA Hwy 10	Jackson	(225) 634 2636	80	10
						EFP Total	***1,131***	***133***
East Baton Rouge Parish								
13	SE	7.3	Port Hudson Head Start	205 W Flanacher Rd	Zachary	(225) 654 4118	111	17
						EBRP Total	***111***	***17***
Pointe Coupee Parish								
17	SSW	10.4	Rougon Elementary School	13258 LA Hwy 416	Point Coupee	(225) 627 4291	490	65
18	WSW	7.0	Rosenwald Elementary School	1100 New Roads St	New Roads	(225) 638 6341	490	65
18	SW	7.6	Catholic Elementary, Middle and High Schools	302 Napoleon St	New Roads	(225) 638 9313	733	80
18	WSW	8.5	False River Academy	201 Major Pkwy	New Roads	(225) 638 3783	470	50
18	WSW	9.2	Louisiana Technical College - Jumonville Campus	605 Hospital Rd	New Roads	(225) 638 8613	150	14
						PCP Total	***2,333***	***274***
						Entire EPZ Total:	**5,831**	**643**

Table E-2. Daycare Centers Within the RBS EPZ								
PAS	Direction	Distance (Miles)	Name	Street Address	Municipality	Phone	Enrollment	Staff
West Feliciana Parish								
2	WNW	3.3	In the Beginning Child Development Center, First Baptist Church	12404 LA Hwy 10	St. Francisville	(225) 635-6111	55	12
2	NW	3.4	Grace Preschool, Grace Episcopal Church	11621 Saint Ferdinand St	St. Francisville	(225) 635-4065	25	4
2	WNW	3.5	Chase Ministries, United Methodist Church	9856 Royal St	St. Francisville	(225) 784-0024	25	7
2	NW	3.5	First Steps Childcare Learning Center	9912 Wilcox St	St. Francisville	(225) 635 4050	55	8
Pointe Coupee Parish								
18	SW	6.9	Happy Hearts Learning Center	7670 Park St	Ventress	(225) 485 9852	45	7
18	WSW	7.2	Wonderland Day Care & Learning Center	709 Court St	New Roads	(225) 638 3175	12	5
18	WSW	9.3	Mae Mae's Playhouse and Preschool	3432 Ewing Drive	New Roads	(225) 638 5437	60	13
18	WSW	9.3	Christian Women Caring for Children	3462 Mary Dr	New Roads	(225) 618 8080	50	9
						Total:	**327**	**65**

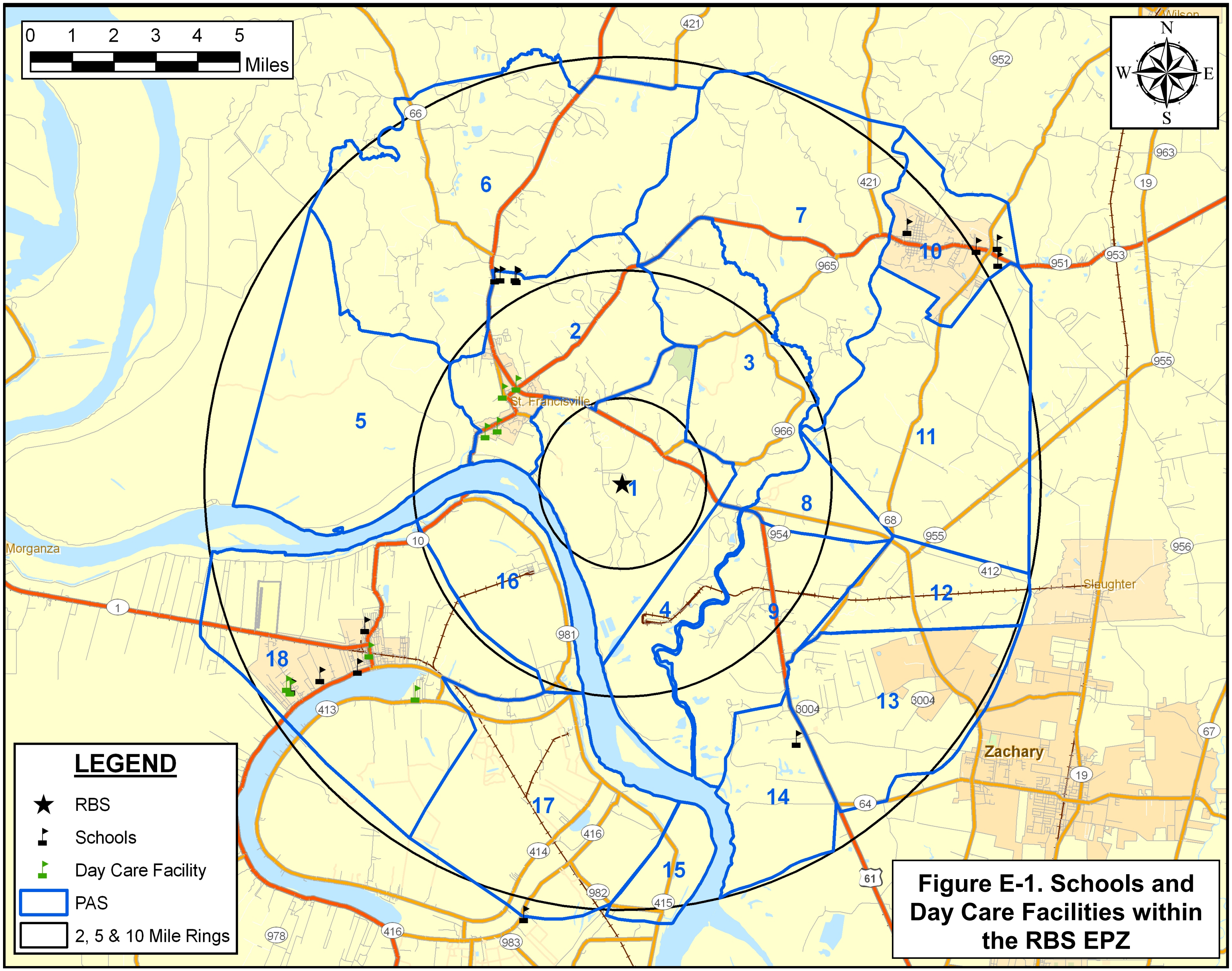


Figure E-1. Schools and Day Care Facilities within the RBS EPZ

Table E-3. Medical Facilities Within the RBS EPZ									
PAS	**Direction**	**Distance (Miles)**	**Name**	**Street Address**	**Municipality**	**Phone**	**Staff**	**Ambulatory**	**Non-Ambulatory**
West Feliciana Parish									
2	NW	2.7	West Feliciana Parish Hospital	5266 Commerce St	St. Francisville	(225) 635-3811	23	12	3
7	NNE	6.0	St. Francisville Country Manor	15243 LA Hwy 10	St. Francisville	(225) 635-3346	40	44	84
East Feliciana Parish									
10	NE	8.7	FMCNA Felicianas Dialysis Center	2995 Race St	Jackson	(225) 634-2733	13	44	2
10	NE	9.0	East Louisiana State Hospital	4502 LA Hwy 951	Jackson	(225) 634-0100	600	586	5
Pointe Coupee Parish									
18	WSW	9.1	Pointe Coupee General Hospital	358 Hospital Rd	New Roads	(225) 638-6331	170	14	14
18	WSW	9.2	Lakeview Manor Nursing Home	400 Hospital Rd	New Roads	(225) 638-4404	35	85	25
18	WSW	9.3	Pointe Coupee Nursing Home	2202-A Hospital Rd	New Roads	(225) 638-4431	17	73	5
						Total:	**898**	**858**	**138**

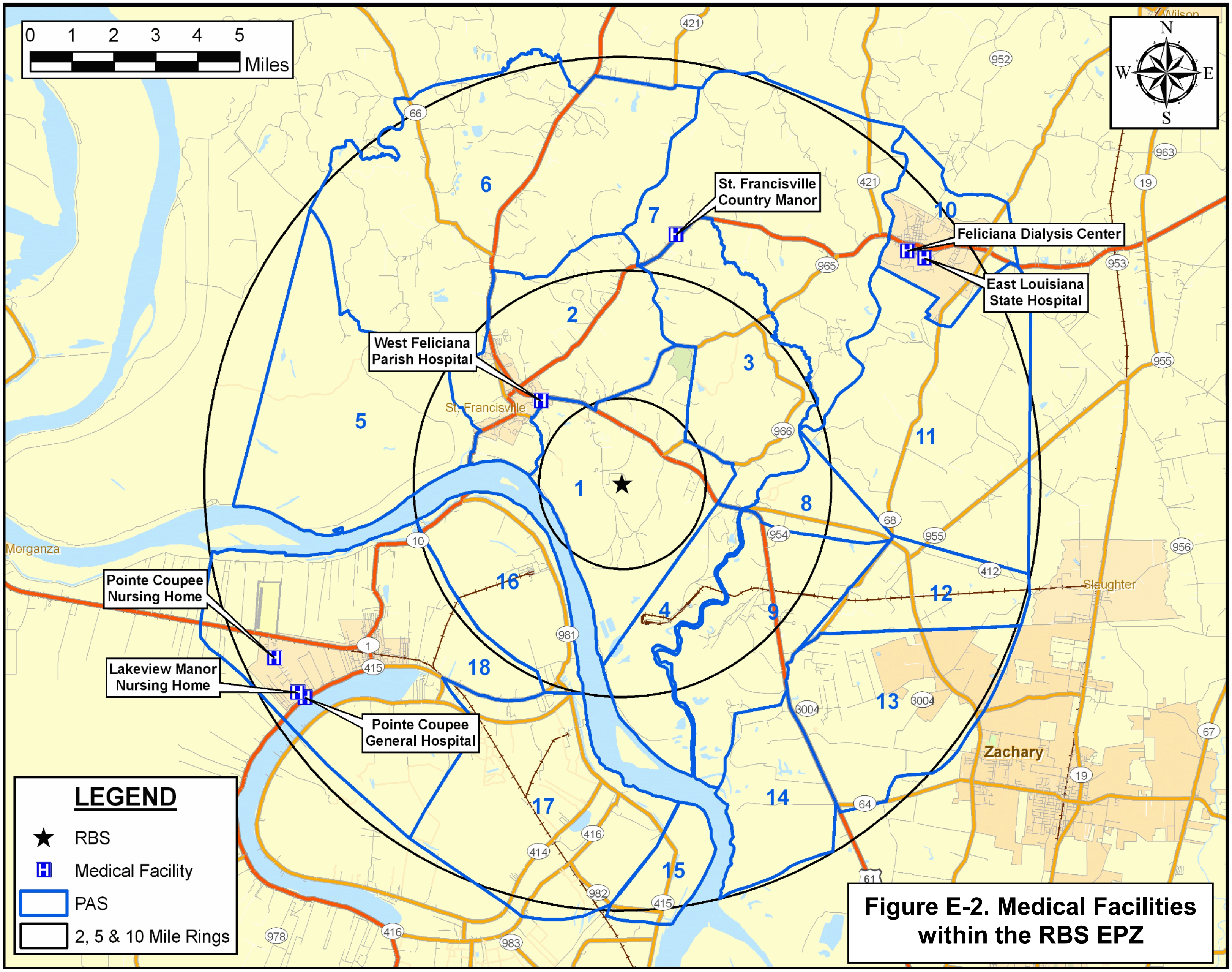


Figure E-2. Medical Facilities within the RBS EPZ

Table E-4. Correctional Facilities Within the RBS EPZ								
PAS	**Direction**	**Distance (Miles)**	**Name**	**Street Address**	**Municipality**	**Phone**	**Inmates**	**Staff**
West Feliciana Parish								
2	WNW	3.4	West Feliciana Parish Jail	4834 Feliciana St	St. Francisville	(225) 635 6513	44	12
East Feliciana Parish								
11	ENE	8.2	Dixon Correctional Institute	5568 Highway 68	Jackson	(225) 634 1200	1,520	550
Pointe Coupee Parish								
16	W	3.1	Point Coupee Parish Jail	10933 Cajun II Rd	New Roads	(225) 638 5407	150	8
						Total:	**1,714**	**570**

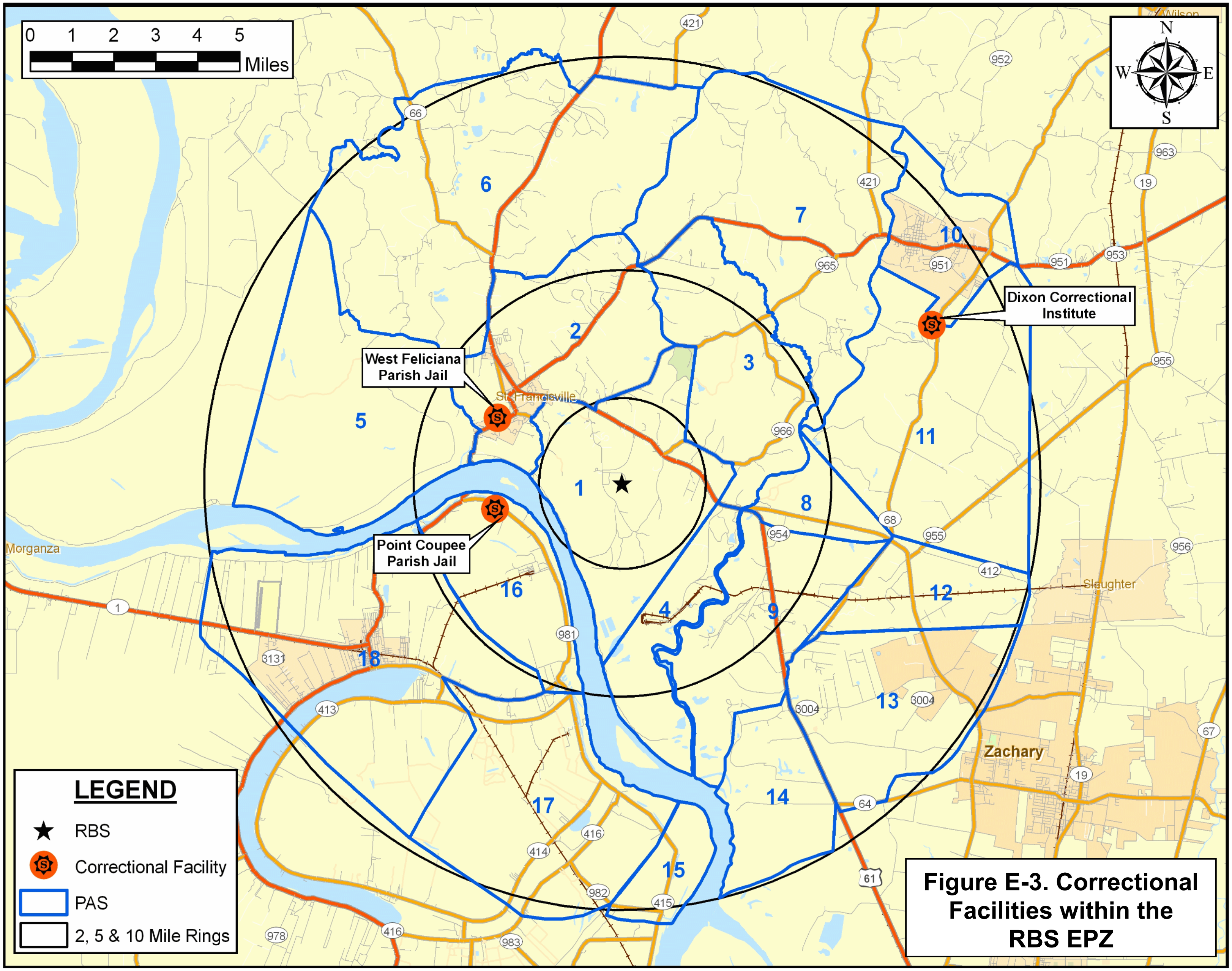


Figure E-3. Correctional Facilities within the RBS EPZ

Table E-5. Lodging Facilities Within the RBS EPZ								
PAS	**Direction**	**Distance (Miles)**	**Facility Name**	**Street Address**	**Municipality**	**Phone**	**Persons**	**Vehicles**
West Feliciana Parish								
1	NW	2.0	Hemingbough Guest House	10591 Beach Rd	St. Francisville	(225) 635 6617	16	10
2	NW	3.4	St. Francisville Inn	5720 Commerce St	St. Francisville	(225) 635 6502	10	6
2	NW	3.3	Best Western - St. Francis Hotel on The Lake	US Hwy 61	St. Francisville	(225) 635 3821	99	60
6	NNW	7.0	Cottage Plantation	10528 Cottage Ln	St. Francisville	(225) 635 3674	6	4
7	NE	6.2	The Bluffs Country Club & Resort	14233 Sunrise Way	St. Francisville	(225) 634 5222	120	73
East Feliciana Parish								
10	NE	9.1	Old Centenary Inn	1740 Charter St	Jackson	(225) 634 5050	8	5
Pointe Coupee Parish								
18	SW	7.3	Point Coupee B & B	405 Richey St	New Roads	(225) 638 6254	8	2
18	SW	7.4	Morel's Inn	211 W Main St	New Roads	(225) 638 7177	12	7
18	SW	9.0	Pointe Breeze Motel	2111 False River Dr	New Roads	(225) 638 3414	15	9
18	WSW	9.2	Neal's Cypress Inn	675 Hospital Rd	New Roads	(225) 638 8084	40	24
						Total:	**334**	**200**

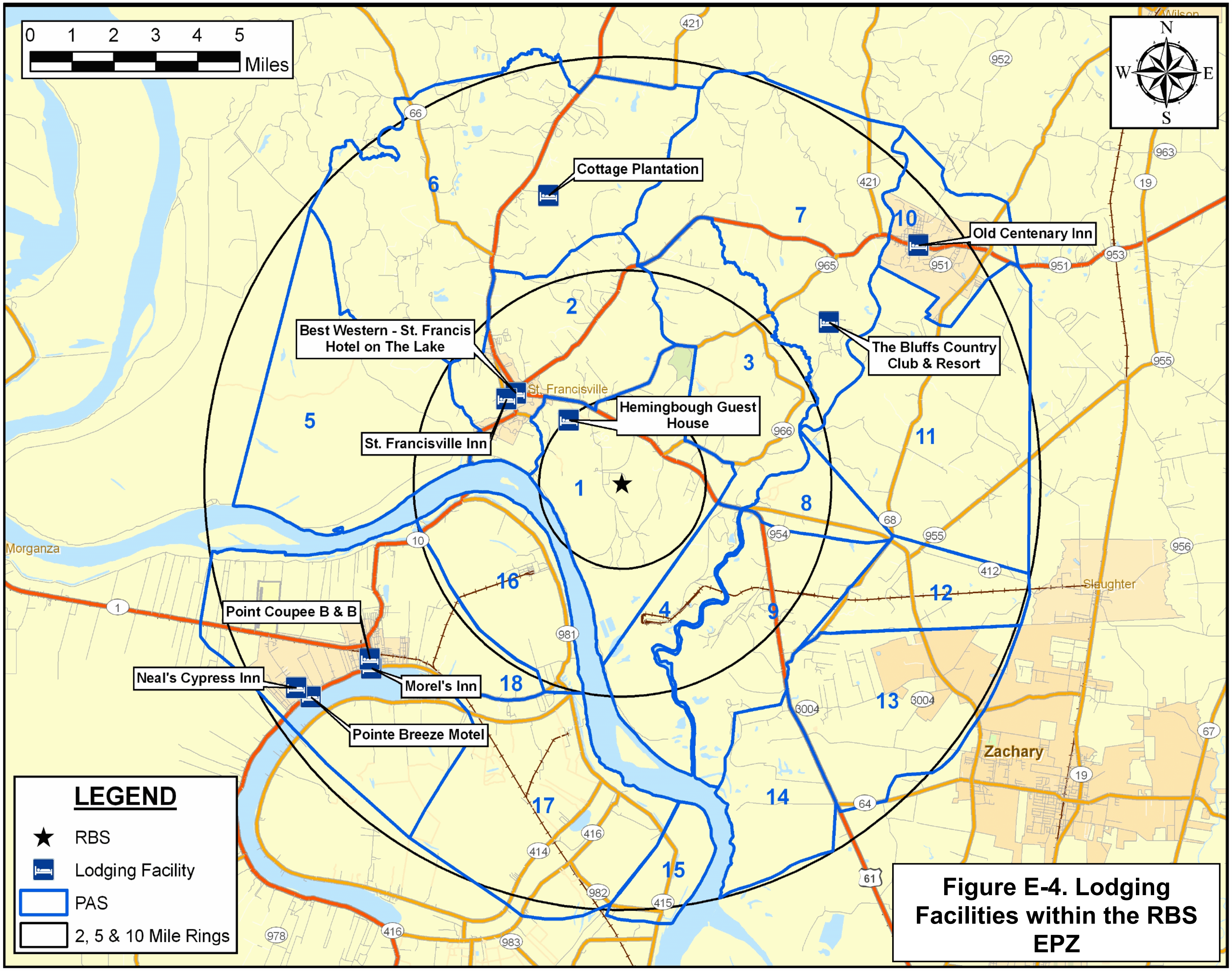


Figure E-4. Lodging Facilities within the RBS EPZ

Table E-6. Recreational Areas Within the RBS EPZ									
PAS	**Direction**	**Distance (Miles)**	**Facility Name**	**Street Address**	**Municipality**	**Phone**	**Persons**	**Vehicles**	**PPV**
West Feliciana Parish									
1	NW	2.0	Hemingbough	10101 LA Hwy 965	St. Francisville	(225) 635 6617	500	250	2
1	NW	2.0	Green Acres Campground	11907 LA Hwy 965	St. Francisville	(225) 635 4903	28	14	2
1	S	3.5	Dugan's Landing	LA Hwy 964	St. Francisville	N/A	100	50	2
2	W	3.5	River Boats (Mississippi Queen, Delta Queen and American Queen)	Boats Land in St. Francisville. Passengers board tour buses to tour the St. Francisville area. 1 bus is equivalent to 2 vehicles.			400	20	40
5	W	9.0	West Feliciana Hunting Club	Cat Island Rd	St. Francisville	N/A	80	40	2
6	NNW	8.6	Bayou Sarah Hunting Club	RT 66/Solitude Rd	St. Francisville	N/A	60	30	2
6	NW	9.5	Big Oak, Gainer, High Point	N/A	St. Francisville	N/A	100	50	2
6	NNW	6.2	Camp Marydale (Kids Camp)	10317 Marydale Rd	St. Francisville	(225) 927 8946	250	20	12.5
East Baton Rouge Parish									
13	SE	8.0	Beaver Creek Golf Course	1100 E Plains Port Hudson Rd	Zachary	(225) 658-6338	50	50	1
Pointe Coupee Parish									
18	WSW	8.3	Pointe Coupee Parish Parks & Recreation – Scott Civic Center	1200 Major Pkwy	New Roads	(225) 638 3870	100	50	2
						Total:	**1,668**	**574**	

PPV = Persons/Vehicle

Table E-7. Historical Sites Within the RBS EPZ									
PAS	Direction	Distance (Miles)	Facility Name	Street Address	Municipality	Phone	Persons	Vehicles	PPV
West Feliciana Parish									
1	NNE	3.3	Audubon State Historic Site	11788 LA Hwy 965	St. Francisville	(225) 635 3739	1,000	84	12
2	WNW	3.4	West Feliciana Historical Museum	11757 Ferdinand St	St. Francisville	(225) 635 6330	100	50	2
2	NW	3.6	Rosedown Plantation Historic Site	12501 LA Hwy 10	St. Francisville	(225) 635 3332	150	75	2
East Feliciana Parish									
9	SE	5.7	Port Hudson State Historic Site	236 US Hwy 61	Jackson	(225) 654 3775	264	132	2
10	NE	9.3	Centenary State Historic Site	3522 College St	Jackson	(225) 634 7925	100	50	2
						Total:	**1,614**	**391**	

PPV = Persons/Vehicle

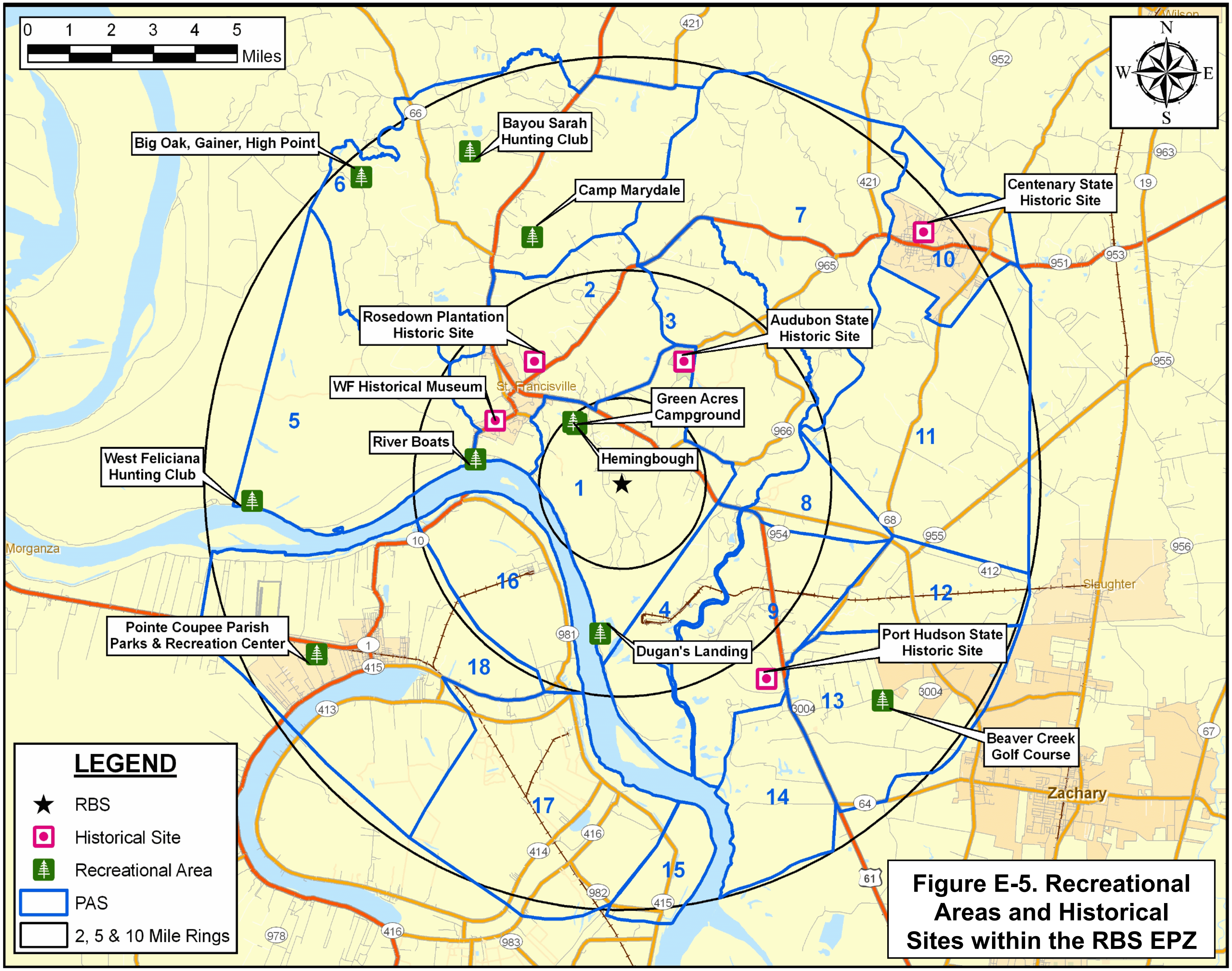


Figure E-5. Recreational Areas and Historical Sites within the RBS EPZ

Table E-8. Major Employers Within the RBS EPZ							
PAS	**Direction**	**Distance (Miles)**	**Facility Name**	**Street Address**	**Municipality**	**Phone**	**Total Employees**
West Feliciana Parish							
1	NNE	0.0	River Bend Station	5485 US Hwy 61	St. Francisville	(225) 635-6094	650
2	NW	3.3	Bayou Sara Unlimited	5677 Commerce St	St. Francisville	(225) 635-6010	60
2	WNW	3.5	US Army Corps of Engineers, Materials Casting Yard	11374 Ferdinand St	St. Francisville	(225) 635-3540	100
2	NW	3.7	Myrtle's Plantation	7747 US Hwy 61	St. Francisville	(225) 635-6277	100
7	NE	7.8	Duke Energy/Texas Eastern	LA Hwy 10	Jackson	(225) 634-5727	10
East Feliciana Parish							
8	E	4.1	Williams Gas Pipelines Transco	2988 Highway 964	Jackson	(225) 654-2047	19
9	SE	4.7	Colonial Pipeline	1476 Highway 61	Jackson	(225) 654-4572	30
East Baton Rouge Parish							
14	SSE	7.8	Amoco Production	LA Hwy 3113	Zachary	(225) 654-0596	20
14	SSE	7.8	Georgia Pacific Paper Mill	1000 W Mount Pleasant Rd	Zachary	(225) 654-1700	550
Pointe Coupee Parish							
16	SW	2.9	Big Cajun No. 2	10431 Cajun II Rd	New Roads	(225) 638-3773	245
17	SSW	5.9	Big Cajun No. 1	7807 River Rd	Ventress	(225) 638-6311	16
18	WSW	8.9	Wal-Mart	2050 False River Dr	New Roads	(225) 638-8616	50
18	WSW	9.8	Louisiana Generating, LLC - New Roads Operations Center	112 Telly St	New Roads	(225) 618-4000	25
						Total:	**1,875**

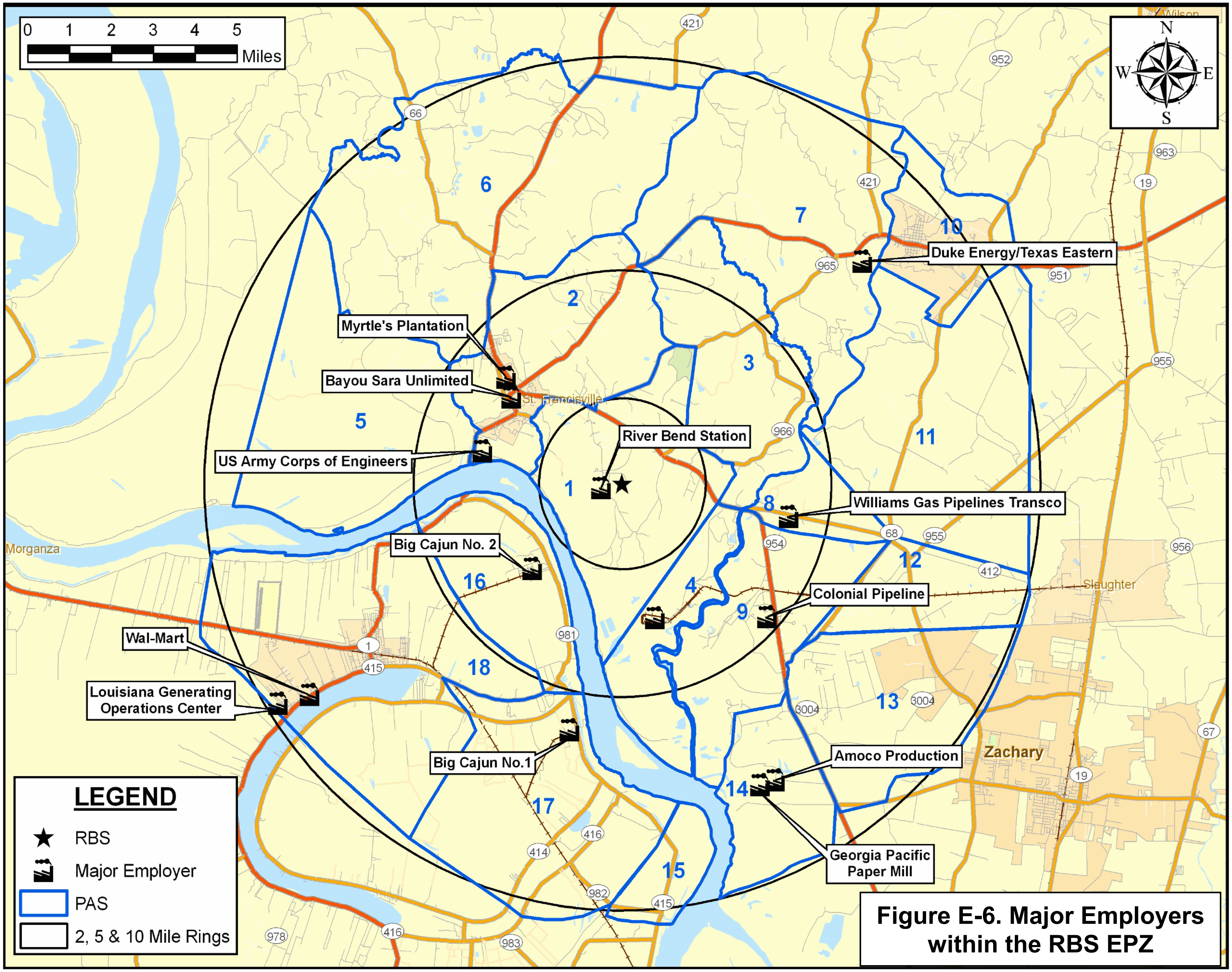


Figure E-6. Major Employers within the RBS EPZ

APPENDIX F

Telephone Survey

APPENDIX F: TELEPHONE SURVEY

1. INTRODUCTION

The development of evacuation time estimates for the Emergency Planning Zone (EPZ) of the River Bend Station requires the identification of travel patterns, car ownership and the household size of the population within the EPZ. Demographic information is obtained from Census data. The use of this data has several limitations when applied to emergency planning. First, the census data do not encompass the range of information needed to identify the time required for preliminary activities that must be undertaken prior to evacuating the area. Secondly, the census data do not contain attitudinal responses needed from the population of the EPZ and consequently may not accurately represent the anticipated behavioral characteristics of the evacuating populace.

These concerns are addressed by a telephone survey. The survey is designed to elicit information from the public concerning family demographics and estimates of response times to well defined events. The design of the survey includes a limited number of questions of the form “What would you do if …?” and other questions regarding activities with which the respondent is familiar (“How long does it take you to …?”)

2. SURVEY INSTRUMENT AND SAMPLING PLAN

Attachment A presents the final survey instrument. A draft of the instrument was submitted for comment. Comments were received and the survey instrument was modified appropriately.

Following the completion of the instrument, a sampling plan was developed. A sample size of approximately 550 completed survey forms yields results with an acceptable sampling error. The sample must be drawn from the EPZ population. Consequently, a list of EPZ zip codes was developed. This list is shown in Table F-1. Along with each zip code, an estimate of the population in each area was determined, based on average household size provided by Census data. The proportional number of the desired completed survey interviews for each area was identified, as shown in Table F-1. The completed survey adhered to the sampling plan.

Table F-1. River Bend Station Telephone Survey Sampling Plan

Zip Code	EPZ Population in Zip Code (2000)	Households	Required Sample
70729	62	24	2
70730	211	79	5
70736	512	179	12
70748	5,961	1,509	100
70749	331	146	10
70760	6,989	2,446	162
70773	234	89	6
70775	6,240	2,231	148
70777	109	43	3
70783	2,197	872	58
70791	2,154	696	46
Total:	**25,000**	**8,314**	**550**
Average Household Size		**3.01**	
Total Sample Required		**550**	

3. SURVEY RESULTS

The results of the survey fall into two categories. First, the household demographics of the area can be identified. Demographic information includes such factors as household size, automobile ownership, and automobile availability. The distributions of the time to perform certain pre-evacuation activities are the second category of survey results. These data are processed to develop the trip generation distributions used in the evacuation modeling effort.

Household Demographic Results

Household Size

Figure F-1 presents the distribution of household size within the EPZ. The average household contains 2.52 people. The estimated household size (3.01 persons) used to determine the survey sample (Table F-1) was drawn from Census data. The difference between the average household size obtained from the survey and the Census value is likely a combination of population change since the 2000 Census and the non-uniform distribution of population across zip code areas.

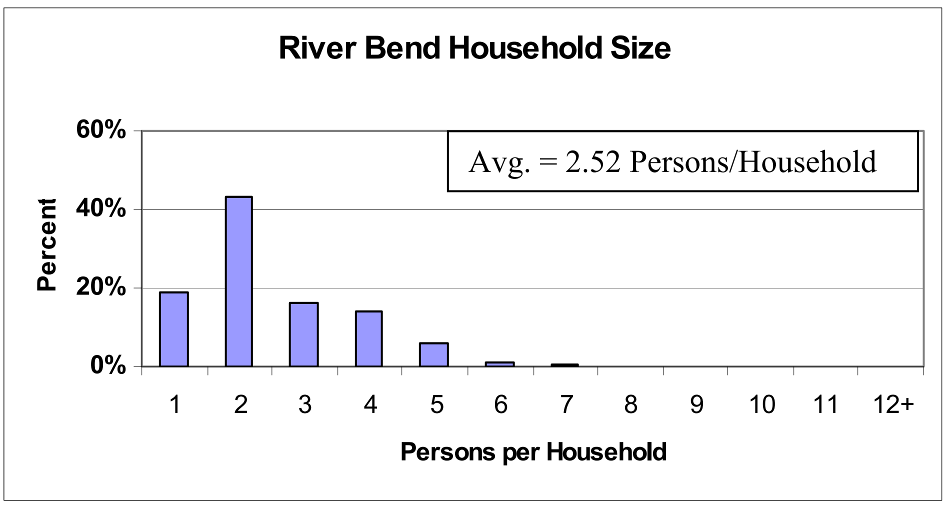


Figure F-1. Household Size in the EPZ

Automobile Ownership

The average number of automobiles per household in the EPZ is 1.98. The distribution of automobile ownership is presented in Figure F-2. Figures F-3 and F-4 present the automobile availability by household size; approximately 6 percent of households do not have access to an automobile. The majority of households without access to a car are single person households; nearly all households of 2 or more people have access to at least one vehicle.

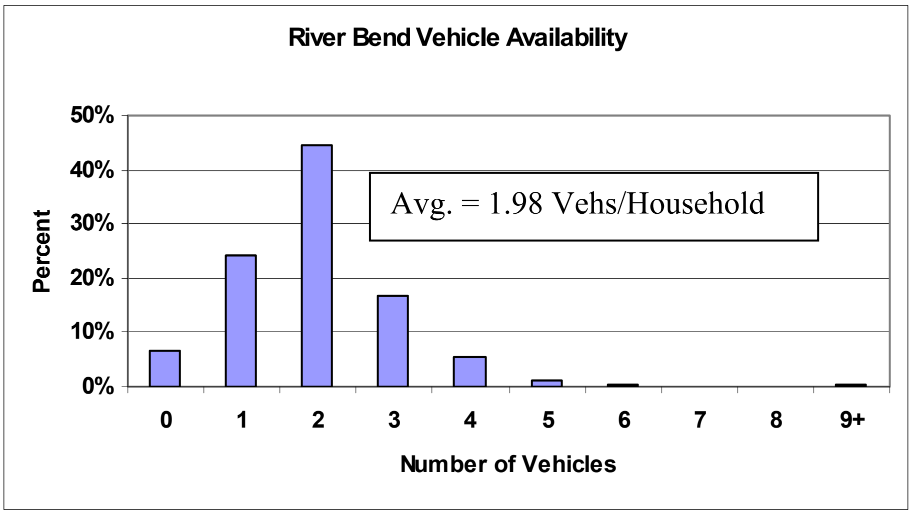


Figure F-2. Household Vehicle Availability

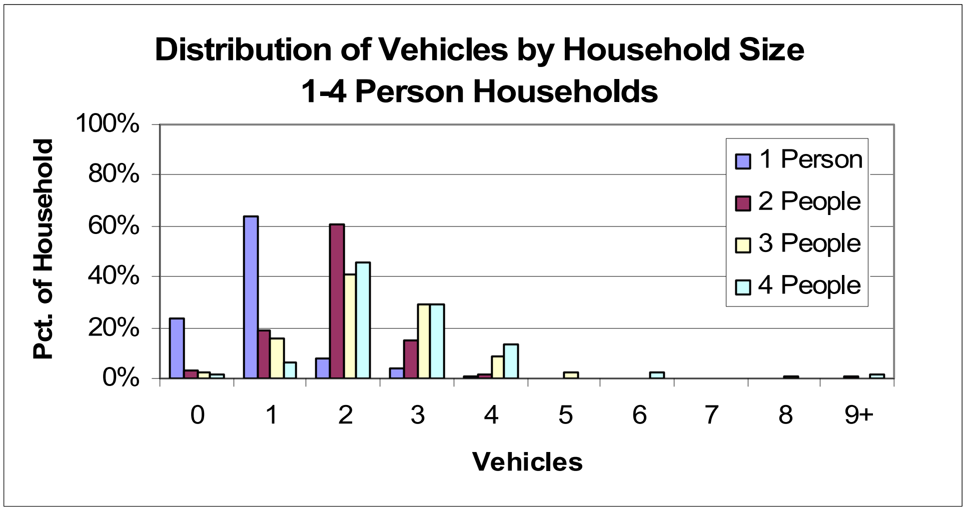


Figure F-3. Vehicle Availability – 1 to 4 Person Households

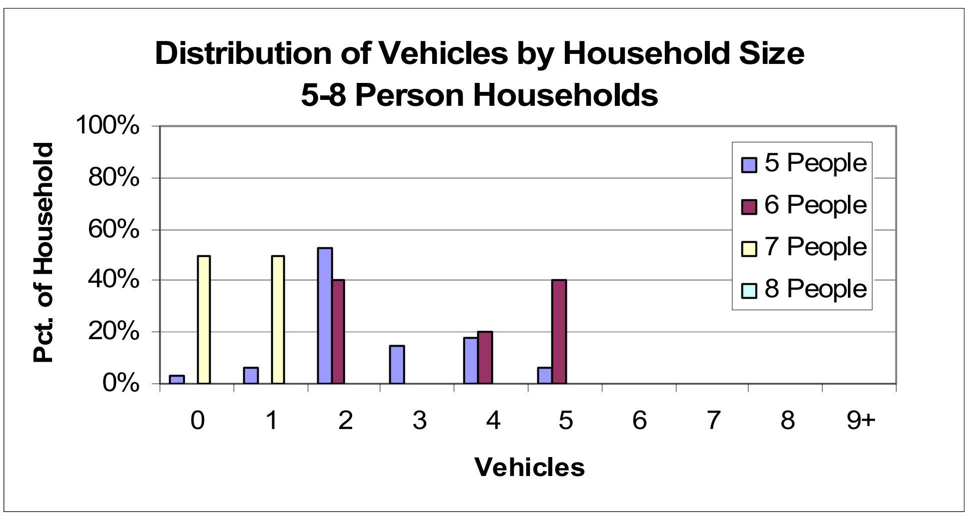


Figure F-4. Vehicle Availability – 5 to 8 Person Households

School Children

The average number of school children per household identified by the survey is 0.47. Figure F-5 presents the distribution of school children.

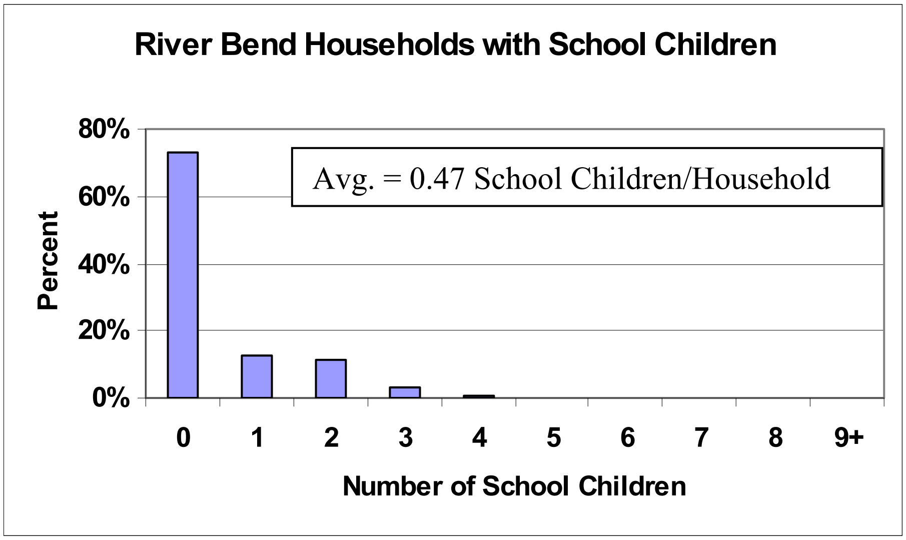


Figure F-5. School Children in Households

Commuters

Figure F-6 presents the distribution of the number of commuters in each household. The data shows an average of 1 commuter in each household in the EPZ.

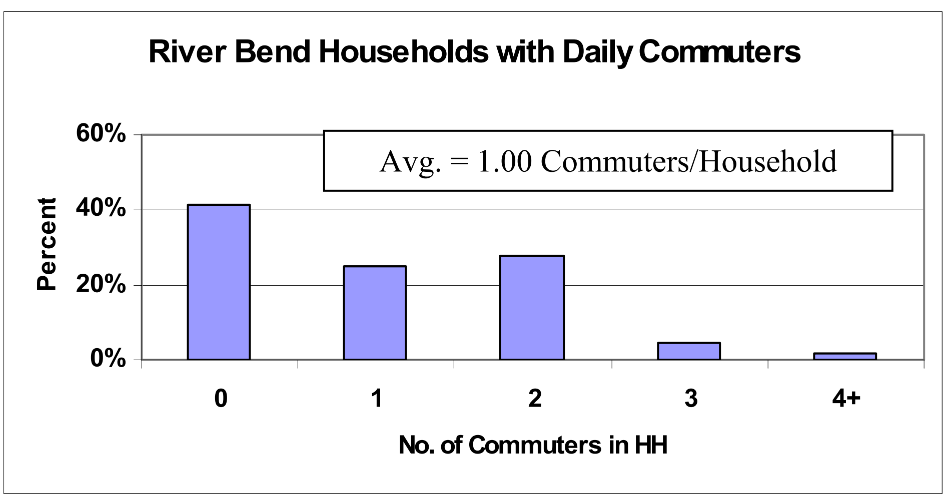


Figure F-6. Commuters in Households in the EPZ

Commuter Travel Modes

Figure F-7 presents the mode of travel that commuters use on a daily basis. Nearly all commuters use their private automobiles to travel to work or school.

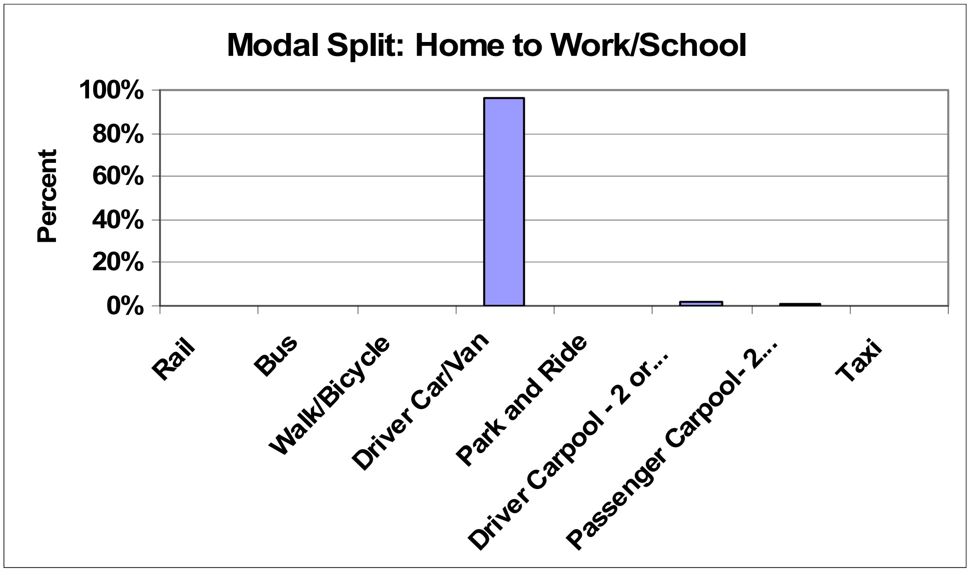


Figure F-7. Modes of Travel to Work by EPZ Residents

Evacuation Response

Several questions were asked which are used to gauge the population's response to an emergency. The first of these asked "How many of the vehicles that are usually available to the household would your family use during an evacuation?" The response is shown in Figure F-8. On average, 1.53 vehicles per household would be used for evacuation purposes.

The second evacuation response question asked was "When the commuters are away from home, is there a vehicle at home that is available for evacuation during an emergency?" Of the survey participants who responded, 60 percent said that there was another vehicle available to evacuate, while 40 percent answered that there would be no vehicle available for evacuation.

The third evacuation response question was "Would your family await the return of other family members prior to evacuating the area?" Of the survey participants who responded, 65 percent said they would await the return of other family members before evacuating and 35 percent indicated that they would not await the return of other family members.

The fourth evacuation response question was "Would you take household pets with you if you were asked to evacuate the area?" As shown in Figure F-9, 47 percent of respondents said they would take their pets; 16 percent would not. The remaining 37 percent either did not have a pet, or did not give a definitive answer.

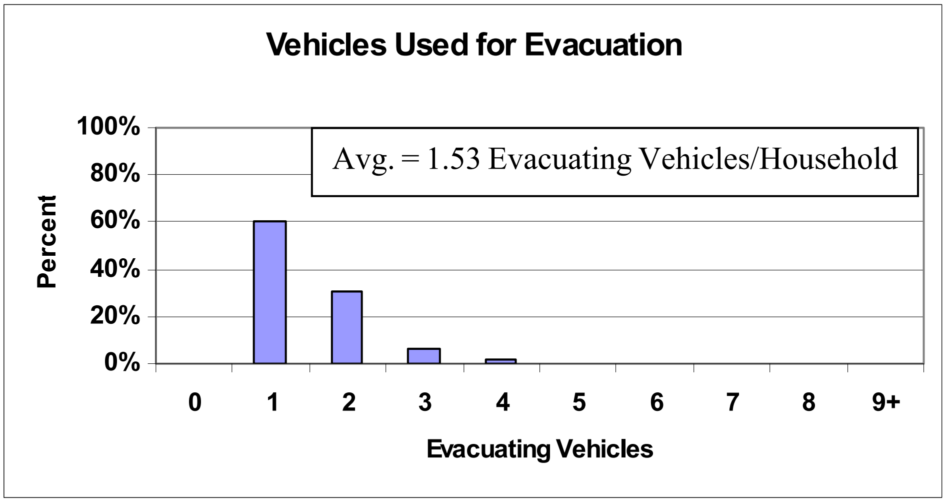
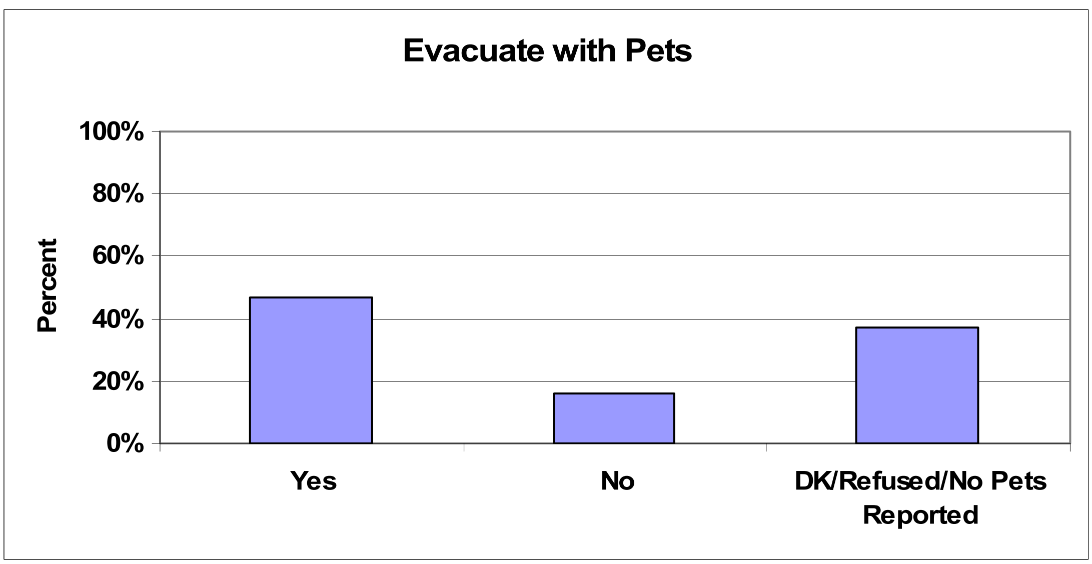


Figure F-8. Number of Vehicles Used for Evacuation



DK = Does Not Know

Figure F-9. Households Evacuating With Pets

Time Distribution Results

The survey asked several questions about the amount of time it takes to perform certain pre-evacuation activities. These activities involve actions taken by residents during the course of their day-to-day lives. Thus, the answers fall within the realm of the responder's experience.

How long does it take the commuter to complete preparation for leaving work? Figure F-10 presents the cumulative distribution; the activity is completed by about 120 minutes. Approximately 60 percent can leave within 15 minutes.

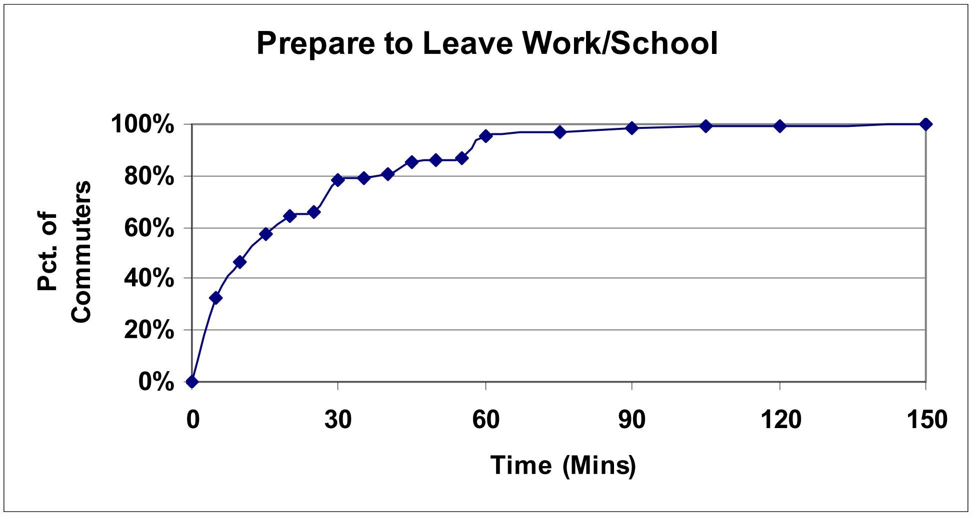


Figure F-10. Time Required to Prepare to Leave Work/School

How long would it take the commuter to travel home?
Figure F-11 presents the work to home travel time. In all cases, over 80 percent of commuters can arrive home within about 45 minutes after leaving work; nearly all within 2 hours.

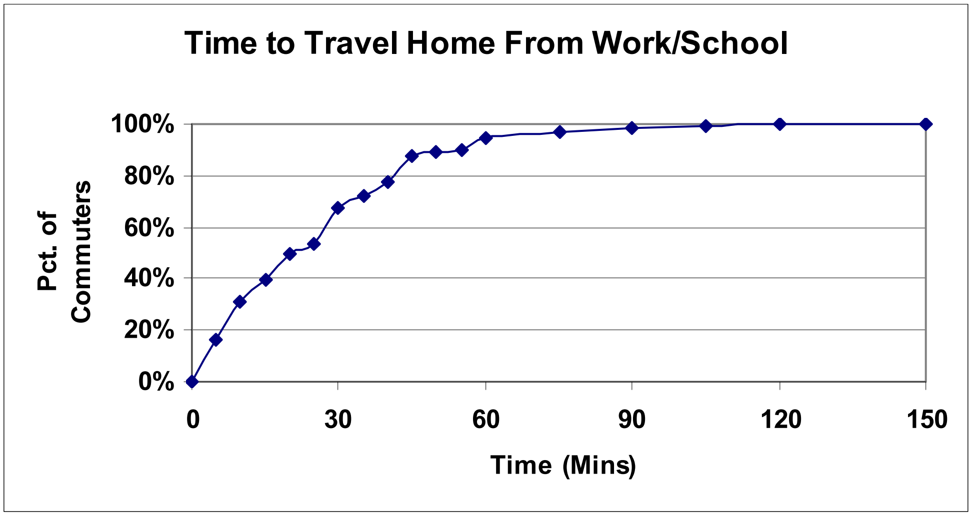


Figure F-11. Work to Home Travel Time

How long would it take the family to pack clothing, secure the house, and load the car?

Figure F-12 presents the time required to prepare for leaving on an evacuation trip. In many ways this activity mimics a family's preparation for a short holiday or weekend away from home. Hence, the responses represent the experience of the responder in performing similar activities.

The distribution shown in Figure F-12 has a long "tail." Nearly 95 percent of households can be ready to leave home within two and a half hours; most of the remaining households can be ready to leave within 4 hours.

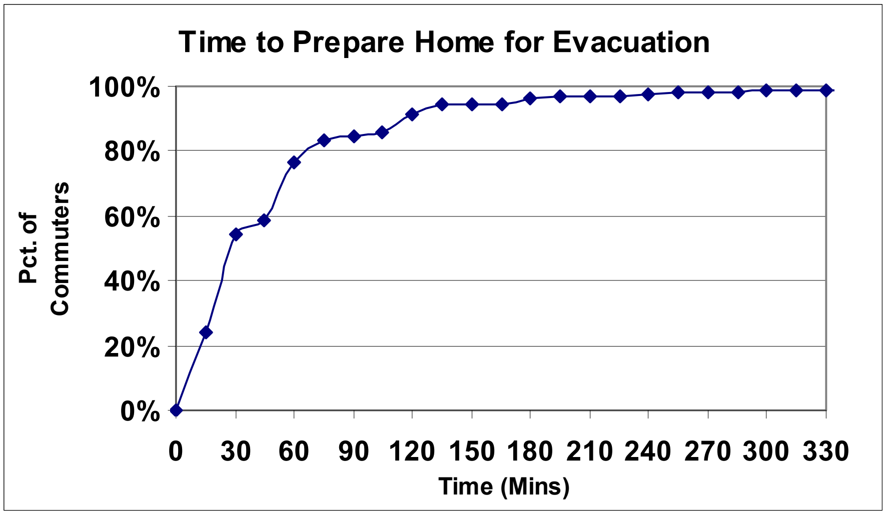


Figure F-12. Time to Prepare Home for Evacuation

4. CONCLUSIONS

The telephone survey provides valuable, relevant data that have been used to quantify "mobilization time" which can influence evacuation time estimates.

ATTACHMENT A

Telephone Survey Instrument

Survey Instrument

Hello, my name is _______________ and I'm working on a survey being made for [insert marketing firm name] designed to identify local travel patterns in your area. The survey will be used for emergency plans in response to hazards that **are not weather-related**. The information obtained will be used in a traffic engineering study and in connection with an update of the parish's emergency response plans. Your participation in this survey will greatly enhance the parish's emergency preparedness program.

COL.1 Unused
COL.2 Unused
COL.3 Unused

COL.4 Unused
COL.5 Unused

Sex **COL. 8**
1 Male
2 Female

INTERVIEWER: ASK TO SPEAK TO THE HEAD OF HOUSEHOLD OR THE SPOUSE OF THE HEAD OF HOUSEHOLD. (Terminate call if not a residence)

DO NOT ASK:

1A. Record area code. To Be Determined

COL. 9-11

1B. Record exchange number. To Be Determined

COL. 12-14

---

2. What is your home Zip Code **Col. 15-19**

3. In total, how many cars, or other vehicles are usually available to the household? (DO NOT READ ANSWERS.)

COL.20
1 ONE
2 TWO
3 THREE
4 FOUR
5 FIVE
6 SIX
7 SEVEN
8 EIGHT
9 NINE OR MORE
0 ZERO (NONE)
X REFUSED

---

4. How many people usually live in this household? (DO NOT READ ANSWERS.)

COL.21	COL.22
1 ONE	0 TEN
2 TWO	1 ELEVEN
3 THREE	2 TWELVE
4 FOUR	3 THIRTEEN
5 FIVE	4 FOURTEEN
6 SIX	5 FIFTEEN
7 SEVEN	6 SIXTEEN
8 EIGHT	7 SEVENTEEN
9 NINE	8 EIGHTEEN
	9 NINETEEN OR MORE
	X REFUSED

5. How many children living in this household go to local public, private, or parochial schools? (DO NOT READ ANSWERS.)

COL.23
0 ZERO
1 ONE
2 TWO
3 THREE
4 FOUR
5 FIVE
6 SIX
7 SEVEN
8 EIGHT
9 NINE OR MORE
X REFUSED

---

6. How many people in the household commute to a job, or to college, at least 4 times a week?

COL.24		SKIP TO
0	ZERO	Q. 12
1	ONE	Q. 7
2	TWO	Q. 7
3	THREE	Q. 7
4	FOUR OR MORE	Q. 7
5	DON'T KNOW/REFUSED	Q. 12

INTERVIEWER: For each person identified in Question 6, ask Questions 7, 8, 9, and 10.

7. Thinking about commuter #1, how does that person usually travel to work or college? (REPEAT QUESTION FOR EACH COMMUTER.)

	Commuter #1 **COL.25**	Commuter #2 **COL.26**	Commuter #3 **COL.27**	Commuter #4 **COL.28**
Rail	1	1	1	1
Bus	2	2	2	2
Walk/Bicycle	3	3	3	3
Driver Car/Van	4	4	4	4
Park & Ride (Car/Rail, Xpress_bus)	5	5	5	5
Driver Carpool-2 or more people	6	6	6	6
Passenger Carpool-2 or more people	7	7	7	7
Taxi	8	8	8	8
Refused	9	9	9	9

---

8. What is the name of the city, town or community in which Commuter #1 works or attends school? (REPEAT QUESTION FOR EACH COMMUTER.) (FILL IN ANSWER.)

COMMUTER #1			COMMUTER #2			COMMUTER #3			COMMUTER #4		
City/Town		State	City/Town		State	City/Town		State	City/Town		State
COL.29	**COL.30**	**COL.31**	**COL.32**	**COL.33**	**COL.34**	**COL.35**	**COL.36**	**COL.37**	**COL.38**	**COL.39**	**COL.40**
0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9

9. How long would it take Commuter #1 to travel home from work or college?
(REPEAT QUESTION FOR EACH COMMUTER.) (DO NOT READ ANSWERS.)

COMMUTER #1

COL.41
1 5 MINUTES OR LESS
2 6-10 MINUTES
3 11-15 MINUTES
4 16-20 MINUTES
5 21-25 MINUTES
6 26-30 MINUTES
7 31-35 MINUTES
8 36-40 MINUTES
9 41-45 MINUTES

COL.42
1 46-50 MINUTES
2 51-55 MINUTES
3 56 - 1 HOUR
4 OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES
5 BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6 BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7 BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8 OVER 2 HOURS (SPECIFY _____)
9
0
X DON'T KNOW/REFUSED

COMMUTER #2

COL.43
1 5 MINUTES OR LESS
2 6-10 MINUTES
3 11-15 MINUTES
4 16-20 MINUTES
5 21-25 MINUTES
6 26-30 MINUTES
7 31-35 MINUTES
8 36-40 MINUTES
9 41-45 MINUTES

COL.44
1 46-50 MINUTES
2 51-55 MINUTES
3 56 - 1 HOUR
4 OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES
5 BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6 BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7 BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8 OVER 2 HOURS (SPECIFY _____)
9
0
X DON'T KNOW/REFUSED

COMMUTER #3

COL.45
1 5 MINUTES OR LESS
2 6-10 MINUTES
3 11-15 MINUTES
4 16-20 MINUTES
5 21-25 MINUTES
6 26-30 MINUTES
7 31-35 MINUTES
8 36-40 MINUTES
9 41-45 MINUTES

COL.46
1 46-50 MINUTES
2 51-55 MINUTES
3 56 - 1 HOUR
4 OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES –
5 BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6 BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7 BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8 OVER 2 HOURS (SPECIFY _____)
9
0
X DON'T KNOW/REFUSED

COMMUTER #4

COL.47
1 5 MINUTES OR LESS
2 6-10 MINUTES
3 11-15 MINUTES
4 16-20 MINUTES
5 21-25 MINUTES
6 26-30 MINUTES
7 31-35 MINUTES
8 36-40 MINUTES
9 41-45 MINUTES

COL.48
1 46-50 MINUTES
2 51-55 MINUTES
3 56 - 1 HOUR
4 OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES
5 BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6 BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7 BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8 OVER 2 HOURS (SPECIFY _____)
9
0
X DON'T KNOW/REFUSED

10. Approximately how long does it take Commuter #1 to complete preparation for leaving work or college prior to starting the trip home? (REPEAT QUESTION FOR EACH COMMUTER.) (DO NOT READ ANSWERS.)

COMMUTER #1

COL. 49	COL.50
1 5 MINUTES OR LESS	1 46-50 MINUTES
2 6-10 MINUTES	2 51-55 MINUTES
3 11-15 MINUTES	3 56 - 1 HOUR
4 16-20 MINUTES	4 OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES
5 21-25 MINUTES	5 BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6 26-30 MINUTES	6 BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7 31-35 MINUTES	7 BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8 36-40 MINUTES	8 OVER 2 HOURS (SPECIFY _____)
9 41-45 MINUTES	9
	0
	X DON'T KNOW/REFUSED

COMMUTER #2

COL.51	COL. 52
1 5 MINUTES OR LESS	1 46-50 MINUTES
2 6-10 MINUTES	2 51-55 MINUTES
3 11-15 MINUTES	3 56 - 1 HOUR
4 16-20 MINUTES	4 OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES
5 21-25 MINUTES	5 BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6 26-30 MINUTES	6 BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7 31-35 MINUTES	7 BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8 36-40 MINUTES	8 OVER 2 HOURS (SPECIFY _____)
9 41-45 MINUTES	9
	0
	X DON'T KNOW/REFUSED

COMMUTER #3

COL. 53	COL. 54
1 5 MINUTES OR LESS	1 46-50 MINUTES
2 6-10 MINUTES	2 51-55 MINUTES
3 11-15 MINUTES	3 56 - 1 HOUR
4 16-20 MINUTES	4 OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES –
5 21-25 MINUTES	5 BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6 26-30 MINUTES	6 BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7 31-35 MINUTES	7 BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8 36-40 MINUTES	8 OVER 2 HOURS (SPECIFY _____)
9 41-45 MINUTES	9
	0
	X DON'T KNOW/REFUSED

COMMUTER #4

COL. 55	COL. 56
1 5 MINUTES OR LESS	1 46-50 MINUTES
2 6-10 MINUTES	2 51-55 MINUTES
3 11-15 MINUTES	3 56 - 1 HOUR
4 16-20 MINUTES	4 OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES
5 21-25 MINUTES	5 BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6 26-30 MINUTES	6 BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7 31-35 MINUTES	7 BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8 36-40 MINUTES	8 OVER 2 HOURS (SPECIFY _____)
9 41-45 MINUTES	9
	0
	X DON'T KNOW/REFUSED

---

11. When the commuters are away from home, is there a vehicle at home that is available for evacuation during any emergency?

Col. 57
1 Yes
2 No
3 Don’t Know/Refused

12. Would you await the return of family members prior to evacuating the area?

Col. 58
1 Yes
2 No
3 Don't Know/Refused

---

13. How many of the vehicles that are usually available to the household would your family use during an evacuation? (DO NOT READ ANSWERS.)

COL.59
1 ONE
2 TWO
3 THREE
4 FOUR
5 FIVE
6 SIX
7 SEVEN
8 EIGHT
9 NINE OR MORE
0 ZERO (NONE)
X REFUSED

---

14. How long would it take the family to pack clothing, secure the house, load the car, and complete preparations prior to evacuating the area? (DO NOT READ ANSWERS.)

COL.60
1 LESS THAN 15 MINUTES
2 15-30 MINUTES
3 31-45 MINUTES
4 46 MINUTES - 1 HOUR
5 1 HOUR TO 1 HOUR 15 MINUTES
6 1 HOUR 16 MINUTES TO 1 HOUR 30 MINUTES
7 1 HOUR 31 MINUTES TO 1 HOUR 45 MINUTES
8 1 HOUR 46 MINUTES TO 2 HOURS
9 2 HOURS TO 2 HOURS 15 MINUTES
0 2 HOURS 16 MINUTES TO 2 HOURS 30 MINUTES
X 2 HOURS 31 MINUTES TO 2 HOURS 45 MINUTES
Y 2 HOURS 46 MINUTES TO 3 HOURS

COL.61
1 3 HOURS TO 3 HOURS 15 MINUTES
2 3 HOURS 16 MINUTES TO 3 HOURS 30 MINUTES
3 3 HOURS 31 MINUTES TO 3 HOURS 45 MINUTES
4 3 HOURS 46 MINUTES TO 4 HOURS
5 4 HOURS TO 4 HOURS 15 MINUTES
6 4 HOURS 16 MINUTES TO 4 HOURS 30 MINUTES
7 4 HOURS 31 MINUTES TO 4 HOURS 45 MINUTES
8 4 HOURS 46 MINUTES TO 5 HOURS
9 5 HOURS TO 5 HOURS 15 MINUTES
0 5 HOURS 16 MINUTES TO 5 HOURS 30 MINUTES
X 5 HOURS 31 MINUTES TO 5 HOURS 45 MINUTES
Y 5 HOURS 46 MINUTES TO 6 HOURS

COL.62
1 DON'T KNOW

---

15. Would you take household pets with you if you were asked to evacuate the area?

Col. 58
1 Yes
2 No
3 Don't Know/Refused

Thank you very much. __________________________

(TELEPHONE NUMBER CALLED)

If requested:
For Additional information
Contact your Parish Emergency Management Office

East Baton Rouge OHSEP	389-2100
East Feliciana Parish OHSEP	244-1142
Pointe Coupee Parish OHSEP	694-3737
West Baton Rouge Parish OHSEP	346-1577
West Feliciana Parish OHSEP	635-6428

ANNEX B
Code of Data Collection Standards With Notes Section
Market Research Association

P.O. Box 230 • Rocky Hill, CT 06067-0230 • 860-257-4008 • Fax: 860-257-3990

Code Approved May 1997
Notes Added September 1999

RESPONSIBILITIES TO RESPONDENTS

Data Collection Companies ...

1. will make factually correct statements to secure cooperation and will honor promises to respondents, whether verbal or written;
2. will not use information to identify respondents without the permission of the respondent, except to those who check the data or are involved in processing the data. If such permission is given, it must be recorded by the interviewer at the time the permission is secured;
3. will respect the respondent's right to withdraw or to refuse to cooperate at any stage of the study and not use any procedure or technique to coerce or imply that cooperation is obligatory;
4. will obtain and document respondent consent when it is known that the name and address or identity of the respondent may be passed to a third party for legal or other purposes, such as audio or video recordings;
5. will obtain permission and document consent of a parent, legal guardian or responsible guardian before interviewing children 12 years old or younger;
6. will give respondents the opportunity to refuse to participate in the research when there is a possibility they may be identifiable even without the use of their name or address (e.g., because of the size of the population being sampled).

Interviewers ...

1. will treat the respondent with respect and not influence him or her through direct or indirect attempts, including the framing of questions and/or a respondent's opinion or attitudes on any issue;
2. will obtain and document permission from a parent, legal guardian or responsible guardian before interviewing children 12 years old or younger. Prior to obtaining permission, the interviewer should divulge the subject matter, length of the interview and other special tasks that will be required.

RESPONSIBILITIES TO CLIENTS

Data Collection Companies ...

1. will ensure that each study is conducted according to the client's exact specifications;
2. will observe confidentiality with all research techniques or methodologies and with information considered confidential or proprietary. Information will not be revealed that could be used to identify clients or respondents without proper authorization;
3. will ensure that companies, their employees and subcontractors involved in data collection take all reasonable precautions so that more than one survey is not conducted in one interview without explicit permission from the Client
4. will report research results accurately and honestly;
5. will not misrepresent themselves as having qualifications, experience, skills or facilities that they do not possess;
6. will refrain from referring to membership in the Marketing Research Association as proof of competence, since the Association does not certify any person's or organization's competency or skill level.

RESPONSIBILITIES TO DATA COLLECTORS

Clients ...

1. will be responsible for providing products and services that are safe and fit or their intended use and disclose/label all product contents;
2. will provide verbal or written instructions;
3. will not ask our members who subcontract research to engage in any activity that is not acceptable as defined in this Code or that is prohibited under any applicable federal, state, local laws, regulations and/or ordinances.

RESPONSIBILITIES TO THE GENERAL PUBLIC AND BUSINESS COMMUNITY

Data Collection Companies ...

1. will not intentionally abuse public confidence in marketing and opinion research;
2. will not represent a non-research activity to be marketing and opinion research, such as:
   - questions whose sole objective is to obtain personal information about respondents, whether for legal, political, private or other purposes,
   - the compilation of lists, registers or data banks of names and addresses for any non-research purposes (e.g., canvassing or fundraising),
   - industrial, commercial or any other form of espionage,
   - the acquisition of information for use by credit rating services or similar organizations,
   - sales or promotional approaches to the respondent,
   - the collection of debts;
3. will make interviewers aware of any special conditions that may be applicable to any minor (18 years old or younger).

These notes are intended to help users of the Code to interpret and apply it in practice. Any questions about how to apply the Code in a specific situation should be addressed to MRA Headquarters.

RESPONSIBILITIES TO RESPONDENTS

Data Collection Companies ...

1. will make factually correct statements to secure cooperation and honor promises to respondents, whether oral or written; *Interviewers will not knowingly provide respondents with information that misrepresents any portion of the interviewing process, such as; length of the interview, scope of task involved, compensation, or intended use of the information collected.*
2. will not use information to identify respondents without the permission of the respondent, except to those who check the data or are involved in processing the data. If such permission is given, it must be recorded by the interviewer at the time the permission is secured; *Respondent information will be linked to data collected only for research purposes such as validation, evaluating data in aggregate based on demographic information, modeling. Providing respondent information is not permissible for any purpose other than legitimate research purposes as mentioned above. If anyone requests respondent identifiable information it will only be provided upon receipt of written declaration of and agreement of some intended use. Such use shall be determined by the provider to qualify as legitimate research use. (i.e. validation, planned recalls, modeling, demographic analysis.) No other use of this information falls within the boundaries of the Code. This applies to all types of respondent sample sources including client supplied lists.*
3. will respect the respondent's right to withdraw or to refuse to cooperate at any stage of the study and not use any procedure or technique to coerce or imply that cooperation is obligatory. *Respondent cooperation is strictly on a voluntary basis. Respondents are entitled to withdraw from an interview at any stage or to refuse to cooperate in a research project. Interviewers should never lead respondents to believe they have no choice in their participation.*
4. will obtain and record respondent consent when it is known that the name and addresses or identity of the respondent may be passed to a third party for legal or other purposes, such as audio or video recordings; *By documenting the respondent's consent for a defined specific use of his/ her name and address we are confirming the respondent realizes we are asking something new of them, i.e., possible participation in another research project.*
5. will obtain permission and document consent of a parent, legal guardian or responsible guardian before interviewing children 12 years old or younger; *Interviewers must take special care when interviewing children or young people. The informed consent of the parent or responsible adult must first be obtained for interviews with children.*
6. will give respondents the opportunity to refuse to participate in the research when there is a possibility they may be identifiable even without the use of their name or address (e.g., because of the size of the population being sampled.) *Respondent cooperation is strictly on a voluntary basis. Respondents are entitled to withdraw from a research project. Company policies and/or interviewer instructions should state the interviewer must give respondents the opportunity to not participate for any reason.*

Interviewers ...

1. will treat the respondent with respect and not influence him or her through direct or indirect attempts, including the framing of questions, a respondent's opinion or attitudes on any issue. *Interviewers cannot ask questions in a way that leads or influences respondents' answers, nor can they provide their own opinions, thoughts or feelings that might bias a respondent and therefore impact the answers they give.*
2. will obtain and document permission of a parent, legal guardian or responsible guardian before interviewing children 12 years old or younger. Prior to obtaining permission, the interviewer should divulge the subject matter, length of interview and other special tasks that will be required. *Interviewers must take special care when interviewing children and young people. The informed consent of the parent or responsible adult must first be obtained for interviews with children. Parents or responsible adults must be told some specifics about the interview process and special tasks, such as audio or video recording, taste testing, respondent fees and special tasks, before permission is obtained.*

RESPONSIBILITIES TO CLIENTS

Data Collection Companies ...

1. will ensure that each study is conducted according to the client's specifications; *Procedures are implemented to conform or verify that client specifications are being followed.*
2. will observe confidentiality with all research techniques or methodologies and with information considered confidential or proprietary. Information will not be revealed that could be used to identify clients or respondents without proper authorization; *Respondent information will be linked to data collected only for research purposes and will not be used for any purpose other than legitimate research. Protect the confidentiality of anything learned about the respondent and/or his or her business.*
3. will ensure that companies, their employees and subcontractors involved in data collection take all reasonable precautions so that no more than one survey is conducted in one interview without explicit permission from the sponsorship company or companies; *Company policies or procedures indicate the practice of conducting more than one survey within an interview is not done without specific permission from the relevant clients.*
4. will report research results accurately and honestly; *Describe how the research was done in enough detail that a skilled researcher could repeat the study; provide data representative of a defined population or activity and enough data to yield projectable results; present the results understandably and fairly, including any results that may seem contradictory or unfavorable.*
5. will not misrepresent themselves as having qualifications, experience, skills or facilities that they do no possess; *If regularly subcontracting data collection, should not infer to clients and prospective clients that they possess this capability "in house"; claim only legitimate academic degrees, clients and other qualifications.*
6. will refrain from referring to membership in the Marketing Research Association as proof of competence, since the Association does not certify any person's or organization's competency or skill level. *MRA does not currently have a certification program for marketing research competency, therefore while members can state their membership in the Association, they cannot claim that this automatically conveys a message of their competency to carry out the marketing research process.*

RESPONSIBILITIES TO DATA COLLECTORS

Clients ...

1. will be responsible for providing products and services that are safe and fit for their intended use and disclose/label all product contents; *It is the client's responsibility to ensure that all test products are in compliance with all safety standards and that all product contents information is provided to the data collectors. Data Collectors should request in writing all pertinent information as well as emergency numbers for respondents and themselves.*
2. will provide oral or written instructions; *To ensure the success of the research, detailed instructions are to be provided prior to the start of any project. These instructions must be written and then confirmed orally for: understanding, ability of the agency to implement and agreement to comply.*
3. will not ask our members who subcontract research to engage in any activity that is not acceptable as defined in this Code or that is prohibited under any applicable federal, state and local laws, regulations and ordinances. *All MRA Members have agreed to comply with the Code as written and thus will not agree to, or ask anyone else to, knowingly violate any of the points of the Code.*

RESPONSIBILITIES TO THE GENERAL PUBLIC AND BUSINESS COMMUNITY

Data Collection Companies ...

1. will not intentionally abuse public confidence in marketing and opinion research; *Marketing research shall be conducted and reported for the sole purpose of providing factual information upon which decisions will be made. At no time is marketing research information to be used to intentionally mislead public opinion. Instances of abuse of public confidence undermine the credibility of our Industry.*
2. will not represent a non-research activity to be marketing and opinion research, such as:
    - questions whose sole objective is to obtain personal information about respondents, whether for legal, political, private or other purposes,
    - the compilation of lists, registers or data banks of names and addresses for any non-research purposes (e.g., canvassing or fundraising),
    - industrial, commercial or any other form of espionage,
    - the acquisition of information for use by credit rating services or similar organizations,
    - sales or promotional approaches to the respondent,

APPENDIX G

Traffic Management

APPENDIX G: TRAFFIC MANAGEMENT

This appendix presents suggested traffic control measures to facilitate the evacuation of the River Bend Station EPZ. Pages G-2 through G-36 detail Traffic Control Points (TCP), which are typically intersections within or just outside the EPZ; these points are established to facilitate the flow of evacuee traffic from within the EPZ. Table G-1 summarizes the TCP and the manpower and equipment needed to implement traffic control. Figure G-1 provides detailed mapping of the location of each traffic control point.

Pages G-37 through G-54 detail the Access Control Points (ACP), which are typically on the periphery of the EPZ; these points are established to divert vehicles from entering the EPZ. Doing so provides all of the available roadway capacity within the EPZ to the evacuees and also prevents people from entering the EPZ and being exposed to risk. Table G-2 summarizes the ACP and the manpower and equipment needed to establish access control, while Figure G-2 provides a detailed map of the location of each ACP.

Manpower and equipment shortages are likely to arise; as such, prioritization of TCP and ACP is established to make the most efficient use of manpower and equipment in the event of an emergency. The use of ITS technologies, as outlined in Section 9, will also aid in overcoming manpower shortages.

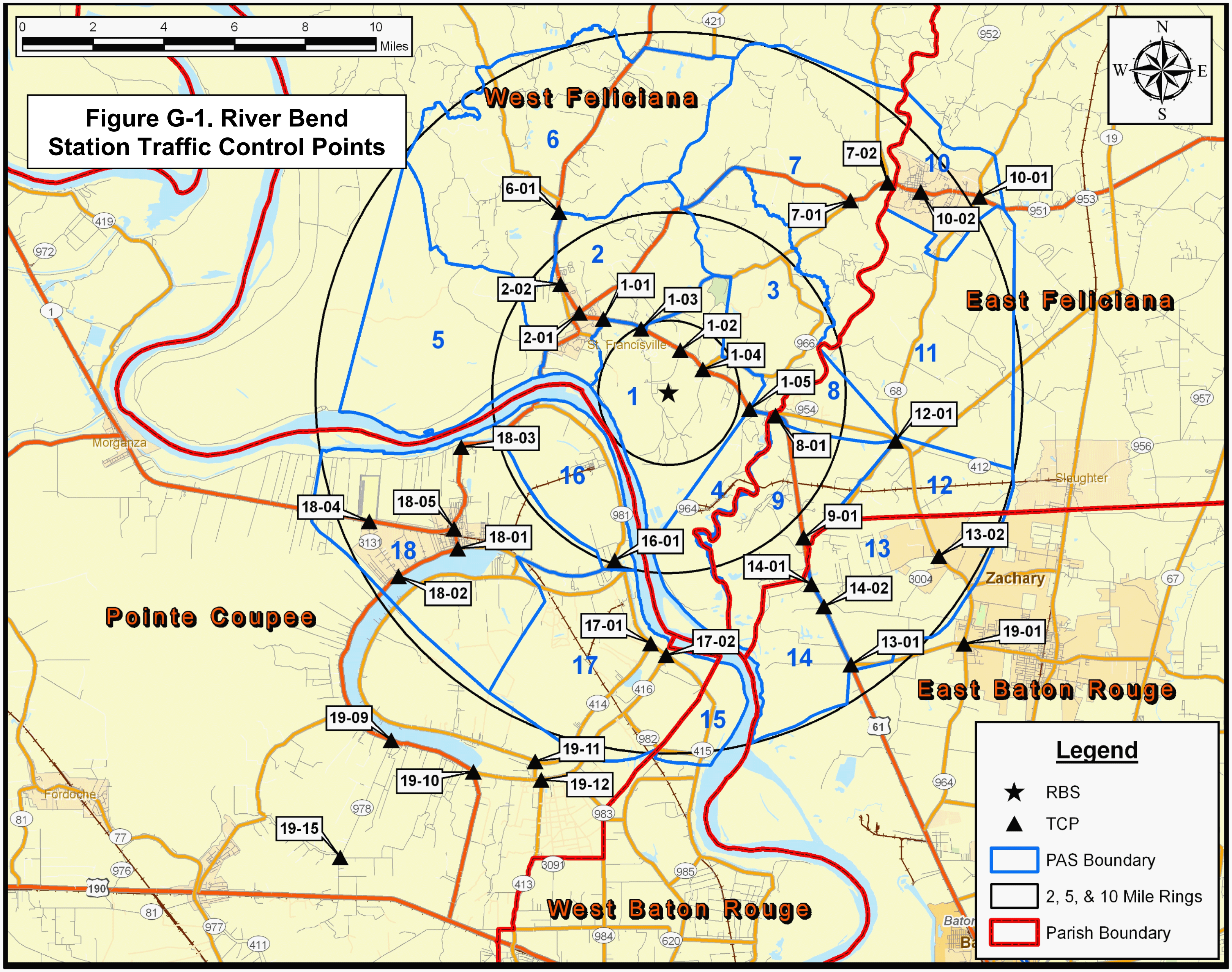


Figure G-1. River Bend Station Traffic Control Points
0 2 4 6 8 10 Miles
N S E W
West Feliciana
East Feliciana
Pointe Coupee
East Baton Rouge
West Baton Rouge
St. Francisville
Morganza
Slaughter
Zachary
Fordoche
6-01
2-02
2-01
1-01
1-03
1-02
1-04
1-05
8-01
7-02
7-01
10-01
10-02
12-01
9-01
13-02
13-01
14-01
14-02
19-01
16-01
17-01
17-02
18-03
18-04
18-05
18-01
18-02
19-09
19-10
19-11
19-12
19-15
Legend
RBS
TCP
PAS Boundary
2, 5, & 10 Mile Rings
Parish Boundary

Table G-1. Summary of Traffic Control Points						
PAS	TCP ID	Town	Intersection Location	Priority	# of Guides	# of Cones
East Baton Rouge Parish						
13	13-01	Bonn	U.S. Highway 61 & LA Highway 64	1	2	9
13	13-02	Plains	E Plains Port Hudson Rd & LA Highway 964	2	1	6
14	14-01	Port Hudson	U.S. Highway 61 & Plains Port Hudson Rd	2	2	9
Shadow	19-01	Zachary	LA Highway 964 & LA Highway 64	2	3	18
14	14-02	Port Hudson	U.S. Highway 61 & Flanacher Rd	3	2	9
Total Manpower/Equipment for East Baton Rouge Parish:					**10**	**51**
East Feliciana Parish						
10	10-01	Jackson	LA Highway 951/68 & LA Highway 10	1	2	6
8	8-01	Delombre	U.S. Highway 61 & LA Highway 964	2	1	6
9	9-01	Port Hudson	U.S. Highway 61 & LA Highway 68	2	1	6
12	12-01	Lindsay	LA Highway 964 & LA Highway 68	2	1	6
10	10-02	Jackson	LA Highway 10 & LA Highway 952	3	1	6
Total Manpower/Equipment for East Feliciana Parish:					**6**	**30**
Pointe Coupee Parish						
17	17-01	Hermitage	LA Highway 415 & LA Highway 414	2	1	3
17	17-02	Hermitage	LA Highway 415 & LA Highway 416	2	1	3
18	18-01	New Roads	LA Highway 1 & LA Highway 415	2	1	3
18	18-02	New Roads	LA Highway 1 & LA Highway 3131	2	1	3
18	18-04	New Roads	LA Highway 1/10 & LA Highway 3131	2	1	6
18	18-05	New Roads	LA Highway 1 & LA Highway 10	2	1	3
Shadow	19-09	Oscar	LA Highway 1 & LA Highway 978	2	1	3
Shadow	19-10	Knapp	LA Highway 1 & LA Highway 416	2	1	3
Shadow	19-11	Lakeland	LA Highway 413 & LA Highway 414	2	1	6
16	16-01	Waterloo	LA Highway 981 & LA Highway 415	3	1	3
18	18-03	Pointe Coupee	LA Highway 10 & LA Highway 420	3	2	6
Shadow	19-12	Lakeland	LA Highway 416 & LA Highway 413	3	1	6
Shadow	19-15	Torbert	LA Highway 978 & LA Highway 979	3	1	9
Total Manpower/Equipment for Pointe Coupee Parish:					**14**	**57**
West Feliciana Parish						
2	2-01	St. Francisville	U.S. Highway 61 & LA Highway 10	1	2	18
1	1-02	Starhill	U.S. Highway 61 & River Bend Power Station Rd	2	1	3
1	1-03	St. Francisville	U.S. Highway 61 & LA Highway 965	2	2	9
1	1-04	Starhill	U.S. Highway 61 & LA Highway 966	2	2	6
6	6-01	St. Francisville	U.S. Highway 61 & Bains Rd	2	1	3
7	7-01	Jackson	LA Highway 965 & LA Highway 10	2	1	6
7	7-02	Jackson	LA Highway 421 & LA Highway 10	2	1	3
1	1-01	St. Francisville	U.S. Highway 61 & LA Highway 3057	3	1	6
1	1-05	Starhill	U.S. Highway 61 & Fo kes Rd	3	1	9
2	2-02	St. Francisville	U.S. Highway 61 & Commerce St (LA Highway 3057)	3	1	6
Total Manpower/Equipment for West Feliciana Parish:					**13**	**69**
TOTAL Manpower/Equipment FOR ENTIRE EPZ:					**43**	**207**

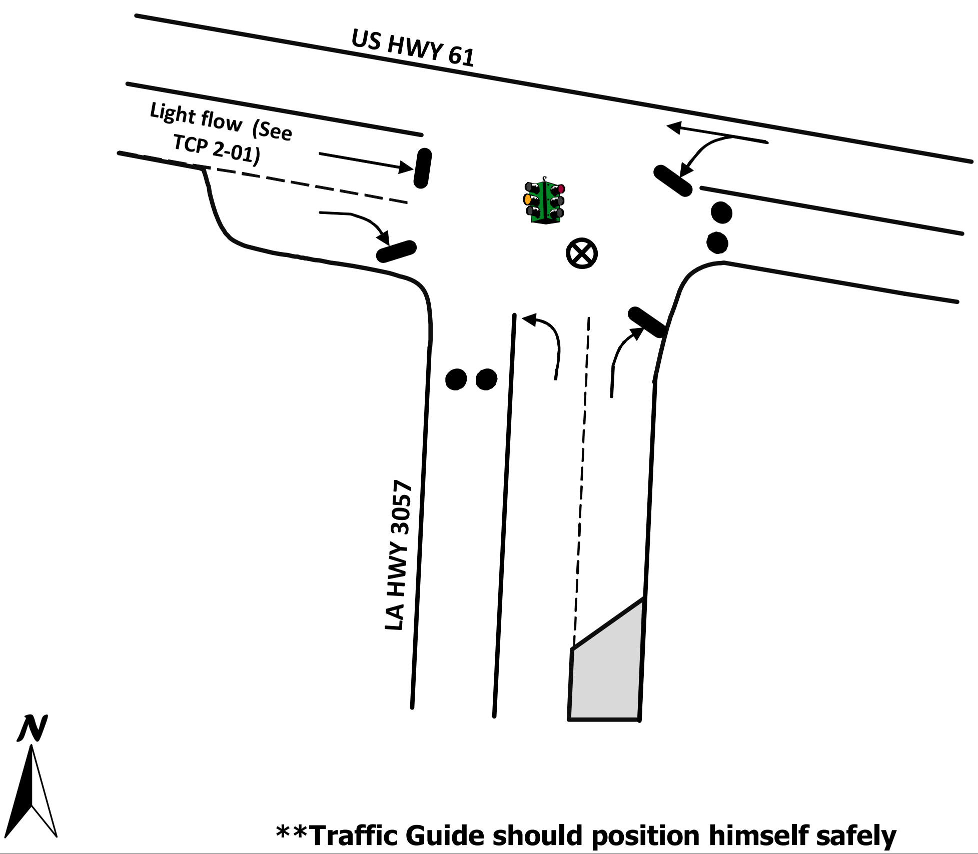
TCP

TOWN: ST. FRANCISVILLE

LOCATION: US HWY 61 & LA HWY 3057

TCP ID: 1-01

PAS: 1



KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

2 ft

3 ft

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Discourage southbound movement on LA Hwy 3057.
2. Discourage southbound movement on US Hwy 61.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
6 Traffic Cones

LOCATION PRIORITY

3

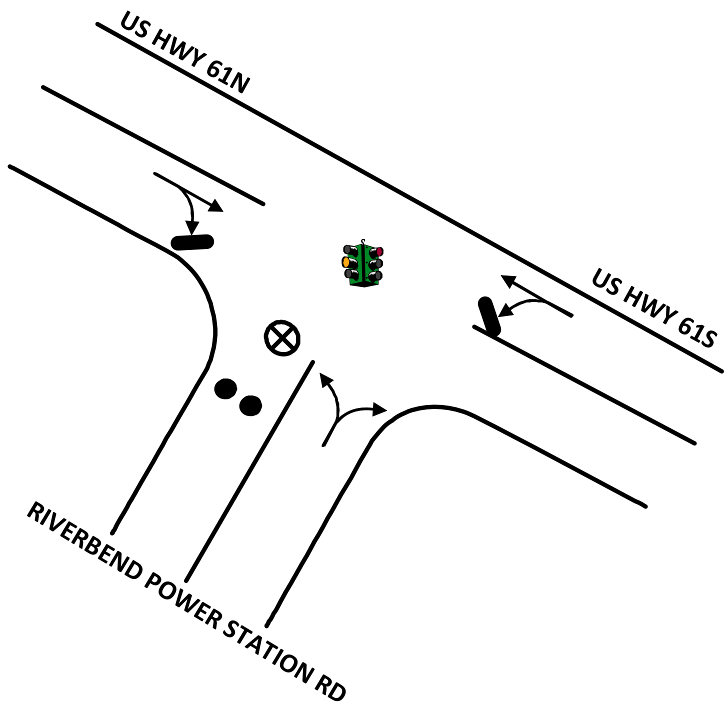
TCP

TOWN: STARHILL

LOCATION: US HWY 61 & RIVERBEND POWER STATION RD

TCP ID: 1-02

PAS: 1



****Traffic Guide should position himself safely**

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Facilitate the flow of traffic from RBS.
2. Discourage access to RBS for all non-emergency vehicles.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
3 Traffic Cones

LOCATION PRIORITY

2

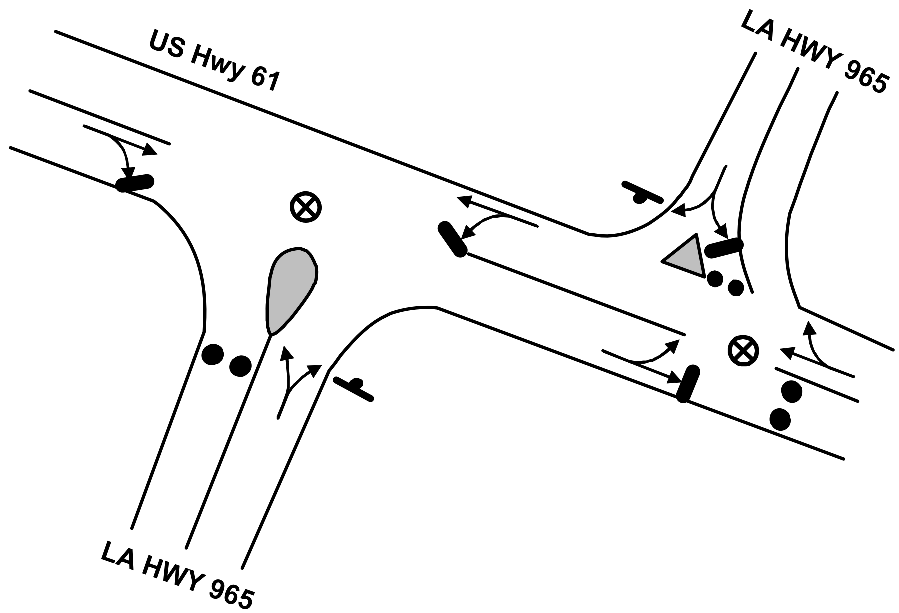
TCP

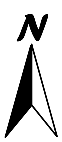
TOWN: ST. FRANCISVILLE

LOCATION: US HWY 61 & LA HWY 965

TCP ID: 1-03

PAS: 1





****Traffic Guide should position himself safely**

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Discourage southbound movement on US Hwy 61.
2. Discourage southbound movement on LA Hwy 965.

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)
9 Traffic Cones

LOCATION PRIORITY

2

TCP

TOWN: STARHILL

LOCATION: US HWY 61 & LA HWY 966

TCP ID: 1-04

PAS: 1

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

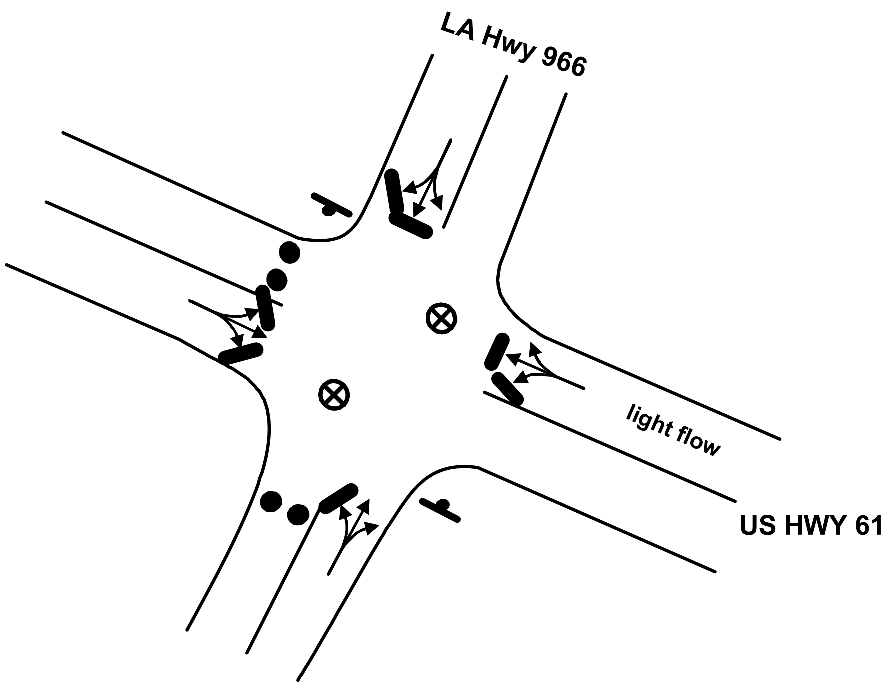
2 PER LANE (LOCAL ROADS AND RAMPS)

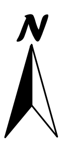
4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft





****Traffic Guide should position himself safely**

ACTIONS TO BE TAKEN

1. Discourage southbound movement on LA Hwy 966.
2. Discourage northbound movement on US Hwy 61.
3. Discourage left turn from US Hwy 61 southbound.

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)

6 Traffic Cones

LOCATION PRIORITY

2

TCP

TOWN: STARHILL

LOCATION: US HWY 61 & FOLKES RD

TCP ID: 1-05

ZONE: 1

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

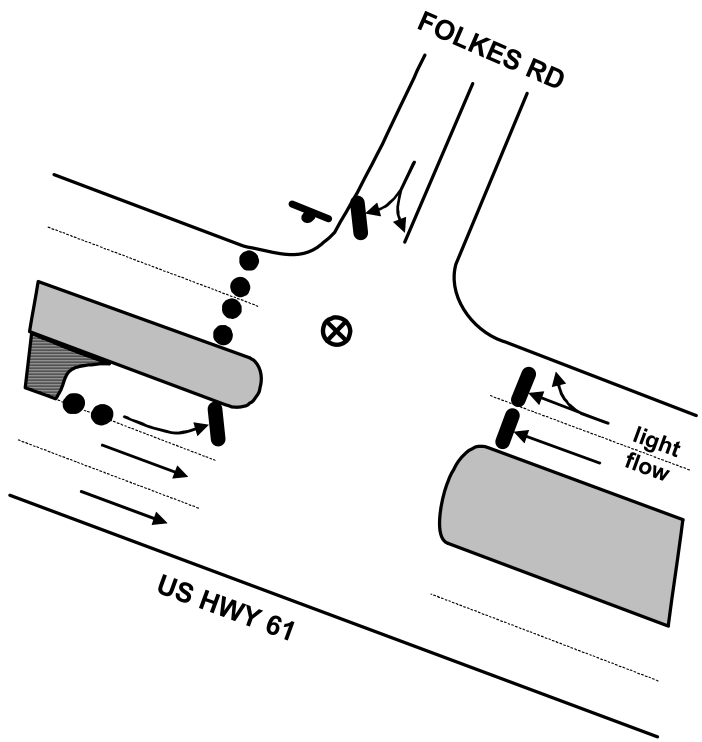
2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft



ACTIONS TO BE TAKEN

1. Discourage northbound movement on US Hwy 61.
2. Discourage left turn from US Hwy 61 southbound.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
9 Traffic Cones

LOCATION PRIORITY

3

****Traffic Guide should position himself safely**

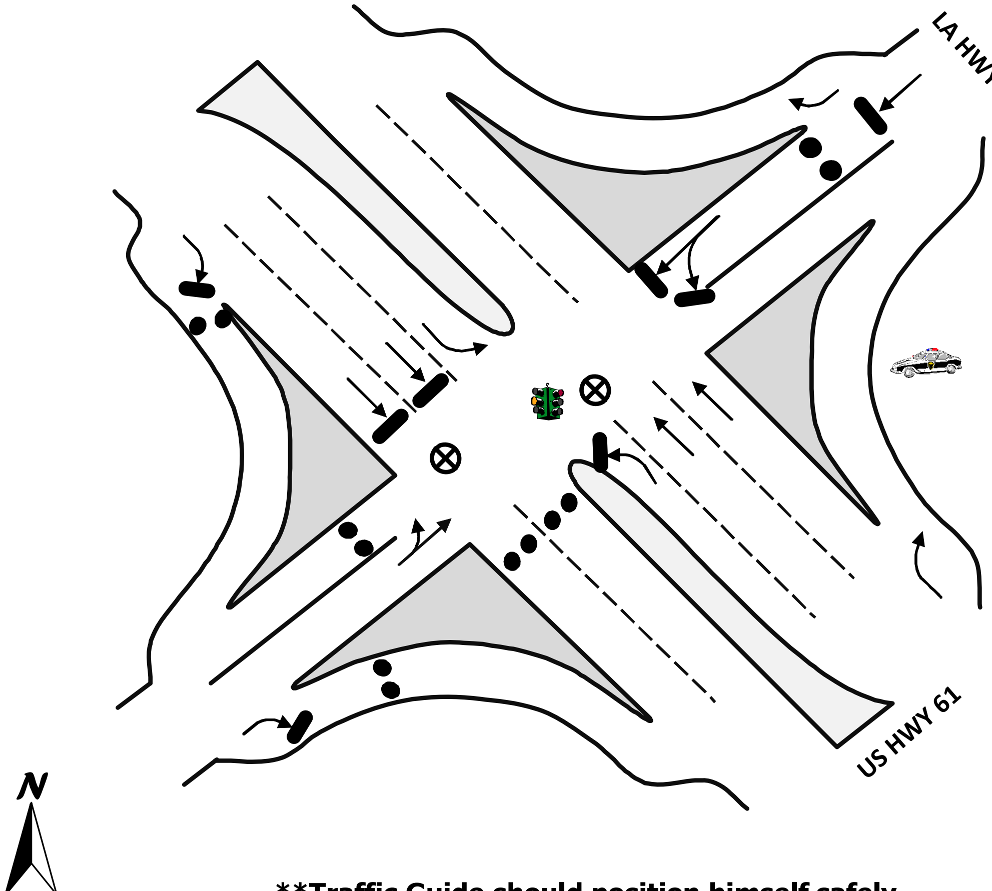
TCP

TOWN: ST. FRANCISVILLE

LOCATION: US HWY 61 & LA HWY 10

TCP ID: 2-01

PAS: 2



****Traffic Guide should position himself safely**

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

2 ft

3 ft

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Discourage westbound movement on LA Hwy 10.
2. Discourage southbound movement on US Hwy 61.

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)
18 Traffic Cones

LOCATION PRIORITY

1

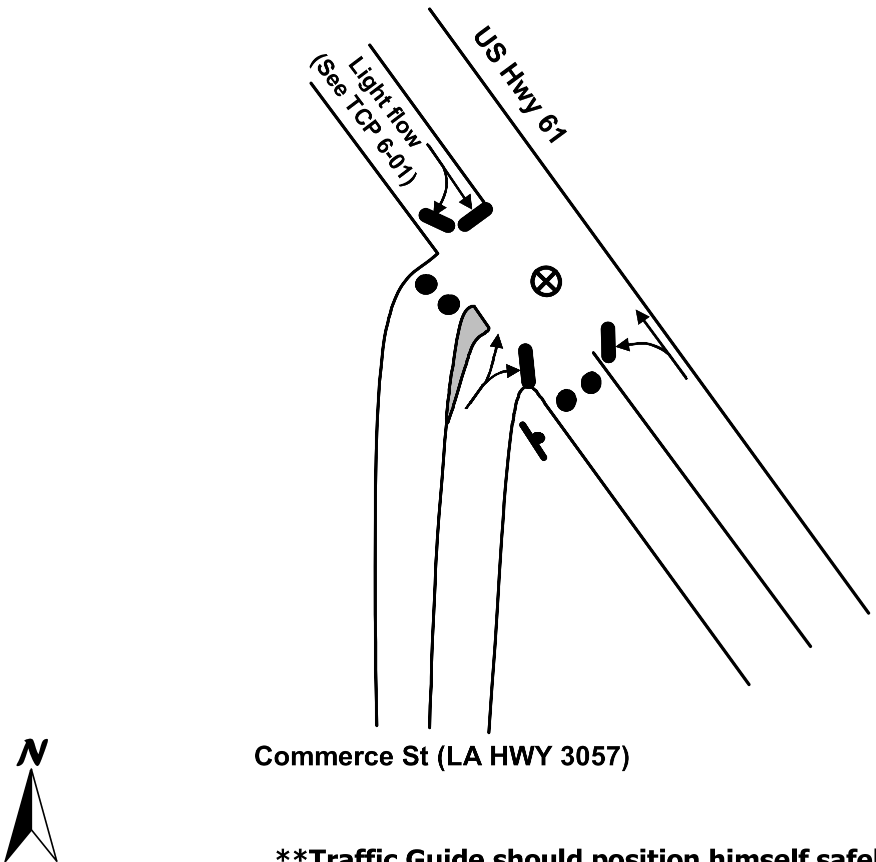
TCP

TOWN: ST. FRANCISVILLE

LOCATION: US HWY 61 & COMMERCE ST (LA HWY 3057)

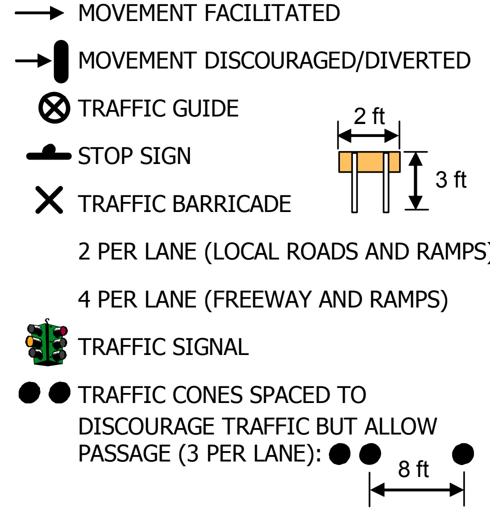
TCP ID: 2-02

PAS: 2



****Traffic Guide should position himself safely**

KEY



ACTIONS TO BE TAKEN

1. Discourage southbound movement on US Hwy 61.
2. Discourage southbound movement on Commerce St.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
6 Traffic Cones

LOCATION PRIORITY

3

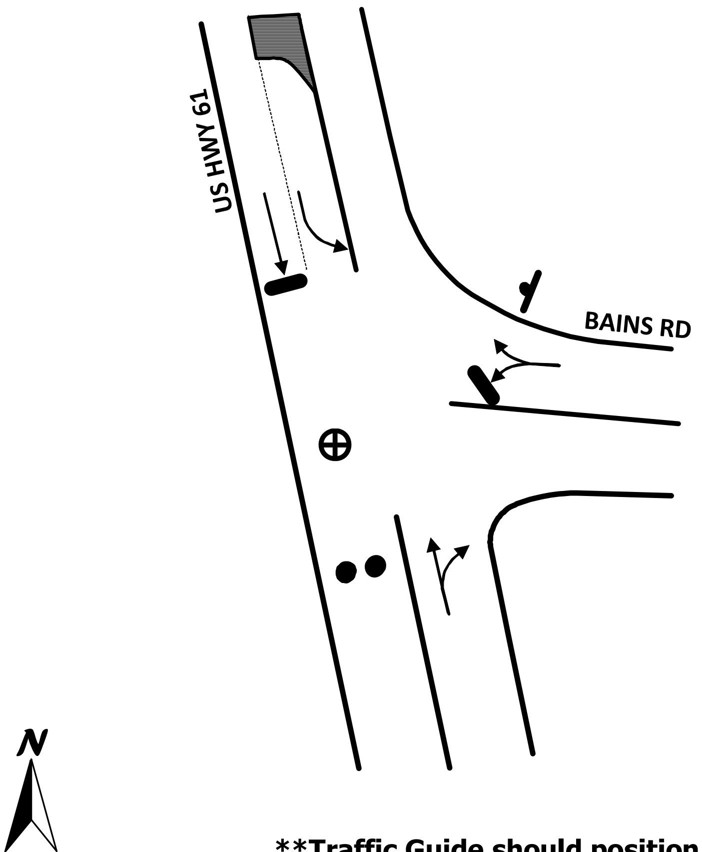
TCP

TOWN: ST. FRANCISVILLE

LOCATION: US HWY 61 & BAINS RD

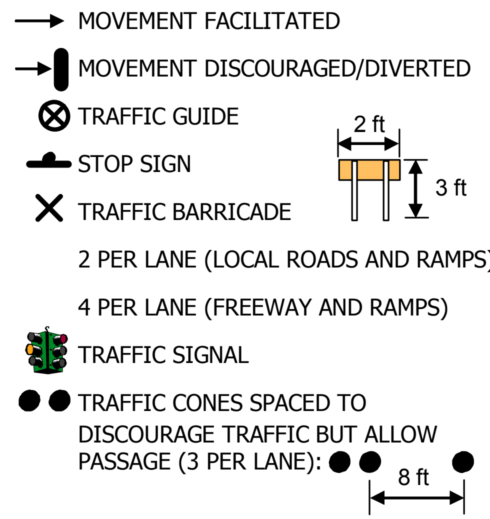
TCP ID: 6-01

ZONE: 6



****Traffic Guide should position himself safely**

KEY



ACTIONS TO BE TAKEN

1. Discourage southbound movement on US Hwy 61.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
3 Traffic Cones

LOCATION PRIORITY

2

TCP

TOWN: JACKSON

LOCATION: LA HWY 965 & LA HWY 10

TCP ID: 7-01

ZONE: 7

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

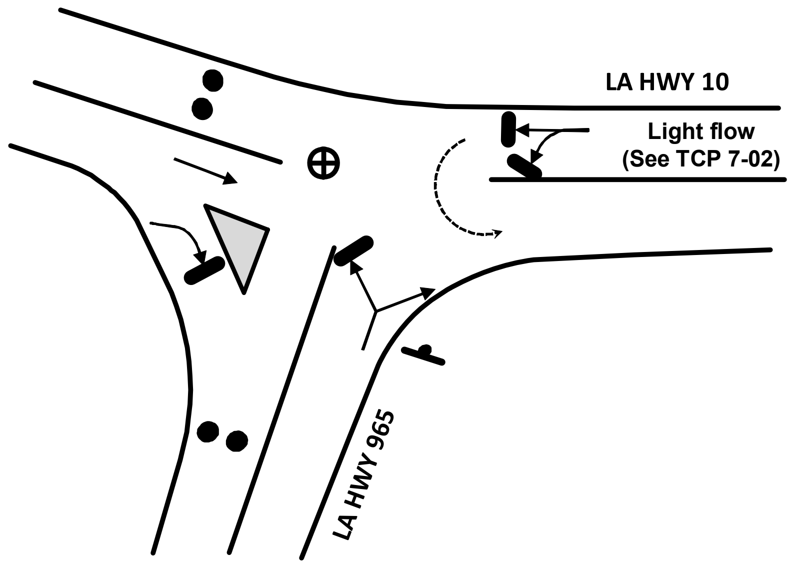
2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft



N

**Traffic Guide should position himself safely

ACTIONS TO BE TAKEN

1. Discourage westbound movement on LA Hwy 10.
2. Discourage southbound movement on LA Hwy 965.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)

6 Traffic Cones

LOCATION PRIORITY

2

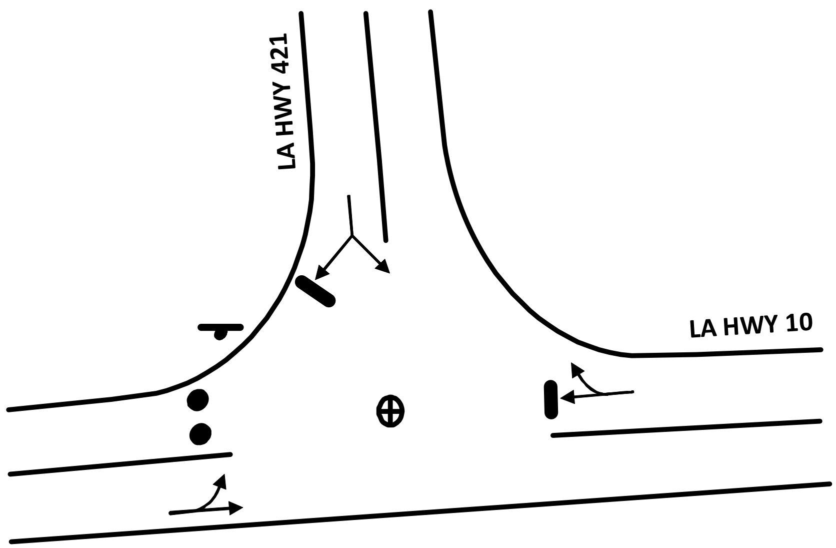
TCP

TOWN: JACKSON

LOCATION: LA HWY 421 & LA HWY 10

TCP ID: 7-02

PAS: 7



****Traffic Guide should position himself safely**

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Discourage westbound movement on LA Hwy 10.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
3 Traffic Cones

LOCATION PRIORITY

2

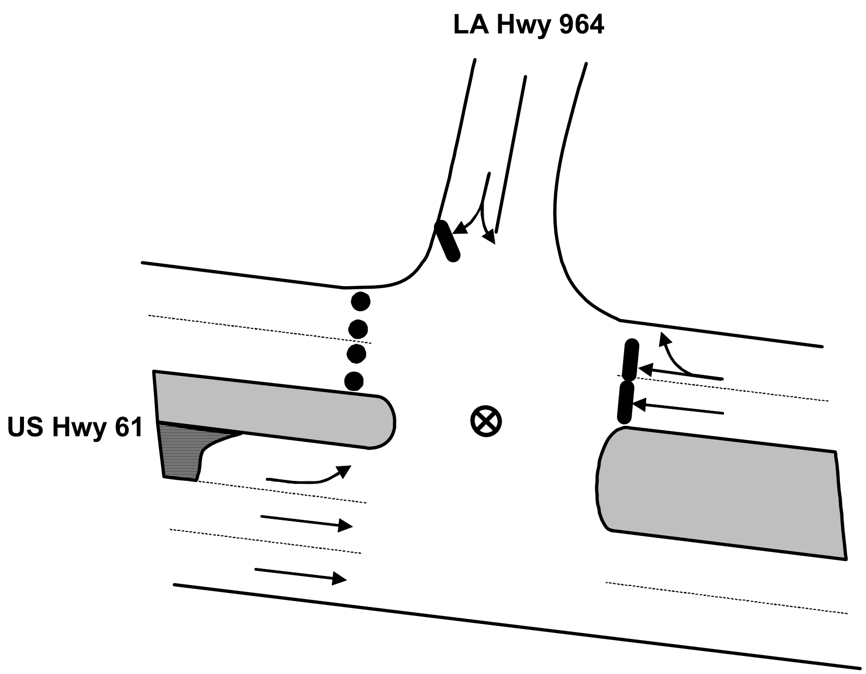
TCP

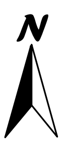
TOWN: DELOMBRE

LOCATION: US HWY 61 & LA HWY 964

TCP ID: 8-01

PAS: 8





****Traffic Guide should position himself safely**

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE
  - 2 ft
  - 3 ft
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Discourage northbound movement on US Hwy 61.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
6 Traffic Cones

LOCATION PRIORITY

2

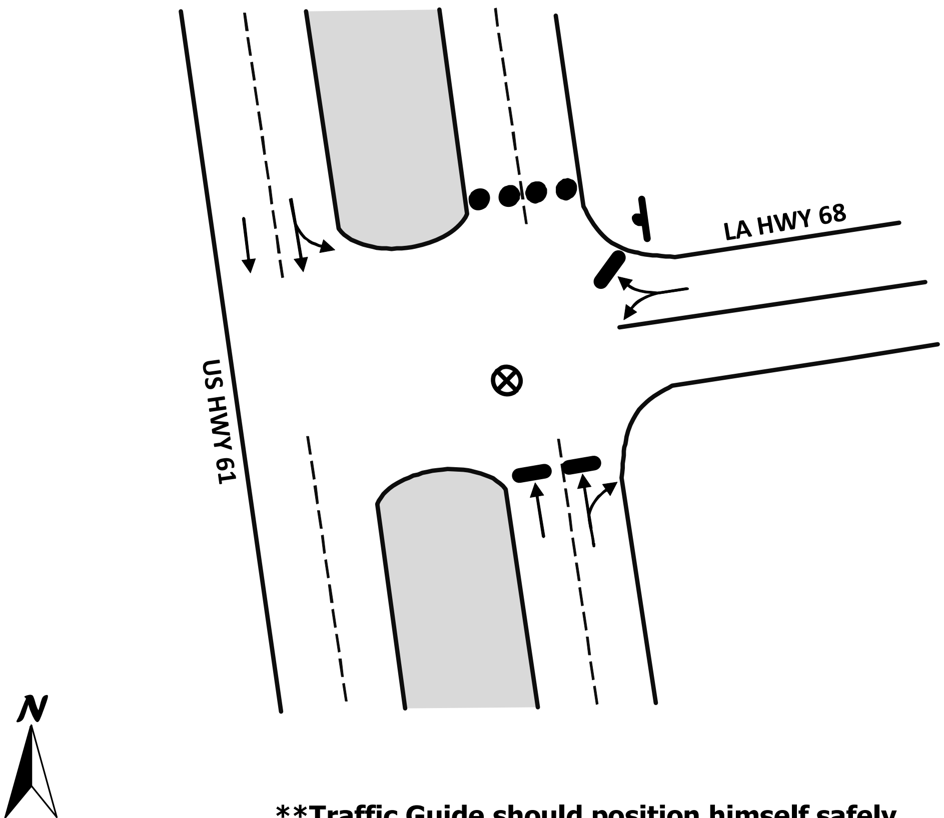
TCP

TOWN: PORT HUDSON

LOCATION: US HWY 61 & LA HWY 68

TCP ID: 9-01

PAS: 9



**Traffic Guide should position himself safely

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

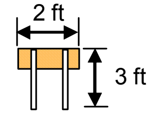
TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

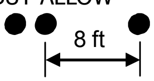
2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)



TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):



ACTIONS TO BE TAKEN

1. Discourage northbound movement on US Hwy 61.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
6 Traffic Cones

LOCATION PRIORITY

2

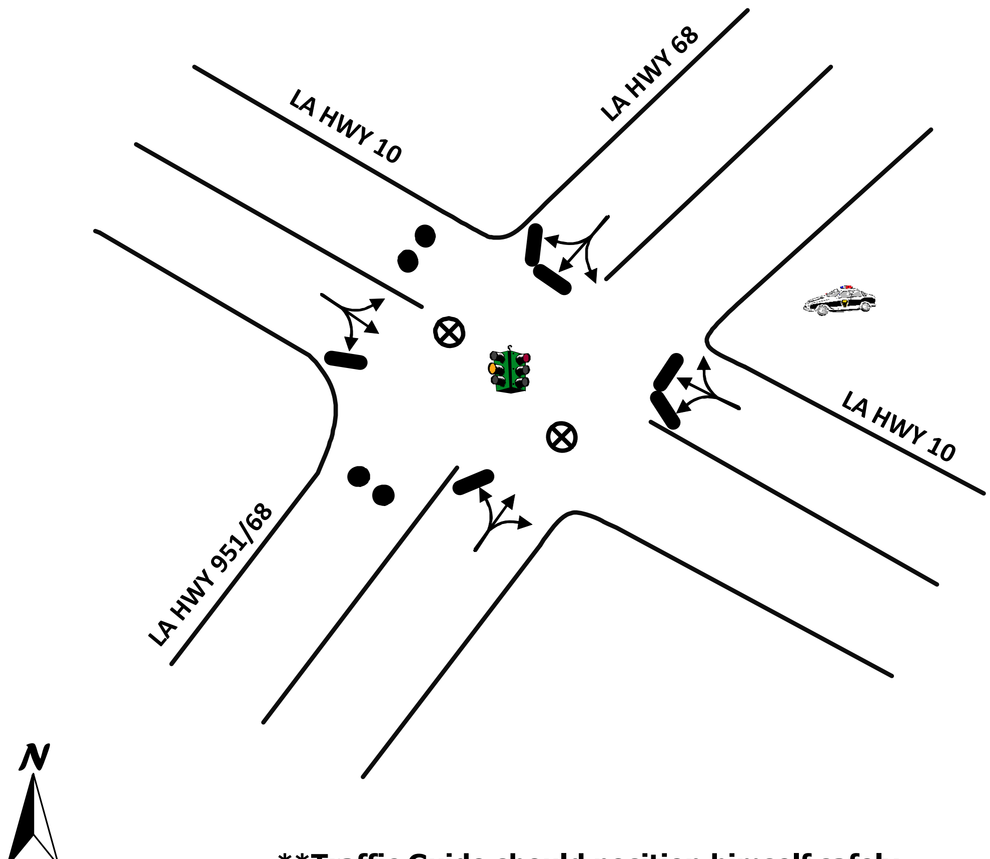
TCP

TOWN: JACKSON

LOCATION: LA HWY 951/68 & LA HWY 10

TCP ID: 10-01

PAS: 10



****Traffic Guide should position himself safely**

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Discourage westbound movement on LA Hwy 10.
2. Discourage southbound movement on LA Hwy 951/68.

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)
6 Traffic Cones

LOCATION PRIORITY

1

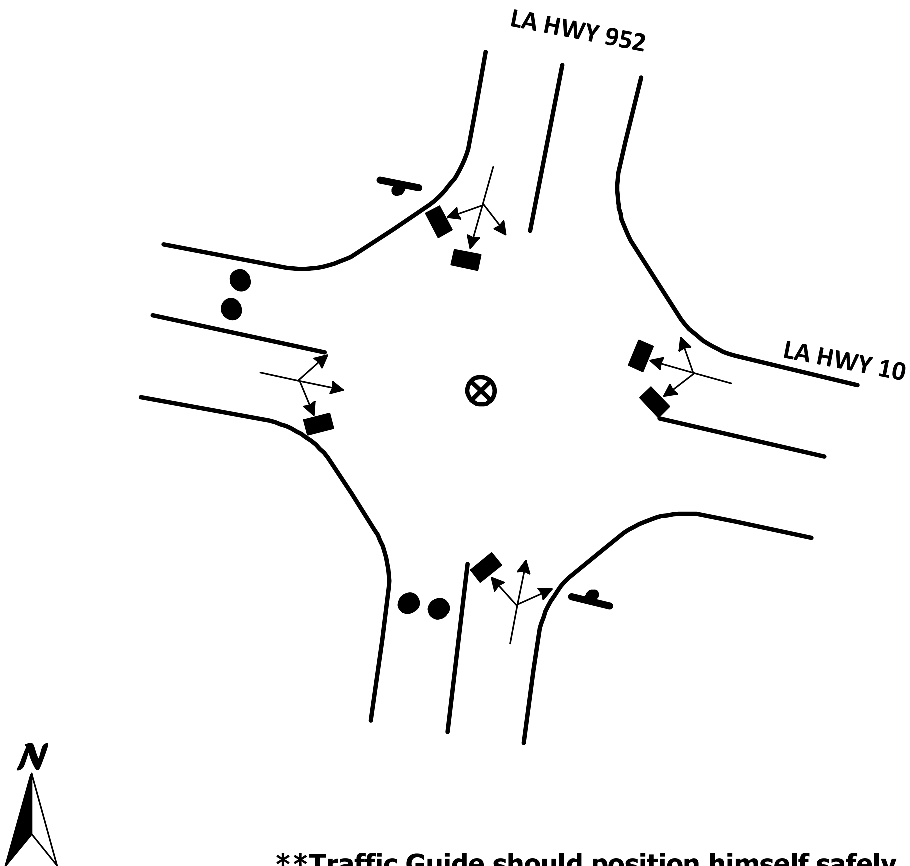
TCP

TOWN: JACKSON

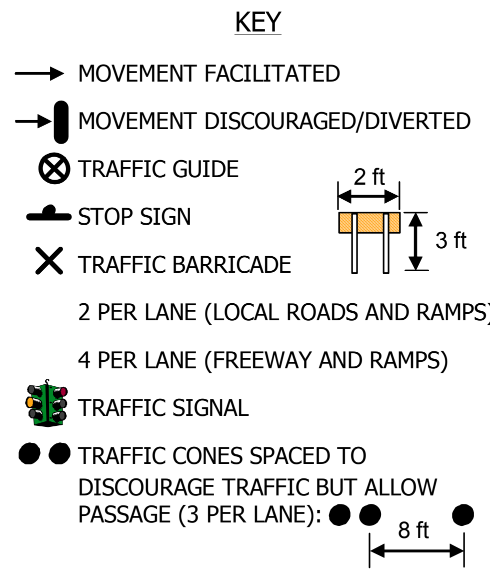
LOCATION: LA HWY10 & LA HWY 952

TCP ID: 10-02

PAS: 10



Traffic Guide should position himself safely



ACTIONS TO BE TAKEN

1. Discourage southbound movement on LA Hwy 952.
2. Discourage westbound movement on LA Hwy 10.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
6 Traffic Cones

LOCATION PRIORITY

3

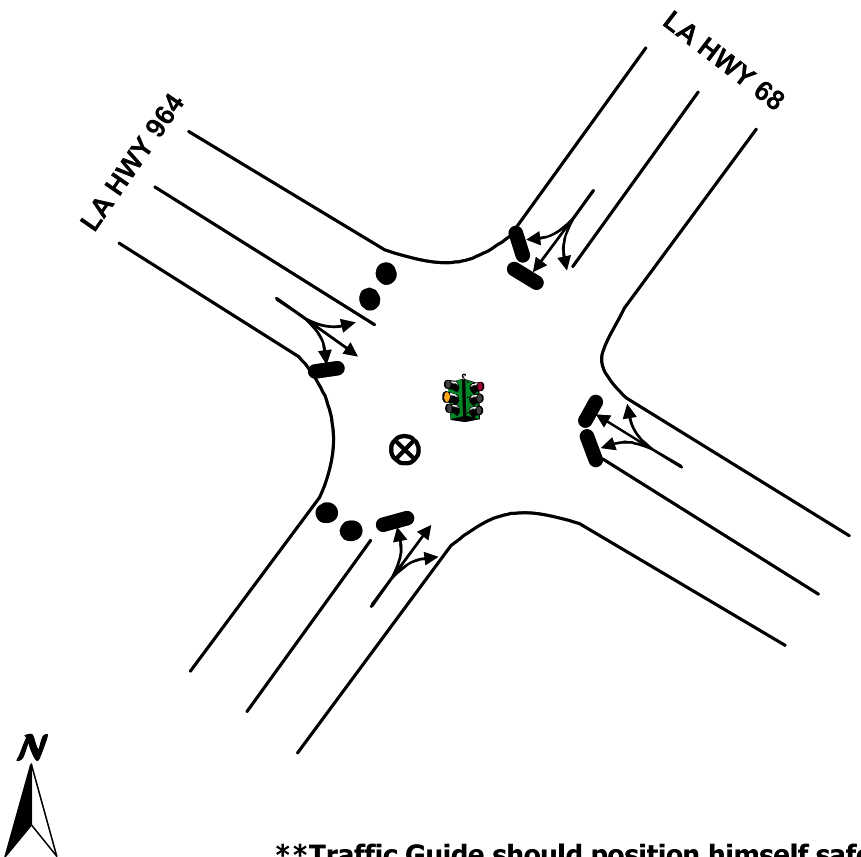
TCP

TOWN: LINDSAY

LOCATION: LA HWY 964 & LA HWY 68

TCP ID: 12-01

PAS: 12



****Traffic Guide should position himself safely**

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Discourage westbound movement on LA Hwy 964.
2. Discourage southbound movement on LA Hwy 68.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
6 Traffic Cones

LOCATION PRIORITY

2

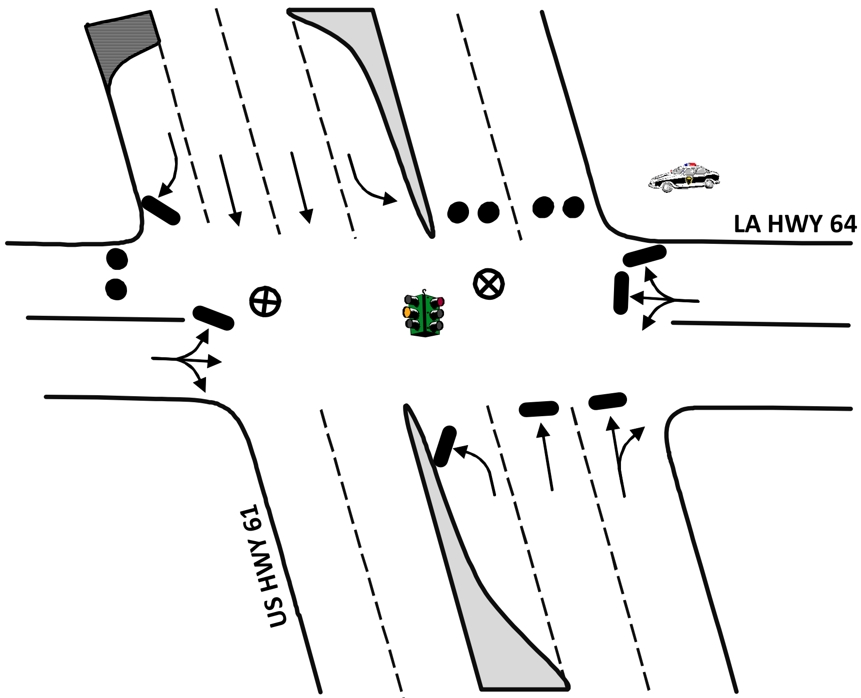
TCP

TOWN: BONN

LOCATION: US HWY 61 & LA HWY 64

TCP ID: 13-01

PAS: 13



****Traffic Guide should position himself safely**

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Discourage westbound movement on LA Hwy 64.
2. Discourage northbound movement on US Hwy 61.

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)

9 Traffic Cones

LOCATION PRIORITY

1

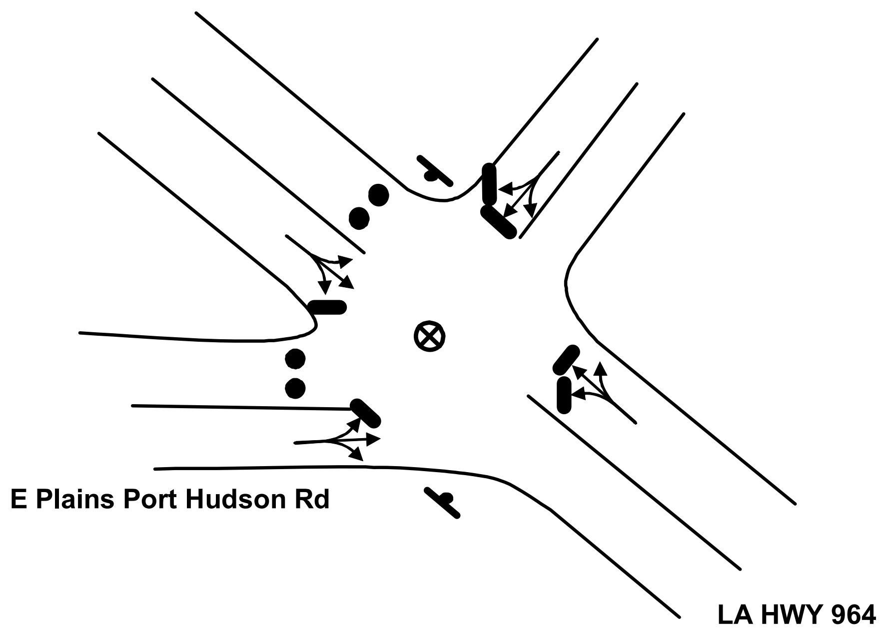
TCP

TOWN: PLAINS

LOCATION: E PLAINS PORT HUDSON RD & LA HWY 964

TCP ID: 13-02

PAS: 13



****Traffic Guide should position himself safely**

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Discourage westbound movement on E Plains Port Hudson Rd.
2. Discourage northbound movement on LA Hwy 964.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
6 Traffic Cones

LOCATION PRIORITY

2

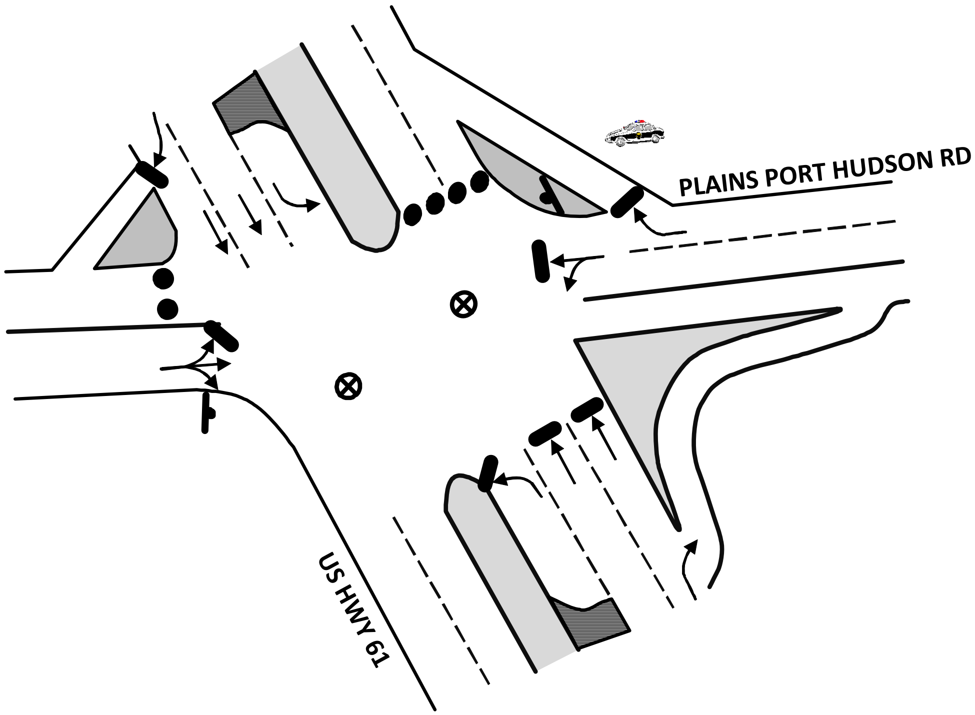
TCP

TOWN: PORT HUDSON

LOCATION: US HWY 61 & PLAINS PORT HUDSON RD

TCP ID: 14-01

PAS: 14



N

****Traffic Guide should position himself safely**

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Discourage westbound movement on Plains-Port Hudson Rd.
2. Discourage northbound movement on US Hwy 61.

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)
9 Traffic Cones

LOCATION PRIORITY

2

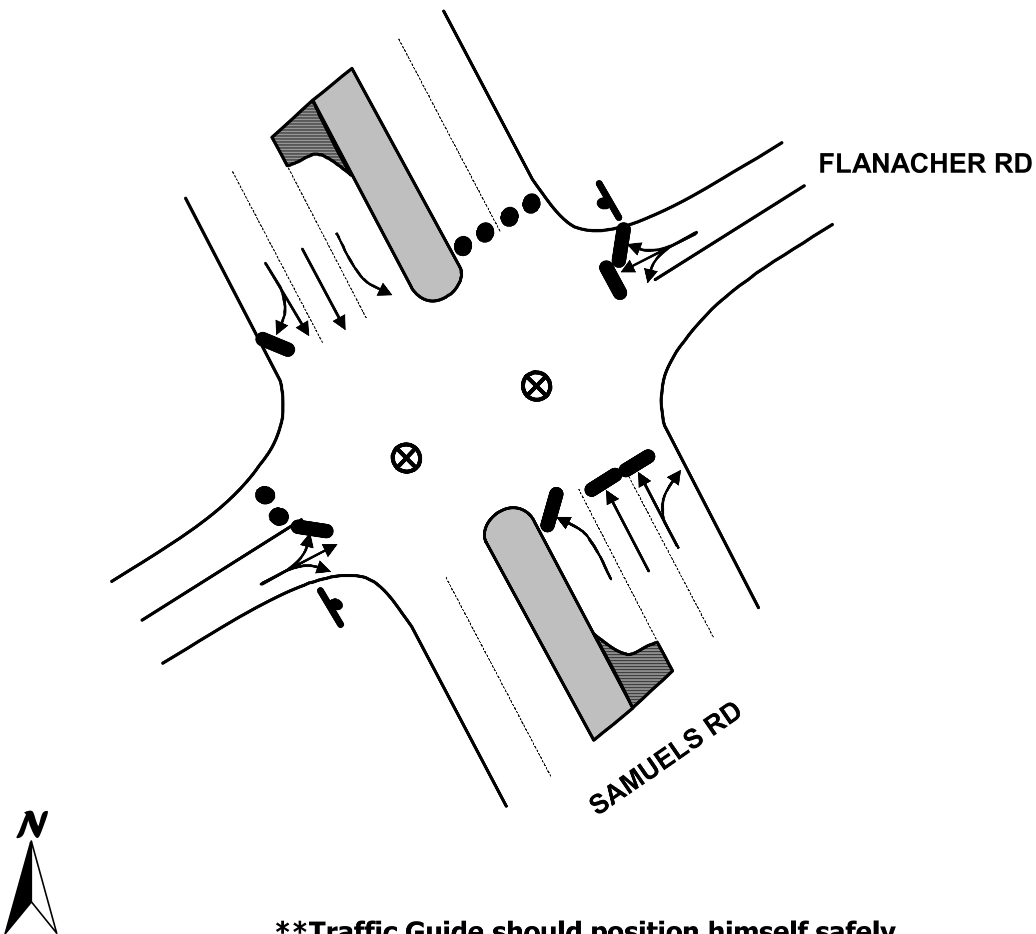
TCP

TOWN: PORT HUDSON

LOCATION: US HWY 61 & FLANACHER RD

TCP ID: 14-02

PAS: 14



**Traffic Guide should position himself safely

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Discourage northbound movement on US Hwy 61.
2. Discourage westbound movement on Flanacher Rd.

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)

9 Traffic Cones

LOCATION PRIORITY

3

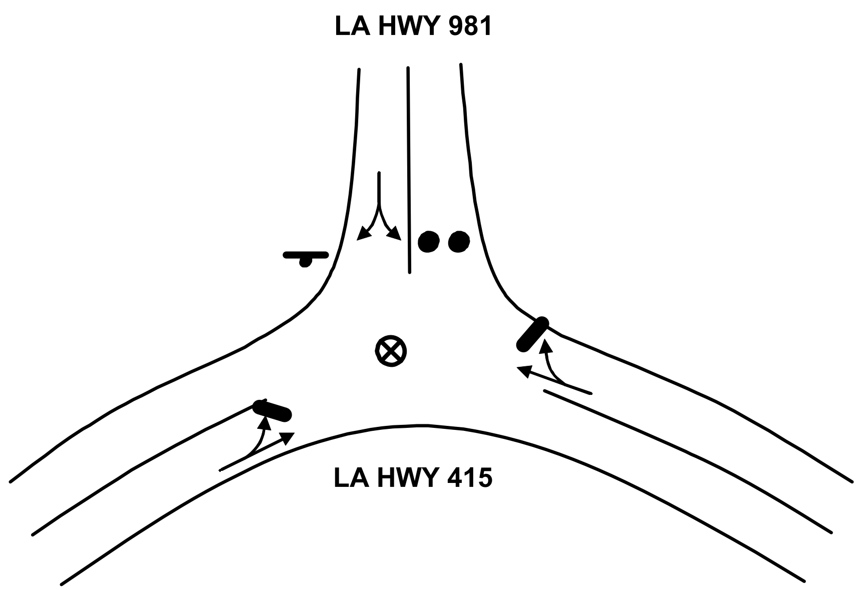
TCP

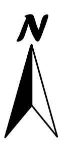
TOWN: WATERLOO

LOCATION: LA HWY 981 & LA HWY 415

TCP ID: 16-01

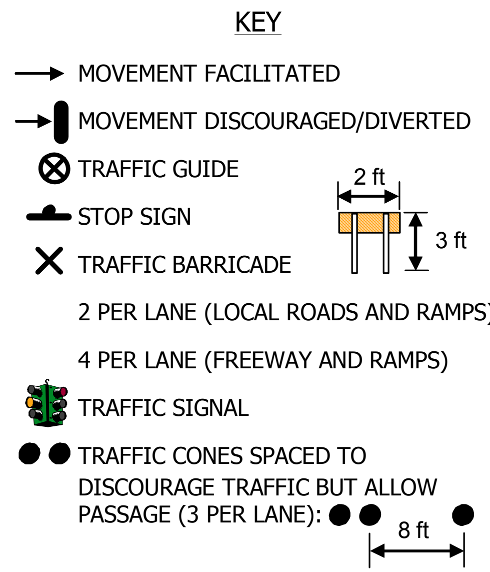
ZONE: 16





****Traffic Guide should position himself safely**

KEY



ACTIONS TO BE TAKEN

1. Discourage northbound movement on LA Hwy 981.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
3 Traffic Cones

LOCATION PRIORITY

3

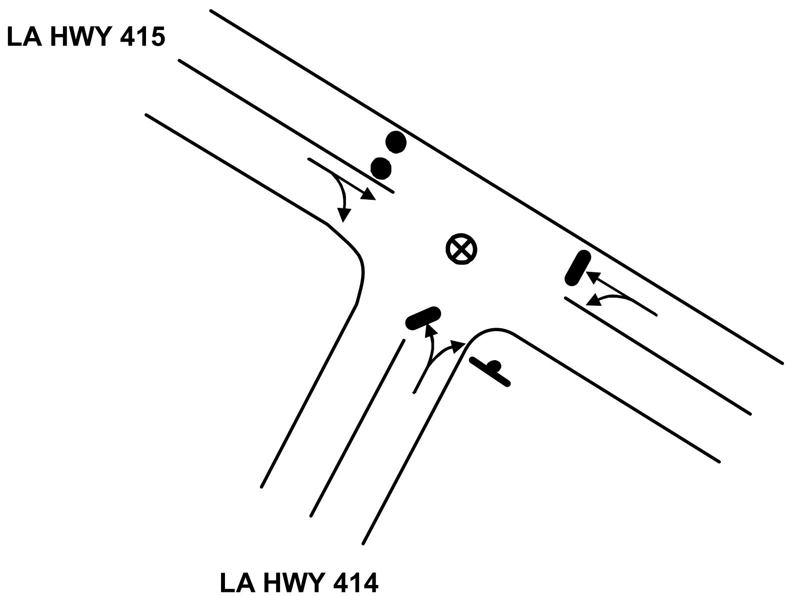
TCP

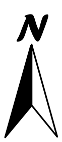
TOWN: HERMITAGE

LOCATION: LA HWY 415 & LA HWY 414

TCP ID: 17-01

PAS: 17





****Traffic Guide should position himself safely**

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Discourage westbound movement on LA HWY 415.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
3 Traffic Cones

LOCATION PRIORITY

2

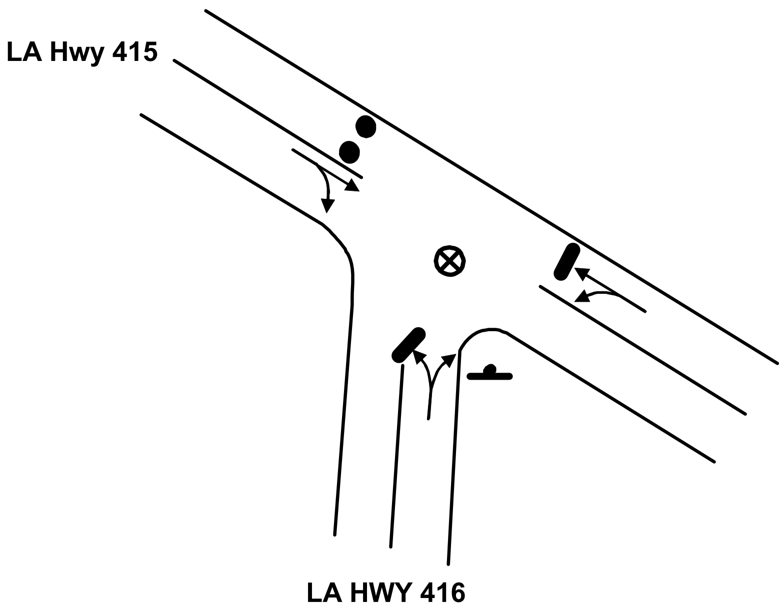
TCP

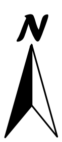
TOWN: HERMITAGE

LOCATION: LA HWY 415 & LA HWY 416

TCP ID: 17-02

PAS: 17





****Traffic Guide should position himself safely**

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Discourage westbound movement on LA HWY 415.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
3 Traffic Cones

LOCATION PRIORITY

2

TCP

TOWN: NEW ROADS

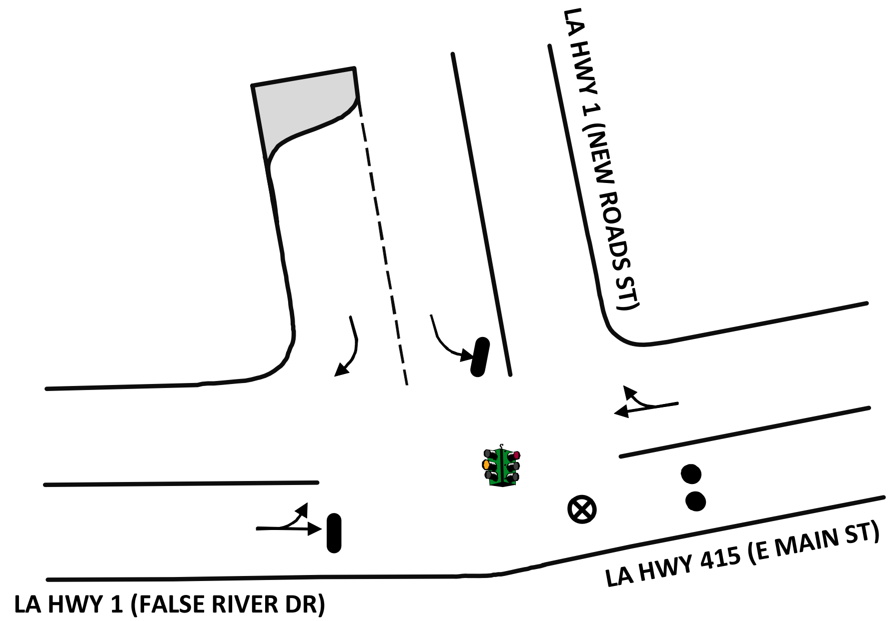
LOCATION: LA HWY 1 & LA HWY 415

TCP ID: 18-01

PAS: 18

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE 2 ft 3 ft
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft



****Traffic Guide should position himself safely**

ACTIONS TO BE TAKEN

1. Discourage eastbound movement on LA HWY 415.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
3 Traffic Cones

LOCATION PRIORITY

2

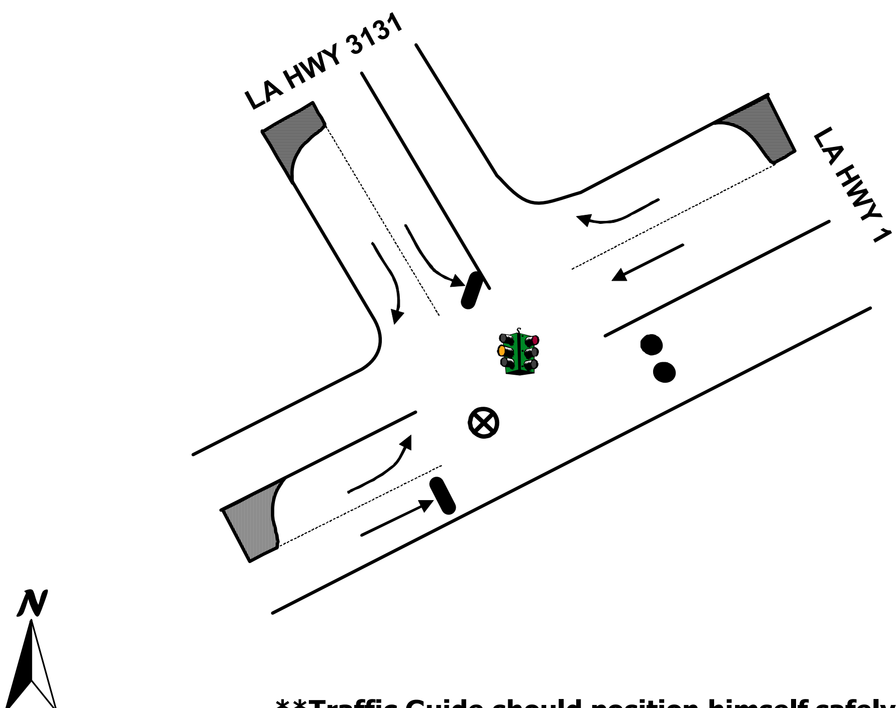
TCP

TOWN: NEW ROADS

LOCATION: LA HWY 1 & LA HWY 3131

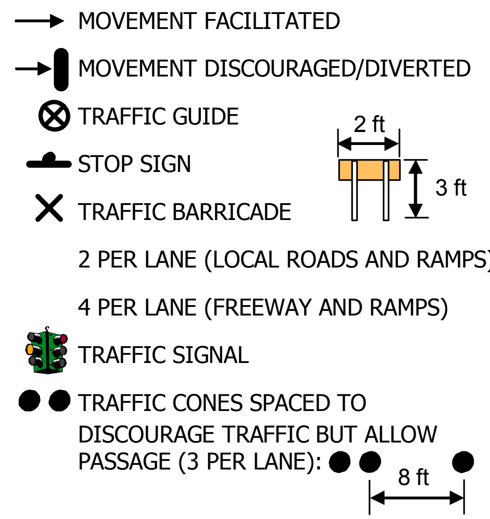
TCP ID: 18-02

PAS: 18



****Traffic Guide should position himself safely**

KEY



ACTIONS TO BE TAKEN

1. Discourage eastbound movement on LA HWY 1.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
3 Traffic Cones

LOCATION PRIORITY

2

TCP

TOWN: POINT COUPEE

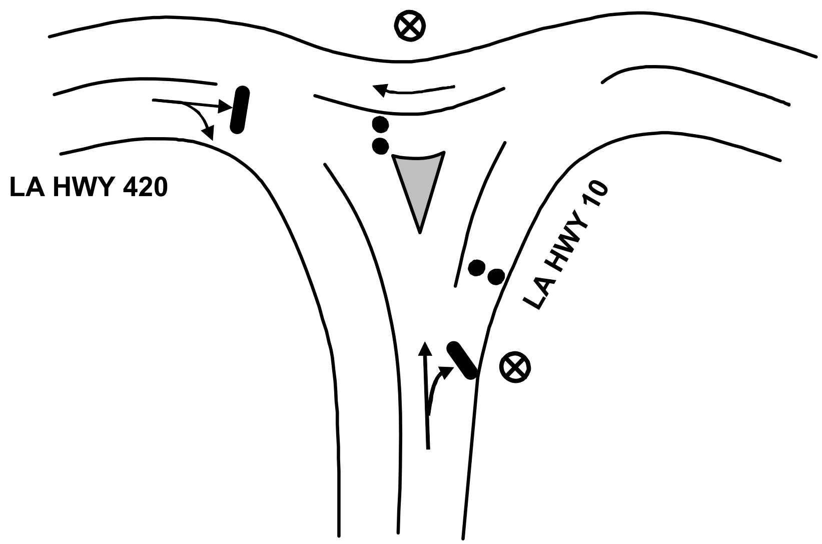
LOCATION: LA HWY 10 & LA HWY 420

TCP ID: 18-03

PAS: 18

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft × 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft



****Traffic Guide should position himself safely**

ACTIONS TO BE TAKEN

1. Discourage eastbound movement on LA HWY 10.

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)
6 Traffic Cones

LOCATION PRIORITY

3

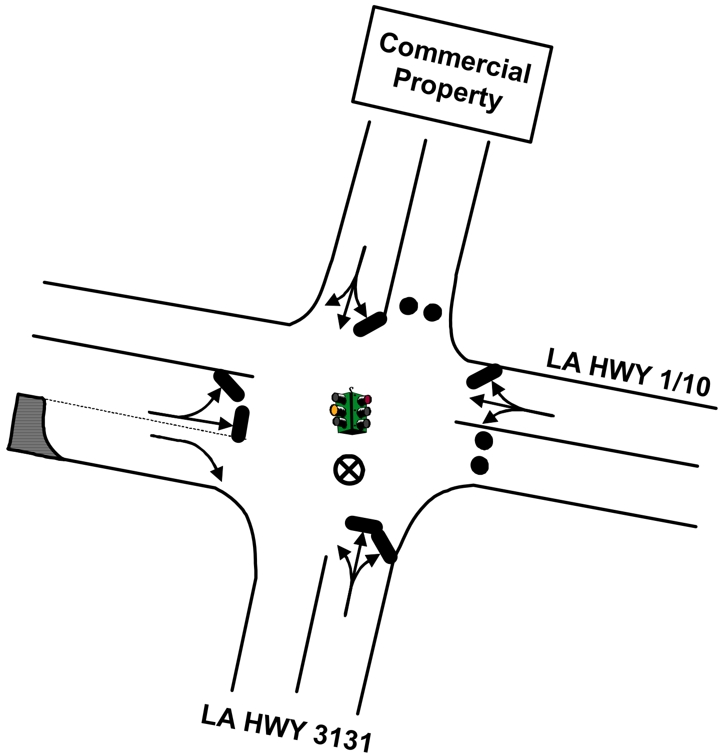
TCP

TOWN: NEW ROADS

LOCATION: LA HWY 1/10 & LA HWY 3131

TCP ID: 18-04

PAS: 18



N

****Traffic Guide should position himself safely**

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Discourage eastbound movement on LA Hwy 1/10.
2. Discourage entrance to the Commercial Property.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)

6 Traffic Cones

LOCATION PRIORITY

2

TCP

TOWN: NEW ROADS

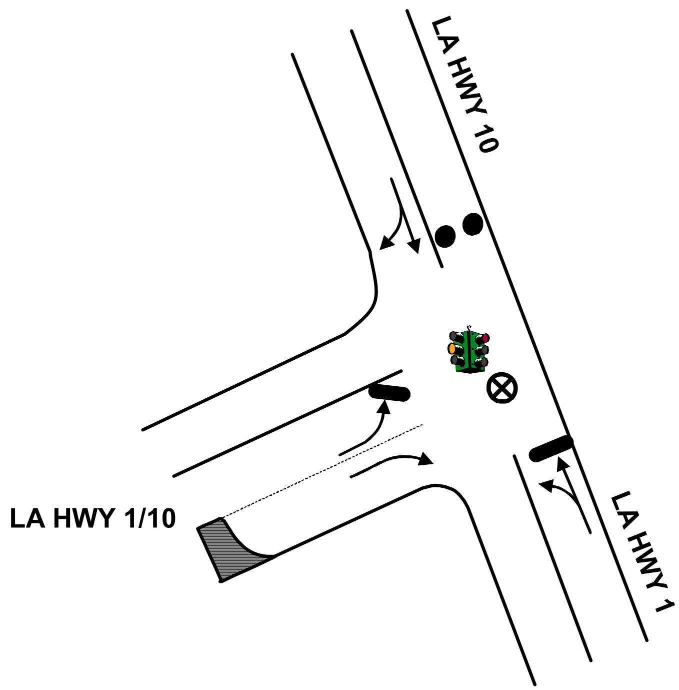
LOCATION: LA HWY 1 & LA HWY 10

TCP ID: 18-05

PAS: 18

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft × 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft



ACTIONS TO BE TAKEN

1. Discourage eastbound movement on LA Hwy 10.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
3 Traffic Cones

LOCATION PRIORITY

2

N

****Traffic Guide should position himself safely**

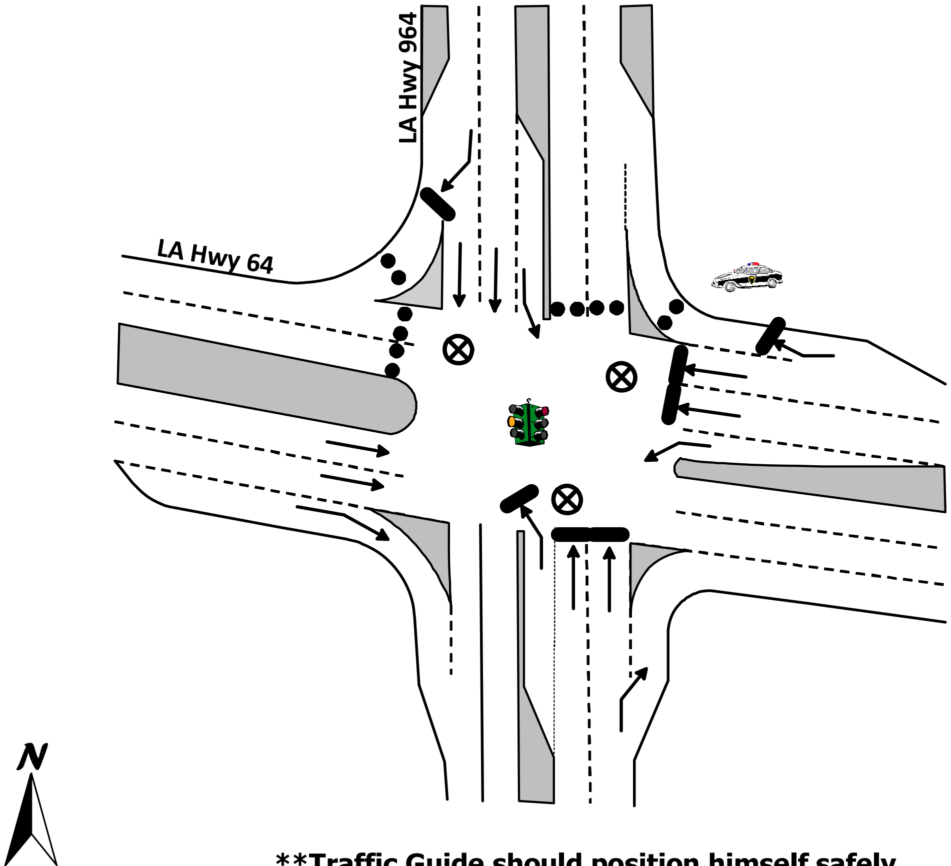
TCP

TOWN: ZACHARY

LOCATION: LA HWY 964 & LA HWY 64

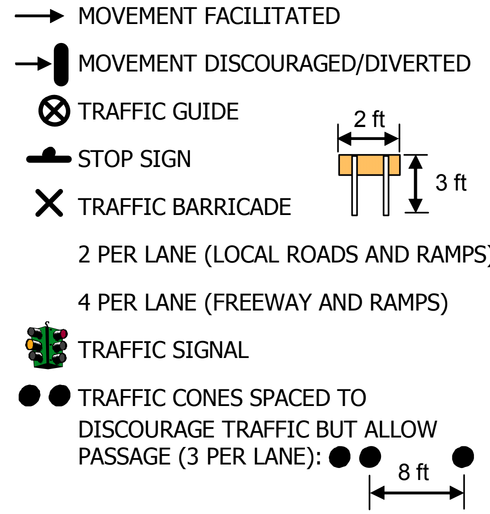
TCP ID: 19-01

PAS: SHADOW



**Traffic Guide should position himself safely

KEY



ACTIONS TO BE TAKEN

1. Discourage northbound movement on LA Hwy 964.
2. Discourage westbound movement on LA Hwy 64.

MANPOWER/EQUIPMENT ESTIMATE

3 Traffic Guide(s)
18 Traffic Cones

LOCATION PRIORITY

2

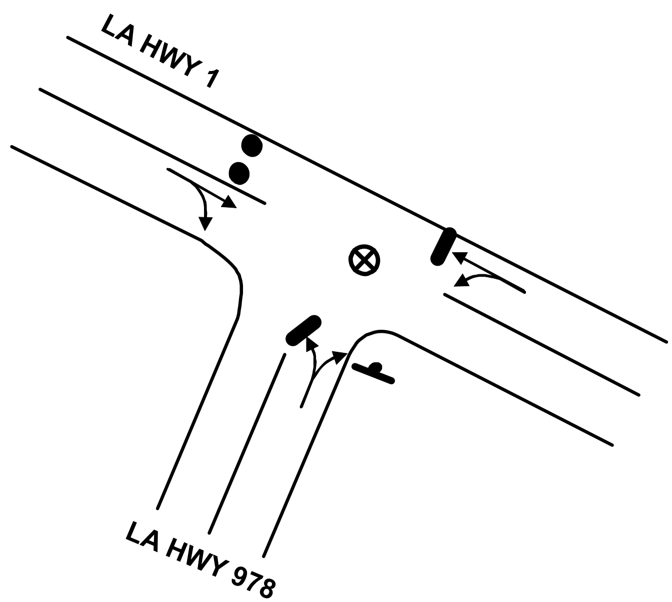
TCP

TOWN: OSCAR

LOCATION: LA HWY 1 & LA HWY 978

TCP ID: 19-09

PAS: SHADOW



KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Discourage northbound movement on LA HWY 1.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
3 Traffic Cones

LOCATION PRIORITY

2

****Traffic Guide should position himself safely**

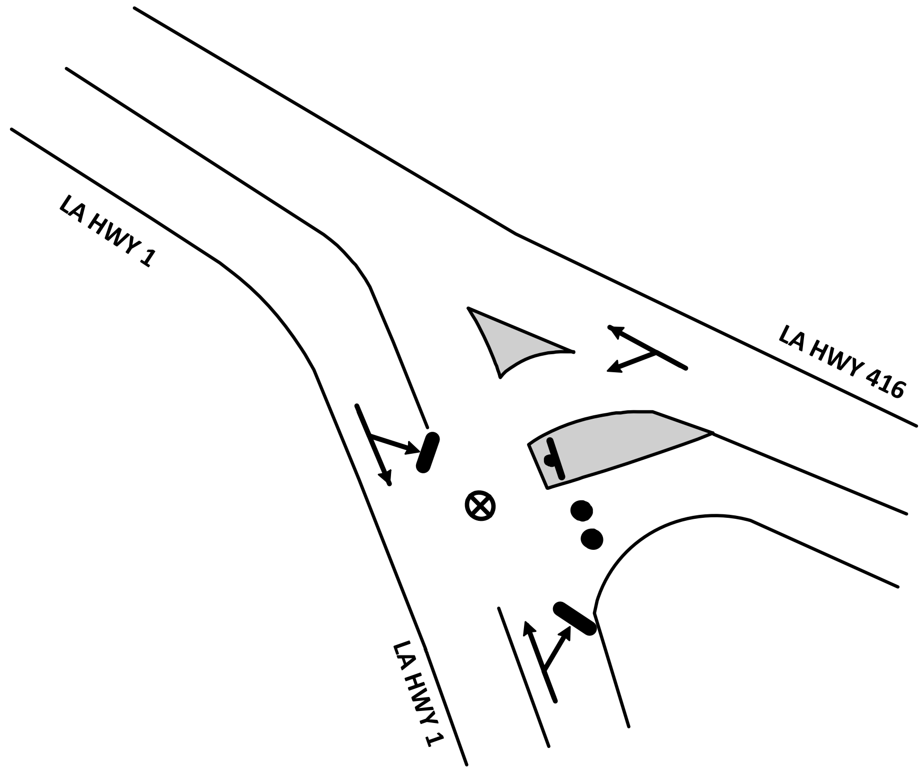
TCP

TOWN: KNAPP

LOCATION: LA HWY 1 & LA HWY 416

TCP ID: 19-10

PAS: SHADOW



N

****Traffic Guide should position himself safely**

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Discourage eastbound movement on LA Hwy 416.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
3 Traffic Cones

LOCATION PRIORITY

2

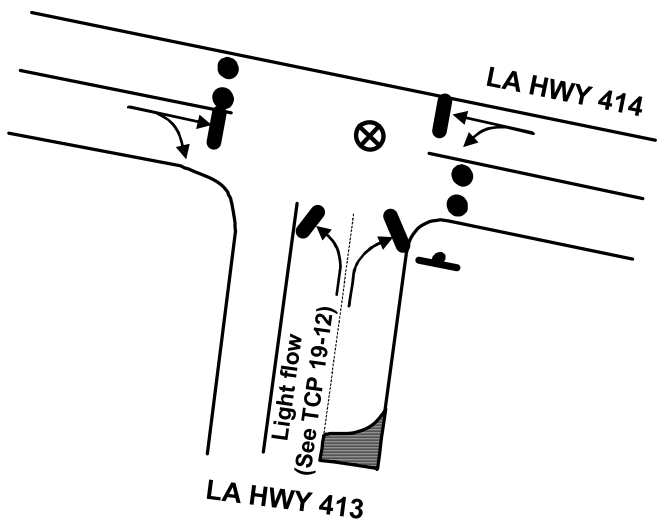
TCP

TOWN: LAKELAND

LOCATION: LA HWY 413 & LA HWY 414

TCP ID: 19-11

PAS: SHADOW



****Traffic Guide should position himself safely**

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Discourage eastbound and westbound movement on LA Hwy 414.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
6 Traffic Cones

LOCATION PRIORITY

2

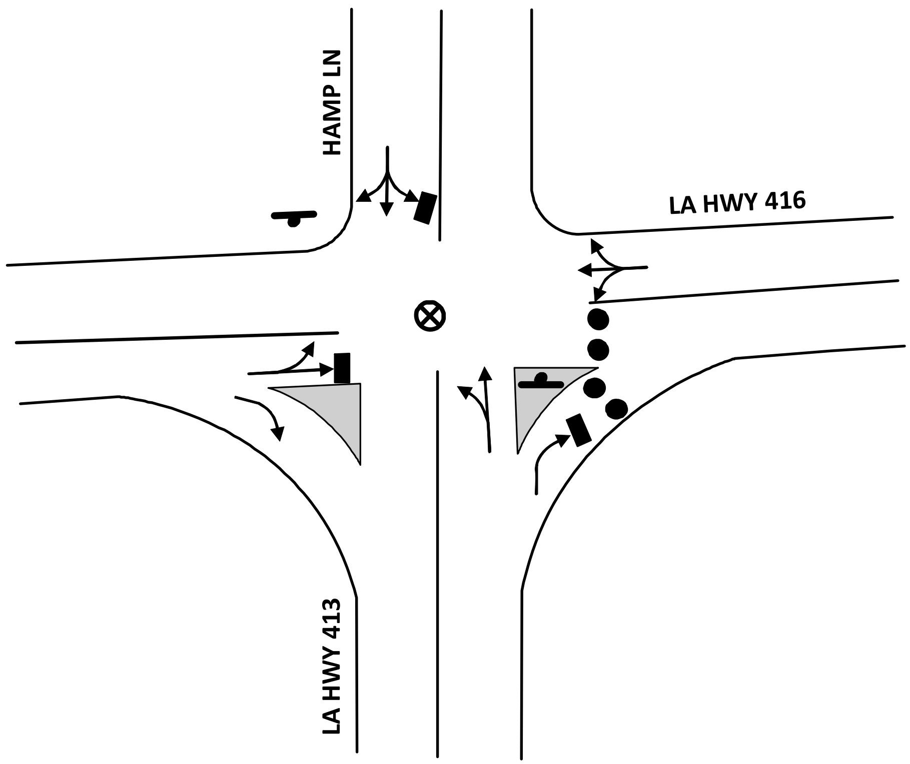
TCP

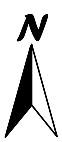
TOWN: LAKELAND

LOCATION: LA HWY 416 & LA HWY 413

TCP ID: 19-12

PAS: SHADOW





****Traffic Guide should position himself safely**

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Discourage eastbound movement on LA Hwy 416.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
6 Traffic Cones

LOCATION PRIORITY

3

TCP

TOWN: TORBERT

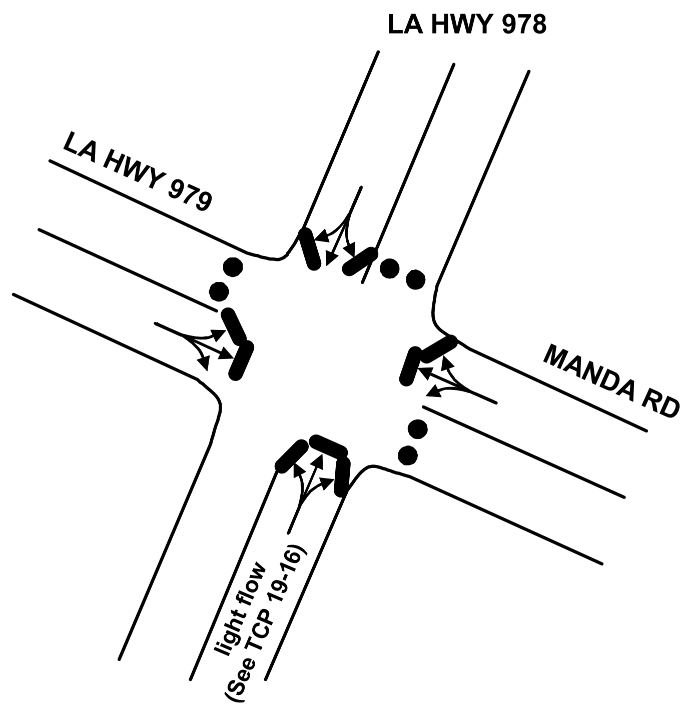
LOCATION: LA HWY 978 & LA HWY 979

TCP ID: 19-15

PAS: SHADOW

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft



****Traffic Guide should position himself safely**

ACTIONS TO BE TAKEN

1. Discourage northbound movement on LA Hwy 978.
2. Discourage westbound movement on LA Hwy 979.
3. Discourage eastbound movement on Manda Rd.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
9 Traffic Cones

LOCATION PRIORITY

3

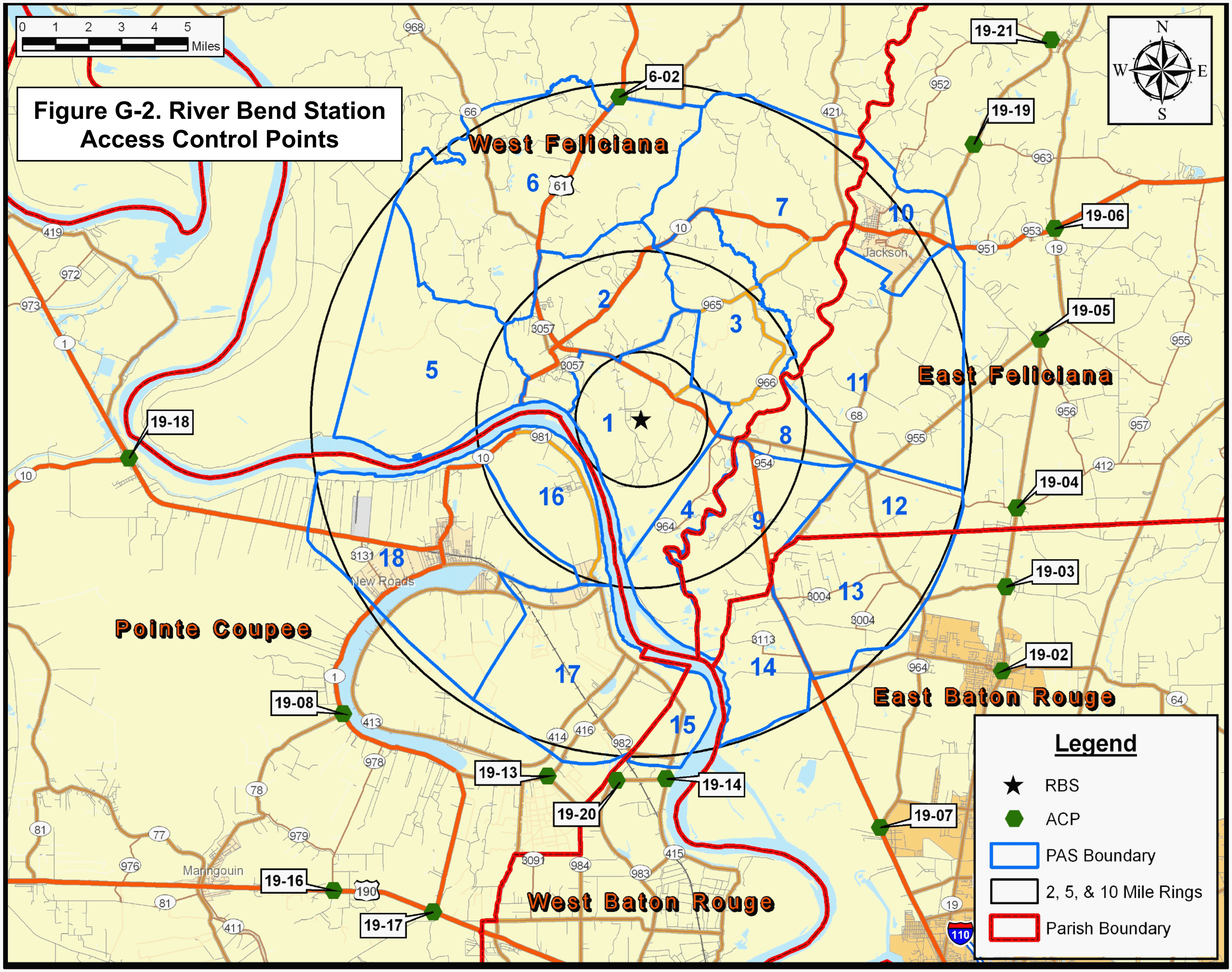


Figure G-2. River Bend Station
Access Control Points
0 1 2 3 4 5
Miles
West Feliciana
East Feliciana
Pointe Coupee
East Baton Rouge
West Baton Rouge
Jackson
New Roads
Maringouin
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
6-02
19-21
19-19
19-06
19-05
19-04
19-03
19-02
19-07
19-18
19-08
19-13
19-20
19-14
19-16
19-17
N
S
E
W
Legend
RBS
ACP
PAS Boundary
2, 5, & 10 Mile Rings
Parish Boundary

Table G-2. Summary of Access Control Points

PAS	ACP ID	Town	Intersection Location	Priority	# of Guides	# of Barricades
East Baton Rouge Parish						
Shadow	19-02	Zachary	LA Highway 19 & LA Highway 64/Main St	1	2	8
Shadow	19-07	Alsen	U.S. Highway 61 & LA Highway 964	1	2	6
Shadow	19-03	Zachary	LA Highway 19 & Port Hudson Pride Rd	2	1	2
Total Manpower/Equipment for East Baton Rouge Parish:					**5**	**16**
East Feliciana Parish						
Shadow	19-06	Battle	LA Highway 10 & LA Highway 19	1	2	4
Shadow	19-05	Ethel	LA Highway 19 & LA Highway 955	2	1	2
Shadow	19-21	Wilson	LA Highway 68 & LA Highway 952	2	1	2
Shadow	19-04	Slaughter	LA Highway 19 & LA Highway 412	3	1	2
Shadow	19-19	Jackson	LA Highway 68 & LA Highway 963	3	1	2
Total Manpower/Equipment for East Feliciana Parish:					**6**	**12**
Pointe Coupee Parish						
Shadow	19-17	Erwinville	LA Highway 1 & U.S. Highway 190	1	2	4
Shadow	19-18	Morganza	LA Highway 10 & LA Highway 1	1	2	8
Shadow	19-13	Rougon	LA Highway 416 & LA Highway 983	2	1	4
Shadow	19-16	Torbert	LA Highway 978 & U.S. Highway 190	2	2	4
Shadow	19-08	Parlange	LA Highway 78 & LA Highway 1	3	1	2
Total Manpower/Equipment for Pointe Coupee Parish:					**8**	**22**
West Baton Rouge Parish						
Shadow	19-14	Yattan	LA Highway 984 & LA Highway 415	2	1	2
Shadow	19-20	Bueche	LA Highway 984 & Bueche Rd Extension	3	1	2
Total Manpower/Equipment for West Baton Rouge Parish:					**2**	**4**
West Feliciana Parish						
6	6-02	Wakefield	U.S. Highway 61 & Spillman Dr	2	2	4
Total Manpower/Equipment for West Feliciana Parish:					**2**	**4**
TOTAL Manpower/Equipment FOR ENTIRE EPZ:					**23**	**58**

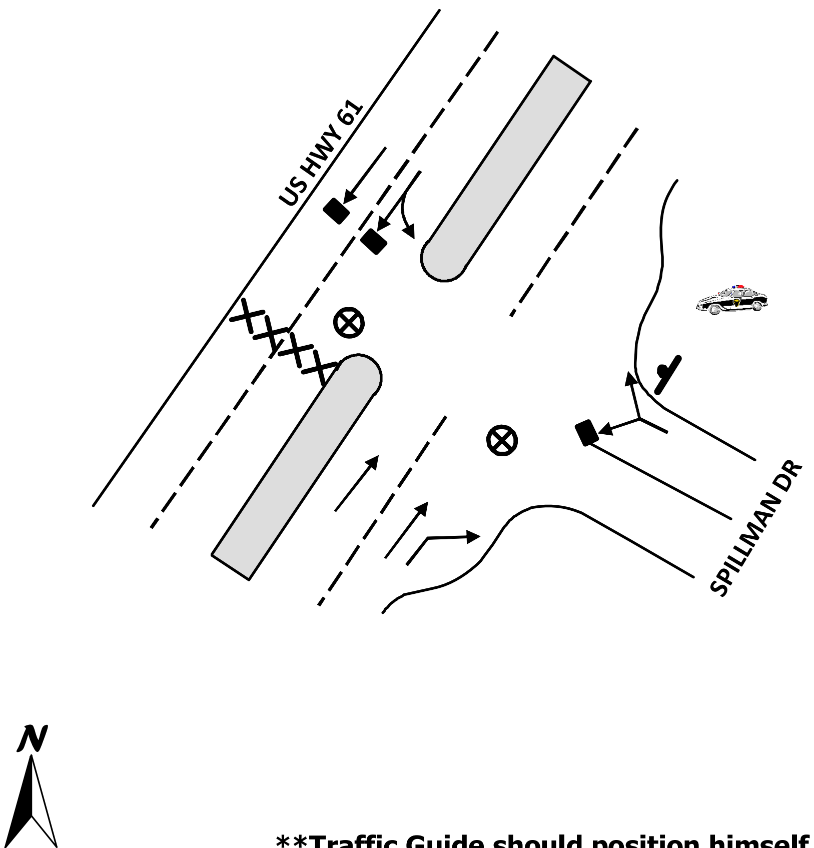
ACP

TOWN: WAKEFIELD

LOCATION: US HWY 61 & SPILLMAN DR

ACP ID: 6-02

PAS: 6



KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

2 ft

3 ft

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Interdict and Divert southbound movement on US Hwy 61.

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)
4 Traffic Barricades

LOCATION PRIORITY

2

****Traffic Guide should position himself safely**

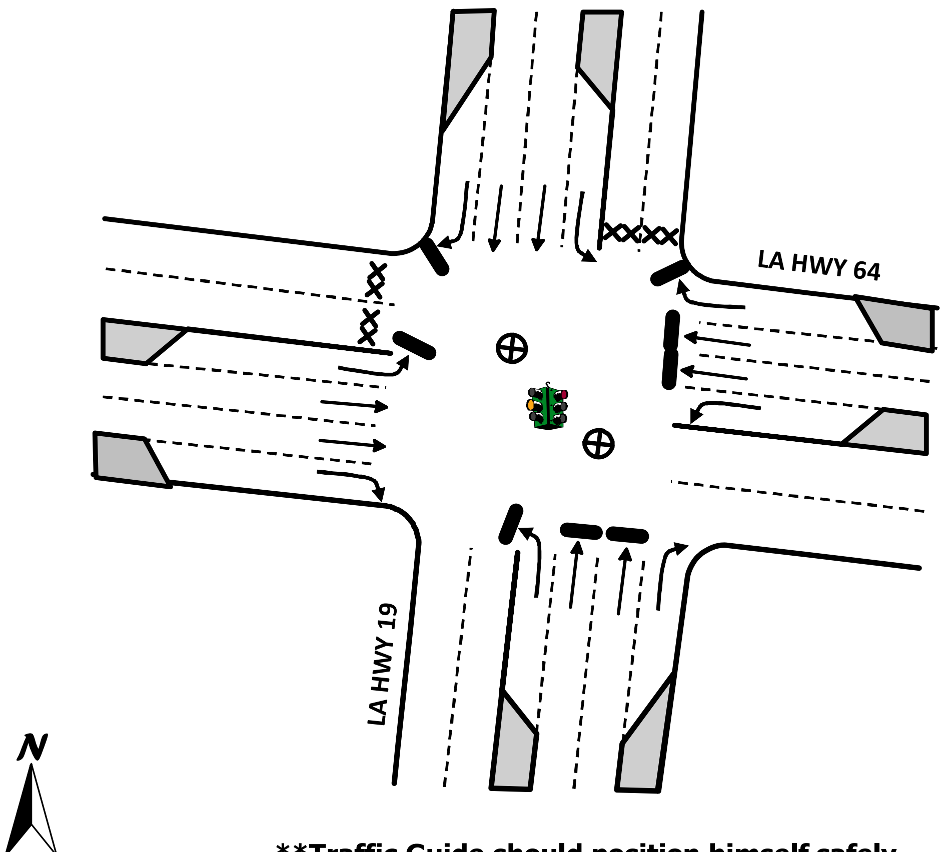
ACP

TOWN: ZACHARY

LOCATION: LA HWY 19 & LA HWY 64/MAIN ST

ACP ID: 19-02

PAS: SHADOW



****Traffic Guide should position himself safely**

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

2 ft
3 ft
8 ft

ACTIONS TO BE TAKEN

1. Interdict and Divert northbound movement on LA Hwy 19.
2. Interdict and Divert westbound movement on LA Hwy 64.

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)
8 Traffic Barricades

LOCATION PRIORITY

1

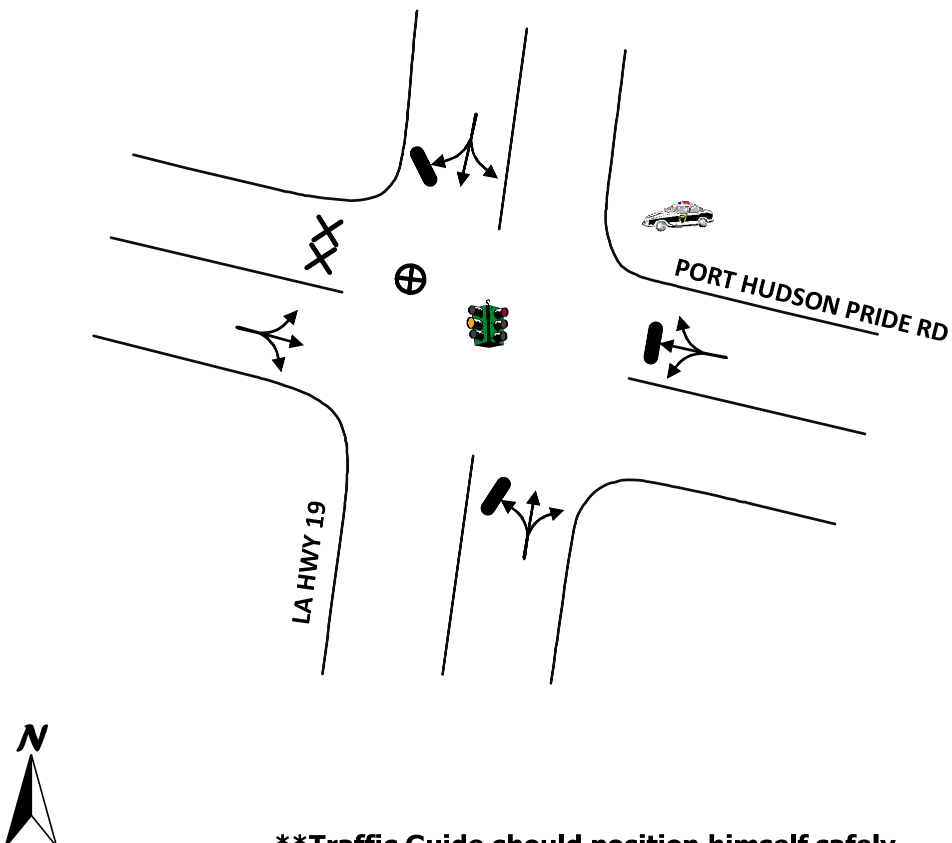
ACP

TOWN: ZACHARY

LOCATION: LA HWY 19 & PORT HUDSON PRIDE RD

ACP ID: 19-03

PAS: SHADOW



****Traffic Guide should position himself safely**

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Interdict and Divert westbound movement on Port Hudson Pride Rd.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
2 Traffic Barricades

LOCATION PRIORITY

2

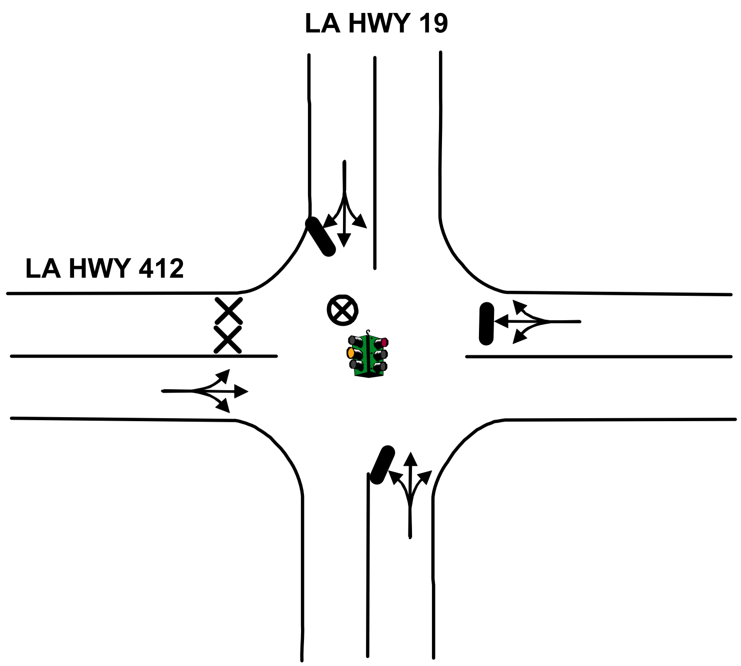
ACP

TOWN: SLAUGHTER

LOCATION: LA HWY 19 & LA HWY 412

ACP ID: 19-04

PAS: SHADOW



****Traffic Guide should position himself safely**

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft × 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Interdict and Divert westbound movement on LA Hwy 412.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
2 Traffic Barricades

LOCATION PRIORITY

3

ACP

TOWN: ETHEL

LOCATION: LA HWY 19 & LA HWY 955

ACP ID: 19-05

PAS: SHADOW

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

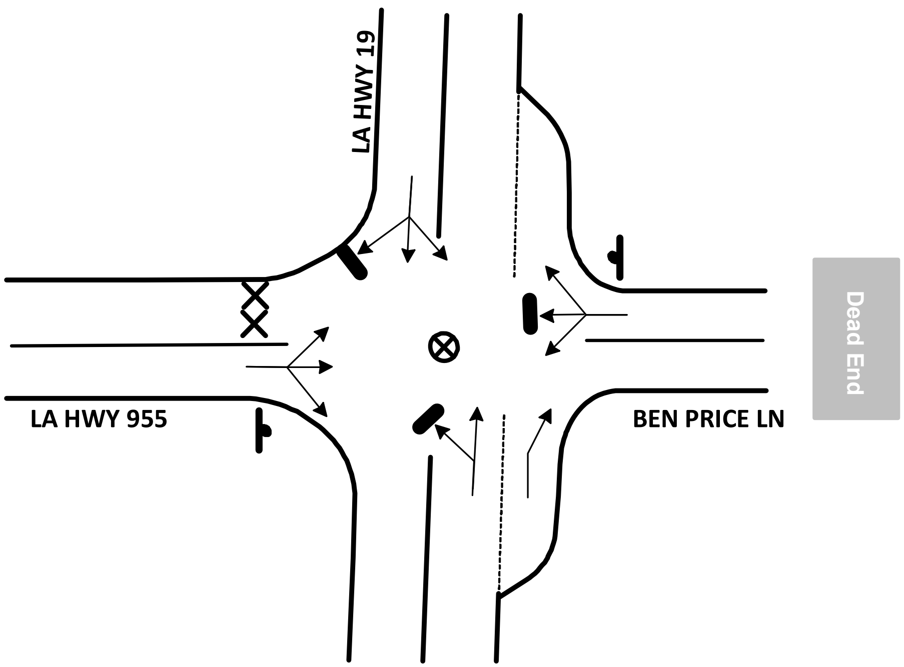
2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft



ACTIONS TO BE TAKEN

1. Interdict and Divert westbound movement on LA Hwy 955.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)

2 Traffic Barricades

LOCATION PRIORITY

2

N

Traffic Guide should position himself safely

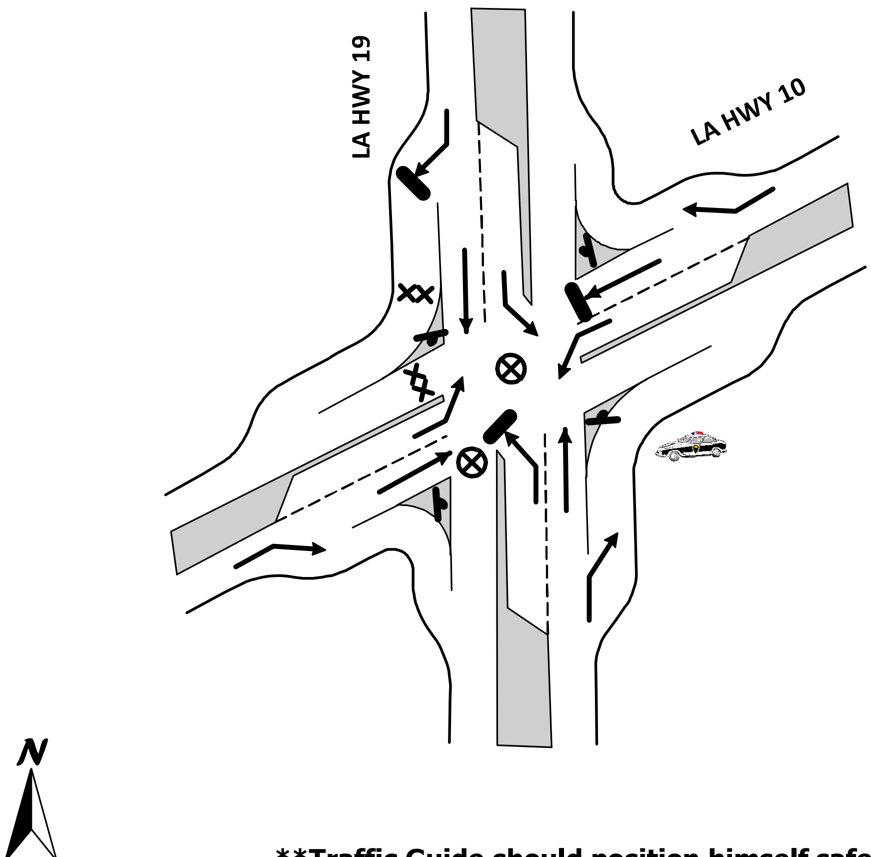
ACP

TOWN: BATTLE

LOCATION: LA HWY 10 & LA HWY 19

ACP ID: 19-06

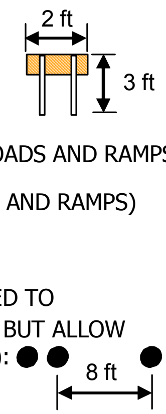
PAS: SHADOW



****Traffic Guide should position himself safely**

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):



ACTIONS TO BE TAKEN

1. Interdict and Divert westbound movement on LA Hwy 10.

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)
4 Traffic Barricades

LOCATION PRIORITY

1

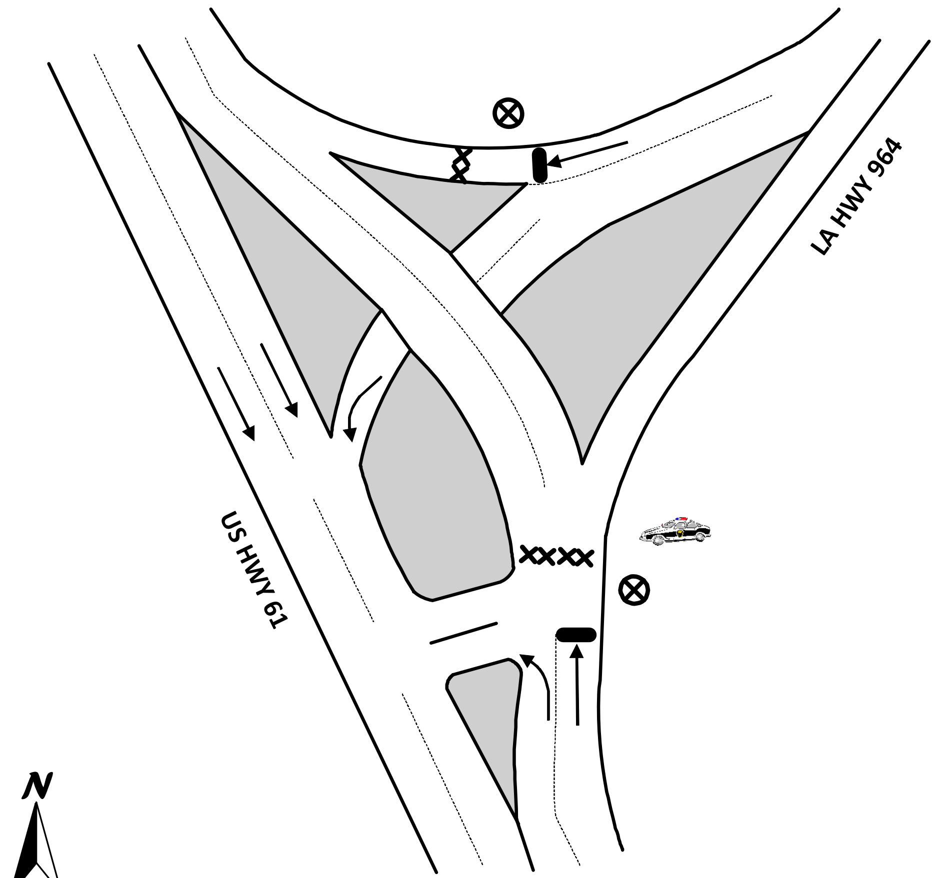
ACP

TOWN: ALSEN

LOCATION: US HWY 61 & LA HWY 964

ACP ID: 19-07

PAS: SHADOW



****Traffic Guide should position himself safely**

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Interdict and Divert northbound movement on US Hwy 61.
2. Interdict and Divert eastbound movement on LA Hwy 964.

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)
6 Traffic Barricades

LOCATION PRIORITY

1

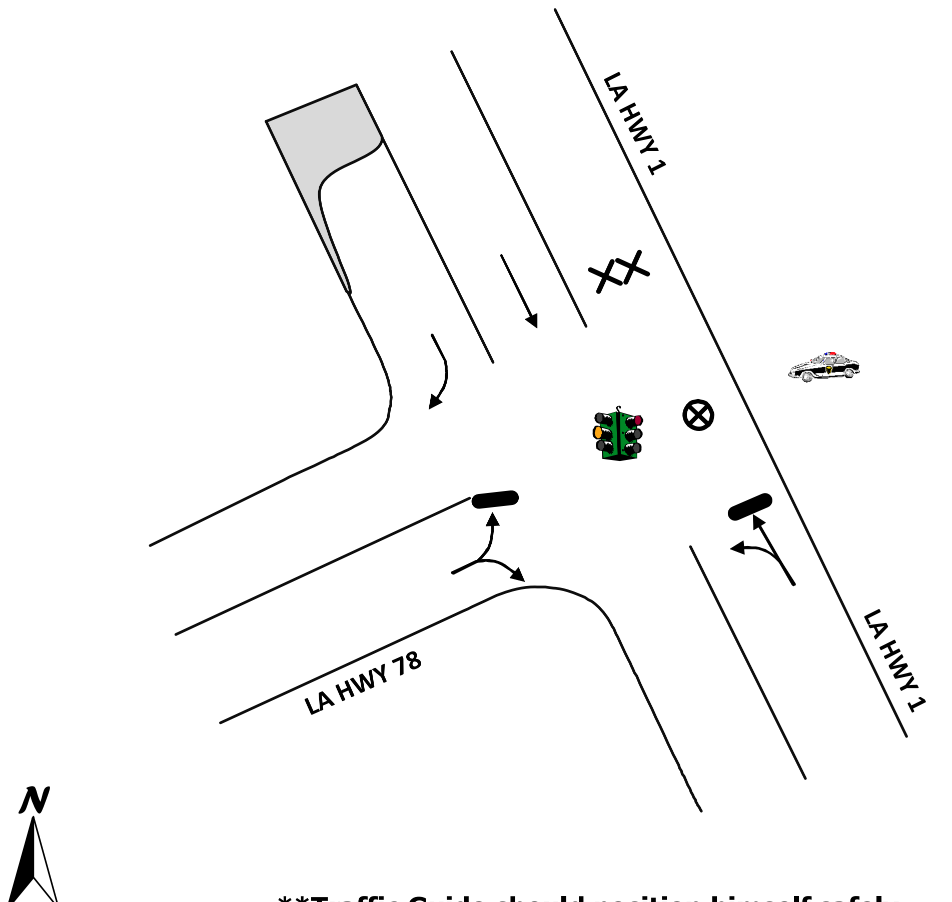
ACP

TOWN: PARLANGE

LOCATION: LA HWY 78 & LA HWY 1

ACP ID: 19-08

PAS: SHADOW



****Traffic Guide should position himself safely**

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Interdict and Divert northbound movement on LA Hwy 1.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
2 Traffic Barricades

LOCATION PRIORITY

3

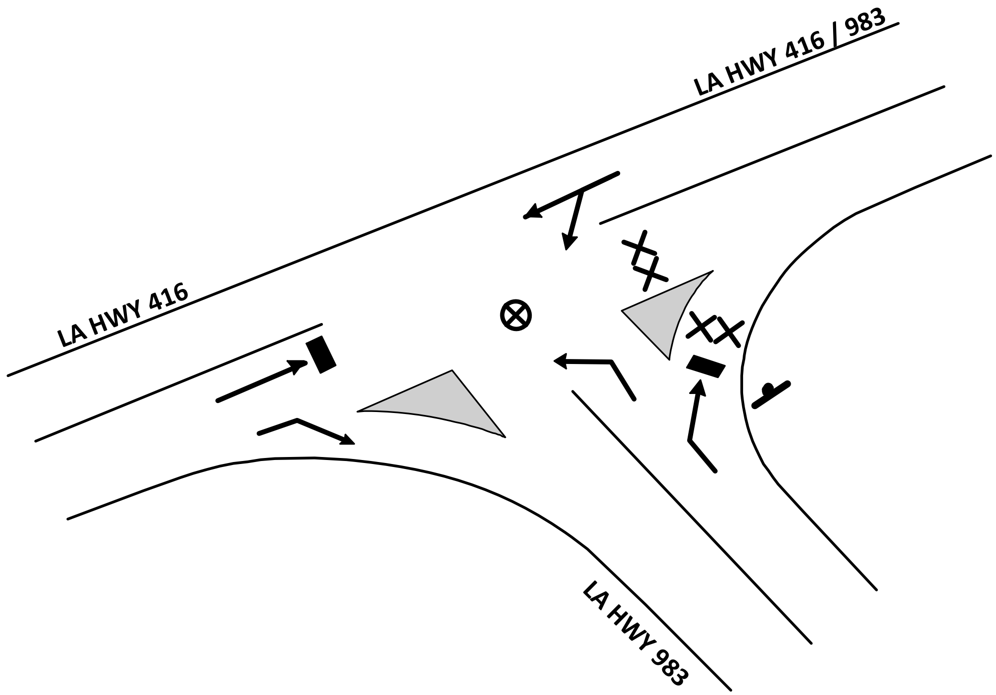
ACP

TOWN: ROUGON

LOCATION: LA HWY 416 & LA HWY 983

ACP ID: 19-13

PAS: SHADOW



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****Traffic Guide should position himself safely**

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Interdict and Divert eastbound movement on LA Hwy 416/983.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)

4 Traffic Barricades

LOCATION PRIORITY

2

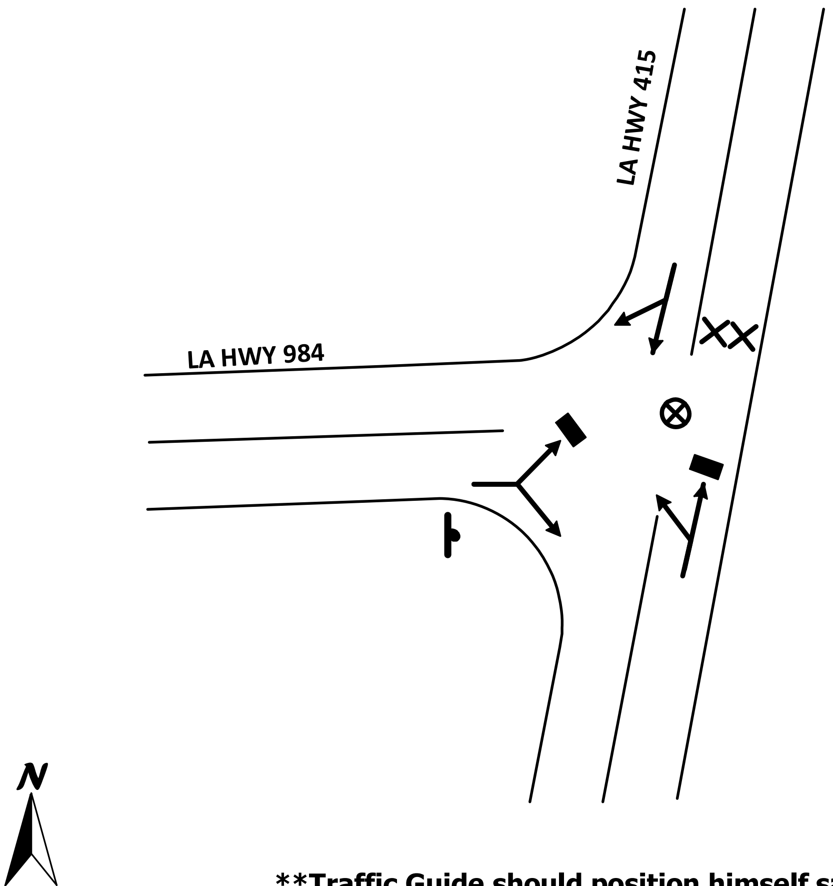
ACP

TOWN: YATTAN

LOCATION: LA HWY 984 & LA HWY 415

ACP ID: 19-14

PAS: SHADOW



****Traffic Guide should position himself safely**

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Interdict and Divert westbound movement on LA Hwy 415.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
2 Traffic Barricades

LOCATION PRIORITY

2

ACP

TOWN: TORBERT

LOCATION: LA HWY 978 & US HWY 190

ACP ID: 19-16

PAS: SHADOW

KEY

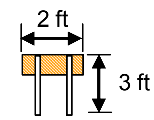
MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE



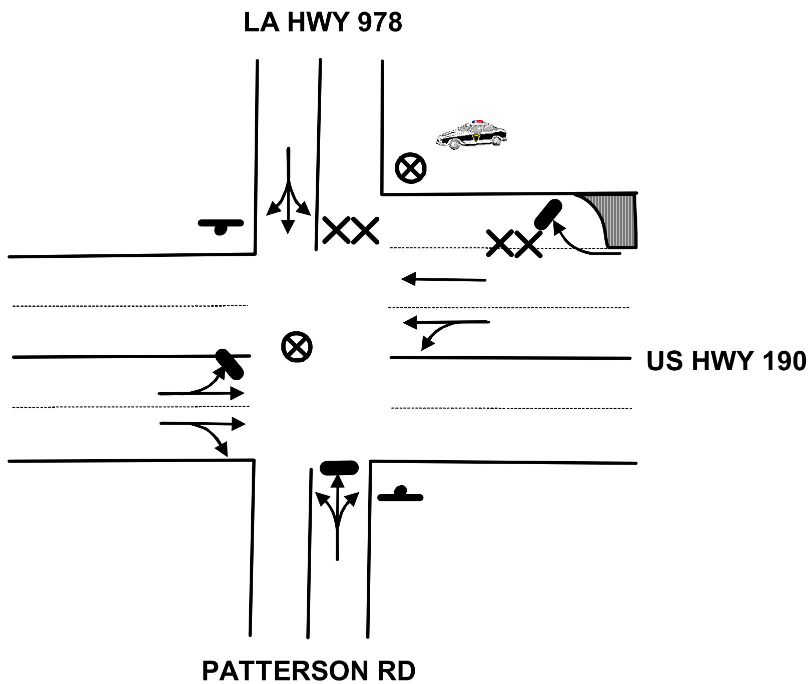
2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft



N

****Traffic Guide should position himself safely**

ACTIONS TO BE TAKEN

1. Interdict and Divert northbound movement on LA Hwy 978.
2. Facilitate the flow of EPZ evacuees from LA Hwy 978.

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)
4 Traffic Barricades

LOCATION PRIORITY

2

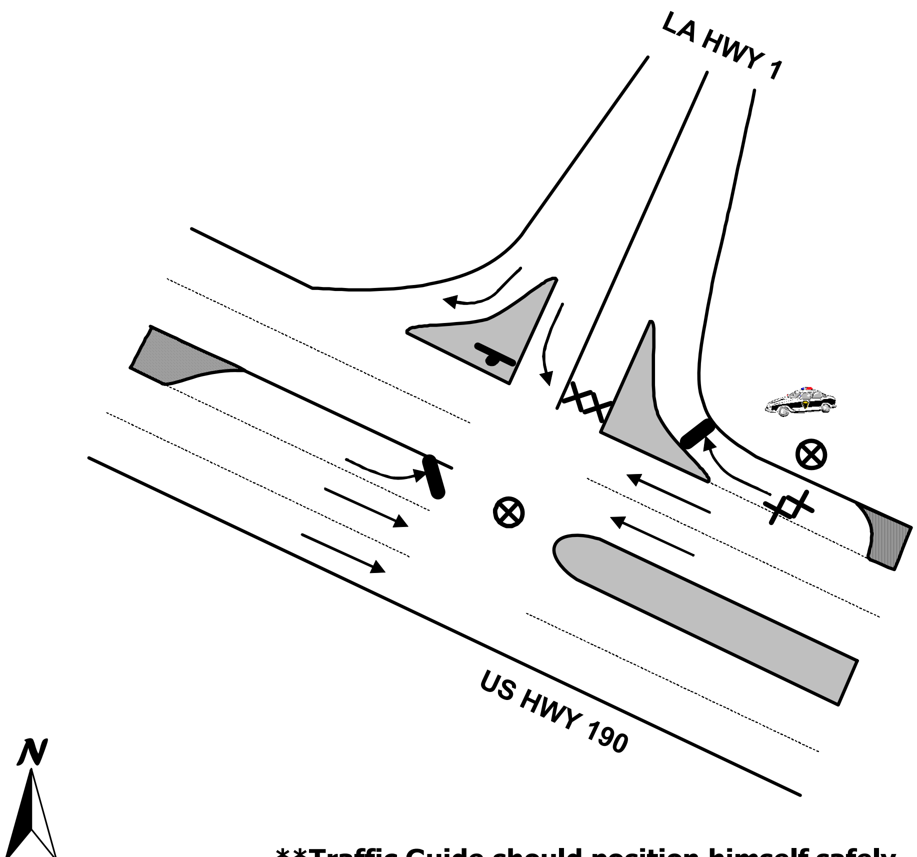
ACP

TOWN: ERWINVILLE

LOCATION: LA HWY 1 & US HWY 190

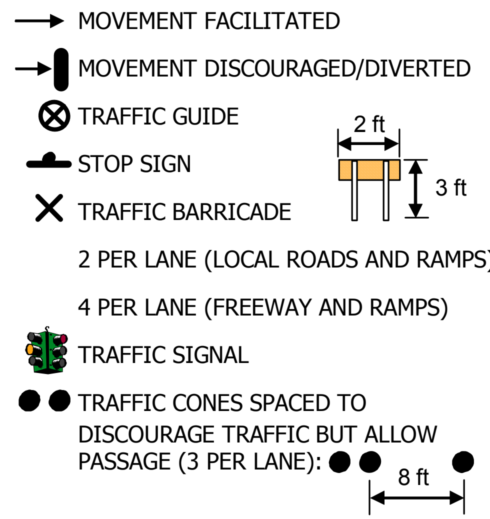
ACP ID: 19-17

PAS: SHADOW



****Traffic Guide should position himself safely**

KEY



ACTIONS TO BE TAKEN

1. Interdict and Divert northbound movement on LA Hwy 1.
2. Facilitate flow of EPZ evacuees from LA Hwy 1.

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)
4 Traffic Barricades

LOCATION PRIORITY

1

ACP

TOWN: MORGANZA

LOCATION: LA HWY 10 & LA HWY 1

ACP ID: 19-18

PAS: SHADOW

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

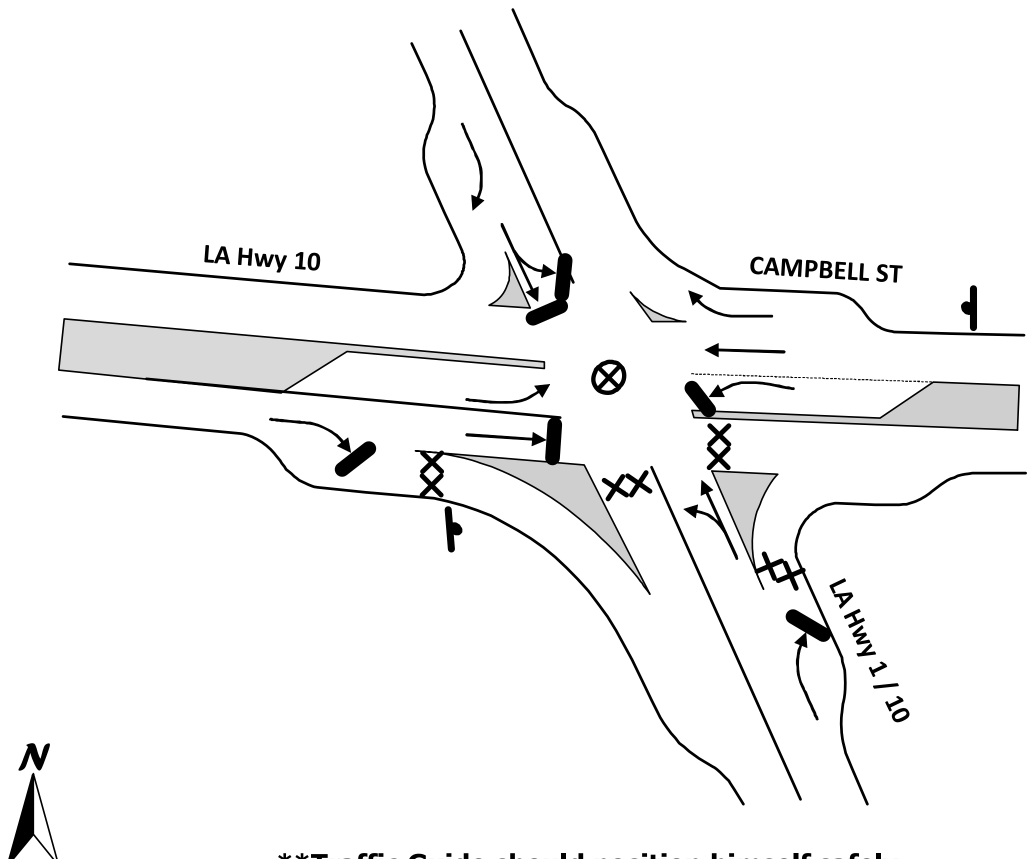
2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft



****Traffic Guide should position himself safely**

ACTIONS TO BE TAKEN

1. Interdict and Divert southbound movement on LA Hwy 1/10.
2. Interdict and Divert eastbound movement on Campbell St.

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)
8 Traffic Barricades

LOCATION PRIORITY

1

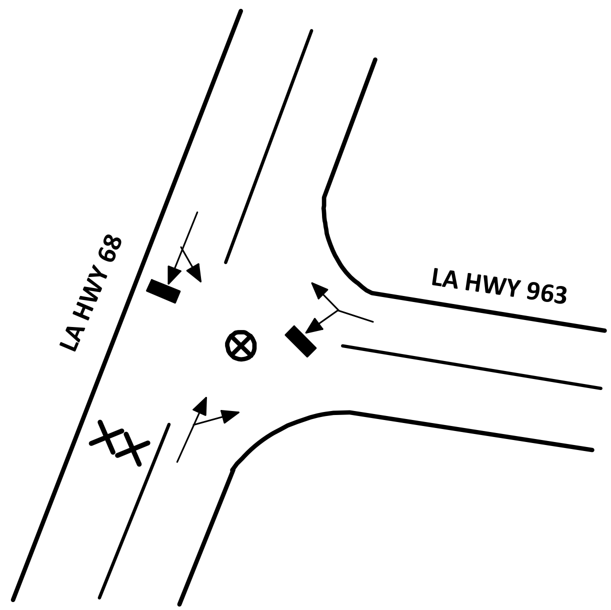
ACP

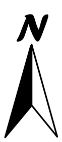
TOWN: JACKSON

LOCATION: LA HWY 68 & LA HWY 963

ACP ID: 19-19

PAS: SHADOW





****Traffic Guide should position himself safely**

KEY

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Interdict and Divert southbound movement on LA Hwy 68.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
2 Traffic Barricades

LOCATION PRIORITY

3

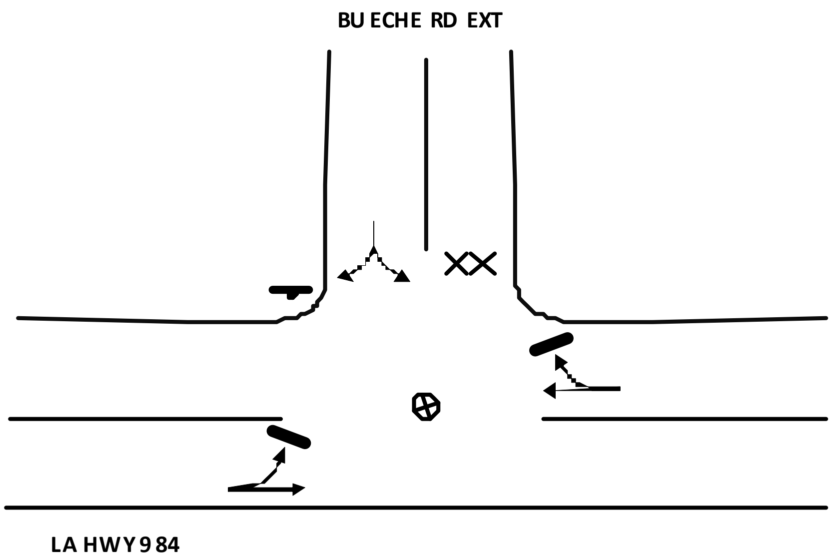
ACP

TOWN: BUECHE

LOCATION: LA HWY 984 & BUECHE RD EXTENSION

ACP ID: 19-20

PAS: SHADOW



**Traffic Guide should position himself safely

KEY

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Interdict and Divert northbound movement on Bueche Rd Extension.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
2 Traffic Barricades

LOCATION PRIORITY

3

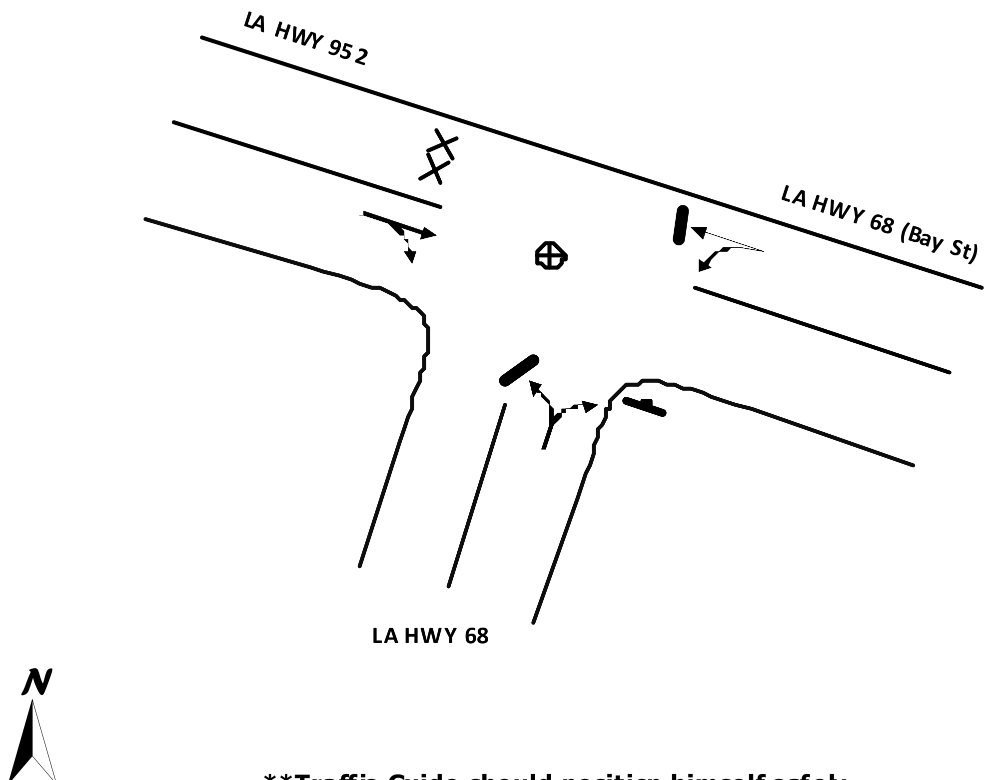
ACP

TOWN: WILSON

LOCATION: LA HWY 68 & LA HWY 952

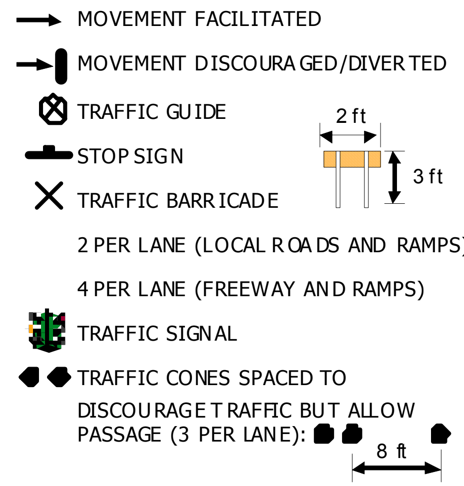
ACP ID: 19-21

PAS: SHADOW



**Traffic Guide should position himself safely

KEY



ACTIONS TO BE TAKEN

1. Interdict and Divert westbound movement on LA HWY 952.
2. Southbound traffic on LA HWY 68 will be diverted towards LA HWY 19 at ACP 19-19.

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)

2 Traffic Barricades

LOCATION PRIORITY

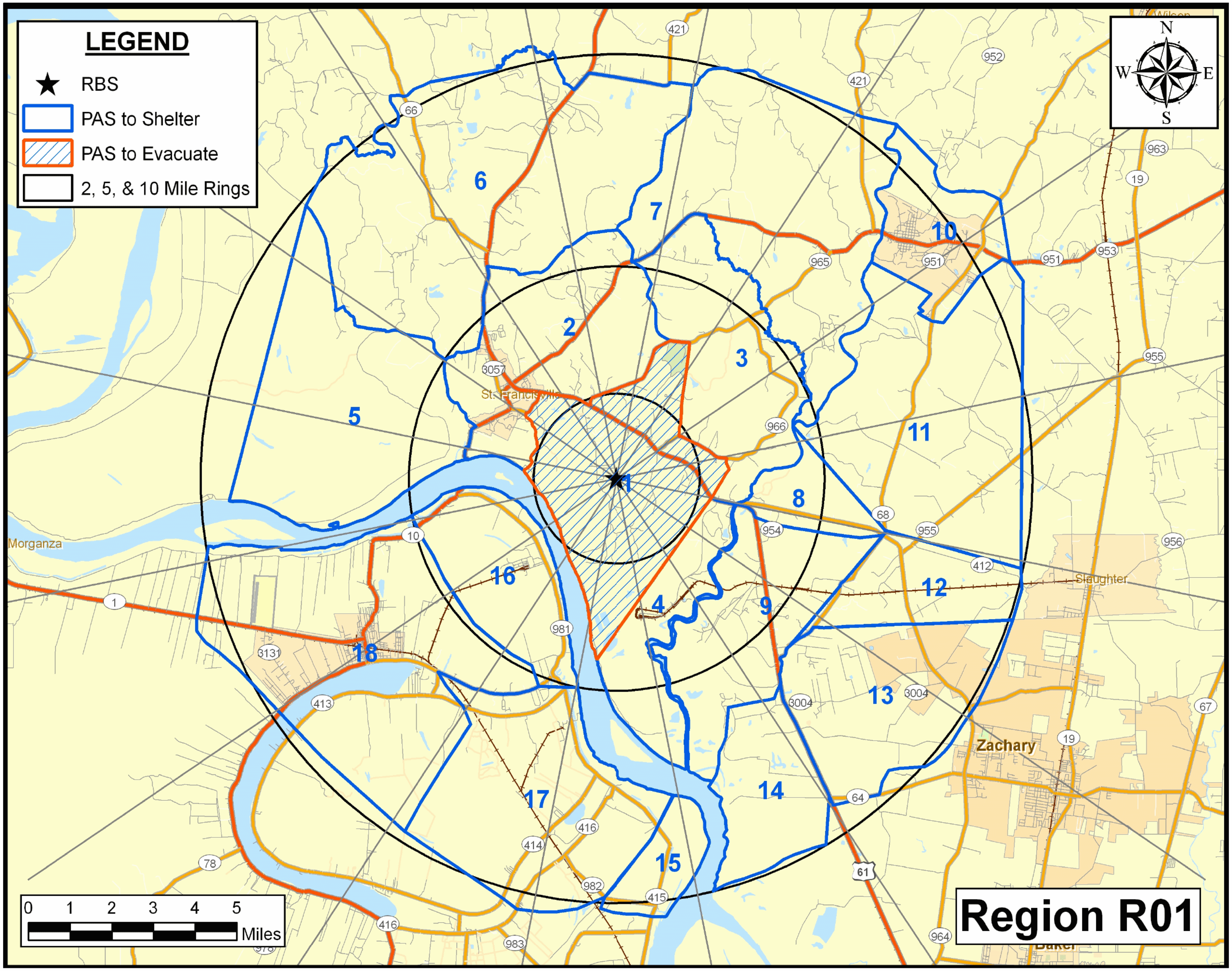
2

APPENDIX H

Evacuation Region Maps

APPENDIX H: EVACUATION REGION MAPS

This appendix presents maps of all Evacuation Regions.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RBS
PAS to Shelter
PAS to Evacuate
2, 5, & 10 Mile Rings
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Region R01
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Miles
St. Francisville
Morganza
Zachary
Slaughter
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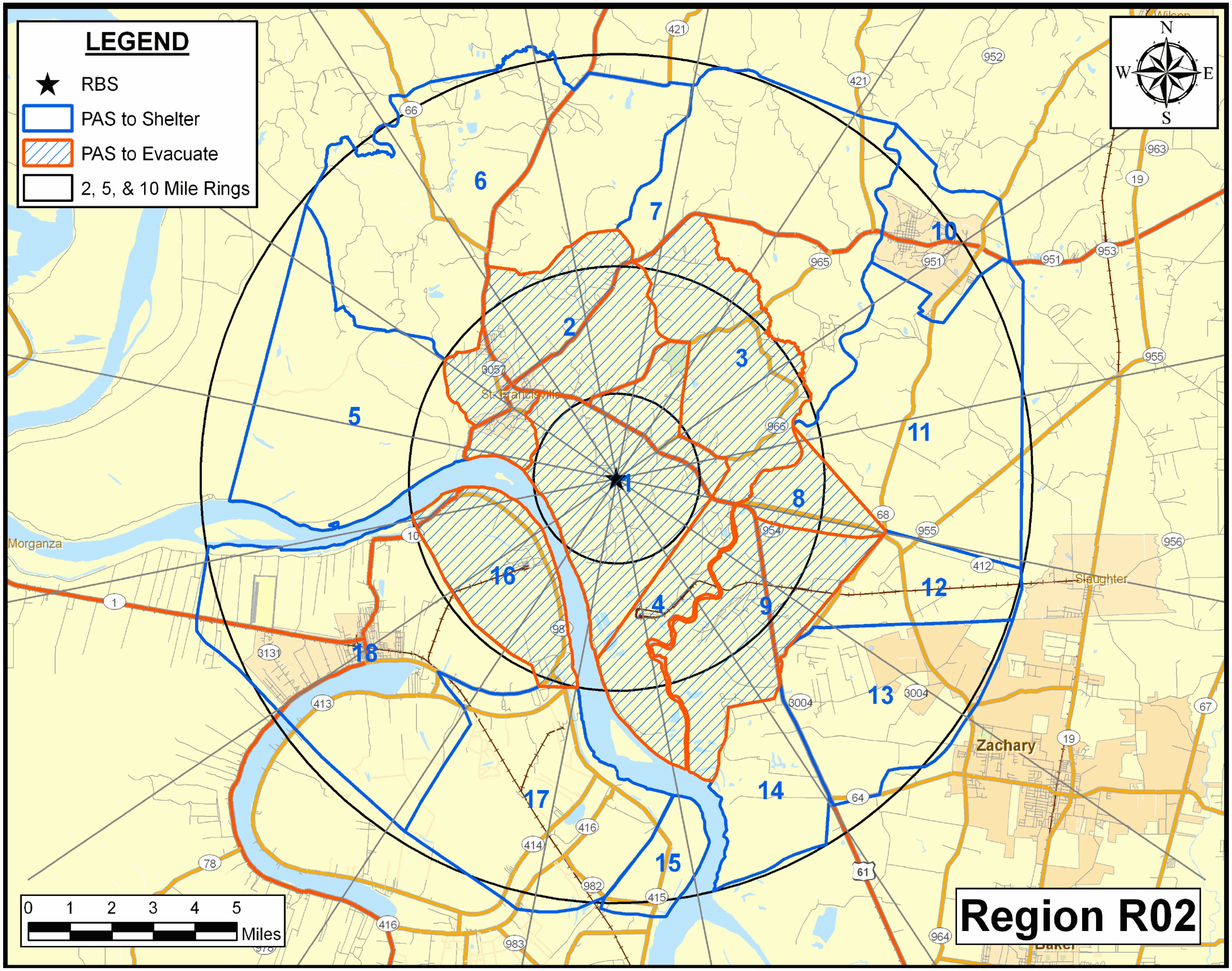
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PAS to Evacuate
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Region R02
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Zachary
Morganza
Slaughter
St. Francisville
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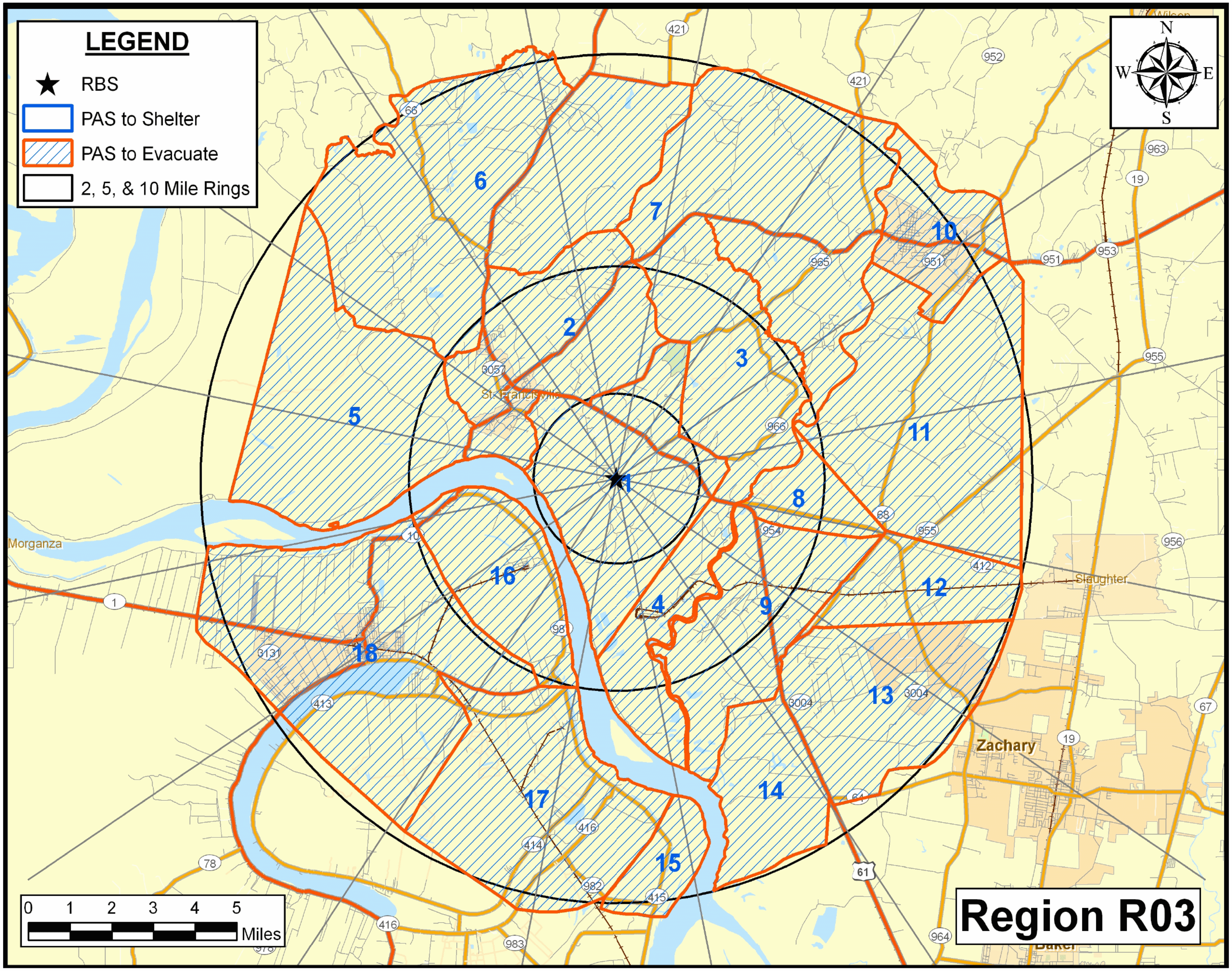
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PAS to Evacuate
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Region R03
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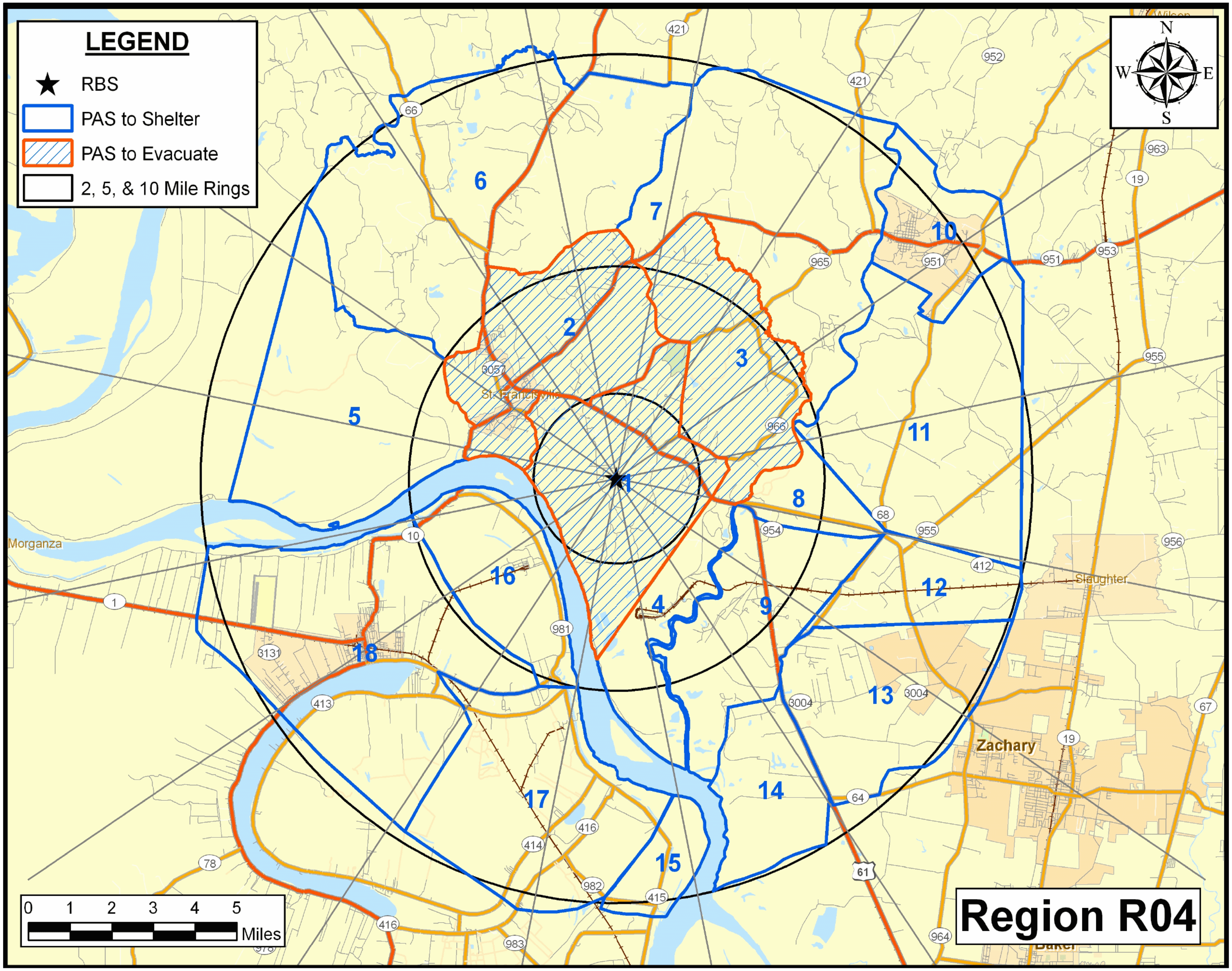
Zachary
Morganza
Slaughter
St. Francisville



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PAS to Evacuate
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Miles
Region R04
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Zachary
Slaughter
St. Francisville
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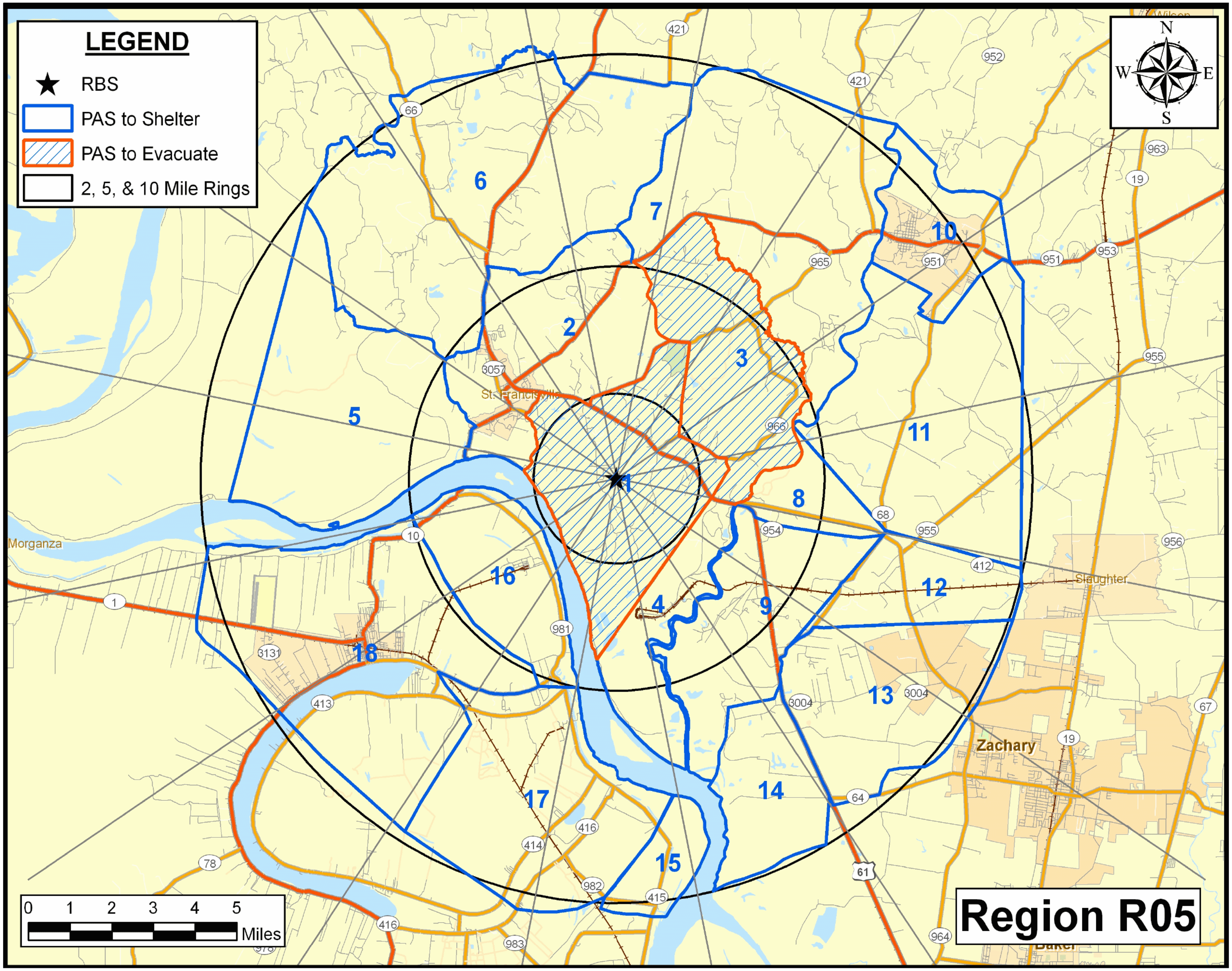
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2, 5, & 10 Mile Rings
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Region R05
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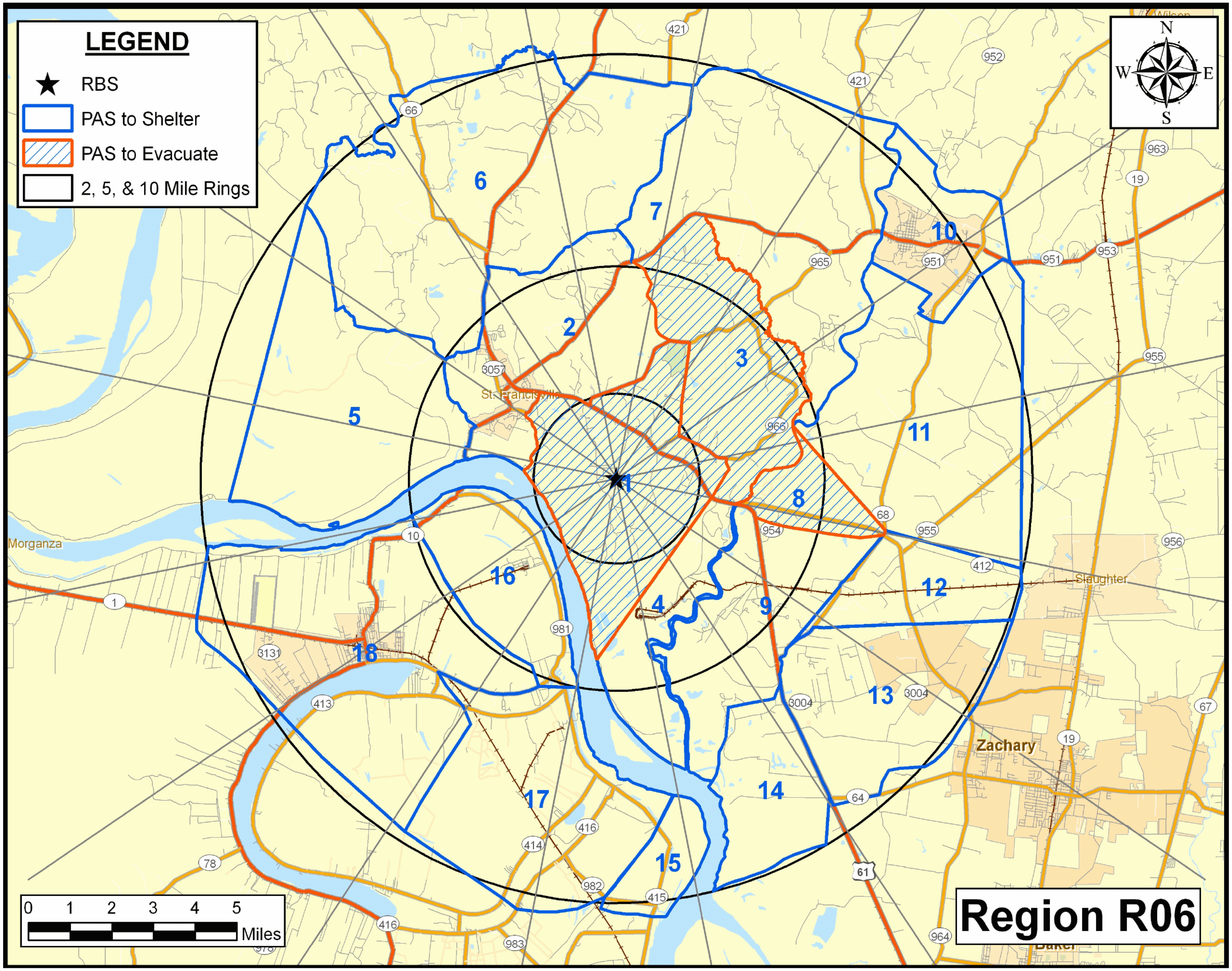
St. Francisville
Morganza
Slaughter
Zachary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PAS to Evacuate
2, 5, & 10 Mile Rings
Region R06
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St. Francisville
Morganza
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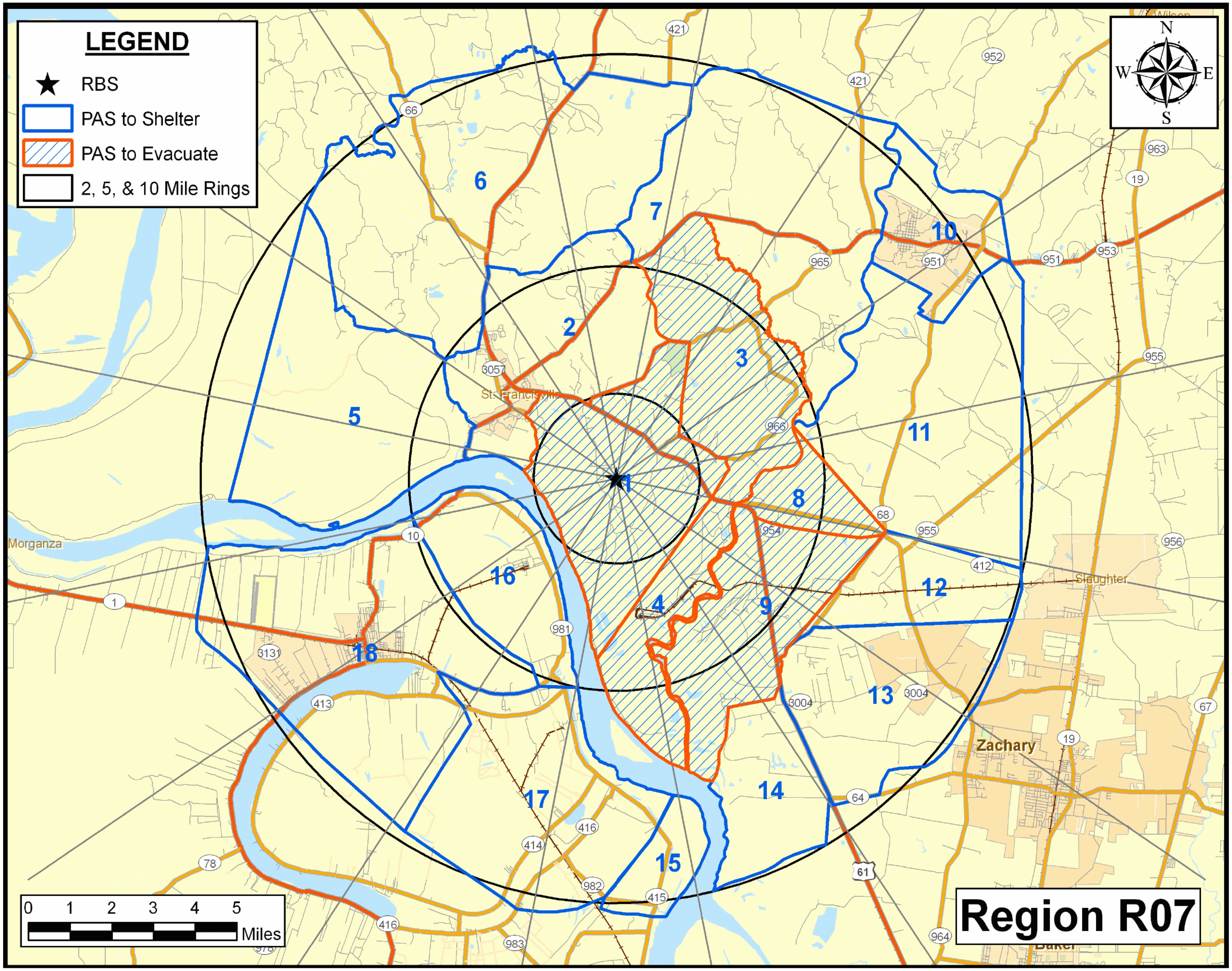
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PAS to Evacuate
2, 5, & 10 Mile Rings
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Region R07
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Miles
St. Francisville
Morganza
Zachary
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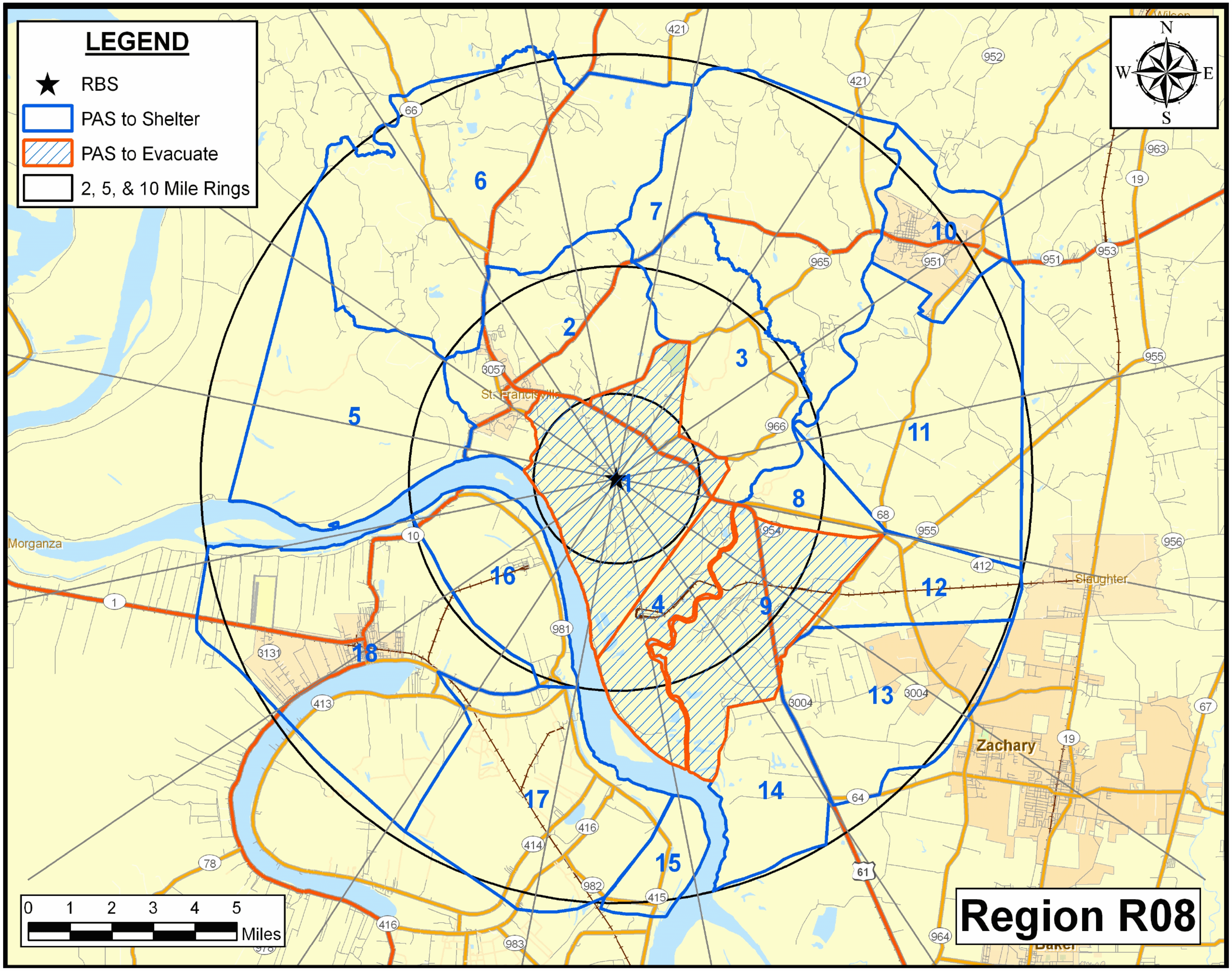
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PAS to Evacuate
2, 5, & 10 Mile Rings
Region R08
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Miles
St. Francisville
Morganza
Zachary
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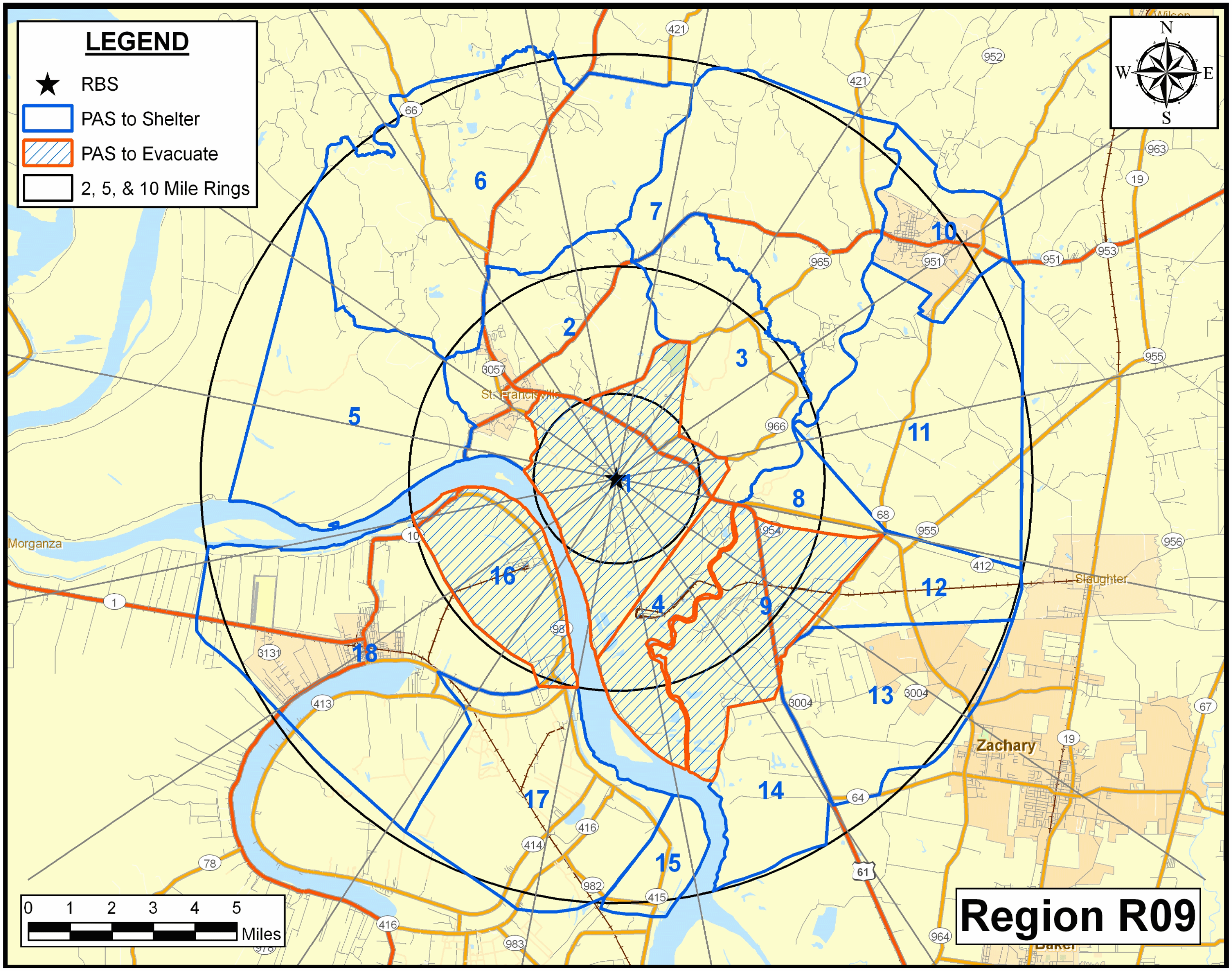
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PAS to Shelter
PAS to Evacuate
2, 5, & 10 Mile Rings
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Region R09
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St. Francisville
Morganza
Zachary
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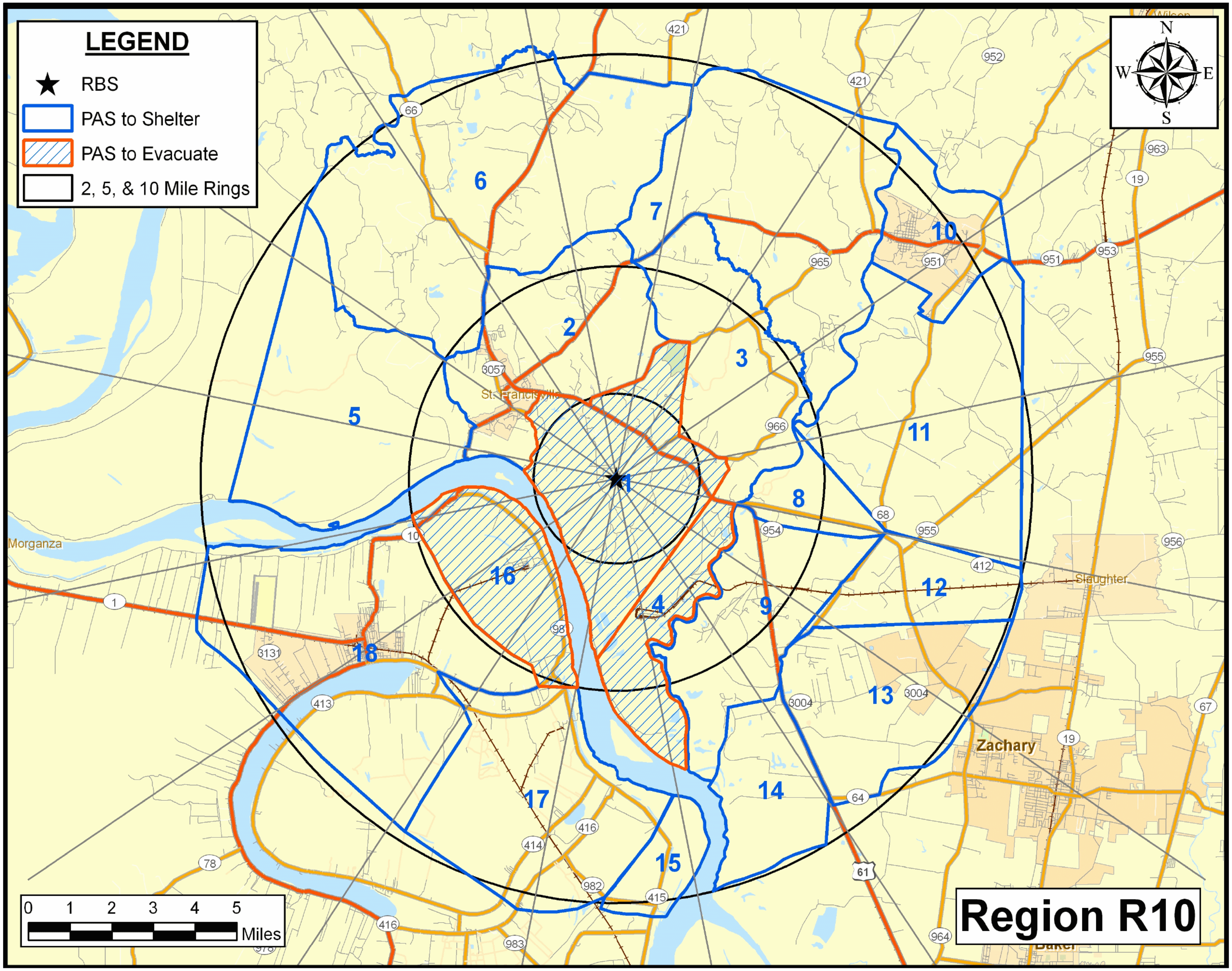
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PAS to Evacuate
2, 5, & 10 Mile Rings
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St. Francisville
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Zachary
Slaughter
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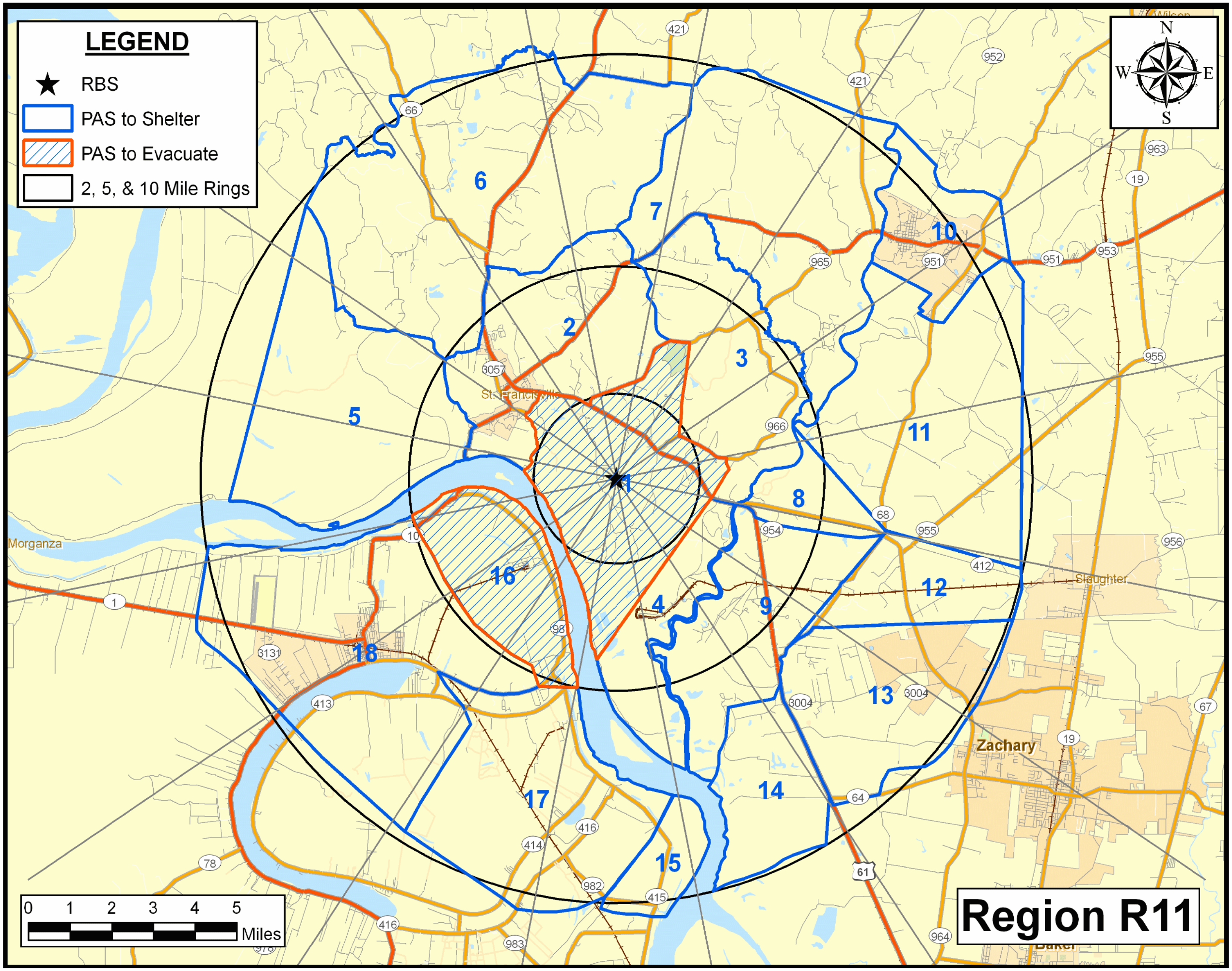
Miles
Region R10



LEGEND
RBS
PAS to Shelter
PAS to Evacuate
2, 5, & 10 Mile Rings
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Region R11
Miles
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St. Francisville
Morganza
Zachary
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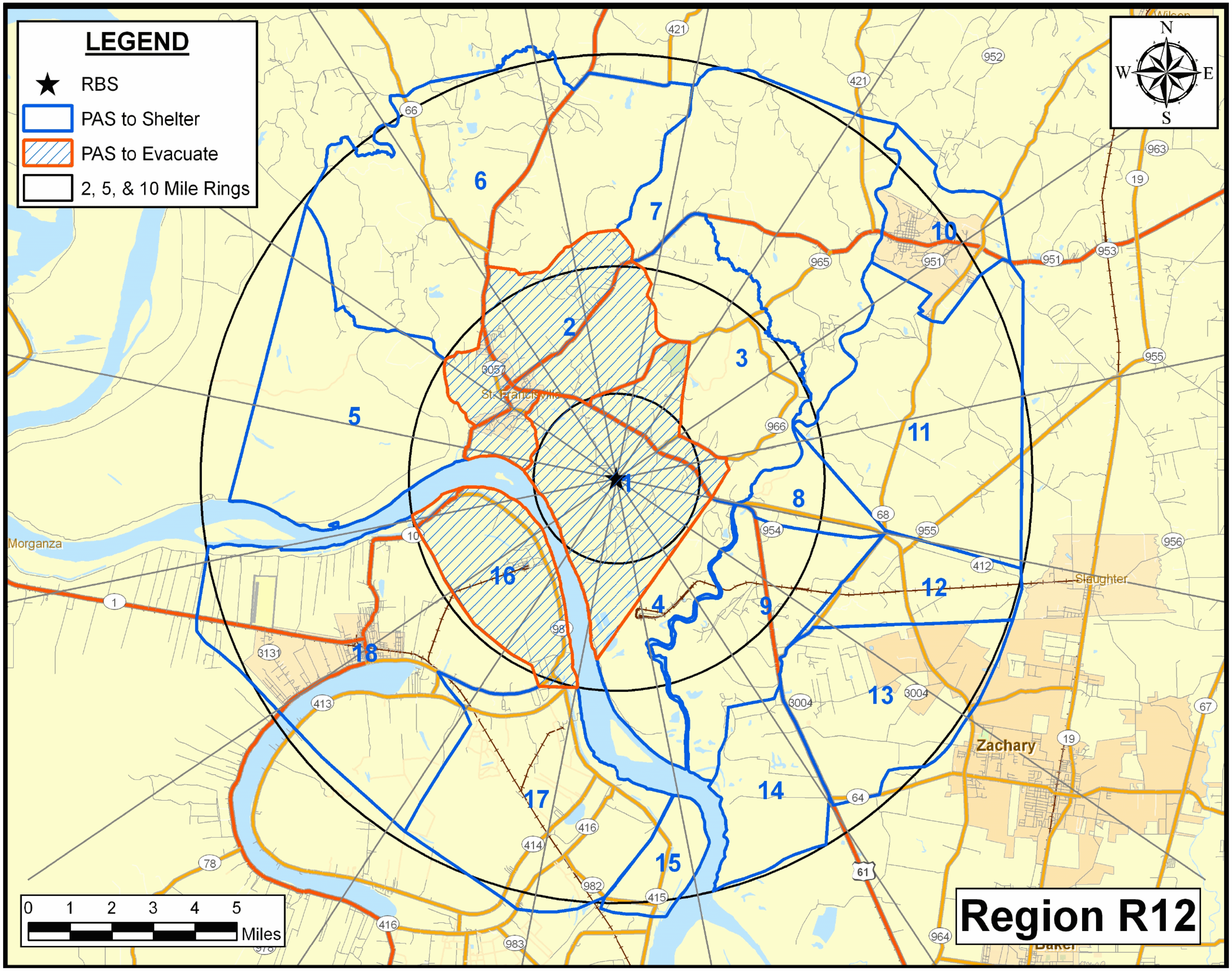
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RBS
PAS to Shelter
PAS to Evacuate
2, 5, & 10 Mile Rings
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Region R12
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Miles
Morganza
St. Francisville
Zachary
Slaughter
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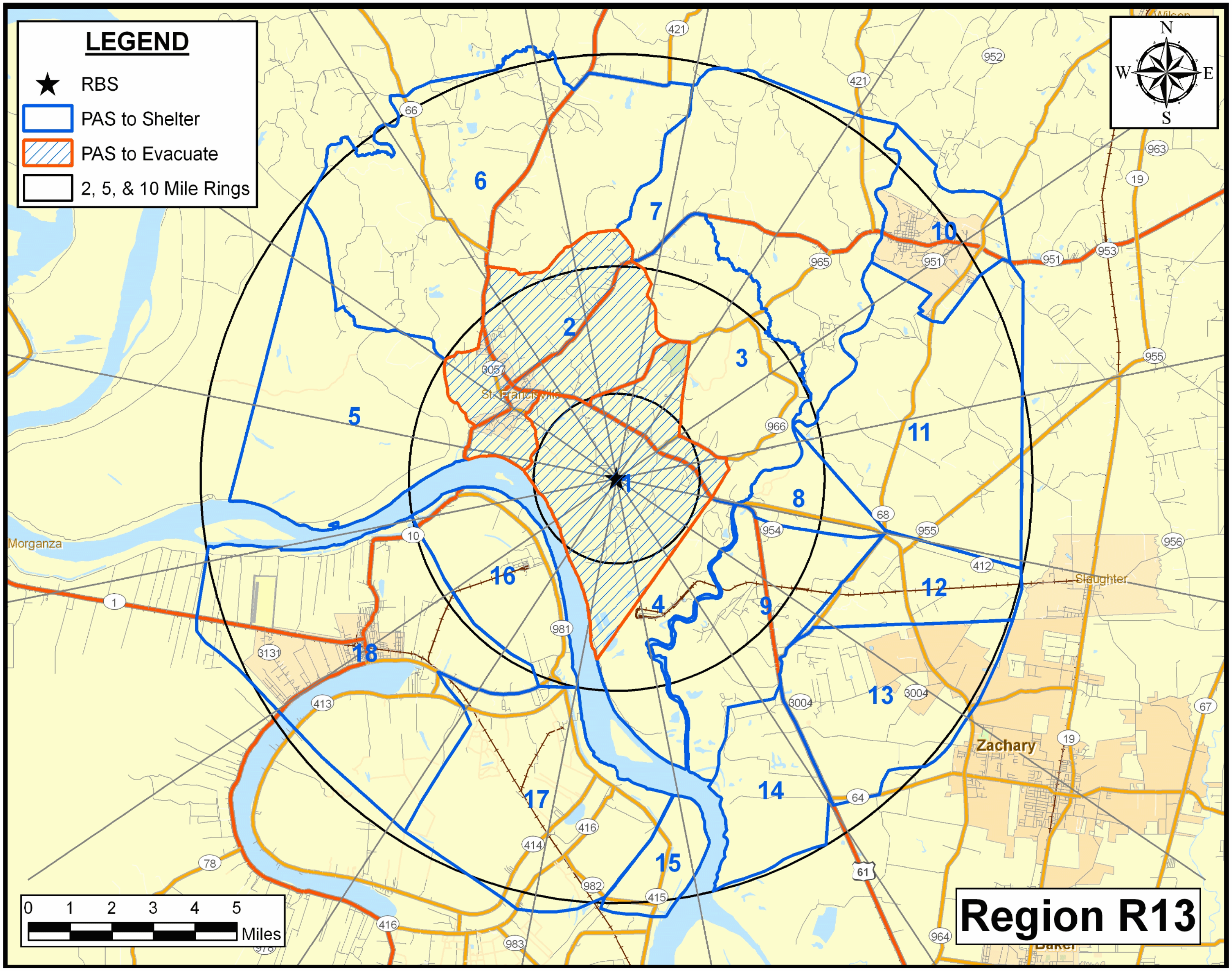
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PAS to Shelter
PAS to Evacuate
2, 5, & 10 Mile Rings
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Region R13
Miles
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Zachary
Morganza
Slaughter
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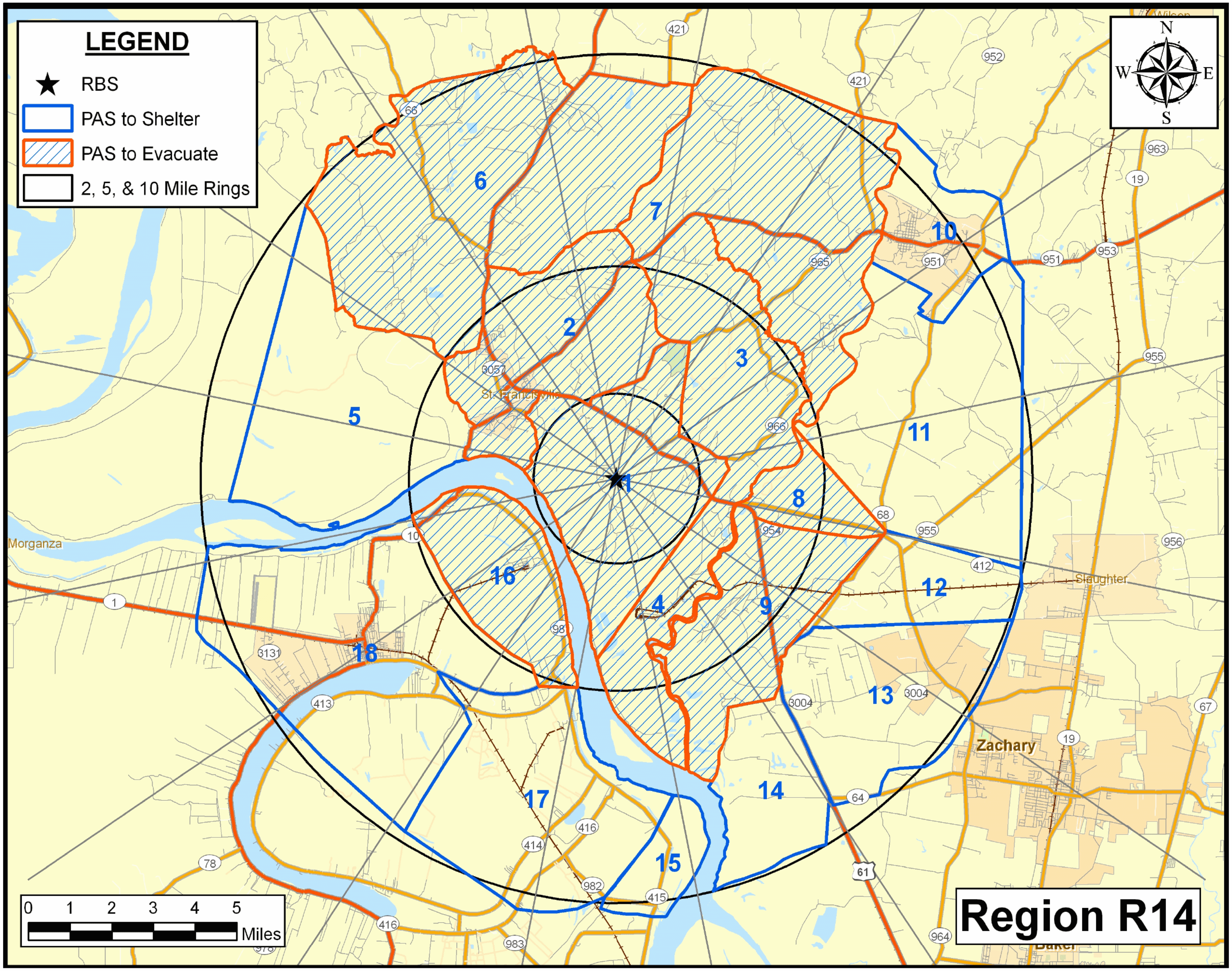
LEGEND
RBS
PAS to Shelter
PAS to Evacuate
2, 5, & 10 Mile Rings
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Region R14
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Miles
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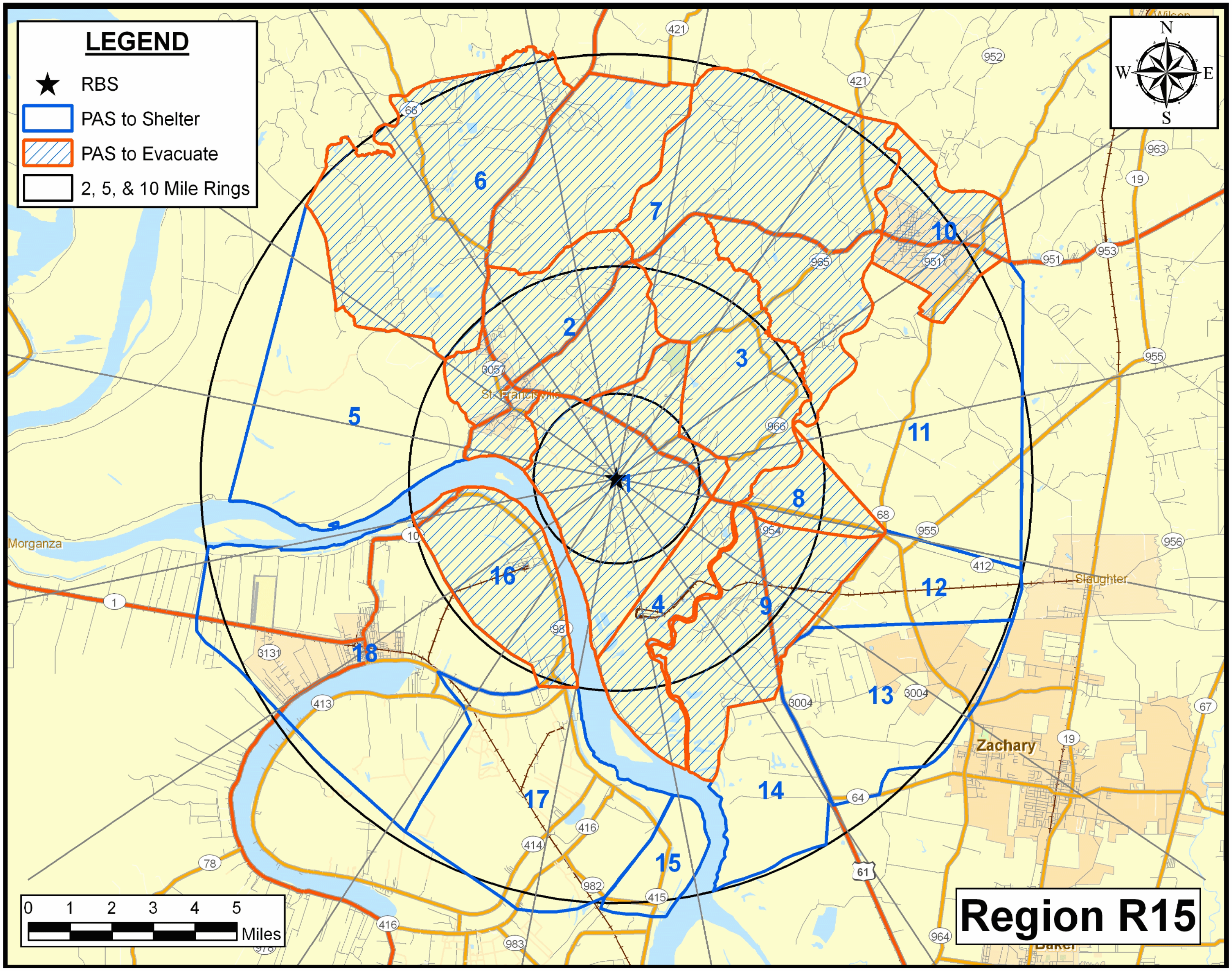
Zachary
Morganza
Slaughter
St. Francisville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PAS to Shelter
PAS to Evacuate
2, 5, & 10 Mile Rings
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St. Francisville
Morganza
Zachary
Slaughter
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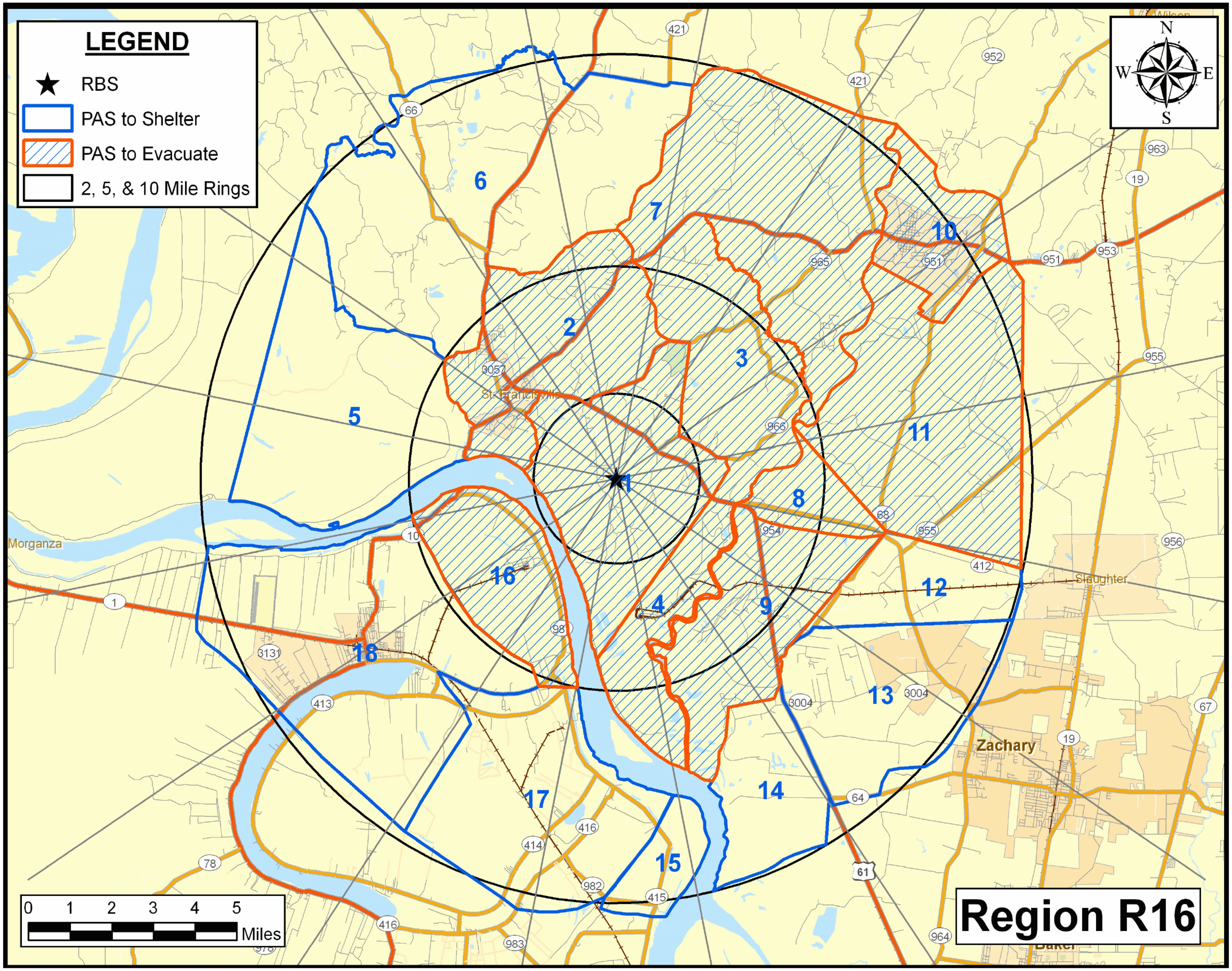
Miles
Region R15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RBS
PAS to Shelter
PAS to Evacuate
2, 5, & 10 Mile Rings
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Region R16
0 1 2 3 4 5
Miles
Morganza
St. Francisville
Zachary
Slaughter
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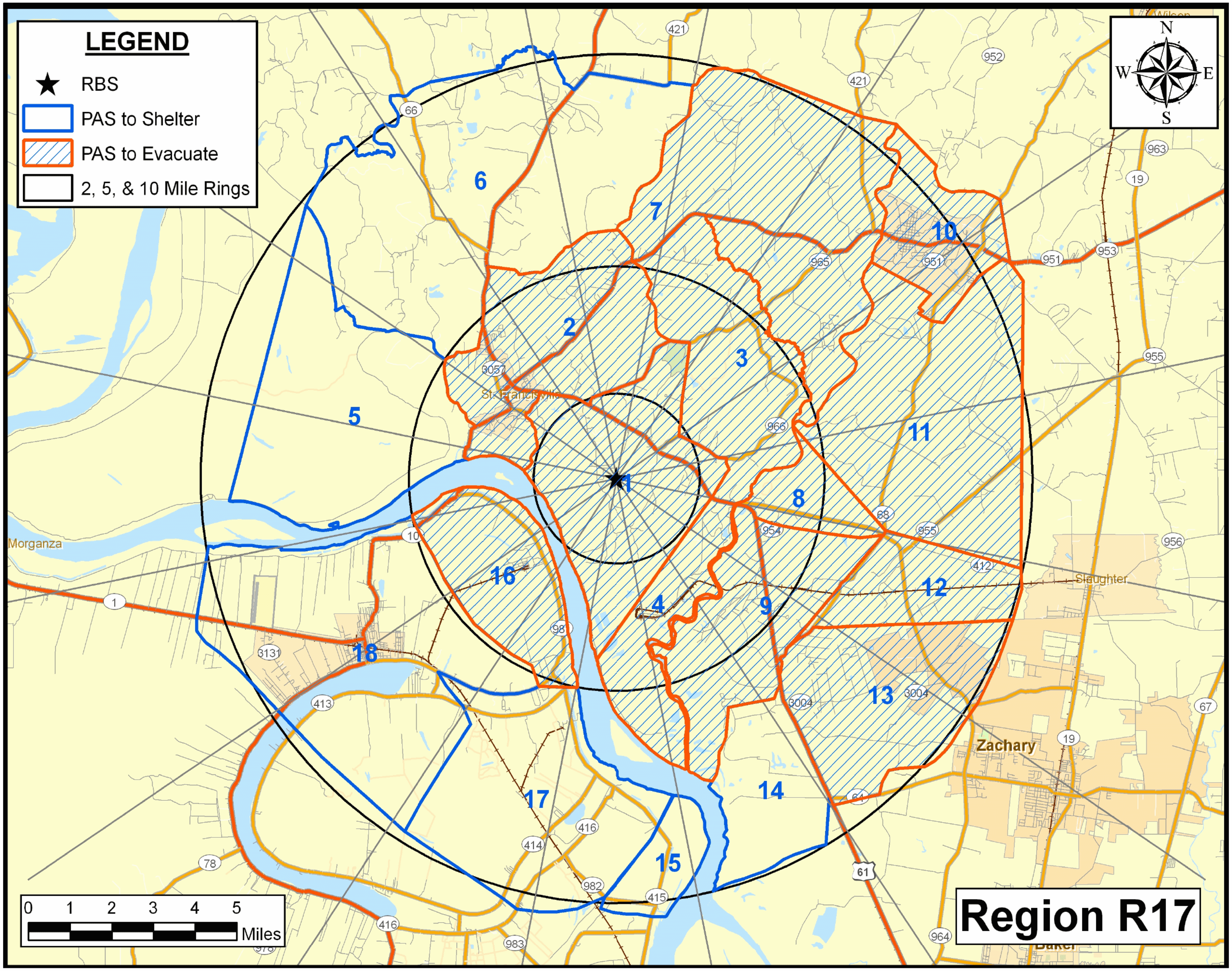
LEGEND
RBS
PAS to Shelter
PAS to Evacuate
2, 5, & 10 Mile Rings
Region R17
Miles
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Morganza
St. Francisville
Slaughter
Zachary
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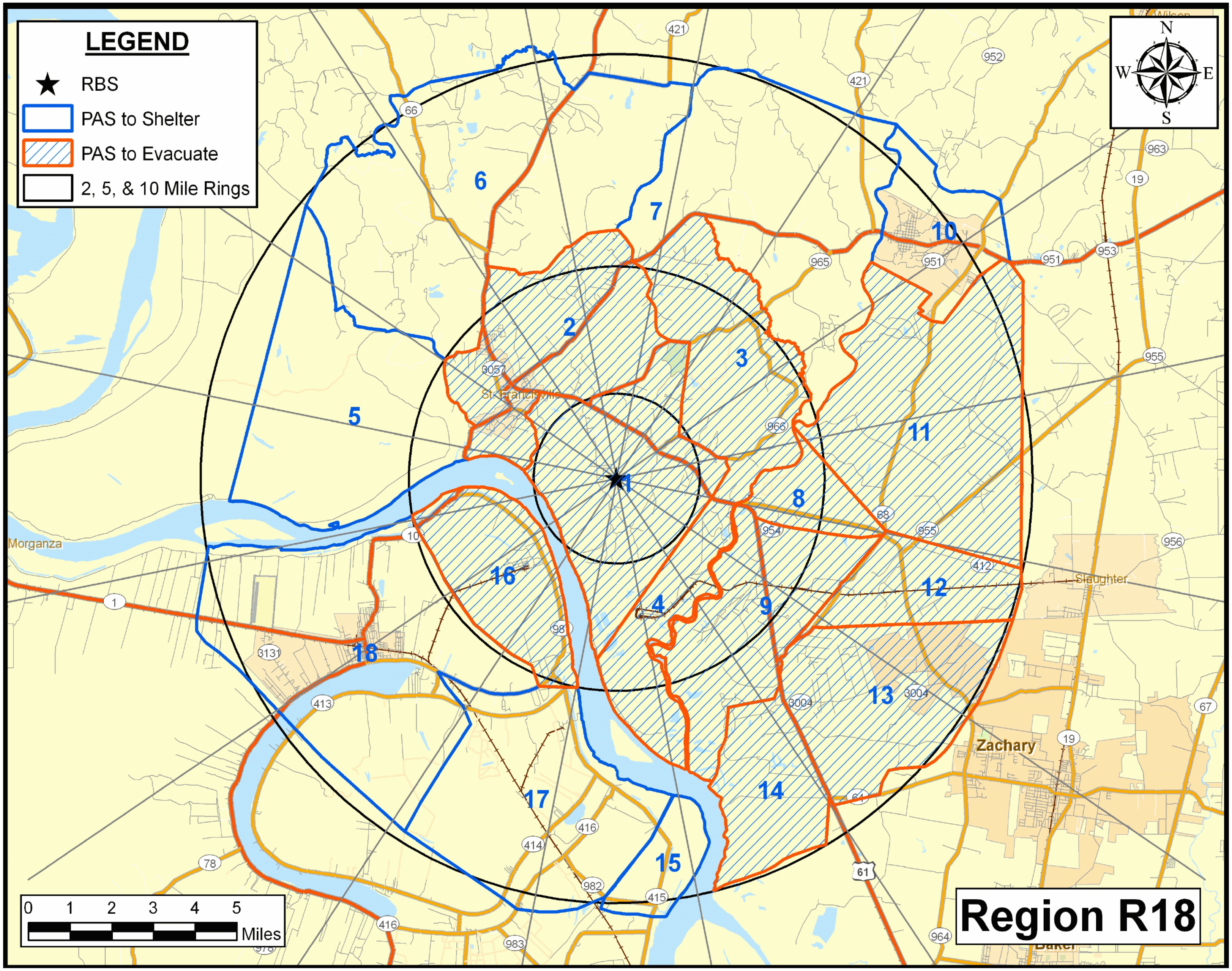
LEGEND
RBS
PAS to Shelter
PAS to Evacuate
2, 5, & 10 Mile Rings
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Morganza
St. Francisville
Zachary
Slaughter
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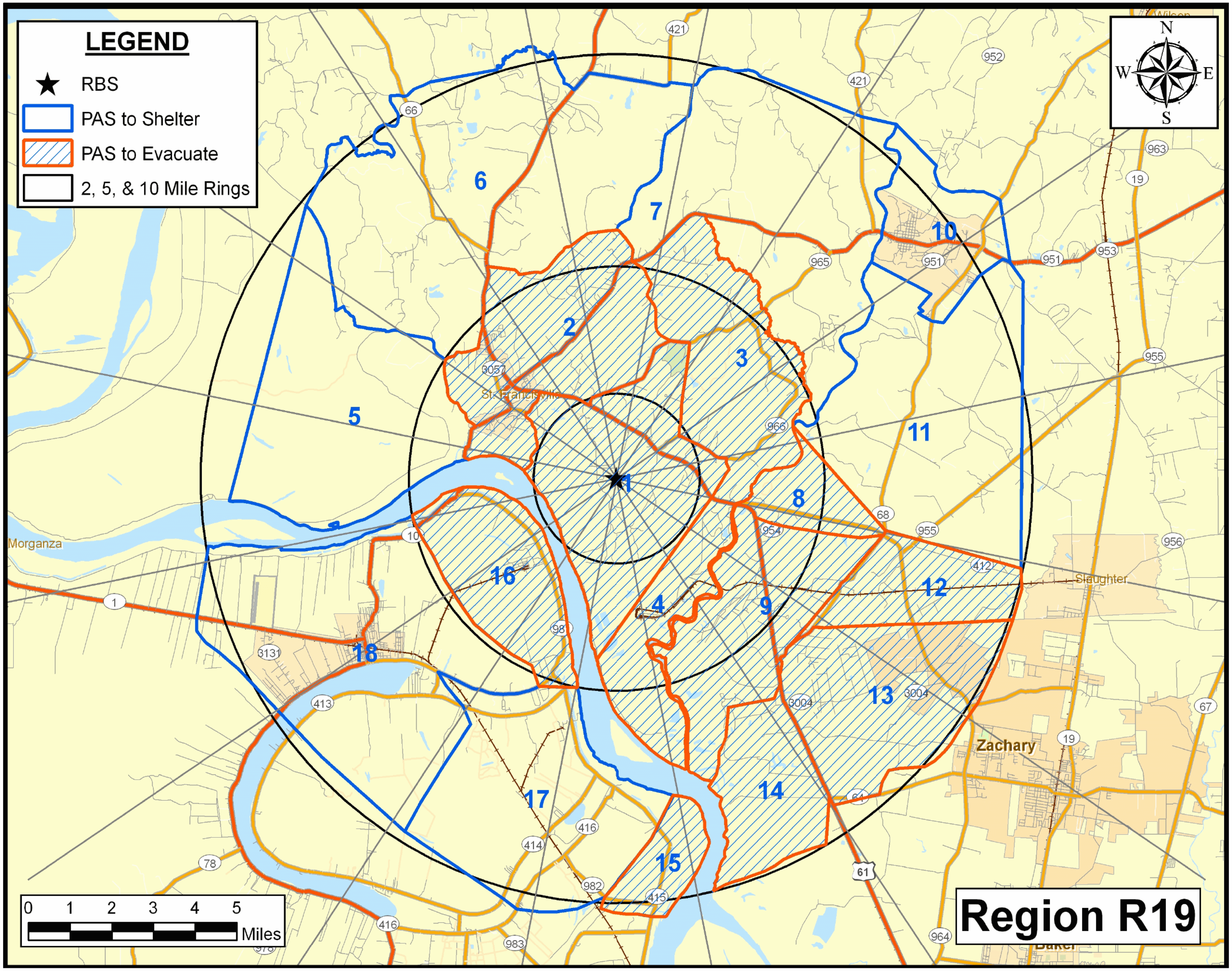
Miles
Region R18


LEGEND
RBS
PAS to Shelter
PAS to Evacuate
2, 5, & 10 Mile Rings
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Miles
Region R19
Morganza
Zachary
Slaughter
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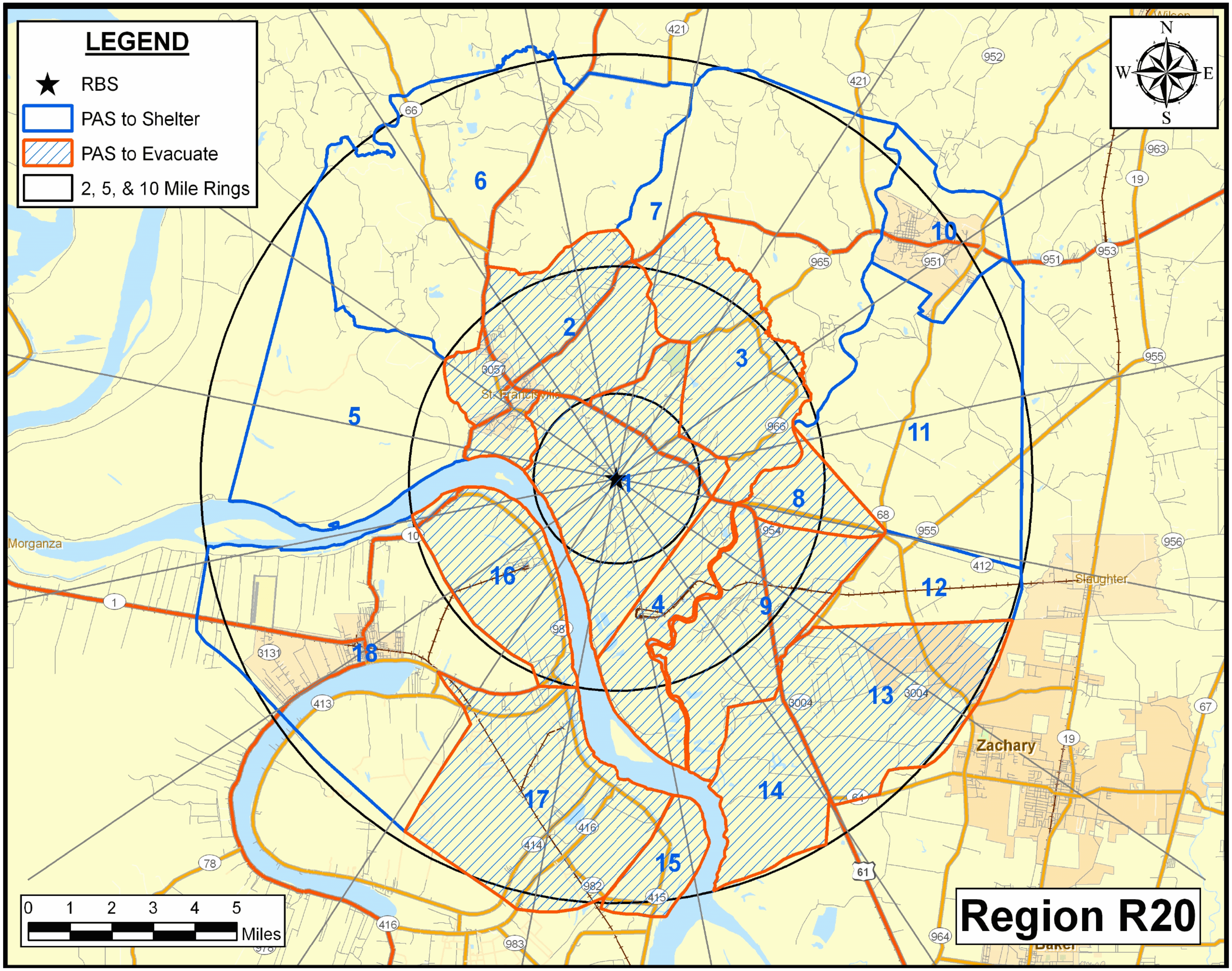

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PAS to Evacuate
2, 5, & 10 Mile Rings
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Region R20
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Miles
St. Francisville
Morganza
Zachary
Slaughter
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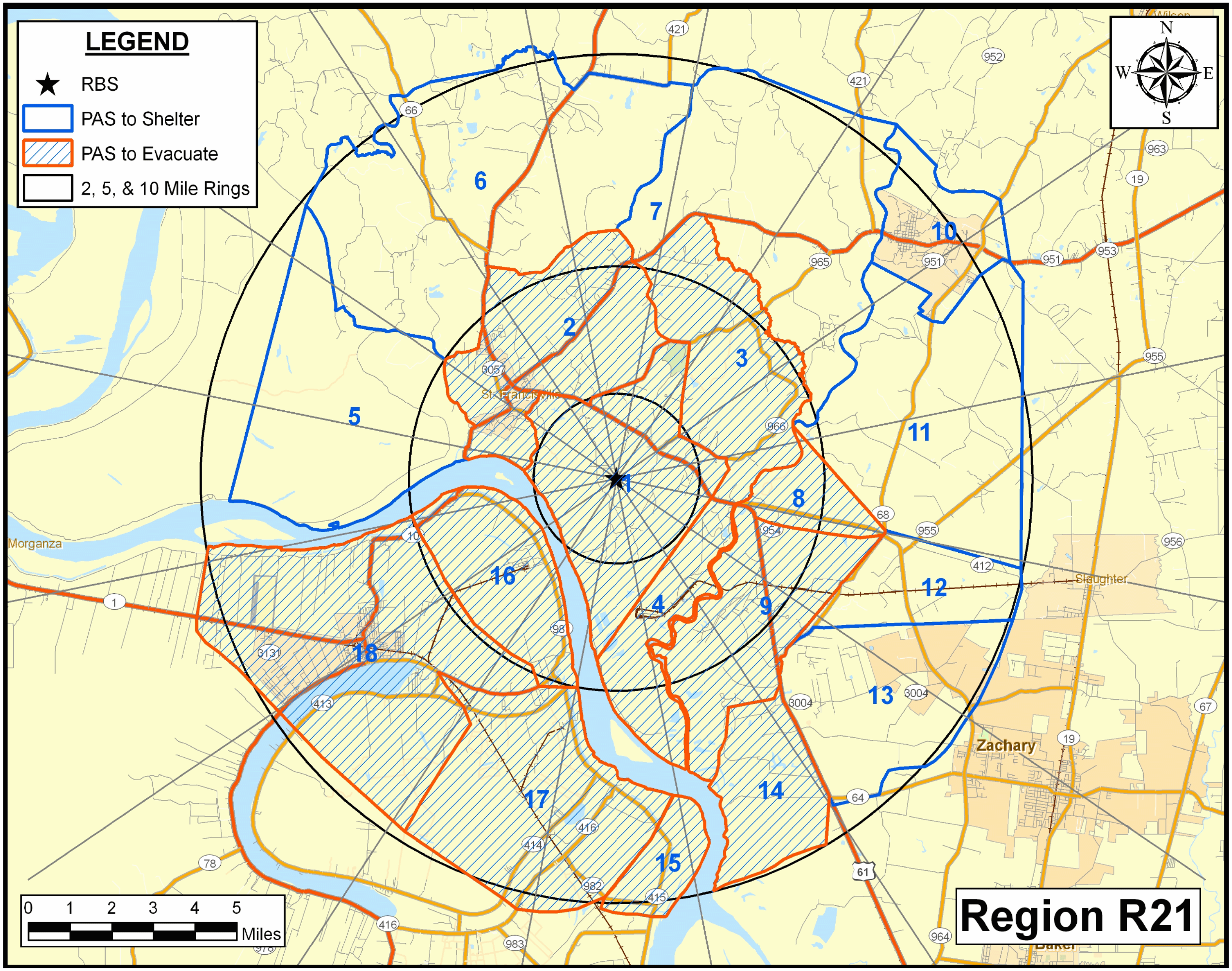
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PAS to Shelter
PAS to Evacuate
2, 5, & 10 Mile Rings
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Region R21
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Miles
Morganza
St. Francisville
Zachary
Slaughter
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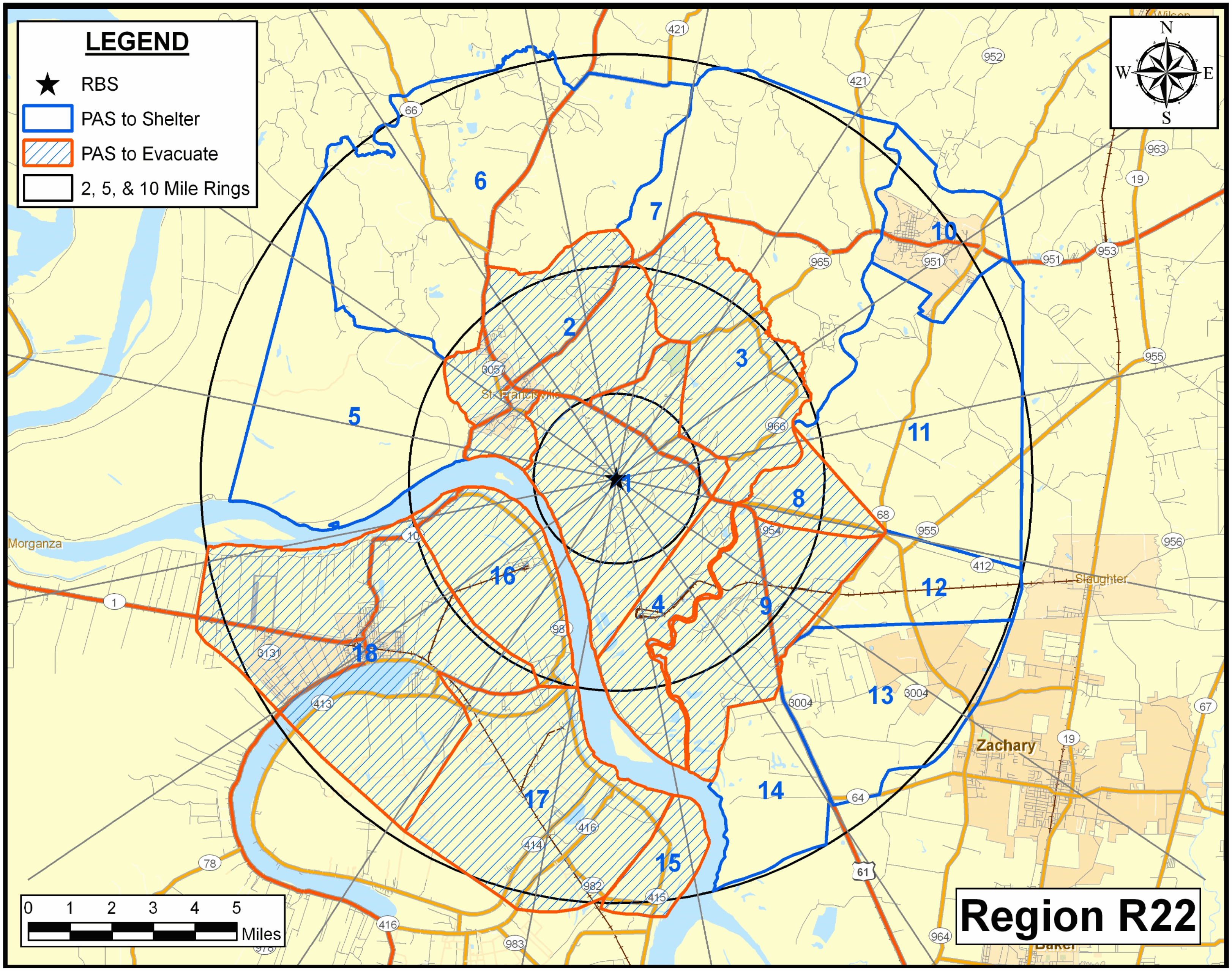
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PAS to Evacuate
2, 5, & 10 Mile Rings
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Region R22
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Miles
Morganza
Zachary
Slaughter
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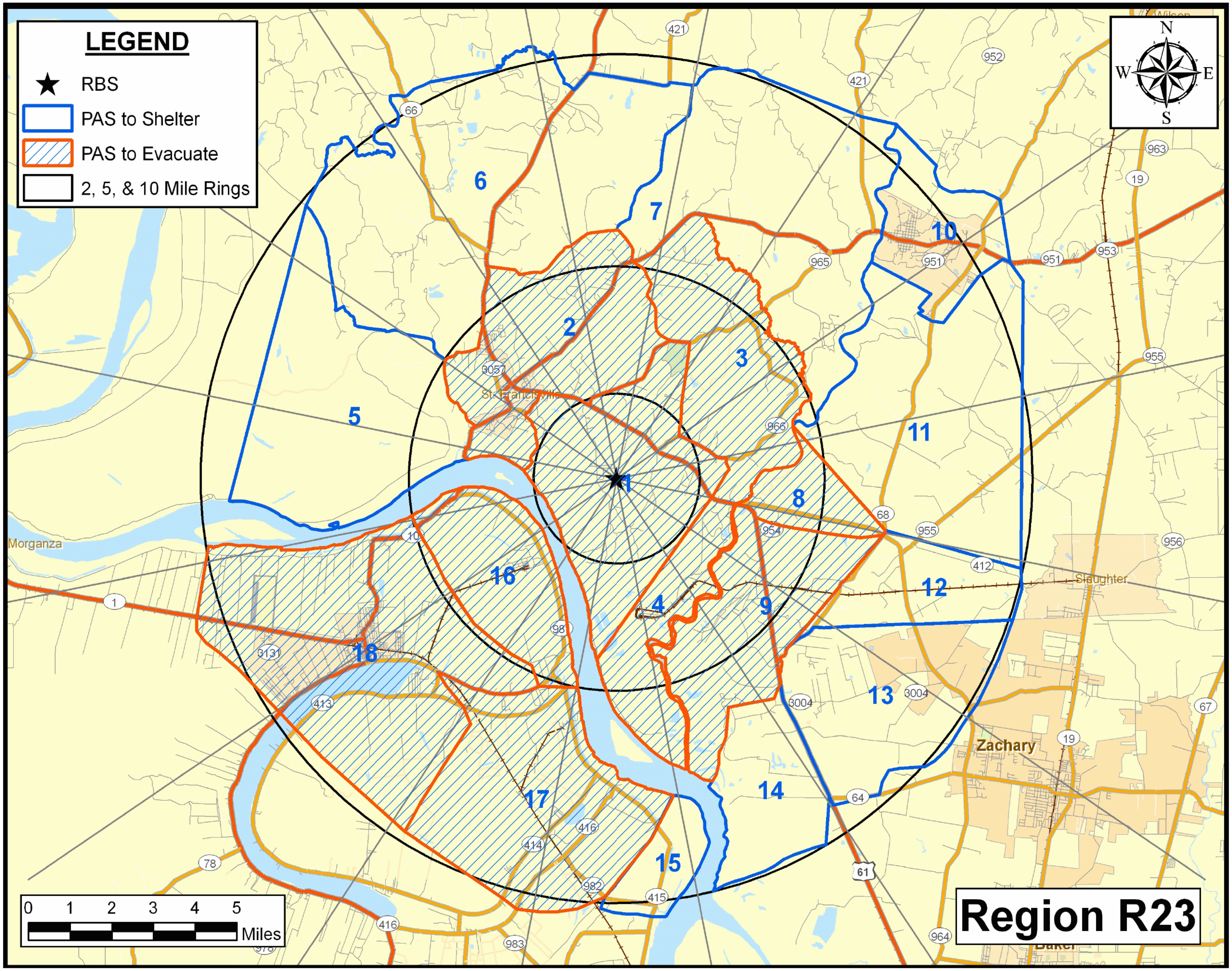

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PAS to Evacuate
2, 5, & 10 Mile Rings
Region R23
Zachary
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Slaughter
St. Francisville
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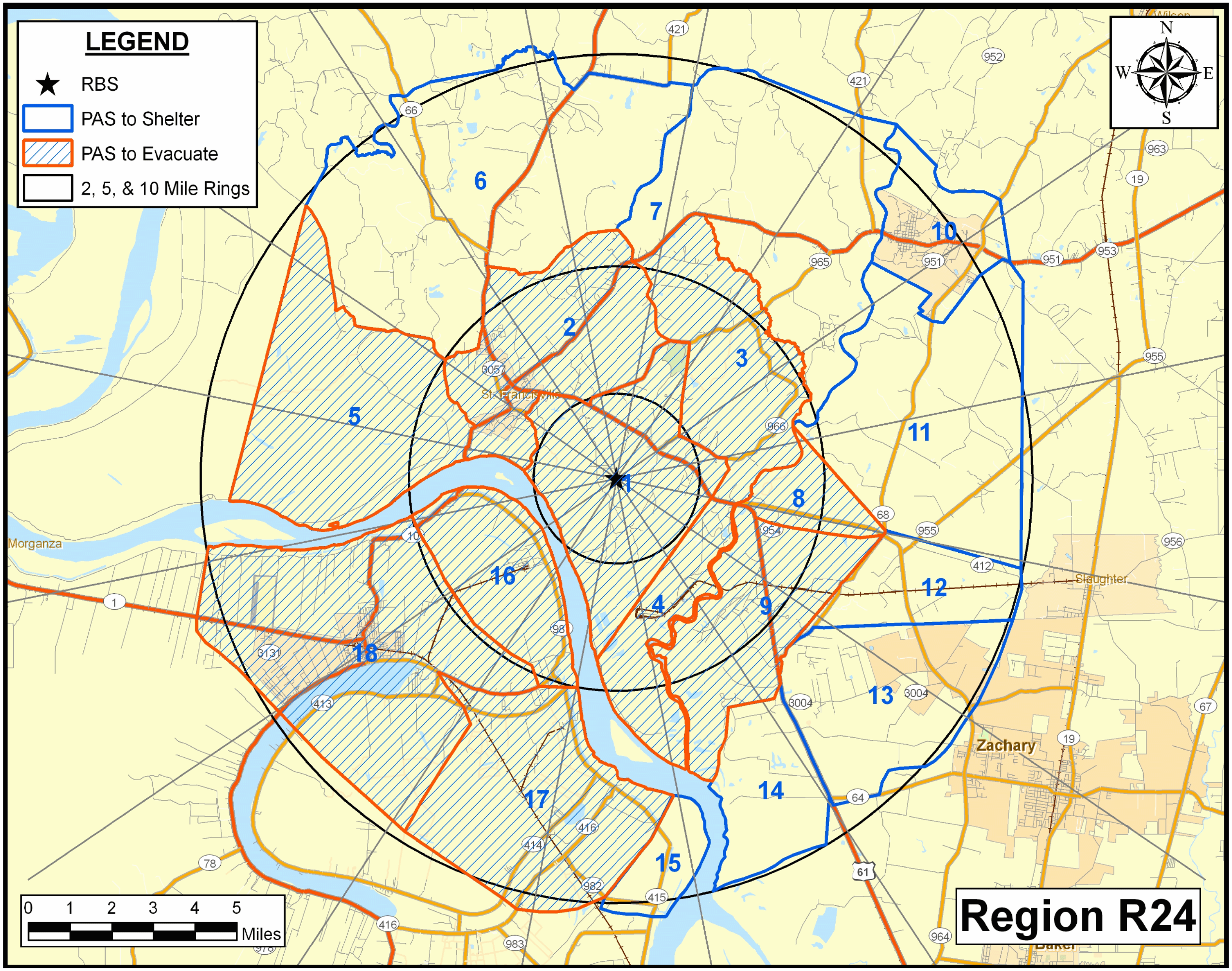

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PAS to Evacuate
2, 5, & 10 Mile Rings
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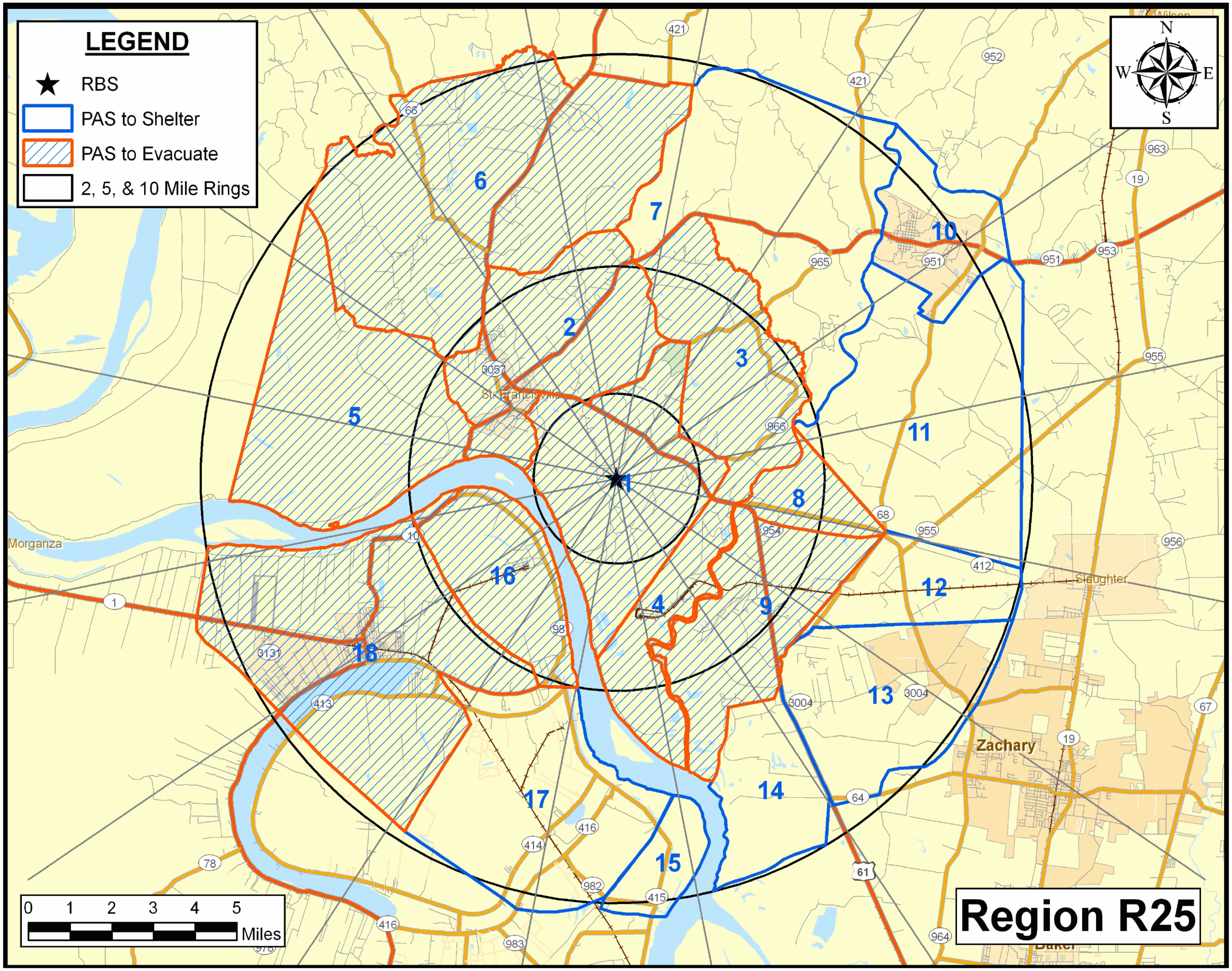
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PAS to Evacuate
2, 5, & 10 Mile Rings
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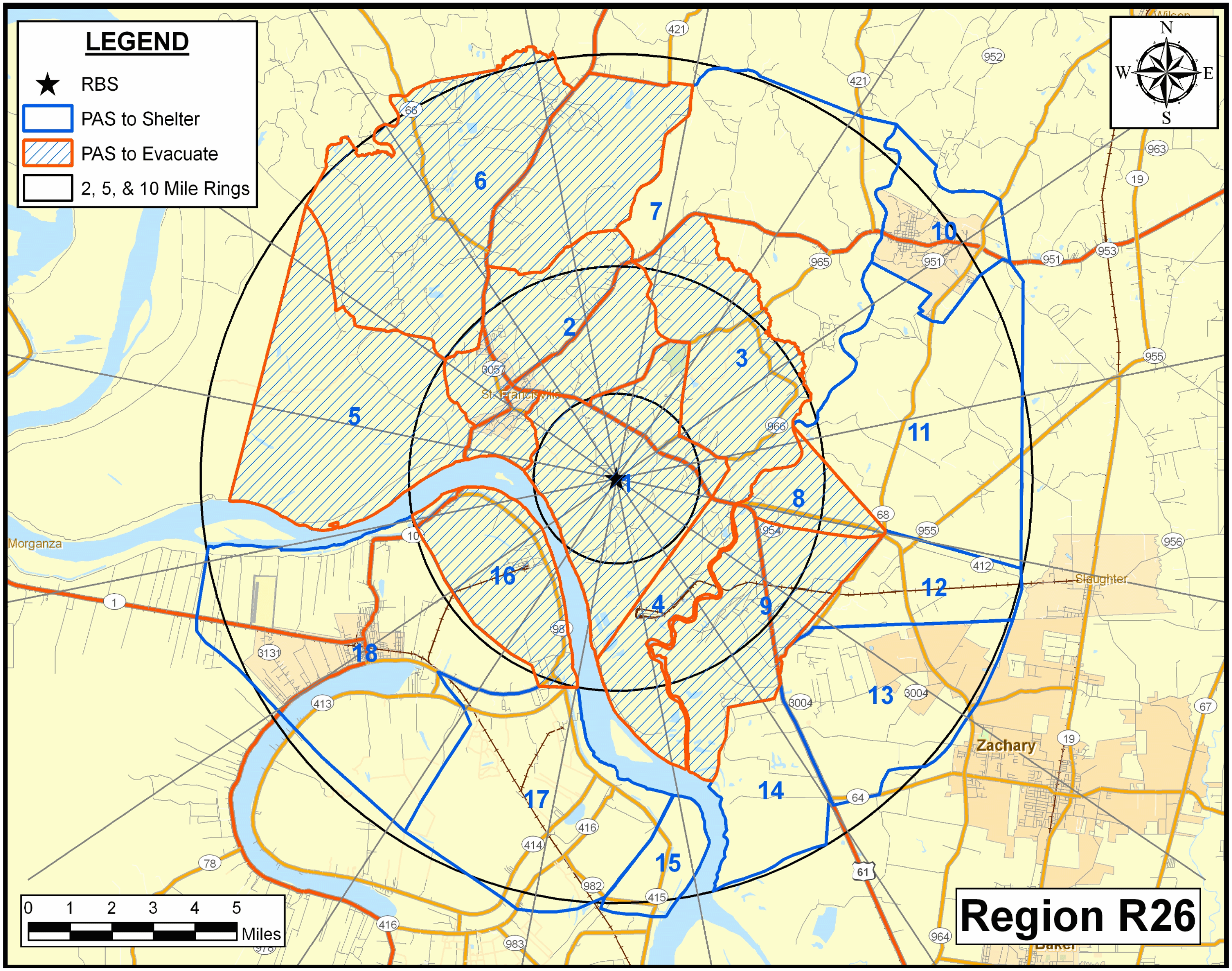
Zachary
St. Francisville
0 1 2 3 4 5
Miles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PAS to Evacuate
2, 5, & 10 Mile Rings
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Region R26
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Miles
Morganza
Zachary
Slaughter
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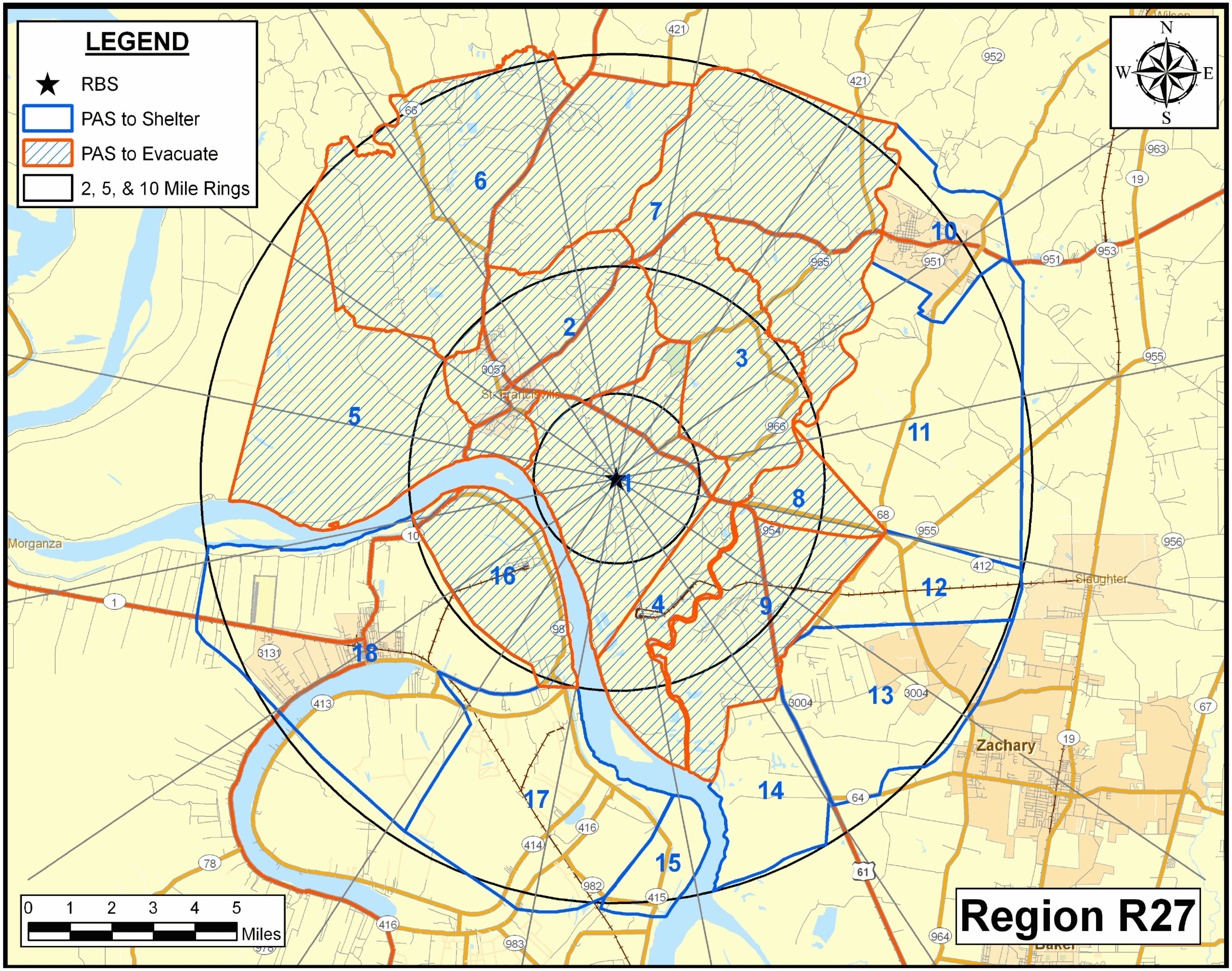

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PAS to Evacuate
2, 5, & 10 Mile Rings
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Region R27
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Miles
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St. Francisville
Morganza
Zachary
Slaughter

APPENDIX I

Evacuation Sensitivity Studies

APPENDIX I: EVACUATION SENSITIVITY STUDIES

A sensitivity study was performed to determine whether changes in the estimated trip generation time have an effect upon the Evacuation Time Estimate (ETE) for the entire EPZ. The case considered was Scenario 6, Region 3; a winter, midweek, midday, good weather evacuation for the entire EPZ. Table I-1 presents the results of this study.

Table I-1. Evacuation Time Estimates for Trip Generation Sensitivity Study

Trip Generation Period	Evacuation Region		
	2-Mile Region (R01)	5-Mile Region (R02)	Entire EPZ (R03)
4:00	4:00	4:05	4:10
5:00	5:00	5:05	5:10
5:30 (Base)	5:20	5:30	5:40
6:30	6:30	6:30	6:35

NOTE: Trip generation and Evacuation Times presented in HH:MM format.

The results confirm the importance of accurately estimating the trip generation times. The ETE closely mirror the values for the time the last evacuation trip is generated. The mobilization time determines the ETE for most rural plants as there is limited traffic congestion during the evacuation. There is traffic congestion near the EPZ boundary along LA Highway 10 eastbound; however, that congestion dissipates approximately 3 hours and 40 minutes after the advisory to evacuate. **These results indicate that programs to educate the public and encourage them toward faster responses for a radiological emergency can reduce evacuation time.**

A sensitivity study was conducted to determine the effect on ETE of changes in the percentage of people who decide to relocate from the Shadow Region. The movement of people in the Shadow Region has the potential to impede vehicles evacuating from an Evacuation Region within the EPZ.

The case considered is Scenario 6, Region 3; a winter, midweek, midday, good weather evacuation for the entire EPZ with the percent of shadow evacuation ranging from 15% to 60%. Table I-2 presents the ETE for each of these cases. The ETE for all regions remains unchanged as the percentage of people who decide to relocate from areas within the shadow region increases from 15% to 60%, showing the insensitivity of the ETE to shadow evacuation. The animation of the evacuation process indicates increased congestion in the Shadow Region, especially near Zachary; however, that congestion does not delay those evacuating from within the EPZ. There are a total of 30,824 people (18,717 vehicles) living in the Shadow Region.

Table I-2. Evacuation Time Estimates for Shadow Sensitivity Study

Shadow Data			Evacuation Region		
Percent Shadow Evacuation	**Number of Shadow Residents**	**Number of Shadow Resident Vehicles**	**2-Mile Region (R01)**	**5-Mile Region (R02)**	**Entire EPZ (R03)**
15	4,624	2,808	5:20	5:30	5:40
30 (Base)	9,247	5,615	5:20	5:30	5:40
60	18,494	11,230	5:20	5:30	5:40

NOTE: Evacuation Times presented in HH:MM format.

APPENDIX J

Evacuation Time Estimates for All Evacuation Regions and Scenarios
And
Evacuation Time Graphs for Region R03, for all Scenarios

APPENDIX J: EVACUATION TIME ESTIMATES FOR ALL EVACUATION REGIONS AND SCENARIOS

AND

EVACUATION TIME GRAPHS FOR REGION R03, FOR ALL SCENARIOS

This appendix presents the ETE Results for all 27 Regions and all 11 Scenarios (Tables J-1A through J-1D).

Plots of Evacuating Vehicles vs. Elapsed Time leaving the 2-mile and 5-mile circular areas around RBS and the entire EPZ for Region R03, for all 11 scenarios are presented. Each plot has points indicating the evacuation times corresponding to the 50^{th}, 90^{th}, and 95^{th} percentiles of evacuated vehicles.

J.1 Guidance on Using ETE Tables

Tables J-1A through J-1D present the ETE values for all 27 Evacuation Regions and all 11 Evacuation Scenarios. They are organized as follows:

Table	Contents
J-1A	ETE represents the elapsed time required for 50 percent of the population within a Region, to evacuate from that Region.
J-1B	ETE represents the elapsed time required for 90 percent of the population within a Region, to evacuate from that Region.
J-1C	ETE represents the elapsed time required for 95 percent of the population within a Region, to evacuate from that Region.
J-1D	ETE represents the elapsed time required for 100 percent of the population within a Region, to evacuate from that Region.

The user first determines the percentile of population for which the ETE is sought. The applicable value of ETE within the chosen Table may then be identified using the following procedure:

1. Identify the applicable **Scenario**:
   - The Season
     - Summer (schools not in session)
     - Winter (also Autumn and Spring)
   - The Day of Week

- Midweek (work-day)
  - Weekend, Holiday
- The Time of Day
  - Midday (work and commuting hours)
  - Evening
- Weather Condition
  - Good Weather
  - Rain
- Special Event (if any)
  - New Plant Construction

While these Scenarios are designed, in aggregate, to represent conditions throughout the year, some further clarification is warranted:

- The conditions of a summer evening (either midweek or weekend) and rain are not explicitly identified in Tables J-1A through J-1D. For these conditions, Scenario (4) applies.
- The conditions of a winter evening (either midweek or weekend) and rain are not explicitly identified in Tables J-1A through J-1D. For these conditions, Scenario (9) applies.
- The seasons are defined as follows:
  - Summer implies that public schools are not in session.
  - Winter, Spring and Autumn imply that public schools are in session.
- Time of Day: Midday implies the time over which most commuters are at work.

2. With the Scenario (and column in the Table) identified, now identify the **Evacuation Region**:
   - Determine the projected azimuth direction of the plume (coincident with the wind direction). This direction is expressed in terms of compass orientation: *towards* N, NNE, NE, …
   - Determine the distance that the Evacuation Region will extend from RBS. The applicable distances and their associated candidate Regions are given below:
     - 2 Miles (Region R01)
     - 5 Miles (Regions R02 and R04 through R13)
     - to EPZ Boundary (Regions R03 and R14 through R27)
   - Enter Table J-2 and identify the applicable group of candidate Regions based on the wind direction and on the distance that the selected Region extends from RBS. Select the Evacuation Region identifier in that row from the first column of the Table.

3. Determine the **ETE for the Scenario** identified in Step 1 and the Region identified in Step 2, as follows:
   - The columns of Table J-1 are labeled with the Scenario numbers. Identify the proper column in the selected Table using the Scenario number determined in Step 1.
   - Identify the row in this table that provides ETE values for the Region identified in Step 2.
   - The unique data cell defined by the column and row so determined contains the desired value of ETE expressed in Hours:Minutes.

<u>Example</u>

It is desired to identify the ETE for the following conditions:

- Sunday, August 10th at 4:00 AM.
- It is raining.
- Wind direction is *towards* the northeast (NE).
- Wind speed is such that the distance to be evacuated is judged to be 10 miles (to EPZ boundary).
- The desired ETE is that value needed to evacuate 95 percent of the population from within the impacted Region.

Table J-1C is applicable because the 95th-percentile population is desired. Proceed as follows:

1. Identify the Scenario as summer, weekend, evening and raining. Entering Table J-1C, it is seen that there is no match for these descriptors. However, the clarification given above assigns this combination of circumstances to Scenario 4.

2. Enter Table J-2 and locate the group entitled “Evacuate 5-Mile Ring and Downwind to EPZ Boundary”. Under “Wind Direction”, identify the NE (northeast) azimuth and read REGION R16 in the first column of that row.

3. Enter Table J-1C to locate the data cell containing the value of ETE for Scenario 4 and Region R16. This data cell is in column (4) and in the row for Region R16; it contains the ETE value of **3:10**.

Table J-1A Time To Clear The Indicated Area of 50 Percent of the Affected Population

	Summer		Summer		Summer		Winter		Winter		Winter		Winter
	Midweek		Weekend		Midweek Weekend		Midweek		Weekend		Midweek Weekend		Weekend
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	Scenario:	(11)
Region Wind Towards:	Midday		Midday		Evening	Region Wind Towards:	Midday		Midday		Evening	Region Wind Towards:	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather		Good Weather	Rain	Good Weather	Rain	Good Weather		New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ													
R01 2-mile ring	1:00	1:00	0:55	1:00	1:00	R01 2-mile ring	1:00	1:00	0:55	0:55	1:00	R01 2-mile ring	1:05
R02 5-mile ring	1:15	1:15	1:05	1:05	1:05	R02 5-mile ring	1:15	1:15	1:05	1:10	1:05	R02 5-mile ring	1:15
R03 Entire EPZ	1:25	1:30	1:15	1:20	1:15	R03 Entire EPZ	1:30	1:30	1:20	1:25	1:15	R03 Entire EPZ	1:25
2-Mile Ring and Downwind to 5 Miles													
R04 N, NNE	1:10	1:15	1:05	1:05	1:05	R04 N, NNE	1:10	1:15	1:05	1:10	1:05	R04 N, NNE	1:15
R05 NE	1:05	1:05	1:00	1:00	1:00	R05 NE	1:00	1:05	0:55	1:00	1:00	R05 NE	1:10
R06 ENE	1:05	1:05	1:00	1:00	1:00	R06 ENE	1:05	1:05	1:00	1:00	1:00	R06 ENE	1:10
R07 E, ESE	1:10	1:10	1:00	1:00	1:00	R07 E, ESE	1:05	1:05	1:00	1:00	1:00	R07 E, ESE	1:10
R08 SE, SSE	1:05	1:05	1:00	1:00	1:00	R08 SE, SSE	1:05	1:05	1:00	1:00	1:00	R08 SE, SSE	1:10
R09 S	1:05	1:05	1:00	1:00	1:00	R09 S	1:05	1:05	1:00	1:00	1:00	R09 S	1:10
R10 SSW	1:00	1:05	0:55	1:00	1:00	R10 SSW	1:00	1:00	0:55	0:55	1:00	R10 SSW	1:05
R11 SW, WSW	1:00	1:00	0:55	1:00	1:00	R11 SW, WSW	1:00	1:00	0:55	0:55	1:00	R11 SW, WSW	1:05
R12 W	1:10	1:15	1:05	1:05	1:05	R12 W	1:10	1:15	1:05	1:10	1:05	R12 W	1:15
R13 WNW, NW, NNW	1:10	1:15	1:05	1:05	1:05	R13 WNW, NW, NNW	1:10	1:15	1:05	1:10	1:05	R13 WNW, NW, NNW	1:15
5-Mile Ring and Downwind to EPZ Boundary													
R14 N	1:20	1:20	1:10	1:10	1:05	R14 N	1:20	1:20	1:10	1:15	1:10	R14 N	1:15
R15 NNE	1:25	1:30	1:15	1:20	1:15	R15 NNE	1:25	1:30	1:20	1:25	1:15	R15 NNE	1:25
R16 NE, ENE	1:25	1:30	1:15	1:20	1:15	R16 NE, ENE	1:25	1:30	1:20	1:25	1:15	R16 NE, ENE	1:25
R17 E	1:25	1:30	1:15	1:20	1:15	R17 E	1:25	1:30	1:20	1:25	1:15	R17 E	1:25
R18 ESE	1:15	1:20	1:05	1:05	1:05	R18 ESE	1:15	1:20	1:05	1:10	1:05	R18 ESE	1:15
R19 SE	1:15	1:20	1:05	1:05	1:05	R19 SE	1:15	1:20	1:05	1:10	1:05	R19 SE	1:15
R20 SSE	1:15	1:20	1:05	1:05	1:05	R20 SSE	1:15	1:20	1:05	1:10	1:05	R20 SSE	1:15
R21 S	1:20	1:25	1:10	1:10	1:10	R21 S	1:20	1:25	1:10	1:15	1:10	R21 S	1:15
R22 SSW	1:20	1:25	1:10	1:10	1:10	R22 SSW	1:25	1:25	1:10	1:15	1:10	R22 SSW	1:15
R23 SW	1:20	1:25	1:10	1:10	1:10	R23 SW	1:25	1:25	1:10	1:15	1:10	R23 SW	1:15
R24 WSW	1:20	1:25	1:10	1:10	1:10	R24 WSW	1:25	1:25	1:10	1:15	1:10	R24 WSW	1:15
R25 W	1:25	1:25	1:10	1:15	1:10	R25 W	1:25	1:25	1:10	1:15	1:10	R25 W	1:15
R26 WNW, NW	1:15	1:20	1:05	1:10	1:05	R26 WNW, NW	1:20	1:20	1:05	1:10	1:05	R26 WNW, NW	1:15
R27 NNW	1:20	1:20	1:10	1:10	1:05	R27 NNW	1:20	1:20	1:10	1:15	1:10	R27 NNW	1:15

Table J-1B Time To Clear The Indicated Area of 90 Percent of the Affected Population

	Summer		Summer		Summer		Winter		Winter		Winter		Winter
	Midweek		Weekend		Midweek Weekend		Midweek		Weekend		Midweek Weekend		Weekend
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	Scenario:	(11)
Region Wind Towards:	Midday		Midday		Evening	Region Wind Towards:	Midday		Midday		Evening	Region Wind Towards:	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather		Good Weather	Rain	Good Weather	Rain	Good Weather		New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ													
R01 2-mile ring	1:50	1:50	1:45	1:45	1:45	R01 2-mile ring	1:45	1:50	1:40	1:45	1:45	R01 2-mile ring	2:20
R02 5-mile ring	2:30	2:30	2:00	2:10	2:10	R02 5-mile ring	2:30	2:30	2:10	2:20	2:10	R02 5-mile ring	2:30
R03 Entire EPZ	3:00	3:05	2:40	2:50	2:40	R03 Entire EPZ	3:00	3:10	2:45	2:55	2:50	R03 Entire EPZ	2:50
2-Mile Ring and Downwind to 5 Miles													
R04 N, NNE	2:20	2:20	2:00	2:10	2:10	R04 N, NNE	2:20	2:25	2:10	2:20	2:10	R04 N, NNE	2:25
R05 NE	1:55	1:55	1:45	1:45	1:50	R05 NE	1:55	1:55	1:45	1:45	1:50	R05 NE	2:30
R06 ENE	1:55	2:00	1:45	1:50	1:50	R06 ENE	1:55	1:55	1:45	1:45	1:50	R06 ENE	2:30
R07 E, ESE	2:00	2:00	1:50	1:50	1:55	R07 E, ESE	2:00	2:00	1:50	1:50	1:50	R07 E, ESE	2:30
R08 SE, SSE	2:00	2:00	1:45	1:50	1:50	R08 SE, SSE	1:55	1:55	1:45	1:50	1:50	R08 SE, SSE	2:30
R09 S	2:00	2:00	1:50	1:50	1:55	R09 S	2:00	2:00	1:45	1:50	1:50	R09 S	2:30
R10 SSW	1:55	1:55	1:45	1:45	1:50	R10 SSW	1:50	1:55	1:45	1:45	1:50	R10 SSW	2:30
R11 SW, WSW	1:50	1:55	1:45	1:45	1:50	R11 SW, WSW	1:50	1:55	1:40	1:45	1:45	R11 SW, WSW	2:20
R12 W	2:20	2:20	2:00	2:10	2:10	R12 W	2:20	2:25	2:10	2:20	2:00	R12 W	2:25
R13 WNW, NW, NNW	2:20	2:20	2:00	2:10	2:10	R13 WNW, NW, NNW	2:20	2:25	2:10	2:20	2:00	R13 WNW, NW, NNW	2:25
5-Mile Ring and Downwind to EPZ Boundary													
R14 N	2:40	2:40	2:10	2:20	2:20	R14 N	2:40	2:40	2:20	2:25	2:20	R14 N	2:30
R15 NNE	2:50	3:05	2:40	2:50	2:40	R15 NNE	3:00	3:10	2:40	3:00	2:50	R15 NNE	2:50
R16 NE, ENE	2:50	3:05	2:40	2:50	2:40	R16 NE, ENE	3:00	3:10	2:45	2:55	2:50	R16 NE, ENE	2:50
R17 E	2:50	3:05	2:40	2:50	2:40	R17 E	3:00	3:10	2:45	2:55	2:50	R17 E	2:50
R18 ESE	2:30	2:40	2:05	2:10	2:20	R18 ESE	2:30	2:30	2:10	2:20	2:10	R18 ESE	2:30
R19 SE	2:30	2:30	2:05	2:10	2:20	R19 SE	2:30	2:30	2:10	2:20	2:10	R19 SE	2:30
R20 SSE	2:30	2:40	2:05	2:10	2:20	R20 SSE	2:30	2:30	2:10	2:20	2:10	R20 SSE	2:30
R21 S	2:50	2:50	2:15	2:20	2:20	R21 S	2:50	2:50	2:20	2:30	2:20	R21 S	2:30
R22 SSW	2:50	2:50	2:15	2:20	2:20	R22 SSW	2:50	2:50	2:20	2:30	2:20	R22 SSW	2:30
R23 SW	2:50	2:50	2:15	2:20	2:20	R23 SW	2:50	2:50	2:20	2:30	2:20	R23 SW	2:30
R24 WSW	2:50	2:50	2:15	2:20	2:20	R24 WSW	2:50	2:50	2:20	2:30	2:20	R24 WSW	2:30
R25 W	2:50	2:50	2:20	2:25	2:20	R25 W	2:50	2:50	2:20	2:30	2:20	R25 W	2:30
R26 WNW, NW	2:40	2:40	2:10	2:20	2:20	R26 WNW, NW	2:30	2:40	2:20	2:30	2:10	R26 WNW, NW	2:30
R27 NNW	2:40	2:40	2:10	2:20	2:20	R27 NNW	2:40	2:40	2:20	2:30	2:20	R27 NNW	2:30

Table J-1C Time To Clear The Indicated Area of 95 Percent of the Affected Population

	Summer		Summer		Summer		Winter		Winter		Winter		Winter
	Midweek		Weekend		Midweek Weekend		Midweek		Weekend		Midweek Weekend		Weekend
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	Scenario:	(11)
Region Wind Towards:	Midday		Midday		Evening	Region Wind Towards:	Midday		Midday		Evening	Region Wind Towards:	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather		Good Weather	Rain	Good Weather	Rain	Good Weather		New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ													
R01 2-mile ring	2:10	2:10	1:50	1:55	2:10	R01 2-mile ring	2:10	2:10	1:50	1:50	2:00	R01 2-mile ring	2:50
R02 5-mile ring	3:10	3:10	2:30	2:30	3:00	R02 5-mile ring	3:10	3:10	2:30	2:35	2:50	R02 5-mile ring	3:00
R03 Entire EPZ	3:40	3:50	3:10	3:20	3:20	R03 Entire EPZ	3:40	3:40	3:10	3:20	3:20	R03 Entire EPZ	3:10
2-Mile Ring and Downwind to 5 Miles													
R04 N, NNE	3:10	3:10	2:30	2:30	2:50	R04 N, NNE	3:10	3:10	2:25	2:35	2:50	R04 N, NNE	2:50
R05 NE	2:30	2:30	2:00	2:00	2:20	R05 NE	2:30	2:30	2:00	2:00	2:20	R05 NE	2:50
R06 ENE	2:30	2:30	2:00	2:00	2:20	R06 ENE	2:30	2:30	2:00	2:00	2:20	R06 ENE	2:50
R07 E, ESE	2:40	2:40	2:10	2:10	2:30	R07 E, ESE	2:40	2:40	2:10	2:10	2:20	R07 E, ESE	3:00
R08 SE, SSE	2:30	2:30	2:00	2:00	2:20	R08 SE, SSE	2:30	2:30	2:00	2:00	2:20	R08 SE, SSE	2:50
R09 S	2:40	2:40	2:10	2:10	2:20	R09 S	2:40	2:40	2:00	2:00	2:20	R09 S	2:50
R10 SSW	2:30	2:30	2:00	2:00	2:20	R10 SSW	2:30	2:30	2:00	2:00	2:20	R10 SSW	2:50
R11 SW, WSW	2:30	2:30	2:00	2:00	2:20	R11 SW, WSW	2:20	2:20	1:50	1:55	2:10	R11 SW, WSW	2:50
R12 W	3:10	3:10	2:30	2:30	2:50	R12 W	3:10	3:10	2:25	2:35	2:50	R12 W	2:50
R13 WNW, NW, NNW	3:00	3:00	2:20	2:20	2:50	R13 WNW, NW, NNW	3:00	3:00	2:25	2:35	2:40	R13 WNW, NW, NNW	2:50
5-Mile Ring and Downwind to EPZ Boundary													
R14 N	3:30	3:30	2:50	2:50	3:00	R14 N	3:30	3:30	2:40	2:40	3:00	R14 N	3:00
R15 NNE	3:40	3:40	3:00	3:10	3:10	R15 NNE	3:40	3:40	3:10	3:20	3:10	R15 NNE	3:10
R16 NE, ENE	3:40	3:40	3:00	3:10	3:10	R16 NE, ENE	3:30	3:30	3:10	3:20	3:10	R16 NE, ENE	3:10
R17 E	3:40	3:40	3:00	3:10	3:10	R17 E	3:40	3:40	3:10	3:20	3:10	R17 E	3:10
R18 ESE	3:20	3:20	2:40	2:40	3:10	R18 ESE	3:20	3:20	2:40	2:40	3:00	R18 ESE	3:00
R19 SE	3:20	3:20	2:40	2:40	3:00	R19 SE	3:20	3:20	2:30	2:40	3:00	R19 SE	3:00
R20 SSE	3:20	3:20	2:40	2:40	3:00	R20 SSE	3:20	3:20	2:30	2:40	3:00	R20 SSE	3:00
R21 S	3:40	3:40	3:00	3:00	3:10	R21 S	3:40	3:40	3:00	3:00	3:10	R21 S	3:00
R22 SSW	3:40	3:40	3:00	3:00	3:10	R22 SSW	3:40	3:40	3:00	3:00	3:10	R22 SSW	3:00
R23 SW	3:40	3:40	3:00	3:00	3:10	R23 SW	3:40	3:40	3:00	3:00	3:10	R23 SW	3:00
R24 WSW	3:40	3:40	3:00	3:00	3:10	R24 WSW	3:40	3:40	3:00	3:00	3:10	R24 WSW	3:00
R25 W	3:40	3:40	3:00	3:00	3:10	R25 W	3:40	3:40	3:00	3:00	3:10	R25 W	3:00
R26 WNW, NW	3:30	3:30	2:50	2:50	3:00	R26 WNW, NW	3:20	3:20	2:40	2:40	3:00	R26 WNW, NW	3:00
R27 NNW	3:30	3:30	2:50	2:50	3:00	R27 NNW	3:30	3:30	2:40	2:40	3:00	R27 NNW	3:00

Table J-1D Time To Clear The Indicated Area of 100 Percent of the Affected Population

	Summer		Summer		Summer		Winter		Winter		Winter		Winter
	Midweek		Weekend		Midweek Weekend		Midweek		Weekend		Midweek Weekend		Weekend
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	Scenario:	(11)
Region Wind Towards:	Midday Good Weather	Midday Rain	Midday Good Weather	Midday Rain	Evening Good Weather	Region Wind Towards:	Midday Good Weather	Midday Rain	Midday Good Weather	Midday Rain	Evening Good Weather	Region Wind Towards:	Midday New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ													
R01 2-mile ring	5:20	5:20	5:00	5:00	5:00	R01 2-mile ring	5:20	5:20	5:00	5:00	5:00	R01 2-mile ring	5:00
R02 5-mile ring	5:30	5:30	5:10	5:10	5:10	R02 5-mile ring	5:30	5:30	5:10	5:10	5:20	R02 5-mile ring	5:10
R03 Entire EPZ	5:40	5:40	5:30	5:30	5:30	R03 Entire EPZ	5:40	5:40	5:30	5:30	5:30	R03 Entire EPZ	5:30
2-Mile Ring and Downwind to 5 Miles													
R04 N, NNE	5:30	5:30	5:10	5:10	5:10	R04 N, NNE	5:30	5:30	5:10	5:10	5:20	R04 N, NNE	5:10
R05 NE	5:30	5:30	5:00	5:00	5:00	R05 NE	5:30	5:30	5:00	5:00	5:00	R05 NE	5:00
R06 ENE	5:30	5:30	5:00	5:00	5:00	R06 ENE	5:30	5:30	5:00	5:00	5:00	R06 ENE	5:00
R07 E, ESE	5:30	5:30	5:00	5:00	5:00	R07 E, ESE	5:30	5:30	5:00	5:00	5:00	R07 E, ESE	5:00
R08 SE, SSE	5:30	5:30	5:00	5:00	5:00	R08 SE, SSE	5:30	5:30	5:00	5:00	5:00	R08 SE, SSE	5:00
R09 S	5:30	5:30	5:00	5:00	5:00	R09 S	5:30	5:30	5:00	5:00	5:00	R09 S	5:00
R10 SSW	5:30	5:30	5:00	5:00	5:00	R10 SSW	5:30	5:30	5:00	5:00	5:00	R10 SSW	5:00
R11 SW, WSW	5:30	5:30	5:00	5:00	5:00	R11 SW, WSW	5:30	5:30	5:00	5:00	5:00	R11 SW, WSW	5:00
R12 W	5:30	5:30	5:10	5:10	5:10	R12 W	5:30	5:30	5:10	5:10	5:20	R12 W	5:10
R13 WNW, NW, NNW	5:30	5:30	5:10	5:10	5:10	R13 WNW, NW, NNW	5:30	5:30	5:10	5:10	5:20	R13 WNW, NW, NNW	5:10
5-Mile Ring and Downwind to EPZ Boundary													
R14 N	5:30	5:30	5:20	5:20	5:20	R14 N	5:30	5:30	5:20	5:30	5:30	R14 N	5:20
R15 NNE	5:40	5:40	5:30	5:30	5:30	R15 NNE	5:40	5:40	5:30	5:30	5:30	R15 NNE	5:30
R16 NE, ENE	5:40	5:40	5:20	5:20	5:20	R16 NE, ENE	5:40	5:40	5:20	5:20	5:20	R16 NE, ENE	5:20
R17 E	5:40	5:40	5:20	5:20	5:20	R17 E	5:40	5:40	5:20	5:20	5:30	R17 E	5:20
R18 ESE	5:30	5:30	5:20	5:20	5:20	R18 ESE	5:30	5:30	5:20	5:20	5:20	R18 ESE	5:20
R19 SE	5:30	5:40	5:10	5:10	5:10	R19 SE	5:30	5:40	5:10	5:10	5:20	R19 SE	5:10
R20 SSE	5:30	5:30	5:10	5:10	5:10	R20 SSE	5:30	5:30	5:10	5:10	5:20	R20 SSE	5:10
R21 S	5:30	5:40	5:20	5:20	5:20	R21 S	5:30	5:40	5:20	5:20	5:20	R21 S	5:20
R22 SSW	5:30	5:40	5:20	5:20	5:20	R22 SSW	5:30	5:40	5:20	5:20	5:20	R22 SSW	5:20
R23 SW	5:30	5:40	5:20	5:20	5:20	R23 SW	5:30	5:40	5:20	5:20	5:20	R23 SW	5:20
R24 WSW	5:30	5:40	5:30	5:30	5:20	R24 WSW	5:30	5:40	5:20	5:20	5:20	R24 WSW	5:20
R25 W	5:30	5:30	5:20	5:30	5:30	R25 W	5:30	5:40	5:30	5:30	5:30	R25 W	5:30
R26 WNW, NW	5:30	5:30	5:20	5:30	5:30	R26 WNW, NW	5:30	5:30	5:30	5:30	5:20	R26 WNW, NW	5:30
R27 NNW	5:30	5:30	5:20	5:30	5:30	R27 NNW	5:40	5:40	5:30	5:30	5:20	R27 NNW	5:30

Table J-2. Description of Evacuation Regions																			
		PAS																	
Region	**Description**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
R01	2 mile ring	■																	
R02	5-mile ring	■	■	■	■				■	■							■		
R03	Full EPZ	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Evacuate 2 mile ring and 5 miles downwind																			
		PAS																	
Region	**Wind Direction Towards:**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
R04	N, NNE	■	■	■															
R05	NE	■		■															
R06	ENE	■		■					■										
R07	E, ESE	■		■	■				■	■									
R08	SE, SSE	■			■					■									
R09	S	■			■					■							■		
R10	SSW	■			■												■		
R11	SW, WSW	■															■		
R12	W	■	■														■		
R13	WNW, NW, NNW	■	■																
Evacuate 5 mile ring and downwind to EPZ boundary																			
		PAS																	
Region	**Wind Direction Towards:**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
R14	N	■	■	■	■		■	■	■	■							■		
R15	NNE	■	■	■	■		■	■	■	■	■						■		
R16	NE, ENE	■	■	■	■			■	■	■	■	■					■		
R17	E	■	■	■	■			■	■	■	■	■	■	■			■		
R18	ESE	■	■	■	■				■	■		■	■	■	■		■		
R19	SE	■	■	■	■				■	■			■	■	■	■	■		
R20	SSE	■	■	■	■				■	■				■	■	■	■	■	
R21	S	■	■	■	■				■	■					■	■	■	■	■
R22	SSW	■	■	■	■				■	■						■	■	■	■
R23	SW	■	■	■	■				■	■							■	■	■
R24	WSW	■	■	■	■	■			■	■							■	■	■
R25	W	■	■	■	■	■	■		■	■							■		■
R26	WNW, NW	■	■	■	■	■	■		■	■							■		
R27	NNW	■	■	■	■	■	■	■	■	■							■		

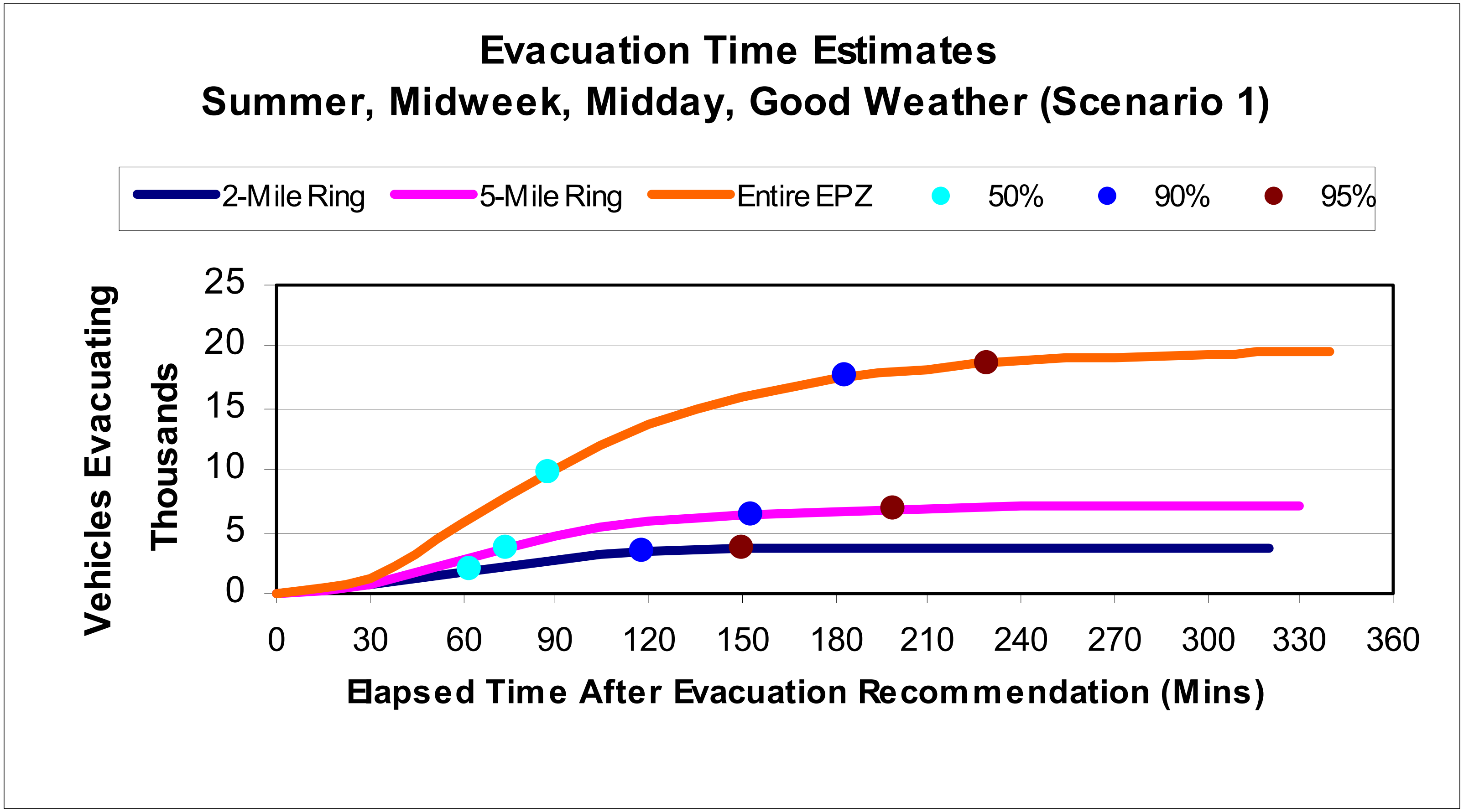

Figure J-1. Evacuation Time Estimates – Scenario 1 for Region R03 (Entire EPZ)

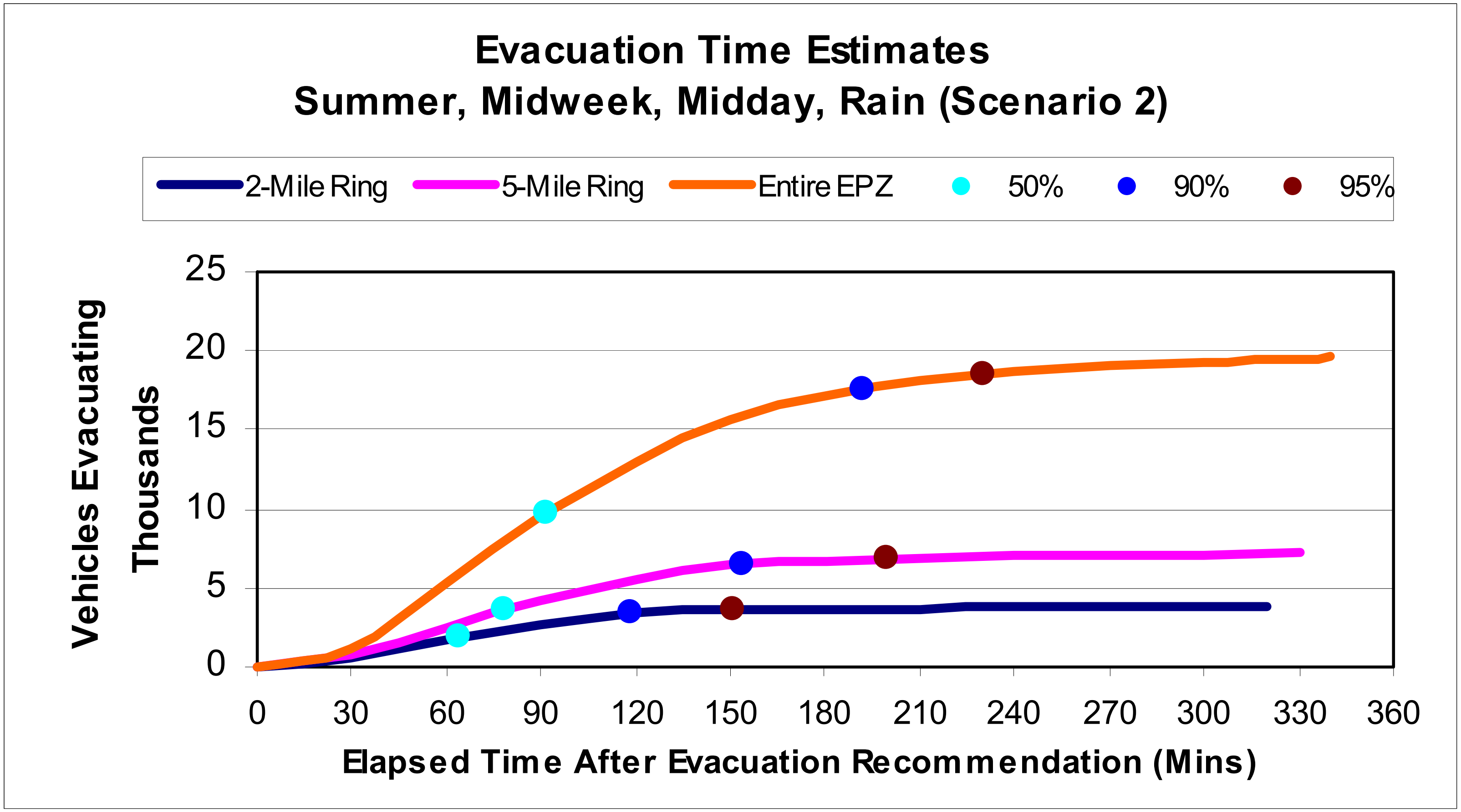

Figure J-2. Evacuation Time Estimates – Scenario 2 for Region R03 (Entire EPZ)

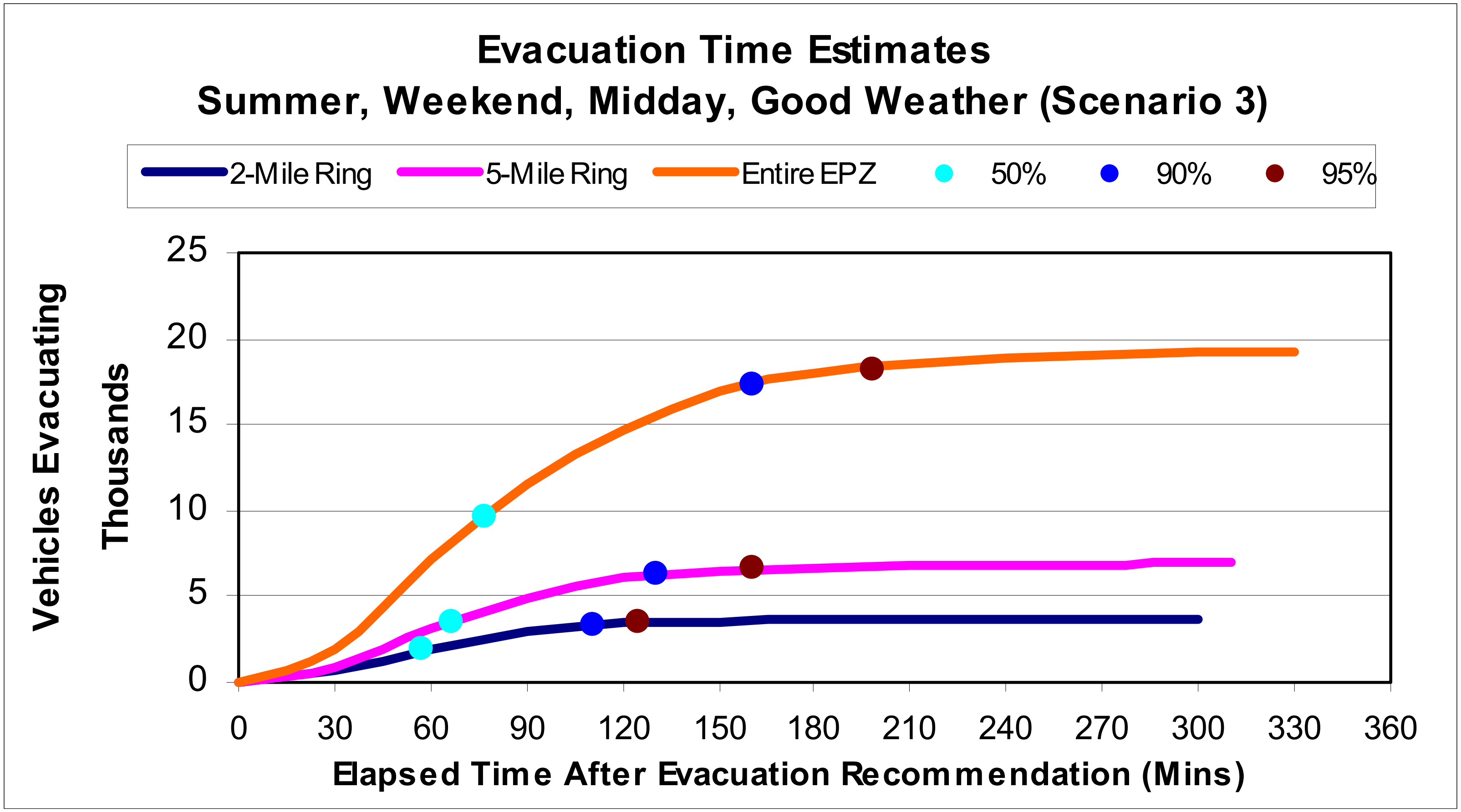

Figure J-3. Evacuation Time Estimates – Scenario 3 for Region R03 (Entire EPZ)

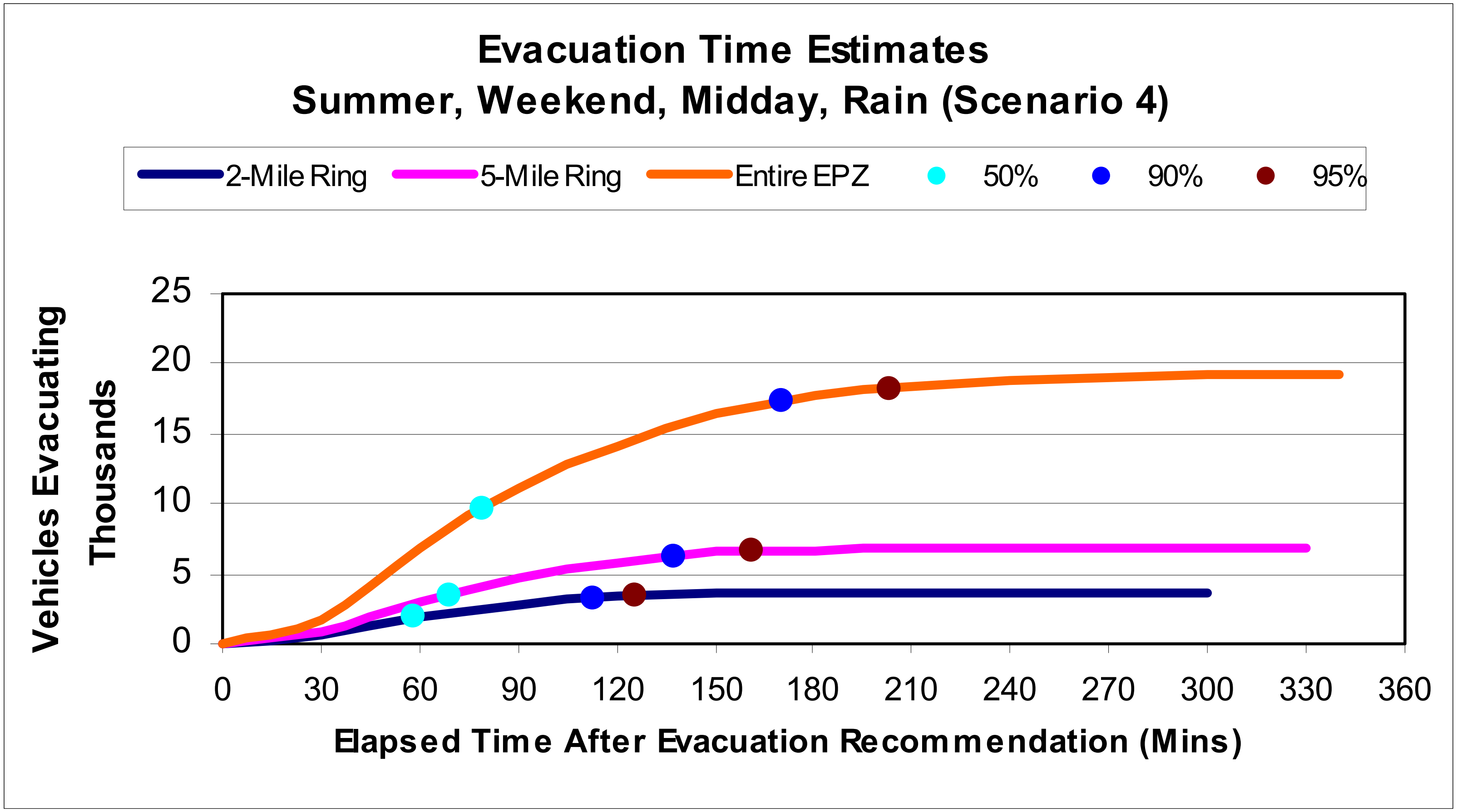

Figure J-4. Evacuation Time Estimates – Scenario 4 for Region R03 (Entire EPZ)

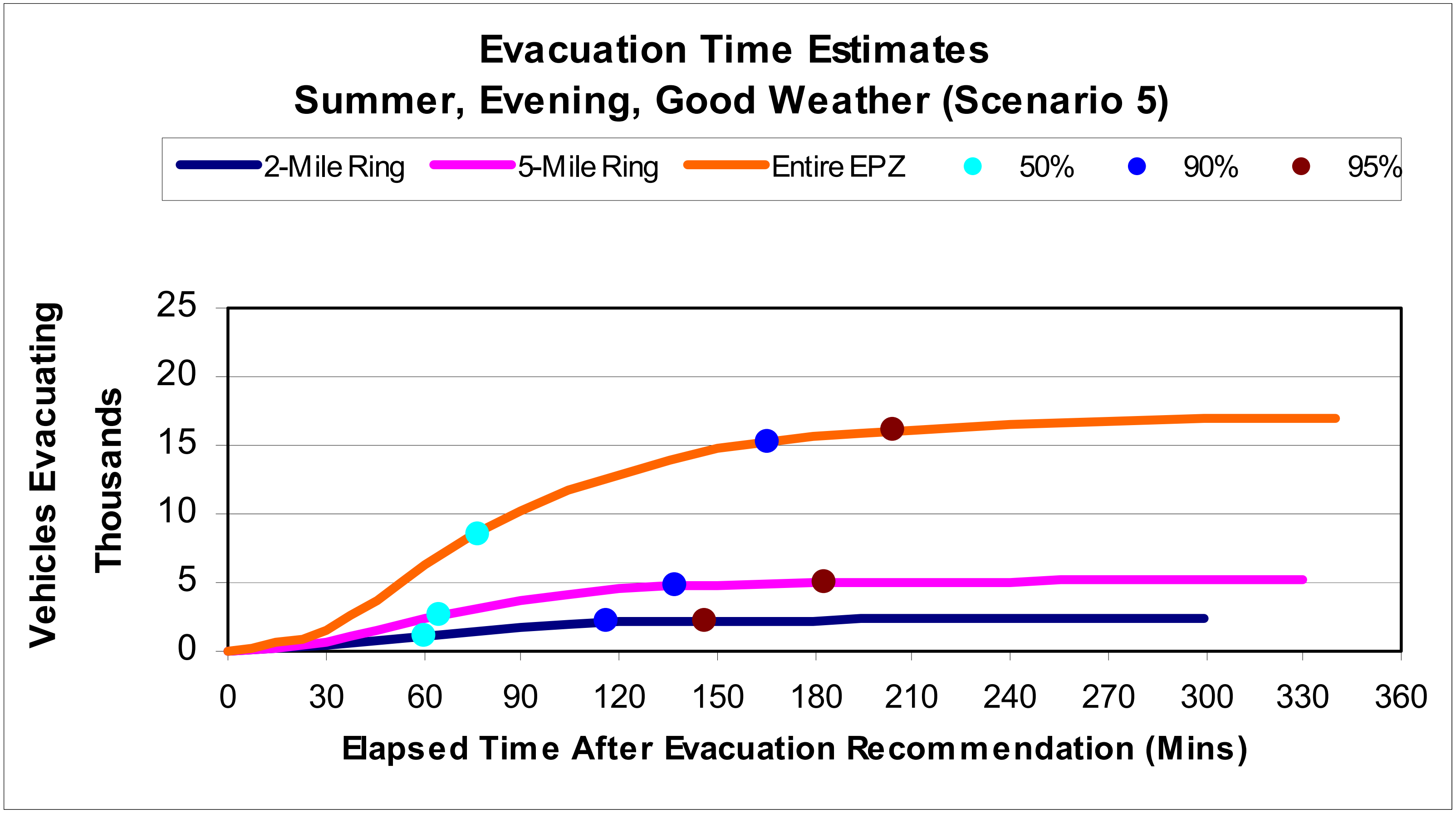

Figure J-5. Evacuation Time Estimates – Scenario 5 for Region R03 (Entire EPZ)

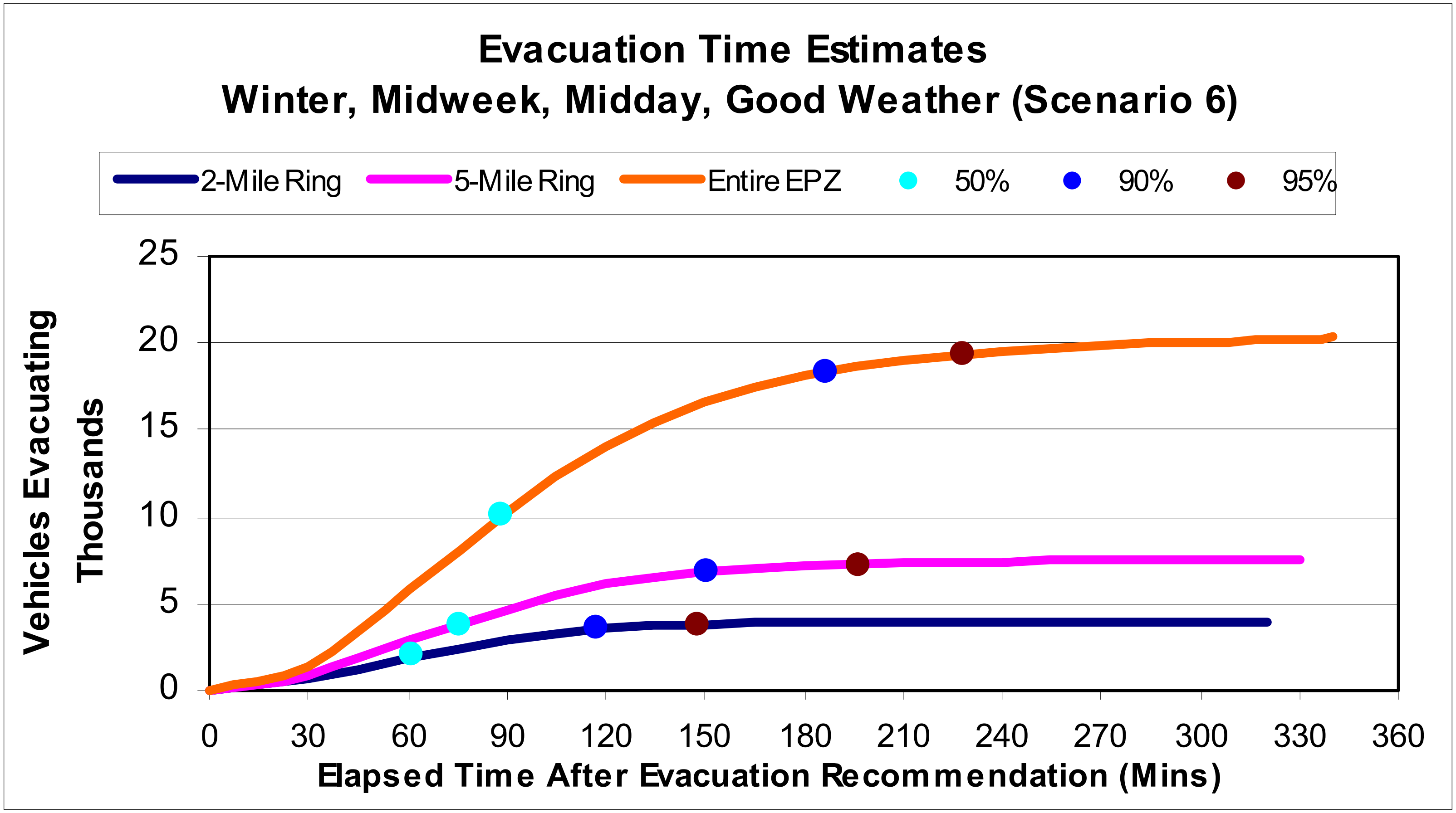

Figure J-6. Evacuation Time Estimates – Scenario 6 for Region R03 (Entire EPZ)

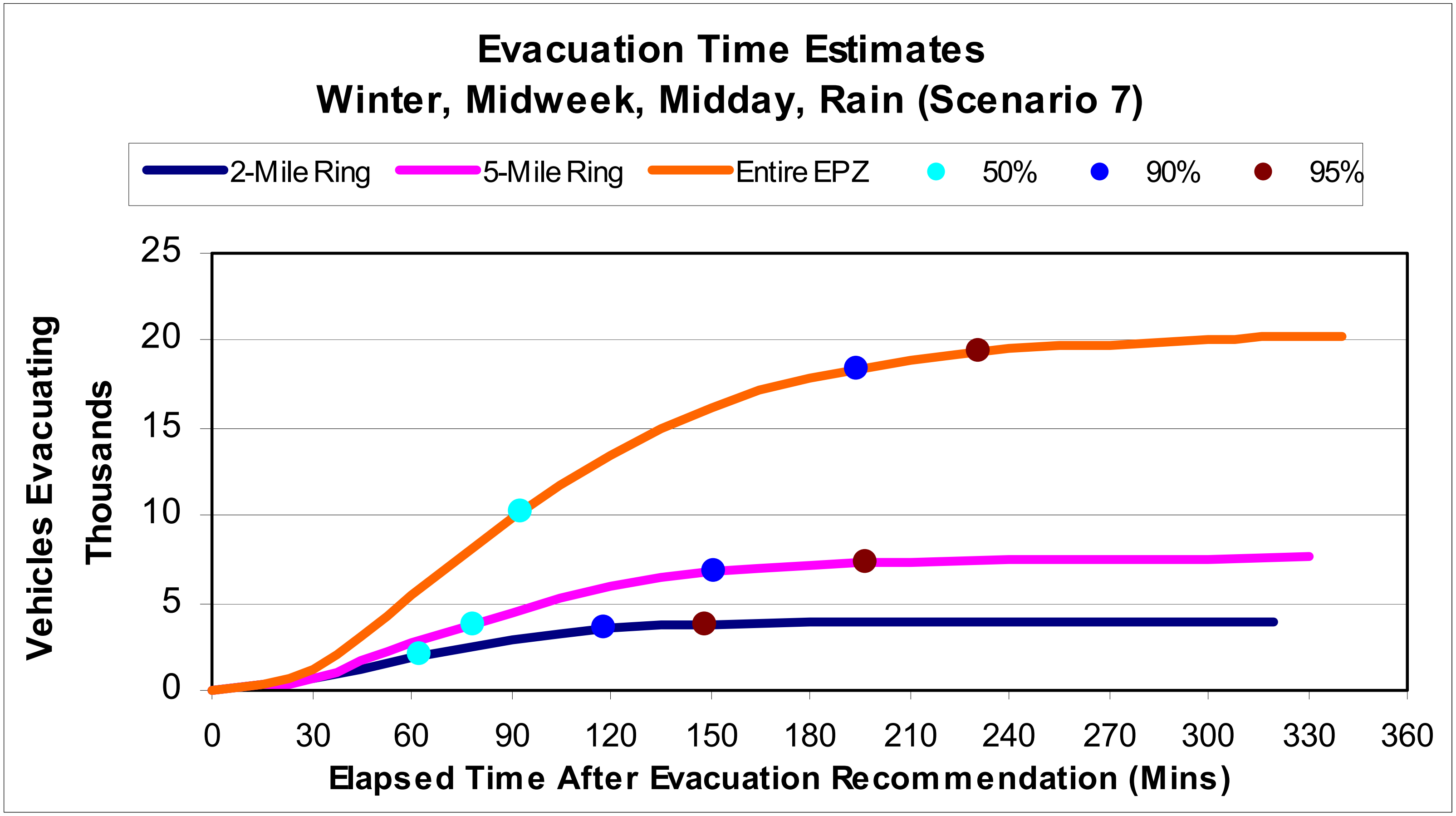

Figure J-7. Evacuation Time Estimates – Scenario 7 for Region R03 (Entire EPZ)

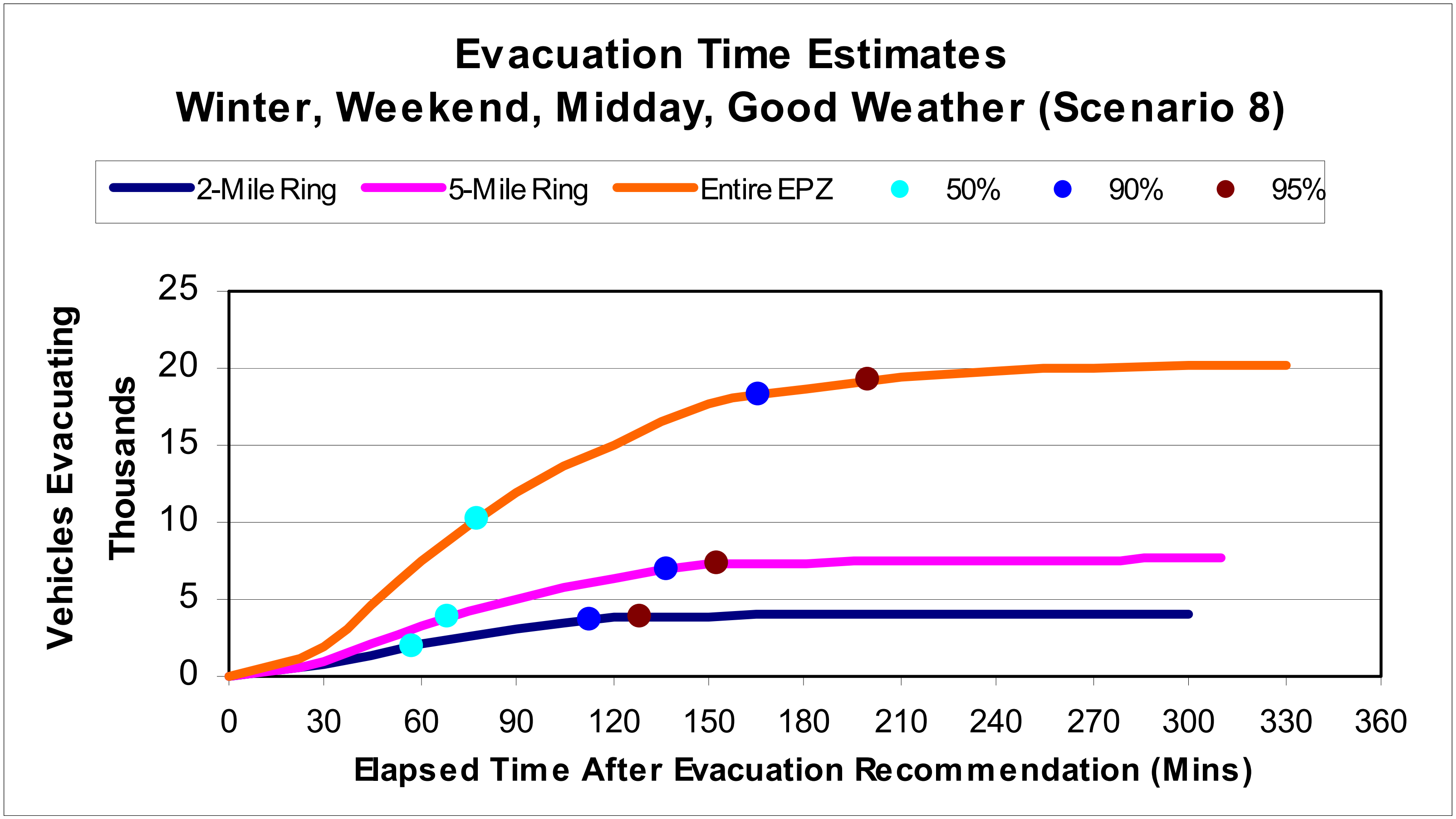

Figure J-8. Evacuation Time Estimates – Scenario 8 for Region R03 (Entire EPZ)

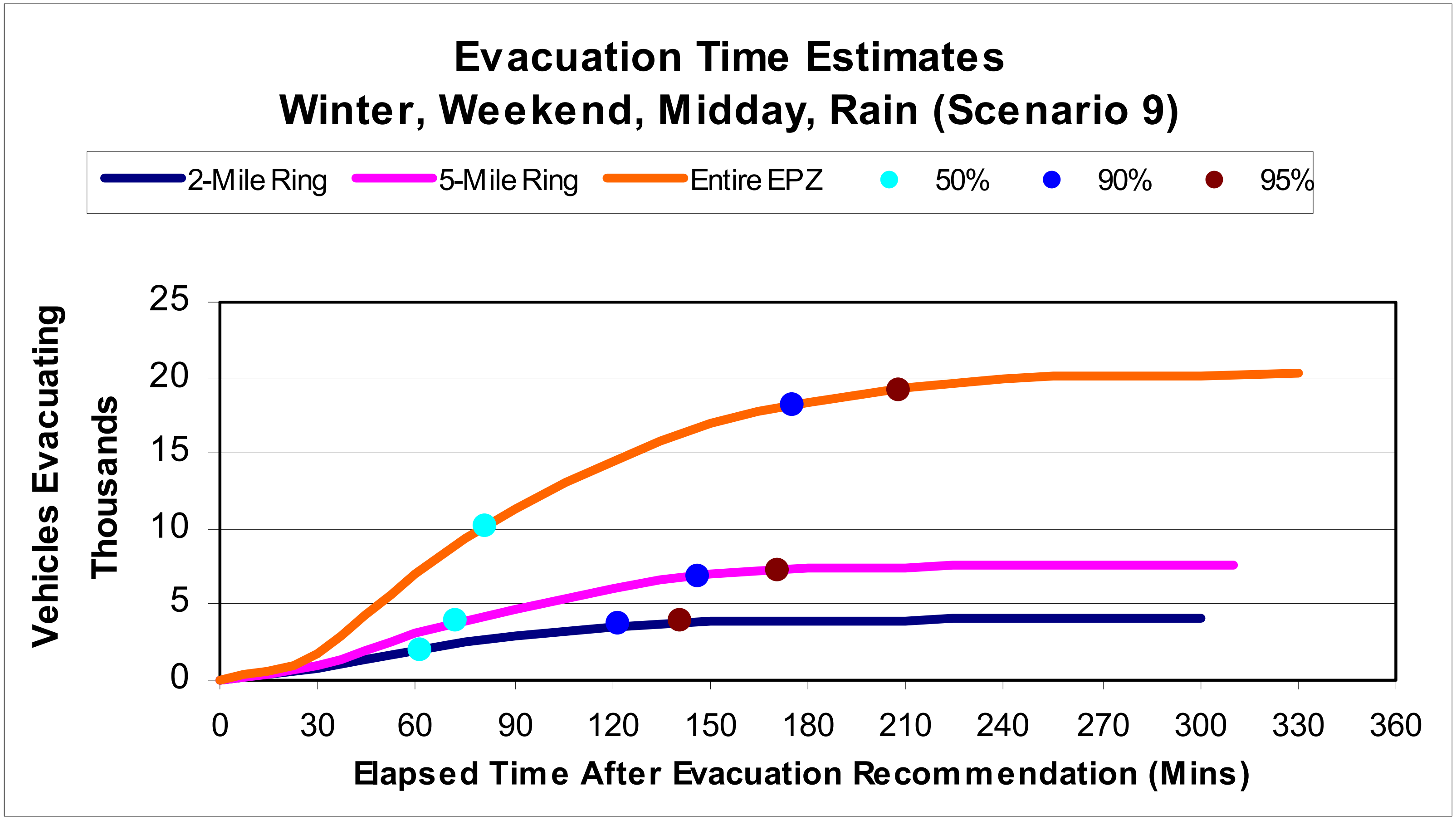

Figure J-9. Evacuation Time Estimates – Scenario 9 for Region R03 (Entire EPZ)

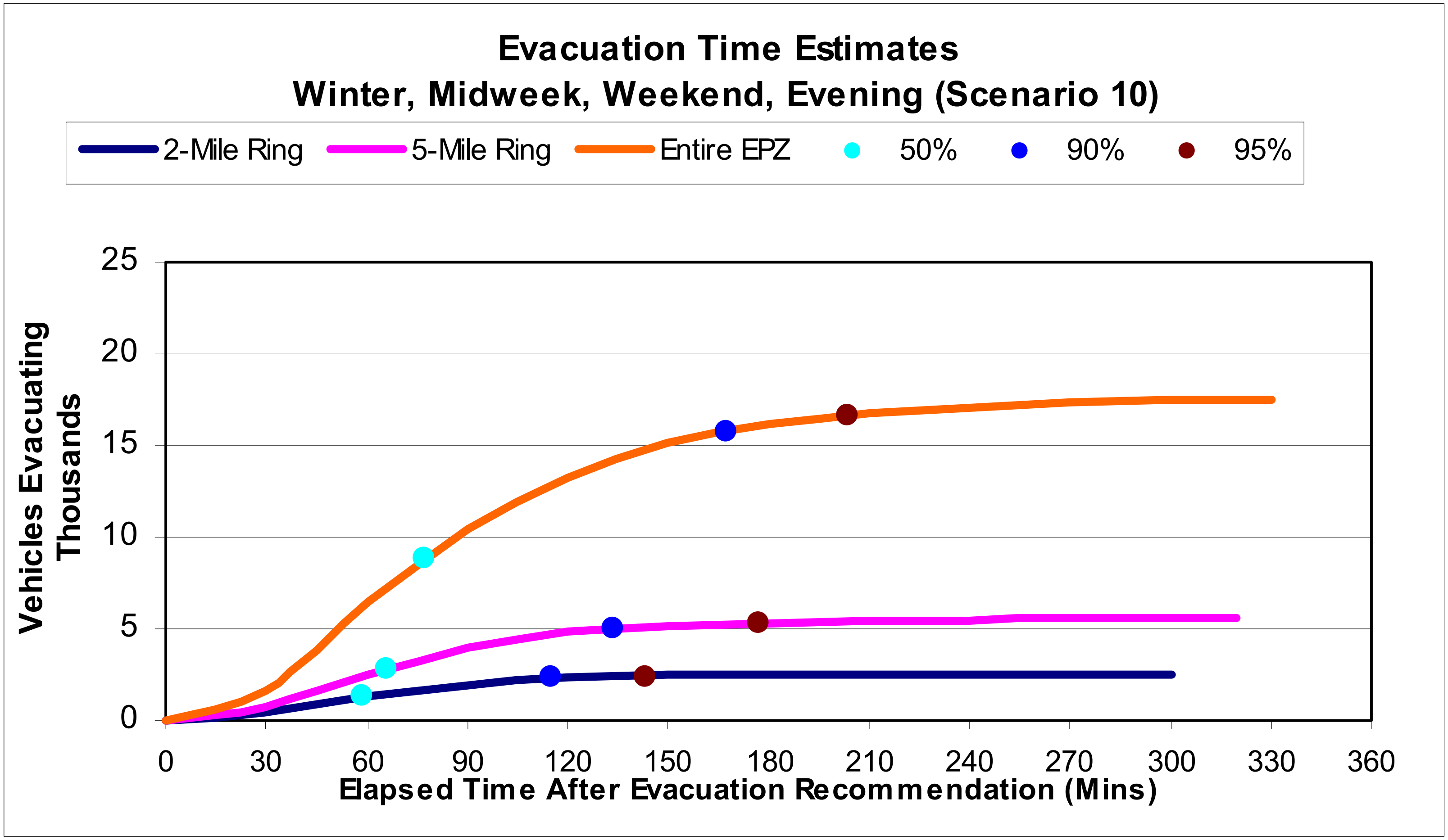

Figure J-10. Evacuation Time Estimates – Scenario 10 for Region R03 (Entire EPZ)

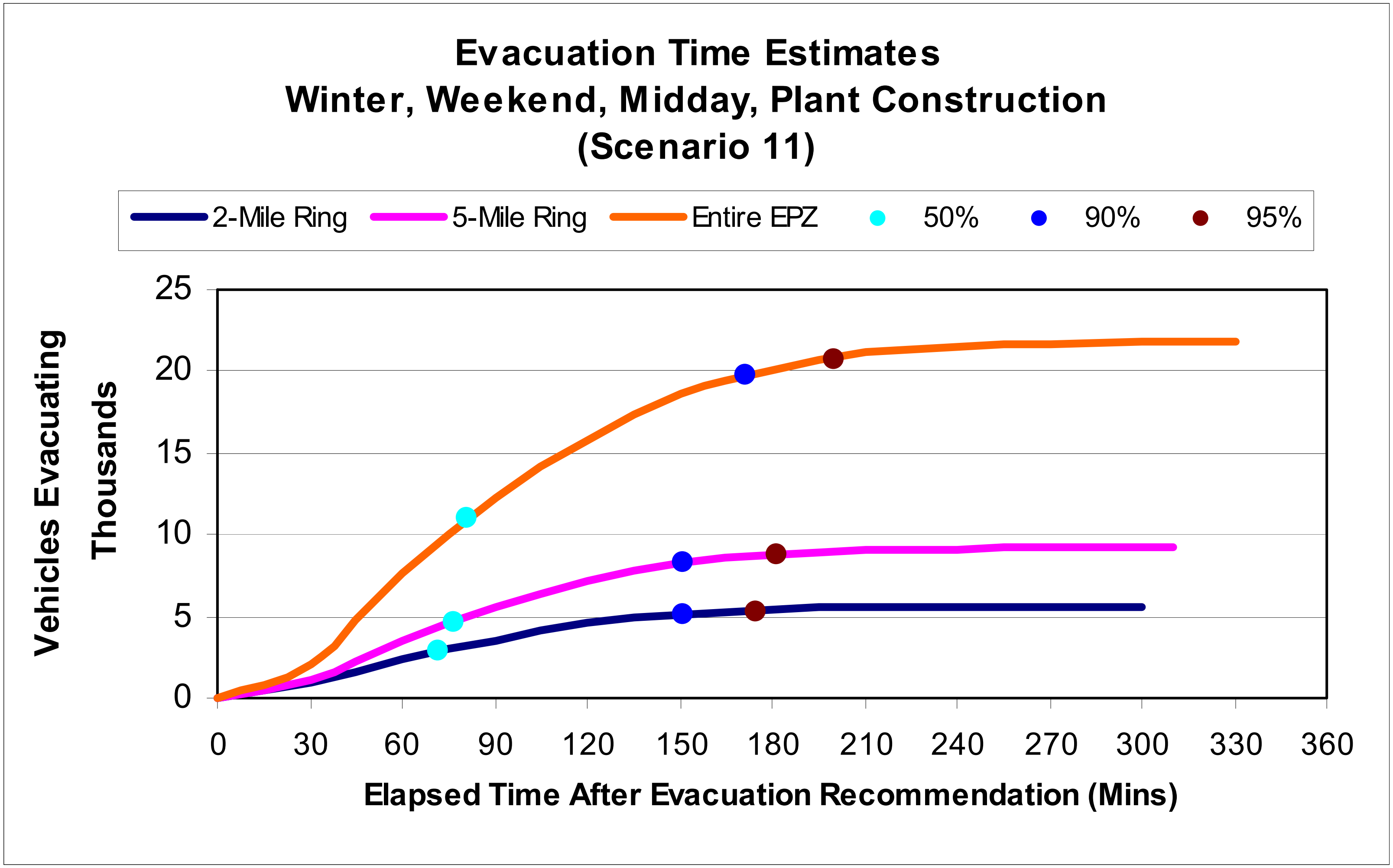

Figure J-11. Evacuation Time Estimates – Scenario 11 for Region R03 (Entire EPZ)

APPENDIX K

Evacuation Roadway Network Characteristics

Upstream Node Number	Downstream Node Number	Length (miles * 100)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
1	3	88	1	1714	40
2	134	67	1	1714	55
2	3	86	1	1714	55
3	4	109	1	1714	55
3	2	86	1	1714	55
4	3	109	1	1714	55
4	171	18	1	1714	45
4	602	17	1	1714	55
5	602	18	1	1714	55
5	6	93	1	1714	55
6	5	93	1	1714	55
6	563	45	1	1714	55
7	8	27	2	1714	45
7	563	26	2	1714	55
7	55	113	1	1714	45
8	9	64	1	1714	55
8	7	27	2	1714	45
9	10	65	1	1714	55
9	8	64	1	1714	55
10	11	63	1	1714	55
10	9	65	1	1714	55
11	10	63	1	1714	55
11	12	77	1	1714	55
12	11	77	1	1714	55
12	30	35	1	1714	55
13	498	271	1	1714	50
14	16	39	1	1714	55
15	17	51	1	1714	50
16	18	38	1	1714	55
17	27	59	1	1714	50
18	19	75	1	1714	55
19	20	37	1	1714	55
20	21	45	1	1714	55
21	22	94	1	1714	55
22	23	50	1	1714	55
23	24	69	1	1714	55
24	26	57	1	1714	55
25	568	135	1	1714	55
26	28	107	1	1714	55
27	31	76	1	1714	50
28	29	52	1	1714	55

Upstream Node Number	Downstream Node Number	Length (miles * 100)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
29	25	55	1	1714	55
30	14	78	1	1714	55
30	12	35	1	1714	40
30	32	39	1	1714	55
31	495	144	1	1714	50
32	30	39	1	1714	55
32	33	63	2	2118	65
33	32	63	2	2118	65
33	37	123	2	2118	65
34	46	71	1	1714	45
35	36	57	1	1714	45
36	143	65	1	1714	45
37	33	123	2	2118	65
37	40	137	2	2118	65
38	39	34	1	1714	40
39	41	19	1	1714	40
40	47	136	2	2118	65
40	37	137	2	2118	65
41	42	19	1	1714	40
42	43	36	1	1714	45
42	142	35	1	1714	45
43	42	36	1	1714	45
43	153	93	1	1714	55
44	45	60	1	1714	45
45	34	59	1	1714	45
46	38	106	1	1714	40
47	40	136	2	2118	65
47	48	34	2	2118	65
48	47	34	2	2118	65
48	50	67	2	2118	65
49	60	76	1	1714	55
50	51	104	2	2118	65
50	48	67	2	2118	65
51	50	104	2	2118	65
51	52	143	2	2118	65
52	51	143	2	2118	65
52	53	133	2	2118	65
53	52	133	2	2118	65
53	54	145	2	2118	65
54	53	145	2	2118	65
54	598	149	2	2118	65

Upstream Node Number	Downstream Node Number	Length (miles * 100)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
55	63	78	1	1714	45
56	9	10	1	1714	40
57	58	139	1	1714	55
58	59	53	1	1714	55
59	253	32	1	1714	55
61	49	82	1	1714	45
62	61	64	1	1714	45
63	64	132	1	1714	45
64	65	40	1	1714	45
65	66	31	1	1714	45
66	182	25	1	1714	45
68	182	30	1	1714	40
69	68	59	1	1714	55
70	71	51	1	1714	55
70	69	73	1	1714	55
71	72	74	1	1714	55
72	73	69	1	1714	55
73	74	27	1	1714	55
74	12	55	1	1714	55
75	76	139	1	1714	55
76	79	150	1	1714	55
79	83	60	1	1714	55
80	511	92	1	1714	45
80	81	118	1	1714	55
81	62	123	1	1714	45
81	80	118	1	1714	55
81	125	64	1	1714	55
82	81	53	1	1714	45
83	84	46	1	1714	55
84	85	59	1	1714	55
85	86	35	1	1714	55
86	88	45	1	1714	55
87	82	122	1	1714	45
88	89	48	1	1714	55
89	90	31	1	1714	45
90	91	25	1	1714	45
91	92	26	1	1714	35
92	93	48	1	1714	35
93	104	57	1	1714	40
94	93	57	1	1714	35
95	94	33	1	1714	35

Upstream Node Number	Downstream Node Number	Length (miles * 100)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
96	95	34	1	1714	45
97	96	35	1	1714	45
98	97	33	1	1714	45
99	100	45	1	1714	45
99	98	79	1	1714	45
100	101	138	1	1714	45
100	35	46	1	1714	45
101	102	62	1	1714	45
102	103	56	1	1714	45
103	44	129	1	1714	45
104	105	24	1	1714	45
105	106	37	1	1714	45
106	107	51	1	1714	45
107	144	86	1	1714	55
107	137	26	1	1714	45
108	114	46	1	1714	45
109	107	91	1	1714	55
110	109	48	1	1714	45
111	112	16	1	1714	35
111	135	26	1	1714	35
112	113	6	1	1714	35
113	104	30	1	1714	35
114	115	57	1	1714	45
115	121	116	1	1714	45
116	109	86	1	1714	55
117	116	81	1	1714	55
118	136	65	1	1714	55
119	118	60	1	1714	55
120	119	30	1	1714	55
121	122	40	1	1714	45
122	605	11	1	1714	40
123	120	188	1	1714	55
124	235	44	1	1714	55
124	224	144	1	1714	55
124	184	20	1	1714	55
125	132	53	1	1714	55
125	81	64	1	1714	55
126	124	38	1	1714	45
127	126	259	1	1714	55
128	127	40	1	1714	55
129	206	38	2	1895	50

Upstream Node Number	Downstream Node Number	Length (miles * 100)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
129	130	23	2	1895	55
129	128	13	1	1714	45
130	605	41	2	1895	55
130	129	23	2	1895	50
131	605	15	2	1895	55
131	133	75	1	1714	55
132	125	53	1	1714	55
132	139	100	1	1714	55
133	131	75	1	1714	55
133	134	35	1	1714	55
134	2	67	1	1714	55
134	133	35	1	1714	55
135	110	25	1	1714	35
136	117	53	1	1714	55
137	138	37	1	1714	55
138	140	86	1	1714	55
139	141	55	1	1714	55
139	132	100	1	1714	55
140	143	118	1	1714	55
141	142	44	1	1714	45
141	139	55	1	1714	55
142	141	44	1	1714	45
142	42	35	1	1714	45
143	512	47	1	1714	55
144	145	159	1	1714	55
145	146	63	1	1714	55
146	511	84	1	1714	45
147	86	58	1	1714	40
148	147	66	1	1714	45
149	148	54	1	1714	45
150	149	35	1	1714	45
151	150	42	1	1714	45
153	43	93	1	1714	45
154	151	55	1	1714	45
155	154	28	1	1714	45
156	155	24	1	1714	45
157	156	23	1	1714	45
158	157	24	1	1714	45
159	158	47	1	1714	45
160	111	18	1	1714	40
161	268	46	1	1714	55

Upstream Node Number	Downstream Node Number	Length (miles * 100)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
161	506	39	1	1714	55
162	159	39	1	1714	45
163	162	36	1	1714	45
164	163	38	1	1714	45
165	164	35	1	1714	45
166	160	14	1	1714	40
170	165	58	1	1714	45
171	170	42	1	1714	45
182	75	46	1	1714	55
184	123	70	1	1714	55
185	151	30	1	1714	45
188	185	54	1	1714	55
189	188	25	1	1714	55
190	189	30	1	1714	55
193	190	70	1	1714	55
194	193	23	1	1714	55
195	2	59	1	1714	45
197	198	54	1	1714	55
197	195	47	1	1714	55
198	201	65	1	1714	55
201	202	43	1	1714	55
202	203	24	1	1714	55
203	204	30	1	1714	55
204	205	60	1	1714	55
205	194	50	1	1714	55
206	129	38	2	1895	50
206	209	184	2	1895	50
209	210	85	2	1895	50
209	206	184	2	1895	50
210	209	85	2	1895	50
210	211	48	2	1895	50
211	210	48	2	1895	50
211	212	28	2	1895	50
212	211	28	2	1895	50
212	213	18	2	1895	50
213	212	18	2	1895	50
213	214	34	2	1895	50
214	213	34	2	1895	50
214	215	55	2	1895	50
215	214	55	2	1895	50
215	216	68	2	1895	50

Upstream Node Number	Downstream Node Number	Length (miles * 100)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
216	217	121	2	1895	50
216	215	68	2	1895	50
217	218	56	2	1895	50
217	216	121	2	1895	50
218	219	124	2	1895	50
218	217	56	2	1500	30
219	221	133	2	1895	50
219	218	124	2	1895	50
221	222	171	2	1895	50
221	219	133	2	1895	50
222	223	88	2	1895	50
222	221	171	2	1895	50
223	561	30	3	1895	50
224	225	80	1	1714	55
225	226	78	1	1714	55
226	227	40	1	1714	55
227	211	41	1	1714	40
231	215	171	1	1714	40
231	232	32	1	1714	55
232	233	124	1	1714	55
233	234	42	1	1714	45
234	244	65	1	1714	55
235	236	26	1	1714	55
236	237	85	1	1714	55
236	254	49	1	1714	55
237	238	63	1	1714	55
238	239	51	1	1714	55
239	234	91	1	1714	55
241	242	66	1	1714	55
242	567	104	1	1714	40
243	249	27	2	1714	45
244	245	53	1	1714	55
245	246	38	1	1714	55
245	502	129	1	1714	45
246	567	58	1	1714	45
247	218	109	1	1714	40
247	248	202	1	1714	45
248	249	18	2	1714	45
249	250	31	2	1714	45
249	295	52	2	1714	45
250	251	82	1	1714	55

Upstream Node Number	Downstream Node Number	Length (miles * 100)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
251	252	74	1	1714	55
252	57	39	1	1714	55
253	560	80	1	1714	45
254	260	280	1	1714	55
254	580	253	1	1714	45
260	265	231	1	1714	55
265	266	96	1	1714	55
266	268	15	1	1714	40
268	161	46	1	1714	55
268	269	47	1	1714	55
269	268	47	1	1714	55
269	307	81	1	1714	55
270	307	107	1	1714	55
270	271	197	1	1714	55
271	270	197	1	1714	55
271	272	76	1	1714	45
272	271	76	1	1714	45
272	273	55	1	1714	45
273	272	55	1	1714	45
273	274	71	1	1714	45
274	277	110	1	1714	55
274	273	71	1	1714	45
277	274	110	1	1714	55
277	278	80	1	1714	45
278	277	80	1	1714	55
278	279	70	1	1714	40
279	278	70	1	1714	45
279	280	51	1	1714	40
280	579	29	1	1714	40
280	279	51	1	1714	40
281	507	24	2	1714	45
281	282	21	2	1714	40
281	572	14	2	1714	40
282	281	21	2	1714	40
282	283	29	2	1714	40
283	282	29	2	1714	40
283	284	65	2	1714	40
284	285	64	2	2118	65
284	283	65	2	1714	40
285	284	64	2	2118	65
285	286	131	2	2118	65

Upstream Node Number	Downstream Node Number	Length (miles * 100)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
286	287	33	2	1714	45
286	285	131	2	2118	65
287	288	42	2	1714	45
287	286	33	2	1714	45
288	289	44	2	1714	45
288	287	42	2	1714	45
289	288	44	2	1714	45
289	290	89	2	1714	45
289	152	158	1	1714	45
290	289	89	2	1714	45
291	559	91	2	1895	50
291	562	62	2	1895	50
292	253	112	1	1714	40
292	294	77	1	1714	45
293	292	43	1	1714	45
294	289	27	1	1714	45
295	296	37	2	1714	45
296	297	65	2	1714	45
297	298	55	2	1714	45
298	574	57	1	1714	40
298	306	28	2	1714	45
299	300	118	1	1714	40
299	246	52	1	1714	40
300	301	38	1	1714	40
301	302	19	1	1714	40
302	304	18	1	1714	40
304	570	19	1	1714	40
305	573	26	1	1714	35
305	298	7	1	1714	35
306	281	27	2	1714	45
307	269	81	1	1714	55
307	270	107	1	1714	55
308	215	39	1	1714	30
309	308	87	1	1500	30
309	310	49	1	1500	30
310	311	45	1	1500	30
311	312	98	1	1500	30
312	313	38	1	1500	30
313	217	123	1	1895	50
314	485	132	1	1714	40
315	314	37	1	1500	40

Upstream Node Number	Downstream Node Number	Length (miles * 100)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
321	315	190	1	1500	40
325	321	195	1	1500	40
326	325	73	1	1500	40
327	326	38	1	1500	40
328	327	19	1	1714	40
328	460	99	1	1714	55
329	328	22	1	1714	40
330	329	79	1	1714	40
331	330	46	1	1714	40
334	331	96	1	1714	40
335	334	56	1	1714	55
336	335	59	1	1714	55
336	337	44	1	1714	55
337	338	37	1	1714	55
338	339	44	1	1714	55
339	340	63	1	1714	55
340	343	78	1	1714	55
343	344	119	1	1714	55
344	345	18	1	1714	55
345	346	47	1	1714	35
346	347	60	1	1714	35
346	431	42	1	1714	55
347	355	63	1	1714	35
355	356	75	1	1714	35
356	357	101	1	1714	40
357	358	63	1	1714	40
357	459	28	1	1714	40
358	366	80	1	1714	40
366	367	30	1	1714	40
367	467	39	1	1714	40
367	368	43	1	1714	40
368	376	77	1	1714	40
376	378	66	1	1714	40
378	500	62	1	1714	45
378	380	40	1	1714	40
380	382	54	1	1714	50
382	384	86	1	1714	50
384	391	106	1	1714	50
391	392	103	1	1714	50
392	393	33	1	1714	50
393	394	35	1	1714	50

Upstream Node Number	Downstream Node Number	Length (miles * 100)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
393	528	251	1	1714	45
394	393	35	1	1714	50
394	397	56	1	1714	50
397	398	64	1	1714	50
397	394	56	1	1714	50
398	535	363	1	1714	45
398	397	64	1	1714	50
398	399	32	1	1714	50
399	398	32	1	1714	50
399	400	94	1	1714	50
400	399	94	1	1714	50
400	404	68	1	1714	50
404	400	68	1	1714	50
404	405	52	1	1714	50
405	404	52	1	1714	50
405	538	63	1	1714	50
406	405	31	1	1714	35
410	406	83	1	1714	35
411	410	64	1	1714	35
411	412	20	1	1714	45
412	411	20	1	1714	35
412	413	22	1	1714	45
412	504	205	1	1714	45
413	414	31	1	1714	45
413	412	22	1	1714	45
414	413	31	1	1714	45
414	415	22	1	1714	40
415	414	22	1	1714	45
415	505	137	1	1714	45
416	415	37	1	1714	45
418	416	44	1	1714	45
419	418	73	1	1714	45
420	419	53	1	1714	45
421	565	43	1	1714	40
421	420	32	1	1714	45
422	421	84	1	1714	40
423	422	70	1	1714	40
424	423	22	1	1714	40
425	424	24	1	1714	40
425	542	89	1	1714	45
426	425	9	1	1714	45

Upstream Node Number	Downstream Node Number	Length (miles * 100)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
427	426	42	1	1714	45
427	458	56	1	1714	45
428	427	70	1	1714	55
430	428	87	1	1714	55
431	430	61	1	1714	55
431	432	49	1	1714	35
432	433	61	1	1714	35
433	434	49	1	1714	35
434	435	64	1	1714	35
435	436	48	1	1714	35
436	437	69	1	1714	35
437	459	30	1	1714	40
437	438	37	1	1714	40
438	439	71	1	1714	40
439	440	78	1	1714	45
440	441	99	1	1714	45
441	442	81	1	1714	45
442	443	84	1	1714	45
443	444	134	1	1714	45
444	445	71	1	1714	45
445	446	80	1	1714	45
446	447	132	1	1714	45
447	448	82	1	1714	45
448	449	59	1	1714	45
449	450	84	1	1714	45
450	451	78	1	1714	40
451	411	51	1	1714	35
452	486	45	1	1714	45
453	452	102	1	1714	45
454	453	100	1	1714	45
455	454	23	1	1714	45
457	455	37	1	1714	45
458	457	67	1	1714	45
459	357	28	1	1714	40
459	437	30	1	1714	40
460	461	42	1	1714	45
461	462	36	1	1714	40
462	463	45	1	1714	40
463	464	17	1	1714	40
464	467	17	1	1714	40
464	465	44	1	1714	40

Upstream Node Number	Downstream Node Number	Length (miles * 100)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
465	466	98	1	1714	40
466	472	27	1	1714	40
467	367	39	1	1714	40
467	464	17	1	1714	40
472	473	52	1	1714	40
473	474	19	1	1714	40
474	475	142	1	1714	45
474	501	41	1	1714	45
475	485	179	1	1714	45
485	527	307	1	1714	45
486	451	61	1	1714	40
487	492	43	1	1714	30
488	487	95	1	1714	30
488	489	76	1	1714	40
489	490	103	1	1714	40
490	491	83	1	1714	40
491	10	54	1	1714	40
492	7	31	1	1714	40
492	56	94	1	1714	40
493	487	35	1	1714	30
493	6	59	1	1714	30
494	90	38	1	1714	40
495	494	82	1	1714	50
496	15	77	1	1714	50
497	47	197	1	1714	50
498	497	112	1	1714	50
499	13	99	1	1714	50
499	523	205	1	1714	50
500	378	62	1	1714	40
500	501	76	1	1714	45
501	474	41	1	1714	40
501	500	76	1	1714	45
502	503	93	1	1714	45
503	277	39	1	1714	40
504	526	181	1	1714	45
505	541	481	1	1714	45
506	161	39	1	1714	55
506	510	162	1	1714	55
507	508	55	2	1714	45
509	277	24	1	1714	40
510	506	162	1	1714	55

Upstream Node Number	Downstream Node Number	Length (miles * 100)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
510	511	118	1	1714	45
511	80	92	1	1714	55
511	510	118	1	1714	55
511	49	295	1	1714	55
512	513	188	1	1714	55
512	87	84	1	1714	45
513	514	154	1	1714	55
514	38	53	1	1714	40
515	296	51	1	1714	35
515	569	32	1	1714	35
519	218	203	1	1714	40
520	93	12	1	1714	35
521	488	24	1	1714	30
522	493	23	1	1714	30
523	496	145	1	1714	50
524	309	32	1	1500	30
525	336	25	1	1714	30
526	540	82	1	1714	45
528	529	115	1	1714	45
529	530	57	1	1714	45
530	531	22	1	1714	40
531	532	82	1	1714	45
532	533	184	1	1714	45
533	534	34	1	1714	45
534	537	141	2	1895	55
534	536	397	2	1895	55
535	536	99	1	1714	45
536	534	397	2	1895	55
536	558	152	2	1895	55
537	534	141	2	1895	55
538	539	358	1	1714	45
539	540	196	2	1895	55
539	558	169	2	1895	55
540	539	196	2	1895	55
540	541	278	2	1895	55
541	551	189	2	1895	55
541	540	278	2	1895	55
542	543	106	1	1714	45
543	564	143	1	1714	40
544	545	66	1	1714	45
545	546	58	1	1714	40

Upstream Node Number	Downstream Node Number	Length (miles * 100)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
546	552	207	1	1714	45
546	547	121	1	1714	40
547	548	73	1	1714	45
548	549	105	1	1714	45
549	550	76	1	1714	45
550	551	110	1	1714	45
551	541	189	2	1895	55
551	557	80	2	1895	55
552	553	33	1	1714	45
553	554	96	1	1714	45
554	555	111	1	1714	45
555	556	69	1	1714	45
557	551	80	2	1895	55
558	536	152	2	1895	55
558	539	169	2	1895	55
559	222	87	2	1895	50
560	223	31	1	1714	40
561	291	53	2	1895	50
562	291	62	2	1895	50
563	7	26	2	1714	45
563	6	45	1	1714	55
564	544	169	1	1714	45
565	566	105	1	1714	45
566	564	110	1	1714	40
567	243	41	1	1714	45
569	295	57	1	1714	35
569	299	66	1	1714	40
570	571	20	1	1714	40
571	305	36	1	1714	35
572	579	9	2	1714	40
572	281	14	2	1714	40
573	572	26	1	1714	35
573	306	13	1	1714	35
574	283	40	1	1714	35
574	578	59	1	1714	40
575	285	21	1	1714	35
575	576	84	1	1714	40
576	577	49	1	1714	40
577	286	16	1	1714	40
578	575	64	1	1714	40
579	280	29	1	1714	40

Upstream Node Number	Downstream Node Number	Length (miles * 100)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
579	572	9	2	1714	40
580	581	37	1	1714	45
581	582	60	1	1714	45
582	272	96	1	1714	40
583	272	73	1	1714	40
584	583	76	1	1714	45
585	584	86	1	1714	45
585	586	224	1	1714	45
586	269	158	1	1714	40
587	588	58	1	1714	45
588	589	73	1	1714	40
589	490	24	1	1714	40
590	18	54	1	1714	40
591	590	28	1	1714	45
592	591	62	1	1714	45
593	595	87	1	1714	45
594	593	61	1	1714	45
595	596	62	1	1714	45
596	597	89	1	1714	45
597	23	86	1	1714	40
598	54	149	2	2118	65
599	54	49	1	1714	40
600	599	162	1	1714	45
601	600	140	1	1714	45
602	4	17	1	1714	55
602	5	18	1	1714	55
603	602	25	1	1714	40
604	603	61	1	1714	45
605	130	41	2	1714	45
605	131	15	2	1895	55
606	108	54	1	1714	45

APPENDIX L

Protective Action Section Boundaries

APPENDIX L: PROTECTIVE ACTION SECTION BOUNDARIES

West Feliciana Parish	
PAS 1	Bounded by Mississippi River on the west, by St. Francisville town's southern border on the north, Commerce street (LA HWY 3057) to US 61, US 61 south to LA HWY 965, east on LA HWY 965 to Audubon Ln, south on Audubon Ln to LA HWY 966, LA HWY 966 to Folkes Rd, Folkes Rd south to US 61, then follows a straight line path in southwest direction to the Mississippi River. Includes River Bend Station Area, Star Hill and Audubon State Historic Site.
PAS 2	Bounded by the Mississippi River on the west, by St. Francisville town's southern border on the south, Commerce street (LA HWY 3057) to US 61, US 61 south to LA HWY 965, east on LA HWY 965 to Joe Daniel Rd, north on Joe Daniel Rd to LA HWY 10, Continue on Bains Rd west to US 61, south on US 61 to Myrtle Ln, south on Myrtle Ln to Airport Rd., west on Airport Rd to Mahoney Rd, south on Mahoney Rd to LA HWY 10, then west on LA HWY 10 to the Mississippi River. Includes St. Francisville township, Harwood, Elm Park, Bains Road, Mahoney Road and Airport Road.
PAS 3	Bounded by West Feliciana Parish (WFP) boundary on the south, follows Hammer creek (LA HWY 11) going north on the eastern boundary until LA HWY 10, west on LA HWY 10 to Joe Daniel Rd/Bains Rd, south on Joe Daniel Rd to LA HWY 965, east on LA HWY 965 to Audubon Ln, south on Audubon Ln to LA HWY 966, LA HWY 966 to Folkes Rd, Folkes Rd south to US 61, then south on US 61 to WFP border. Includes Carney and Freeland.
PAS 4	Bounded by the Mississippi River on the west, the southern boundary of PAS 1 on the north, by the WFP boundary on the south to US 61, then north on US 61 to Folkes Rd. Includes Tembec and Riddle Area.
PAS 5	Bounded by the Mississippi River on the south to LA HWY 10, west on LA HWY 10 to Mahoney Rd, north on Mahoney Rd to Solitude Rd, north on Solitude Rd and continue on Jacko Rd to the 10-mile boundary, then follow a straight line path in the southwest direction to the Mississippi River. Includes Tunica Swamp and Cat Island.

PAS 6	Bounded on the west by PAS 5, continues closely along 10-mile boundary, and then follows the Spring Branch and Little Bayou Sara Creek to Highland Rd, east on Highland Rd to LA HWY 66, continue east on Sligo Rd and follow Williams Creek to Mulberry Hill Rd, south on Mulberry Hill Rd to US 61, north on US 61 to Spillman Rd, east on Spillman Rd to Jones Vaughn Creek, east on Jones Vaughn Creek to Sage Hill Rd., southwest on Sage Hill Rd to Bains Rd, west on Bains Rd to US 61, south on US 61 to Myrtle Rd, south on Myrtle Rd to Airport Rd, then west on Airport Rd to the PAS 5 boundary. Includes Solitude, Wakefield, Whitman, Beachwood and Bains.
PAS 7	Bounded by the southeastern boundary of PAS 6 (Sage Hill Rd and Jones Vaughn Creek Road) to Bains Rd, south on Bains Rd to LA HWY 10, east on LA HWY 10 to Hammer Creek, follow Hammer Creek to WFP boundary, east along WFP boundary to Cason Creek, a straight line from Cason Creek to the Jones Vaughn Creek Rd/Weaver Rd intersection. Includes Jones Vaughn Creek Rd, Freeland Rd and LA Highway 10 between Carney and Jackson.
East Feliciana Parish	
PAS 8	Bounded on north by the East Feliciana Parish (EFP) border between US 61 on the west and Hammer Creek on the east, a straight line between Hammer Creek and intersection of LA HWY 964 and LA HWY 68, a straight line on the south between the intersection of LA HWY 964 and LA HWY 68 and US 61. Includes Williams Gas Pipeline/Transco and sparsely populated area north of LA Highway 964 and west of LA Highway 68.
PAS 9	Bounded by the Mississippi River on the west, the EFP border on the south to US 61/LA HWY 68 intersection, east on LA HWY 68 to LA HWY 964, follow southern border of PAS 8 and the EFP border on north. Includes Delombre and Port Hudson State Historic Site.
PAS 10	Jackson Town Boundaries Includes Jackson and Centenary State Historic Site
PAS 11	Bounded by the southern boundary of PAS 10 and the EFP border on the north, PAS 8 on the west, straight line on the southwest from LA HWY 68/ LA HWY 964 intersection to Thomson Rd/LA HWY 412 intersection, straight line from there following the 10-mile boundary closely to LA HWY 10. Includes Asphodel, Green Briar Road, LA Highway 68 south of Jackson City limits to LA Highway 964, LA Highway 955 between Green Briar Road and LA Highway 412.
PAS 12	Bounded by the EFP border on the south, the 10-mile boundary on the east, PAS 11 on the north, and PAS 9 on the west. Includes Lindsay, LA Highway 68 south of LA Highway 964 to US Highway 61, LA Highway 412 from LA Highway 955 to Thompson Road

East Baton Rouge Parish	
PAS 13	Bounded by the East Baton Rouge Parish (EBRP) border on the north, the 10-mile boundary along the east and south to US 61, north on US 61 to the EBRP border. Includes Plains and Flanacher Road.
PAS 14	Bounded by the Mississippi River on the west, the EBRP border on the north, US 61 on the west, and the 10-mile border on the south. Includes Port Hudson, Bonn, Mount Pleasant and Port Hickey.
West Baton Rouge Parish	
PAS 15	Bounded by the Mississippi River on the east, the West Baton Rouge Parish (WBRP) border on the north and a straight line south of Arbroth Rd. and parallel to Arbroth Rd. on the south side. Includes Arbroth.
Pointe Coupeé Parish	
PAS 16	Bounded by the Mississippi River on the north and east, and 5-mile ring along the west and south. Includes Waterloo and Big Cajun No. 2.
PAS 17	Bounded by the Mississippi River on the east, the Pointe Coupeé Parish (PCP) border on the south, the 10-mile ring on the west to Oil Field Rd, northeast to LA HWY 414/Glenn Lane, then follow straight line northwest to LA HWY 413/ LA HWY 415 intersection, east on LA HWY 415 to the Mississippi River. Includes Rougon, Chenal, Glynn, Hermitage, Island, Wickliffe, Anchor and Big Cajun No. 1.
PAS 18	Bounded by PAS 17 on south, PAS 16 on east, the PCP border on the north and the 10-mile ring on the west. Includes New Roads, Ventress, Patins, Leavel, Ploup, Brooks, Schexnayder and Beaud.