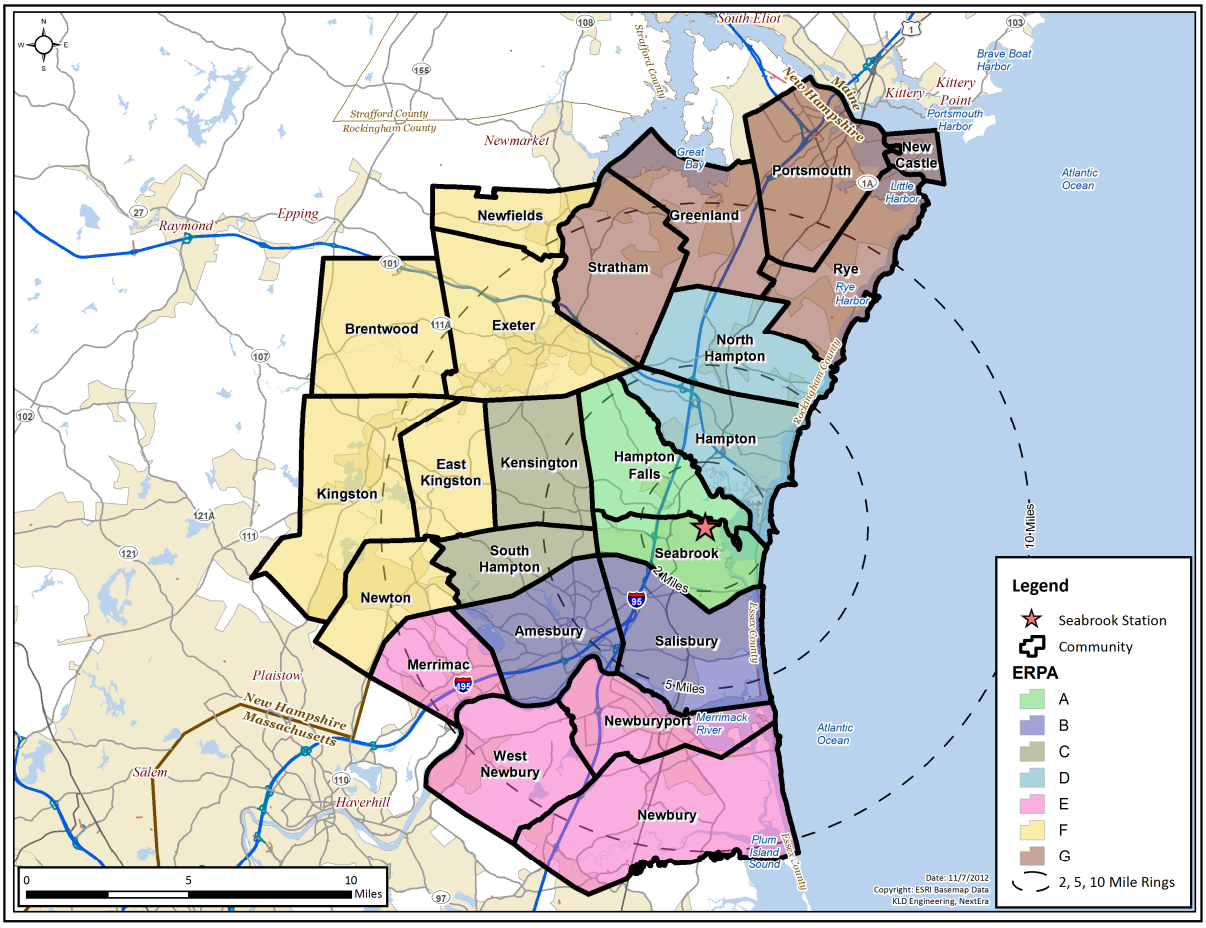
KLD ENGINEERING, P.C.

Seabrook Station

Development of Evacuation Time Estimates



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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 Seabrook Station located in Rockingham County, New Hampshire. ETE are part of the required planning basis and provide NextEra and State and local governments with site-specific information needed for Protective Action decision-making.

In the performance of this effort, guidance is provided by documents published by Federal Governmental agencies. Most important of these are:

- Criteria for Development of Evacuation Time Estimate Studies, NUREG/CR-7002, November 2011.
- Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, NUREG-0654/FEMA-REP-1, Rev. 1, November 1980.
- Development of Evacuation Time Estimates for Nuclear Power Plants, NUREG/CR-6863, January 2005.
- 10CFR50, Appendix E – "Emergency Planning and Preparedness for Production and Utilization Facilities"

Overview of Project Activities

This project began in February, 2011 and extended over a period of 10 months. The major activities performed are briefly described in chronological sequence:

- Attended a project kick-off meeting with NextEra personnel and emergency management personnel representing state and local governments.
- Accessed U.S. Census Bureau data files for the year 2010.
- Studied Geographical Information Systems (GIS) maps of the area in the vicinity of the Seabrook Station, 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 Region covering the region between the EPZ boundary and approximately 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 the licensee and offsite response organization (ORO) personnel prior to the survey.
- A data needs matrix was provided to the OROs at the kickoff meeting. Data pertaining to employment, transients, and special facilities in each state were provided in response to the data needs matrix. Telephone calls to specific facilities supplemented the data provided.

- 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 23 Communities. These Communities are grouped into 7 Emergency Response Planning Areas (ERPA) based on location relative to the plant. ERPA are then grouped within circular areas or "keyhole" configurations (circles plus radial sectors) that define a total of 19 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, Snow). One special event scenario involving a 4th of July firework show in Hampton Beach was considered. One roadway impact scenario was considered wherein a single lane was closed on State Highway 101 westbound for the duration of the evacuation.
- Staged evacuation was considered for those regions wherein the 2 mile radius and sectors downwind to 5 miles were evacuated.
- As per NUREG/CR-7002, the planning basis for the calculation of ETE is:
    - A rapidly escalating accident at the Seabrook Station that quickly assumes the status of General Emergency such that the Advisory to Evacuate is virtually coincident with the Emergency Alert System (EAS) message, and no early protective actions have been implemented.
    - While an unlikely accident scenario, this planning basis will yield ETE, measured as the elapsed time from the Advisory to Evacuate until the stated percentage of the population 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, pre-schools, day cares or day camps are in session, the ETE study assumes that the children will be evacuated by bus directly to school reception centers or host schools located outside the EPZ. Parents, relatives, and neighbors are advised to not pick up their children at facilities prior to the arrival of the buses dispatched for that purpose. The ETE for children at these facilities 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 state 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, for homebound special needs population, and for those evacuated from special facilities.

Computation of ETE

A total of 266 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 19 Evacuation Regions to evacuate from that Region, under the circumstances defined for one of the 14 Evacuation Scenarios (19 x 14 = 266). Separate ETE are calculated for transit-dependent evacuees, including schoolchildren 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 20% of the population within the EPZ but outside the impacted region, will elect to "voluntarily" evacuate. In addition, 20% of the population in the Shadow Region 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.

Staged evacuation is considered wherein those people within the 2-mile region evacuate immediately, while those beyond 2 miles, but within the EPZ, shelter-in-place. Once 90% of the 2-mile region is evacuated, those people beyond 2 miles begin to evacuate. As per federal guidance, 20% of people beyond 2 miles will evacuate (non-compliance) even though they are advised to shelter-in-place.

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 traffic engineering procedures.
- The evacuation trips are generated at locations called "zonal centroids" located within the EPZ and Shadow Region. 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 evacuation model computes the routing patterns for evacuating vehicles that are compliant with federal guidelines (outbound relative to the location of the plant), 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 90 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. The 90^{th} percentile ETE have been identified in the federal guidance as the values that should be considered when making

protective action decisions because the 100th percentile ETE are prolonged by those relatively few people who take longer to mobilize. This is referred to as the "evacuation tail" in Section 4.0 of NUREG/CR-7002.

Traffic Management

This study references the existing comprehensive traffic management plans provided by the Massachusetts Emergency Management Agency and New Hampshire Homeland Security and Emergency Management. As discussed in Section 9 and Appendix G, no changes to these existing plans are identified as a result of this study.

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 6-1 displays a map of the Seabrook Station EPZ showing the layout of the 23 Communities and 7 ERPA that comprise, in aggregate, the EPZ.
- Table 3-1 presents the estimates of permanent resident population in each Community based on the 2010 Census data.
- Table 6-1 defines each ERPA in terms of their respective groups of Communities.
- Table 6-2 defines each of the 19 Evacuation Regions in terms of their respective groups of ERPA.
- Table 6-3 lists the Evacuation Scenarios considered in this study.
- Tables 7-1 and 7-2 are compilations of ETE. These data are the times needed to clear the indicated regions of 90 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.
- Tables 7-3 and 7-4 presents ETE for the 2-mile region for un-staged and staged evacuations for the 90th and 100th percentiles, respectively.
- Table 8-10 presents ETE for the children at schools, Preschools/daycares and day camps in good weather.
- Table 8-14 presents ETE for the transit-dependent population in good weather.
- Figure H-8 presents an example of an Evacuation Region (Region R08) to be evacuated under the circumstances defined in Table 6-3. Maps of all regions are provided in Appendix H.

Conclusions

- General population ETE were computed for 266 unique cases – a combination of 19 unique Evacuation Regions and 14 unique Evacuation Scenarios. Table 7-1 and Table 7-2 document these ETE for the 90th and 100th percentiles. These ETE range from 1:35 (hr:min) to 5:05 at the 90th percentile for non-special event scenarios.
- Inspection of Table 7-1 and Table 7-2 indicates that the ETE for the 100th percentile are significantly longer than those for the 90th percentile. This is the result of the congestion

within the EPZ for some regions (whenever Portsmouth evacuates) and of the long tail of the mobilization time for other regions (evacuating to 5 miles or less). 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. See Figures 7-9 through 7-22.

- Inspection of Table 7-3 and Table 7-4 indicates that a staged evacuation protective action strategy could benefit those people evacuating from within the 2-mile region when wind is blowing over Hampton and North Hampton (by as much as 20 minutes), or when evacuating the entire EPZ (by as much as 1 hour and 10 minutes). Although staged evacuation is disadvantageous to those beyond 2 miles, it does expedite the evacuation of those evacuees from within the 2-mile region. See Section 7.6 for additional discussion.
- Comparison of Scenarios 5 (summer, midweek/weekend, evening) and 13 (summer, midweek/weekend, evening) in Table 7-1 and Table 7-2 indicates that the special event does materially affect the ETE. See Section 7.5 for additional discussion.
- Comparison of Scenarios 1 and 14 in Table 7-1 and Table 7-2 indicates that the roadway closure – one lane westbound on SH 101 from the interchange with I-95 to the interchange with State Highway 107 (Exit 5) – does have a material impact on 90th and 100th percentile ETE for keyhole regions with wind from the east to the EPZ boundary (Regions R10 through R12). See Section 7.5 for additional discussion.
- Portsmouth is the most congested area in the EPZ during an evacuation and is the last location in the EPZ to clear of traffic congestion. Thus, the clearance of congestion in Portsmouth dictates ETE. All congestion within the EPZ clears by about 6 hours after the Advisory to Evacuate. See Section 7.3 and Figures 7-3 through 7-8.
- Separate ETE were computed for schools, preschools and licensed day cares, day camps, medical facilities, transit-dependent persons, homebound special needs persons and correctional facilities. The average single-wave ETE for these facilities are comparable to or less than the general population ETE at the 90th percentile for an evacuation of the entire EPZ (Region R03). See Section 8.
- Table 8-8 indicates that there are enough buses, half buses, vans, evacuation bed buses and ambulances available to evacuate the transit-dependent population within the EPZ in a single wave. There are not enough wheelchair van transportation resources to evacuate the wheelchair bound population at medical facilities within the EPZ in a single wave. A second wave of wheelchair vans is required to evacuate the wheelchair bound population. See Sections 8.4 and 8.5.
- The general population ETE at the 90th and 100th percentile is insensitive to reductions in the base trip generation time of 5 hours due to the traffic congestion within the EPZ. See Table M-1.
- The general population ETE is insensitive to the voluntary evacuation of vehicles in the Shadow Region. As noted above, the last area or the EPZ to clear of traffic congestion is Portsmouth. The city boundaries of Portsmouth extend to about 14 miles from the

plant. Thus, there is only a small area of the Shadow Region north of Portsmouth. The number of shadow vehicles evacuating from this small area is not significant enough to delay the evacuation of Portsmouth and prolong ETE. See Table M-2.

- A population increases within the EPZ of 23% or more results in ETE changes which meet the NRC criteria for updating ETE between decennial Censuses. See Section M.3.

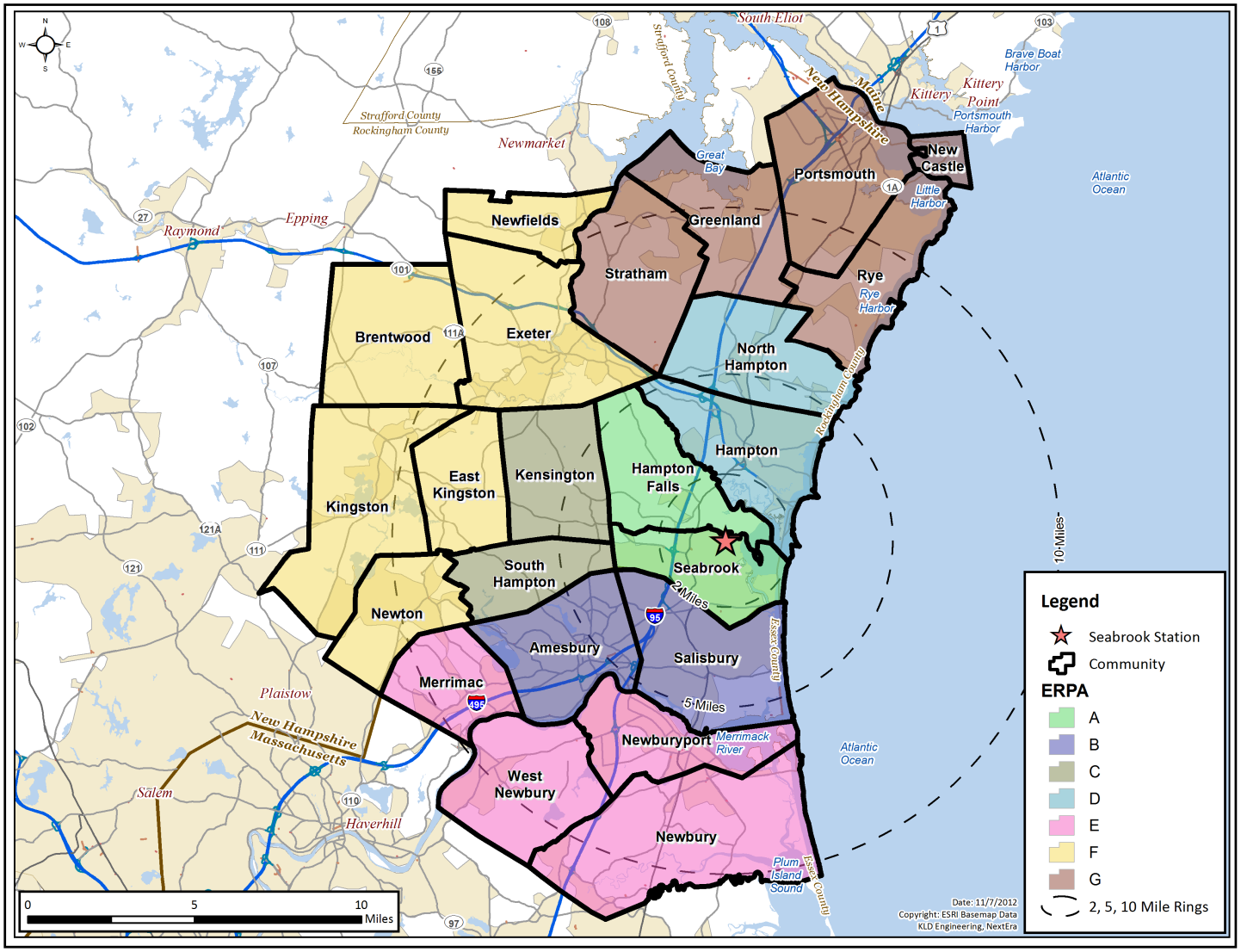

Figure 6-1. Seabrook Station EPZ Communities and ERPA

Table 3-1. EPZ Permanent Resident Population

Community	2000 Population	2010 Population
Amesbury	16,450	16,281
Brentwood	3,197	4,490
East Kingston	1,784	2,326
Exeter	14,058	14,313
Greenland	3,217	3,554
Hampton	14,950	15,444
Hampton Falls	1,880	2,242
Kensington	1,893	2,128
Kingston	5,862	6,117
Merrimac	6,138	6,361
New Castle	1,010	968
Newbury	6,729	6,664
Newburyport	17,177	17,417
Newfields	1,551	1,682
Newton	4,293	4,589
North Hampton	4,259	4,307
Portsmouth	20,784	20,746
Rye	5,182	5,317
Salisbury	7,828	8,372
Seabrook	7,920	8,566
South Hampton	840	812
Stratham	6,346	7,276
West Newbury	4,149	4,235
TOTAL	**157,497**	**164,207**
EPZ Population Growth:		**4.26%**

Table 6-1. ERPA Designations

Community	ERPA
NEW HAMPSHIRE	
Seabrook	A
Hampton Falls	
Kensington	C
South Hampton	
Hampton	D
North Hampton	
Brentwood	F
East Kingston	
Exeter	
Newfields	
Newton	
Kingston	
Greenland	G
Stratham	
Rye	
New Castle	
Portsmouth	
MASSACHUSETTS	
Amesbury	B
Salisbury	
Merrimac	E
Newburyport	
Newbury	
West Newbury	

Table 6-2. Description of Evacuation Regions

Region[1]	Description	ERPA						
		NH					MA	
		A	C	D	F	G	B	E
R01	2-Mile Region	x						
R02	5-Mile Region	x	x	x			x	
R03	Full EPZ	x	x	x	x	x	x	x
Evacuate 2-Mile Region and Downwind to 5 Miles								
Region	Wind Direction From:	ERPA						
		NH					MA	
		A	C	D	F	G	B	E
R04	NW, NNW, N, NNE	x					x	
R05	NE, ENE, E	x	x				x	
R06	ESE	x	x					
R07	SE, SSE	x	x	x				
R08	S, SSW, SW, WSW, W	x		x				
N/A	WNW	Refer to Region R01						
Evacuate 5-Mile Region and Downwind to the EPZ Boundary								
Region	Wind Direction From:	ERPA						
		NH					MA	
		A	C	D	F	G	B	E
R09	NW, NNW, N, NNE	x	x	x			x	x
R10	NE, ENE, E	x	x	x	x		x	x
R11	ESE	x	x	x	x		x	
R12	SE, SSE, S	x	x	x	x	x	x	
R13	SSW, SW, WSW	x	x	x		x	x	
N/A	W, WNW	Refer to Region R02						
Staged Evacuation - 2-Mile Region Evacuates, then Evacuate Downwind to 5 Miles								
Region	Wind Direction From:	ERPA						
		NH					MA	
		A	C	D	F	G	B	E
R14	5-Mile Region	x	x	x			x	
R15	NW, NNW, N, NNE	x					x	
R16	NE, ENE, E	x	x				x	
R17	ESE	x	x					
R18	SE, SSE	x	x	x				
R19	S, SSW, SW, WSW, W	x		x				
N/A	WNW	Refer to Region R01						
Shelter-in-Place until 90% ETE for R01, then Evacuate[2]		ERPA(s) Shelter-in-Place					ERPA(s) Evacuate	

[1] The town of Hampton Beach along SH 1A, as well as all New Hampshire and Massachusetts beaches within the EPZ, evacuates for all Regions.

[2] 20% of population in these Communities will not comply with the shelter advisory, as per Section 2.5.2 of NUREG/CR-7002. Once 90% of the 2-mile Region has evacuated, the remaining population in these Communities will evacuate.

Table 6-3. Evacuation Scenario Definitions

Scenario	Season[3]	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	Midweek	Midday	Snow	None
9	Winter	Weekend	Midday	Good	None
10	Winter	Weekend	Midday	Rain	None
11	Winter	Weekend	Midday	Snow	None
12	Winter	Midweek, Weekend	Evening	Good	None
13	Summer	Midweek, Weekend	Evening	Good	July 4th Fireworks Show at Hampton Beach
14	Summer	Midweek	Midday	Good	Roadway Impact – Lane Closure on SH 101 WB

[3] Winter assumes that school is in session (also applies to spring and autumn). Summer assumes that school is not in session.

Table 7-1. Time to Clear the Indicated Area of *90* Percent of the Affected Population

	Summer		Summer		Summer	Winter			Winter			Winter	Summer	Summer
	Midweek		Weekend		Midweek Weekend	Midweek			Weekend			Midweek Weekend	Midweek Weekend	Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Region	Midday		Midday		Evening	Midday			Midday			Evening	Evening	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather	Special Event	Roadway Impact
Entire 2-Mile Region, 5-Mile Region, and EPZ														
R01	1:55	2:05	1:45	2:05	1:35	2:00	2:15	2:25	1:45	2:05	2:25	1:35	1:40	1:55
R02	2:55	3:05	2:55	3:00	2:50	3:00	3:05	3:30	2:35	2:50	3:15	2:40	6:25	3:00
R03	4:25	4:40	3:40	3:55	3:25	4:15	4:30	4:55	3:25	3:40	4:00	3:15	5:20	4:40
2-Mile Region and Keyhole to 5 Miles														
R04	3:05	3:15	3:05	3:15	3:00	3:05	3:10	3:30	2:45	3:00	3:20	2:50	3:00	3:05
R05	3:05	3:15	3:00	3:15	3:00	3:00	3:10	3:30	2:50	2:55	3:25	2:50	3:00	3:05
R06	2:05	2:15	1:50	2:10	1:40	2:05	2:15	2:30	1:45	2:10	2:25	1:40	1:45	2:05
R07	2:30	2:35	2:25	2:25	2:10	2:30	2:40	3:00	2:10	2:20	2:45	2:10	6:50	2:30
R08	2:30	2:40	2:25	2:25	2:10	2:30	2:40	3:00	2:15	2:20	2:45	2:10	6:50	2:30
5-Mile Region and Keyhole to EPZ Boundary														
R09	3:00	3:10	2:50	3:00	2:45	2:55	3:05	3:30	2:45	2:50	3:15	2:40	5:50	3:00
R10	3:25	3:50	3:05	3:20	3:00	3:20	3:40	4:05	2:55	3:05	3:30	2:55	5:15	4:05
R11	3:35	3:55	3:10	3:25	3:00	3:30	3:50	4:05	2:55	3:10	3:35	2:55	5:45	4:20
R12	4:30	4:50	3:45	4:00	3:30	4:30	4:40	5:05	3:25	3:40	4:05	3:20	5:40	4:55
R13	4:20	4:30	3:35	3:50	3:25	4:15	4:25	4:40	3:25	3:35	4:00	3:15	5:55	4:25
Staged Evacuation - 2-Mile Region and Keyhole to 5 Miles														
R14	3:15	3:25	3:20	3:30	3:20	3:15	3:20	3:55	3:10	3:15	3:55	3:20	6:25	3:20
R15	3:25	3:35	3:40	3:50	3:40	3:20	3:25	4:00	3:20	3:30	4:05	3:25	3:35	3:25
R16	3:25	3:35	3:35	3:45	3:35	3:15	3:25	4:00	3:20	3:25	4:00	3:25	3:35	3:25
R17	2:15	2:20	2:10	2:10	2:15	2:15	2:20	2:45	2:15	2:15	2:45	2:15	2:15	2:15
R18	2:45	2:55	2:45	2:50	2:50	2:50	2:55	3:25	2:50	2:55	3:25	2:50	6:55	2:45
R19	2:45	2:55	2:45	2:45	2:50	2:50	2:55	3:30	2:50	2:55	3:30	2:55	7:00	2:45

Table 7-2. Time to Clear the Indicated Area of *100* Percent of the Affected Population

	Summer		Summer		Summer	Winter			Winter			Winter	Summer	Summer
	Midweek		Weekend		Midweek Weekend	Midweek			Weekend			Midweek Weekend	Midweek Weekend	Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Region	Midday		Midday		Evening	Midday			Midday			Evening	Evening	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather	Special Event	Roadway Impact
Entire 2-Mile Region, 5-Mile Region, and EPZ														
R01	5:05	5:05	5:00	5:00	5:00	5:00	5:00	6:00	5:00	5:00	6:00	5:00	5:00	5:05
R02	5:05	5:05	5:05	5:15	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	9:15	5:05
R03	6:20	6:25	5:10	5:30	5:10	6:15	6:35	6:55	5:10	5:10	6:10	5:10	9:45	7:50
2-Mile Region and Keyhole to 5 Miles														
R04	5:05	5:05	5:05	5:15	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	5:05	5:05
R05	5:05	5:05	5:05	5:15	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	5:05	5:05
R06	5:05	5:05	5:05	5:05	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	5:05	5:05
R07	5:05	5:05	5:05	5:05	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	9:25	5:05
R08	5:05	5:05	5:05	5:05	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	9:15	5:05
5-Mile Region and Keyhole to EPZ Boundary														
R09	5:10	5:10	5:10	5:25	5:10	5:10	5:10	6:10	5:10	5:10	6:10	5:10	8:50	5:10
R10	5:10	5:35	5:10	5:30	5:10	5:10	5:20	6:10	5:10	5:10	6:10	5:10	9:30	6:45
R11	5:10	5:15	5:10	5:15	5:10	5:10	5:10	6:10	5:10	5:10	6:10	5:10	8:40	7:20
R12	6:20	6:25	5:10	5:15	5:10	6:15	6:20	6:45	5:10	5:10	6:10	5:10	9:35	7:50
R13	6:10	6:10	5:10	5:15	5:10	6:05	6:20	6:40	5:10	5:10	6:10	5:10	9:35	6:10
Staged Evacuation - 2-Mile Region and Keyhole to 5 Miles														
R14	5:05	5:10	5:10	5:30	5:05	5:05	5:10	6:10	5:05	5:05	6:05	5:05	9:25	5:05
R15	5:05	5:10	5:10	5:30	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	5:05	5:05
R16	5:05	5:10	5:10	5:30	5:05	5:05	5:15	6:05	5:05	5:05	6:05	5:05	5:05	5:05
R17	5:05	5:05	5:05	5:05	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	5:05	5:05
R18	5:05	5:05	5:05	5:05	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	9:10	5:05
R19	5:05	5:05	5:05	5:05	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	9:25	5:05

Table 7-3. Time to Clear 90 Percent of the 2-Mile Region

	Summer		Summer		Summer	Winter			Winter			Winter	Summer	Summer
	Midweek		Weekend		Midweek Weekend	Midweek			Weekend			Midweek Weekend	Midweek Weekend	Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Region	Midday		Midday		Evening	Midday			Midday			Evening	Evening	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather	Special Event	Roadway Impact
Un-staged Evacuation - 2-Mile Region, 5-Mile Region, Full EPZ, and Keyhole to 5-Miles														
R01	1:55	2:05	1:45	2:05	1:35	2:00	2:15	2:25	1:45	2:05	2:25	1:35	1:40	1:55
R02	2:10	2:20	2:05	2:10	1:40	2:15	2:20	2:45	1:50	2:10	2:30	1:40	2:20	2:10
R03	2:40	2:50	2:25	2:50	2:10	2:45	2:50	3:35	2:35	2:35	3:10	2:05	2:45	2:40
R04	1:55	2:10	1:50	2:05	1:40	2:05	2:15	2:25	2:00	2:05	2:25	1:35	1:40	1:55
R05	2:05	2:10	2:00	2:05	1:35	2:05	2:15	2:25	1:55	2:05	2:25	1:35	1:40	1:55
R06	2:00	2:10	1:50	2:10	1:35	2:00	2:15	2:25	1:45	2:10	2:25	1:35	1:45	2:00
R07	2:10	2:20	2:05	2:10	1:40	2:10	2:20	2:40	1:50	2:15	2:30	1:40	2:25	2:15
R08	2:10	2:20	2:05	2:10	1:40	2:10	2:20	2:40	2:00	2:10	2:30	1:40	2:10	2:15
Staged Evacuation - 2-Mile Region and Keyhole to 5-Miles														
R14	1:55	2:05	1:45	2:05	1:35	2:00	2:15	2:25	1:45	2:05	2:25	1:35	1:40	1:55
R15	1:55	2:05	1:45	2:05	1:35	2:00	2:15	2:25	1:45	2:05	2:25	1:35	1:40	1:55
R16	1:55	2:05	1:45	2:05	1:35	2:00	2:15	2:25	1:45	2:05	2:25	1:35	1:40	1:55
R17	1:55	2:05	1:45	2:05	1:35	2:00	2:15	2:25	1:45	2:05	2:25	1:35	1:40	1:55
R18	1:55	2:05	1:45	2:05	1:35	2:00	2:15	2:25	1:45	2:05	2:25	1:35	1:40	1:55
R19	1:55	2:05	1:45	2:05	1:35	2:00	2:15	2:25	1:45	2:05	2:25	1:35	1:40	1:55

Table 7-4. Time to Clear 100 Percent of the 2-Mile Region

	Summer		Summer		Summer	Winter			Winter			Winter	Summer	Summer
	Midweek		Weekend		Midweek Weekend	Midweek			Weekend			Midweek Weekend	Midweek Weekend	Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Region	Midday		Midday		Evening	Midday			Midday			Evening	Evening	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather	Special Event	Roadway Impact
Un-staged Evacuation - 2-Mile Region, 5-Mile Region, Full EPZ, and Keyhole to 5-Miles														
R01	5:05	5:05	5:00	5:00	5:00	5:00	5:00	6:00	5:00	5:00	6:00	5:00	5:00	5:05
R02	5:05	5:05	5:00	5:00	5:00	5:05	5:00	6:00	5:00	5:00	6:00	5:00	7:45	5:05
R03	5:05	6:10	5:00	5:00	5:00	5:50	5:10	6:40	5:00	5:00	6:00	5:00	6:45	6:00
R04	5:05	5:05	5:00	5:00	5:00	5:00	5:05	6:05	5:00	5:00	6:00	5:00	5:00	5:05
R05	5:05	5:05	5:00	5:00	5:00	5:05	5:05	6:00	5:00	5:00	6:00	5:00	5:00	5:05
R06	5:05	5:05	5:00	5:00	5:00	5:00	5:05	6:00	5:00	5:00	6:00	5:00	5:00	5:05
R07	5:05	5:05	5:00	5:00	5:00	5:05	5:00	6:00	5:00	5:00	6:00	5:00	7:15	5:05
R08	5:05	5:05	5:00	5:00	5:00	5:05	5:00	6:05	5:00	5:00	6:00	5:00	5:00	5:05
Staged Evacuation - 2-Mile Region and Keyhole to 5-Miles														
R14	5:05	5:05	5:00	5:00	5:00	5:05	5:05	6:05	5:00	5:00	6:00	5:00	5:40	5:05
R15	5:05	5:05	5:00	5:00	5:00	5:05	5:05	6:00	5:00	5:00	6:00	5:00	5:00	5:05
R16	5:05	5:05	5:00	5:00	5:00	5:05	5:05	6:00	5:00	5:00	6:00	5:00	5:00	5:05
R17	5:05	5:05	5:00	5:00	5:00	5:05	5:00	6:00	5:00	5:00	6:00	5:00	5:00	5:05
R18	5:05	5:05	5:00	5:00	5:00	5:05	5:00	6:00	5:00	5:00	6:00	5:00	7:40	5:05
R19	5:05	5:05	5:00	5:00	5:00	5:00	5:00	6:00	5:00	5:00	6:00	5:00	7:45	5:05

Table 8-10. School, Preschools/Daycares, and Day Camp Evacuation Time Estimates – Good Weather

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
MASSACHUSETTS SCHOOLS									
Amesbury Academy Charter Public School	90	15	5.8	17.3	20	**2:05**	12.2	16	**2:25**
Amesbury Elementary School	90	15	6.5	16.4	24	**2:10**	12.2	16	**2:30**
Amesbury High School	90	15	5.5	36.0	9	**1:55**	12.2	16	**2:15**
Amesbury Middle School	90	15	5.4	33.9	10	**1:55**	12.2	16	**2:15**
Cashman School	90	15	5.9	36.0	10	**1:55**	12.2	16	**2:15**
Sparhawk High School	90	15	5.6	33.9	10	**1:55**	12.2	16	**2:15**
Sparhawk School	90	15	6.4	34.8	11	**2:00**	12.2	16	**2:20**
Dr. FN Sweetsir School	90	15	2.2	42.5	3	**1:50**	22.7	30	**2:20**
Helen R. Donaghue School	90	15	1.1	41.7	2	**1:50**	22.7	30	**2:20**
Newbury Elementary School	90	15	3.7	28.4	8	**1:55**	21.1	28	**2:25**
The Governor's Academy	90	15	0.6	44.0	1	**1:50**	21.1	28	**2:20**
Triton Regional Middle School and High School	90	15	2.6	49.1	3	**1:50**	21.0	28	**2:20**
Bresnahan Elementary School	90	15	6.4	41.9	9	**1:55**	34.1	45	**2:40**
Coastal Alternative School	90	15	5.8	48.9	7	**1:55**	34.1	45	**2:40**
DARE Family Services	90	15	5.4	3.4	95	**3:20**	34.1	45	**4:05**
E.G. Molin Upper Elementary School	90	15	6.0	31.1	12	**2:00**	34.1	45	**2:45**
G.W. Brown School	90	15	8.6	41.9	12	**2:00**	34.1	45	**2:45**
Immaculate Conception School	90	15	8.2	41.9	12	**2:00**	34.1	45	**2:45**
Inn Street Montessori School	90	15	8.3	41.9	12	**2:00**	34.1	45	**2:45**
Newburyport High School	90	15	7.2	47.5	9	**1:55**	34.1	45	**2:40**
River Valley Charter School	90	15	6.0	48.0	8	**1:55**	34.1	45	**2:40**
Rupert A. Nock Middle School	90	15	6.0	47.5	8	**1:55**	34.1	45	**2:40**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Salisbury Elementary School	90	15	10.0	30.1	20	**2:05**	15.1	20	**2:25**
Dr. John C. Page School	90	15	3.5	3.8	55	**2:40**	23.0	33	**3:15**
Pentucket Regional High School	90	15	0.1	5.5	1	**1:50**	23.0	33	**2:25**
Pentucket Regional Middle School	90	15	0.1	5.5	1	**1:50**	23.0	33	**2:25**
MASSACHUSETTS DAYCARES									
Amesbury Country Day School	90	15	6.8	17.3	24	**2:10**	12.2	16	**2:30**
James Place The Next Generation	90	15	5.6	19.9	17	**2:05**	12.2	16	**2:25**
Leaps and Bounds Pre-School	90	15	5.4	55.0	6	**1:55**	12.2	16	**2:15**
Leaps and Bounds Pre-School	90	15	5.4	55.0	6	**1:55**	12.2	16	**2:15**
Little Sprouts Daycare	90	15	5.4	22.4	14	**2:00**	12.2	16	**2:20**
Windmill Country Day School	90	15	5.3	33.9	9	**1:55**	12.2	16	**2:15**
Little People's Pre-School	90	15	0.9	41.7	1	**1:50**	22.7	30	**2:20**
Creative Playhouse	90	15	0.9	55.0	1	**1:50**	21.0	28	**2:20**
Bright Horizons at Newburyport	90	15	5.7	48.9	7	**1:55**	34.1	45	**2:40**
Community Action, Inc. Newburyport Head Start	90	15	6.6	41.4	10	**1:55**	34.1	45	**2:40**
Kinder Care Learning Center	90	15	6.6	49.3	8	**1:55**	34.1	45	**2:40**
Kindercare Learning Center	90	15	5.4	3.4	95	**3:20**	34.1	45	**4:05**
Knoll Edge Nursery	90	15	6.2	49.7	7	**1:55**	34.1	45	**2:40**
Knoll Edge Too!	90	15	5.7	49.7	7	**1:55**	34.1	45	**2:40**
Mrs Murray's Nursery School	90	15	6.3	37.4	10	**1:55**	34.1	45	**2:40**
Newburyport Montessori School	90	15	8.2	41.9	12	**2:00**	34.1	45	**2:45**
YWCA - School's Out Program	90	15	7.9	49.7	10	**1:55**	34.1	45	**2:40**
New Beginnings Learning Center	90	15	8.5	55.0	9	**1:55**	15.1	20	**2:15**
Children's Castle	90	15	3.5	3.8	55	**2:40**	23.0	33	**3:15**
Koinonia PreSchool	90	15	1.5	3.7	24	**2:10**	23.0	33	**2:45**
Learning Tree Preschool	90	15	2.5	3.7	41	**2:30**	23.0	33	**3:05**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Pathways for Learning Preschool	90	15	1.1	5.0	13	**2:00**	23.0	33	**2:35**
MASSACHUSETTS DAY CAMPS									
Camp Bauercrest	90	15	3.5	18.8	11	**2:00**	25.9	35	**2:35**
James Place	90	15	5.6	19.9	17	**2:05**	12.2	16	**2:25**
Tosh Farrell Soccer Development	90	15	5.4	22.4	14	**2:00**	12.2	16	**2:20**
US Sports Institute	90	15	5.9	36.0	10	**1:55**	12.2	16	**2:15**
Governor's Academy	90	15	0.6	44.0	1	**1:50**	21.1	28	**2:20**
Clipper Girls Basketball Camp	90	15	5.4	3.4	95	**3:20**	34.1	45	**4:05**
Coastal Discoveries Marine	90	15	8.3	41.9	12	**2:00**	34.1	45	**2:45**
Joppa Flats Summer Camp	90	15	3.7	28.4	8	**1:55**	21.1	28	**2:25**
Metro Rock Climbing Camps	90	15	5.7	49.7	7	**1:55**	34.1	45	**2:40**
YWCA Scamper Camp	90	15	8.3	41.9	12	**2:00**	34.1	45	**2:45**
Koinonia Day Camp	90	15	1.5	3.7	24	**2:10**	23.0	33	**2:45**
					MA Maximum:	**3:20**		**MA Maximum:**	**4:05**
					MA Average:	**1:05**		**MA Average:**	**2:40**
NEWHAMPSHIRE SCHOOLS									
Brentwood Christian Academy	90	15	4.5	47.9	6	**1:55**	25.6	34	**2:30**
Seacoast Learning Collaborative	90	15	1.3	7.4	11	**2:00**	24.7	33	**2:35**
Swasey Elementary	90	15	3.6	8.4	26	**2:15**	23.8	32	**2:50**
East Kingston Elementary School	90	15	6.9	17.4	24	**2:10**	25.6	34	**2:45**
Exeter Classical Christian School	90	15	6.2	7.0	53	**2:40**	24.7	33	**3:15**
Exeter High School	90	15	2.8	10.7	16	**2:05**	24.7	33	**2:40**
Great Bay e-Learning Charter School	90	15	5.9	5.7	62	**2:50**	24.7	33	**3:25**
Lincoln Street Elementary School	90	15	5.9	5.7	62	**2:50**	24.7	33	**3:25**
Main Street School	90	15	5.9	6.9	51	**2:40**	24.7	33	**3:15**
Phillips Exeter Academy	90	15	6.0	7.1	51	**2:40**	24.7	33	**3:15**
Greenland Central School	90	15	6.1	2.5	148	**4:15**	8.2	11	**4:30**

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Hampton Academy	90	15	13.3	5.4	148	**4:15**	8.2	11	**4:30**
Hampton Centre School	90	15	13.1	5.4	145	**4:10**	8.2	11	**4:25**
Marston School	90	15	13.3	5.4	147	**4:15**	8.2	11	**4:30**
Sacred Heart School	90	15	13.2	5.3	150	**4:15**	8.2	11	**4:30**
Winnacunnet Reg. High School	90	15	13.2	5.4	148	**4:15**	8.2	11	**4:30**
Heronfield Academy	90	15	14.0	5.1	164	**4:30**	8.2	11	**4:45**
Lincoln Akerman School	90	15	15.3	6.2	148	**4:15**	8.2	11	**4:30**
Kensington Elementary School	90	15	10.3	5.1	120	**3:45**	24.7	33	**4:20**
Daniel J. Bakie School	90	15	3.0	39.9	5	**1:50**	25.6	34	**2:25**
Sanborn Regional High School	90	15	1.2	50.2	1	**1:50**	27.5	37	**2:30**
Seacoast Charter School	90	15	2.7	39.9	4	**1:50**	25.6	34	**2:25**
Maude H. Trefethen School	90	15	5.8	3.6	97	**3:25**	8.2	11	**3:40**
Newfields Elementary School	90	15	8.0	9.4	51	**2:40**	24.7	33	**3:15**
Memorial Elementary School	90	15	8.6	40.6	13	**2:00**	25.6	34	**2:35**
Sanborn Regional Middle School	90	15	8.6	50.2	10	**1:55**	25.6	34	**2:30**
North Hampton Elementary School	90	15	10.4	4.4	143	**4:10**	8.2	11	**4:25**
Dondero School	90	15	4.6	2.7	104	**3:30**	18.4	25	**3:55**
Little Harbor School	90	15	4.1	3.9	63	**2:50**	18.4	25	**3:15**
New Franklin School	90	15	2.3	5.9	23	**2:10**	18.4	25	**2:35**
Portsmouth High School	90	15	3.2	4.1	47	**2:35**	18.4	25	**3:00**
Portsmouth Middle School	90	15	3.5	4.9	42	**2:30**	18.4	25	**2:55**
Robert J. Lister Academy	90	15	2.7	2.2	72	**3:00**	18.4	25	**3:25**
St Patrick's School	90	15	2.8	4.9	35	**2:20**	18.4	25	**2:45**
Learning Skills Academy	90	15	7.1	3.0	142	**4:10**	8.2	11	**4:25**
Rye Elementary School	90	15	6.5	2.7	146	**4:15**	8.2	11	**4:30**
Rye Junior High School	90	15	6.9	2.7	151	**4:20**	8.2	11	**4:35**
Seabrook Elementary School	90	15	18.6	12.4	90	**3:15**	24.7	33	**3:50**

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Seabrook Middle School	90	15	18.6	12.4	90	**3:15**	24.7	33	**3:50**
Barnard School	90	15	9.5	29.2	20	**2:05**	25.6	34	**2:40**
Seventh Day Adventist Elementary School	90	15	9.5	29.2	20	**2:05**	25.6	34	**2:40**
Acorn School	90	15	11.0	4.0	166	**4:35**	24.7	33	**5:10**
Cooperative Middle School	90	15	8.5	6.2	83	**3:10**	24.7	33	**3:45**
Cornerstone Christian Academy	90	15	9.3	4.6	122	**3:50**	24.7	33	**4:25**
Stratham Memorial School	90	15	11.9	4.9	146	**4:15**	24.7	33	**4:50**
The Cornerstone School	90	15	11.8	4.2	168	**4:35**	24.7	33	**5:10**
NEW HAMPSHIRE DAYCARES									
A Place To Grow	90	15	1.2	36.8	2	**1:50**	23.8	32	**2:25**
Appleseeds Day School	90	15	10.2	4.6	133	**4:00**	24.7	33	**4:35**
Building Block School	90	15	7.4	6.2	72	**3:00**	24.7	33	**3:35**
De Colores Children's Center	90	15	5.0	6.6	45	**2:30**	24.7	33	**3:05**
Exeter Day School	90	15	7.9	4.6	104	**3:30**	24.7	33	**4:05**
Exeter Child Care Center/Great Bay Kid's Company	90	15	5.9	5.8	61	**2:50**	24.7	33	**3:25**
Great Bay Kids Company	90	15	5.9	6.9	51	**2:40**	24.7	33	**3:15**
Great Bay Kids Company	90	15	5.9	6.9	51	**2:40**	24.7	33	**3:15**
Montessori School for the Arts & Sciences	90	15	6.2	7.5	50	**2:35**	24.7	33	**3:10**
Community School of SAU 50/Greenland Peak	90	15	6.1	2.5	148	**4:15**	8.2	11	**4:30**
Greenland Live Y'ers	90	15	6.9	2.7	151	**4:20**	8.2	11	**4:35**
Kaleidoscope Home Childcare	90	15	5.8	2.4	147	**4:15**	8.2	11	**4:30**
Fun After School Program	90	15	14.7	5.8	152	**4:20**	8.2	11	**4:35**
Kids Stop Inc.	90	15	12.5	5.0	149	**4:15**	8.2	11	**4:30**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
My First School	90	15	13.3	5.4	148	**4:15**	8.2	11	**4:30**
Sandbox Preschool Day Care	90	15	11.3	4.6	149	**4:15**	8.2	11	**4:30**
Village Preschool	90	15	13.2	5.3	150	**4:15**	8.2	11	**4:30**
Hampton Falls Child Care Center	90	15	15.0	6.0	150	**4:15**	8.2	11	**4:30**
Robin's Childsplace	90	15	15.1	6.2	147	**4:15**	8.2	11	**4:30**
Seacoast Head Start	90	15	14.9	6.0	149	**4:15**	8.2	11	**4:30**
Bright Start Early Learning	90	15	2.0	48.6	2	**1:50**	25.6	34	**2:25**
Kingston Children's Center	90	15	2.7	39.9	4	**1:50**	25.6	34	**2:25**
Story Brook Station Day School & Offspring Kids	90	15	2.2	48.6	3	**1:50**	25.6	34	**2:25**
Gateway to Learning	90	15	5.9	9.8	36	**2:25**	24.7	33	**3:00**
Nurture & Nature Children Center	90	15	7.1	9.2	46	**2:35**	24.7	33	**3:10**
Newton Learning Center	90	15	2.4	5.3	27	**2:15**	36.7	49	**3:05**
Imprint's Day School	90	15	7.8	3.2	144	**4:10**	8.2	11	**4:25**
Chase Home For Children	90	15	4.0	4.4	55	**2:40**	18.4	25	**3:05**
Children's Garden School	90	15	3.4	4.6	44	**2:30**	18.4	25	**2:55**
Community Child Care Center of Portsmouth	90	15	4.9	2.7	108	**3:35**	18.4	25	**4:00**
Community Day Care Center	90	15	1.8	6.4	17	**2:05**	18.4	25	**2:30**
Discovery Child Enrichment Center	90	15	1.2	8.6	8	**1:55**	18.4	25	**2:20**
Dondero Peak Program	90	15	4.6	2.7	104	**3:30**	18.4	25	**3:55**
Early Learning Center at Temple Israel Preschool	90	15	2.5	2.9	51	**2:40**	18.5	25	**3:05**
Edgewood Early Learning Center	90	15	3.5	4.0	53	**2:40**	18.4	25	**3:05**
Kathleen Tostenson	90	15	2.1	6.4	20	**2:05**	18.4	25	**2:30**
Kindercare Learning Center	90	15	5.4	3.4	95	**3:20**	34.1	45	**4:05**
Little Blessings Day Care	90	15	3.5	3.4	61	**2:50**	18.4	25	**3:15**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Little Harbour Peak Program	90	15	4.0	3.9	62	**2:50**	18.4	25	**3:15**
Live Y'ers Child Care Center	90	15	3.5	4.7	45	**2:30**	18.4	25	**2:55**
New Franklin Peak Program	90	15	2.3	5.9	23	**2:10**	18.4	25	**2:35**
Patricia Katkin	90	15	0.7	10.2	4	**1:50**	18.4	25	**2:15**
Pease Center - Great Bay Kids	90	15	1.6	12.4	8	**1:55**	18.4	25	**2:20**
PEEP School - Pre School	90	15	4.9	2.7	108	**3:35**	18.4	25	**4:00**
Place for Friends and Fun	90	15	4.3	2.6	100	**3:25**	18.4	25	**3:50**
Portsmouth Head Start	90	15	4.8	3.8	76	**3:05**	18.4	25	**3:30**
The Agape Preschool	90	15	3.0	4.1	44	**2:30**	18.4	25	**2:55**
Unalkaya	90	15	3.8	4.0	58	**2:45**	18.4	25	**3:10**
Children's House Montessori	90	15	5.3	2.7	117	**3:45**	8.2	11	**4:00**
Rye Country Day School	90	15	7.1	3.0	142	**4:10**	8.2	11	**4:25**
Over the Rainbow Day School	90	15	18.4	12.1	91	**3:20**	24.7	33	**3:55**
Bright Horizons at Timberland	90	15	9.7	50.0	12	**2:00**	24.7	33	**2:35**
Debbys Day Care	90	15	10.3	4.1	150	**4:15**	24.7	33	**4:50**
Four Pines Childcare	90	15	11.3	4.0	168	**4:35**	24.7	33	**5:10**
Polka Dots Child Care Center	90	15	7.0	6.3	67	**2:55**	24.7	33	**3:30**
Richie Mc Farland Children's Center	90	15	10.9	4.7	139	**4:05**	24.7	33	**4:40**
Stratham Circle Learning Center	90	15	8.4	4.4	115	**3:40**	24.7	33	**4:15**
NEW HAMPSHIRE DAY CAMPS									
YMCA Tricklin' Falls Day Camp	90	15	6.9	9.7	43	**2:30**	25.6	34	**3:05**
Long Tree Scout Reservation	90	15	2.5	50.2	3	**1:50**	27.5	37	**2:30**
YMCA Camp Lincoln Kingston	90	15	1.2	50.2	1	**1:50**	27.5	37	**2:30**
					NH Maximum:	**4:35**		**NH Maximum:**	**5:10**
					NH Average:	**3:10**		**NH Average:**	**3:35**

Table 8-14. Transit-Dependent Evacuation Time Estimates – Good Weather

Route	Bus Number	One-Wave						Two-Wave						
		Mobilization (min)	Route Length (miles)	Speed (mph)	Route Travel Time (min)	Pickup Time (min)	ETE (hr:min)	Distance to R. C. (miles)	Travel Time to R. C. (min)	Unload (min)	Driver Rest (min)	Route Travel Time (min)	Pickup Time (min)	ETE (hr:min)
Amesbury	1-3	120	31.1	22.0	85	36	**4:05**	8.9	12	5	10	102	36	**6:50**
	4-7	140	31.1	24.4	76	36	**4:15**	8.9	12	5	10	101	36	**7:00**
	8-11	160	31.1	27.0	69	36	**4:25**	8.9	12	5	10	101	36	**7:10**
Brentwood	1-3	120	35.4	12.9	164	36	**5:20**	23.7	32	5	10	126	36	**8:50**
East Kingston	1 & 2	120	4.9	20.2	14	36	**2:50**	8.9	12	5	10	26	36	**4:20**
Exeter	1-3	120	8.4	4.5	112	36	**4:30**	24.6	33	5	10	56	36	**6:50**
	5-6	140	8.4	5.2	97	36	**4:35**	24.6	33	5	10	55	36	**6:55**
	7-9	160	8.4	5.9	85	36	**4:45**	24.6	33	5	10	54	36	**7:05**
Greenland	1 & 2	120	22.0	8.0	164	36	**5:20**	8.1	11	5	10	70	36	**7:35**
Hampton	1-5	120	41.0	15.0	164	36	**5:20**	8.1	11	5	10	114	36	**8:20**
Hampton Beach	1-5	120	8.1	11.2	44	36	**3:20**	24.6	33	5	10	61	36	**5:45**
Hampton Falls	1	120	22.3	8.1	165	36	**5:25**	8.1	11	5	10	67	36	**7:35**
Kensington	1	120	25.8	9.0	172	36	**5:30**	24.6	33	5	10	99	36	**8:35**
Kingston	1-4	120	46.6	49.2	57	36	**3:35**	25.6	34	5	10	147	36	**7:30**
Merrimac	1-4	120	17.2	37.5	28	36	**3:05**	8.9	12	5	10	60	36	**5:10**
New Castle	1	120	2.6	3.2	48	36	**3:25**	8.1	11	5	10	26	36	**4:55**
Newbury	1-4	120	22.8	16.6	83	36	**4:00**	8.9	12	5	10	74	36	**6:20**
Newburyport	1-3	120	20.8	55.0	23	36	**3:00**	8.9	12	5	10	62	36	**5:05**
	4-7	140	20.8	54.8	23	36	**3:20**	8.9	12	5	10	62	36	**5:25**
	8-11	160	20.8	55.0	23	36	**3:40**	8.9	12	5	10	62	36	**5:45**
Newfields	1	120	10.9	45.0	15	36	**2:55**	28.1	37	5	10	67	36	**5:35**
Newton	1-3	120	25.0	14.6	103	36	**4:20**	25.6	34	5	10	103	36	**7:30**

Route	Bus Number	One-Wave						Two-Wave						
		Mobilization (min)	Route Length (miles)	Speed (mph)	Route Travel Time (min)	Pickup Time (min)	ETE (hr:min)	Distance to R. C. (miles)	Travel Time to R. C. (min)	Unload (min)	Driver Rest (min)	Route Travel Time (min)	Pickup Time (min)	ETE (hr:min)
North Hampton	1-3	120	31.3	10.5	178	36	**5:35**	8.1	11	5	10	95	36	**8:15**
Portsmouth	1-5	120	42.2	9.7	260	36	**7:00**	18.4	25	5	10	152	36	**10:50**
	6-10	140	42.2	10.4	244	36	**7:00**	18.4	25	5	10	152	36	**10:50**
	11-14	160	42.2	11.7	217	36	**6:55**	18.4	25	5	10	152	36	**10:45**
Rye	1-3	120	35.5	10.9	195	36	**5:55**	8.1	11	5	10	106	36	**8:45**
Salisbury	1-5	120	26.2	20.1	78	36	**3:55**	8.9	12	5	10	77	36	**6:15**
Seabrook	1-3	120	21.0	28.3	44	36	**3:20**	24.6	33	5	10	91	36	**6:15**
Seabrook Beach	1-3	120	1.5	5.4	17	36	**2:55**	8.9	12	5	10	16	36	**4:15**
South Hampton	1	120	15.4	33.6	27	36	**3:05**	25.6	34	5	10	77	36	**5:50**
Stratham	1-5	120	34.5	14.6	142	36	**5:00**	24.6	33	5	10	126	36	**8:30**
West Newbury	1-3	120	21.4	15.6	82	36	**4:00**	8.9	12	5	10	70	36	**6:15**
						Maximum ETE:	**7:00**						**Maximum ETE:**	**10:50**
						Average ETE:	**4:25**						**Average ETE:**	**7:05**

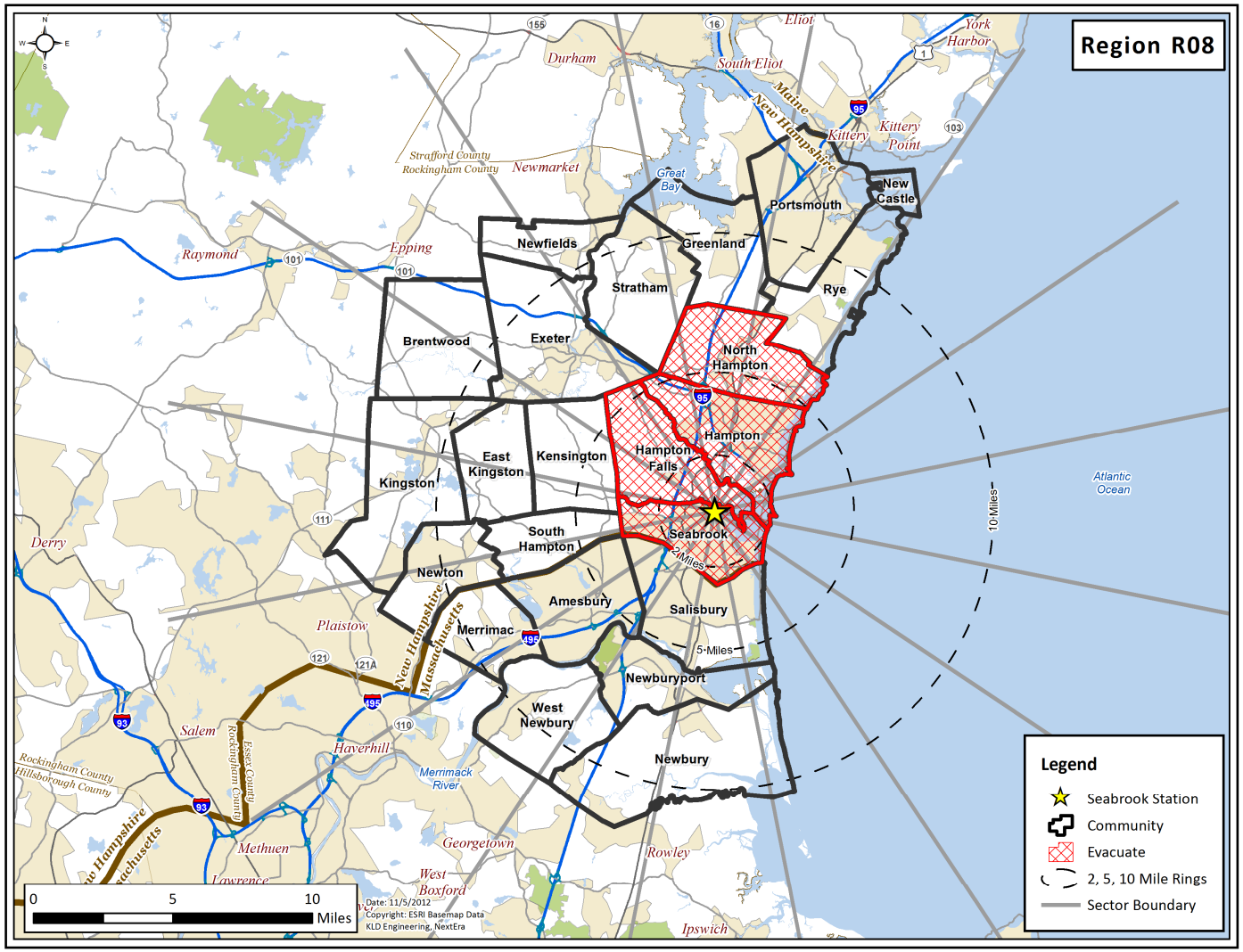


Figure H-8. Region R08

1 INTRODUCTION

This report describes the analyses undertaken and the results obtained by a study to develop Evacuation Time Estimates (ETE) for the Seabrook Station, located in Rockingham County, NH. ETE provide State and local governments with site-specific information needed for Protective Action decision-making.

In the performance of this effort, guidance is provided by documents published by Federal Governmental agencies. Most important of these are:

- Criteria for Development of Evacuation Time Estimate Studies, NUREG/CR-7002, November 2011.
- Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, NUREG 0654/FEMA REP 1, Rev. 1, 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.

The work effort reported herein was supported and guided by local stakeholders who contributed suggestions, critiques, and the local knowledge base required. Table 1-1 presents a summary of stakeholders and interactions.

Table 1-1. Stakeholder Interaction

Stakeholder	Nature of Stakeholder Interaction
NextEra emergency planning personnel	Meeting to define data requirements and set up contacts with state government agencies. Review and approval of telephone survey instrument and of key project assumptions.
Massachusetts Emergency Management Agency (MEMA) and New Hampshire Homeland Security and Emergency Management (NH HSEM)	Provided Massachusetts and New Hampshire Radiological Emergency Response Plans. Meeting to define data requirements. Provided special facility data. Review and approval of telephone survey instrument and of key project assumptions.
Local and State Police Agencies	Obtain existing traffic management plans

1.1 Overview of the ETE Process

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

1. Information Gathering:
    a. Defined the scope of work in discussions with representatives from NextEra.

b. Attended project kickoff meeting with emergency planners from NextEra, MEMA and NH HSEM to discuss project methodology, key project assumptions, identify issues to be addressed and data needed.

c. Conducted a detailed field survey of the highway system and of area traffic conditions within the Emergency Planning Zone (EPZ) and Shadow Region.

d. Obtained demographic data from the 2010 census, MEMA, and NH HSEM.

e. Conducted a random sample telephone survey of EPZ residents.

f. Conducted a data collection effort to identify and describe schools, preschools and licensed day cares, day camps, medical facilities, major employers, transient attractions, correctional facilities, homebound special needs population, and transportation providers.

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, in trip generation distribution and in highway capacities, associated with different seasons, day of week, time of day and weather conditions.

4. Reviewed the existing traffic management plan to be implemented by local and state police in the event of an incident at the plant. Traffic and access control are applied at specified Traffic Control Points (TCP) located within the EPZ and Access Control Points (ACP) typically located on the periphery of the EPZ or the area to be evacuated.

5. Used existing Communities to define Evacuation Regions. The EPZ is partitioned into 23 Communities along jurisdictional and geographic boundaries. Communities are grouped into 7 Emergency Response Planning Areas (ERPA). "Regions" are groups of contiguous ERPA for which ETE are calculated. The configurations of these Regions reflect wind direction and the radial extent of the impacted area. Each Region, other than those that approximate circular areas, approximates a "key-hole section" within the EPZ as recommended by NUREG/CR-7002.

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 DYNEV II system.

    a. Estimated the evacuation traffic demand, based on the available information derived from Census data, and from data provided by state agencies, NextEra and from the telephone survey.

b. Applied the procedures specified in the 2010 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.

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

d. Calculated the evacuating traffic demand for each Region and for each Scenario.

e. Specified selected candidate destinations for each "origin" (location of each "source" where evacuation trips are generated over the mobilization time) to support evacuation travel consistent with outbound movement relative to the location of the Seabrook Station.

8. Executed the DYNEV II model to determine optimal evacuation routing and compute ETE for all residents, transients and employees ("general population") with access to private vehicles. Generated a complete set of ETE for all specified Regions and Scenarios.
9. Documented ETE in formats in accordance with NUREG/CR-7002.
10. Calculated the ETE for all transit activities including those for special facilities (schools, medical facilities, etc.), for the transit-dependent population and for homebound special needs population.

1.2 The Seabrook Station Location

The Seabrook Station is located along the shores of Swains Creek in Rockingham County, New Hampshire. The site is approximately 40 miles northeast of Boston, MA. The Emergency Planning Zone (EPZ) consists of parts of Massachusetts and New Hampshire. Figure 1-1 displays the area surrounding the Seabrook Station. This map identifies major communities and major roads in the area and shows the location of the plant relative to Boston.

[1] Highway Capacity Manual (HCM 2010), Transportation Research Board, National Research Council, 2010.

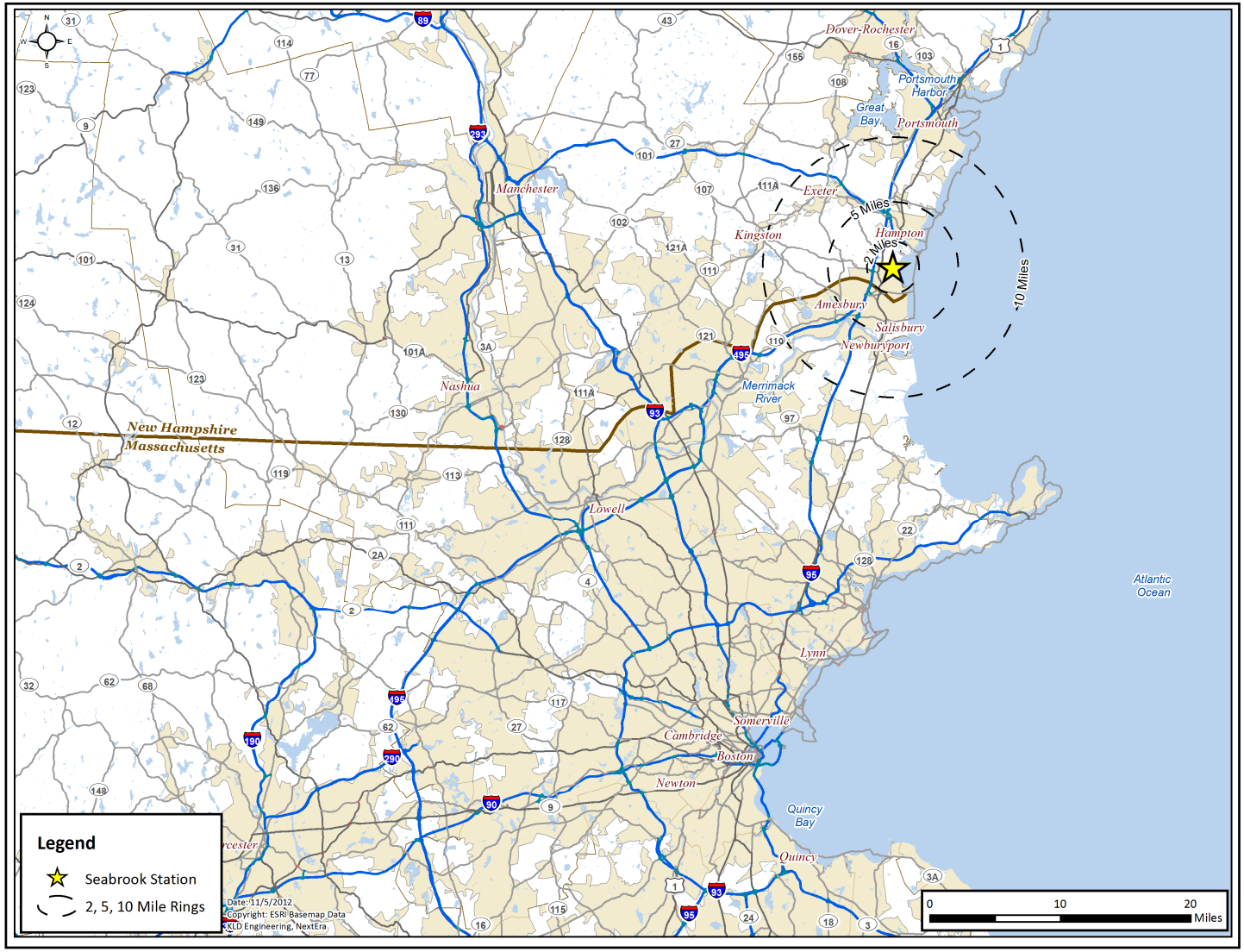


Figure 1-1. Seabrook Station Location

1.3 Preliminary Activities

These activities are described below.

Field Surveys of the Highway Network

KLD personnel drove the entire highway system within the EPZ and the Shadow Region which consists of the area between the EPZ boundary and approximately 15 miles radially from the plant. The characteristics of each section of highway were recorded. These characteristics are shown in Table 1-2:

Table 1-2. Highway Characteristics

- Number of lanes
- Lane width
- Shoulder type & width
- Interchange geometries
- Lane channelization & queuing capacity (including turn bays/lanes)
- Geometrics: curves, grades (>4%)
- Posted speed
- Actual free speed
- Abutting land use
- Control devices
- Intersection configuration (including roundabouts where applicable)
- Traffic signal type
- Unusual characteristics: Narrow bridges, sharp curves, poor pavement, flood warning signs, inadequate delineations, toll booths, etc.

Video and audio recording equipment were used to capture a permanent record of the highway infrastructure. No attempt was made to meticulously measure such attributes as lane width and shoulder width; estimates of these measures based on visual observation and recorded images were considered appropriate for the purpose of estimating the capacity of highway sections. For example, Exhibit 15-7 in the HCM indicates that a reduction in lane width from 12 feet (the "base" value) to 10 feet can reduce free flow speed (FFS) by 1.1 mph – not a material difference – for two-lane highways. Exhibit 15-30 in the HCM shows little sensitivity for the estimates of Service Volumes at Level of Service (LOS) E (near capacity), with respect to FFS, for two-lane highways.

The data from the audio and video recordings were used to create detailed geographical information systems (GIS) shapefiles and databases of the roadway characteristics and of the traffic control devices observed during the road survey; this information was referenced while preparing the input stream for the DYNEV II System.

As documented on page 15-5 of the HCM 2010, the capacity of a two-lane highway is 1700 passenger cars per hour in one direction. For freeway sections, a value of 2250 vehicles per hour per lane is assigned, as per Exhibit 11-17 of the HCM 2010. The road survey has identified several segments which are characterized by adverse geometrics on two-lane highways which are reflected in reduced values for both capacity and speed. These estimates are consistent with the service volumes for LOS E presented in HCM Exhibit 15-30. These links may be

identified by reviewing Appendix K. Link capacity is an input to DYNEV II which computes the ETE. Further discussion of roadway capacity is provided in Section 4 of this report.

Traffic signals are either pre-timed (signal timings are fixed over time and do not change with the traffic volume on competing approaches), or are actuated (signal timings vary over time based on the changing traffic volumes on competing approaches). Actuated signals require detectors to provide the traffic data used by the signal controller to adjust the signal timings. These detectors are typically magnetic loops in the roadway, or video cameras mounted on the signal masts and pointed toward the intersection approaches. If detectors were observed on the approaches to a signalized intersection during the road survey, detailed signal timings were not collected as the timings vary with traffic volume. TCPs at locations which have control devices are represented as actuated signals in the DYNEV II system.

If no detectors were observed, the signal control at the intersection was considered pre-timed, and detailed signal timings were gathered for several signal cycles. These signal timings were input to the DYNEV II system used to compute ETE, as per NUREG/CR-7002 guidance.

Figure 1-2 presents the link-node analysis network that was constructed to model the evacuation roadway network in the EPZ and Shadow Region. The directional arrows on the links and the node numbers have been removed from Figure 1-2 to clarify the figure. The detailed figures provided in Appendix K depict the analysis network with directional arrows shown and node numbers provided. The observations made during the field survey were used to calibrate the analysis network.

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 to estimate the number of evacuating vehicles during an evacuation and to estimate elements of the mobilization process. This database was also referenced to estimate the number of transit-dependent residents.

Computing the Evacuation Time Estimates

The overall study procedure is outlined in Appendix D. Demographic data were obtained from several sources, as detailed in Sections 3, 8 and Appendix E of this report. These data were analyzed and converted into vehicle demand data. The vehicle demand was loaded onto appropriate source links of the analysis network using GIS mapping software. The DYNEV II system was then used to compute ETE for all Regions and Scenarios.

Analytical Tools

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

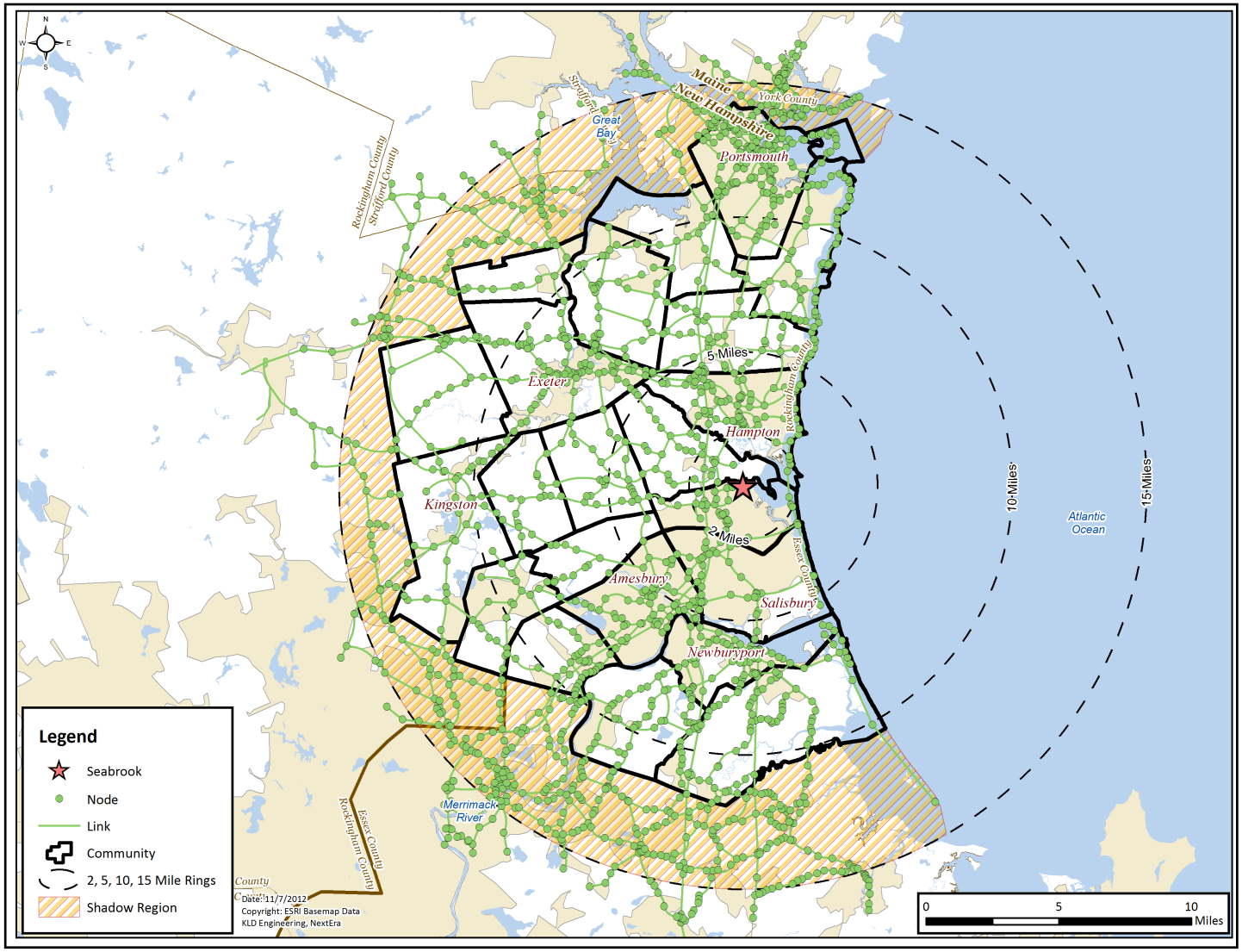


Figure 1-2. Seabrook Station Link-Node Analysis Network

DYNEV II consists of four sub-models:

- A macroscopic traffic simulation model (for details, see Appendix C).
- A Trip Distribution (TD), model that assigns a set of candidate destination (D) nodes for each origin (O) located within the analysis network, where evacuation trips are generated over time. This establishes a set of O-D tables.
- A Dynamic Traffic Assignment (DTA), model which assigns trips to paths of travel (routes) which satisfy the O-D tables, over time. The TD and DTA models are integrated to form the DTRAD (Dynamic Traffic Assignment and Distribution) model, as described in Appendix B.
- A Myopic Traffic Diversion model which diverts traffic to avoid intense, local congestion, if possible.

Another software product developed by KLD, named UNITES (UNIfied Transportation Engineering System) was used to expedite data entry and to automate the production of output tables.

The dynamics of traffic flow over the network are graphically animated using the software product, EVAN (EVacuation ANimator), developed by KLD. EVAN is GIS based, and displays statistics such as LOS, vehicles discharged, average speed, and percent of vehicles evacuated, output by the DYNEV II System. The use of a GIS framework enables the user to zoom in on areas of congestion and query road name, town name and other geographical information.

The procedure for applying the DYNEV II System within the framework of developing ETE is outlined in Appendix D. Appendix A is a glossary of terms.

For the reader interested in an evaluation of the original model, I-DYNEV, the following references are suggested:

- NUREG/CR-4873 – Benchmark Study of the I-DYNEV Evacuation Time Estimate Computer Code
- NUREG/CR-4874 – The Sensitivity of Evacuation Time Estimates to Changes in Input Parameters for the I-DYNEV Computer Code

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 the plant 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 the Seabrook Station.

DYNEV II provides 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 represent the behavioral responses of evacuees. The effects of these countermeasures may then be tested with the model.

1.4 Comparison with Prior ETE Study

Table 1-3 presents a comparison of the present ETE study with the 2002 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:

- An increase in permanent resident population, which could result in longer ETE.
- A decrease in resident vehicle occupancy (1.92 versus 2.60), which results in more evacuating vehicles and could result in longer ETE.
- A decrease in employee vehicle occupancy (1.06 versus 1.60), which results in more evacuating vehicles and could result in longer ETE.
- A decrease in employees commuting into the EPZ, which could result in shorter ETE.
- A significant decrease (nearly 50%) in transients within the EPZ, which could result in shorter ETE. The estimated transient population data used in the 2002 study was adapted from 1983 aerial photography (also used in a 1992 ETE update) and roadway traffic counts near the major beaches in the EPZ. These roadway traffic counts were multiplied by average vehicle occupancy to estimate the number of transients. Using traffic count data leads to overestimation as permanent resident vehicles (which are estimated separately) are included in the counts and repeat trips for the same vehicle cannot be reliably estimated. Using traffic counts also assumes that all the vehicles counted during the day were at the beaches at one time. This can often result in vehicle counts which exceed parking lot capacity. Some people go to the beach in the morning before it is too hot, while others prefer the afternoon or early evening. In order to avoid the inaccuracies and uncertainties with traffic count data, this study uses Google 2012 aerial imagery to reliably estimate parking lot capacity and applies a transient percentage of 55% (see Section 3.3) to avoid double counting permanent residents.
- 2010 HCM used – baseline capacity estimates have continuously increased from one version to the next of the HCM. The previous study used the 2000 HCM. Higher capacity estimates result in lower ETE.
- Dynamic evacuation modeling used which adjusts routing to avoid traffic congestion to the extent feasible (similar to a modern GPS), which could reduce ETE.

Those factors identified above which could reduce ETE outweigh those that prolong ETE and the result is a decrease in ETE of about 1 hour and 30 minutes for summer scenarios in this study relative to the previous ETE study.

Table 1-3. ETE Study Comparisons

Topic	Previous ETE Study	Current ETE Study
Resident Population Basis	2000 US Census Data; Population = 157,497	ArcGIS Software using 2010 US Census blocks; area ratio method used. Population = 164,207
Resident Population Vehicle Occupancy	Vehicle occupancy based on telephone survey results. 2.6 persons/vehicle.	2.51 persons/household, 1.31 evacuating vehicles/household yielding: 1.92 persons/vehicle.
Employee Population	Employee estimates based on average employment within each town. 1.6 employees per vehicle were used for all major employers. 1.2 employees per vehicle used for Seabrook Station Employees = 33,805	Employee estimates based on 2010 Longitudinal Employer-Household Dynamic Census data, supplemented by phone calls to major employers in MA. 1.06 employees per vehicle based on telephone survey results. Employees = 31,549
Transit-Dependent Population	Results of a telephone survey used to determine the number of permanent resident transit-dependent population. A total of 3,819 people do not have access to a vehicle, requiring 142 buses to evacuate.	Estimates based upon U.S. Census data and the results of the telephone survey. A total of 3,820 people do not have access to a vehicle, requiring 107 buses to evacuate. Additionally, homebound special needs persons need special transportation to evacuate (215 buses, 116 wheelchair vans, and 30 ambulances) based on information provided by state agencies.
Transient Population	Transient estimate based upon phone surveys to transient facilities. Source for Seasonal Population data not mentioned. Transients = 59,882 Seasonal Residents = 4,602	Transient estimates based upon information provided about transient attractions in EPZ, supplemented by surveys to the facilities and from 2012 aerial photography. Seasonal Residents computed from 2010 Census data. Transients = 30,706 Seasonal Residents = 4,841

Topic	Previous ETE Study	Current ETE Study
Special Facilities Population	Not specified	Special facility population based on information provided by each state within the EPZ. Current census = 3,619 Buses required = 72 Half Buses required = 7 Evacuation Bed Buses required = 27 Wheelchair Vans required = 205 Ambulances required = 147
School Population	School population based on Census data for each Community within the EPZ. School enrollment = 20,570	School population based on information provided by each state within the EPZ. School and daycare enrollment = 35,186 Buses required = 724 Wheelchair Vans required = 25 Vans required = 31
Voluntary evacuation from within EPZ in areas outside region to be evacuated	Not considered	20 percent of the population within the EPZ, but not within the Evacuation Region (see Figure 2-1)
Shadow Evacuation	20% of people outside of the EPZ up to 20 miles from Seabrook Station	20% of people outside of the EPZ within the Shadow Region (see Figure 7-2)
Network Size	Not Specified	2,297 links; 1,694 nodes
Roadway Geometric Data	Field surveys conducted in 2001. Road capacities based on 2000 HCM.	Field surveys conducted in February 2010. Roads and intersections were video archived. Road capacities based on 2010 HCM.
School Evacuation	Direct evacuation to designated Reception Center/Host School.	Direct evacuation to designated Reception Center/Host School.
Ridesharing	50 percent of transit-dependent persons will evacuate with a neighbor or friend.	50 percent of transit-dependent persons will evacuate with a neighbor or friend.

Topic	Previous ETE Study	Current ETE Study
Trip Generation for Evacuation	Based on residential telephone survey of specific pre-trip mobilization activities: Residents with commuters returning leave between 0 and 245 minutes. Residents without commuters returning leave between 15 and 215 minutes. Employees and transients leave between 0 and 105 minutes.	Based on residential telephone survey of specific pre-trip mobilization activities: Residents with commuters returning leave between 30 and 300 minutes. Residents without commuters returning leave between 15 and 240 minutes. Employees and transients leave between 15 and 105 minutes. All times measured from the Advisory to Evacuate.
Weather	Normal, Rain, or Snow. The capacity and free flow speed of all links in the network are reduced by 20% in the event of rain and 25% for snow.	Normal, Rain, or Snow. The capacity and free flow speed of all links in the network are reduced by 10% in the event of rain and 20% for snow.
Modeling	IDYNEV	DYNEV II System – Version 4.0.15.0
Special Events	None considered	4th of July Fireworks Show at Hampton Beach Special Event Population = 75,989 additional transients
Evacuation Cases	17 Regions and 10 Scenarios producing 170 unique cases.	19 Regions (central sector wind direction and each adjacent sector technique used) and 14 Scenarios producing 266 unique cases.
Evacuation Time Estimates Reporting	ETE reported for 100th percentile population for all regions. Results presented by Region and Scenario.	ETE reported for 90th and 100th percentile population. Results presented by Region and Scenario.
Evacuation Time Estimates for the entire EPZ, 100th percentile	Summer Weekday Midday, Good Weather: 7:45 Winter Weekday, Midday, Good Weather: 6:20	Summer Weekday, Midday, Good Weather: 6:20 Winter Weekday Midday, Good Weather: 6:15

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 2010 data.
2. Estimates of employees who reside outside the EPZ and commute to work within the EPZ are based upon data obtained from the U.S. Census Bureau, Longitudinal Employer-Household Dynamics[1], and surveys of major employers in the EPZ.
3. Population estimates at special facilities are based on available data from state emergency management agencies and from phone calls to specific facilities.
4. Roadway capacity estimates are based on field surveys and the application of the Highway Capacity Manual 2010.
5. Population mobilization times are based on a statistical analysis of data acquired from a random sample telephone survey of EPZ residents (see Section 5 and Appendix F).
6. The relationship between resident population and evacuating vehicles is developed from the telephone survey. Average values of 2.51 persons per household and 1.31 evacuating vehicles per household are used. The relationship between persons and vehicles for transients and employees is as follows:
    a. Employees: 1.06 employees per vehicle (telephone survey results) for all major employers.
    b. Beaches, marinas, and parks: Aerial imagery used to estimate parking lot vehicle occupancy. Assumed transients at the beaches travel as families/households in a single vehicle, and used the average household size of 2.51 persons to estimate the number of people.
    c. Golf Courses, campgrounds, historical sites: Vehicle occupancy varies from 1.00 person per vehicle to 2.65 persons per vehicle based upon data gathered from local transient facilities.
    d. Lodging facilities: Vehicle occupancy varies from 1.33 to 4.91 persons per vehicle based upon data gathered from facilities within the EPZ.
    e. Special Events: Assumed transients attending the 4th of July Firework show at Hampton Beach travel as families/households in a single vehicle, and used the average household size of 2.51 persons to estimate the number of vehicles.

[1] http://lehdmap.did.census.gov/

2.2 Study Methodological Assumptions

1. ETE are presented for the evacuation of the 90th and 100th percentiles of population for each Region and for each Scenario. The percentile ETE is defined as the elapsed time from the Advisory to Evacuate issued to a specific Region of the EPZ, to the time that Region is clear of the indicated percentile of evacuees. A Region is defined as a group of communities that is issued an Advisory to Evacuate. A scenario is a combination of circumstances, including time of day, day of week, season, and weather conditions.
2. The ETE are computed and presented in tabular format and graphically, in a format compliant with NUREG/CR-7002.
3. Evacuation movements (paths of travel) are generally outbound relative to the plant to the extent permitted by the highway network. All major evacuation routes are used in the analysis.
4. Regions are defined by the underlying "keyhole" or circular configurations as specified in Section 1.4 of NUREG/CR-7002. These Regions, as defined, display irregular boundaries reflecting the geography of the communities included within these underlying configurations.
5. As indicated in Figure 2-2 of NUREG/CR-7002, 100% of people within the impacted "keyhole" evacuate. 20% of those people within the EPZ, not within the impacted keyhole, will voluntarily evacuate. 20% of those people within the Shadow Region will voluntarily evacuate. See Figure 2-1 for a graphical representation of these evacuation percentages. Sensitivity studies explore the effect on ETE of increasing the percentage of voluntary evacuees in the Shadow Region (see Appendix M).
6. A total of 14 "Scenarios" representing different temporal variations (season, time of day, day of week) and weather conditions are considered. These Scenarios are outlined in Table 2-1.
7. Scenario 14 considers the closure of a single lane westbound on State Highway (SH) 101 from the interchange with Interstate-95 to the end of the analysis-network at the interchange with State Highway 107 (Exit 5). SH 101 was chosen for the roadway impact scenario due to the heavy congestion experienced (see Figure 7-3 through Figure 7-8) from the large number of evacuees exiting the area on this roadway (see Table J-5). For these reasons, a lane closure on SH 101 would have the most impact.
8. The models of the I-DYNEV System were recognized as state of the art by the Atomic Safety & Licensing Board (ASLB) in past hearings. (Sources: Atomic Safety & Licensing Board Hearings on Seabrook and Shoreham; Urbanik[2]). The models have continuously been refined and extended since those hearings and were independently validated by a consultant retained by the NRC. The new DYNEV II system incorporates the latest technology in traffic simulation and in dynamic traffic assignment. The DYNEV II system will be used to compute ETE.

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

Table 2-1. Evacuation Scenario Definitions

Scenarios	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	Midweek	Midday	Snow	None
9	Winter	Weekend	Midday	Good	None
10	Winter	Weekend	Midday	Rain	None
11	Winter	Weekend	Midday	Snow	None
12	Winter	Midweek, Weekend	Evening	Good	None
13	Summer	Midweek, Weekend	Evening	Good	July 4th Fireworks Show at Hampton Beach
14	Summer	Midweek	Midday	Good	Lane Closure on SH 101 Westbound

Figure 2-1. Voluntary Evacuation Methodology

2.3 Study Assumptions

1. The planning basis for the calculation of ETE is a rapidly escalating accident that requires evacuation, and includes the following:
    a. Advisory to Evacuate is announced coincident with the Emergency Alert System (EAS) message.
    b. Mobilization of the general population will commence within 15 minutes after the EAS message.
    c. ETE are measured relative to the Advisory to Evacuate.
2. It is assumed that everyone within the group of communities forming a Region that is issued an Advisory to Evacuate will, in fact, respond and evacuate in general accord with the planned routes.
3. 61 percent of the households in the EPZ have at least 1 commuter; 41 percent of those households with commuters will await the return of a commuter before beginning their evacuation trip, based on the telephone survey results. Therefore 25 percent (61% x 41% = 25%) of EPZ households will await the return of a commuter, prior to beginning their evacuation trip.
4. 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.
5. Access Control Points (ACP) will be staffed within approximately 60 minutes following the EAS message, to divert traffic attempting to enter the EPZ. Earlier activation of ACP locations could delay returning commuters. It is assumed that no through traffic will enter the EPZ after this 60 minute time period.
6. 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 resources available. The objectives of these TCP are:
    a. Facilitate the movements of all (mostly evacuating) vehicles at the location.
    b. Discourage inadvertent vehicle movements towards the plant.
    c. Provide assurance and guidance to any traveler who is unsure of the appropriate actions or routing.
    d. Act as local surveillance and communications center.
    e. Provide information to the emergency operations center (EOC) as needed, based on direct observation or on information provided by travelers.

    In calculating ETE, it is assumed that evacuees will drive safely, travel in directions identified in the plan, and obey all control devices and traffic guides.

7. Buses will be used to transport those without access to private vehicles:
    a. If schools are in session and there is no release, transport (buses) will evacuate students directly to the designated host schools. If there is a release, students will be evacuated to the designated reception centers for their respective communities. In New Hampshire, host schools and reception centers are the same facilities.
    b. It is assumed that children at licensed day care centers will be bused to the designated reception center for their respective communities.
    c. Buses, evacuation bed buses, wheelchair vans and ambulances will evacuate patients at medical facilities and at any senior facilities within the EPZ, as needed.
    d. Transit-dependent general population will be evacuated to reception centers.
    e. Schoolchildren, if school is in session, are given priority in assigning transit vehicles.
    f. Bus mobilization time is considered in ETE calculations.
    g. Analysis of the number of required round-trips ("waves") of evacuating transit vehicles is presented.
    h. Transport of transit-dependent evacuees from reception centers to congregate care centers is not considered in this study.
8. Provisions are made for evacuating the transit-dependent portion of the general population to reception centers by bus, based on the assumption that some of these people 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], and on guidance in Section 2.2 of NUREG/CR-7002.
9. Two types of adverse weather scenarios are considered. Rain may occur for either winter or summer scenarios; snow occurs in winter scenarios only. It is assumed that the rain or snow begins earlier or at about the same time the evacuation advisory is issued. No weather-related reduction in the number of transients who may be present in the EPZ is assumed. It is assumed that roads are passable and that the appropriate agencies are plowing the roads as they would normally when snowing.

    Adverse weather scenarios affect roadway capacity and the free flow highway speeds. The factors applied for the ETE study are based on recent research on the effects of weather on roadway operations[4]; the factors are shown in Table 2-2.
10. School buses in Massachusetts are assumed to transport 60 students and staff per bus

[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).

[4] Agarwal, M. et. al. Impacts of Weather on Urban Freeway Traffic Flow Characteristics and Facility Capacity, Proceedings of the 2005 Mid-Continent Transportation Research Symposium, August, 2005. The results of this paper are included as Exhibit 10-15 in the HCM 2010.

for elementary schools and 50 students and staff per bus for middle and high schools unless otherwise specified. School buses in New Hampshire are assumed to transport 60 students per bus for elementary schools and 45 students per bus for middle and high schools for New Hampshire unless otherwise specified. Transit buses used to transport the transit-dependent general population are assumed to transport 36 people per bus. These assumptions are based on discussions with state emergency management agencies and documentation in the state emergency plans.

Table 2-2. Model Adjustment for Adverse Weather

Scenario	Highway Capacity*	Free Flow Speed*	Mobilization Time for General Population
Rain	90%	90%	No Effect
Snow	80%	80%	Clear driveway before leaving home (See Figure F-14)
*Adverse weather capacity and speed values are given as a percentage of good weather conditions. Roads are assumed to be passable.			

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 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 2010 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. Estimating counts of vehicles by simply adding up the capacities of different types of parking facilities will tend to overestimate the number of transients and can lead to ETE that are too conservative.

Analysis of the population characteristics of the Seabrook Station 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 (shopping, recreation) and then leave the area. Also includes seasonal residents who may spend several weeks or months in the EPZ.
- Employees - people who reside outside of the EPZ and commute to businesses within the EPZ on a daily basis.

Estimates of the population and number of evacuating vehicles for each of the population groups are presented for each Community and by polar coordinate representation (population rose). The Seabrook Station EPZ is subdivided into 23 Communities. The EPZ is shown in Figure 3-1.

3.1 Permanent Residents

The primary source for estimating permanent population is the latest U.S. Census data. The average household size (2.51 persons/household – See Figure F-1) and the number of evacuating vehicles per household (1.31 vehicles/household – See Figure F-8) were adapted from the telephone survey results.

Population estimates are based upon Census 2010 data. The estimates are created by cutting the census block polygons by the Community and EPZ boundaries. A ratio of the original area of each census block and the updated area (after cutting) is multiplied by the total block population to estimate what the population is within the EPZ. This methodology assumes that the population is evenly distributed across a census block. Table 3-1 provides the permanent resident population within the EPZ by Community based on this methodology.

The year 2010 permanent resident population is divided by the average household size and then multiplied by the average number of evacuating vehicles per household in order to estimate number of vehicles. Permanent resident population and vehicle estimates are presented in Table 3-2. Figure 3-2 and Figure 3-3 present the permanent resident population and permanent resident vehicle estimates by sector and distance from Seabrook Station. This "rose" was constructed using GIS software.

3.1.1 Correctional and Medical Facilities

The Rockingham County Jail and several large medical facilities are located within the EPZ; see Tables E-4 and E-9. These facilities have permanent residents that are included in the Census, but these residents are transit dependent and are addressed in Section 8. As such, these residents are included in the EPZ resident population, but no evacuating vehicles are considered for these residents. The vehicles in Table 3-2 and Figure 3-3 have been adjusted accordingly.

3.1.2 Schools

Phillips Exeter Academy and The Governor's Academy are located within the EPZ; see Table E-1. These students live on campus and are included in the Census, but the students are transit dependent and are addressed in Section 8. As such, these resident students are included in the EPZ resident population but no evacuating vehicles are considered for them. The vehicles in Table 3-2 and Figure 3-3 have been adjusted accordingly.

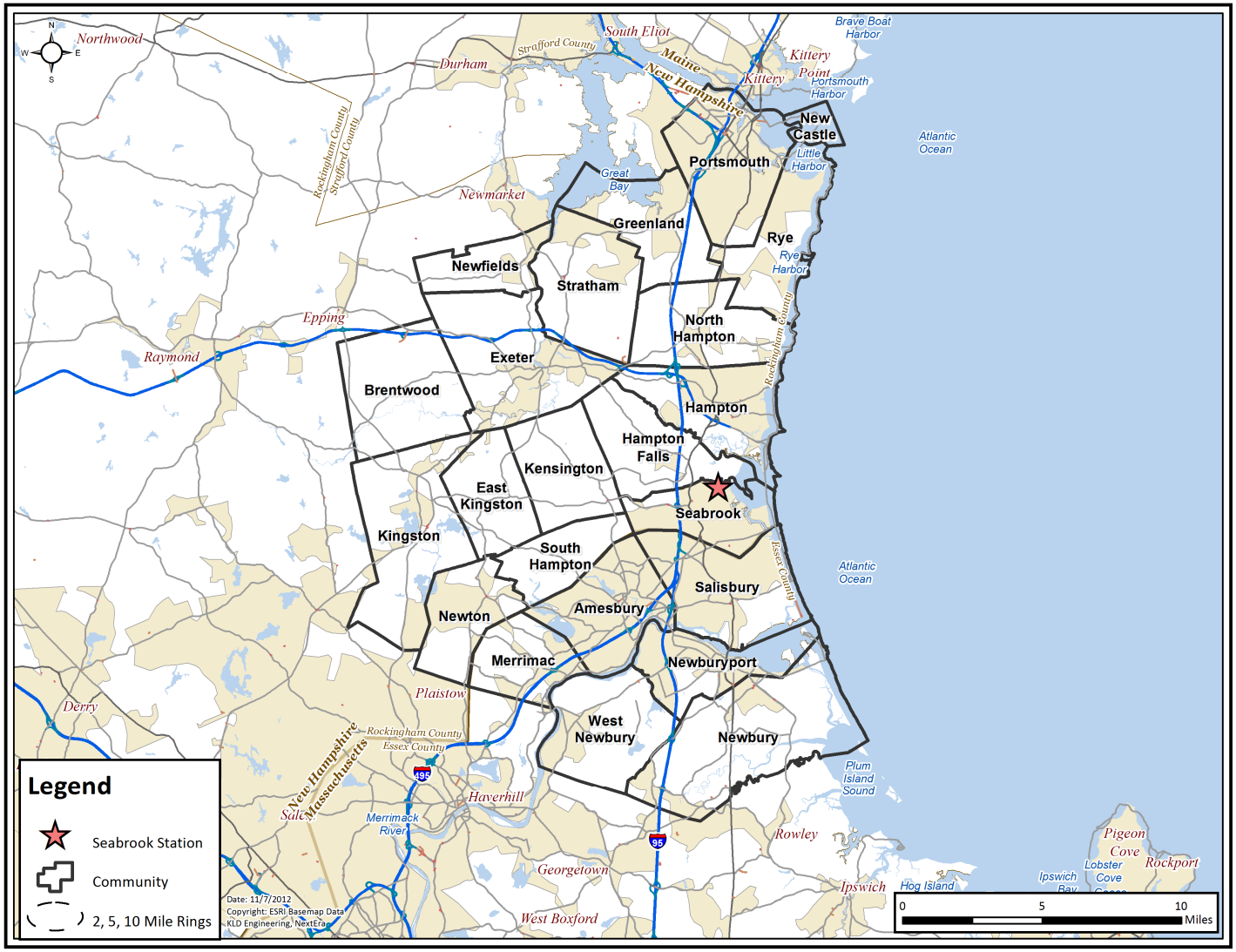


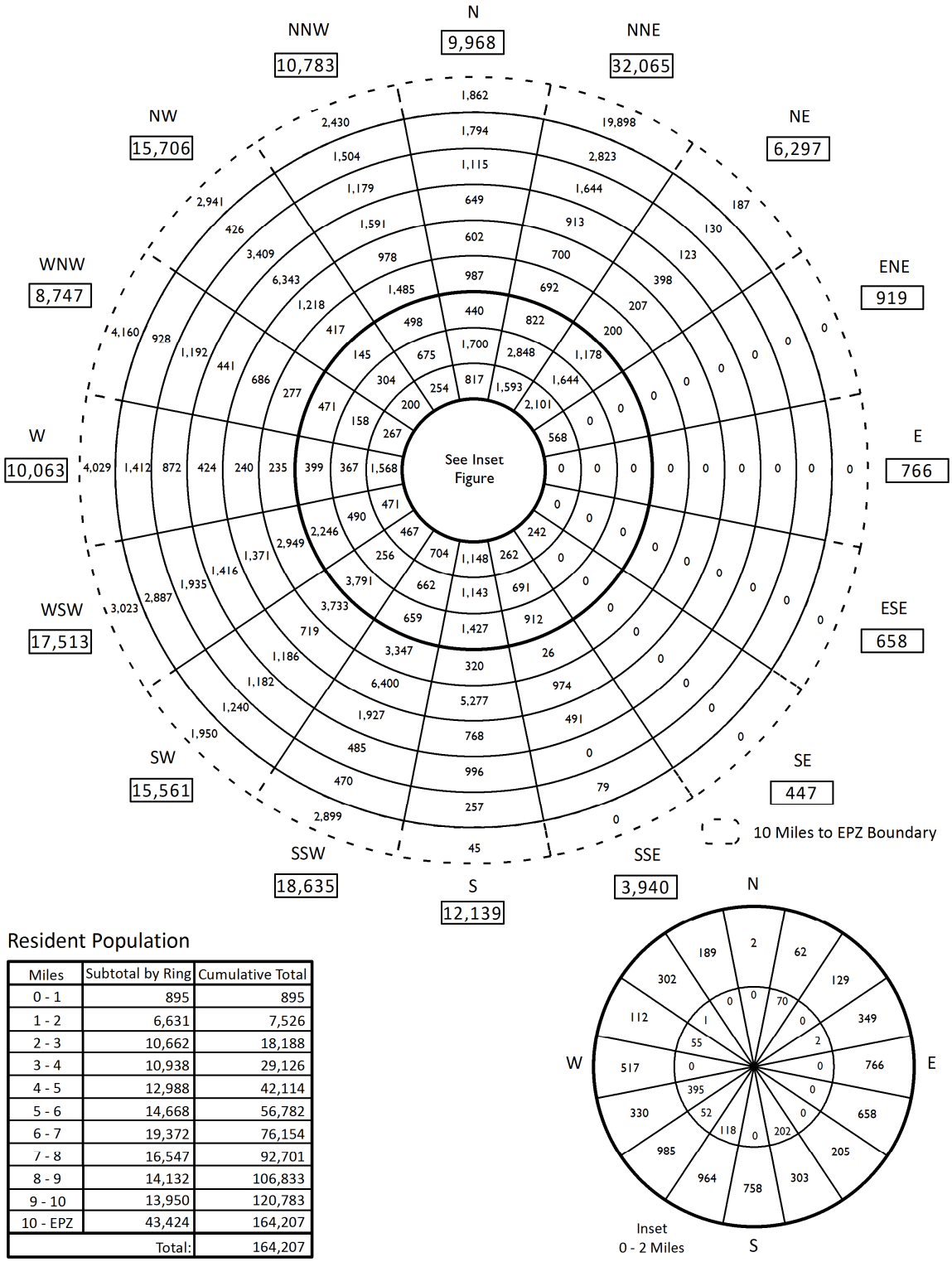
Figure 3-1. Seabrook Station EPZ

Table 3-1. EPZ Permanent Resident Population

Community	2000 Population	2010 Population
Amesbury	16,450	16,281
Brentwood	3,197	4,490
East Kingston	1,784	2,326
Exeter	14,058	14,313
Greenland	3,217	3,554
Hampton	14,950	15,444
Hampton Falls	1,880	2,242
Kensington	1,893	2,128
Kingston	5,862	6,117
Merrimac	6,138	6,361
New Castle	1,010	968
Newbury	6,729	6,664
Newburyport	17,177	17,417
Newfields	1,551	1,682
Newton	4,293	4,589
North Hampton	4,259	4,307
Portsmouth	20,784	20,746
Rye	5,182	5,317
Salisbury	7,828	8,372
Seabrook	7,920	8,566
South Hampton	840	812
Stratham	6,346	7,276
West Newbury	4,149	4,235
TOTAL	**157,497**	**164,207**
EPZ Population Growth:		**4.26%**

Table 3-2. Permanent Resident Population and Vehicles by Community

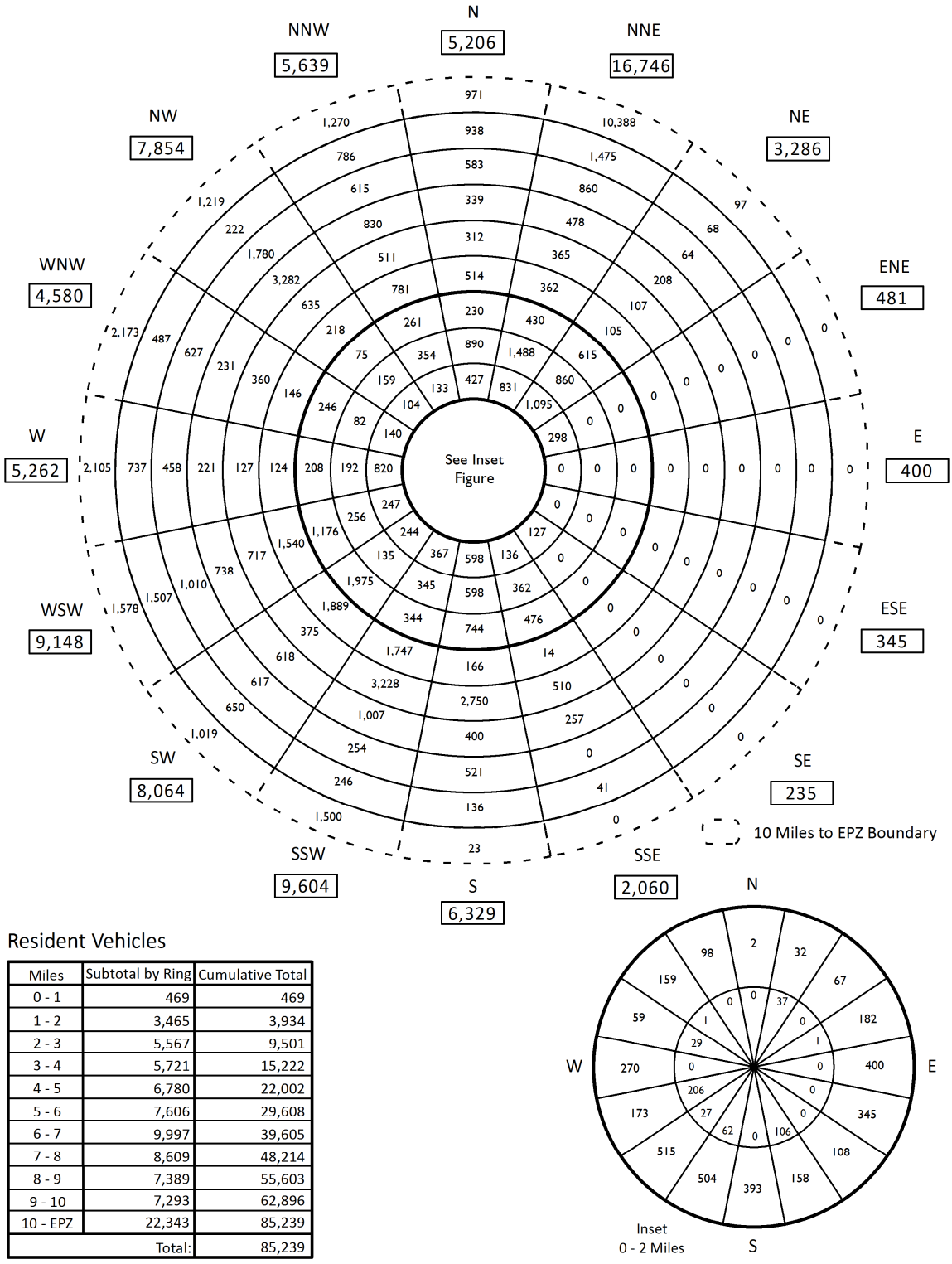
Community	2010 Population	2010 Resident Vehicles
Amesbury	16,281	8,440
Brentwood	4,490	2,030
East Kingston	2,326	1,217
Exeter	14,313	7,449
Greenland	3,554	1,857
Hampton	15,444	8,072
Hampton Falls	2,242	1,176
Kensington	2,128	1,116
Kingston	6,117	3,201
Merrimac	6,361	3,321
New Castle	968	505
Newbury	6,664	3,470
Newburyport	17,417	8,974
Newfields	1,682	877
Newton	4,589	2,393
North Hampton	4,307	2,250
Portsmouth	20,746	10,832
Rye	5,317	2,774
Salisbury	8,372	4,371
Seabrook	8,566	4,473
South Hampton	812	427
Stratham	7,276	3,800
West Newbury	4,235	2,214
TOTAL	**164,207**	**85,239**



Resident Population

Miles	Subtotal by Ring	Cumulative Total
0 - 1	895	895
1 - 2	6,631	7,526
2 - 3	10,662	18,188
3 - 4	10,938	29,126
4 - 5	12,988	42,114
5 - 6	14,668	56,782
6 - 7	19,372	76,154
7 - 8	16,547	92,701
8 - 9	14,132	106,833
9 - 10	13,950	120,783
10 - EPZ	43,424	164,207
	Total:	164,207

Figure 3-2. Permanent Resident Population by Sector



Resident Vehicles

Miles	Subtotal by Ring	Cumulative Total
0 - 1	469	469
1 - 2	3,465	3,934
2 - 3	5,567	9,501
3 - 4	5,721	15,222
4 - 5	6,780	22,002
5 - 6	7,606	29,608
6 - 7	9,997	39,605
7 - 8	8,609	48,214
8 - 9	7,389	55,603
9 - 10	7,293	62,896
10 - EPZ	22,343	85,239
	Total:	85,239

Figure 3-3. Permanent Resident Vehicles by Sector

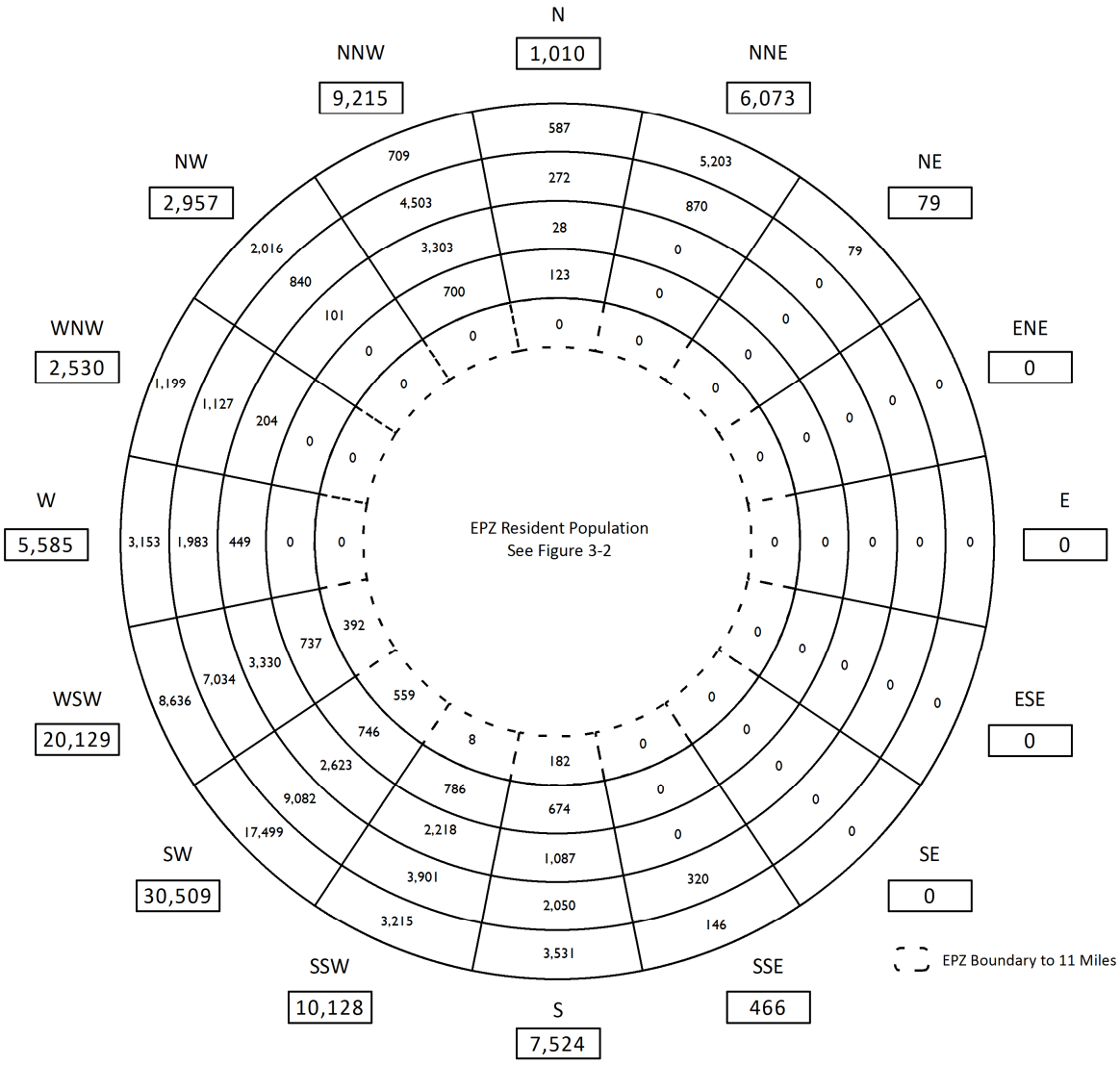
3.2 Shadow Population

A portion of the population living outside the evacuation area extending to 15 miles radially from the Seabrook Station (in the Shadow Region) may elect to evacuate without having been instructed to do so. Based upon NUREG/CR-7002 guidance, it is assumed that 20 percent of the permanent resident population, based on U.S. Census Bureau data, in this Shadow Region will elect to evacuate.

Shadow population characteristics (household size, evacuating vehicles per household, mobilization time) are assumed to be the same as that for the EPZ permanent resident population. Table 3-3, Figure 3-4, and Figure 3-5 present estimates of the shadow population and vehicles, by sector.

Table 3-3. Shadow Population and Vehicles by Sector

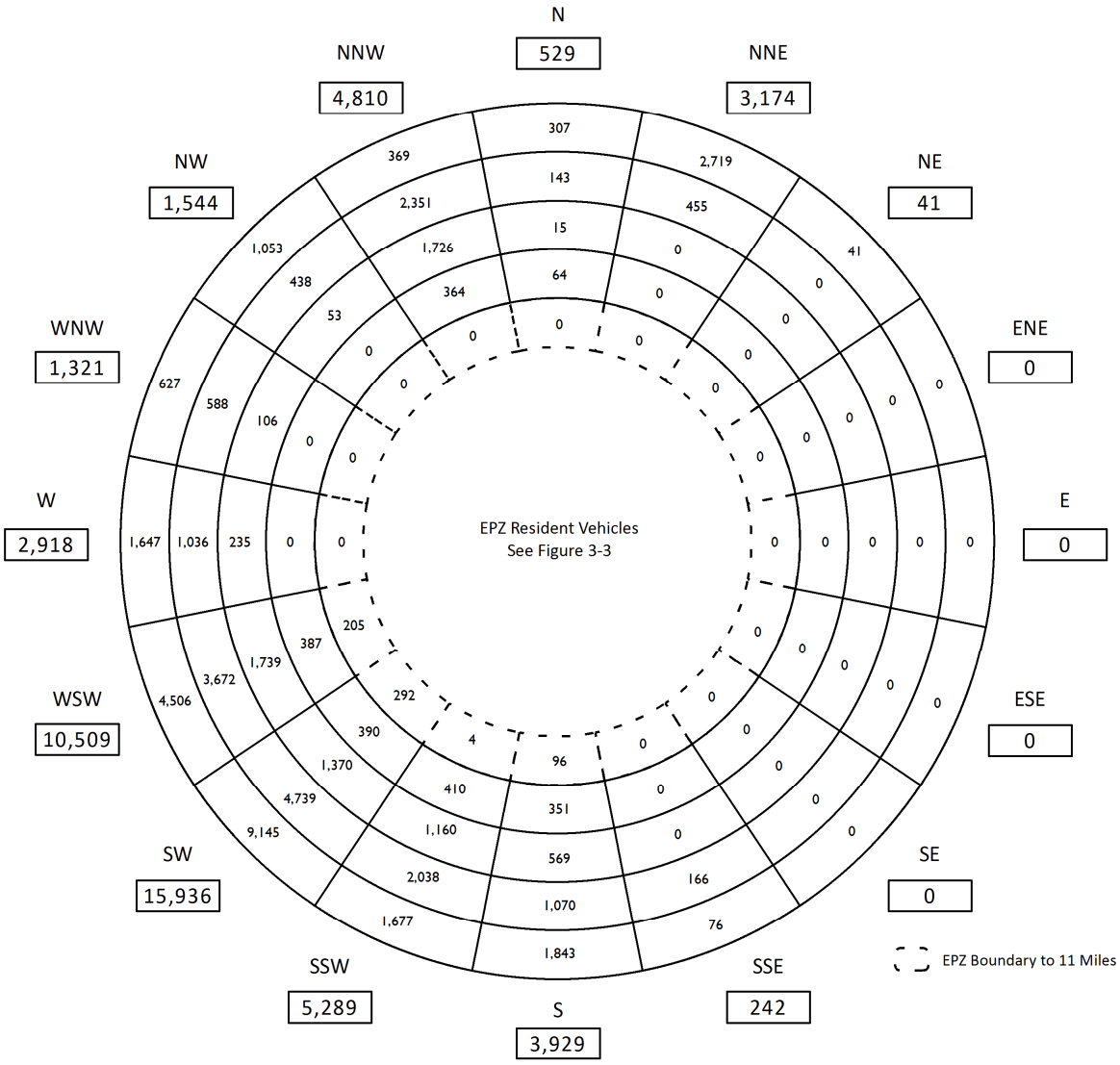
Sector	Population	Evacuating Vehicles
N	1,010	529
NNE	6,073	3,174
NE	79	41
ENE	0	0
E	0	0
ESE	0	0
SE	0	0
SSE	466	242
S	7,524	3,929
SSW	10,128	5,289
SW	30,509	15,936
WSW	20,129	10,509
W	5,585	2,918
WNW	2,530	1,321
NW	2,957	1,544
NNW	9,215	4,810
TOTAL	**96,205**	**50,242**



Shadow Population

Miles	Subtotal by Ring	Cumulative Total
EPZ - 11	1,141	1,141
11 - 12	3,766	4,907
12 - 13	13,343	18,250
13 - 14	31,982	50,232
14 - 15	45,973	96,205
	Total:	96,205

Figure 3-4. Shadow Population by Sector



Shadow Vehicles

Miles	Subtotal by Ring	Cumulative Total
EPZ - 11	597	597
11 - 12	1,966	2,563
12 - 13	6,973	9,536
13 - 14	16,696	26,232
14 - 15	24,010	50,242
	Total:	50,242

Figure 3-5. Shadow Vehicles by Sector

3.3 Transient Population

Transient population groups are defined as those people (who are not permanent residents, nor commuting employees) who enter the EPZ for a specific purpose (shopping, recreation). Transients may spend less than one day or stay overnight at camping facilities, hotels and motels. The Seabrook Station EPZ has a number of areas and facilities that attract transients, including:

- Lodging Facilities
- Historical Sites/Museums
- Campgrounds
- Parks
- Beaches
- Marinas
- Golf Courses

Surveys of lodging facilities within the EPZ were conducted to determine the number of rooms, percentage of occupied rooms at peak times, and the number of people and vehicles per room for each facility. These data were used to estimate the number of transients and evacuating vehicles at each of these facilities. A total of 7,037 transients in 2,516 vehicles are assigned to lodging facilities in the EPZ.

Data was provided by state emergency management personnel on the average daily attendance at historical sites and museums in the EPZ. This data was used to estimate the number of transients and evacuating vehicles at each of these facilities. Averages were used for facilities without data. A total of 119 transients and 60 vehicles are assigned to historical sites in the EPZ.

Data provided by the states along with surveys of campgrounds within the EPZ were used to determine the number of campsites, peak occupancy, and the number of vehicles and people per campsite for each facility. These data were used to estimate the number of evacuating vehicles for transients at each of these facilities. A total of 8,861 transients and 6,191 vehicles are assigned to campgrounds in the EPZ.

There are two water amusement parks in the EPZ. Supplemented with data provided by the states, surveys of the parks within the EPZ were conducted to determine the number of transients visiting each of those places on a typical day. A total of 5,500 transients and 2,797 vehicles have been assigned to these parks.

Google 2012 aerial imagery was used to determine the number of parking spots at beach parking lots within the EPZ. According to the previous ETE study, KLD TR-364 (March 2002), approximately 45% of beach visitors are local residents. The remaining 55% of visitors come from outside the EPZ. The average household size – 2.51 persons per vehicle – was assumed to be the vehicle occupancy rate for beachgoers. A total of 7,514 transients and 2,995 transient vehicles are assigned to beaches in the EPZ.

Supplemented with data provided by the states, surveys of the marinas in the EPZ were

conducted to determine average daily attendance. These data were used to estimate the number of transients and evacuating vehicles at each of these facilities. A total of 641 transients and 256 vehicles are assigned to marinas in the EPZ.

Surveys of golf courses were conducted to determine the number of golfers and vehicles at each facility on a typical peak day, and the number of golfers that travel from outside the area. A total of 1,034 transients and 538 vehicles are assigned to golf courses within the EPZ.

Appendix E summarizes the transient data that was estimated for the EPZ. Table E-6 and Table E-7 presents the number of transients visiting recreational areas, while Table E-8 presents the number of transients at lodging facilities within the EPZ.

Table 3-4 presents transient population and transient vehicle estimates by Community. Figure 3-6 and Figure 3-7 present these data by sector and distance from the plant.

3.3.1 Seasonal Transient Population

The Seabrook Station EPZ has a second category of transient population which is seasonal residents. These people will enter the area during the summer months and may stay considerably longer (several weeks or the entire season) than the average transient staying at a lodging facility. The seasonal population use other lodging facilities such as condos, beach houses and rentals that otherwise would not be captured with the year-round typical lodging population.

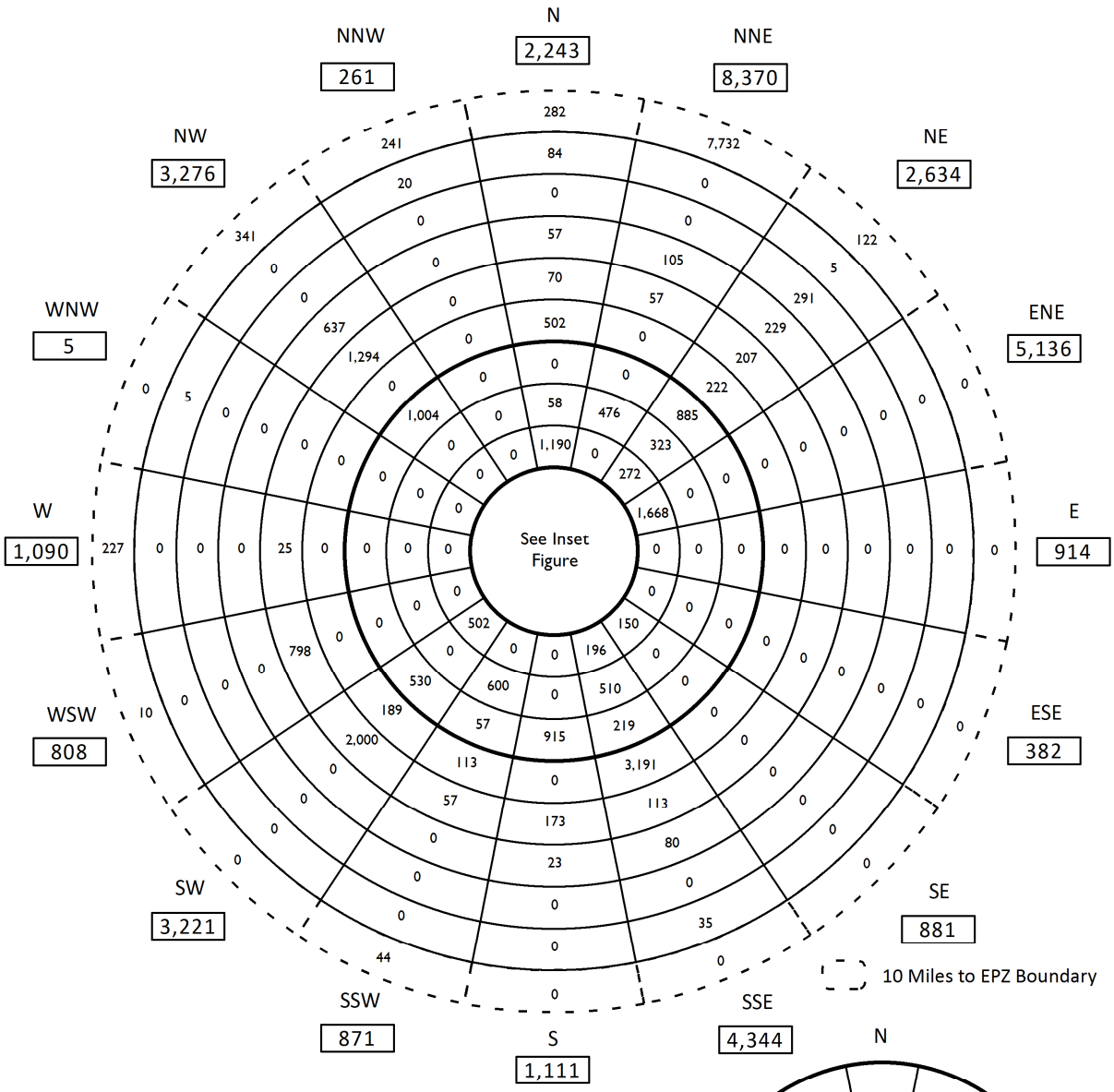
The methodology used to calculate the seasonal population is based on 2010 Census Block data. Each Census Block includes information regarding the number of vacant and occupied households. Using the Census data, an average vacant household percentage of 23% was calculated for the entire Seabrook Station EPZ.

It is assumed that seasonal residents will be renting homes near the Atlantic Ocean shoreline. Using only those Census blocks that are within a half mile of the shoreline, the number of seasonal homes was calculated by determining the percentage of vacant households within the block and subtracting out the average vacant household percentages (23%) within the EPZ. An average household size of 2.51 persons per household is used to determine the seasonal transient population, and 1.31 evacuating vehicles per seasonal household is used to determine the number of seasonal transient vehicles. These numbers are adapted from the telephone survey results (see Appendix F).

Based on this analysis, it is estimated that there is an additional seasonal population of 4,841 transients and 2,501 transient vehicles within the Seabrook Station EPZ. These numbers are included with the transient population in Table 3-4 as well as in Figure 3-6 and Figure 3-7.

Table 3-4. Summary of Transients and Transient Vehicles

Community	Transients	Transient Vehicles	Seasonal Residents	Seasonal Resident Vehicles	Total Transients	Total Transient Vehicles
Amesbury	2,719	1,039	0	0	2,719	1,039
Brentwood	341	272	0	0	341	272
East Kingston	25	13	0	0	25	13
Exeter	1,931	851	0	0	1,931	851
Greenland	297	146	3	1	300	147
Hampton	6,568	2,522	2,855	1,480	9,423	4,002
Hampton Falls	1,004	800	0	0	1,004	800
Kensington	0	0	0	0	0	0
Kingston	242	200	0	0	242	200
Merrimac	0	0	0	0	0	0
New Castle	815	393	11	5	826	398
Newbury	109	63	135	67	244	130
Newburyport	470	187	67	33	537	220
Newfields	238	190	0	0	238	190
Newton	0	0	0	0	0	0
North Hampton	810	539	44	22	854	561
Portsmouth	6,359	3,165	13	7	6,372	3,172
Rye	1,282	511	334	168	1,616	679
Salisbury	5,122	3,319	815	424	5,937	3,743
Seabrook	1,556	496	564	294	2,120	790
South Hampton	798	636	0	0	798	636
Stratham	20	11	0	0	20	11
West Newbury	0	0	0	0	0	0
TOTAL	**30,706**	**15,353**	**4,841**	**2,501**	**35,547**	**17,854**



Transients

Miles	Subtotal by Ring	Cumulative Total
0 - 1	0	0
1 - 2	6,411	6,411
2 - 3	3,978	10,389
3 - 4	1,967	12,356
4 - 5	3,610	15,966
5 - 6	4,217	20,183
6 - 7	4,794	24,977
7 - 8	1,131	26,108
8 - 9	291	26,399
9 - 10	149	26,548
10 - EPZ	8,999	35,547
	Total:	35,547

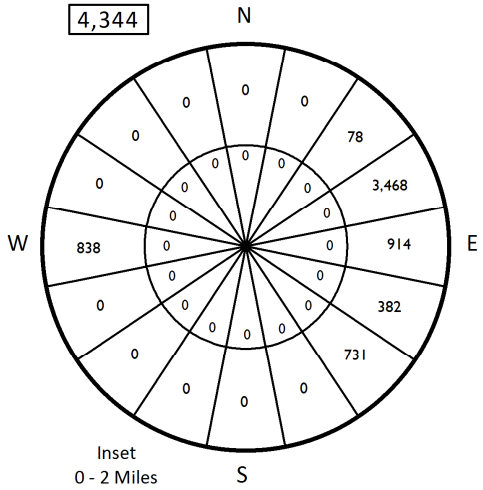
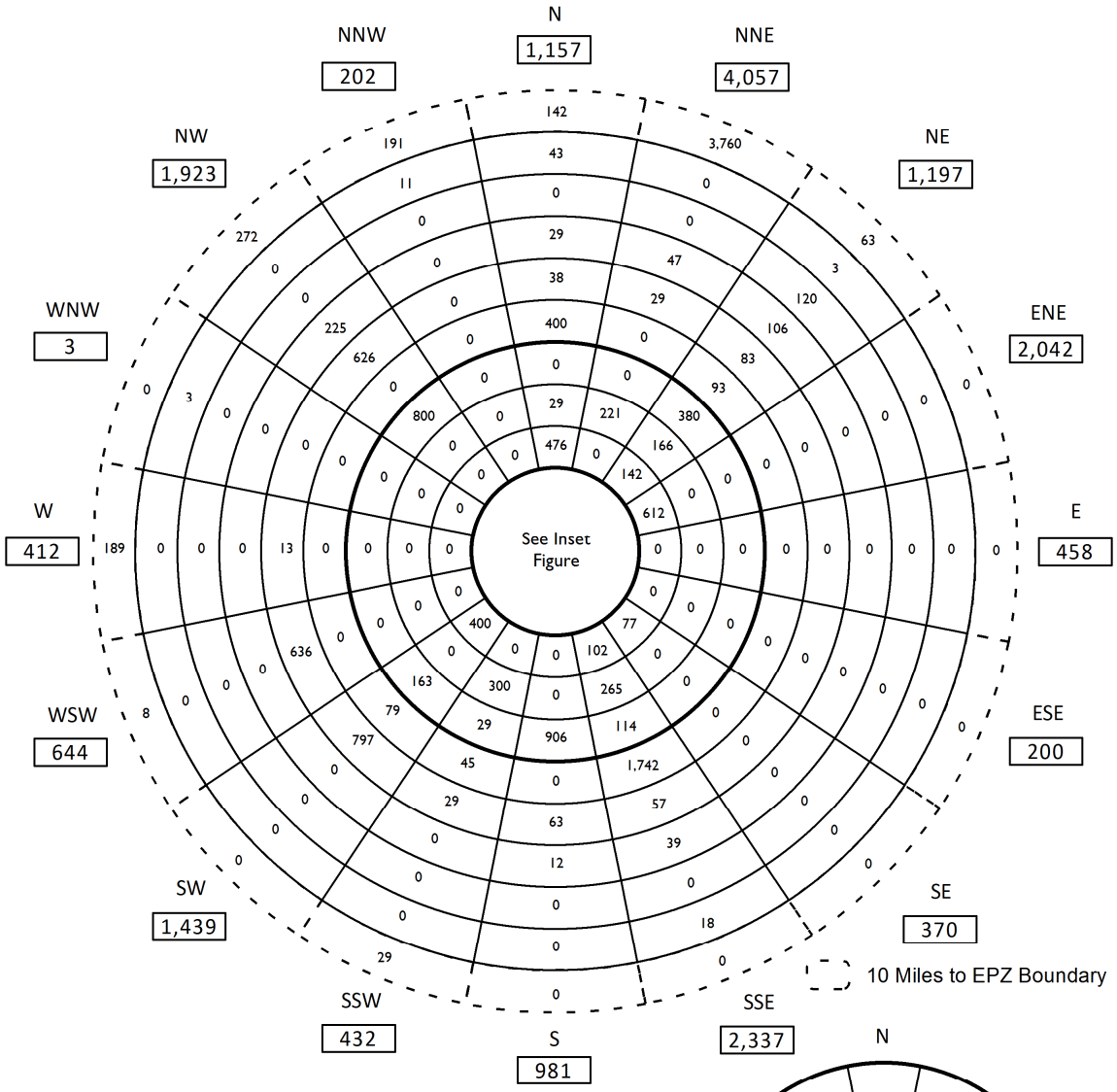


Figure 3-6. Transient Population by Sector



Transient Vehicles

Miles	Subtotal by Ring	Cumulative Total
0 - 1	0	0
1 - 2	2,632	2,632
2 - 3	1,809	4,441
3 - 4	981	5,422
4 - 5	2,392	7,814
5 - 6	2,359	10,173
6 - 7	2,371	12,544
7 - 8	458	13,002
8 - 9	120	13,122
9 - 10	78	13,200
10 - EPZ	4,654	17,854
	Total:	17,854

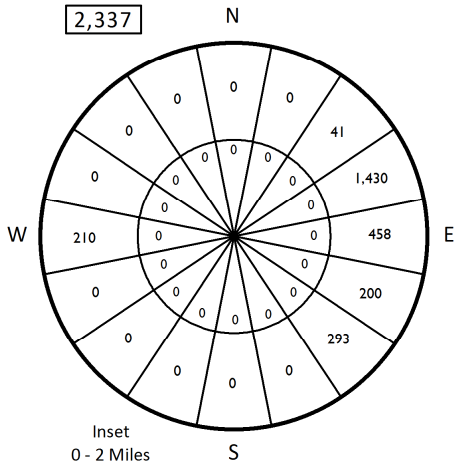


Figure 3-7. Transient Vehicles by Sector

3.4 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 only on those employees commuting from outside the EPZ who will evacuate along with the permanent resident population.

Data obtained from the US Census Longitudinal Employer-Household Dynamics from the OnTheMap Census analysis tool[1] were used to estimate the number of employees commuting into the New Hampshire portion of the EPZ. The 2010 Workplace Area Characteristic data was also obtained from this website and was used to determine the number of employees by Census Block within the Seabrook Station EPZ.

Since not all employees are working at facilities within the EPZ at one time, a maximum shift reduction was applied. The Work Area Profile Report, also output by the OnTheMap Application, breaks down jobs within the EPZ by industry sector. Assuming maximum shift employment occurs Monday through Friday between 9 AM and 5 PM, the following jobs take place outside the typical 9-5 work day:

- Manufacturing – 9.1% of jobs; takes place in shifts over 24 hours
- Arts, Entertainment, and Recreation – 1.4% of jobs; takes place in evenings and on weekends
- Accommodations and Food Services – 7.7% of jobs; peaks in the evenings

The maximum shift in the EPZ is about 81.8% (100% - 9.1% - 1.4% - 7.7% = 81.8%). This value was applied to the total employment in 2010 to represent the maximum number of employees present in the NH portion of the EPZ at any one time. The Inflow/Outflow Report for the Seabrook Station EPZ was then used to calculate the percent of employees that work within the EPZ but live outside. This value, 65.3%, was applied to the maximum shift employee values to compute the number of people commuting into the EPZ to work at peak times.

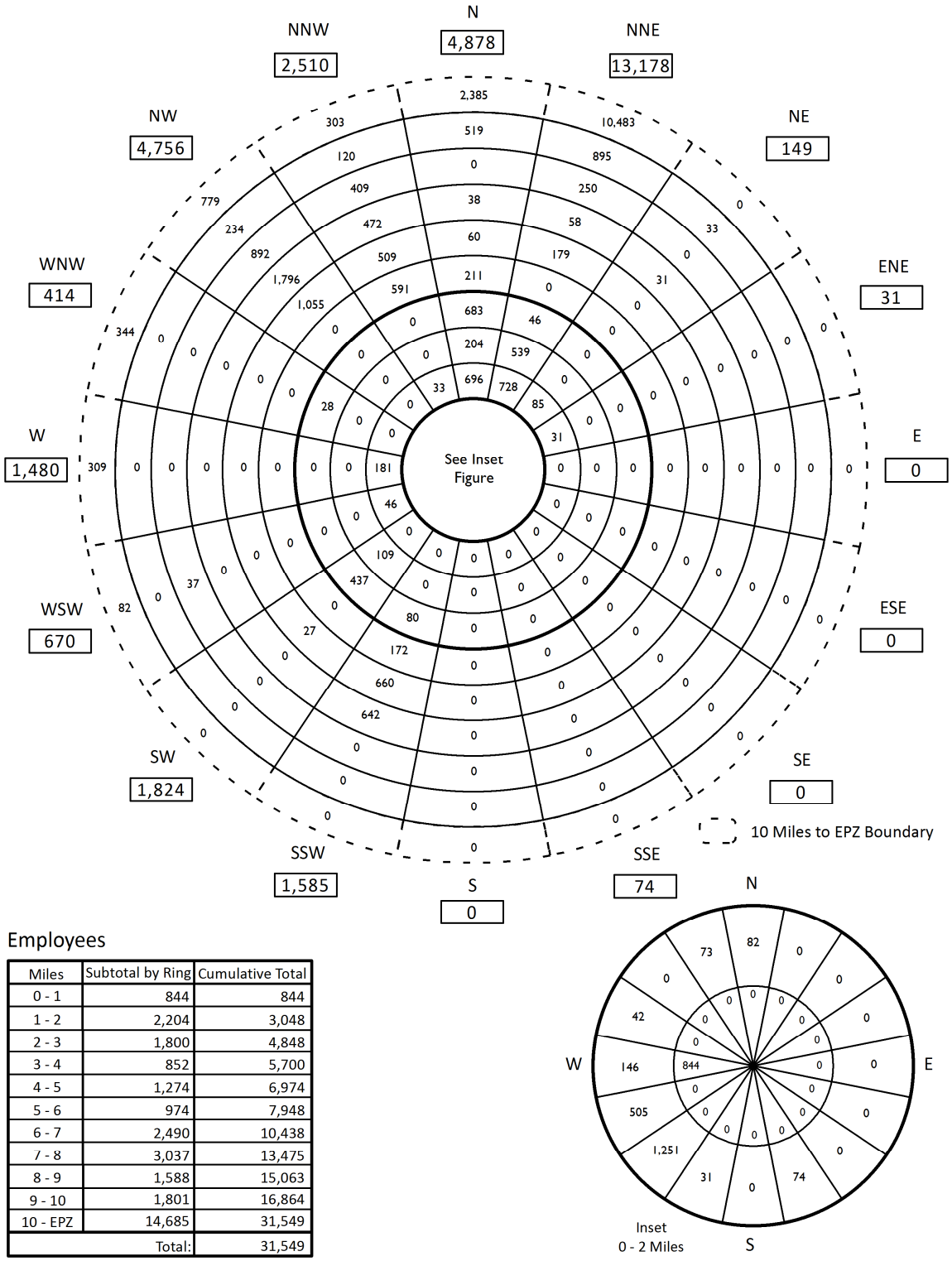
The OnTheMap application is not available for Massachusetts. Data for major employers in Massachusetts were obtained from phone calls to major employers. Table E-5 summarizes the major employers within the Massachusetts portion of the EPZ. The Employees (Max Shift) is multiplied by the percent Non-EPZ factor to determine the number of employees during the max shift who are not residents of the EPZ. A vehicle occupancy of 1.06 employees per vehicle obtained from the telephone survey (See Figure F-7) was used to determine the number of evacuating employee vehicles for all major employers.

The results of both methods are summarized in Table 3-5. Table 3-5 presents total employment, maximum shift employment, non-EPZ Resident employment and vehicle estimates by Community. Figure 3-8 and Figure 3-9 present these data by sector.

[1] http://onthemap.ces.census.gov/

Table 3-5. Summary of Non-EPZ Resident Employees and Employee Vehicles

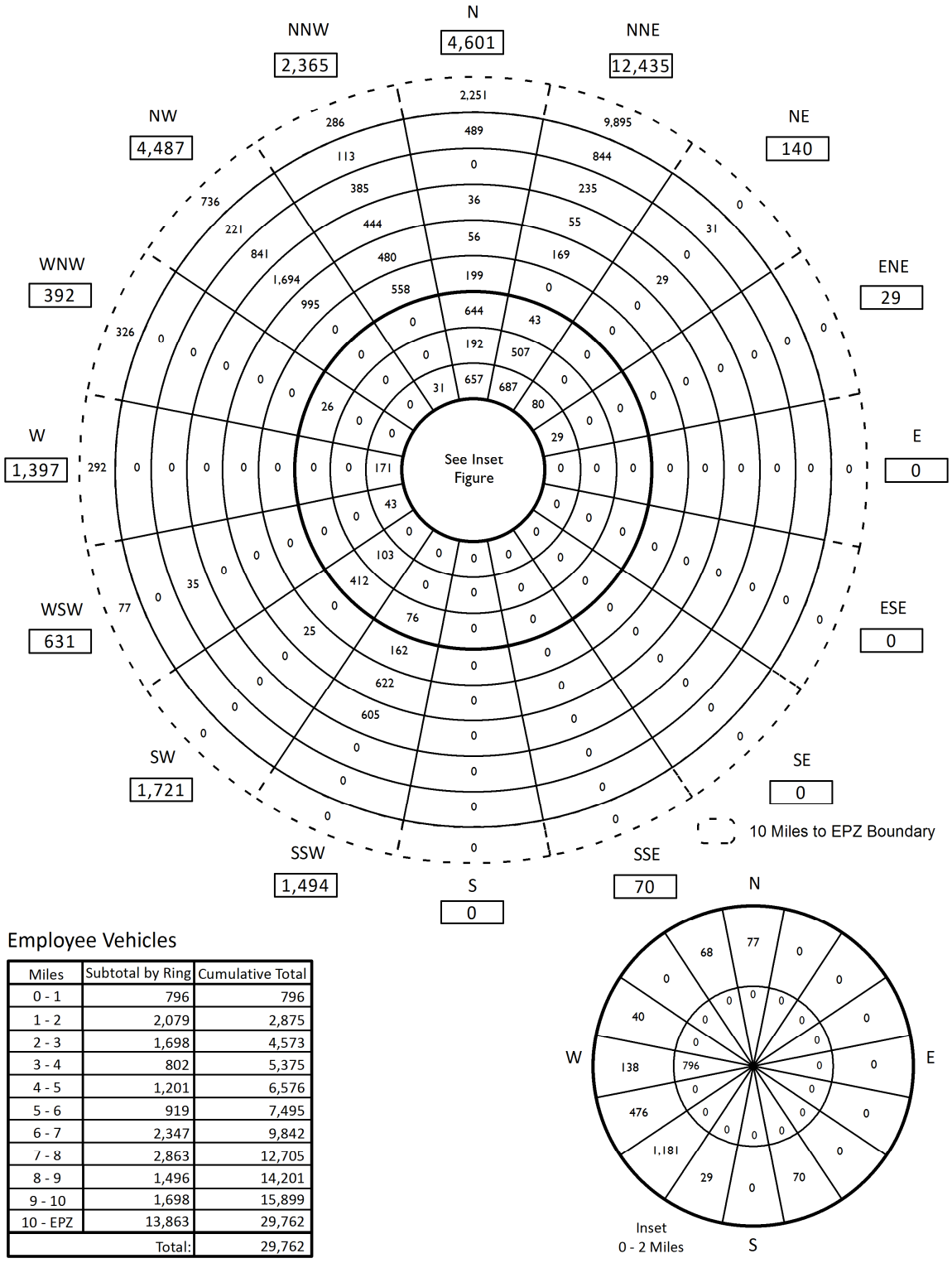
Community	2010 Total Employment	Max Shift Employment	Non-EPZ Employees	Employee Vehicles
Amesbury	-	-	464	437
Brentwood	1,505	1,231	803	759
East Kingston	-	-	0	0
Exeter	9,059	7,411	4,840	4,566
Greenland	1,173	959	626	591
Hampton	4,419	3,615	2,362	2,226
Hampton Falls	291	238	155	145
Kensington	52	43	28	26
Kingston	910	744	485	459
Merrimac	-	-	0	0
New Castle	-	-	0	0
Newbury	-	-	0	0
Newburyport	-	-	1,474	1,389
Newfields	362	296	194	183
Newton	285	234	153	144
North Hampton	2,118	1,732	1,133	1,068
Portsmouth	25,569	20,920	13,659	12,892
Rye	715	584	380	357
Salisbury	-	-	189	179
Seabrook	5,842	4,779	3,120	2,944
South Hampton	-	-	0	0
Stratham	2,777	2,274	1,484	1,397
West Newbury	-	-	0	0
TOTAL	**55,077**	**45,060**	**31,549**	**29,762**



Employees

Miles	Subtotal by Ring	Cumulative Total
0 - 1	844	844
1 - 2	2,204	3,048
2 - 3	1,800	4,848
3 - 4	852	5,700
4 - 5	1,274	6,974
5 - 6	974	7,948
6 - 7	2,490	10,438
7 - 8	3,037	13,475
8 - 9	1,588	15,063
9 - 10	1,801	16,864
10 - EPZ	14,685	31,549
	Total:	31,549

Figure 3-8. Employee Population by Sector



Employee Vehicles

Miles	Subtotal by Ring	Cumulative Total
0 - 1	796	796
1 - 2	2,079	2,875
2 - 3	1,698	4,573
3 - 4	802	5,375
4 - 5	1,201	6,576
5 - 6	919	7,495
6 - 7	2,347	9,842
7 - 8	2,863	12,705
8 - 9	1,496	14,201
9 - 10	1,698	15,899
10 - EPZ	13,863	29,762
	Total:	29,762

Figure 3-9. Employee Vehicles by Sector

3.5 Medical Facilities

Data were provided by the states for each of the medical facilities within the EPZ. Table E-4 in Appendix E summarizes the data gathered. Section 8 details the evacuation of medical facilities and their patients. The number and type of evacuating vehicles that need to be provided depend on the patients' state of health. It is estimated that buses can transport up to 36 people; half buses, up to 12 people; wheelchair vans, up to 4 people; evacuation bed buses up to 10 people; and ambulances, up to 2 people.

3.6 Total Demand in Addition to Permanent Population

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 traversing the EPZ – I-95, I-495, US 4 and SH 101. It is assumed that this traffic will continue to enter the EPZ during the first 60 minutes following the Advisory to Evacuate.

Average Annual Daily Traffic (AADT) data was obtained from Federal Highway Administration to estimate the number of vehicles per hour on the aforementioned routes. The AADT was multiplied by the K-Factor, which is the proportion of the AADT on a roadway segment or link during the design hour, resulting in the design hour volume (DHV). The design hour is usually the 30th highest hourly traffic volume of the year, measured in vehicles per hour (vph). The DHV is then multiplied by the D-Factor, which is the proportion of the DHV occurring in the peak direction of travel (also known as the directional split). The resulting values are the directional design hourly volumes (DDHV), and are presented in Table 3-6, for each of the routes considered. The DDHV is then multiplied by 1 hour (access control points – ACP – are assumed to be activated at 60 minutes after the advisory to evacuate) to estimate the total number of external vehicles loaded on the analysis network. As indicated, there are 11,838 vehicles entering the EPZ as external-external trips prior to the activation of the ACP and the diversion of this traffic. This number is reduced by 60% for evening scenarios (Scenarios 5, 12, and 13) as discussed in Section 6.

3.7 Special Event

One special event (Scenario 13) is considered for the ETE study – a 4th of July fireworks show at Hampton Beach. The fireworks show commences after sundown at Hampton Beach on the 4th of July. Data were obtained from New Hampshire emergency management personnel. According to New Hampshire emergency management personnel, approximately 150,000 people are at the beach at peak times. According to the previous ETE study, KLD TR-364, about 45% of beach visitors are local residents. As such, 55% of these beach visitors, or 82,500 transients, come from outside the EPZ. It is assumed that families travel to the event as a family in a single vehicle; therefore, the average household size of 2.51 was used for vehicle occupancy. The 82,500 transients would evacuate in 32,869 vehicles.

Transients already counted at the beaches, marinas, campgrounds, and lodging facilities within the Hampton Beach area were assumed to also attend the event. For this reason, 6,511 transients and 2,494 vehicles were subtracted to prevent double counting. A total of 75,989 transients evacuating in 30,375 vehicles were incorporated at various parking locations for this special event. The special event vehicle trips were generated utilizing the same mobilization distributions as transients. Public transportation is not provided for this event and was not considered in the special event analysis.

Table 3-6. Seabrook Station EPZ External Traffic

Upstream Node	Downstream Node	Road Name	Direction	HPMS[1] AADT	K-Factor[2]	D-Factor[2]	Hourly Volume	External Traffic
8051	51	US-4	Eastbound	55,400	0.091	0.25	1,260	1,260
8090	90	I-495	Northbound	62,918	0.091	0.25	1,431	1,431
8061	61	SH 101	Eastbound	41,000	0.107	0.25	1,097	1,097
8003	3	I-95	Northbound	88,453	0.091	0.5	4,025	4,025
8050	1653	I-95	Southbound	88,453	0.091	0.5	4,025	4,025
							TOTAL:	**11,838**

[1]Highway Performance Monitoring System (HPMS), Federal Highway Administration (FHWA), Washington, D.C., 2012
[2]HCM 2010

3.8 Summary of Demand

A summary of population and vehicle demand is provided in Table 3-7 and Table 3-8, respectively. This summary includes all population groups described in this section. Additional population groups – transit-dependent, special facility and school population – are described in greater detail in Section 8. A total of 296,083 people and 157,119 vehicles are considered in this study.

Table 3-7. Summary of Population Demand

Community	Residents	Transit-Dependent	Transients	Employees	Special Facilities	Schools/ Daycares	Day Camps	Shadow Population	External Traffic	Total
Amesbury	16,281	379	2,719	464	344	2,810	688	0	0	23,685
Brentwood	4,490	104	341	803	478	549	0	0	0	6,765
East Kingston	2,326	54	25	0	0	204	200	0	0	2,809
Exeter	14,313	333	1,931	4,840	1,024	5,022	0	0	0	27,463
Greenland	3,554	83	300	626	0	451	0	0	0	5,014
Hampton	15,444	359	9,423	2,362	332	3,607	0	0	0	31,527
Hampton Falls	2,242	52	1,004	155	0	701	0	0	0	4,154
Kensington	2,128	50	0	28	0	194	0	0	0	2,400
Kingston	6,117	142	242	485	0	2,284	696	0	0	9,966
Merrimac	6,361	148	0	0	37	676	0	0	0	7,222
New Castle	968	23	826	0	0	54	0	0	0	1,871
Newbury	6,664	155	244	0	46	2,291	117	0	0	9,517
Newburyport	17,417	405	537	1,474	954	3,651	677	0	0	25,115
Newfields	1,682	39	238	194	0	219	0	0	0	2,372
Newton	4,589	106	0	153	0	815	0	0	0	5,663
North Hampton	4,307	100	854	1,133	0	603	0	0	0	6,997
Portsmouth	20,746	483	6,372	13,659	600	3,998	0	0	0	45,858
Rye	5,317	124	1,616	380	114	839	0	0	0	8,390
Salisbury	8,372	195	5,937	189	30	575	0	0	0	15,298
Seabrook	8,566	199	2,120	3,120	0	874	0	0	0	14,879
South Hampton	812	19	798	0	0	120	0	0	0	1,749
Stratham	7,276	169	20	1,484	0	2,671	0	0	0	11,620
West Newbury	4,235	99	0	0	0	1,978	196	0	0	6,508
Shadow	0	0	0	0	0	0	0	19,241	0	19,241
Total:	**164,207**	**3,820**	**35,547**	**31,549**	**3,959**	**35,186**	**2,574**	**19,241**	**0**	**296,083**

NOTE: Shadow Population has been reduced to 20%. Refer to Figure 2-1 for additional information.
NOTE: Special Facilities include medical facilities and correctional facilities.

Table 3-8. Summary of Vehicle Demand

Community	Residents	Transit-Dependent	Transients	Employees	Special Facilities	Schools/ Daycares	Day Camps	Shadow Population	External Traffic	Total
Amesbury	8,440	22	1,039	437	50	139	30	0	0	10,157
Brentwood	2,030	6	272	759	45	24	0	0	0	3,136
East Kingston	1,217	4	13	0	0	10	10	0	0	1,254
Exeter	7,449	18	851	4,566	181	201	0	0	0	13,266
Greenland	1,857	4	147	591	0	19	0	0	0	2,618
Hampton	8,072	20	4,002	2,226	47	138	0	0	0	14,505
Hampton Falls	1,176	2	800	145	0	30	0	0	0	2,153
Kensington	1,116	2	0	26	0	8	0	0	0	1,152
Kingston	3,201	8	200	459	0	90	28	0	0	3,986
Merrimac	3,321	8	0	0	0	28	0	0	0	3,357
New Castle	505	2	398	0	0	2	0	0	0	907
Newbury	3,470	8	130	0	5	98	6	0	0	3,717
Newburyport	8,974	22	220	1,389	124	180	30	0	0	10,939
Newfields	877	2	190	183	0	10	0	0	0	1,262
Newton	2,393	6	0	144	0	30	0	0	0	2,573
North Hampton	2,250	6	561	1,068	0	22	0	0	0	3,907
Portsmouth	10,832	28	3,172	12,892	83	180	0	0	0	27,187
Rye	2,774	6	679	357	10	32	0	0	0	3,858
Salisbury	4,371	10	3,743	179	3	22	0	0	0	8,328
Seabrook	4,473	12	790	2,944	0	36	0	0	0	8,255
South Hampton	427	2	636	0	0	4	0	0	0	1,069
Stratham	3,800	10	11	1,397	0	107	0	0	0	5,325
West Newbury	2,214	6	0	0	0	94	8	0	0	2,322
Shadow	0	0	0	0	0	0	0	10,048	11,838	21,886
Total:	**85,239**	**214**	**17,854**	**29,762**	**548**	**1,504**	**112**	**10,048**	**11,838**	**157,119**

NOTE: Buses represented as two passenger vehicles. Refer to Section 8 for additional information.

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, as stated in the 2010 Highway Capacity Manual (HCM 2010).

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.

Another concept, closely associated with capacity, is “Service Volume” (SV). Service volume is defined as “The maximum hourly rate at which vehicles, bicycles or persons reasonably can be expected to traverse a point or uniform section of a roadway during an hour under specific assumed conditions while maintaining a designated level of service.” This definition is similar to that for capacity. The major distinction is that values of SV vary from one LOS to another, while capacity is the service volume at the upper bound of LOS E, only.

This distinction is illustrated in Exhibit 11-17 of the HCM 2010. As indicated there, the SV varies with Free Flow Speed (FFS), and LOS. The SV is calculated by the DYNEV II simulation model, based on the specified link attributes, FFS, capacity, control device and traffic demand.

Other factors also influence capacity. These include, but are not limited to:

- Lane width
- Shoulder width
- Pavement condition
- Horizontal and vertical alignment (curvature and grade)
- Percent truck traffic
- Control device (and timing, if it is a signal)
- Weather conditions (rain, snow, fog, wind speed, ice)

These factors are considered during the road survey and in the capacity estimation process; some factors have greater influence on capacity than others. For example, lane and shoulder width have only a limited influence on Base Free Flow Speed (BFFS[1]) according to Exhibit 15-7 of the HCM. Consequently, lane and shoulder widths at the narrowest points were observed during the road survey and these observations were recorded, but no detailed measurements of lane or shoulder width were taken. Horizontal and vertical alignment can influence both FFS and capacity. The estimated FFS were measured using the survey vehicle’s speedometer and observing local traffic, under free flow conditions. Capacity is estimated from the procedures of

[1] A very rough estimate of BFFS might be taken as the posted speed limit plus 10 mph (HCM 2010 Page 15-15)

the 2010 HCM. For example, HCM Exhibit 7-1(b) shows the sensitivity of Service Volume at the upper bound of LOS D to grade (capacity is the Service Volume at the upper bound of LOS E).

As discussed in Section 2.3, it is necessary to adjust capacity figures to represent the prevailing conditions during inclement weather. Based on limited empirical data, weather conditions such as 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. As indicated in Section 2.3, we employ a reduction in free speed and in highway capacity of 10 percent and 20 percent for rain and snow, respectively.

Since congestion arising from evacuation may be significant, 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.

Rural highways generally consist of: (1) one or more uniform sections with limited access (driveways, parking areas) characterized by "uninterrupted" flow; and (2) approaches to at-grade intersections where flow can be "interrupted" by a control device or by turning or crossing traffic at the intersection. Due to these differences, separate estimates of capacity must be made for each section. Often, the approach to the intersection is widened by the addition of one or more lanes (turn pockets or turn bays), to compensate for the lower capacity of the approach due to the factors there that can interrupt the flow of traffic. These additional lanes are recorded during the field survey and later entered as input to the DYNEV II system.

4.1 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 existing traffic management plans documented in the state emergency plans are extensive and were adopted without change.

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

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

where:

$Q_{cap,m}$ = 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 = Mean duration of GREEN time servicing vehicles that are executing movement, *m*, for each signal cycle; seconds

L = Mean "lost time" for each signal phase servicing movement, *m*; seconds

C = Duration of each signal cycle; seconds

P_m = 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, and 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,

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

where:

h_{sat} = Saturation discharge headway for through vehicles; seconds per vehicle

F_1,F_2 = The various known factors influencing h_m

$f_m( )$ = Complex function relating h_m to the known (or estimated) values of h_{sat}, F_1, F_2, …

The estimation of h_m for specified values of h_{sat}, F_1, F_2, ... is undertaken within the DYNEV II simulation model by a mathematical model[2]. The resulting values for h_m always satisfy the condition:

$$h_m \geq h_{sat}$$

[2]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. Lieberman, E., Xin, W., "Macroscopic Traffic Modeling For Large-Scale Evacuation Planning", presented at the TRB 2012 Annual Meeting, January 22-26, 2012

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 HCM 2010.

The above discussion is necessarily brief given the scope of this ETE report and the complexity of the subject of intersection capacity. In fact, Chapters 18, 19 and 20 in the HCM 2010 address this topic. The factors, F_1, F_2,…, influencing saturation flow rate are identified in equation (18-5) of the HCM 2010.

The traffic signals within the EPZ and Shadow Region are modeled using representative phasing plans and phase durations obtained as part of the field data collection. Traffic responsive signal installations allow the proportion of green time allocated (P_m) for each approach to each intersection to be determined by the expected traffic volumes on each approach during evacuation circumstances. The amount of green time (G) allocated is subject to maximum and minimum phase duration constraints; 2 seconds of yellow time are indicated for each signal phase and 1 second of all-red time is assigned between signal phases, typically. If a signal is pre-timed, the yellow and all-red times observed during the road survey are used. A lost time (L) of 2.0 seconds is used for each signal phase in the analysis.

4.2 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. The top curve in Figure 4-1 illustrates this relationship.

As indicated, there are two flow regimes: (1) Free Flow (left side of curve); and (2) Forced Flow (right side). In the Free Flow regime, the traffic demand is fully serviced; the 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 decline below capacity ("capacity drop"). 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:

$$V_F = R \times Capacity$$

where:

R = Reduction factor which is less than unity

We have employed a value of R=0.90. The advisability of such a capacity reduction factor is based upon empirical studies that identified a fall-off in the service flow rate when congestion occurs at "bottlenecks" or "choke points" on a freeway system. Zhang and Levinson[3] describe a research program that collected data from a computer-based surveillance system (loop detectors) installed on the Interstate Highway System, at 27 active bottlenecks in the twin cities metro area in Minnesota over a 7-week period. When flow breakdown occurs, queues are formed which discharge at lower flow rates than the maximum capacity prior to observed breakdown. These queue discharge flow (QDF) rates vary from one location to the next and also vary by day of week and time of day based upon local circumstances. The cited reference presents a mean QDF of 2,016 passenger cars per hour per lane (pcphpl). This figure compares with the nominal capacity estimate of 2,250 pcphpl estimated for the ETE and indicated in Appendix K for freeway links. The ratio of these two numbers is 0.896 which translates into a capacity reduction factor of 0.90.

Since the principal objective of evacuation time estimate analyses is to develop a "realistic" estimate of evacuation times, use of the representative value for this capacity reduction factor (R=0.90) is justified. This factor is applied only when flow breaks down, as determined by the simulation model.

Rural roads, like freeways, are classified as "uninterrupted flow" facilities. (This is in contrast with urban street systems which have closely spaced signalized intersections and are classified as "interrupted flow" facilities.) As such, traffic flow along rural roads is subject to the same effects as freeways in the event traffic demand exceeds the nominal capacity, resulting in queuing and lower QDF rates. As a practical matter, rural roads rarely break down at locations away from intersections. Any breakdowns on rural roads are generally experienced at intersections where other model logic applies, or at lane drops which reduce capacity there. Therefore, the application of a factor of 0.90 is appropriate on rural roads, but rarely, if ever, activated.

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. Exhibit 15-30 in the Highway Capacity Manual was referenced to estimate saturation flow rates. The impact of narrow lanes and shoulders on free-flow speed and on capacity is not material, particularly when flow is predominantly in one direction as is the case during an evacuation.

The procedure used here was to estimate "section" capacity, V_E, based on observations made traveling over each section of the evacuation network, based on the posted speed limits and travel behavior of other motorists and by reference to the 2010 HCM. The DYNEV II simulation model determines 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.

[3]Lei Zhang and David Levinson, "Some Properties of Flows at Freeway Bottlenecks," Transportation Research Record 1883, 2004.

4.3 Application to the Seabrook Station Study Area

As part of the development of the link-node analysis network for the study area, an estimate of roadway capacity is required. The source material for the capacity estimates presented herein is contained in:

2010 Highway Capacity Manual (HCM)
Transportation Research Board
National Research Council
Washington, D.C.

The highway system in the study area consists primarily of three categories of roads and, of course, intersections:

- Two-Lane roads: Local, State
- Multi-Lane Highways (at-grade)
- Freeways

Each of these classifications will be discussed.

4.3.1 Two-Lane Roads

Ref: HCM Chapter 15

Two lane roads comprise the majority of highways 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 (LOS) and Average Travel Speed. The DYNEV II 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 urban and suburban centers.

4.3.2 Multi-Lane Highway

Ref: HCM Chapter 14

Exhibit 14-2 of the HCM 2010 presents a set of curves that indicate a per-lane capacity ranging from approximately 1900 to 2200 pc/h, for free-speeds of 45 to 60 mph, respectively. Based on observation, the multi-lane highways outside of urban areas 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. A

conservative estimate of per-lane capacity of 1900 pc/h is adopted for this study for multi-lane highways outside of urban areas, as shown in Appendix K.

4.3.3 Freeways

Ref: HCM Chapters 10, 11, 12, 13

Chapter 10 of the HCM 2010 describes a procedure for integrating the results obtained in Chapters 11, 12 and 13, which compute capacity and LOS for freeway components. Chapter 10 also presents a discussion of simulation models. The DYNEV II simulation model automatically performs this integration process.

Chapter 11 of the HCM 2010 presents procedures for estimating capacity and LOS for “Basic Freeway Segments". Exhibit 11-17 of the HCM 2010 presents capacity vs. free speed estimates, which are provided below.

Free Speed (mph):	55	60	65	70+
Per-Lane Capacity (pc/h):	2250	2300	2350	2400

The inputs to the simulation model are highway geometrics, free-speeds and capacity based on field observations. The simulation logic calculates actual time-varying speeds based on demand: capacity relationships. A conservative estimate of per-lane capacity of 2250 pc/h is adopted for this study for freeways, as shown in Appendix K.

Chapter 12 of the HCM 2010 presents procedures for estimating capacity, speed, density and LOS for freeway weaving sections. The simulation model contains logic that relates speed to demand volume: capacity ratio. The value of capacity obtained from the computational procedures detailed in Chapter 12 depends on the "Type" and geometrics of the weaving segment and on the "Volume Ratio" (ratio of weaving volume to total volume).

Chapter 13 of the HCM 2010 presents procedures for estimating capacities of ramps and of "merge" areas. There are three significant factors to the determination of capacity of a ramp-freeway junction: The capacity of the freeway immediately downstream of an on-ramp or immediately upstream of an off-ramp; the capacity of the ramp roadway; and the maximum flow rate entering the ramp influence area. In most cases, the freeway capacity is the controlling factor. Values of this merge area capacity are presented in Exhibit 13-8 of the HCM 2010, and depend on the number of freeway lanes and on the freeway free speed. Ramp capacity is presented in Exhibit 13-10 and is a function of the ramp free flow speed. The DYNEV II simulation model logic simulates the merging operations of the ramp and freeway traffic in accord with the procedures in Chapter 13 of the HCM 2010. If congestion results from an excess of demand relative to capacity, then the model allocates service appropriately to the two entering traffic streams and produces LOS F conditions (The HCM does not address LOS F explicitly).

4.3.4 Intersections

Ref: HCM Chapters 18, 19, 20, 21

Procedures for estimating capacity and LOS for approaches to intersections are presented in Chapter 18 (signalized intersections), Chapters 19, 20 (un-signalized intersections) and Chapter 21 (roundabouts). The complexity of these computations is indicated by the aggregate length of these chapters. The DYNEV II simulation logic is likewise complex.

The simulation model explicitly models intersections: Stop/yield controlled intersections (both 2-way and all-way) and traffic signal controlled intersections. Where intersections are controlled by fixed time controllers, traffic signal timings are set to reflect average (non-evacuation) traffic conditions. Actuated traffic signal settings respond to the time-varying demands of evacuation traffic to adjust the relative capacities of the competing intersection approaches.

The model is also capable of modeling the presence of manned traffic control. At specific locations where it is advisable or where existing plans call for overriding existing traffic control to implement manned control, the model will use actuated signal timings that reflect the presence of traffic guides. At locations where a special traffic control strategy (continuous left-turns, contra-flow lanes) is used, the strategy is modeled explicitly. Where applicable, the location and type of traffic control for nodes in the evacuation network are noted in Appendix K. The characteristics of the ten highest volume signalized intersections are detailed in Appendix J.

4.4 Simulation and Capacity Estimation

Chapter 6 of the HCM is entitled, "HCM and Alternative Analysis Tools." The chapter discusses the use of alternative tools such as simulation modeling to evaluate the operational performance of highway networks. Among the reasons cited in Chapter 6 to consider using simulation as an alternative analysis tool is:

> *"The system under study involves a group of different facilities or travel modes with mutual interactions invoking several procedural chapters of the HCM. Alternative tools are able to analyze these facilities as a single system."*

This statement succinctly describes the analyses required to determine traffic operations across an area encompassing an EPZ operating under evacuation conditions. The model utilized for this study, DYNEV II, is further described in Appendix C. It is essential to recognize that simulation models do not replicate the methodology and procedures of the HCM – they *replace* these procedures by describing the complex interactions of traffic flow and computing Measures of Effectiveness (MOE) detailing the operational performance of traffic over time and by location. The DYNEV II simulation model includes some HCM 2010 procedures only for the purpose of estimating capacity.

All simulation models must be calibrated properly with field observations that quantify the performance parameters applicable to the analysis network. Two of the most important of

these are: (1) Free flow speed (FFS); and (2) saturation headway, h_{sat}. The first of these is estimated by direct observation during the road survey; the second is estimated using the concepts of the HCM 2010, as described earlier. These parameters are listed in Appendix K, for each network link.

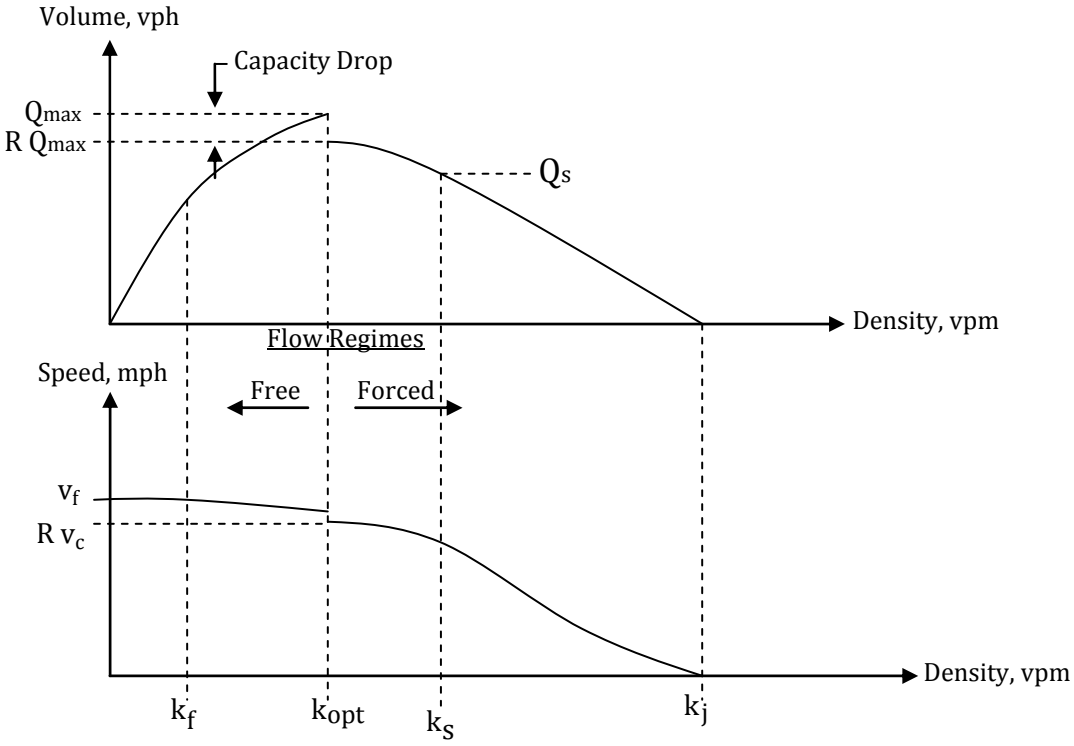


Figure 4-1. Fundamental Diagrams

5 ESTIMATION OF TRIP GENERATION TIME

Federal Government guidelines (see NUREG CR-7002) 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. We define the sum of these distributions of elapsed times as the Trip Generation Time Distribution.

5.1 Background

In general, an accident at a nuclear power plant is characterized by the following Emergency 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 accordance with Section 1.2 of NUREG/CR-7002, that a rapidly escalating accident will be considered in calculating the Trip Generation Time. We will assume:

1. The Advisory to Evacuate will be announced coincident with the EAS message.
2. Mobilization of the general population will commence within 15 minutes after the EAS message
3. ETE are measured relative to the Advisory to Evacuate.

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

1. Establish a temporal framework for estimating the Trip Generation distribution in the format recommended in Section 2.13 of NUREG/CR-6863.
2. Identify temporal points of reference that uniquely define "Clear Time" and ETE.

It is likely that a longer time will elapse between the various classes of an emergency.

For example, suppose one hour elapses from the EAS message 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 EPZ will be lower when the Advisory to Evacuate is announced, than at the time of the EAS message. In addition, many will engage in preparation activities to evacuate, in anticipation that an Advisory will be broadcast. Thus, the time needed to complete the mobilization activities and the number of people

remaining to evacuate the EPZ after the Advisory to Evacuate, will both be somewhat less than the estimates presented in this report. Consequently, the ETE presented in this report are higher than the actual evacuation time, if this hypothetical situation were to take place.

The notification process consists of two events:

1. Transmitting information using the alert notification systems available within the EPZ (e.g. sirens, tone alerts, EAS broadcasts, loud speakers).
2. Receiving and correctly interpreting the information that is transmitted.

The population within the EPZ is dispersed over an area of approximately 310 square miles and is 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 on 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 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 Section 2.13 of NUREG/CR-6863, 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 ETE may be computed.

For example, people at home or at work within the EPZ will be notified by EAS message, siren, and/or tone alert and/or radio (if available). 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 differ from weekdays.

As indicated in Section 4.1 of NUREG/CR-7002, the information required to compute trip generation times is typically obtained from a telephone survey of EPZ residents. Such a survey was conducted in support of this ETE study. Appendix F presents the survey sampling plan, survey instrument, and raw survey results. The remaining discussion will focus on the application of the trip generation data obtained from the telephone survey to the development of the ETE documented in this report.

5.2 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 events) 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	Notification
2	Awareness of Situation
3	Depart Work
4	Arrive Home
5	Depart on Evacuation Trip

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

Table 5-1. Event Sequence for Evacuation Activities

Event Sequence	Activity	Distribution
1 → 2	Receive Notification	1
2 → 3	Prepare to Leave Work	2
2,3 → 4	Travel Home	3
2,4 → 5	Prepare to Leave to Evacuate	4
N/A	Snow Clearance	5

These relationships are shown graphically in Figure 5-1.

- An Event is a 'state' that exists at a point in time (e.g., depart work, arrive home)
- An Activity is a 'process' that takes place over some elapsed time (e.g., prepare to leave work, travel home)

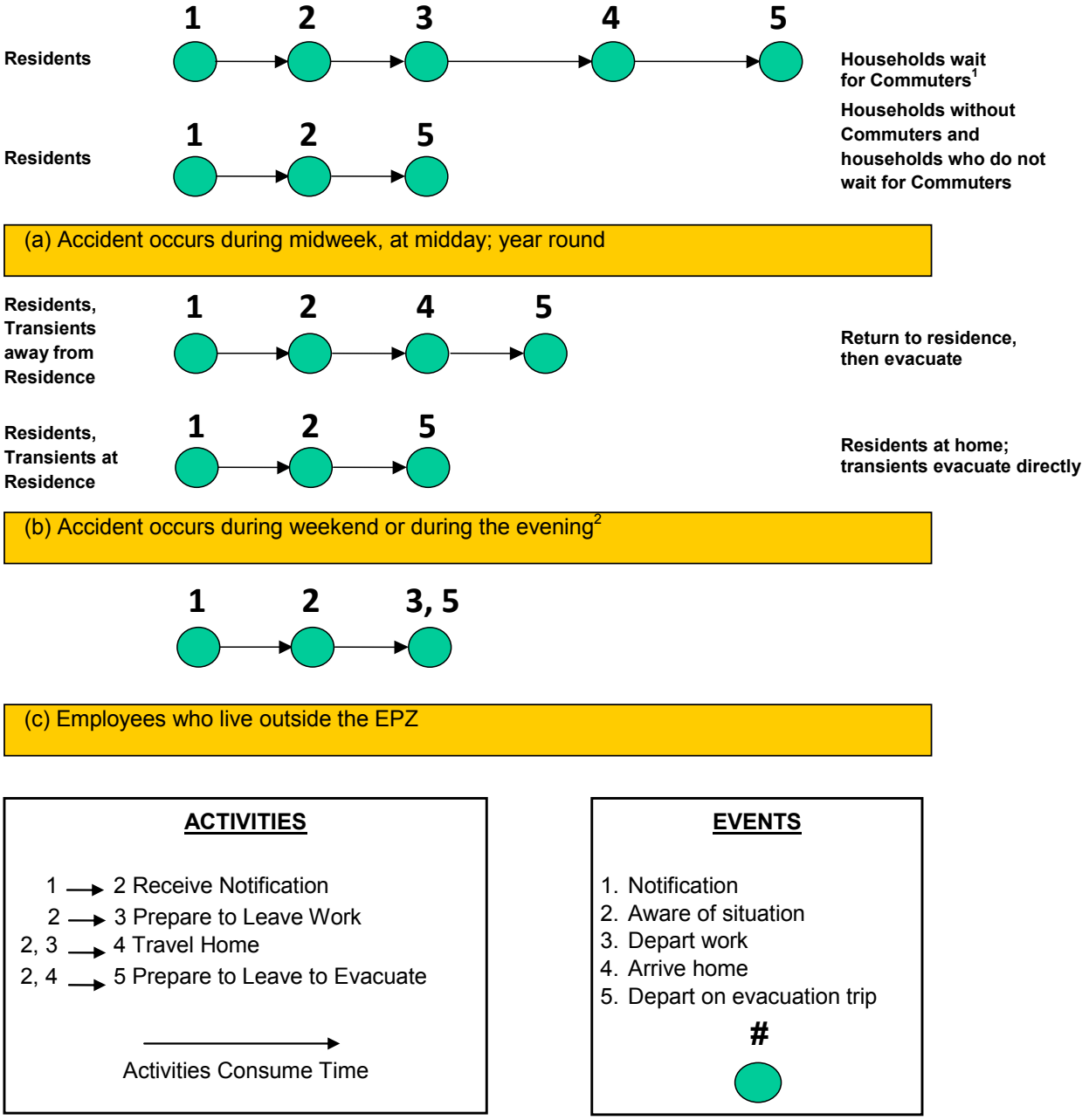
As such, a completed Activity changes the 'state' of an individual (e.g. the activity, 'travel home' changes the state from 'depart work' to 'arrive home'). Therefore, an Activity can be described as an 'Event Sequence'; the elapsed times to perform an event sequence vary from one person to the next and are described as statistical distributions on the following pages.

An employee who lives outside the EPZ will follow sequence (c) of Figure 5-1. A household within the EPZ that has one or more commuters at work, and will await their return before beginning the evacuation trip will follow the first sequence of Figure 5-1(a). A household within the EPZ that has no commuters at work, or that will not await the return of any commuters, will follow the second sequence of Figure 5-1(a), regardless of day of week or time of day.

Households with no commuters on weekends or in the evening/night-time, will follow the applicable sequence in Figure 5-1(b). Transients will always follow one of the sequences of Figure 5-1(b). Some transients away from their residence could elect to evacuate immediately without returning to the residence, as indicated in the second 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. For this study, we adopt the conservative posture that all activities will occur in sequence.

In some cases, assuming certain events occur strictly sequential (for instance, commuter returning home before beginning preparation to leave, or removing snow only after the preparation to leave) can result in rather *conservative* (that is, longer) estimates of mobilization times. It is reasonable to expect that at least some parts of these events will overlap for many households, but that assumption is not made in this study.



[1] Applies for evening and weekends also if commuters are at work.
[2] Applies throughout the year for transients.

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

5.3 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 it is performed on distributions – not scalar numbers).

Time Distribution No. 1, Notification Process: Activity 1 $\rightarrow$ 2

In accordance with the 2012 Federal Emergency Management Agency (FEMA) Radiological Emergency Preparedness Program Manual, 100% of the population is notified within 45 minutes. It is assumed (based on the presence of sirens within the EPZ) that 87 percent of those within the EPZ will be aware of the accident within 30 minutes with the remainder notified within the following 15 minutes. The notification distribution is given below:

Table 5-2. Time Distribution for Notifying the Public

Elapsed Time (Minutes)	Percent of Population Notified
0	0.0%
5	7.1%
10	13.3%
15	26.5%
20	46.9%
25	66.3%
30	86.7%
35	91.8%
40	96.9%
45	100.0%

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/livestock would require additional time to secure their facility. The distribution of Activity 2 → 3 shown in Table 5-3 reflects data obtained by the telephone survey. This distribution is plotted in Figure 5-2.

Table 5-3. Time Distribution for Employees to Prepare to Leave Work

Elapsed Time (Minutes)	Cumulative Percent Employees Leaving Work	Elapsed Time (Minutes)	Cumulative Percent Employees Leaving Work
0	0.0%	35	91.3%
5	48.0%	40	92.1%
10	63.8%	45	92.8%
15	72.7%	50	93.0%
20	77.9%	55	93.0%
25	78.2%	60	99.8%
30	90.6%	75	100.0%

NOTE: The survey data was normalized to distribute the "Don't know" response. That is, the sample was reduced in size to include only those households who responded to this question. The underlying assumption is that the distribution of this activity for the "Don't know" responders, if the event takes place, would be the same as those responders who provided estimates.

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

These data are provided directly by those households which responded to the telephone survey. This distribution is plotted in Figure 5-2 and listed in Table 5-4.

Table 5-4. Time Distribution for Commuters to Travel Home

Elapsed Time (Minutes)	Cumulative Percent Returning Home	Elapsed Time (Minutes)	Cumulative Percent Returning Home
0	0.0%	45	85.2%
5	11.5%	50	86.0%
10	24.6%	55	86.2%
15	38.8%	60	96.4%
20	53.9%	75	97.9%
25	57.8%	90	99.0%
30	70.2%	105	99.6%
35	72.9%	120	100.0%
40	76.8%		

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 those households which responded to the telephone survey. This distribution is plotted in Figure 5-2 and listed in Table 5-5.

Table 5-5. Time Distribution for Population to Prepare to Evacuate

Elapsed Time (Minutes)	Cumulative Percent Ready to Evacuate	Elapsed Time (Minutes)	Cumulative Percent Ready to Evacuate
0	0%	105	88.2%
15	15.7%	120	93.1%
30	54.1%	135	97.0%
45	62.0%	150	97.4%
60	79.8%	165	97.4%
75	86.9%	180	99.1%
90	88.0%	195	100.0%

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

Distribution No. 5, Snow Clearance Time Distribution

Inclement weather scenarios involving snowfall must address the time lags associated with snow clearance. It is assumed that snow equipment is mobilized and deployed during the snowfall to maintain passable roads. The general consensus is that the snow-plowing efforts are generally successful for all but the most extreme blizzards when the rate of snow accumulation exceeds that of snow clearance over a period of many hours.

Consequently, it is reasonable to assume that the highway system will remain passable – albeit at a lower capacity – under the vast majority of snow conditions. Nevertheless, for the vehicles to gain access to the highway system, it may be necessary for driveways and employee parking lots to be cleared to the extent needed to permit vehicles to gain access to the roadways. These clearance activities take time; this time must be incorporated into the trip generation time distributions. These data are provided by those households which responded to the telephone survey. This distribution is plotted in Figure 5-2 and listed in Table 5-6.

Note that those respondents (about 47%) who answered that they would not take time to clear their driveway were assumed to be ready immediately at the start of this activity. Essentially they would drive through the snow on the driveway to access the roadway and begin their evacuation trip.

Table 5-6. Time Distribution for Population to Clear 6"-8" of Snow

Elapsed Time (Minutes)	Cumulative Percent Completing Snow Removal	Elapsed Time (Minutes)	Cumulative Percent Completing Snow Removal
0	46.6%	105	95.6%
15	55.9%	120	97.3%
30	78.2%	135	97.9%
45	83.2%	150	98.1%
60	89.8%	165	98.1%
75	92.7%	180	100.0%
90	95.0%		

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

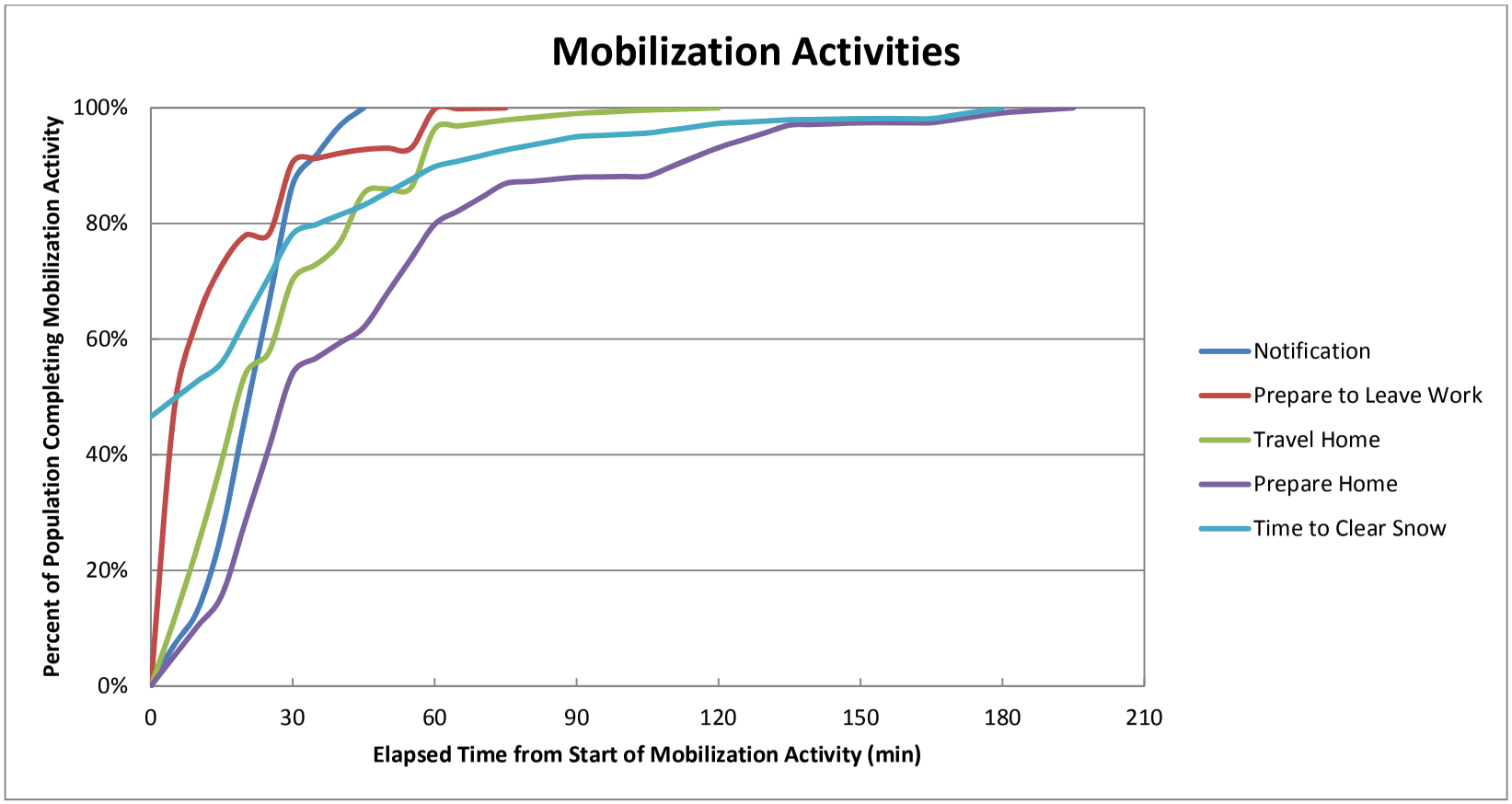


Figure 5-2. Evacuation Mobilization Activities

5.4 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. As discussed above, this study assumes 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. Table 5-7 presents the summing procedure to arrive at each designated distribution.

Table 5-7. Mapping Distributions to Events

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 C and 5	Distribution E	Event 5
Distributions D and 5	Distribution F	Event 5

Table 5-8 presents a description of each of the final trip generation distributions achieved after the summing process is completed.

Table 5-8. Description of the Distributions

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 (Event 4).
C	Time distribution of residents with commuters who return home, leaving home to begin the evacuation trip (Event 5).
D	Time distribution of residents without commuters returning home, leaving home to begin the evacuation trip (Event 5).
E	Time distribution of residents with commuters who return home, leaving home to begin the evacuation trip, after snow clearance activities (Event 5).
F	Time distribution of residents with no commuters returning home, leaving to begin the evacuation trip, after snow clearance activities (Event 5).

5.4.1 Statistical Outliers

As already mentioned, some portion of the survey respondents answer "don't know" to some questions or choose to not respond to a question. The mobilization activity distributions are based upon actual responses. But, it is the nature of surveys that a few numeric responses are inconsistent with the overall pattern of results. An example would be a case in which for 500 responses, almost all of them estimate less than two hours for a given answer, but 3 say "four hours" and 4 say "six or more hours".

These "outliers" must be considered: are they valid responses, or so atypical that they should be dropped from the sample?

In assessing outliers, there are three alternates to consider:

1) Some responses with very long times may be valid, but reflect the reality that the respondent really needs to be classified in a different population subgroup, based upon special needs;

2) Other responses may be unrealistic (6 hours to return home from commuting distance, or 2 days to prepare the home for departure);

3) Some high values are representative and plausible, and one must not cut them as part of the consideration of outliers.

The issue of course is how to make the decision that a given response or set of responses are to be considered "outliers" for the component mobilization activities, using a method that objectively quantifies the process.

There is considerable statistical literature on the identification and treatment of outliers singly or in groups, much of which assumes the data is normally distributed and some of which uses non-

parametric methods to avoid that assumption. The literature cites that limited work has been done directly on outliers in sample survey responses.

In establishing the overall mobilization time/trip generation distributions, the following principles are used:

1) It is recognized that the overall trip generation distributions are conservative estimates, because they assume a household will do the mobilization activities sequentially, with no overlap of activities;

2) The individual mobilization activities (prepare to leave work, travel home, prepare home, clear snow) are reviewed for outliers, and then the overall trip generation distributions are created (see Figure 5-1, Table 5-7, Table 5-8);

3) Outliers can be eliminated either because the response reflects a special population (e.g. special needs, transit dependent) or lack of realism, because the purpose is to estimate trip generation patterns for personal vehicles;

4) To eliminate outliers,
    a) the mean and standard deviation of the specific activity are estimated from the responses,
    b) the median of the same data is estimated, with its position relative to the mean noted,
    c) the histogram of the data is inspected, and
    d) all values greater than 3.5 standard deviations are flagged for attention, taking special note of whether there are gaps (categories with zero entries) in the histogram display.

    In general, only flagged values more than 4 standard deviations from the mean are allowed to be considered outliers, with gaps in the histogram expected.

    When flagged values are classified as outliers and dropped, steps “a” to “d” are repeated.

5) As a practical matter, even with outliers eliminated by the above, the resultant histogram, viewed as a cumulative distribution, is not a normal distribution. A typical situation that results is shown below in Figure 5-3.

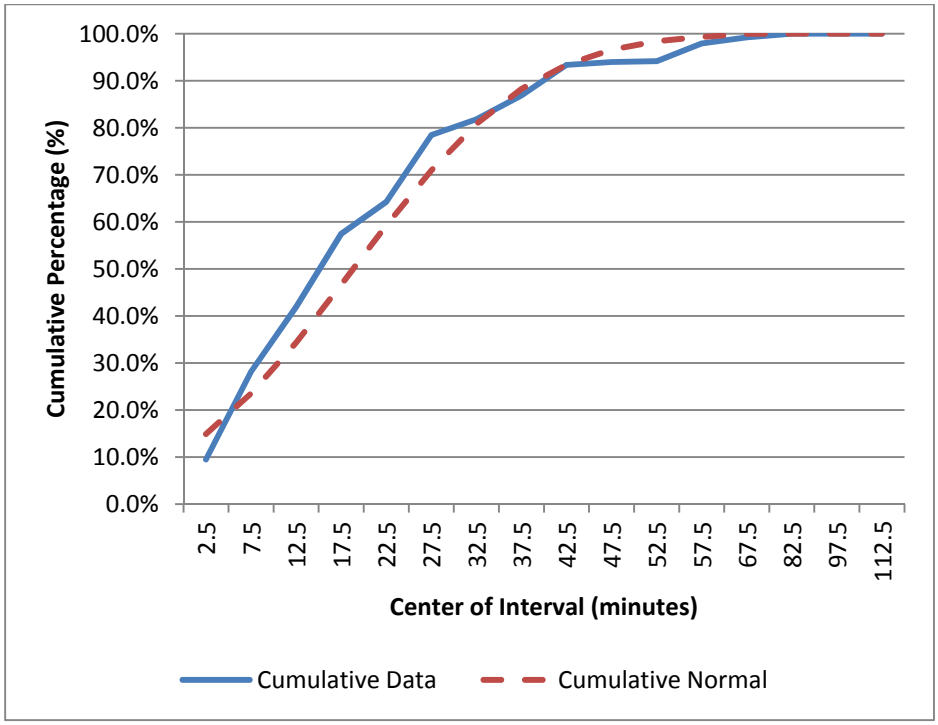


Figure 5-3. Comparison of Data Distribution and Normal Distribution

6) In particular, the cumulative distribution differs from the normal distribution in two key aspects, both very important in loading a network to estimate evacuation times:

- Most of the real data is to the left of the "normal" curve above, indicating that the network loads faster for the first 80-85% of the vehicles, potentially causing more (and earlier) congestion than otherwise modeled;
- The last 10-15% of the real data "tails off" slower than the comparable "normal" curve, indicating that there is significant traffic still loading at later times.

Because these two features are important to preserve, it is the histogram of the data that is used to describe the mobilization activities, not a "normal" curve fit to the data. One could consider other distributions, but using the shape of the *actual* data curve is unambiguous and preserves these important features;

7) With the mobilization activities each modeled according to Steps 1-6, including preserving the features cited in Step 6, the overall (or total) mobilization times are constructed.

This is done by using the data sets and distributions under different scenarios (e.g. commuter returning, no commuter returning, no snow or snow in each). In general, these are additive, using

weighting based upon the probability distributions of each element; Figure 5-4 presents the combined trip generation distributions designated A, C, D, E and F. These distributions are presented on the same time scale. (As discussed earlier, the use of strictly additive activities is a conservative approach, because it makes all activities sequential – preparation for departure follows the return of the commuter; snow clearance follows the preparation for departure, and so forth. In practice, it is reasonable that some of these activities are done in parallel, at least to some extent – for instance, preparation to depart begins by a household member at home while the commuter is still on the road.)

The mobilization distributions that result are used in their tabular/graphical form as direct inputs to later computations that lead to the ETE.

The DYNEV II 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, D, E and F, properly displaced with respect to one another, are tabulated in Table 5-9 (Distribution B, Arrive Home, omitted for clarity).

The final time period (15) is 600 minutes long. This time period is added to allow the analysis network to clear, in the event congestion persists beyond the trip generation period. Note that there are no trips generated during this final time period.

5.4.2 Staged Evacuation Trip Generation

As defined in NUREG/CR-7002, staged evacuation consists of the following:

1. Communities comprising the 2 mile region are advised to evacuate immediately
2. Communities comprising regions extending from 2 to 5 miles downwind are advised to shelter in-place while the 2 mile region is cleared
3. As vehicles evacuate the 2 mile region, sheltered people from 2 to 5 miles downwind continue preparation for evacuation
4. The population sheltering in the 2 to 5 mile region are advised to begin evacuating when approximately 90% of those originally within the 2 mile region evacuate across the 2 mile region boundary
5. Non-compliance with the shelter recommendation is the same as the shadow evacuation percentage of 20%

Assumptions

1. The EPZ population in Communities beyond 5 miles will react as does the population in the 2 to 5 mile region; that is they will first shelter, then evacuate after the 90th percentile ETE for the 2 mile region
2. The population in the shadow region beyond the EPZ boundary, extending to 15 miles radially from the plant, will react as they do for all non-staged evacuation scenarios. That is 20% of these households will elect to evacuate with no shelter delay.

3. The transient population will not be expected to stage their evacuation because of the limited sheltering options available to people who may be at parks, on a beach, or at other venues. Also, notifying the transient population of a staged evacuation would prove difficult.
4. Employees will also be assumed to evacuate without first sheltering.

Procedure

1. Trip generation for population groups in the 2 mile region will be as computed based upon the results of the telephone survey and analysis.
2. Trip generation for the population subject to staged evacuation will be formulated as follows:
    a. Identify the 90th percentile evacuation time for the Communities comprising the two mile region. This value, T_{Scen}^{*}, is obtained from simulation results. It will become the time at which the region being sheltered will be told to evacuate for each scenario.
    b. The resultant trip generation curves for staging are then formed as follows:
        i. The non-shelter trip generation curve is followed until a maximum of 20% of the total trips are generated (to account for shelter non-compliance).
        ii. No additional trips are generated until time T_{Scen}^{*}
        iii. Following time T_{Scen}^{*}, the balance of trips are generated:
            1. by stepping up and then following the non-shelter trip generation curve (if T_{Scen}^{*} is $\leq$ max trip generation time) or
            2. by stepping up to 100% (if T_{Scen}^{*} is > max trip generation time)
    c. Note: This procedure implies that there may be different staged trip generation distributions for different scenarios. NUREG/CR-7002 uses the statement "approximately 90th percentile" as the time to end staging and begin evacuating. The value of T_{Scen}^{*} is about 2:00 for good weather and rain scenarios, and about 2:30 for snow scenarios.
3. Staged trip generation distributions are created for the following population groups:
    a. Residents with returning commuters
    b. Residents without returning commuters
    c. Residents with returning commuters and snow conditions
    d. Residents without returning commuters and snow conditions

Figure 5-5 presents the staged trip generation distributions for both residents with and without returning commuters; the 90th percentile two-mile evacuation time is 120 minutes for good weather and 150 minutes for snow scenarios. At the 90th percentile evacuation time, 20% of the population (who normally would have completed their mobilization activities for an un-staged evacuation) advised to shelter has nevertheless departed the area. These people do not comply with the shelter advisory. Also included in the plot are the trip generation distributions for these groups as applied to the regions advised to evacuate immediately.

Since the 90th percentile evacuation time occurs before the end of the trip generation time, after the sheltered region is advised to evacuate, the shelter trip generation distribution rises to meet the balance of the non-staged trip generation distribution. Following time T_{Scen}^{*}, the balance of staged evacuation trips that are ready to depart are released within 15 minutes. After T_{Scen}^{*}+15, the remainder of evacuation trips are generated in accordance with the un-staged trip generation distribution.

Table 5-10 provides the trip generation histograms for staged evacuation.

5.4.3 Trip Generation for Waterways and Recreational Areas

Chapter 5 of the New Hampshire State Emergency Operations Plan Incident Annex indicates that the Department of Resources and Economic Development (DRED) is responsible for alerting individuals located in state recreational facilities. Personnel from the Department of Fish and Game will be responsible for alerting people in other remote recreational areas, including boaters on waterways.

Section 8 of the Massachusetts Radiological Emergency Response Plan indicates MEMA is responsible for closing public beaches, parks, outdoor recreational areas and the waterway EPZ at Alert and/or Site Area Emergency levels.

As indicated in Table 5-2, this study assumes 100% notification in 45 minutes in accordance with the FEMA REP manual. Table 5-9 indicates that all transients will have mobilized within 1 hour and 45 minutes. It is assumed that this 1 hour, 45 minute timeframe is sufficient time for boaters, campers and other transients to return to their vehicles and begin their evacuation trip.

Table 5-9. Trip Generation Histograms for the EPZ Population for Un-staged Evacuation

Time Period	Duration (Min)	Percent of Total Trips Generated Within Indicated Time Period					
		Employees (Distribution A)	Transients (Distribution A)	Residents with Commuters (Distribution C)	Residents Without Commuters (Distribution D)	Residents With Commuters Snow (Distribution E)	Residents Without Commuters Snow (Distribution F)
1	15	7%	7%	0%	1%	0%	1%
2	15	35%	35%	0%	9%	0%	4%
3	15	34%	34%	3%	23%	1%	13%
4	15	14%	14%	8%	23%	5%	16%
5	30	9%	9%	28%	26%	19%	28%
6	15	1%	1%	15%	5%	12%	9%
7	15	0%	0%	13%	1%	12%	6%
8	15	0%	0%	9%	3%	11%	5%
9	15	0%	0%	6%	4%	8%	4%
10	15	0%	0%	5%	2%	7%	4%
11	15	0%	0%	4%	1%	6%	2%
12	60	0%	0%	7%	2%	13%	6%
13	60	0%	0%	2%	0%	5%	2%
14	60	0%	0%	0%	0%	1%	0%
15	600	0%	0%	0%	0%	0%	0%

NOTE:

- Shadow vehicles are loaded onto the analysis network (Figure 1-2) using Distributions C and E for good weather and snow, respectively.
- Special event and Beach transient vehicles are loaded using Distribution A.
- Seasonal Residents are loaded using Distribution D.

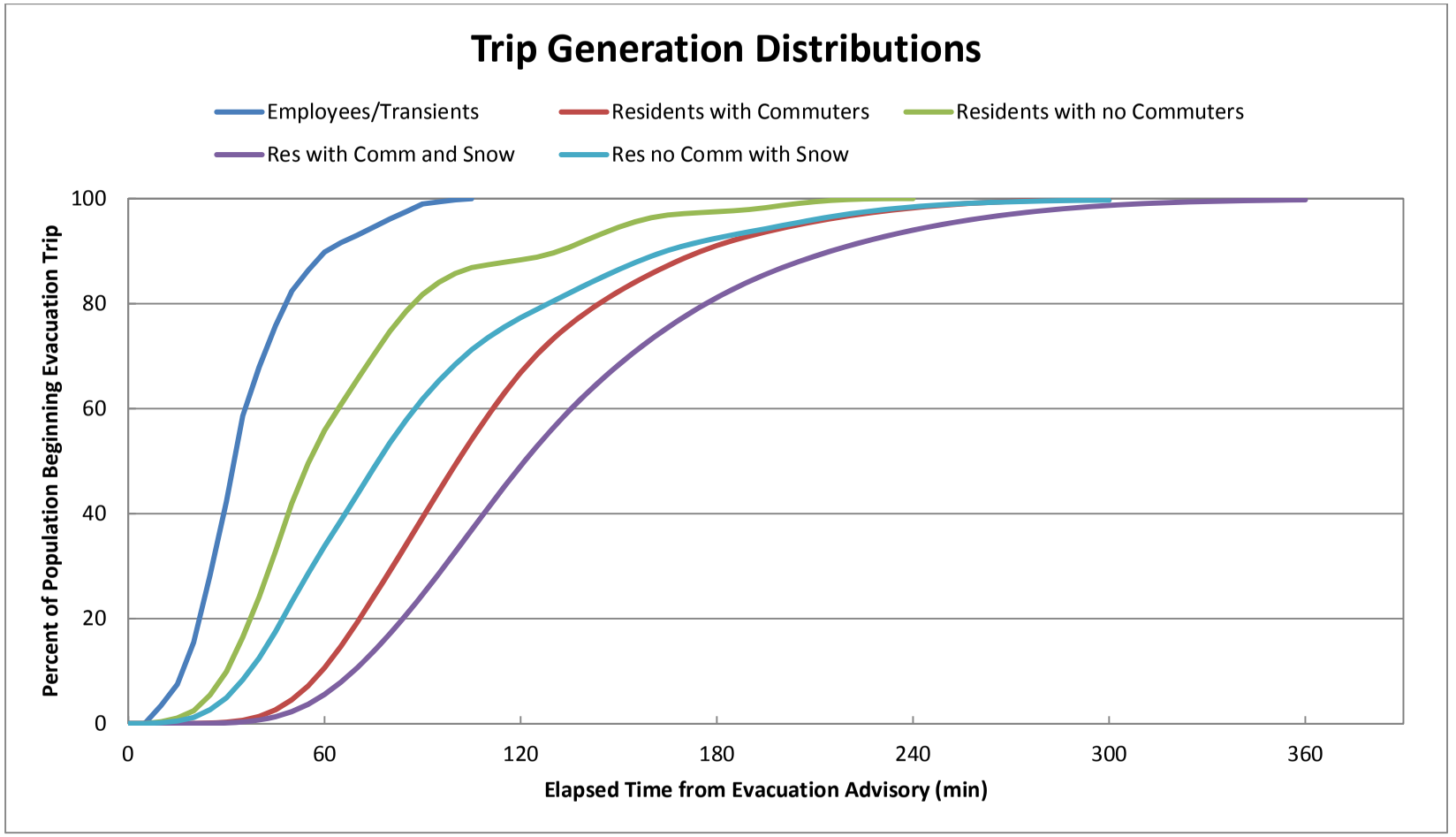


Figure 5-4. Comparison of Trip Generation Distributions

Table 5-10. Trip Generation Histograms for the EPZ Population for Staged Evacuation

Time Period	Duration (Min)	Percent of Total Trips Generated Within Indicated Time Period*			
		Residents with Commuters (Distribution C)	Residents Without Commuters (Distribution D)	Residents With Commuters Snow (Distribution E)	Residents Without Commuters Snow (Distribution F)
1	15	0%	0%	0%	0%
2	15	0%	2%	0%	1%
3	15	1%	5%	0%	3%
4	15	1%	4%	1%	3%
5	30	6%	5%	4%	5%
6	15	3%	1%	2%	2%
7	15	2%	1%	3%	1%
8	15	63%	73%	2%	1%
9	15	6%	4%	2%	1%
10	15	5%	2%	61%	73%
11	15	4%	1%	6%	2%
12	60	7%	2%	13%	6%
13	60	2%	0%	5%	2%
14	60	0%	0%	1%	0%
15	600	0%	0%	0%	0%

*Trip Generation for Employees and Transients (see Table 5-9) is the same for Un-staged and Staged Evacuation.

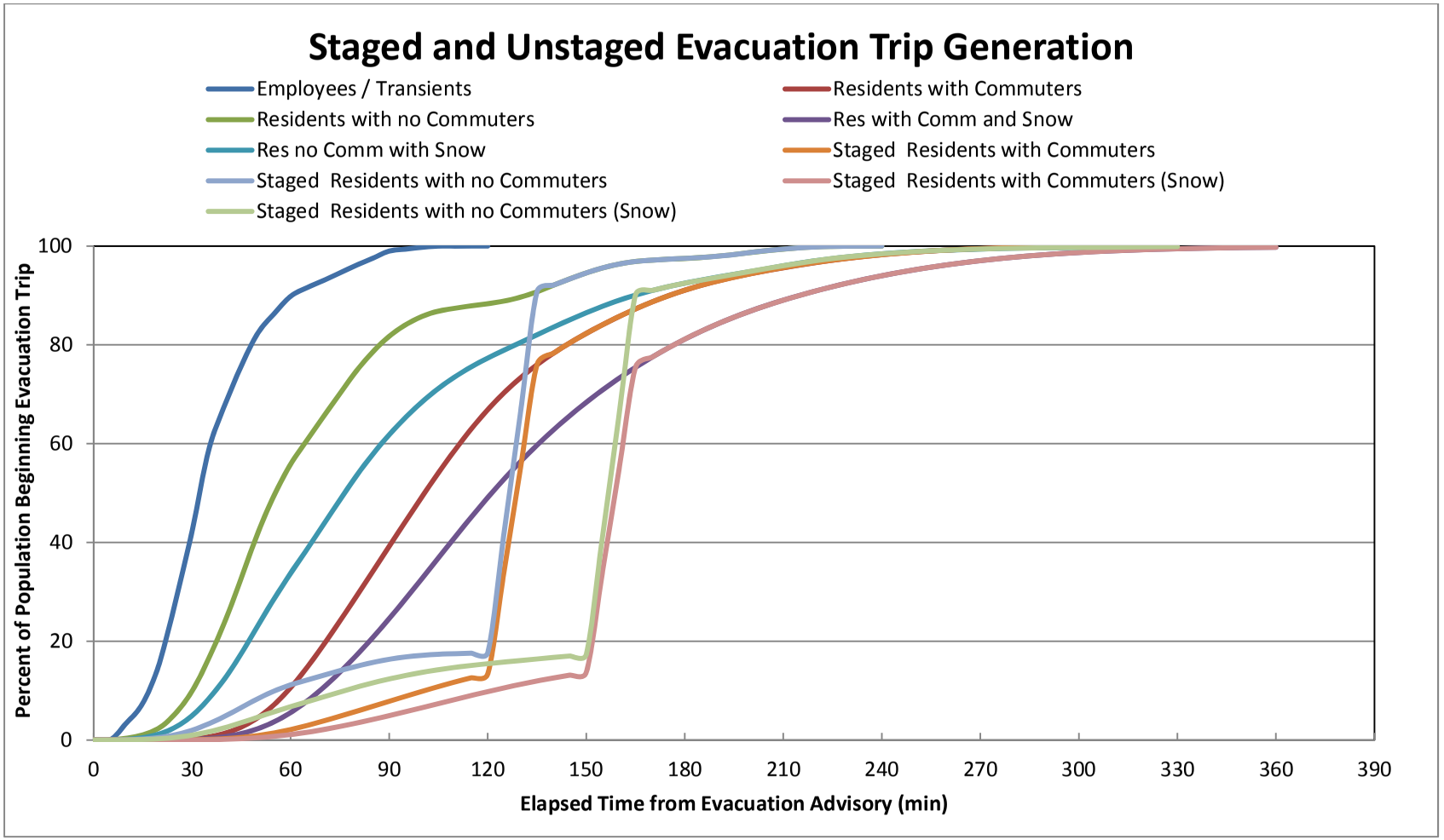


Figure 5-5. Comparison of Staged and Un-staged Trip Generation Distributions in the 2 to 5 Mile Region

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 evacuating ERPA 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. ERPA are groupings of contiguous Communities that evacuate concurrently. Table 6-1 indicates which Communities are within each ERPA.

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 19 Regions were defined which encompass all the groupings of ERPA considered. These Regions are defined in Table 6-2. The Community and ERPA configurations are identified in Figure 6-1. Each keyhole sector-based area consists of a central circle centered at the power plant, and three adjoining sectors, each with a central angle of 22.5 degrees, as per NUREG/CR-7002 guidance. The central sector coincides with the wind direction. These sectors extend to 5 miles from the plant (Regions R04 through R08) or to the EPZ boundary (Regions R09 through R13). Regions R01, R02 and R03 represent evacuations of circular areas with radii of 2, 5 and 10 miles, respectively. Regions R14 through R19 are identical to Regions R02, and R04 though R08, respectively; however, those Communities between 2 miles and 5 miles are staged until 90% of the 2-mile region (Region R01) has evacuated. Based on discussion with NextEra, the town of Hampton Beach along SH 1A, as well as all New Hampshire and Massachusetts beaches within the EPZ, is evacuated for all cases. The entire community of Hampton, as shown in Figure 6-1, is not evacuated with the 2-mile region even though there are parts of this community within the 2-mile radius that are not within the town of Hampton Beach.

A total of 14 Scenarios were evaluated for all Regions. Thus, there are a total of 19x14=266 evacuation cases. Table 6-3 is a description of all Scenarios.

Each combination of region and scenario implies a specific population to be evacuated. Table 6-4 presents the percentage of each population group estimated to evacuate for each scenario. Table 6-5 presents the vehicle counts for each scenario for an evacuation of Region R03 – the entire EPZ.

The vehicle estimates presented in Section 3 are peak values. These peak values are adjusted depending on the scenario and region being considered, using scenario and region specific percentages, such that the average population is considered for each evacuation case. The scenario percentages are presented in Table 6-4, while the regional percentages are provided in Table H-1. The percentages presented in Table 6-4 were determined as follows:

The number of residents with commuters during the week (when workforce is at its peak) is equal to the product of 61% (the number of households with at least one commuter) and 41% (the number of households with a commuter that would await the return of the commuter prior to evacuating). See assumption 3 in Section 2.3. It is estimated for weekend and evening scenarios that 10% of households with returning commuters will have a commuter at work during those times.

Employment is assumed to be at its peak (100%) during the winter, midweek, midday scenarios. Employment is reduced slightly (96%) for summer, midweek, midday scenarios. This is based on the estimation that 50% of the employees commuting into the EPZ will be on vacation for a week during the approximate 12 weeks of summer. It is further estimated that those taking vacation will be uniformly dispersed throughout the summer with approximately 4% of employees vacationing each week. It is further estimated that only 10% of the employees are working in the evenings and during the weekends.

Transient activity is estimated to be at its peak during summer weekends and less (75%) during the week. As shown in Appendix E, there are lodging and campgrounds offering overnight accommodations in the EPZ; thus, transient activity is estimated to be 65% for summer evenings and 45% for winter evenings. Transient activity on winter weekdays and weekends is estimated to be 50% and 65%, respectively. Seasonal residents are transients and have the same scenario percentages. Transients would not likely be visiting beaches during the winter months; thus scenario percentages for beaches were reduced to 0% during winter scenarios.

As noted in the shadow footnote to Table 6-4, the shadow percentages are computed using a base of 20% (see assumption 5 in Section 2.2); to include the employees within the Shadow Region who may choose to evacuate, the voluntary evacuation is multiplied by a scenario-specific proportion of employees to permanent residents in the Shadow Region. For example, using the values provided in Table 6-5 for Scenario 1, the shadow percentage is computed as follows:

$$20\% \times \left(1 + \frac{28{,}572}{21{,}393 + 63{,}846}\right) = 27\%$$

One special event – 4th of July Fireworks Show at Hampton Beach – was considered as Scenario 13. Thus, the special event traffic is 100% evacuated for Scenario 13, and 0% for all other scenarios.

It is estimated that summer school enrollment is approximately 10% of enrollment during the regular school year for summer, midweek, midday scenarios. School is not in session during weekends and evenings, thus no buses for school children are needed under those circumstances. As discussed in Section 7, schools are in session during the winter season, midweek, midday and 100% of buses will be needed under those circumstances. Transit buses for the transit-dependent population are set to 100% for all scenarios as it is assumed that the transit-dependent population is present in the EPZ for all scenarios. Day Camps are occupied

during the week in the summer. School buses for day camps are set to 100% for summer midweek scenarios and 0% for all other scenarios.

External traffic is estimated to be reduced by 60% during evening scenarios and is 100% for all other scenarios.

Table 6-1. ERPA Designations

Community	ERPA
NEW HAMPSHIRE	
Seabrook	A
Hampton Falls	
Kensington	C
South Hampton	
Hampton	D
North Hampton	
Brentwood	F
East Kingston	
Exeter	
Newfields	
Newton	
Kingston	
Greenland	G
Stratham	
Rye	
New Castle	
Portsmouth	
MASSACHUSETTS	
Amesbury	B
Salisbury	
Merrimac	E
Newburyport	
Newbury	
West Newbury	

Table 6-2. Description of Evacuation Regions

Region[1]	Description	ERPA						
		NH					MA	
		A	C	D	F	G	B	E
R01	2-Mile Region	x						
R02	5-Mile Region	x	x	x			x	
R03	Full EPZ	x	x	x	x	x	x	x
Evacuate 2-Mile Region and Downwind to 5 Miles								
Region	Wind Direction From:	ERPA						
		NH					MA	
		A	C	D	F	G	B	E
R04	NW, NNW, N, NNE	x					x	
R05	NE, ENE, E	x	x				x	
R06	ESE	x	x					
R07	SE, SSE	x	x	x				
R08	S, SSW, SW, WSW, W	x		x				
N/A	WNW	Refer to Region R01						
Evacuate 5-Mile Region and Downwind to the EPZ Boundary								
Region	Wind Direction From:	ERPA						
		NH					MA	
		A	C	D	F	G	B	E
R09	NW, NNW, N, NNE	x	x	x			x	x
R10	NE, ENE, E	x	x	x	x		x	x
R11	ESE	x	x	x	x		x	
R12	SE, SSE, S	x	x	x	x	x	x	
R13	SSW, SW, WSW	x	x	x		x	x	
N/A	W, WNW	Refer to Region R02						
Staged Evacuation - 2-Mile Region Evacuates, then Evacuate Downwind to 5 Miles								
Region	Wind Direction From:	ERPA						
		NH					MA	
		A	C	D	F	G	B	E
R14	5-Mile Region	x	x	x			x	
R15	NW, NNW, N, NNE	x					x	
R16	NE, ENE, E	x	x				x	
R17	ESE	x	x					
R18	SE, SSE	x	x	x				
R19	S, SSW, SW, WSW, W	x		x				
N/A	WNW	Refer to Region R01						
Shelter-in-Place until 90% ETE for R01, then Evacuate[2]			ERPA(s) Shelter-in-Place				ERPA(s) Evacuate	

[1] The town of Hampton Beach along SH 1A, as well as all New Hampshire and Massachusetts beaches within the EPZ, evacuates for all Regions.

[2] 20% of population in these Communities will not comply with the shelter advisory, as per Section 2.5.2 of NUREG/CR-7002. Once 90% of the 2-mile Region has evacuated, the remaining population in these Communities will evacuate.

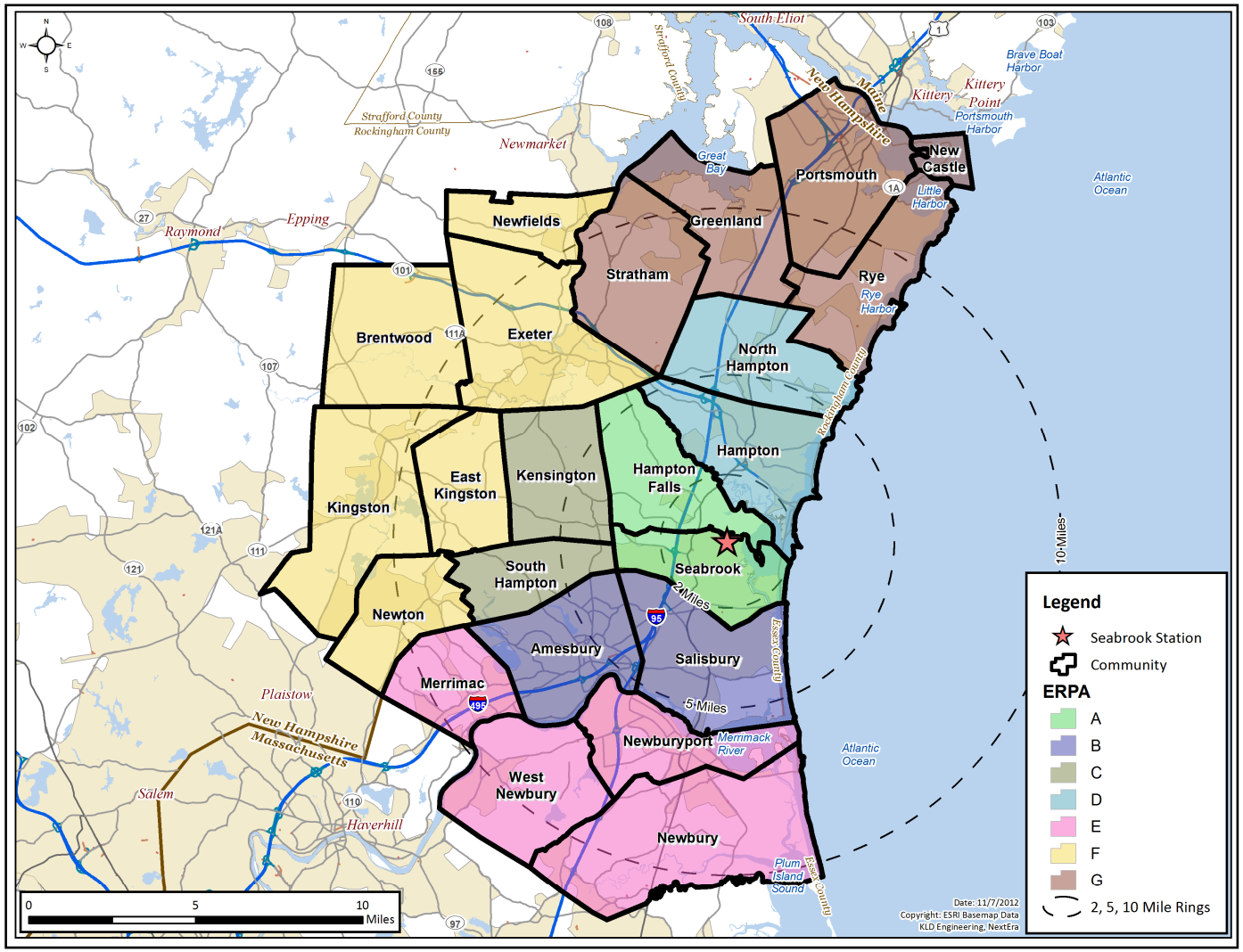


Figure 6-1. Seabrook Station EPZ Communities and ERPA

Table 6-3. Evacuation Scenario Definitions

Scenario	Season[3]	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	Midweek	Midday	Snow	None
9	Winter	Weekend	Midday	Good	None
10	Winter	Weekend	Midday	Rain	None
11	Winter	Weekend	Midday	Snow	None
12	Winter	Midweek, Weekend	Evening	Good	None
13	Summer	Midweek, Weekend	Evening	Good	July 4th Fireworks Show at Hampton Beach
14	Summer	Midweek	Midday	Good	Roadway Impact – Lane Closure on SH 101 WB

[3] Winter means that school is in session (also applies to spring and autumn). Summer means that school is not in session.

Table 6-4. Percent of Population Groups Evacuating for Various Scenarios

Scenario	Households With Returning Commuters	Households Without Returning Commuters	Employees	Transients	Shadow	Special Events	Beaches	Seasonal Residents	Day Camps	School Buses	Transit Buses	External Through Traffic
1	25%	75%	96%	75%	27%	0%	75%	75%	100%	10%	100%	100%
2	25%	75%	96%	75%	27%	0%	75%	75%	100%	10%	100%	100%
3	3%	97%	10%	100%	21%	0%	100%	100%	0%	0%	100%	100%
4	3%	97%	10%	100%	21%	0%	100%	100%	0%	0%	100%	100%
5	3%	97%	10%	65%	21%	0%	65%	65%	0%	0%	100%	40%
6	25%	75%	100%	50%	27%	0%	0%	50%	0%	100%	100%	100%
7	25%	75%	100%	50%	27%	0%	0%	50%	0%	100%	100%	100%
8	25%	75%	100%	50%	27%	0%	0%	50%	0%	100%	100%	100%
9	3%	97%	10%	65%	21%	0%	0%	65%	0%	0%	100%	100%
10	3%	97%	10%	65%	21%	0%	0%	65%	0%	0%	100%	100%
11	3%	97%	10%	65%	21%	0%	0%	65%	0%	0%	100%	100%
12	3%	97%	10%	45%	21%	0%	0%	45%	0%	0%	100%	40%
13	3%	97%	10%	65%	21%	100%	65%	65%	0%	0%	100%	40%
14	25%	75%	96%	75%	27%	0%	75%	75%	100%	10%	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 the EPZ.
Transients .....People who are in the EPZ at the time of an accident 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 20% relocation of shadow residents along with a proportional percentage of shadow employees.
Special Event.....Additional vehicles in the EPZ due to the identified special event.
Beaches.....People who are visiting beaches at the time of an accident.
Seasonal Residents.....People who visit the EPZ and stay considerably longer than the average transient using condos, beach houses, or rentals.
Day Camps, School and Transit Buses .....Vehicle-equivalents present on the road during evacuation servicing day camps, schools, jails and transit-dependent people (1 bus is equivalent to 2 passenger vehicles).
External Through Traffic .....Traffic on interstates/freeways and major arterial roads at the start of the evacuation. This traffic is stopped by access control approximately 1 hour after the evacuation begins.

Table 6-5. Vehicle Estimates by Scenario

Scenario	Households With Returning Commuters	Households Without Returning Commuters	Employees	Transients	Shadow	Special Events	Beaches	Seasonal Residents	Day Camps	School Buses	Transit Buses	External Through Traffic	Total Scenario Vehicles
1	21,393	63,846	28,572	9,269	13,417	-	2,246	1,876	112	150	232	11,838	152,951
2	21,393	63,846	28,572	9,269	13,417	-	2,246	1,876	112	150	232	11,838	152,951
3	2,139	83,100	2,976	12,358	10,399	-	2,995	2,501	-	-	232	11,838	128,538
4	2,139	83,100	2,976	12,358	10,399	-	2,995	2,501	-	-	232	11,838	128,538
5	2,139	83,100	2,976	8,033	10,399	-	1,947	1,626	-	-	232	4,735	115,187
6	21,393	63,846	29,762	6,179	13,557	-	-	1,251	-	1,504	232	11,838	149,562
7	21,393	63,846	29,762	6,179	13,557	-	-	1,251	-	1,504	232	11,838	149,562
8	21,393	63,846	29,762	6,179	13,557	-	-	1,251	-	1,504	232	11,838	149,562
9	2,139	83,100	2,976	8,033	10,399	-	-	1,626	-	-	232	11,838	120,343
10	2,139	83,100	2,976	8,033	10,399	-	-	1,626	-	-	232	11,838	120,343
11	2,139	83,100	2,976	8,033	10,399	-	-	1,626	-	-	232	11,838	120,343
12	2,139	83,100	2,976	5,561	10,399	-	-	1,125	-	-	232	4,735	110,267
13	2,139	83,100	2,976	8,033	10,399	30,375	1,947	1,626	-	-	232	4,735	145,562
14	21,393	63,846	28,572	9,269	13,417	-	2,246	1,876	112	150	232	11,838	152,951

Note: Vehicle estimates are for an evacuation of the entire EPZ (Region R03)

7 GENERAL POPULATION EVACUATION TIME ESTIMATES (ETE)

This section presents the ETE results of the computer analyses using the DYNEV II System described in Appendices B, C and D. These results cover 19 regions within the Seabrook Station EPZ and the 14 Evacuation Scenarios discussed in Section 6.

The ETE for all Evacuation Cases are presented in Table 7-1 and Table 7-2. These tables present the estimated times to clear the indicated population percentages from the Evacuation Regions for all Evacuation Scenarios. The ETE for the 2-mile region in both staged and un-staged regions are presented in Table 7-3 and Table 7-4. Table 7-5 identifies the communities within each ERPA, while Table 7-6 defines the ERPA in each Evacuation Region. The tabulated values of ETE are obtained from the DYNEV II System outputs which are generated at 5-minute intervals.

7.1 Voluntary Evacuation and Shadow Evacuation

"Voluntary evacuees" are people within the EPZ in Communities for which an Advisory to Evacuate has not been issued, yet who elect to evacuate. "Shadow evacuation" is the voluntary outward movement of some people from the Shadow Region (outside the EPZ) for whom no protective action recommendation has been issued. Both voluntary and shadow evacuations are assumed to take place over the same time frame as the evacuation from within the impacted Evacuation Region.

The ETE for the Seabrook Station EPZ addresses the issue of voluntary evacuees in the manner shown in Figure 7-1. Within the EPZ, 20 percent of people located in Communities outside of the evacuation region who are not advised to evacuate, are assumed to elect to evacuate. Similarly, it is assumed that 20 percent of those people in the Shadow Region will choose to leave the area.

Figure 7-2 presents the area identified as the Shadow Region. This region extends radially from the plant to cover a region between the EPZ boundary and approximately 15 miles. The population and number of evacuating vehicles in the Shadow Region were estimated using the same methodology that was used for permanent residents within the EPZ (see Section 3.1). As discussed in Section 3.2, it is estimated that a total of 96,205 people reside in the Shadow Region; 20 percent of them would evacuate. See Table 6-5 for the number of evacuating vehicles from the Shadow Region.

Traffic generated within this Shadow Region, traveling away from the Seabrook Station has the potential for impeding evacuating vehicles from within the Evacuation Region. All ETE calculations include this shadow traffic movement.

7.2 Staged Evacuation

As defined in NUREG/CR-7002, staged evacuation consists of the following:

1. Communities comprising the 2 mile region are advised to evacuate immediately.
2. Communities comprising regions extending from 2 to 5 miles downwind are advised to shelter in-place while the two mile region is cleared.
3. As vehicles evacuate the 2 mile region, people from 2 to 5 miles downwind continue preparation for evacuation while they shelter.
4. The population sheltering in the 2 to 5 mile region is advised to evacuate when approximately 90% of the 2 mile region evacuating traffic crosses the 2 mile region boundary.
5. Non-compliance with the shelter recommendation is the same as the shadow evacuation percentage of 20%.

See Section 5.4.2 for additional information on staged evacuation.

7.3 Patterns of Traffic Congestion during Evacuation

Figure 7-3 through Figure 7-8 illustrate the patterns of traffic congestion that arise for the case when the entire EPZ (Region R03) is advised to evacuate during the summer, midweek, midday period under good weather conditions (Scenario 1).

Traffic congestion, as the term is used here, is defined as Level of Service (LOS) F. LOS F is defined as follows (HCM 2010, page 5-5):

> The HCM uses LOS F to define operations that have either broken down (i.e., demand exceeds capacity) or have exceeded a specified service measure value, or combination of service measure values, that most users would consider unsatisfactory. However, particularly for planning applications where different alternatives may be compared, analysts may be interested in knowing just how bad the LOS F condition is. Several measures are available to describe individually, or in combination, the severity of a LOS F condition:
>
> • *Demand-to-capacity ratios* describe the extent to which capacity is exceeded during the analysis period (e.g., by 1%, 15%, etc.);
>
> • *Duration of LOS F* describes how long the condition persists (e.g., 15 min, 1 h, 3 h); and
>
> • *Spatial extent measures* describe the areas affected by LOS F conditions. These include measures such as the back of queue, and the identification of the specific intersection approaches or system elements experiencing LOS F conditions.

All highway "links" which experience LOS F are delineated in these figures by a thick red line; all others are lightly indicated. Congestion develops rapidly around concentrations of population and traffic bottlenecks. Figure 7-3 displays the widespread traffic congestion within the study

area at 1 hour after the ATE. All of the evacuation routes in major population centers are heavily congested. Throughout the EPZ, there is congestion in competing directions (north-south and east-west) at most intersections, resulting in little to no benefit from traffic control. SH 101 is heavily congested throughout most of the EPZ. Portsmouth is essentially gridlocked with congestion on all routes within the city. The main thoroughfare on Interstate-95 (I-95) southbound is operating at LOS C or better as the ramps are currently bottlenecks and are metering the flow of traffic. Access control points are now established to stop external-to-external trips throughout the study area.

Figure 7-4 displays the congestion patterns at 2 hours and 15 minutes after the ATE. The major population centers of Portsmouth, Exeter, Amesbury, and Haverhill are still heavily congested. I-95 northbound and SH 101 westbound throughout these areas are operating at LOS F. SH 1A experiences congestion in Salisbury due to the signalized intersection with US 1 and SH 110. This queue backs up into Seabrook Beach and Salisbury Beach. I-95 southbound is essentially clear of congestion since ACPs have been established. The area within two miles radially around the plant is clear of congestion; however, there are congested roadways within the two mile region (Seabrook and Hampton Falls).

Figure 7-5 displays the congestion at 3 hours and 30 minutes after the ATE. Haverhill, Exeter, and Portsmouth still experience heavy congestion, though some routes in these areas are beginning to clear. Slight congestion persists in Amesbury due to the traffic circle at the intersection of SH 150, High St, and Elm St. The queue on SH 1A at the intersection of SH 110 and US 1 has dissipated but still backs up for just over 2 miles to the intersection with Cable Ave. Aside from these areas, congestion has dissipated in the southern portion of the EPZ. US 1 south of the plant is operating at LOS D or better. SH 107 westbound, I-95 southbound, and I-495 southbound are clear of congestion within the EPZ. Congestion within the two mile region persists along SH 88 northbound due to bottlenecks in Exeter.

Congested conditions persist in Haverhill and Portsmouth at 4 hours and 30 minutes after the ATE as shown in Figure 7-6. US 1, I-95 southbound, I-495 southbound, the Massachusetts portion of the EPZ, and the 2-mile region are clear of congestion. Slight congestion remains within 5 miles of the plant at the ramp from I-95 southbound to SH 101 westbound due to the bottleneck created by the toll plaza. The traffic circle at the intersection of SH 1A, Sagamore Rd, and Elwyn Rd causes a queue for 3.5 miles on Sagamore Rd and onto Central Rd northbound for evacuees from Rye.

Figure 7-7 shows the last of the traffic congestion in the EPZ within Portsmouth at 5 hours and 30 minutes after the ATE. Traffic congestion in all other areas of the EPZ has cleared. Congestion in Haverhill cleared at 5 hours and 10 minutes after the ATE. Congestion at the traffic circle at the intersection of SH 1A, Sagamore Rd, and Elwyn Rd cleared at 5 hours and 25 minutes after the ATE.

The EPZ is completely clear of congestion at 6 hours and 10 minutes after the ATE, as shown in Figure 7-8. The last road to clear was I-95 northbound through Portsmouth at approximately 6 hours after the ATE.

7.4 Evacuation Rates

Evacuation is a continuous process, as implied by Figure 7-9 through Figure 7-22. These figures indicate the rate at which traffic flows out of the indicated areas for the case of an evacuation of the full EPZ (Region R03) under the indicated conditions. One figure is presented for each scenario considered.

As indicated in Figure 7-9, there is typically a long "tail" to these distributions. Vehicles begin to evacuate an area slowly at first, as people respond to the ATE 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.

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 reality, this ideal is generally unattainable reflecting the spatial variation in population density, mobilization rates and in highway capacity over the EPZ.

7.5 Evacuation Time Estimate (ETE) Results

Table 7-1 and Table 7-2 present the ETE values for all 19 Evacuation Regions and all 14 Evacuation Scenarios. Table 7-3 and Table 7-4 present the ETE values for the 2-mile region for both staged and un-staged keyhole regions downwind to 5 miles. The tables are organized as follows:

Table	Contents
7-1	ETE represents the elapsed time required for 90 percent of the population within a Region, to evacuate from that Region. All Scenarios are considered, as well as Staged Evacuation scenarios.
7-2	ETE represents the elapsed time required for 100 percent of the population within a Region, to evacuate from that Region. All Scenarios are considered, as well as Staged Evacuation scenarios.
7-3	ETE represents the elapsed time required for 90 percent of the population within the 2-mile Region, to evacuate from that Region with both Concurrent and Staged Evacuations.
7-4	ETE represents the elapsed time required for 100 percent of the population within the 2-mile Region, to evacuate from that Region with both Concurrent and Staged Evacuations.

The animation snapshots described above reflect the ETE statistics for the concurrent (un-staged) evacuation scenarios and regions, which are displayed in Figure 7-3 through Figure 7-8. Most of the congestion is located in Portsmouth and Exeter which are beyond the 5-mile region; Amesbury, which is within 5 miles of the plant, experiences congestion for 4½ hours; this is reflected in the ETE statistics:

- The 90th percentile ETE for Region R01 (the 2-mile area) generally range between 1:35 (hr:min) and 2:00 (slightly higher for rain and snow).
- The 90th percentile ETE for Region R02 (the 5-mile area) and R04 – R08 (which extend to the EPZ boundary) are approximately an hour longer than the 2-mile area due to congestion in Amesbury. The ETE generally range between 2:35 and 3:00 (slightly higher for rain and snow) for non-special event scenarios.
- The 90th percentile ETE for Regions R03 (full EPZ) and R09 – R13 (which extend to the EPZ boundary) are as much as 2 hours longer than the 5-mile area due to the pronounced congestion in Exeter and in Portsmouth. The ETE generally range between 2:40 and 5:05 (slightly higher for rain and snow). ETE for Regions R12 and R13 are considerably higher than Regions R09 through R11 due to the evacuation of Portsmouth.

The 100th percentile ETE for non-special event scenarios range from 5:00 in good weather to 6:55 for snow scenarios. Note that 100th percentile ETE for most regions are comparable to the completion of mobilization time (5 hours in good weather and rain and 6 hours in snow). Only those regions (R03, R12, and R13) wherein Portsmouth evacuates have 100th percentile ETEs which exceed mobilization time due to the traffic congestion within the city.

Comparison of Scenarios 5 and 13 in Table 7-1 indicates that the Special Event – 4th of July fireworks show at Hampton Beach – has a significant impact on the ETE for the 90th and 100th percentiles. The additional 30,375 vehicles at Hampton Beach increase ETE by as much as 4 hours and 40 minutes at the 90th percentile for regions involving the evacuation of Hampton and North Hampton (ERPA D). These additional transients oversaturate the major evacuation routes for these communities and prolong ETE. The 100th percentile ETE increases by as much as 4 hours and 35 minutes.

Comparison of Scenarios 1 and 14 in Table 7-1 indicates that the roadway closure – one lane westbound on SH 101 from the interchange with I-95 to the interchange with SH 107 (Exit 5) – does have a material impact on 90th and 100th percentile ETE for keyhole regions with wind from the east to the EPZ boundary (Regions R10 through R12). The 90th and 100th percentile ETE increase by up to 45 minutes and 2 hours and 10 minutes, respectively. Wind from the east carries the plume over Brentwood, East Kingston, Exeter, Newfields, Newton, and Kingston (ERPA F) which routes traffic onto SH 101 westbound. With a lane closed on SH 101 westbound in this area, the capacity of SH 101 is reduced to half, increasing congestion and prolonging ETE. Regions R09 through R13 involve evacuation predominately along I-95, US-4 and I-495, and are not materially impacted by the decreased capacity westbound along SH 101. SH 101 was chosen for the roadway impact scenario due to the heavy congestion experienced (see Figure

7-3 through Figure 7-8) from the large number of evacuees exiting the area on this roadway (see Table J-5). For these reasons, a lane closure on SH 101 would have the most impact.

The results of the roadway impact scenario indicate that events such as adverse weather or traffic accidents which close a lane on SH 101 or any of the major evacuation routes, could significantly impact ETE. State and local police could consider traffic management tactics such as using the shoulder of the roadway as a travel lane or re-routing of traffic along other evacuation routes (I-95, I-495, US 4) to avoid overwhelming the impacted roadway. All efforts should be made to remove blockages on major evacuation routes as quickly as possible.

7.6 Staged Evacuation Results

Table 7-3 and Table 7-4 present a comparison of the ETE compiled for the concurrent (un-staged) and staged evacuation cases. Note that Regions R14 through R19 are the same geographic areas as Regions R02 and R04 through R08, respectively.

To determine whether the staged evacuation strategy is worthy of consideration, one must show that the ETE for the 2-mile region can be reduced without significantly affecting the region between 2 miles and 5 miles. When evacuating the entire EPZ (Region R03), the ETE for the 2-mile region increases by as much as 1 hour and 10 minutes as shown in Table 7-3. This is due to the traffic congestion in Exeter which persists for more than 4 hours when evacuating the entire EPZ (Region R03). Traffic congestion along SH 88 persists for about 4½ hours and delays the egress of those evacuees from within the 2-mile region. When only the 2-mile region is evacuated, the additional vehicles evacuating from surrounding Communities are not on the roadways and the 2-mile region evacuees are not delayed.

All of the regions shown in Table 7-3, except Regions R01 and R03, evacuate to 5 miles. For these regions, the ETE for the 2-mile region is at most 20 minutes more when evacuating Communities beyond the 2-mile region than when only evacuating those Communities within the 2-mile region – not a significant increase. Note that those Regions (R07 and R08) with wind from the south (blowing over Hampton and North Hampton) are more impacted than those regions with wind from the north. This is due to the congestion on US 1 and I-95 northbound propagating downstream from Portsmouth. When the wind is blowing over Hampton and North Hampton, evacuees from Communities beyond 2 miles congest these roadways and slow down the 2 mile evacuation. Thus, staging evacuation could evacuate the 2-mile region up to 20 minutes faster when evacuating to 5 miles and up to 1 hour and 10 minutes faster when evacuating to the EPZ boundary.

A comparison of ETE for geographically identical regions – R14 through R19 with the respective ETE for R02 and R04 through R13 – in Table 7-1 reveals that staging retards the 90th percentile ETE for those in the 2 to 5-mile region by up to 45 minutes. This extending of ETE is due to the delay in beginning the evacuation trip, experienced by those who shelter, plus the effect of the trip-generation "spike" (significant volume of traffic beginning the evacuation trip at the same time – see Figure 5-5) that follows their eventual ATE, in creating congestion within the EPZ area beyond 2 miles.

In summary, a staged evacuation protective action strategy could benefit those people evacuating from within the 2-mile region when wind is blowing over Hampton and North Hampton, or when evacuating the entire EPZ. Although staged evacuation is disadvantageous to those beyond 2 miles, it does expedite the evacuation of those evacuees from within the 2-mile region.

7.7 Guidance on Using ETE Tables

The user first determines the percentile of population for which the ETE is sought (The NRC guidance calls for the 90th percentile). The applicable value of ETE within the chosen Table may then be identified using the following procedure:

1. Identify the applicable **Scenario**:
   - Season
     - Summer
     - Winter (also Autumn and Spring)
   - Day of Week
     - Midweek
     - Weekend
   - Time of Day
     - Midday
     - Evening
   - Weather Condition
     - Good Weather
     - Rain
     - Snow
   - Special Event
     - 4th of July Fireworks Show at Hampton Beach
     - Road Closure (A lane on SH 101 WB is closed)
   - Evacuation Staging
     - No, Staged Evacuation is not considered
     - Yes, Staged Evacuation is considered

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 the Tables. For these conditions, Scenarios (2) and (4) apply.
- The conditions of a winter evening (either midweek or weekend) and rain are not explicitly identified in the Tables. For these conditions, Scenarios (7) and (10) for rain apply.
- The conditions of a winter evening (either midweek or weekend) and snow are not explicitly identified in the Tables. For these conditions, Scenarios (8) and (11) for snow apply.
- The seasons are defined as follows:

- Summer assumes that public schools are not in session.
- Winter (includes Spring and Autumn) considers that public schools are in session.

- Time of Day: Midday implies the time over which most commuters are at work or are travelling to/from work.

2. With the desired percentile ETE and Scenario 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: from N, NNE, NE…
   - Determine the distance that the Evacuation Region will extend from the nuclear power plant. The applicable distances and their associated candidate Regions are given below:
     - 2 Miles (Region R01)
     - To 5 Miles (Region R02, R04 through R08)
     - To EPZ Boundary (Regions R03, R09 through R13)
   - Enter Table 7-6 and identify the applicable group of candidate Regions based on the distance that the selected Region extends from the Seabrook Station. Select the Evacuation Region identifier in that row, based on the azimuth direction of the plume, from the first column of the Table.
3. Determine the **ETE Table** based on the **percentile** selected. Then, for the **Scenario** identified in Step 1 and the **Region** identified in Step 2, proceed 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 defined 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.

Example

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

- Sunday, August 10th at 4:00 AM.
- It is raining.
- Wind direction is from the northeast (NE).
- Wind speed is such that the distance to be evacuated is judged to be a 5-mile radius and downwind to 10 miles (to EPZ boundary).
- The desired ETE is that value needed to evacuate 90 percent of the population from within the impacted Region.
- A staged evacuation is not desired.

Table 7-1 is applicable because the 90th percentile ETE is desired. Proceed as follows:

1. Identify the Scenario as summer, weekend, evening and raining. Entering Table 7-1, 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 7-6 and locate the Region described as "Evacuate 5-Mile Radius and Downwind to the EPZ Boundary" for wind direction from the NE and read Region R10 in the first column of that row.
3. Enter Table 7-1 to locate the data cell containing the value of ETE for Scenario 4 and Region R10. This data cell is in column (4) and in the row for Region R10; it contains the ETE value of **3:20**.

Table 7-1. Time to Clear the Indicated Area of *90* Percent of the Affected Population

	Summer		Summer		Summer	Winter			Winter			Winter	Summer	Summer
	Midweek		Weekend		Midweek Weekend	Midweek			Weekend			Midweek Weekend	Midweek Weekend	Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Region	Midday		Midday		Evening	Midday			Midday			Evening	Evening	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather	Special Event	Roadway Impact
Entire 2-Mile Region, 5-Mile Region, and EPZ														
R01	1:55	2:05	1:45	2:05	1:35	2:00	2:15	2:25	1:45	2:05	2:25	1:35	1:40	1:55
R02	2:55	3:05	2:55	3:00	2:50	3:00	3:05	3:30	2:35	2:50	3:15	2:40	6:25	3:00
R03	4:25	4:40	3:40	3:55	3:25	4:15	4:30	4:55	3:25	3:40	4:00	3:15	5:20	4:40
2-Mile Region and Keyhole to 5 Miles														
R04	3:05	3:15	3:05	3:15	3:00	3:05	3:10	3:30	2:45	3:00	3:20	2:50	3:00	3:05
R05	3:05	3:15	3:00	3:15	3:00	3:00	3:10	3:30	2:50	2:55	3:25	2:50	3:00	3:05
R06	2:05	2:15	1:50	2:10	1:40	2:05	2:15	2:30	1:45	2:10	2:25	1:40	1:45	2:05
R07	2:30	2:35	2:25	2:25	2:10	2:30	2:40	3:00	2:10	2:20	2:45	2:10	6:50	2:30
R08	2:30	2:40	2:25	2:25	2:10	2:30	2:40	3:00	2:15	2:20	2:45	2:10	6:50	2:30
5-Mile Region and Keyhole to EPZ Boundary														
R09	3:00	3:10	2:50	3:00	2:45	2:55	3:05	3:30	2:45	2:50	3:15	2:40	5:50	3:00
R10	3:25	3:50	3:05	3:20	3:00	3:20	3:40	4:05	2:55	3:05	3:30	2:55	5:15	4:05
R11	3:35	3:55	3:10	3:25	3:00	3:30	3:50	4:05	2:55	3:10	3:35	2:55	5:45	4:20
R12	4:30	4:50	3:45	4:00	3:30	4:30	4:40	5:05	3:25	3:40	4:05	3:20	5:40	4:55
R13	4:20	4:30	3:35	3:50	3:25	4:15	4:25	4:40	3:25	3:35	4:00	3:15	5:55	4:25
Staged Evacuation - 2-Mile Region and Keyhole to 5 Miles														
R14	3:15	3:25	3:20	3:30	3:20	3:15	3:20	3:55	3:10	3:15	3:55	3:20	6:25	3:20
R15	3:25	3:35	3:40	3:50	3:40	3:20	3:25	4:00	3:20	3:30	4:05	3:25	3:35	3:25
R16	3:25	3:35	3:35	3:45	3:35	3:15	3:25	4:00	3:20	3:25	4:00	3:25	3:35	3:25
R17	2:15	2:20	2:10	2:10	2:15	2:15	2:20	2:45	2:15	2:15	2:45	2:15	2:15	2:15
R18	2:45	2:55	2:45	2:50	2:50	2:50	2:55	3:25	2:50	2:55	3:25	2:50	6:55	2:45
R19	2:45	2:55	2:45	2:45	2:50	2:50	2:55	3:30	2:50	2:55	3:30	2:55	7:00	2:45

Table 7-2. Time to Clear the Indicated Area of *100* Percent of the Affected Population

	Summer		Summer		Summer	Winter			Winter			Winter	Summer	Summer
	Midweek		Weekend		Midweek Weekend	Midweek			Weekend			Midweek Weekend	Midweek Weekend	Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Region	Midday		Midday		Evening	Midday			Midday			Evening	Evening	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather	Special Event	Roadway Impact
Entire 2-Mile Region, 5-Mile Region, and EPZ														
R01	5:05	5:05	5:00	5:00	5:00	5:00	5:00	6:00	5:00	5:00	6:00	5:00	5:00	5:05
R02	5:05	5:05	5:05	5:15	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	9:15	5:05
R03	6:20	6:25	5:10	5:30	5:10	6:15	6:35	6:55	5:10	5:10	6:10	5:10	9:45	7:50
2-Mile Region and Keyhole to 5 Miles														
R04	5:05	5:05	5:05	5:15	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	5:05	5:05
R05	5:05	5:05	5:05	5:15	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	5:05	5:05
R06	5:05	5:05	5:05	5:05	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	5:05	5:05
R07	5:05	5:05	5:05	5:05	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	9:25	5:05
R08	5:05	5:05	5:05	5:05	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	9:15	5:05
5-Mile Region and Keyhole to EPZ Boundary														
R09	5:10	5:10	5:10	5:25	5:10	5:10	5:10	6:10	5:10	5:10	6:10	5:10	8:50	5:10
R10	5:10	5:35	5:10	5:30	5:10	5:10	5:20	6:10	5:10	5:10	6:10	5:10	9:30	6:45
R11	5:10	5:15	5:10	5:15	5:10	5:10	5:10	6:10	5:10	5:10	6:10	5:10	8:40	7:20
R12	6:20	6:25	5:10	5:15	5:10	6:15	6:20	6:45	5:10	5:10	6:10	5:10	9:35	7:50
R13	6:10	6:10	5:10	5:15	5:10	6:05	6:20	6:40	5:10	5:10	6:10	5:10	9:35	6:10
Staged Evacuation - 2-Mile Region and Keyhole to 5 Miles														
R14	5:05	5:10	5:10	5:30	5:05	5:05	5:10	6:10	5:05	5:05	6:05	5:05	9:25	5:05
R15	5:05	5:10	5:10	5:30	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	5:05	5:05
R16	5:05	5:10	5:10	5:30	5:05	5:05	5:15	6:05	5:05	5:05	6:05	5:05	5:05	5:05
R17	5:05	5:05	5:05	5:05	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	5:05	5:05
R18	5:05	5:05	5:05	5:05	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	9:10	5:05
R19	5:05	5:05	5:05	5:05	5:05	5:05	5:05	6:05	5:05	5:05	6:05	5:05	9:25	5:05

Table 7-3. Time to Clear *90* Percent of the 2-Mile Area within the Indicated Region

	Summer		Summer		Summer	Winter			Winter			Winter	Summer	Summer
	Midweek		Weekend		Midweek Weekend	Midweek			Weekend			Midweek Weekend	Midweek Weekend	Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Region	Midday		Midday		Evening	Midday			Midday			Evening	Evening	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather	Special Event	Roadway Impact
Un-staged Evacuation - 2-Mile Region, 5-Mile Region, Full EPZ, and Keyhole to 5-Miles														
R01	1:55	2:05	1:45	2:05	1:35	2:00	2:15	2:25	1:45	2:05	2:25	1:35	1:40	1:55
R02	2:10	2:20	2:05	2:10	1:40	2:15	2:20	2:45	1:50	2:10	2:30	1:40	2:20	2:10
R03	2:40	2:50	2:25	2:50	2:10	2:45	2:50	3:35	2:35	2:35	3:10	2:05	2:45	2:40
R04	1:55	2:10	1:50	2:05	1:40	2:05	2:15	2:25	2:00	2:05	2:25	1:35	1:40	1:55
R05	2:05	2:10	2:00	2:05	1:35	2:05	2:15	2:25	1:55	2:05	2:25	1:35	1:40	1:55
R06	2:00	2:10	1:50	2:10	1:35	2:00	2:15	2:25	1:45	2:10	2:25	1:35	1:45	2:00
R07	2:10	2:20	2:05	2:10	1:40	2:10	2:20	2:40	1:50	2:15	2:30	1:40	2:25	2:15
R08	2:10	2:20	2:05	2:10	1:40	2:10	2:20	2:40	2:00	2:10	2:30	1:40	2:10	2:15
Staged Evacuation - 2-Mile Region and Keyhole to 5-Miles														
R14	1:55	2:05	1:45	2:05	1:35	2:00	2:15	2:25	1:45	2:05	2:25	1:35	1:40	1:55
R15	1:55	2:05	1:45	2:05	1:35	2:00	2:15	2:25	1:45	2:05	2:25	1:35	1:40	1:55
R16	1:55	2:05	1:45	2:05	1:35	2:00	2:15	2:25	1:45	2:05	2:25	1:35	1:40	1:55
R17	1:55	2:05	1:45	2:05	1:35	2:00	2:15	2:25	1:45	2:05	2:25	1:35	1:40	1:55
R18	1:55	2:05	1:45	2:05	1:35	2:00	2:15	2:25	1:45	2:05	2:25	1:35	1:40	1:55
R19	1:55	2:05	1:45	2:05	1:35	2:00	2:15	2:25	1:45	2:05	2:25	1:35	1:40	1:55

Table 7-4. Time to Clear *100* Percent of the 2-Mile Area within the Indicated Region

	Summer		Summer		Summer	Winter			Winter			Winter	Summer	Summer
	Midweek		Weekend		Midweek Weekend	Midweek			Weekend			Midweek Weekend	Midweek Weekend	Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Region	Midday		Midday		Evening	Midday			Midday			Evening	Evening	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather	Special Event	Roadway Impact
Un-staged Evacuation - 2-Mile Region, 5-Mile Region, Full EPZ, and Keyhole to 5-Miles														
R01	5:05	5:05	5:00	5:00	5:00	5:00	5:00	6:00	5:00	5:00	6:00	5:00	5:00	5:05
R02	5:05	5:05	5:00	5:00	5:00	5:05	5:00	6:00	5:00	5:00	6:00	5:00	7:45	5:05
R03	5:05	6:10	5:00	5:00	5:00	5:50	5:10	6:40	5:00	5:00	6:00	5:00	6:45	6:00
R04	5:05	5:05	5:00	5:00	5:00	5:00	5:05	6:05	5:00	5:00	6:00	5:00	5:00	5:05
R05	5:05	5:05	5:00	5:00	5:00	5:05	5:05	6:00	5:00	5:00	6:00	5:00	5:00	5:05
R06	5:05	5:05	5:00	5:00	5:00	5:00	5:05	6:00	5:00	5:00	6:00	5:00	5:00	5:05
R07	5:05	5:05	5:00	5:00	5:00	5:05	5:00	6:00	5:00	5:00	6:00	5:00	7:15	5:05
R08	5:05	5:05	5:00	5:00	5:00	5:05	5:00	6:05	5:00	5:00	6:00	5:00	5:00	5:05
Staged Evacuation - 2-Mile Region and Keyhole to 5-Miles														
R14	5:05	5:05	5:00	5:00	5:00	5:05	5:05	6:05	5:00	5:00	6:00	5:00	5:40	5:05
R15	5:05	5:05	5:00	5:00	5:00	5:05	5:05	6:00	5:00	5:00	6:00	5:00	5:00	5:05
R16	5:05	5:05	5:00	5:00	5:00	5:05	5:05	6:00	5:00	5:00	6:00	5:00	5:00	5:05
R17	5:05	5:05	5:00	5:00	5:00	5:05	5:00	6:00	5:00	5:00	6:00	5:00	5:00	5:05
R18	5:05	5:05	5:00	5:00	5:00	5:05	5:00	6:00	5:00	5:00	6:00	5:00	7:40	5:05
R19	5:05	5:05	5:00	5:00	5:00	5:00	5:00	6:00	5:00	5:00	6:00	5:00	7:45	5:05

Table 7-5. ERPA Designations

Community	ERPA
NEW HAMPSHIRE	
Seabrook	A
Hampton Falls	
Kensington	C
South Hampton	
Hampton	D
North Hampton	
Brentwood	F
East Kingston	
Exeter	
Newfields	
Newton	
Kingston	
Greenland	G
Stratham	
Rye	
New Castle	
Portsmouth	
MASSACHUSETTS	
Amesbury	B
Salisbury	
Merrimac	E
Newburyport	
Newbury	
West Newbury	

Table 7-6. Description of Evacuation Regions

Region[1]	Description	ERPA						
		NH					MA	
		A	C	D	F	G	B	E
R01	2-Mile Region	x						
R02	5-Mile Region	x	x	x			x	
R03	Full EPZ	x	x	x	x	x	x	x
Evacuate 2-Mile Region and Downwind to 5 Miles								
Region	**Wind Direction From:**	ERPA						
		NH					MA	
		A	C	D	F	G	B	E
R04	NW, NNW, N, NNE	x					x	
R05	NE, ENE, E	x	x				x	
R06	ESE	x	x					
R07	SE, SSE	x	x	x				
R08	S, SSW, SW, WSW, W	x		x				
N/A	WNW	**Refer to Region R01**						
Evacuate 5-Mile Region and Downwind to the EPZ Boundary								
Region	**Wind Direction From:**	ERPA						
		NH					MA	
		A	C	D	F	G	B	E
R09	NW, NNW, N, NNE	x	x	x			x	x
R10	NE, ENE, E	x	x	x	x		x	x
R11	ESE	x	x	x	x		x	
R12	SE, SSE, S	x	x	x	x	x	x	
R13	SSW, SW, WSW	x	x	x		x	x	
N/A	W, WNW	**Refer to Region R02**						
Staged Evacuation - 2-Mile Region Evacuates, then Evacuate Downwind to 5 Miles								
Region	**Wind Direction From:**	ERPA						
		NH					MA	
		A	C	D	F	G	B	E
R14	5-Mile Region	x	x	x			x	
R15	NW, NNW, N, NNE	x					x	
R16	NE, ENE, E	x	x				x	
R17	ESE	x	x					
R18	SE, SSE	x	x	x				
R19	S, SSW, SW, WSW, W	x		x				
N/A	WNW	**Refer to Region R01**						
Shelter-in-Place until 90% ETE for R01, then Evacuate[2]			ERPA(s) Shelter-in-Place				ERPA(s) Evacuate	

[1] The town of Hampton Beach along SH 1A, as well as all New Hampshire and Massachusetts beaches within the EPZ, evacuates for all Regions.

[2] 20% of population in these Communities will not comply with the shelter advisory, as per Section 2.5.2 of NUREG/CR-7002. Once 90% of the 2-mile Region has evacuated, the remaining population in these Communities will evacuate.

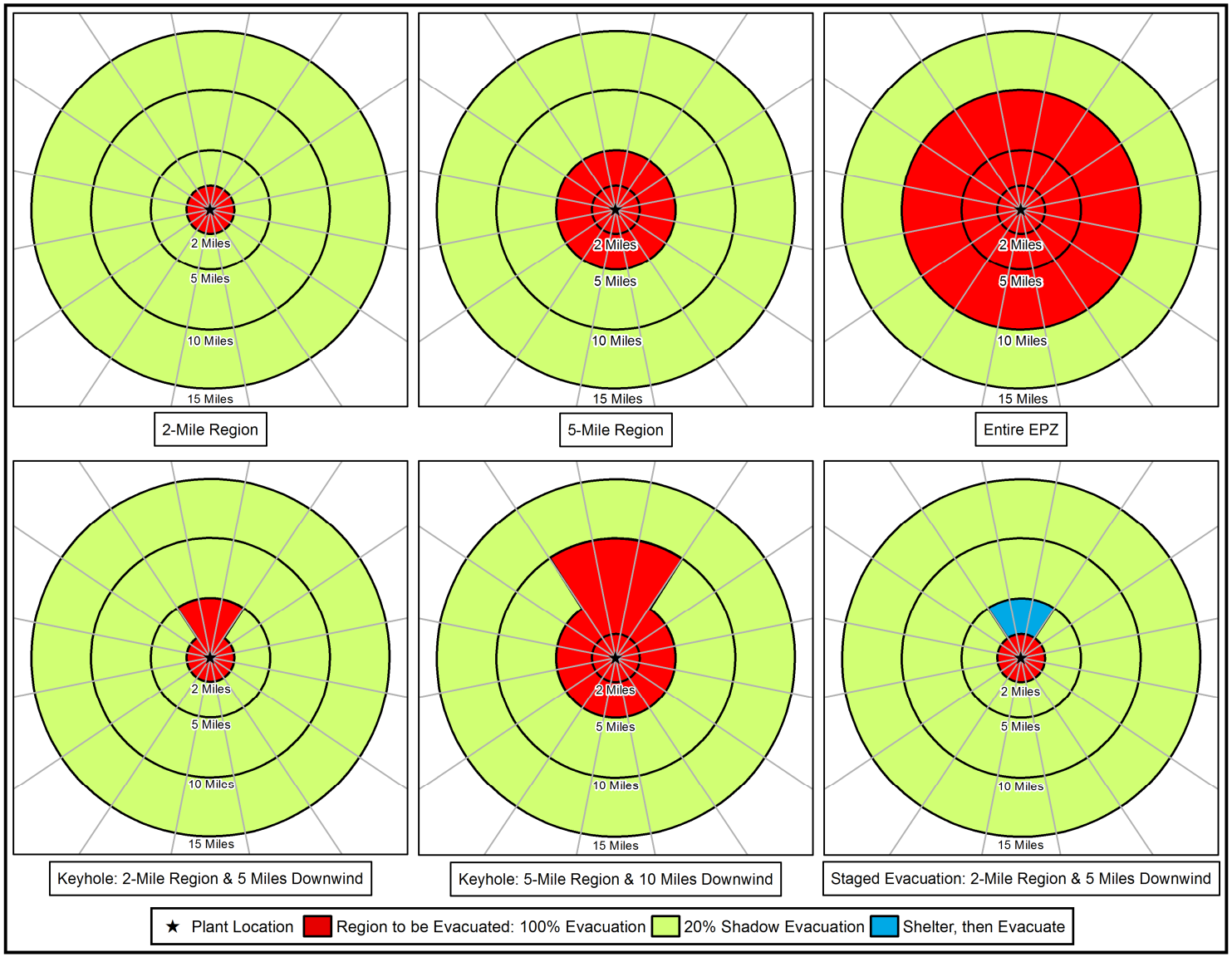


Figure 7-1. Voluntary Evacuation Methodology

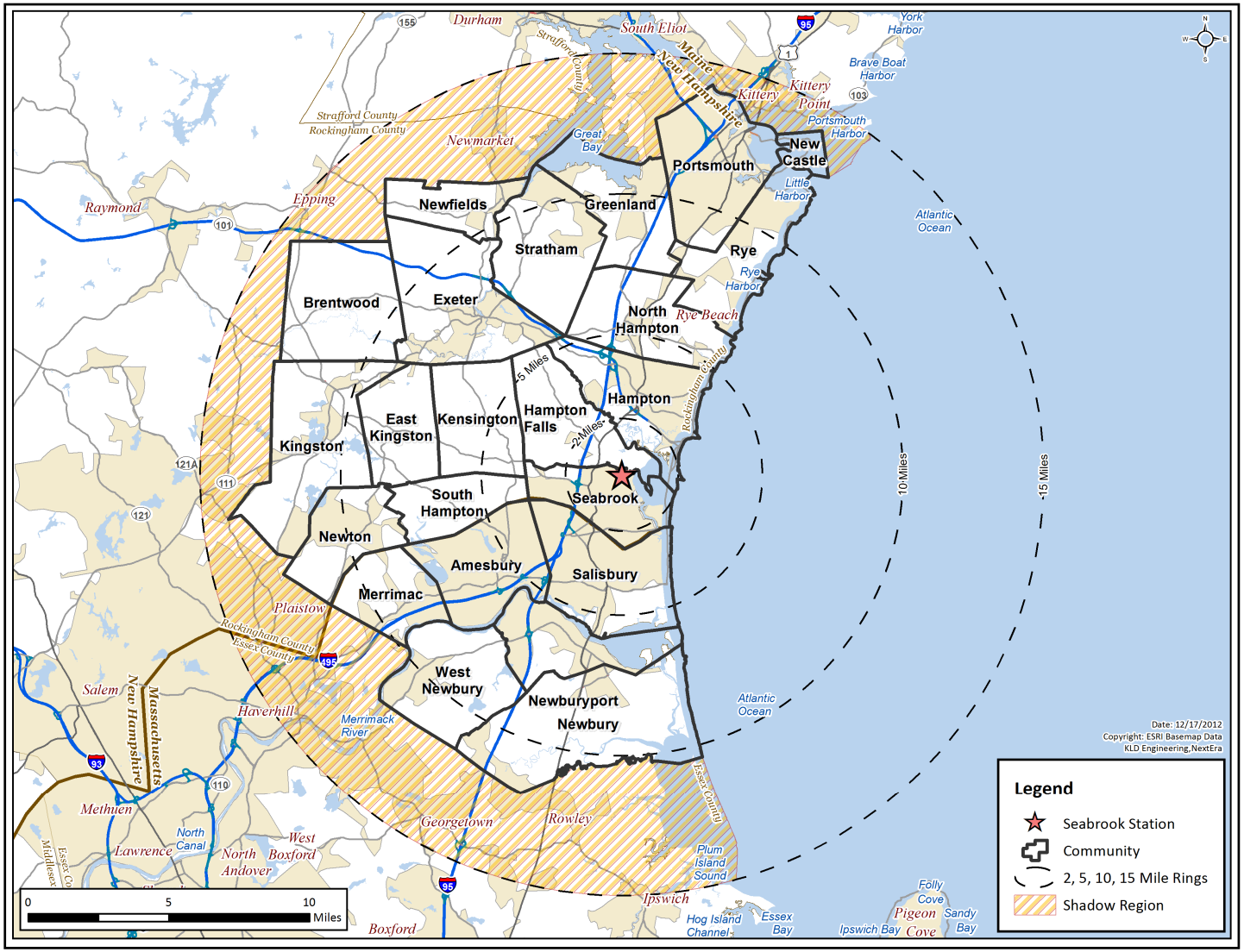


Figure 7-2. Seabrook Station Shadow Region

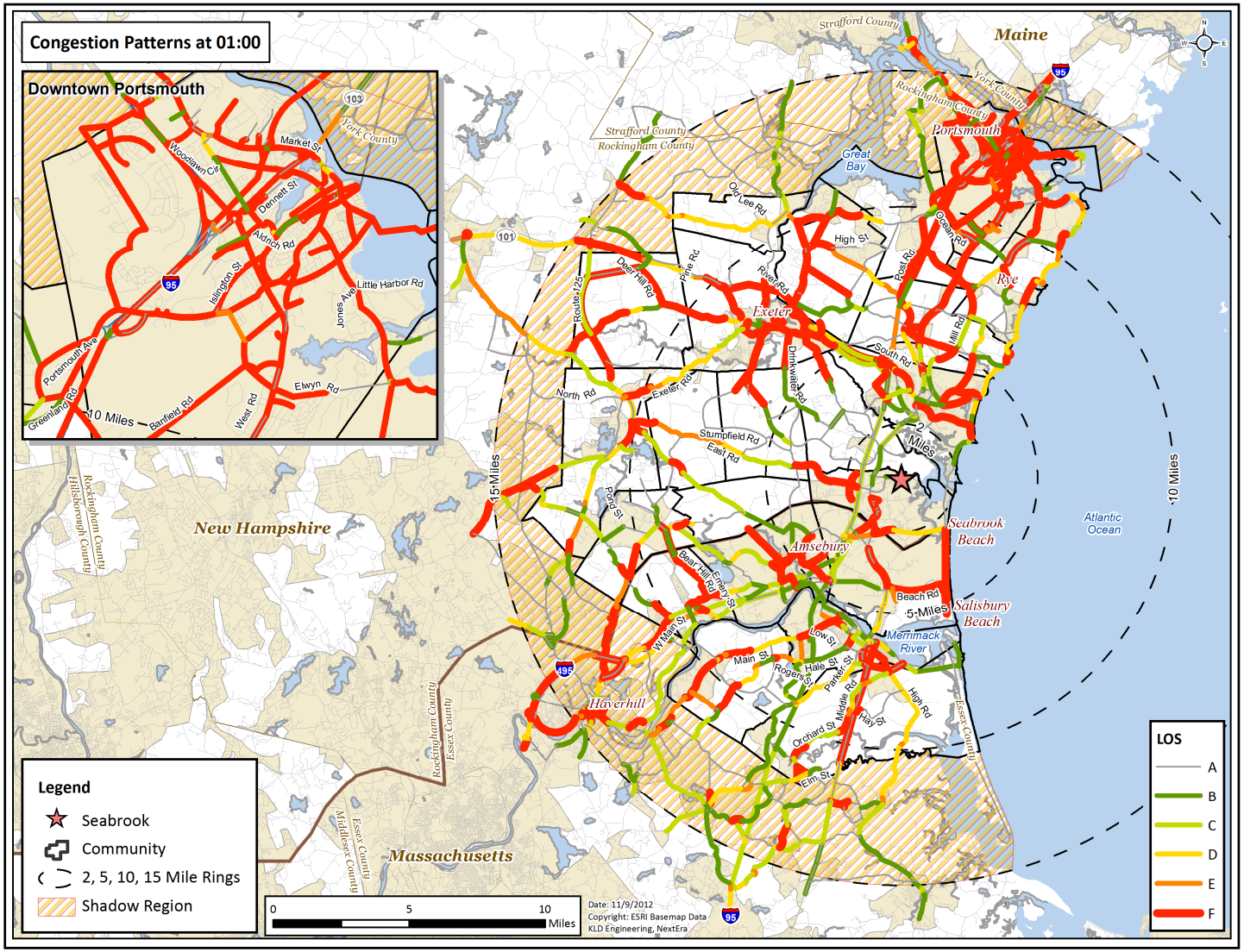


Figure 7-3. Congestion Patterns at 1 Hour after the Advisory to Evacuate

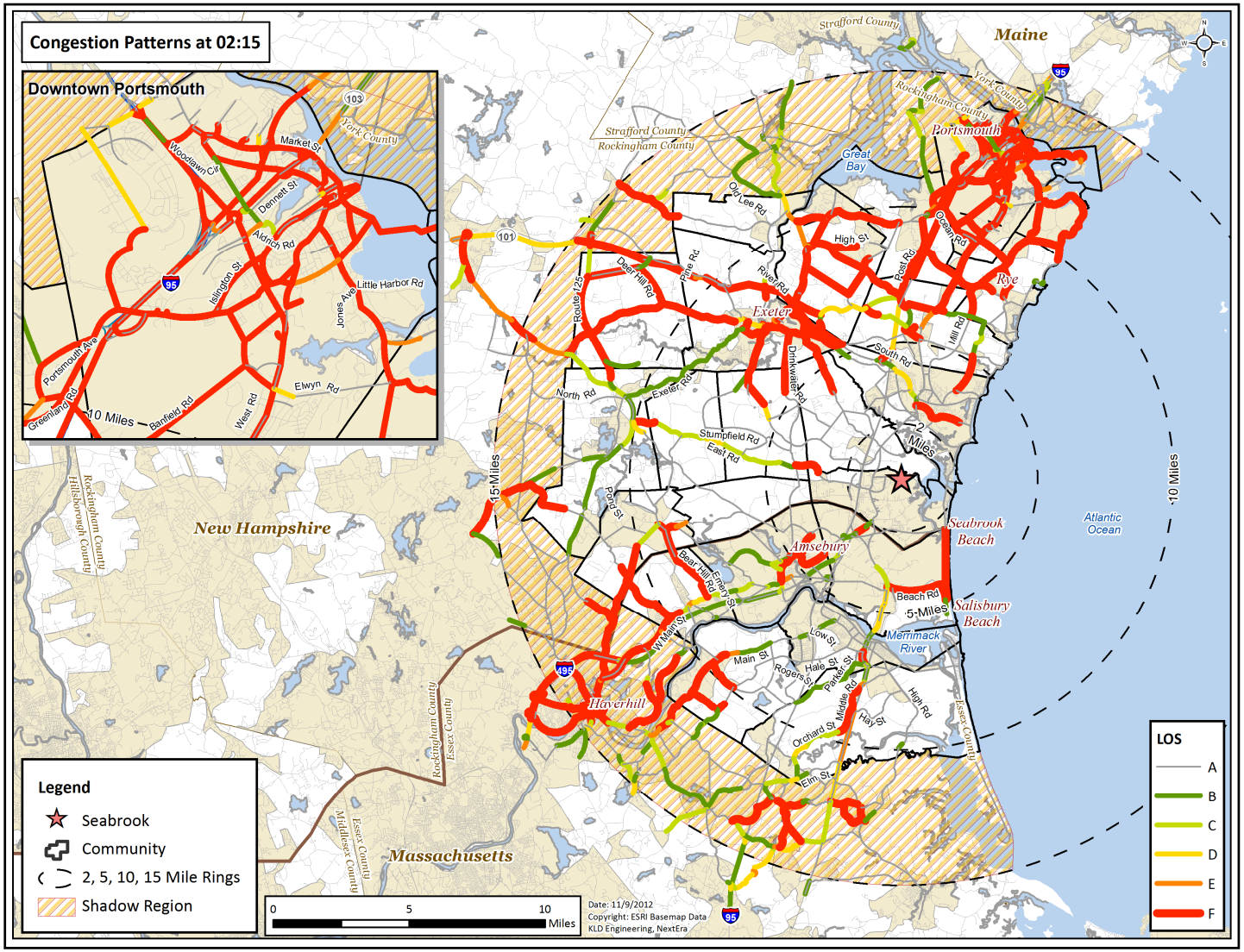


Figure 7-4. Congestion Patterns at 2 Hours, 15 Minutes after the Advisory to Evacuate

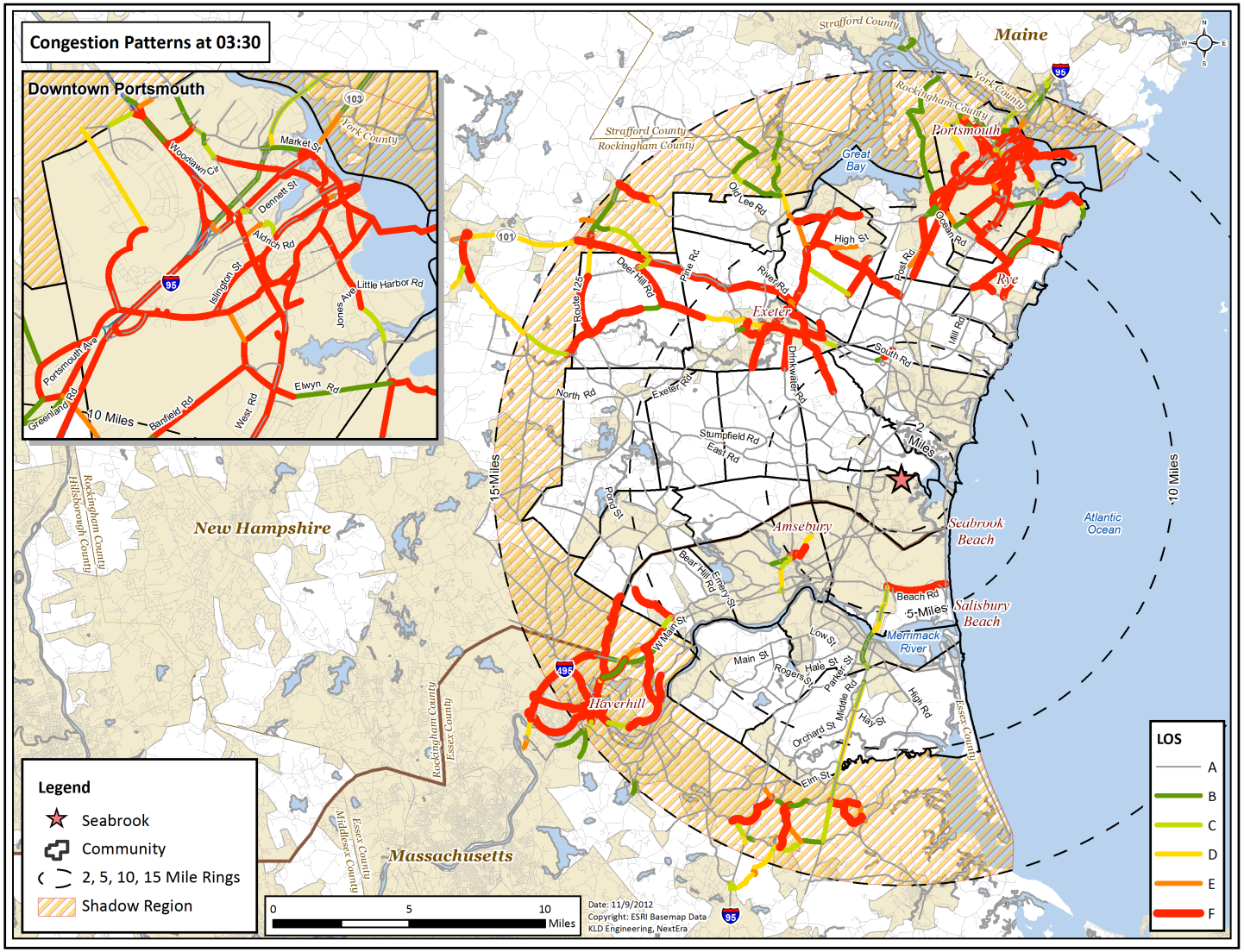


Figure 7-5. Congestion Patterns at 3 Hours, 30 Minutes after the Advisory to Evacuate

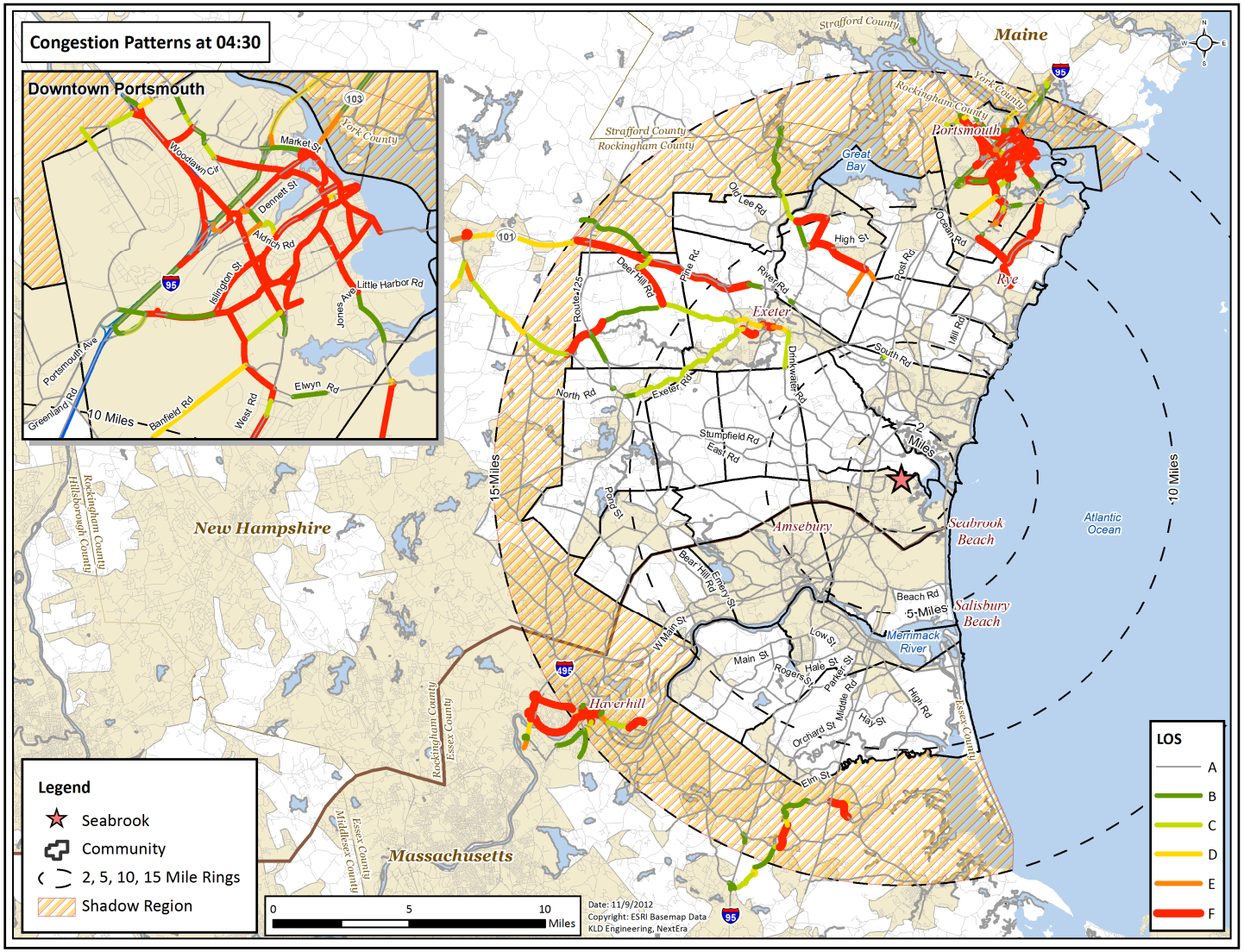


Figure 7-6. Congestion Patterns at 4 Hours, 30 Minutes after the Advisory to Evacuate

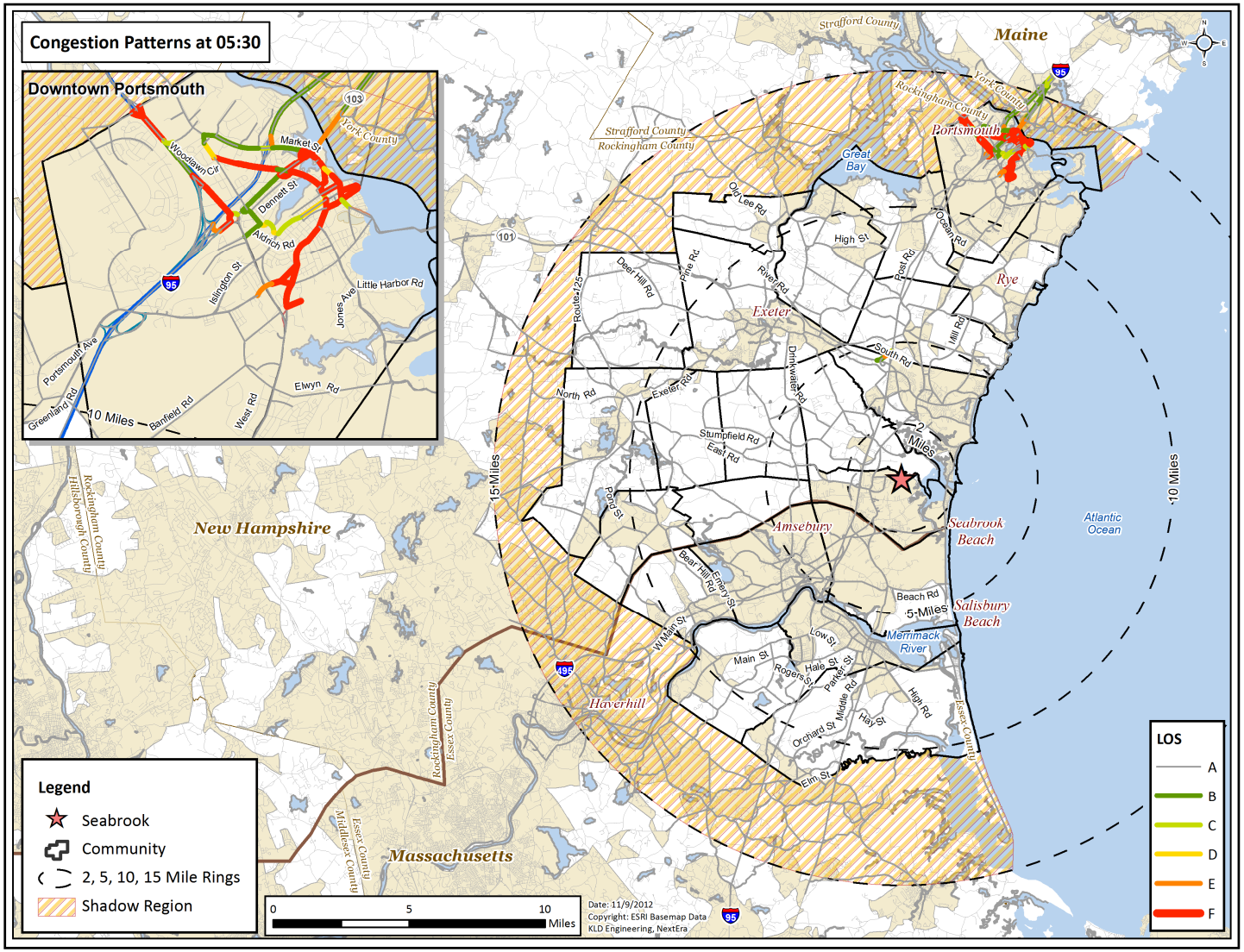


Figure 7-7. Congestion Patterns at 5 Hours, 30 Minutes after the Advisory to Evacuate

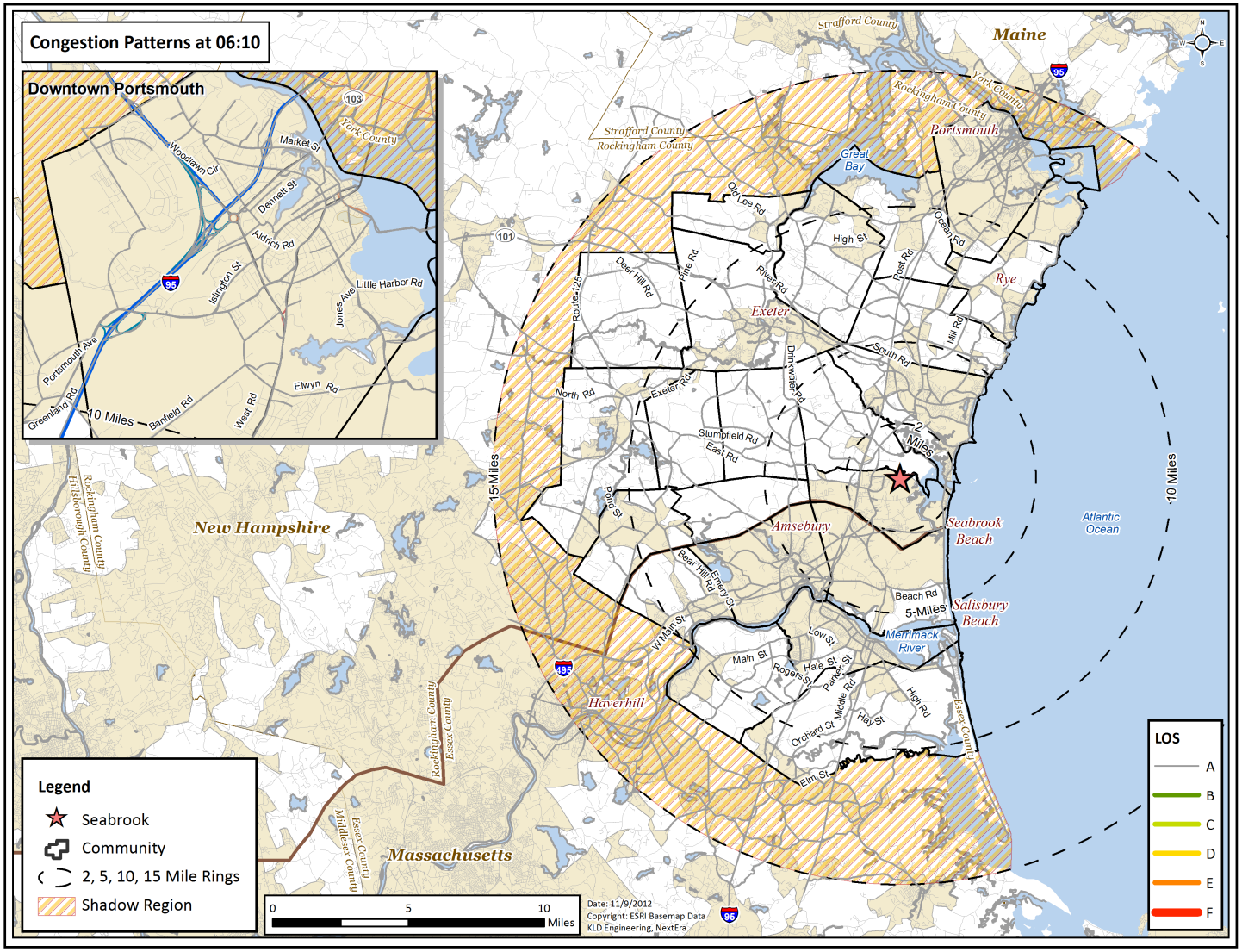


Figure 7-8. Congestion Patterns at 6 Hours, 10 Minutes after the Advisory to Evacuate

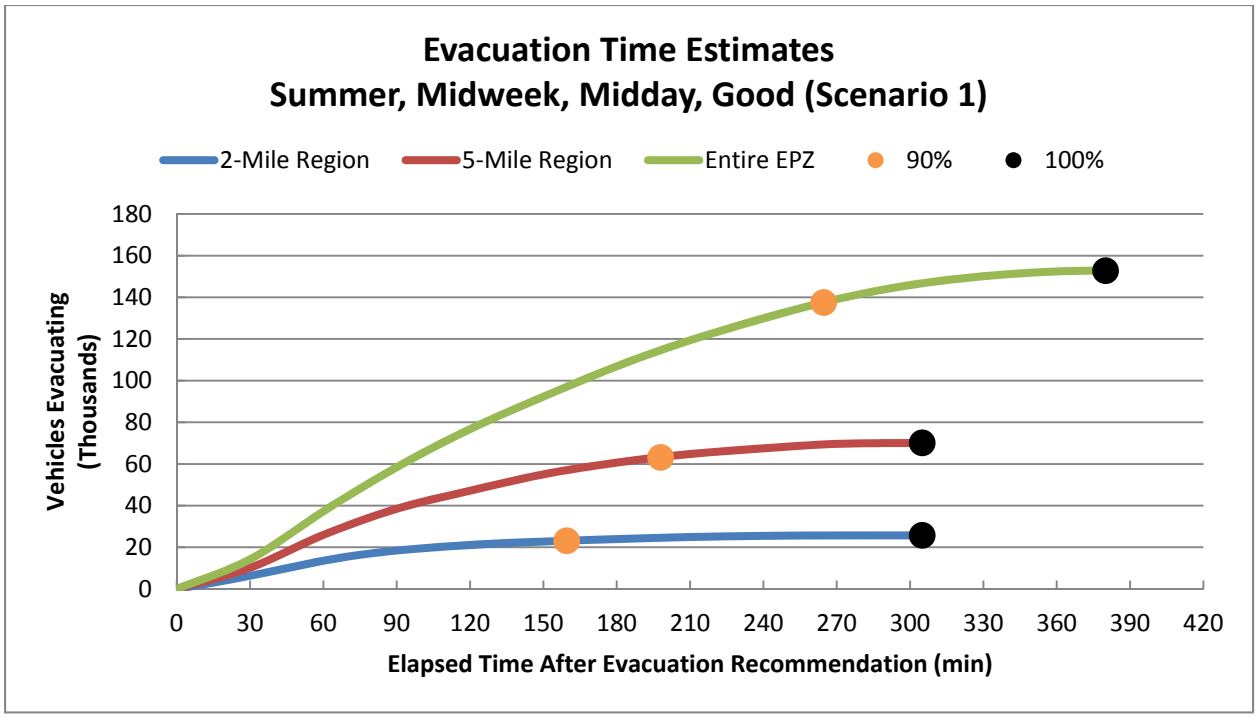


Figure 7-9. Evacuation Time Estimates - Scenario 1 for Region R03

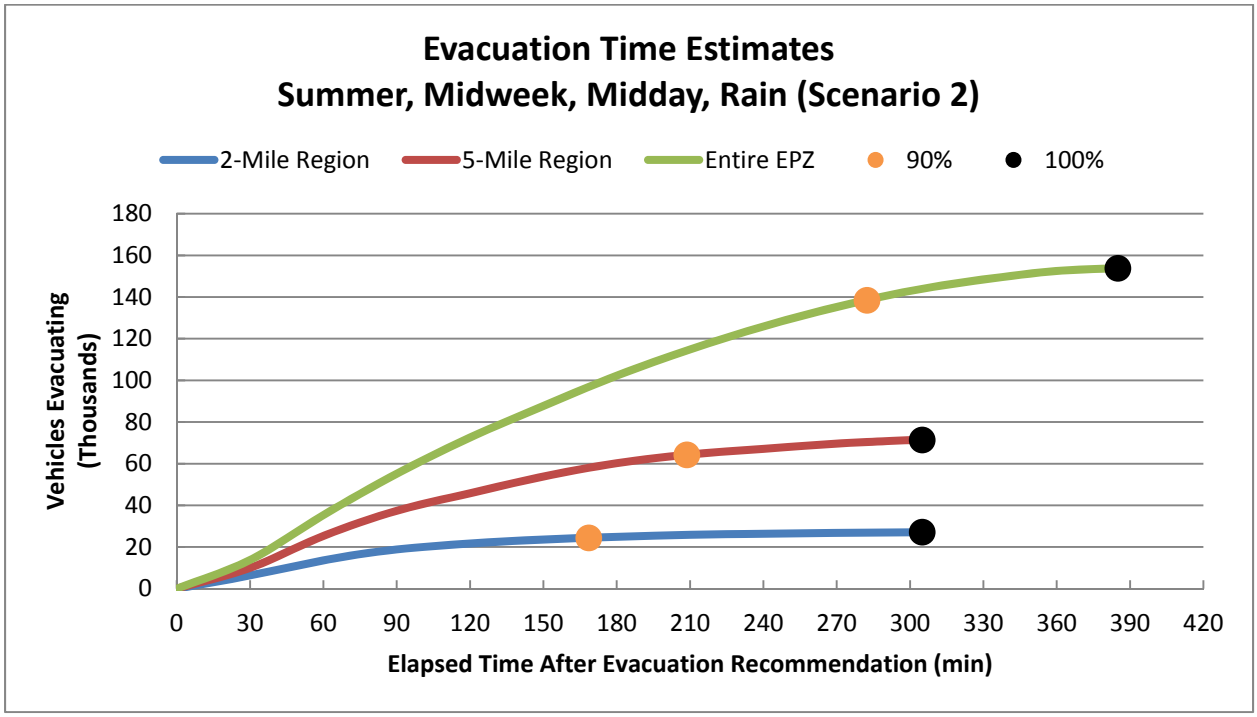


Figure 7-10. Evacuation Time Estimates - Scenario 2 for Region R03

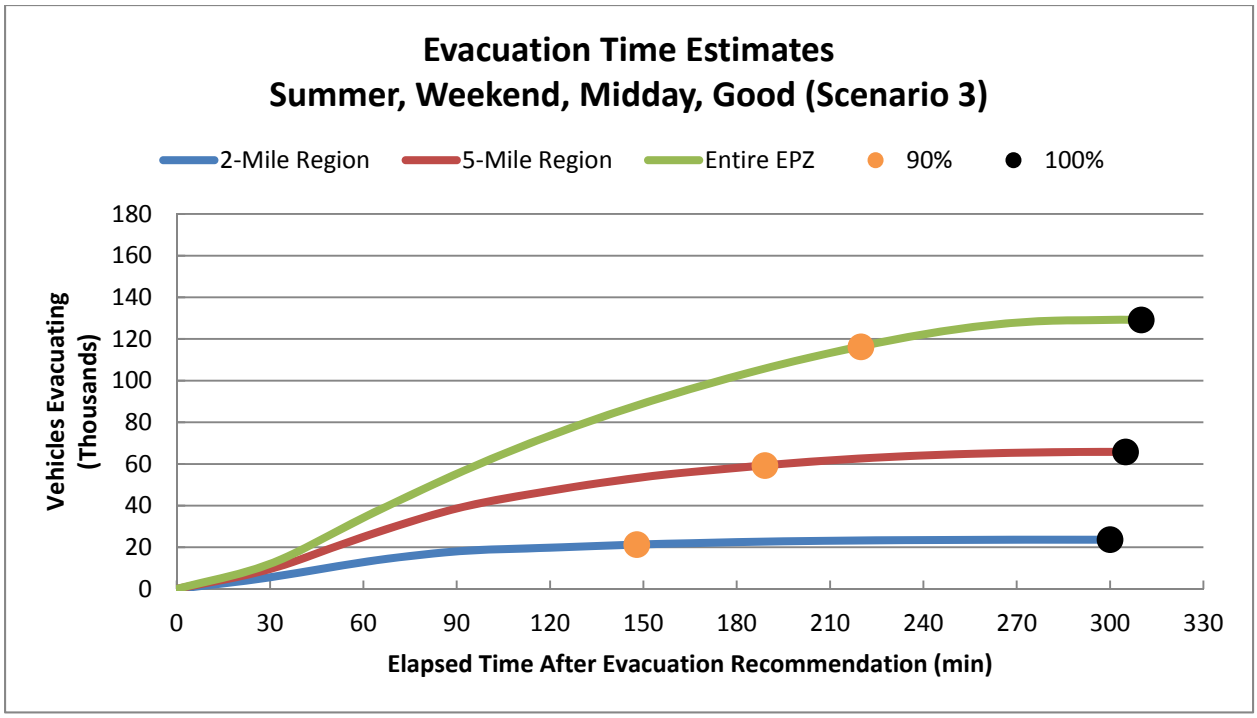


Figure 7-11. Evacuation Time Estimates - Scenario 3 for Region R03

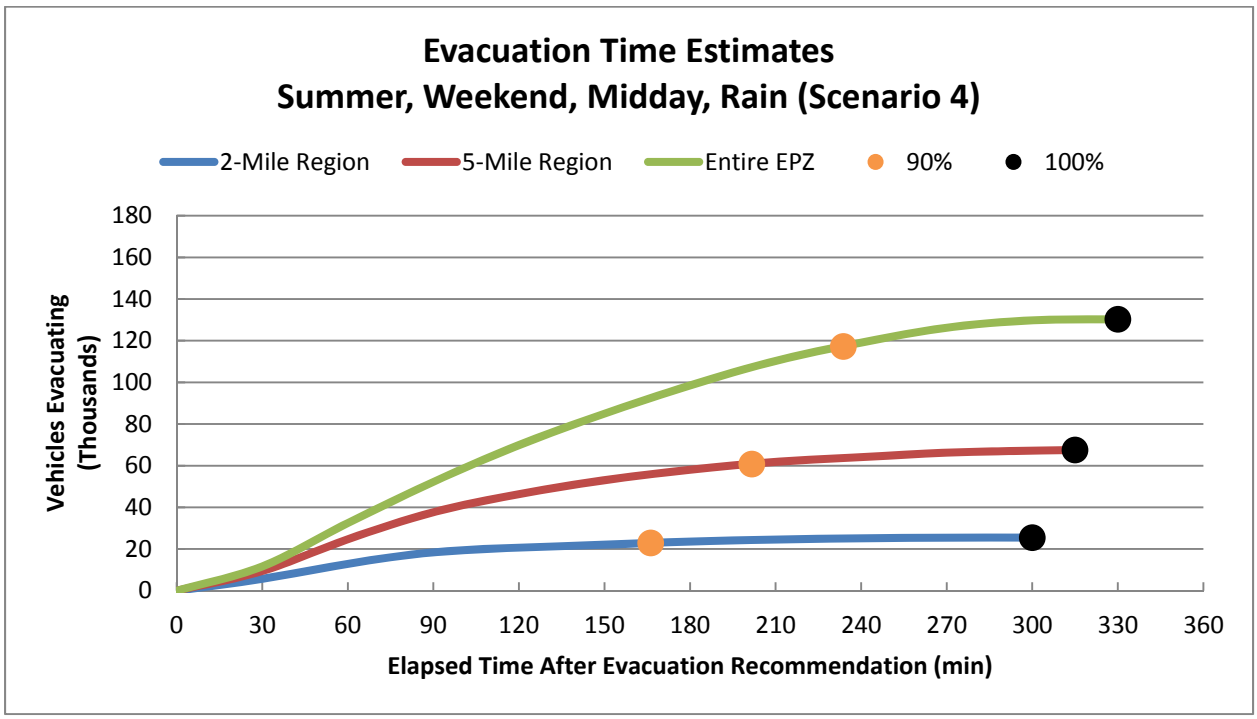


Figure 7-12. Evacuation Time Estimates - Scenario 4 for Region R03

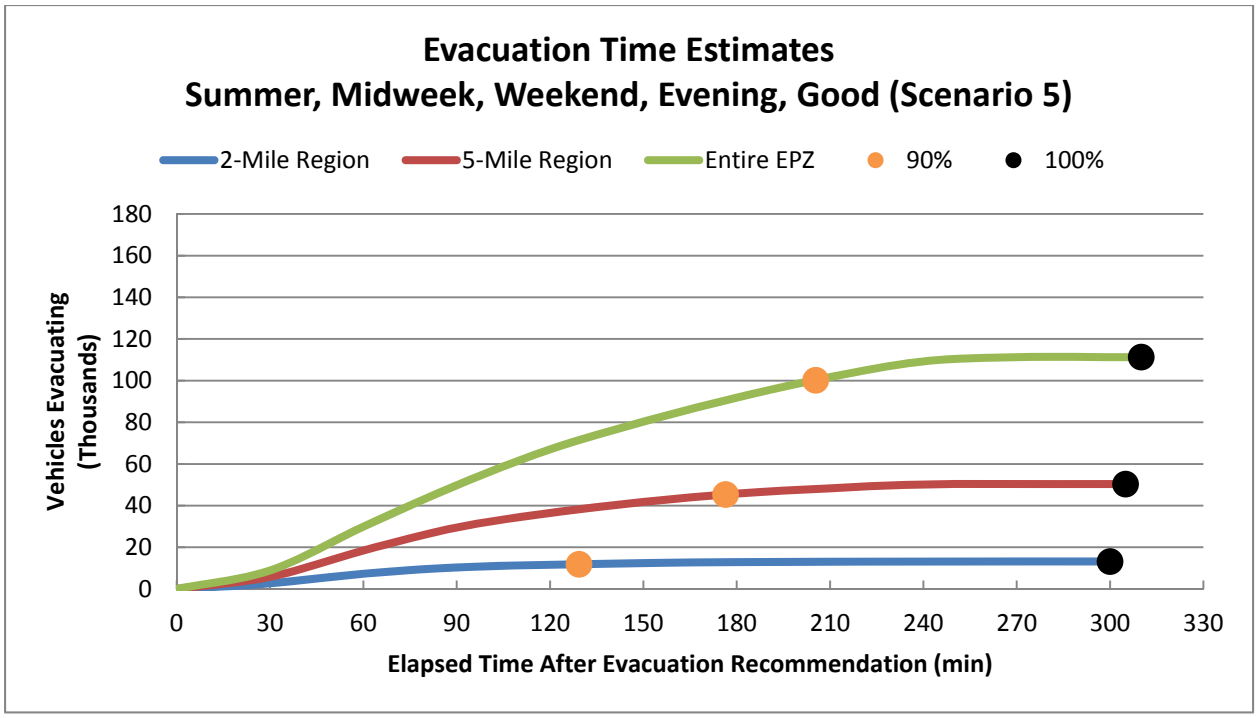


Figure 7-13. Evacuation Time Estimates - Scenario 5 for Region R03

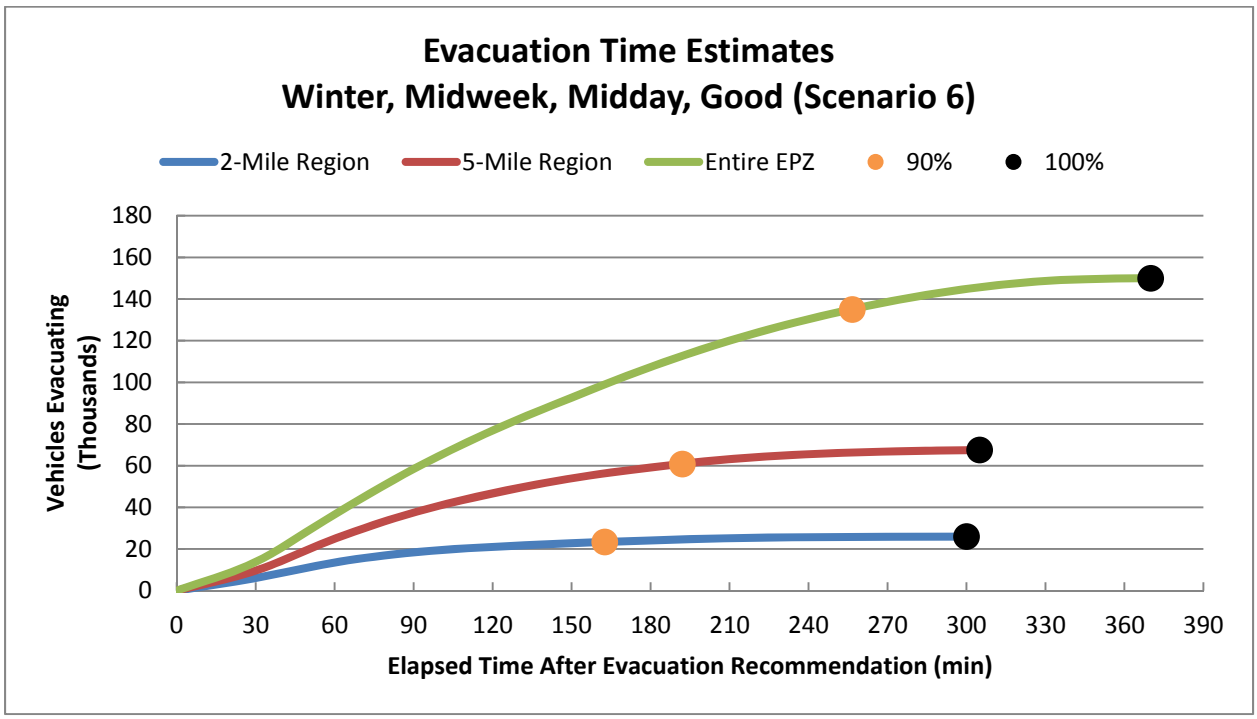


Figure 7-14. Evacuation Time Estimates - Scenario 6 for Region R03

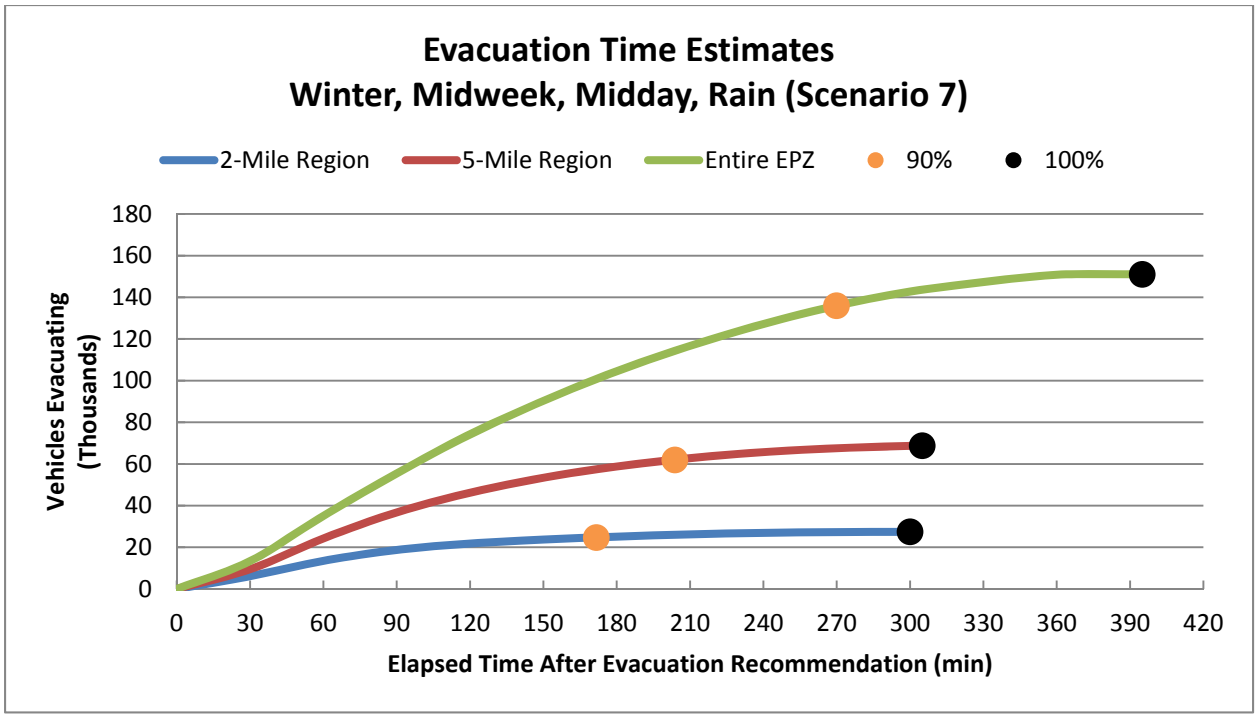


Figure 7-15. Evacuation Time Estimates - Scenario 7 for Region R03

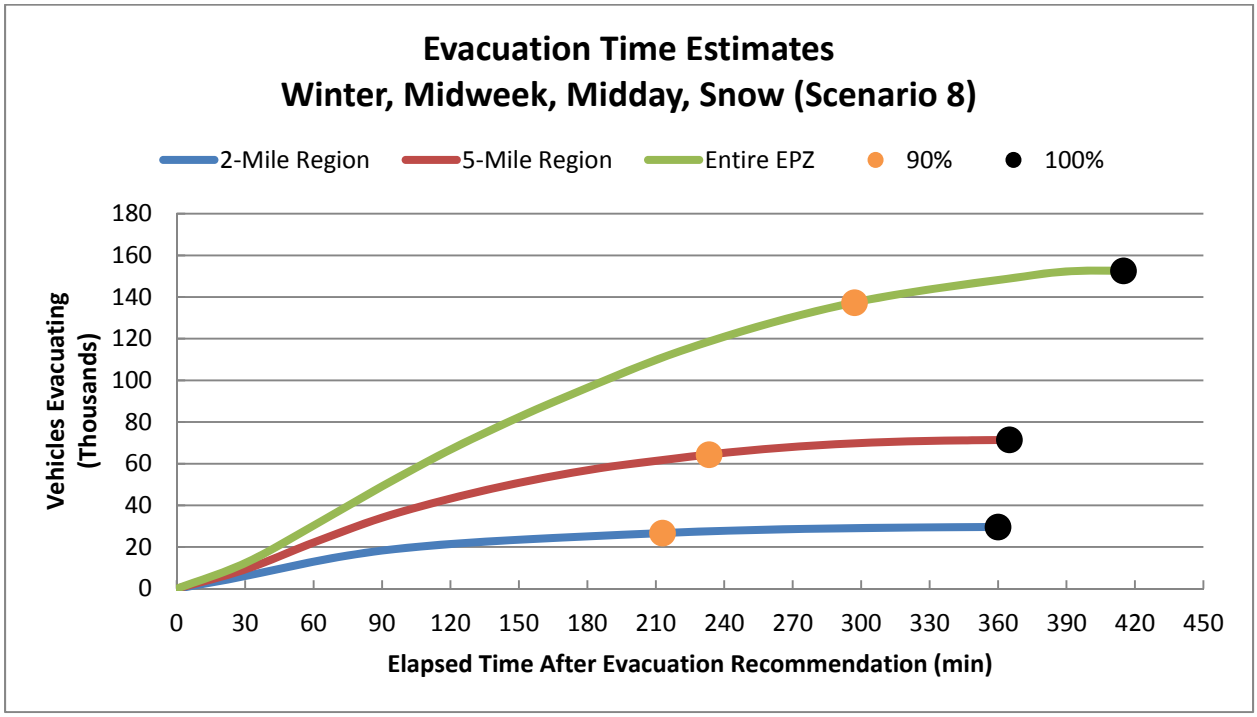


Figure 7-16. Evacuation Time Estimates - Scenario 8 for Region R03

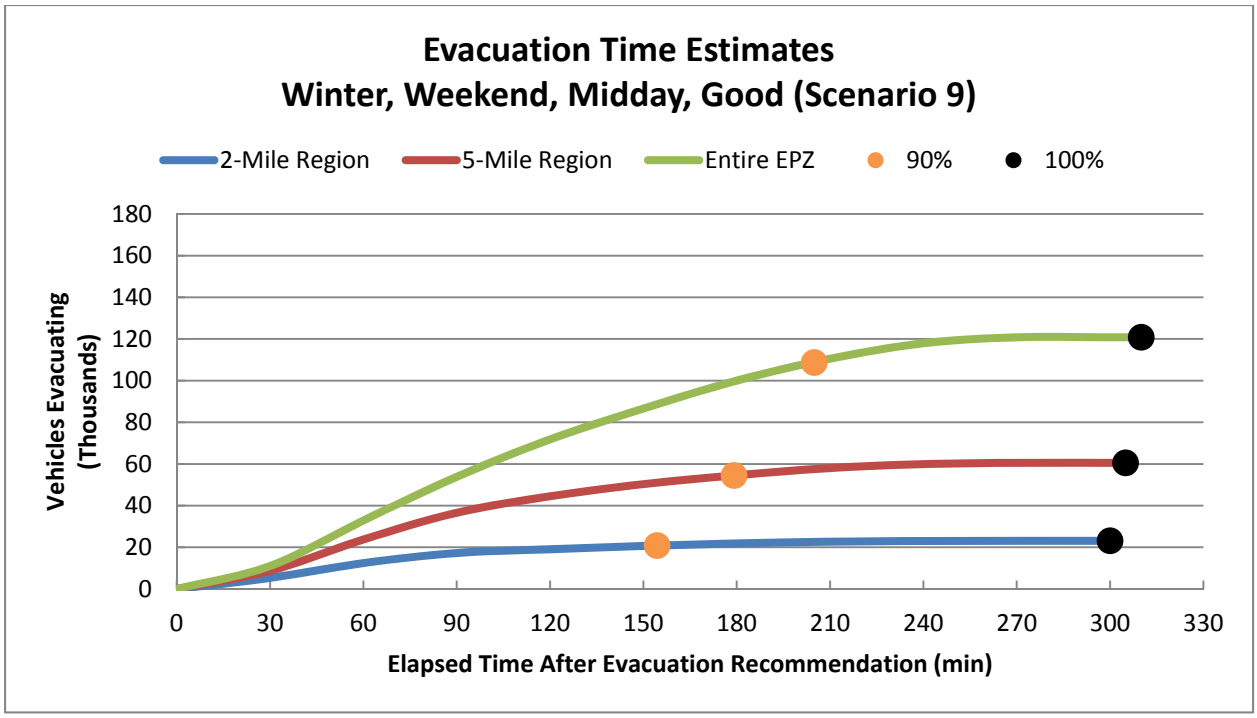


Figure 7-17. Evacuation Time Estimates - Scenario 9 for Region R03

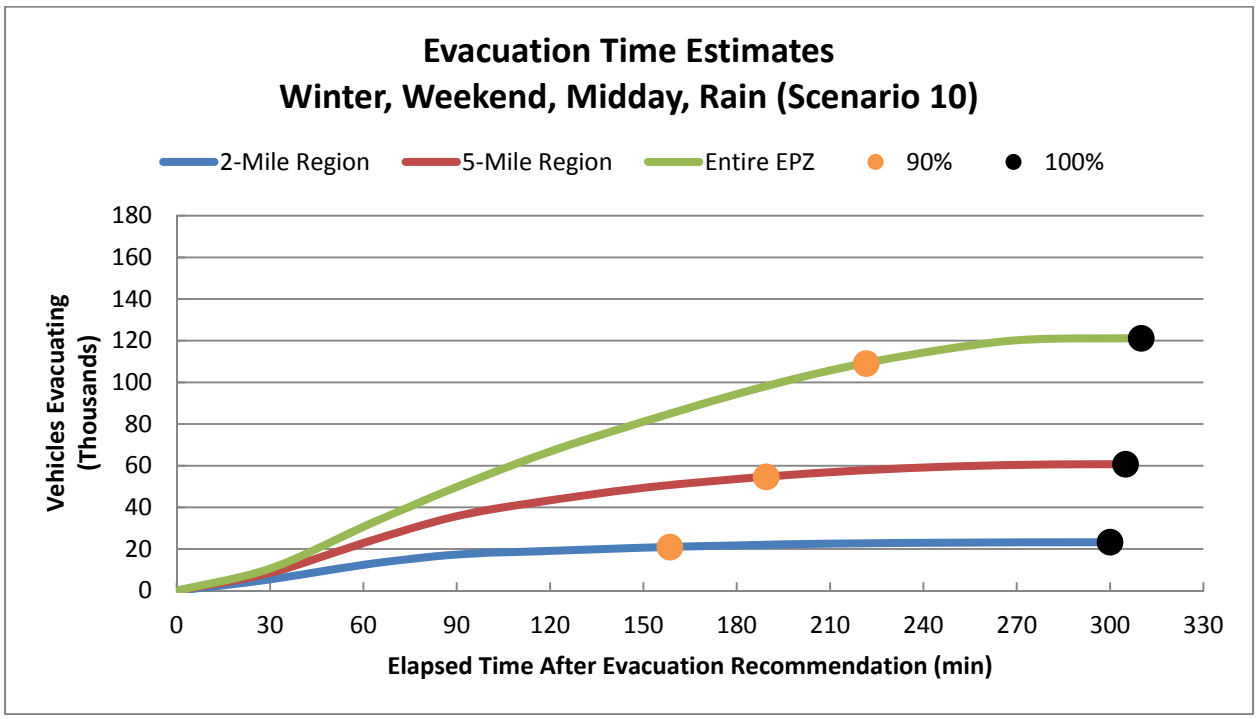


Figure 7-18. Evacuation Time Estimates - Scenario 10 for Region R03

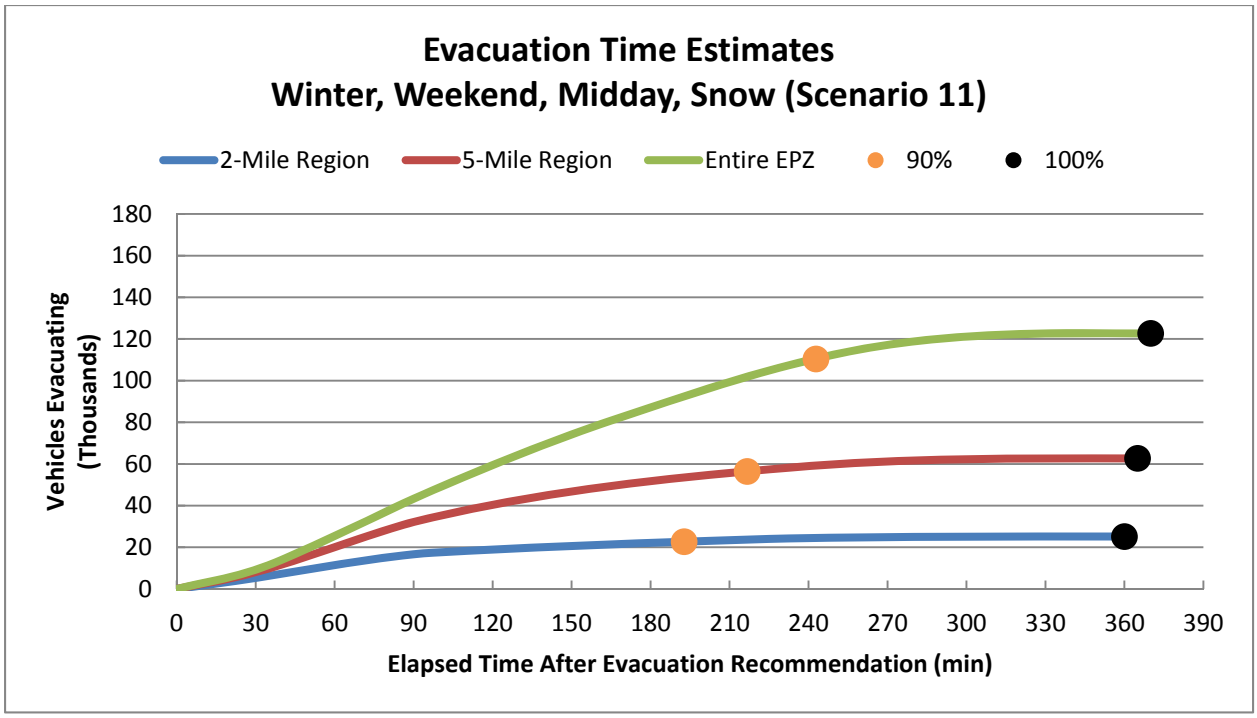


Figure 7-19. Evacuation Time Estimates - Scenario 11 for Region R03

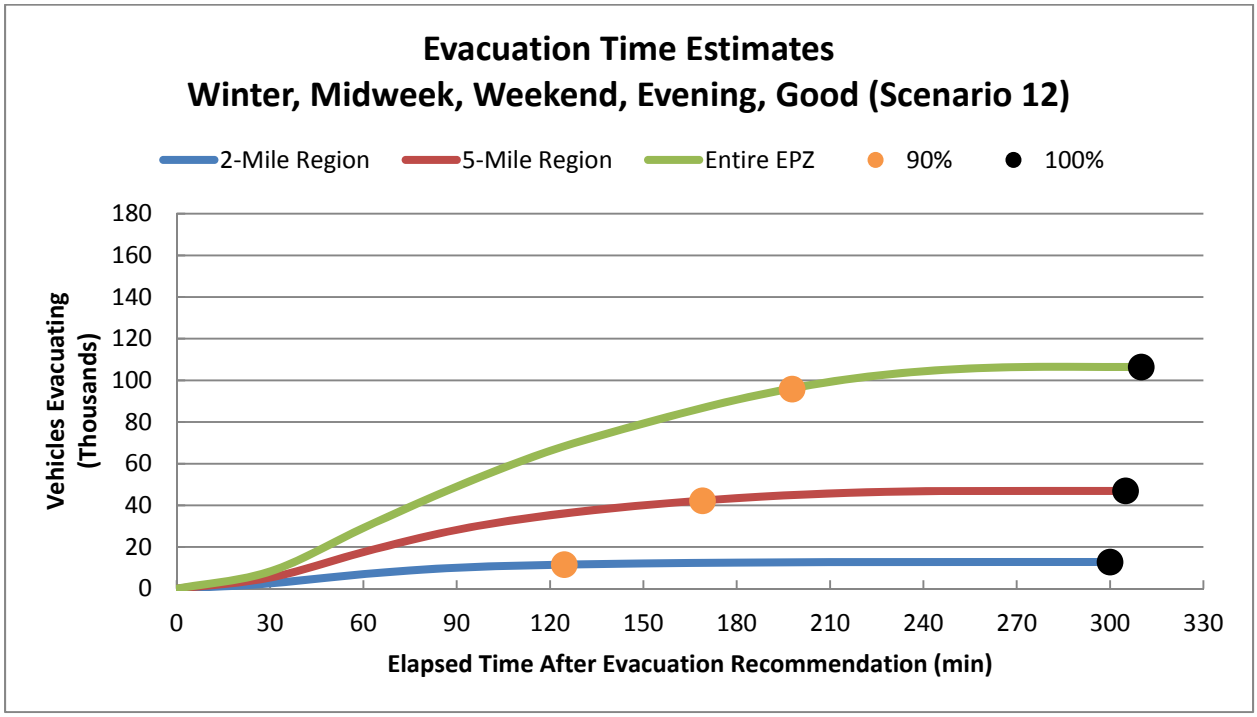


Figure 7-20. Evacuation Time Estimates - Scenario 12 for Region R03

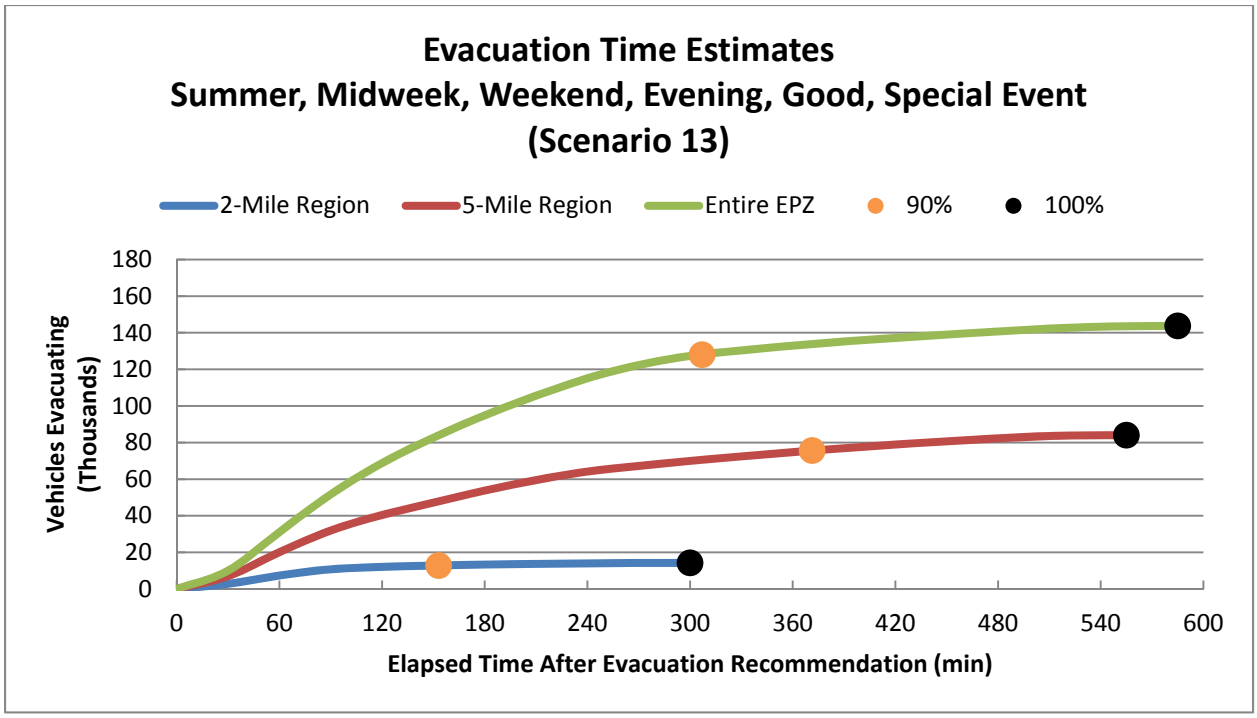


Figure 7-21. Evacuation Time Estimates - Scenario 13 for Region R03

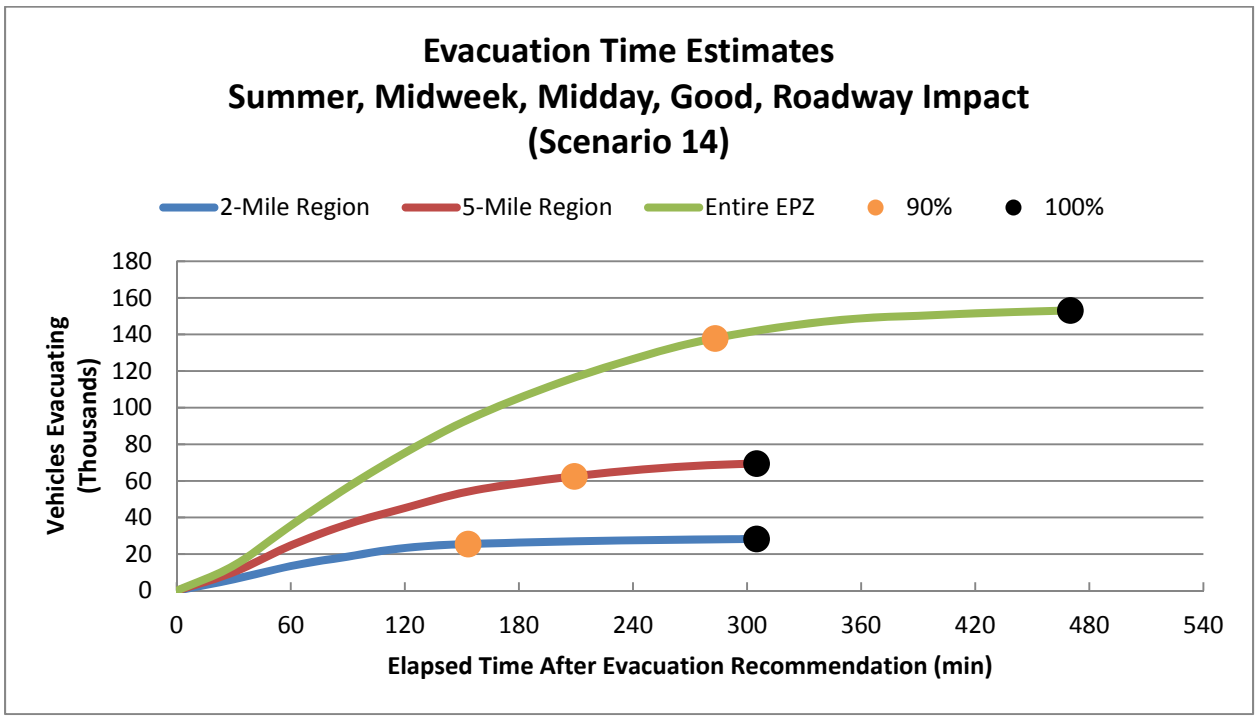


Figure 7-22. Evacuation Time Estimates - Scenario 14 for Region R03

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. The demand for transit service reflects the needs of three population groups: (1) residents with no vehicles available; (2) residents of special facilities such as schools, preschools and licensed daycares, day camps, medical facilities, and correctional facilities; and (3) homebound special needs population.

These transit vehicles mix with the general evacuation traffic 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
- They must travel to the route or facility to be evacuated

These activities consume time. Based on discussion with the offsite agencies, it is estimated that bus mobilization time will average approximately 90 minutes extending from the Advisory to Evacuate, to the time when buses first arrive at the facility to be evacuated.

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 families is universally prevalent during emergencies and should be anticipated in the planning process. The current public information disseminated to residents of the Seabrook Station EPZ indicates that schoolchildren will be evacuated to school reception centers/host schools before the evacuation of the general public and that parents should pick schoolchildren up at school reception centers/host schools. As discussed in Section 2, this study assumes a fast breaking general emergency. Therefore, children are evacuated to school reception centers/host schools. Picking up children at school could add to traffic congestion at the schools, delaying the departure of the buses evacuating schoolchildren, which may have to return in a subsequent "wave" to the EPZ to evacuate the transit-dependent population. This report provides estimates of buses under the assumption that no children will be picked up by their parents (in accordance with NUREG/CR-7002), to present an upper bound estimate of buses required. It is assumed that children at day-care centers are picked up by parents or guardians and that the time to perform this activity is included in the trip generation times discussed in Section 5.

The procedure for computing transit-dependent ETE is to:

- 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/host schools.

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 schoolchildren. For those evacuation scenarios where children are at school when an evacuation is ordered, separate transportation is provided for the schoolchildren. The actual need for transit vehicles by residents is thereby less than the given estimates. However, estimates of transit vehicles are not reduced when schools are in session.
- 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, in accordance with NUREG/CR-7002.**
- The 2010 EPZ population used for the transit-dependent population estimates does not include the 340 inmates that were captured in the Census at the Rockingham County Jail.

The estimated number of bus trips needed to service transit-dependent persons is computed using an average bus occupancy of 36 persons based on discussion with the state emergency management agencies.

Table 8-1 indicates that transportation must be provided for 3,820 people. Therefore, a total of **107 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 Seabrook Station EPZ:

$$P = No.\,of\ HH\ \times \sum_{i=0}^{n} \{(\%\ HH\ with\ i\ vehicles) \times [(Average\ HH\ Size) - i]\} \times A^i C^i$$

Where,

A = Percent of households with commuters

C = Percent of households who will not await the return of a commuter

$$P = 65{,}286 \times [0.022 \times 1.18 + 0.274 \times (1.51 - 1) \times 0.61 \times 0.59 + 0.477 \times (2.66 - 2) \times (0.61 \times 0.59)^2] = 65{,}286 \times 0.117 = 7{,}640$$

$$B = (0.5 \times P) \div 36 = 107$$

These calculations are explained as follows:

- All members (1.18 avg.) of households (HH) with no vehicles (2.2%) will evacuate by public transit or ride-share. The term 65,286 (number of households) x 0.022 x 1.18, accounts for these people.
- The members of HH with 1 vehicle away (27.4%), who are at home, equal (1.51-1). The number of HH where the commuter will not return home is equal to (65,286 x 0.274 x 0.51 x 0.61 x 0.59), as 61% of EPZ households have a commuter, 59% 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 (47.7%), who are at home, equal (2.66 – 2). The number of HH where neither commuter will return home is equal to 65,286 x 0.477 x 0.66 x $(0.61 \times 0.59)^2$. The number of persons who will evacuate by public transit or ride-share is equal to the product of these two terms (the last term is squared to represent the probability that neither commuter will return).
- 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.

The estimate of transit-dependent population in Table 8-1 far exceeds the number of registered transit-dependent persons in the EPZ as provided by the states (discussed below in Section 8.5). This is consistent with the findings of NUREG/CR-6953, Volume 2, in that a large majority of the transit-dependent population within the EPZs of U.S. nuclear plants does not register with their local emergency response agency.

8.2 School Population – Transit Demand

Table 8-2 through Table 8-4 present the population and transportation requirements for the direct evacuation of all schools, preschools/day cares, and day camps within the EPZ for the

2011-2012 school year, respectively. This information was provided by MEMA and NH HSEM. The columns in these tables entitled "Buses Required", "Wheelchair Vans Required", and "Vans Required" specifies the number of buses, wheelchair vans, and vans required for each facility based on the following set of assumptions and estimates:

- No children will be picked up by their parents prior to the arrival of the buses.
- While many high school students commute to school using private automobiles (as discussed in Section 2.4 of NUREG/CR-7002), the estimate of buses required for school evacuation does not consider the use of these private vehicles.
- MA bus capacity, expressed in students per bus, is set to 60 for elementary schools and 50 for middle and high schools.
- NH bus capacity, expressed in students per bus, is set to 60 for elementary schools and 45 for middle and high schools.
- MA wheelchair vans can accommodate 4 wheelchairs.
- NH wheelchair vans can accommodate 2 wheelchairs.
- Vans for MA and NH can accommodate 15 passengers.
- All staff for MA schools will evacuate with students on buses, wheelchair vans, and vans.
- Some staff members at NH schools will accompany students on the buses. Those staff members who do not accompany the students will evacuate in their private vehicles.
- No allowance is made for student absenteeism, typically 3 percent daily.

Facilities could be contacted prior to the dispatch of buses from the depot, to ascertain the current estimate of students to be evacuated. In this way, the number of buses dispatched to the facilities will reflect the actual number needed. The need for buses would be reduced by any high school students who have evacuated using private automobiles (if permitted by school authorities). Those buses originally allocated to evacuate children that are not needed due to parental pickup can be gainfully assigned to service other facilities or those persons who do not have access to private vehicles or to ride-sharing.

Table 8-5 and Table 8-6 present a list of the school reception centers/host schools for each school, preschool and licensed daycare in the EPZ. Children will be transported to these centers where they will be subsequently retrieved by their respective families. Children at day camps will be transported to the nearest school reception center/host school.

8.3 Medical Facility Demand

Table 8-7 presents the census of medical facilities in the EPZ. 3,619 people have been identified as living in, or being treated in, these facilities. The current census for each facility was provided by the state emergency management agencies. This data includes the number of ambulatory, wheelchair-bound and bedridden patients at each facility.

The transportation requirements for the medical facility population are also presented in Table 8-7. The number of ambulance runs is determined by assuming that 2 patients can be accommodated per ambulance trip; the number of evacuation bed buses assumes 10

bedridden patients per trip; the number of wheelchair vans runs assumes 4 and 2 wheelchairs per trip for MA and NH, respectively; the number of half buses assumes 12 ambulatory patients per trip; the number of bus runs estimated assumes 36 ambulatory patients per trip.

8.4 Evacuation Time Estimates for Transit Dependent People

EPZ bus resources are assigned to evacuating schoolchildren (if school is in session at the time of the ATE) 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 for the transit-dependent population 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.

When 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 until the time the buses arrive at the facility to be evacuated. Based on discussions with the state emergency management agencies, for a rapidly escalating radiological emergency with no observable indication before the fact, school bus drivers would 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 in adverse weather – 100 minutes when raining, 110 minutes when snowing.

Activity: Board Passengers (C→D)

Based on discussions with offsite agencies, a loading time of 15 minutes (20 minutes for rain and 25 minutes for snow) for school buses is used.

For multiple stops along a pick-up route (transit-dependent bus routes) estimation of travel time must allow for the delay associated with stopping and starting at each pick-up point. The time, t, required for a bus to decelerate at a rate, “a”, expressed in ft/sec/sec, from a speed, “v”, expressed in ft/sec, to a stop, is t = v/a. Assuming the same acceleration rate and final speed following the stop yields a total time, T, to service boarding passengers:

$$T = t + B + t = B + 2t = B + \frac{2v}{a},$$

Where B = Dwell time to service passengers. The total distance, "s" in feet, travelled during the deceleration and acceleration activities is: $s = v^2/a$. If the bus had not stopped to service passengers, but had continued to travel at speed, v, then its travel time over the distance, s, would be: $s/v = v/a$. Then the total delay (i.e. pickup time, P) to service passengers is:

$$P = T - \frac{v}{a} = B + \frac{v}{a}$$

Assigning reasonable estimates:

- B = 50 seconds: a generous value for a single passenger, carrying personal items, to board per stop
- v = 25 mph = 37 ft/sec
- a = 4 ft/sec/sec, a moderate average rate

Then, P ≈ 1 minute per stop. Based on the aforementioned capacity of 36 passengers for transit-dependent buses, 36 minutes of pick-up time are needed per bus for good weather. It is assumed that bus acceleration and speed will be less in rain; total loading time is 46 minutes per bus in rain, 56 minutes in snow.

Activity: Travel to EPZ Boundary (D→E)

School Evacuation

Transportation resources were provided by MEMA and NH HSEM and are summarized in Table 8-8. Also included in the table are the number of vehicles needed to evacuate schools, medical facilities, transit-dependent population, homebound special needs (discussed below in Section 8.5) and correctional facilities (discussed below in Section 8.6). According to NH HSEM, any New Hampshire bus can be turned into an evacuation bed bus with a capacity to hold 10 bedridden people. As such, the surplus of buses is enough to accommodate the bedridden population requiring evacuation bed buses. These numbers indicate there are sufficient resources available to evacuate all ambulatory and bedridden population in a single wave, while multiple waves are needed for wheelchair bound population within the EPZ. MEMA and NH HSEM provided the number of vehicles needed for each facility to be evacuated. A second wave of wheelchair vans is required to evacuate the wheelchair bound homebound special needs population within the EPZ. Thus, a second-wave ETE is provided for homebound special needs evacuation in Section 8.5.

The buses servicing the schools are ready to begin their evacuation trips at 105 minutes after the advisory to evacuate – 90 minutes mobilization time plus 15 minutes loading time – in good weather. The UNITES software discussed in Section 1.3 was used to define bus routes along the most likely path from a school being evacuated to the EPZ boundary, traveling toward the appropriate school reception center. This is done in UNITES by interactively selecting the series of nodes from the school to the EPZ boundary. Each bus route is given an identification number and is written to the DYNEV II input stream. DYNEV computes the route length and outputs the average speed for each 5 minute interval, for each bus route. The specified bus routes are documented in Table 8-9 (refer to the maps of the link-node analysis network in Appendix K for node locations). Data provided by DYNEV during the appropriate timeframe depending on the

mobilization and loading times (i.e., 100 to 105 minutes after the advisory to evacuate for good weather) were used to compute the average speed for each route, as follows:

$$Average\ Speed\ \left(\frac{mi.}{hr}\right) = \left[\frac{\sum_{i=1}^{n} length\ of\ link\ i\ (mi)}{\sum_{i=1}^{n}\left\{Delay\ on\ link\ i\ (min.) + \frac{length\ of\ link\ i\ (mi.)}{current\ speed\ on\ link\ i\ \left(\frac{mi.}{hr.}\right)} \times \frac{60\ min.}{1\ hr.}\right\}}\right] \times \frac{60\ min.}{1\ hr.}$$

The average speed computed (using this methodology) for the buses servicing each of the schools in the EPZ is shown in Table 8-10 through Table 8-12 for evacuation of schools, preschools, licensed day cares and day camps, and in Table 8-14 through Table 8-16 for the transit vehicles evacuating transit-dependent persons, which are discussed later. The travel time to the EPZ boundary was computed for each bus using the computed average speed and the distance to the EPZ boundary along the most likely route out of the EPZ. The travel time from the EPZ boundary to the Reception Center was computed assuming an average speed of 45 mph, 40 mph, and 35 mph for good weather, rain and snow, respectively. Speeds were reduced in Table 8-10 through Table 8-12 and in Table 8-14 through Table 8-16 to 55 mph (50 mph for rain – 10% decrease – and 44 mph for snow – 20% decrease) for those calculated bus speeds which exceed 55 mph, as the school bus speed limit for state routes in New Hampshire is 55 mph. There is no bus school speed limit in MA; the NH limit of 55 mph was applied to all school vehicles, transit dependent buses, and special facility vehicles within the EPZ.

Table 8-10 (good weather), Table 8-11 (rain) and Table 8-12 (snow) present the following evacuation time estimates (rounded up to the nearest 5 minutes) for schools, preschools, licensed day cares and day camps 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 or host school. The evacuation time out of the EPZ can be computed as the sum of times associated with Activities A→B→C, C→D, and D→E (For example: 90 min. + 15 + 20 = 2:05 for Amesbury Academy Charter Public School, with good weather). The evacuation time to the school reception center/host school is determined by adding the time associated with Activity E→F (discussed below), to this EPZ evacuation time. The average ETE for a one-wave evacuation of schools, preschools, day cares and day camps is less than the 90th percentile ETE for the general population for an evacuation of the entire EPZ.

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 shown in Figure 5-4 (Residents with no Commuters), about 90 percent of

the evacuees will complete their mobilization when the buses will begin their routes, approximately 120 minutes after the Advisory to Evacuate. According to public information disseminated to residents of the EPZ, Hampton Beach and Seabrook Beach have their own route (Table 8-13). As such, two separate routes have been identified for each of these Communities. Amesbury, Exeter, Newburyport, and Portsmouth have large resident populations. For this reason, several groups of buses were incorporated for routes servicing these areas. The start of service on these bus groupings is separated by 20 minute headways, as shown in Table 8-14 through Table 8-16. The use of bus headways ensures that those people who take longer to mobilize will be picked up. Mobilization time is 10 minutes longer in rain (20 minutes longer in snow) to account for slower travel speeds and reduced roadway capacity.

Those buses servicing the transit-dependent evacuees will first travel along their pick-up routes, then proceed out of the EPZ. Transit-dependent pick-up routes are provided annually to EPZ residents in the emergency preparedness calendar. Transit dependent persons are instructed to walk to and congregate at one of the highlighted routes in Figure 8-2 through Figure 8-6 where a bus will pick them up and take them to the appropriate reception center for their Community. Exeter, East Kingston, Hampton Beach and Seabrook Beach have pre-defined pickup points. The bus routes shown in Figure 8-3 through Figure 8-5 were designed by KLD to service these pre-defined pickup points. It is assumed that residents can arrive at the stops within the 120 minute bus mobilization time (good weather).

As previously discussed, a pickup time of 36 minutes (good weather) is estimated for 36 individual stops to pick up passengers, with an average of one minute of delay associated with each stop. Longer pickup times of 46 minutes and 56 minutes are used for rain and snow, respectively.

The travel distance along the respective pick-up routes within the EPZ is estimated using the UNITES software. Bus travel times within the EPZ are computed using average speeds computed by DYNEV, using the aforementioned methodology that was used for school evacuation.

Table 8-14 through Table 8-16 present the transit-dependent population evacuation time estimates for each bus route calculated using the above procedures for good weather, rain and snow, respectively.

For example, the ETE for the bus route servicing Amesbury is computed as 120 + 85 + 36 = 4:05 for good weather (rounded up to nearest 5 minutes). Here, 85 minutes is the time to travel all of the pickup routes defined in the MA emergency preparedness calendar for Amesbury (31.1 miles) at 22.0 mph, the average speed output by the model for this route starting at 120 minutes. The ETE for a second wave (discussed below) is presented in the event there is a shortfall of available buses or bus drivers, as previously discussed.

Activity: Travel to Reception Centers (E→F)

The distances from the EPZ boundary to the reception centers are measured using GIS software along the most likely route from the EPZ exit point to the reception center. The reception centers are mapped in Figure 10-1 and Figures 10-2. 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 population. Assumed bus speeds of 45 mph, 40 mph, and 35 mph for good weather, rain, and snow, respectively, will be applied for this activity for buses servicing the transit-dependent population.

Activity: Passengers Leave Bus (F→G)

A bus can empty within 5 minutes. The driver takes a 10 minute break.

Activity: Bus Returns to Route for Second Wave Evacuation (G→C)

The buses assigned to return to the EPZ to perform a "second wave" evacuation of transit-dependent evacuees will be those that have already evacuated transit-dependent people who mobilized more quickly. The first wave of transit-dependent people depart the bus, and the bus then returns to the EPZ, travels to its route and proceeds to pick up more transit-dependent evacuees along the route. The travel time back to the EPZ is conservatively assumed to be equal to the travel time to the reception center.

The second-wave ETE for the bus route servicing Amesbury is computed as follows for good weather:

- Bus arrives at reception center at 4:17 in good weather (4:05 to exit EPZ + 12 minute travel time to reception center).
- Bus discharges passengers (5 minutes) and driver takes a 10-minute rest: 15 minutes.
- Bus returns to EPZ and completes second route: 12 minutes (equal to travel time to reception center) + 48.5 minutes (31.1 miles @ 38.5 mph – return to the start of the route) + 41.5 minutes (31.1 miles @ 45 mph – travel route second time picking up passengers)= 102 minutes
- Bus completes pick-ups along route: 36 minutes.
- Bus exits EPZ at time 4:05 + 0:12 + 0:15 + 1:42 + 0:36 = 6:50 (rounded to nearest 5 minutes) after the Advisory to Evacuate.

The ETE for the completion of the second wave for all transit-dependent bus routes are provided in Table 8-14 through Table 8-16. The average ETE for a one-wave evacuation of the transit-dependent population is comparable to the 90th percentile ETE for the general population for an evacuation of the entire EPZ. The average ETE for a two-wave evacuation of transit-dependent people exceeds the 90th percentile ETE for the general population.

The relocation of transit-dependent evacuees from the reception centers to mass care centers, if the states decide to do so, is not considered in this study.

Evacuation of Medical Facilities

The evacuation of these facilities is similar to school evacuation except:

- Buses are assigned on the basis of 36 patients to allow for staff to accompany the patients. Half buses can accommodate 12 patients. Wheelchair vans can

accommodate 4 and 2 patients for MA and NH, respectively. Evacuation bed buses can accommodate 10 patients, and ambulances can accommodate 2 patients.

- Loading times of 1 minute, 15 minutes, and 30 minutes per patient are assumed for ambulatory patients, wheelchair bound patients, and bedridden patients, respectively.

Table 8-7 indicates that 72 bus runs, 7 half bus runs, 205 wheelchair van runs, 27 evacuation bed bus runs, and 147 ambulance runs are needed to service all of the medical facilities in the EPZ. According to Table 8-8, Massachusetts and New Hampshire can provide 1,507 buses, 64 half buses, 287 wheelchair vans, 200 vans, and 413 ambulances. NH HSEM indicated any New Hampshire bus can be turned into an evacuation bed bus with a capacity of 10 bedridden patients per bus. The surplus in buses is enough to accommodate the bedridden population requiring evacuation bed buses. Thus, there are sufficient resources to evacuate all patients from the medical facilities in a single wave.

As is done for the schools, it is estimated that mobilization time averages 90 minutes. Specially trained medical support staff (working their regular shift) will be on site to assist in the evacuation of patients. Additional staff (if needed) could be mobilized over this same 90 minute timeframe.

Table 8-17 through Table 8-19 summarize the ETE for medical facilities within the EPZ for good weather, rain, and snow. Average speeds output by the model for Scenario 6 (Scenario 7 for rain and Scenario 8 for snow) Region 3, capped at 45 mph (40 mph for rain and 35 mph for snow), are used to compute travel time to EPZ boundary. The travel time to the EPZ boundary is computed by dividing the distance to the EPZ boundary by the average travel speed. The ETE is the sum of the mobilization time, total passenger loading time, and travel time out of the EPZ. Concurrent loading on multiple buses, wheelchair buses/vans, and ambulances at capacity is assumed such that the maximum loading times for buses, wheelchair vans, evacuation bed buses, and ambulances are 30, 60, 300, and 60 minutes, respectively. All ETE are rounded to the nearest 5 minutes. For example, the calculation of ETE for the Amesbury Health Center with 6 ambulatory residents during good weather is:

ETE: 90 + 6 x 1 + 10 = 106 min. or 1:50 rounded up to the nearest 5 minutes.

It is assumed that medical facility population is directly evacuated to appropriate host medical facilities outside the EPZ. Relocation of this population to permanent facilities and/or passing through the reception center before arriving at the host facility are not considered in this analysis.

8.5 Special Needs Population

The state emergency management agencies have a combined registration for transit-dependent and homebound special needs persons. Based on data provided by these agencies, evacuation of the homebound special needs population requires 215 buses, 116 wheelchair vans, and 30 ambulances.

ETE for Homebound Special Needs Persons

Table 8-20 summarizes the ETE for homebound special needs people. The table is categorized by type of vehicle required and then broken down by weather condition. It is conservatively assumed that ambulatory and wheelchair bound special needs households are spaced 3 miles apart and bedridden households are spaced 5 miles apart. Van and bus speeds approximate 20 mph between households and ambulance speeds approximate 30 mph in good weather (10% slower in rain, 20% slower in snow). Vehicle capacities were used to determine the number of required stops. Mobilization times of 90 minutes were used (100 minutes for rain, and 110 minutes for snow). The last HH is assumed to be 5 miles from the EPZ boundary, and the network-wide average speed, capped at 45 mph (40 mph for rain and 35 mph for snow), after the last pickup is used to compute travel time. ETE is computed by summing mobilization time, loading time at first household, travel to subsequent households, loading time at subsequent households, and travel time to EPZ boundary. All ETE are rounded to the nearest 5 minutes.

For example, state emergency management personnel indicated 215 buses are required to evacuate the ambulatory homebound special needs population. It is conservatively assumed that each bus will service 30 stops. The following outlines the ETE calculations:

1. Assume 215 buses are deployed, each with about 30 stops, to service a total of 30 HH each.
2. The ETE is calculated as follows:
    a. Buses arrive at the first pickup location: 90 minutes
    b. Load HH members at first pickup: 1 minute
    c. Travel to subsequent pickup locations: 29 @ 9 minutes = 261 minutes
    d. Load HH members at subsequent pickup locations: 1 @ 29 minutes = 29 minutes
    e. Travel to EPZ boundary: 24 minutes (5 miles @ 12.6 mph).

    ETE: 90 + 1 + 261 + 29 + 24 = 6:45 rounded to the nearest 5 minutes

As indicated in Table 8-8, there are not sufficient wheelchair vans available to evacuate schools, medical facilities and homebound special needs. The following outlines the ETE calculations for the wheelchair bound population if a second wave is needed using wheelchair vans:

a. Wheelchair Vans exit EPZ in good weather: 3:25
b. Travel to reception center: 15.5 miles (average Dist. to R.C. from Table 8-14) @ 45 mph = 21 minutes
c. Unload patients at reception center: 5 minutes
d. Driver takes 10 minute rest: 10 minutes
e. Travel time back to EPZ: equal to travel time to reception center = 21 minutes
f. Bus travels to all stops: 4 stops @ 9 minutes = 36 minutes
g. Loading time at all stops: 4 stops @ 15 minutes = 60 minutes
h. Travel time to EPZ boundary: 24 minutes (5 miles @ 12.6 mph – from DYNEV II)

ETE: 3:25 + 0:21 + 0:05 + 0:10 + 0:21 + 0:36 + 1:00 + 0:24 = 6:25 (rounded up to nearest 5 minutes)

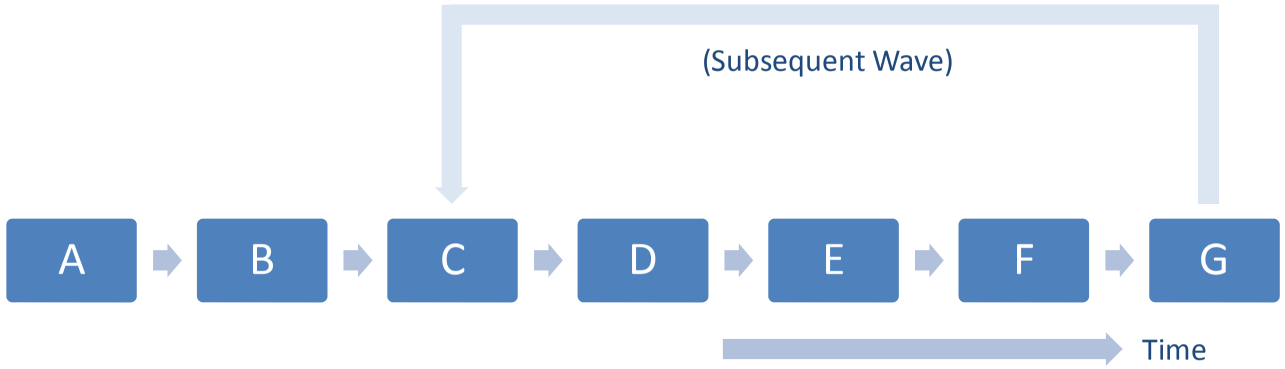
8.6 Correctional Facilities

As detailed in Table E-9, there is one correctional facility within the EPZ – Rockingham County Jail. The total inmate population at this facility is 340 persons. A total of 9 buses are needed to evacuate this facility based on data provided by NH HSEM. Mobilization time is assumed to be 90 minutes (100 minutes in rain, 110 minutes in snow). Each bus holds 40 inmates and 4 staff as per NH HSEM. It is estimated that it takes 1 minute to load each inmate onto a bus, and that the 9 buses can be loaded in parallel. Thus, total loading time is estimated at 44 minutes. The detailed evacuation plans for these facilities are confidential. Using GIS software, the shortest route from the facility to the EPZ boundary, traveling away from the plant, is 2 miles. The travel time to traverse 2 miles is 2 minutes (55 mph at 2:14) in good weather, 2 minutes (50 mph at 2:24) in rain and 3 minutes (44 mph at 2:34) in snow. All ETE are rounded up to the nearest 5 minutes.

ETE: 90 + 44 + 2 = 2:20

Rain ETE: 100 + 44 + 2 = 2:30

Snow ETE: 110 + 44 + 3 = 2:40



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 Reception Center/Host School
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 Reception Center Outside the EPZ
F→G	Passengers Leave Bus; Driver Takes a Break

Figure 8-1. Chronology of Transit Evacuation Operations

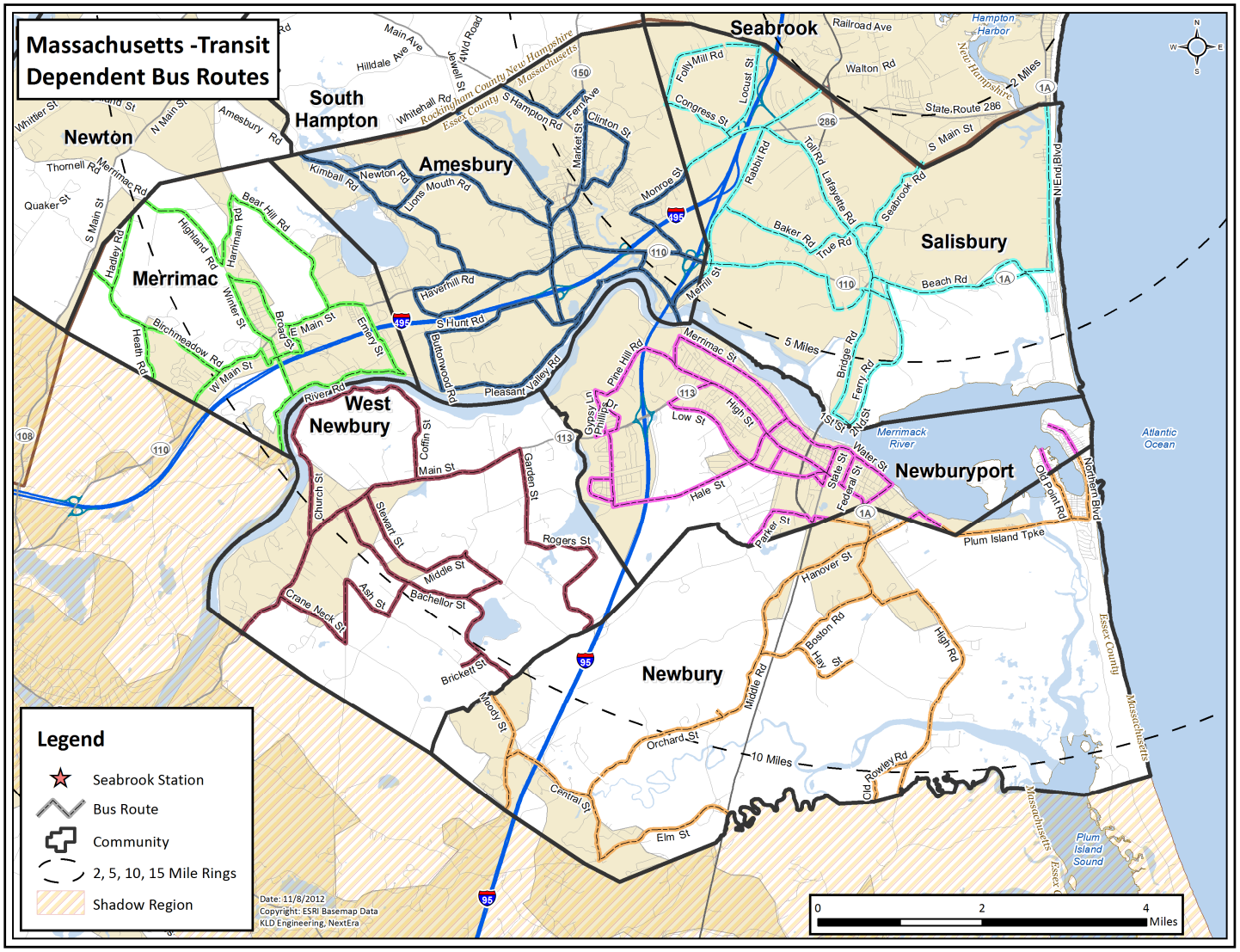


Figure 8-2. Massachusetts Transit-Dependent Bus Routes

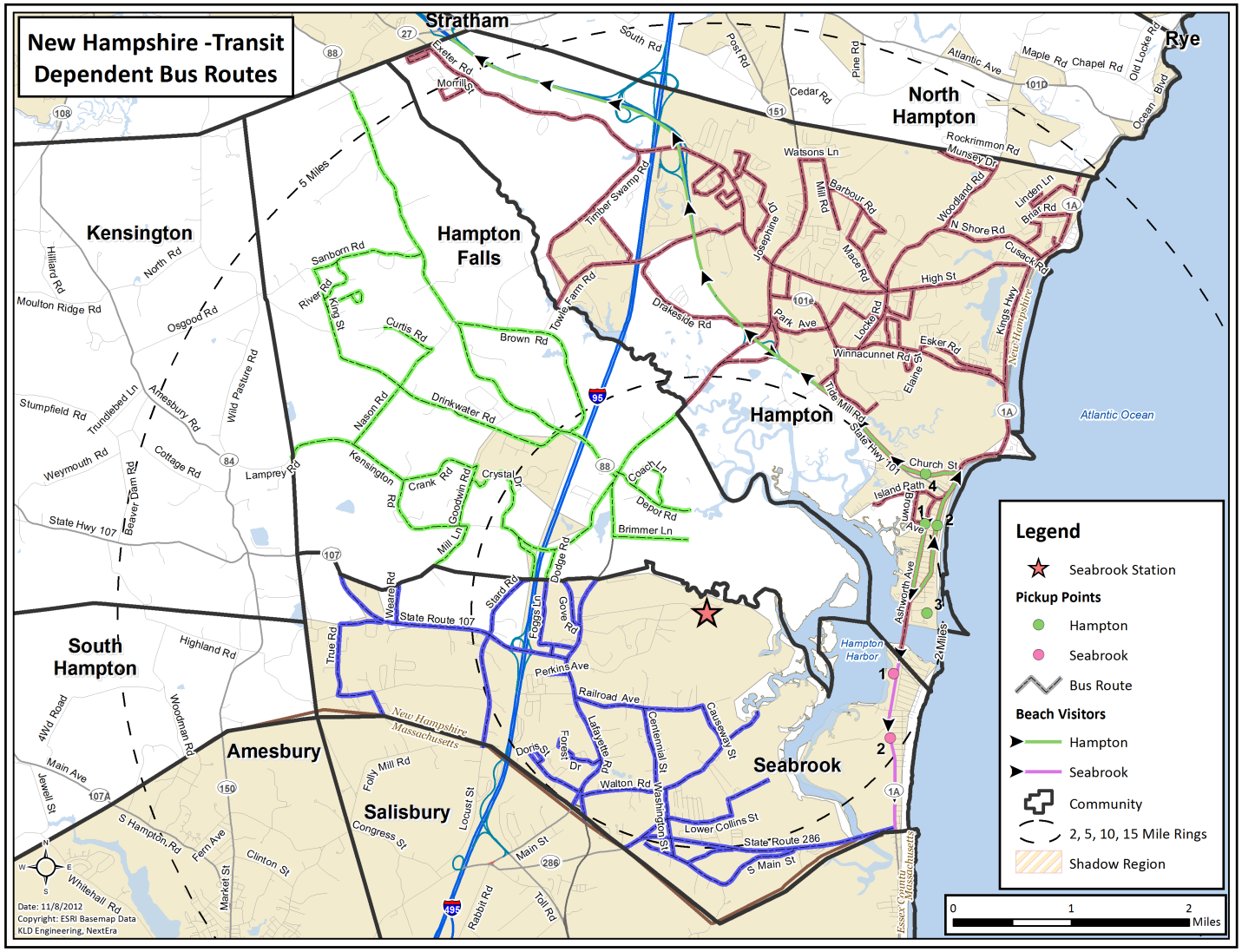


Figure 8-3. New Hampshire Transit-Dependent Bus Routes (Seabrook, Hampton Falls, and Hampton)

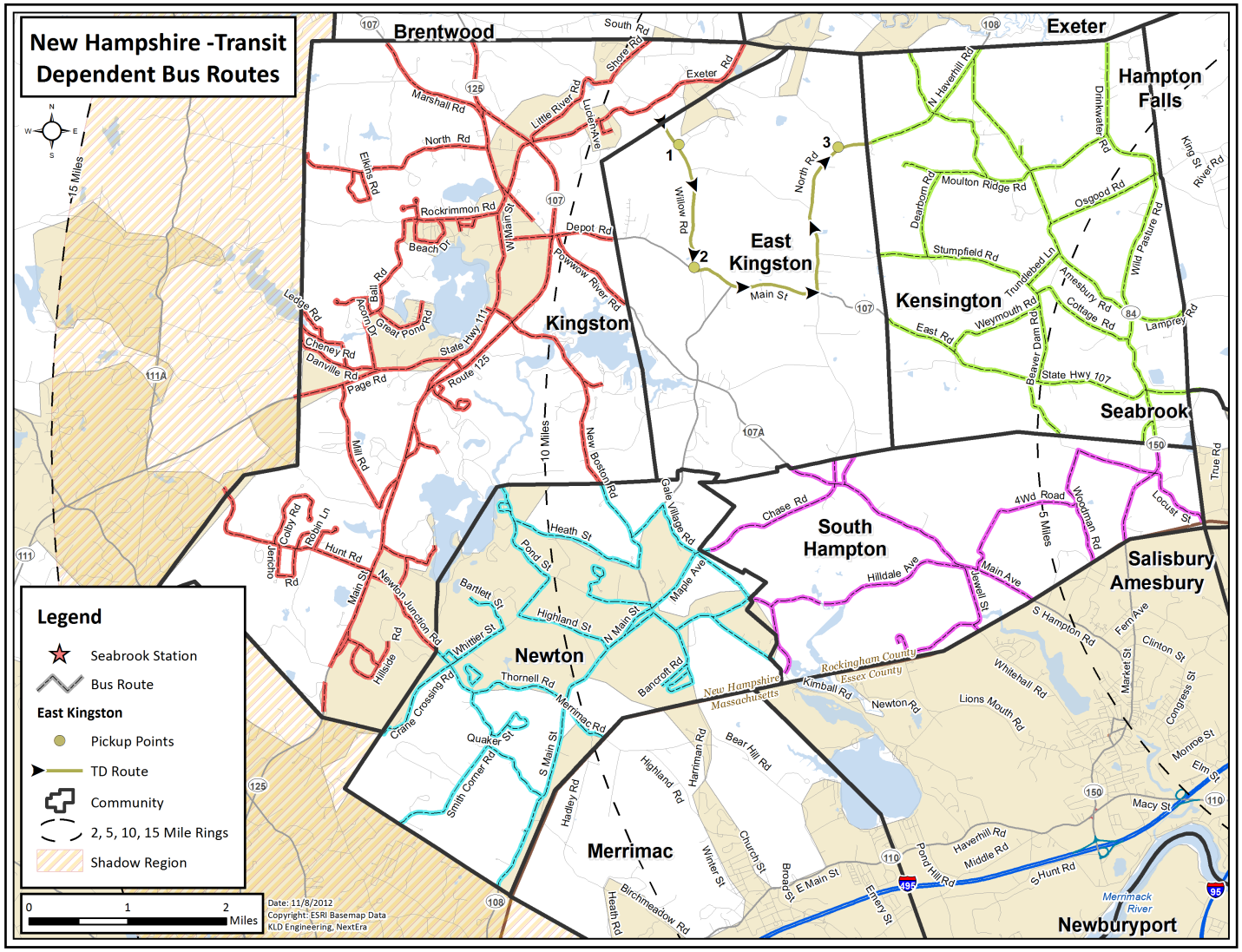


Figure 8-4. New Hampshire Transit-Dependent Bus Routes (Kingston, East Kingston, Kensington, South Hampton, and Newton)

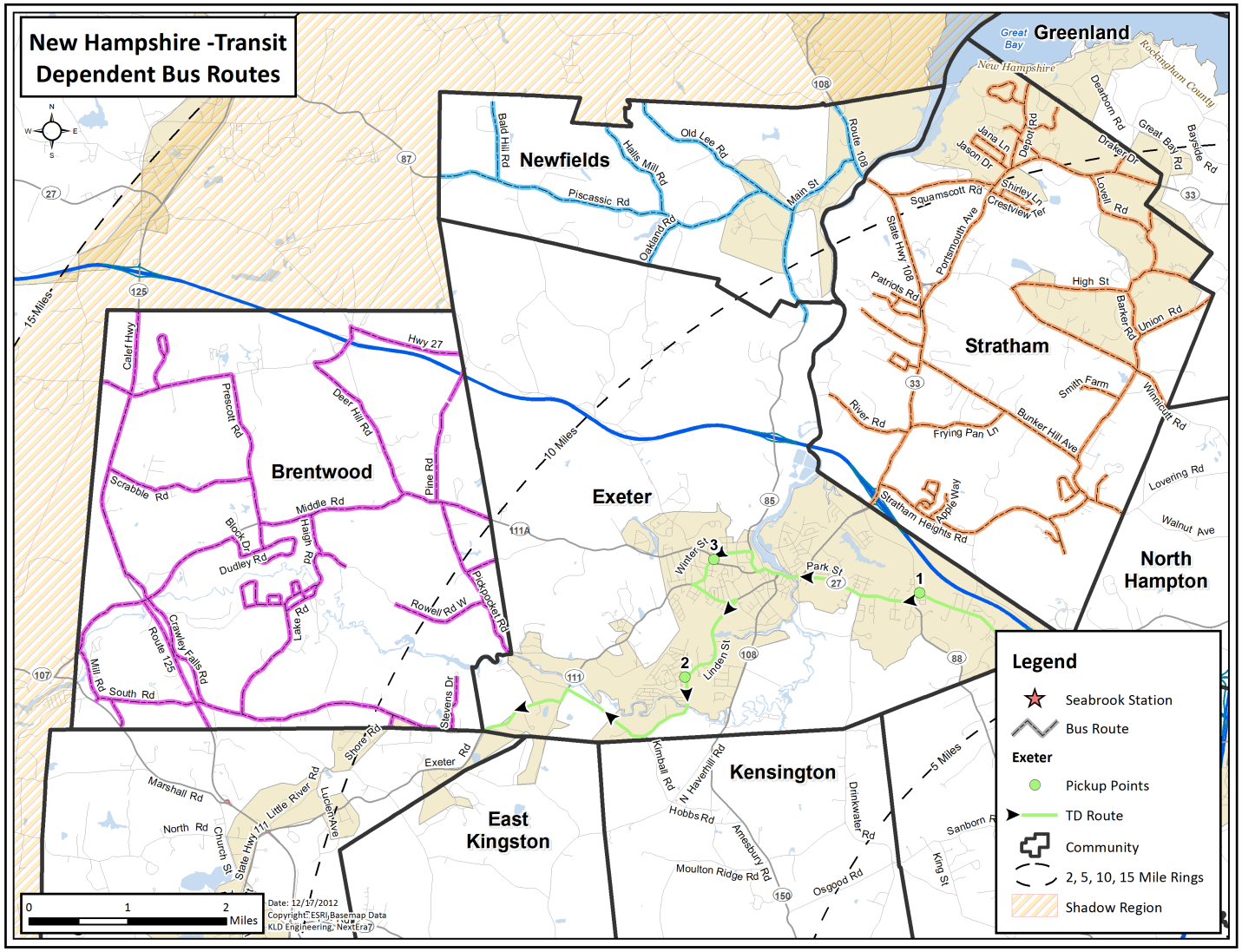


Figure 8-5. New Hampshire Transit-Dependent Bus Routes (Brentwood, Exeter, Newfields, and Stratham)

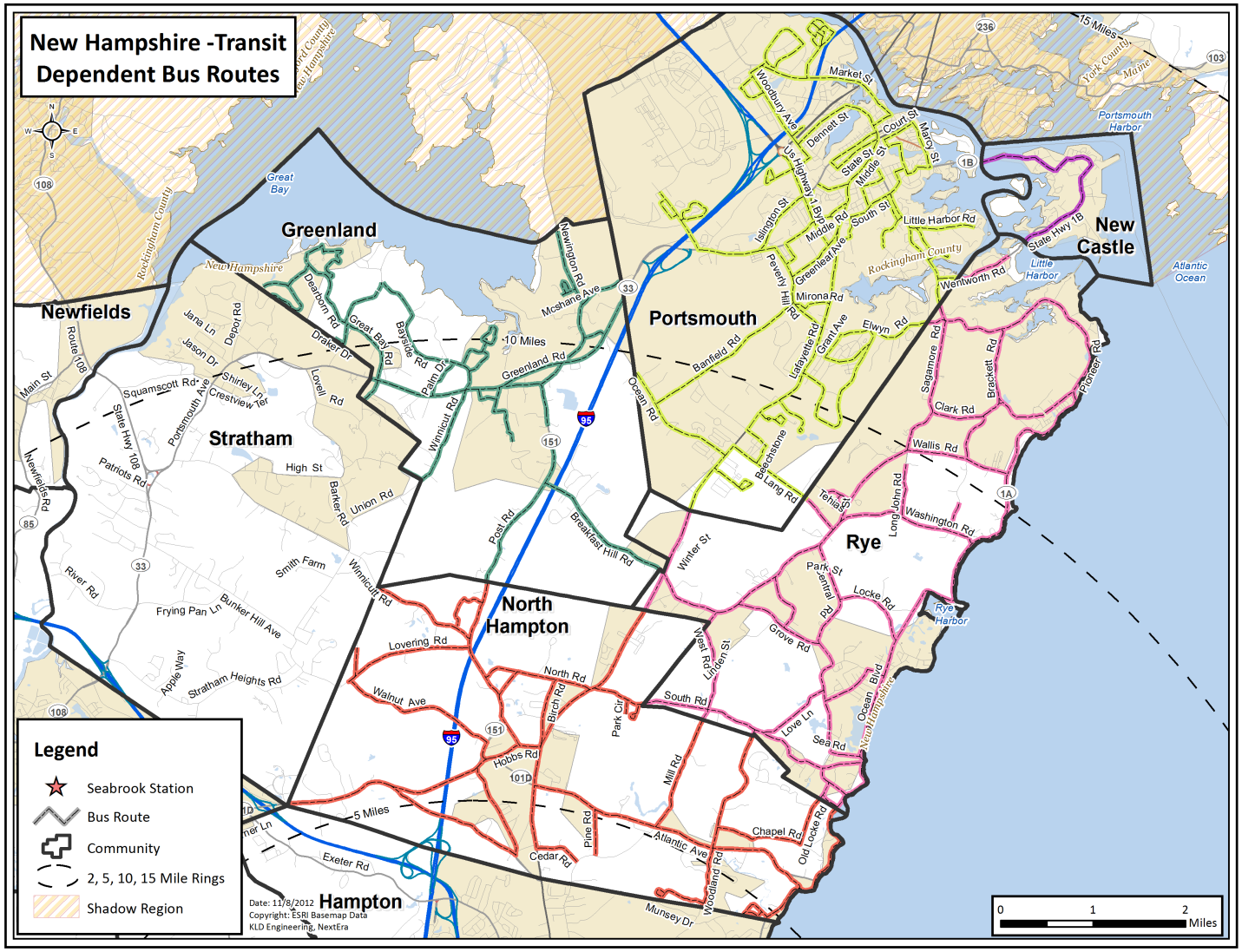


Figure 8-6. New Hampshire Transit-Dependent Bus Routes (Greenland, North Hampton, Rye, New Castle, and Portsmouth)

Table 8-1. Transit-Dependent Population Estimates

2010 EPZ Population	Survey Average HH Size with Indicated No. of Vehicles			Estimated No. of Households	Survey Percent HH with Indicated No. of Vehicles			Survey Percent HH with Commuters	Survey Percent HH with Non-Returning Commuters	Total People Requiring Transport	Estimated Ridesharing Percentage	People Requiring Public Transit	Percent Population Requiring Public Transit
	0	1	2		0	1	2						
163,867	1.18	1.51	2.66	65,286	2.2%	27.4%	47.7%	61%	59%	7,640	50%	3,820	2.3%

Table 8-2. School Population Demand Estimates

Community	School Name	Enrollment	Staff	Buses Required	Wheelchair Vans Required	Vans Required
MASSACHUSETTS						
Amesbury	Amesbury Academy Charter Public School	50	12	2	0	0
Amesbury	Amesbury Elementary School	442	80	9	0	0
Amesbury	Amesbury High School	620	94	14	4	0
Amesbury	Amesbury Middle School	755	94	17	0	0
Amesbury	Cashman School	533	75	11	0	0
Amesbury	Sparhawk High School	64	30	2	0	0
Amesbury	Sparhawk School	74	13	1	0	1
Merrimac	Dr. FN Sweetsir School	242	55	5	0	0
Merrimac	Helen R. Donaghue School	384	65	7	0	0
Newbury	Newbury Elementary School	660	98	10	0	9
Newbury	The Governor's Academy	401	191	9	0	0
Newbury	Triton Regional Middle School and High School	1,214	196	25	0	1
Newburyport	Bresnahan Elementary School	501	91	10	1	0
Newburyport	Coastal Alternative School	16	5	1	0	0
Newburyport	DARE Family Services	22	N/A	1	0	0
Newburyport	E.G. Molin Upper Elementary School	352	55	7	0	0
Newburyport	G.W. Brown School	244	50	5	0	0
Newburyport	Immaculate Conception School	364	28	5	0	0
Newburyport	Inn Street Montessori School	41	6	1	0	0
Newburyport	Newburyport High School	710	96	16	2	0
Newburyport	River Valley Charter School	288	54	6	0	0
Newburyport	Rupert A. Nock Middle School	528	90	13	1	0
Salisbury	Salisbury Elementary School	545	10	10	0	0
West Newbury	Dr. John C. Page School	480	80	9	0	0
West Newbury	Pentucket Regional High School	790	90	17	1	1
West Newbury	Pentucket Regional Middle School	523	70	11	1	0
	Total:	**10,843**	**1,728**	**224**	**10**	**12**
NEW HAMPSHIRE						
Brentwood	Brentwood Christian Academy	120	-	2	0	0
Brentwood	Seacoast Learning Collaborative	52	-	1	0	0

Community	School Name	Enrollment	Staff	Buses Required	Wheelchair Vans Required	Vans Required
Brentwood	Swasey Elementary	462	-	8	0	0
East Kingston	East Kingston Elementary School	204	-	5	0	0
Exeter	Exeter Classical Christian School	12	-	1	0	0
Exeter	Exeter High School	1,904	-	39	0	0
Exeter	Great Bay e-Learning Charter School	164	-	5	0	0
Exeter	Lincoln Street Elementary School	613	-	11	0	0
Exeter	Main Street School	603	-	11	0	0
Exeter	Phillips Exeter Academy	1,034	-	21	0	0
Greenland	Greenland Central School	354	-	6	0	0
Hampton	Hampton Academy	527	-	9	0	0
Hampton	Hampton Centre School	480	-	8	0	0
Hampton	Marston School	475	-	8	0	0
Hampton	Sacred Heart School	332	-	6	0	0
Hampton	Winnacunnet Reg. High School	1,520	-	31	0	0
Hampton Falls	Heronfield Academy	90	-	3	0	0
Hampton Falls	Lincoln Akerman School	340	-	6	0	0
Kensington	Kensington Elementary School	194	-	4	0	0
Kingston	Daniel J. Bakie School	512	-	9	0	0
Kingston	Sanborn Regional High School	1,313	-	27	0	0
Kingston	Seacoast Charter School	170	-	4	0	0
New Castle	Maude H. Trefethen School	54	-	1	0	0
Newfields	Newfields Elementary School	150	-	3	0	0
Newton	Memorial Elementary School	343	-	6	0	0
Newton	Sanborn Regional Middle School	409	-	7	0	0
North Hampton	North Hampton Elementary School	473	-	8	0	0
Portsmouth	Dondero School	339	-	6	0	0
Portsmouth	Little Harbor School	379	-	7	0	0
Portsmouth	New Franklin School	286	-	5	0	0
Portsmouth	Portsmouth High School	1,109	-	23	0	0
Portsmouth	Portsmouth Middle School	508	-	9	0	0
Portsmouth	Robert J. Lister Academy	25	-	1	0	0
Portsmouth	St Patrick's School	212	-	5	0	0

Community	School Name	Enrollment	Staff	Buses Required	Wheelchair Vans Required	Vans Required
Rye	Learning Skills Academy	44	-	1	0	0
Rye	Rye Elementary School	407	-	7	0	0
Rye	Rye Junior High School	245	-	5	0	0
Seabrook	Seabrook Elementary School	483	-	9	0	0
Seabrook	Seabrook Middle School	374	-	8	0	0
South Hampton	Barnard School	97	-	1	0	0
South Hampton	Seventh Day Adventist Elementary School	23	-	1	0	0
Stratham	Acorn School	54	-	1	0	0
Stratham	Cooperative Middle School	1,558	-	26	0	0
Stratham	Cornerstone Christian Academy	10	-	0	0	1
Stratham	Stratham Memorial School	766	-	13	0	0
Stratham	The Cornerstone School	165	-	3	0	0
	TOTAL:	**19,988**	**0**	**381**	**0**	**1**
	TOTAL:	**30,831**	**1,728**	**605**	**10**	**13**

Table 8-3. Preschool/Daycare Population Demand Estimates

Community	School Name	Enrollment	Staff	Buses Required	Wheelchair Vans Required	Vans Required
MASSACHUSETTS						
Amesbury	Amesbury Country Day School	20	2	1	0	0
Amesbury	James Place The Next Generation	46	8	2	0	0
Amesbury	Leaps and Bounds Pre-School	24	3	1	0	0
Amesbury	Leaps and Bounds Pre-School	24	3	1	0	0
Amesbury	Little Sprouts Daycare	85	16	3	0	0
Amesbury	Windmill Country Day School	73	10	3	0	0
Merrimac	Little People's Pre-School	50	6	2	0	0
Newbury	Creative Playhouse	16	3	Notification Only		
Newburyport	Bright Horizons at Newburyport	70	16	3	0	0
Newburyport	Community Action, Inc. Newburyport Head Start	54	11	2	0	0
Newburyport	Kinder Care Learning Center	71	16	3	0	0
Newburyport	Kindercare Learning Center	80	20	3	0	0
Newburyport	Knoll Edge Nursery	85	16	3	0	0
Newburyport	Knoll Edge Too!	20	4	1	0	0
Newburyport	Mrs Murray's Nursery School	33	7	1	0	1
Newburyport	Newburyport Montessori School	107	18	4	0	0
Newburyport	YWCA - School's Out Program	65	8	2	0	1
Salisbury	New Beginnings Learning Center	30	6	1	0	0
West Newbury	Children's Castle	95	17	4	0	0
West Newbury	Koinonia PreSchool	50	12	2	0	0
West Newbury	Learning Tree Preschool	22	3	1	0	0
West Newbury	Pathways for Learning Preschool	18	5	1	1	0
	Total:	**1,138**	**210**	**44**	**1**	**2**
NEW HAMPSHIRE						
Brentwood	A Place To Grow	35	-	1	0	0
Exeter	Appleseeds Day School	144	-	3	0	0
Exeter	Building Block School	40	-	1	0	0
Exeter	De Colores Children's Center	13	-	0	0	1

Community	School Name	Enrollment	Staff	Buses Required	Wheelchair Vans Required	Vans Required
Exeter	Exeter Day School	85	-	2	0	0
Exeter	Exter Child Care Center/Great Bay Kid's Company	90	-	2	0	0
Exeter	Great Bay Kids Company	60	-	1	0	0
Exeter	Great Bay Kids Company	60	-	1	0	0
Exeter	Montessori School for the Arts & Sciences	80	-	2	0	0
Greenland	Community School of SAU 50/Greenland Peak	30	-	1	0	0
Greenland	Greenland Live Y'ers	50	-	0	0	3
Greenland	Kaleidoscope Home Childcare	17	-	1	0	0
Hampton	Fun After School Program	99	-	2	0	0
Hampton	Kids Stop Inc	80	-	2	0	0
Hampton	My First School	53	-	1	0	0
Hampton	Sandbox Preschool Day Care	21	-	0	0	2
Hampton	Village Preschool	20	-	0	0	2
Hampton Falls	Hampton Falls Child Care Center	42	-	1	0	0
Hampton Falls	Robin's Childsplace	192	-	4	0	0
Hampton Falls	Seacoast Head Start	37	-	1	0	0
Kingston	Bright Start Early Learning	20	-	1	0	0
Kingston	Kingston Children's Center	75	-	2	0	0
Kingston	Story Brook Station Day School & Offspring Kids	74	-	2	0	0
Newfields	Gateway to Learning	24	-	1	0	0
Newfields	Nurture & Nature Children Center	45	-	1	0	0
Newton	Newton Learning Center	63	-	2	0	0
North Hampton	Imprint's Day School	130	-	3	0	0
Portsmouth	Chase Home For Children	25	-	1	0	0
Portsmouth	Children's Garden School	32	-	1	0	0
Portsmouth	Community Child Care Center of Portsmouth	43	-	0	14	0
Portsmouth	Community Day Care Center	140	-	3	0	0

Community	School Name	Enrollment	Staff	Buses Required	Wheelchair Vans Required	Vans Required
Portsmouth	Discovery Child Enrichment Center	78	-	2	0	0
Portsmouth	Dondero Peak Program	30	-	1	0	0
Portsmouth	Early Learning Center at Temple Israel Preschool	12	-	0	0	1
Portsmouth	Edgewood Early Learning Center	38	-	1	0	0
Portsmouth	Kathleen Tostenson	6	-	0	0	1
Portsmouth	Kindercare Learning Center	156	-	3	0	0
Portsmouth	Little Blessings Day Care	71	-	2	0	0
Portsmouth	Little Harbour Peak Program	45	-	1	0	0
Portsmouth	Live Y'ers Child Care Center	30	-	1	0	0
Portsmouth	New Franklin Peak Program	30	-	1	0	0
Portsmouth	Patricia Katkin	12	-	0	0	1
Portsmouth	Pease Center - Great Bay Kids	270	-	5	0	0
Portsmouth	PEEP School - Pre School	13	-	0	0	1
Portsmouth	Place for Friends and Fun	9	-	0	0	1
Portsmouth	Portsmouth Head Start	51	-	1	0	0
Portsmouth	The Agape Preschool	36	-	1	0	0
Portsmouth	Unalkaya	13	-	0	0	1
Rye	Children's House Montessori	44	-	1	0	0
Rye	Rye Country Day School	99	-	2	0	0
Seabrook	Over the Rainbow Day School	17	-	1	0	0
Stratham	Bright Horizons at Timberland	120	-	6	0	0
Stratham	Debbys Day Care	9	-	0	0	1
Stratham	Four Pines Childcare	9	-	0	0	1
Stratham	Polka Dots Child Care Center	36	-	1	0	0
Stratham	Richie Mc Farland Children's Center	18	-	1	0	0
Stratham	Stratham Circle Learning Center	46	-	1	0	0
	TOTAL:	**3,217**	**0**	**75**	**14**	**16**
	TOTAL:	**4,355**	**210**	**119**	**15**	**18**

Table 8-4. Day Camp Population Demand

Community	School Name	Enrollment	Buses Required
MASSACHUSETTS			
Amesbury	Camp Bauercrest	250	6
Amesbury	James Place	46	1
Amesbury	Tosh Farrell Soccer Development	196	4
Amesbury	US Sports Institute	196	4
Newbury	Governor's Academy	117	3
Newburyport	Clipper Girls Basketball Camp	196	4
Newburyport	Coastal Discoveries Marine	24	1
Newburyport	Joppa Flats Summer Camp	196	4
Newburyport	Metro Rock Climbing Camps	196	4
Newburyport	YWCA Scamper Camp	65	2
West Newbury	Koinonia Day Camp	196	4
	Total:	**1,678**	**37**
NEW HAMPSHIRE			
East Kingston	YMCA Tricklin' Falls Day Camp	200	5
Kingston	Long Tree Scout Reservation	196	4
Kingston	YMCA Camp Lincoln Kingston	500	10
	TOTAL:	**896**	**19**
	TOTAL:	**2,574**	**56**

Table 8-5. NH School Reception Centers

NH School/Preschool/Daycare	School Reception Center
Brentwood Christian Academy	Memorial High School or Southside Middle School
Seacoast Learning Collaborative	
Swasey Elementary	
East Kingston Elementary School	
Exeter Classical Christian School	
Exeter High School	
Great Bay e-Learning Charter School	
Lincoln Street Elementary School	
Main Street School	
Phillips Exeter Academy	
Kensington Elementary School	
Daniel J. Bakie School	
Sanborn Regional High School	
Seacoast Charter School	
Newfields Elementary School	
Memorial Elementary School	
Sanborn Regional Middle School	
Seabrook Elementary School	
Seabrook Middle School	
Barnard School	
Seventh Day Adventist Elementary School	
Acorn School	
Cooperative Middle School	
Cornerstone Christian Academy	
Stratham Memorial School	
The Cornerstone School	
A Place To Grow	
Appleseeds Day School	
Building Block School	
De Colores Children's Center	
Exeter Day School	
Exeter Child Care Center/Great Bay Kid's Company	
Great Bay Kids Company	
Great Bay Kids Company	
Montessori School for the Arts & Sciences	
Bright Start Early Learning	
Kingston Children's Center	

NH School/Preschool/Daycare	School Reception Center
Story Brook Station Day School & Offspring Kids	Memorial High School or Southside Middle School
Gateway to Learning	
Nurture & Nature Children Center	
Newton Learning Center	
Over the Rainbow Day School	
Bright Horizons at Timberland	
Debbys Day Care	
Four Pines Childcare	
Polka Dots Child Care Center	
Richie Mc Farland Children's Center	
Stratham Circle Learning Center	
YMCA Tricklin' Falls Day Camp	
Long Tree Scout Reservation	
YMCA Camp Lincoln Kingston	
Greenland Central School	Dover Middle School
Hampton Academy	
Hampton Centre School	
Marston School	
Sacred Heart School	
Winnacunnet Reg. High School	
Heronfield Academy	
Lincoln Akerman School	
Maude H. Trefethen School	
North Hampton Elementary School	
Learning Skills Academy	
Rye Elementary School	
Rye Junior High School	
Community School of SAU 50/Greenland Peak	
Greenland Live Y'ers	
Kaleidoscope Home Childcare	
Fun After School Program	
Kids Stop Inc	
My First School	
Sandbox Preschool Day Care	
Village Preschool	
Hampton Falls Child Care Center	
Robin's Childsplace	
Seacoast Head Start	
Imprint's Day School	
Children's House Montessori	
Rye Country Day School	

NH School/Preschool/Daycare	School Reception Center
Dondero School	Rochester Middle School
Little Harbor School	
New Franklin School	
Portsmouth High School	
Portsmouth Middle School	
Robert J. Lister Academy	
St Patrick's School	
Chase Home For Children	
Children's Garden School	
Community Child Care Center of Portsmouth	
Community Day Care Center	
Discovery Child Enrichment Center	
Dondero Peak Program	
Early Learning Center at Temple Israel Preschool	
Edgewood Early Learning Center	
Kathleen Tostenson	
Kindercare Learning Center	
Little Blessings Day Care	
Little Harbour Peak Program	
Live Y'ers Child Care Center	
New Franklin Peak Program	
Patricia Katkin	
Pease Center - Great Bay Kids	
PEEP School - Pre School	
Place for Friends and Fun	
Portsmouth Head Start	
The Agape Preschool	
Unalkaya	

Table 8-6. MA School Reception Centers/Host Schools

MA School/Preschool/Daycare	Host School
Dr. FN Sweetsir School	John W. Wynn Middle School
Helen R. Donaghue School	
Little People's Pre-School	
Salisbury Elementary School	Marsh Grammar School
New Beginnings Learning Center	
Dr. John C. Page School	Tewksbury High School
Pentucket Regional High School	
Pentucket Regional Middle School	
Children's Castle	
Koinonia PreSchool	
Learning Tree Preschool	
Pathways for Learning Preschool	
Koinonia Day Camp	
Amesbury Academy Charter Public School	Methuen High School
Amesbury Elementary School	
Amesbury High School	
Amesbury Middle School	
Cashman School	
Sparhawk High School	
Sparhawk School	
Amesbury Country Day School	
James Place The Next Generation	
Leaps and Bounds Pre-School	
Leaps and Bounds Pre-School	
Little Sprouts Daycare	
Windmill Country Day School	
Camp Bauercrest	
James Place	
Tosh Farrell Soccer Development	
US Sports Institute	

MA School/Preschool/Daycare	Host School
Bresnahan Elementary School	Minuteman Regional High School
Coastal Alternative School	
DARE Family Services	
E.G. Molin Upper Elementary School	
G.W. Brown School	
Immaculate Conception School	
Inn Street Montessori School	
Newburyport High School	
River Valley Charter School	
Rupert A. Nock Middle School	
Bright Horizons at Newburyport	
Community Action, Inc. Newburyport Head Start	
Kinder Care Learning Center	
Kindercare Learning Center	
Knoll Edge Nursery	
Knoll Edge Too!	
Mrs Murray's Nursery School	
Newburyport Montessori School	
YWCA - School's Out Program	
Clipper Girls Basketball Camp	
Coastal Discoveries Marine	
Joppa Flats Summer Camp	
Metro Rock Climbing Camps	
YWCA Scamper Camp	
Newbury Elementary School	Wakefield High School
The Governor's Academy	
Triton Regional Middle School and High School	
Creative Playhouse	

Table 8-7. Medical Facility Transit Demand

Community	Facility Name	Current Census	Ambu-latory	Wheel-chair Bound	Bed-ridden	Bus Runs	Half Bus Runs	Wheel-chair Van Runs	Evacuation Bed Bus	Ambulance Runs
MASSACHUSETTS MEDICAL FACILITIES										
Amesbury	Amesbury Health Center	6	6	0	0	0	1	0	-	0
Amesbury	Amesbury Residence	7	7	0	0	0	1	0	-	0
Amesbury	Amesbury Village, LLC	102	66	26	10	2	0	7	-	5
Amesbury	Coastal Connections Inc	44	34	10	0	1	1	3	-	0
Amesbury	Elizabeth Calsey House & Assisted Living	20	12	8	0	0	1	2	-	0
Amesbury	Elizabeth Calsey House 2	28	28	0	0	1	0	0	-	0
Amesbury	Hillside Rest Home Inc	28	28	0	0	1	0	0	-	0
Amesbury	Maplewood Care & Rehabilitation Center	109	57	48	4	2	1	12	-	2
Merrimac	Church Street House	5	5	0	0	Notification Only				
Merrimac	Harbor School/Easter Seals Merrimac Boys	16	16	0	0	Notification Only				
Merrimac	Harbor Schools Star Program	12	12	0	0	Notification Only				
Merrimac	Merrimac House	4	4	0	0	Notification Only				
Newbury	Oak Ridge	22	18	4	0	1	0	1	-	0
Newbury	Quaker Hill	24	24	0	0	1	0	0	-	0
Newburyport	Anna Jaques Hospital	84	24	44	16	1	0	11	-	8
Newburyport	Atria Merrimack Place	85	77	8	0	3	0	2	-	0
Newburyport	Brigham Manor	64	8	52	4	0	1	13	-	2
Newburyport	Country Rehabilitation & Skilled Nursing Center	111	19	88	4	1	0	22	-	2
Newburyport	Harbor Schools Newburyport Youth Home	5	5	0	0	Notification Only				

Community	Facility Name	Current Census	Ambu-latory	Wheel-chair Bound	Bed-ridden	Bus Runs	Half Bus Runs	Wheel-chair Van Runs	Evacuation Bed Bus	Ambulance Runs
Newburyport	Harborside Adult Health @ St. Paul's Church	35	31	4	0	1	0	1	-	0
Newburyport	Heritage House	128	80	43	5	Notification Only				
Newburyport	Home for Aged Men (Griffin House)	9	9	0	0	0	1	0	-	0
Newburyport	James Steam Mill Elderly Housing	126	79	42	5	Notification Only				
Newburyport	Newburyport Residence	8	8	0	0	Notification Only				
Newburyport	Opportunity Works	148	136	12	0	4	0	3	-	0
Newburyport	Port Healthcare Center	100	28	68	4	1	0	34	-	2
Newburyport	Turning Point Inc.	51	51	0	0	Notification Only				
Salisbury	Assisted Living Center of Salisbury	30	26	4	0	1	0	1	-	0
	MA Subtotal:	***1,411***	***898***	***461***	***52***	***21***	***7***	***112***	***0***	***21***
NEW HAMPSHIRE MEDICAL FACILITIES										
Brentwood	Rockingham County Nursing Home	138	97	11	30	3	-	6	0	15
Exeter	Exeter Healthcare	26	6	12	8	1	-	6	0	4
Exeter	Exeter Hospital	100	64	0	36	2	-	0	3	3
Exeter	Exeter on Hampton Care and Rehabilitation Center	81	67	0	14	2	-	0	2	0
Exeter	Langdon Place of Exeter	100	90	10	0	3	-	5	0	0
Exeter	RiverWoods Continuing Care Retirement Community (CCRC)	60	43	6	11	2	-	3	0	6
Exeter	The Boulders at Riverwoods	620	435	51	134	13	-	26	0	67
Exeter	The Ridge at Riverwoods	37	21	16	0	1	-	8	0	0
Hampton	Oceanside Center Skilled Nursing	194	174	20	0	5	-	10	0	0
Hampton	SolAmor Hospice/Sun Healthcare	138	97	11	30	3	-	6	0	15
Portsmouth	Clipper Harbor of Portsmouth	120	110	0	10	4	-	0	1	0
Portsmouth	Edgewood Centre	177	103	0	74	4	-	0	10	6

Community	Facility Name	Current Census	Ambu-latory	Wheel-chair Bound	Bed-ridden	Bus Runs	Half Bus Runs	Wheel-chair Van Runs	Evacuation Bed Bus	Ambulance Runs
Portsmouth	Northeast Rehabilitation Hospital at Pease	33	0	13	20	0	-	7	0	10
Portsmouth	Portsmouth Regional Hospital	200	100	0	100	3	-	0	10	0
Portsmouth	The Mark Wentworth Home	70	45	25	0	2	-	13	0	0
Rye	Webster-Rye Rehab & Retirement	114	98	6	10	3	-	3	1	0
	NH Subtotal:	***2,208***	***1,550***	***181***	***477***	***51***	***0***	***93***	***27***	***126***
	TOTAL:	**3,619**	**2,448**	**642**	**529**	**72**	**7**	**205**	**27**	**147**

Table 8-8. Summary of Transportation Resources

Transportation Resource	Buses	Half Buses	Wheelchair Vans	Vans	Evacuation Bed Buses	Ambulances
MA Resources Available						
Action Ambulance Service, Inc.	1	-	10	-	-	30
American Medical Response Northeast	-	2	54	-	-	125
Cataldo Ambulance Company	6	-	35	-	-	83
Eastern Ambulance Service, LLC.	-	-	1	-	-	6
Fallon Ambulance Service, Inc.	4	-	39	-	-	96
Professional Ambulance Service	-	-	-	-	-	3
First Student Transportation Services (Merrimac)	18	-	-	-	-	-
Worcester Regional Transit Authority	10	-	5	5	-	-
First Student Transportation Services (North Andover)	25	-	-	4	-	-
Lowell Regional Transit Authority	20	-	-	-	-	-
First Student Transportation Services (Marlborough)	149	2	1	1	-	-
Merrimack Valley Regional Transit Authority	35	-	16	14	-	-
Massachusetts Bay Transportation Authority (MBTA)	978	-	-	80	-	-
NH Resources Available						
COAST (Dover)	23	4	4	2	All buses can be made into evacuation bed buses that can hold 10 bedridden patients.	-
Concord School Dist. (Concord)	26	10	-	4		-
Dail Transportation (Epsom)	75	4	4	-		-
Jalbert/CJ Trailways (Portsmouth)	19	-	-	1		-
Manchester Transit (Manchester)	98 buses with a capacity to hold up to 28 wheelchairs			1		-
Merrimack Valley School (Penacook)	20	3	5	7		-
Oyster River School Dist. (Durham)	23	4	2	6		-
Safeway Training and Transportation	-	-	7	-		-
Seacoast Learning Collaborative	-	5	13	17		-
Student Transportation of America	45	-	-	-		-
The Provider (Brentwood)	3	30	25	30		-
Wildcat Transit (Durham)	25	-	6	-		-
American Medical Response	-	-	4	4		16
Care Plus Ambulance Services	2	-	31	7		16
Golden Cross Ambulance Services	-	-	5	3		3

Transportation Resource	Buses	Half Buses	Wheelchair Vans	Vans	Evacuation Bed Buses	Ambulances
Rescue, Inc.	-	-	-	6		2
Trinity EMS	-	-	20	8		31
Upper Valley Ambulance	-	-	-	-		2
TOTAL:	**1,507**	**64**	**287**	**200**	**0**	**413**
Resources Needed						
Schools (Table 8-2):	724	-	25	31	-	-
Daycares (Table 8-3):	119	-	15	-	-	18
Day Camp (Table 8-4):	56	-	-	-	-	-
Medical Facilities (Table 8-5):	72	7	205	-	27	147
Transit-Dependent Population (Table 8-12):	107	-	-	-	-	-
Homebound Special Needs (Section 8.5):	215	-	116	-	-	30
Correctional Facilities (Section 8.6):	18	-	-	-	-	-
TOTAL TRANSPORTATION NEEDS:	**1,311**	**7**	**361**	**31**	**27**	**195**

Table 8-9. Bus Route Descriptions

Bus Route Number	Description	Nodes Traversed from Route Start to EPZ Boundary
1	Exeter High School	499, 500, 501, 505, 65, 64
2	Seacoast Learning Collaborative	501, 505, 65, 64
3	Rockingham County Nursing Home	794, 831, 505, 65, 64
4	A Place to Grow	795, 830, 544
5	Swasey Elementary	792, 793, 795, 830
6	The Ridge at Riverwoods	730, 731, 629, 630, 631, 632, 633, 634, 495, 70, 69, 68, 67, 66, 65, 64
7	The Boulders at Riverwoods	730, 731, 629, 630, 631, 632, 633, 634, 495, 70, 69, 68, 67, 66, 65, 64
8	Building Block School	730, 731, 629, 630, 631, 632, 633, 634, 495, 70, 69, 68, 67, 66, 65, 64
9	Riverwoods (CCRC)	730, 731, 629, 630, 631, 632, 633, 634, 495, 70, 69, 68, 67, 66, 65, 64
10	De Colores Children's Center	632, 633, 634, 495, 70, 69, 68, 67, 66, 65, 64
11	Exeter Child Care Center	729, 730, 731, 629, 630, 631, 632, 633, 634, 495, 70, 69, 68, 67, 66, 65, 64
12	Lincoln Street Elementary	728, 729, 730, 731, 629, 630, 631, 632, 633, 634, 495, 70, 69, 68, 67, 66, 65, 64
13	Great Bay e-Learning Charter	728, 729, 730, 731, 629, 630, 631, 632, 633, 634, 495, 70, 69, 68, 67, 66, 65, 64
14	Great Bay Kids Company	627, 628, 629, 630, 631, 632, 633, 634, 495, 70, 69, 68, 67, 66, 65, 64
15	Main Street School	627, 628, 629, 630, 631, 632, 633, 634, 495, 70, 69, 68, 67, 66, 65, 64
16	Phillips Exeter Academy	622, 627, 628, 629, 630, 631, 632, 633, 634, 495, 70, 69, 68, 67, 66, 65, 64
17	Exeter Classical Christian School	619, 621, 622, 627, 628, 629, 630, 631, 632, 633, 634, 495, 70, 69, 68, 67, 66, 65, 64
18	Exeter Hospital	620, 619, 621, 622, 627, 628, 629, 630, 631, 632, 633, 634, 495, 70, 69, 68, 67, 66, 65, 64
19	Montessori School for the Arts	625, 1603, 626, 494, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
20	Exeter Day School	616, 615, 1598, 639, 614, 473, 472, 635, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
21	Exeter Healthcare	1599, 1598, 639, 614, 473, 472, 635, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
22	Polka Dots Child Care Center	614, 473, 472, 635, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
23	Exeter on Hampton Care and Rehab Center	1610, 610, 611, 612, 613, 614, 473, 472, 635, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64

Bus Route Number	Description	Nodes Traversed from Route Start to EPZ Boundary
24	Langdon Place of Exeter	1610, 610, 611, 612, 613, 614, 473, 472, 635, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
25	Appleseeds Day School	1610, 610, 611, 612, 613, 614, 473, 472, 635, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
26	Cooperative Middle School	444, 443, 471, 635, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
27	Bright Horizon at Timberland	80, 79, 78, 77, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
28	Heronfield Academy	643, 642, 641, 640, 617, 611, 612, 613, 614, 473, 472, 635, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
29	Nurture & Nature Children Center	490, 491, 492, 493, 494, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
30	Newfields Elementary School	490, 491, 492, 493, 494, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
31	Gateway to Learning	485, 490, 491, 492, 493, 494, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
32	Stratham Circle Learning Center	467, 468, 470, 1601, 469, 443, 471, 635, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
33	Cornerstone Christian Academy	461, 462, 463, 483, 467, 468, 470, 1601, 469, 443, 471, 635, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
34	Debby's Day Care	479, 478, 461, 462, 463, 483, 467, 468, 470, 1601, 469, 443, 471, 635, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
35	Acorn School	451, 476, 478, 461, 462, 463, 483, 467, 468, 470, 1601, 469, 443, 471, 635, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
36	Richie McFarland Children's Center	459, 477, 460, 461, 462, 463, 483, 467, 468, 470, 1601, 469, 443, 471, 635, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
37	Stratham Memorial School	457, 458, 459, 477, 460, 461, 462, 463, 483, 467, 468, 470, 1601, 469, 443, 471, 635, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
38	The Cornerstone School	481, 456, 455, 451, 476, 478, 461, 462, 463, 483, 467, 468, 470, 1601, 469, 443, 471, 635, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
39	Four Pines ChildCare	456, 455, 451, 476, 478, 461, 462, 463, 483, 467, 468, 470, 1601, 469, 443, 471, 635, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
40	Greenland Live Y'ers	427, 429, 379, 378, 376, 374, 375, 1613, 287, 286, 288, 38, 130, 39, 127, 128, 60, 59, 1586, 58
41	Greenland Central School	429, 379, 378, 376, 374, 375, 1613, 287, 286, 288, 38, 130, 39, 127, 128, 60, 59, 1586, 58

Bus Route Number	Description	Nodes Traversed from Route Start to EPZ Boundary
42	Community School of SAU 50	429, 379, 378, 376, 374, 375, 1613, 287, 286, 288, 38, 130, 39, 127, 128, 60, 59, 1586, 58
43	Kaleidoscope Home Childcare	429, 379, 378, 376, 374, 375, 1613, 287, 286, 288, 38, 130, 39, 127, 128, 60, 59, 1586, 58
44	Imprint's Day School	271, 270, 269, 268, 267, 266, 265, 264, 1618, 263, 262, 1554, 261, 260, 259, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
45	North Hampton Elementary School	313, 274, 273, 272, 403, 271, 270, 269, 268, 267, 266, 265, 264, 1618, 263, 262, 1554, 261, 260, 259, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
46	Sandbox Pre School, Oceanside Center	278, 277, 276, 275, 274, 273, 272, 403, 271, 270, 269, 268, 267, 266, 265, 264, 1618, 263, 262, 1554, 261, 260, 259, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
47	Learning Skills Academy	270, 269, 268, 267, 266, 265, 264, 1618, 263, 262, 1554, 261, 260, 259, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
48	Webster-Rye Rehab	319, 320, 321, 268, 267, 266, 265, 264, 1618, 263, 262, 1554, 261, 260, 259, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
49	Rye Junior High School	321, 268, 267, 266, 265, 264, 1618, 263, 262, 1554, 261, 260, 259, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
50	PEEP Pre-school, Community Child Care of Portsmouth	264, 1618, 263, 262, 1554, 261, 260, 259, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
51	Place for Friends, Dondero Peak School	264, 1618, 263, 262, 1554, 261, 260, 259, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
52	Kindercare Learning Center	1555, 1554, 261, 260, 259, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
53	Little Blessing Day Care	1554, 261, 260, 259, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
54	Rye Elementary School	324, 325, 326, 327, 328, 388, 382, 383, 384, 262, 1554, 261, 260, 259, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
55	Children's House Montessori	325, 326, 327, 328, 388, 382, 383, 384, 262, 1554, 261, 260, 259, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
56	Live Y'ers Child Care Center	385, 386, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
57	Children's Garden School	386, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
58	Chase Home for Children	386, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
59	The Agape Preschool, Portsmouth High School	259, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
60	Robert J. Lister Academy	38, 130, 39, 127, 128, 60, 59, 1586, 58
61	Portsmouth Regional Hospital	1579, 1580, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58

Bus Route Number	Description	Nodes Traversed from Route Start to EPZ Boundary
62	Clipper Harbor, L Harbor, Unalkaya, Edgewood	259, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
63	Maude H Trefethen, Little Harbor School	259, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
64	The Mark Wentworth Home	228, 227, 214, 212, 213, 211, 218, 217, 201, 117, 118, 125, 119, 129, 60, 59, 1586, 58
65	Portsmouth Middle School	256, 121, 125, 119, 129, 60, 59, 1586, 58
66	St. Patrick School	256, 121, 125, 119, 129, 60, 59, 1586, 58
67	Early Learning Center at Temple Israel	214, 212, 222, 221, 137, 1563, 1560, 136, 133, 1567, 1575, 134, 135, 132, 289, 290, 291, 292
68	New Franklin, Community Day Care Center, Kathleen Tostenson	205, 204, 1577, 118, 125, 119, 129, 60, 59, 1586, 58
69	Pease Center - Great Bay Kids	307, 312, 305, 304, 303, 302, 1588
70	Discovery Child Enrichment Center	310, 306, 304, 303, 302, 1588
71	Northeast Rehabilitation Hospital	311, 306, 304, 303, 302, 1588
72	Patricia Katkin	135, 132, 289, 290, 291, 292
73	Kensington Elementary School	721, 722, 723, 724, 720, 725, 726, 727, 620, 619, 621, 622, 627, 628, 629, 630, 631, 632, 633, 634, 495, 70, 69, 68, 67, 66, 65, 64
74	Kids Stop Inc	602, 597, 596, 83, 606, 590, 608, 593, 592, 591, 594, 35, 36, 1651, 37, 38, 130, 39, 127, 128, 60, 59, 1586, 58
75	Sacred Heart School	280, 1547, 833, 279, 602, 597, 596, 83, 606, 590, 608, 593, 592, 591, 594, 35, 36, 1651, 37, 38, 130, 39, 127, 128, 60, 59, 1586, 58
76	Winnacunnet High School	660, 280, 1547, 833, 279, 602, 597, 596, 83, 606, 590, 608, 593, 592, 591, 594, 35, 36, 1651, 37, 38, 130, 39, 127, 128, 60, 59, 1586, 58
77	Fun After, Hampton Centre, My First School	834, 833, 279, 602, 597, 596, 83, 606, 590, 608, 593, 592, 591, 594, 35, 36, 1651, 37, 38, 130, 39, 127, 128, 60, 59, 1586, 58
78	Hampton Academy	834, 833, 279, 602, 597, 596, 83, 606, 590, 608, 593, 592, 591, 594, 35, 36, 1651, 37, 38, 130, 39, 127, 128, 60, 59, 1586, 58
79	Marston School, Village Preschool	1607, 279, 602, 597, 596, 83, 606, 590, 608, 593, 592, 591, 594, 35, 36, 1651, 37, 38, 130, 39, 127, 128, 60, 59, 1586, 58
80	Robin, Hampton Falls, Seacoast Head Start	655, 657, 658, 662, 659, 663, 86, 85, 84, 596, 83, 606, 590, 608, 593, 592, 591, 594, 35, 36, 1651, 37, 38, 130, 39, 127, 128, 60, 59, 1586, 58
81	SolAmor Hospice (Sun Healthcare)	655, 657, 658, 662, 659, 663, 86, 85, 84, 596, 83, 606, 590, 608, 593, 592, 591, 594, 35, 36, 1651, 37, 38, 130, 39, 127, 128, 60, 59, 1586, 58
82	Lincoln Akerman School	653, 654, 655, 657, 658, 662, 659, 663, 86, 85, 84, 596, 83, 606, 590, 608, 593, 592, 591, 594, 35, 36, 1651, 37, 38, 130, 39, 127, 128, 60, 59, 1586, 58
83	Bright Start Early, Story Brook Station	764, 827, 828, 829

Bus Route Number	Description	Nodes Traversed from Route Start to EPZ Boundary
84	Kingston, Seacoast Charter, Daniel J	824, 825, 755, 765, 764, 827, 828, 829
85	Brentwood Christian Academy	754, 755, 765, 764, 827, 828, 829
86	East Kingston Elementary School	714, 748, 749, 750, 751, 752, 753, 754, 755, 765, 764, 827, 828, 829
87	Barnard School, Seventh Day Adventist	1153, 1152, 1151, 1150, 1149, 1148, 761, 760, 759, 758, 753, 754, 755, 765, 764, 827, 828, 829
88	Sanborn Regional Middle School, Memorial Elem	824, 825, 755, 765, 764, 827, 828, 829
89	Over the Rainbow	703, 30, 31, 32, 33, 34, 591, 592, 608, 590, 606, 82, 81, 80, 79, 78, 77, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
90	Seabrook Middle, Seabrook Elementary	1541, 843, 680, 702, 31, 32, 33, 34, 591, 592, 608, 590, 606, 82, 81, 80, 79, 78, 77, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
91	Sanborn Regional High School	822, 814, 826
92	Newton Learning Center	1143, 1164, 1165, 1166, 1176, 1175
93	Harbor School Easter Seals, Harbor Start	1179, 1180, 1181
94	Little People's PS, Helen R Donaghue	1188, 1179, 1180
95	Church Street House, Dr FN Sweetsir	1187, 1188, 1179, 1180
96	Marimac House	1025, 1024, 1023, 1022, 102, 101, 100
97	Elizabeth Calsey House 2	999, 1006, 1007, 1008, 1009, 1013, 1014, 1028, 1027, 1026, 1025, 1024, 1023, 1022, 102, 101, 100
98	Amesbury Country Day School	957, 958, 990, 959, 960, 961, 980, 981, 982, 983, 986, 987, 991, 992, 908, 909, 104, 109, 103, 102, 101, 100
99	Amesbury Elementary School	958, 990, 959, 960, 961, 980, 981, 982, 983, 986, 987, 991, 992, 908, 909, 104, 109, 103, 102, 101, 100
100	Cashman School, Elizabeth Calsey House	993, 992, 908, 909, 104, 109, 103, 102, 101, 100
101	Amesbury Village Inc, Amesbury HS	992, 908, 909, 104, 109, 103, 102, 101, 100
102	Little Sprouts Day Care	991, 992, 908, 909, 104, 109, 103, 102, 101, 100
103	Amesbury Academy Charter Public School	982, 983, 986, 987, 991, 992, 908, 909, 104, 109, 103, 102, 101, 100
104	James Place, Amesbury Residence	987, 991, 992, 908, 909, 104, 109, 103, 102, 101, 100
105	Sparhawk HS, Amesbury Middle School	907, 908, 909, 104, 109, 103, 102, 101, 100
106	Windmill Country Day School	907, 908, 909, 104, 109, 103, 102, 101, 100
107	Maplewood Care, Amesbury Health Care	907, 908, 909, 104, 109, 103, 102, 101, 100
108	Hillside Rest Home Inc	992, 908, 909, 104, 109, 103, 102, 101, 100
109	Leaps and Bounds Pre-School	908, 909, 104, 109, 103, 102, 101, 100
110	Coastal Connections Inc	107, 106, 105, 104, 109, 103, 102, 101, 100
111	Leaps and Bounds PS2, Sparhawk School	108, 107, 106, 105, 104, 109, 103, 102, 101, 100
112	New Beginnings Learning Center	849, 852, 1526, 25, 24, 23, 108, 107, 106, 105, 104, 109, 103, 102, 101, 100

Bus Route Number	Description	Nodes Traversed from Route Start to EPZ Boundary
113	Salisbury Elementary School	871, 867, 868, 870, 872, 873, 903, 1527, 1663, 904, 905, 906, 107, 106, 105, 104, 109, 103, 102, 101, 100
114	Assisted Living Center of Salisbury	866, 867, 868, 870, 872, 873, 903, 1527, 1663, 904, 905, 906, 107, 106, 105, 104, 109, 103, 102, 101, 100
115	Community Action Inc	923, 922, 921, 924, 925, 1528, 1529, 15, 14, 13, 12, 11, 10, 9
116	Home for Aged Men	922, 921, 924, 925, 1528, 1529, 15, 14, 13, 12, 11, 10, 9
117	Atria Merrimack Place	919, 917, 918, 903, 1527, 1663, 904, 905, 906, 107, 106, 105, 104, 109, 103, 102, 101, 100
118	Kindercare Learning Center	1529, 15, 14, 13, 12, 11, 10, 9
119	Bresnahan Elementary School	926, 922, 921, 924, 925, 1528, 1529, 15, 14, 13, 12, 11, 10, 9
120	Home for Aged Men (Griffin House)	922, 921, 924, 925, 1528, 16, 17, 18, 19, 20, 21, 1664, 1663, 904, 905, 906, 107, 106, 105, 104, 109, 103, 102, 101, 100
121	Country Rehab, Newbury Res, Day Care Fam	925, 1528, 16, 17, 18, 19, 20, 21, 1664, 1663, 904, 905, 906, 107, 106, 105, 104, 109, 103, 102, 101, 100
122	Kinder Care Learning Center	925, 1528, 1529, 15, 14, 13, 12, 11, 10, 9
123	Anna Jacques Hospital	927, 928, 930, 926, 922, 921, 924, 925, 1528, 16, 17, 18, 19, 20, 21, 1664, 1663, 904, 905, 906, 107, 106, 105, 104, 109, 103, 102, 101, 100
124	Newbury port HS	931, 927, 928, 930, 926, 922, 921, 924, 925, 1528, 1529, 15, 14, 13, 12, 11, 10, 9
125	Mrs Murray, Nursery, Port Healthcare	932, 933, 1232, 1233, 1234, 1235, 1236, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 12, 11, 10, 9
126	Rupert A Nock Middle School	932, 950, 947, 948, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1248, 1246, 12, 11, 10, 9
127	Turning Point Inc, River Valley Charter	950, 947, 948, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1248, 1246, 12, 11, 10, 9
128	Bright Horizons, Heritage House	947, 948, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1248, 1246, 12, 11, 10, 9
129	Coastal Alternative School	947, 948, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1248, 1246, 12, 11, 10, 9
130	Opportunity Works	1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1248, 1246, 12, 11, 10, 9
131	Knoll Edge Too	946, 953, 948, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1248, 1246, 12, 11, 10, 9
132	Harborside Adult Health at St. Paul's	931, 927, 928, 930, 926, 922, 921, 924, 925, 1528, 16, 17, 18, 19, 20, 21, 1664, 1663, 904, 905, 906, 107, 106, 105, 104, 109, 103, 102, 101, 100

Bus Route Number	Description	Nodes Traversed from Route Start to EPZ Boundary
133	YWCA, Newburyport Montessori	931, 927, 928, 930, 926, 922, 921, 924, 925, 1528, 1529, 15, 14, 13, 12, 11, 10, 9
134	Immaculate Conception, Inn Street Montes	931, 927, 928, 930, 926, 922, 921, 924, 925, 1528, 1529, 15, 14, 13, 12, 11, 10, 9
135	Harbor Schools Newburyport Youth Home	931, 927, 928, 930, 926, 922, 921, 924, 925, 1528, 16, 17, 18, 19, 20, 21, 1664, 1663, 904, 905, 906, 107, 106, 105, 104, 109, 103, 102, 101, 100
136	GW Brown School, Brigham Manor	931, 927, 928, 930, 926, 922, 921, 924, 925, 1528, 1529, 15, 14, 13, 12, 11, 10, 9
137	James Steam Mill Eldery Housing	888, 889, 890, 891, 892, 878, 879, 934, 929, 923, 919, 917, 918, 903, 1527, 1663, 904, 905, 906, 107, 106, 105, 104, 109, 103, 102, 101, 100
138	Newbury Village	885, 940, 1356, 1357, 1358, 1359, 1260, 1261, 1262, 1263
139	Newbury Elementary School	1358, 1359, 1260, 1261, 1262, 1263
140	Children's Castle, Dr John C Page School	1391, 1392, 1393, 1394, 1395, 1403, 1404, 1405, 1406, 1407
141	Learning Tree Preschool	1393, 1394, 1395, 1403, 1404, 1405, 1406, 1407
142	Koinonia Preschool	1403, 1404, 1405, 1406, 1407
143	Pathways for Learning Preschool	1404, 1405, 1406, 1407
144	Pentucket Regional (both HS and MS)	1406, 1407, 1408
145	Quaker Hill, Oak Ridge	1381, 1380, 1375, 1374, 10, 9
146	Creative Playhouse	1375, 1374, 10, 9
147	Triton Regional (both MS and HS)	1371, 1372, 1373, 1374, 10, 9
148	The Governor's Academy	1262, 1263, 1352
149	Amesbury TD Route	956, 957, 958, 990, 959, 960, 961, 980, 987, 991, 992, 908, 1010, 1011, 1012, 1009, 1013, 1014, 1028, 1027, 1026, 1025, 1024, 1187, 1188, 1179, 1180
150	Merrimac TD Route	1014, 1028, 1027, 1026, 1025, 1024, 1187, 1188, 1179, 1180
151	Salisbury TD Route	857, 1650, 859, 861, 866, 867, 871, 854, 851, 853, 852, 1526, 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9
152	Newbury TD Route	1269, 1301, 1302, 1303, 1304, 1305, 1306, 1307, 1308, 1309, 1310, 1261, 1364, 1365, 1366, 1367, 1368, 1369, 1370, 1371, 1372, 1373, 1374, 10, 9
153	Newburyport TD Route	931, 927, 928, 930, 926, 922, 921, 924, 925, 1528, 1529, 15, 14, 13, 12, 11, 10, 9
154	West Newbury TD Route	1383, 1384, 1385, 1390, 1391, 1392, 1393, 1394, 1395, 1403, 1404, 1405, 1406, 1407
155	Brentwood TD Route	785, 786, 787, 788, 789, 790, 791, 792, 793, 795, 830
156	East Kingston TD Route	714, 748, 749, 750, 751, 752, 753, 754, 755, 765, 764, 827, 828, 829

Bus Route Number	Description	Nodes Traversed from Route Start to EPZ Boundary
157	Exeter TD Route	604, 605, 609, 1610, 610, 611, 617, 636, 637, 638, 616, 618, 619, 621, 622, 627, 628, 629, 630, 631, 632, 633, 634, 495, 70, 69, 68, 67, 66, 65, 64
158	Greenland TD Route	454, 452, 427, 429, 379, 380, 428, 457, 458, 459, 477, 460, 1612, 484, 482, 485, 486
159	Hampton TD Route 1st	858, 839, 838, 1658, 1659, 89, 840, 841, 842, 329, 330, 408, 414, 1607, 279, 602, 597, 596, 83, 82, 81, 80, 79, 78, 77, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
160	Hampton TD Route 2nd (Hampton Beach)	858, 839, 838, 1658, 1659, 89, 88, 1604, 87, 86, 85, 84, 596, 83, 82, 81, 80, 79, 78, 77, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
161	Hampton Falls TD Route	681, 687, 682, 654, 655, 653, 652, 651, 650, 649, 675, 648, 647, 646, 645, 644, 643, 642, 641, 640, 617, 611, 612, 613, 614, 473, 472, 635, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
162	Kensington TD Route	701, 700, 699, 698, 697, 696, 721, 722, 723, 724, 720, 725, 726, 727, 620, 619, 621, 622, 623, 624, 625, 1603, 626, 494, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64
163	Kingston TD Route	755, 754, 762, 763, 1029, 1030, 1031, 1032, 1033, 1034
164	New Castle TD Route	242, 243, 244, 245, 240, 239, 238, 237, 236, 235, 234, 231, 230, 229, 228, 227, 214, 212, 222, 221, 137, 1563, 1560, 136, 133, 1567, 1575, 134, 135, 132, 289, 290, 291, 292
165	Newfields TD Route	490, 512, 513, 514, 515, 516, 517, 518, 519
166	Newton TD Route	1147, 1146, 1145, 1162, 1144, 1143, 1164, 1165, 1166, 1176, 1175
167	North Hampton Td Route	407, 406, 409, 313, 274, 423, 421, 435, 436, 437, 454, 452, 427, 429, 379, 378, 377, 375, 1613, 287, 286, 288, 38, 130, 39, 127, 128, 60, 59, 1586, 58
168	Portsmouth TD Route	377, 375, 1613, 287, 286, 1615, 285, 284, 283, 282, 254, 253, 250, 251, 252, 224, 223, 211, 218, 217, 201, 200, 202, 203, 135, 132, 289, 290, 291, 292
169	Rye TD Route	315, 316, 317, 318, 319, 320, 321, 322, 323, 349, 350, 1621, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 327, 328, 388, 382, 383, 384, 262, 1554, 261, 260, 259, 258, 257, 256, 121, 125, 119, 129, 60, 59, 1586, 58
170	Seabrook TD Route 1st	1650, 857, 856, 855, 851, 850, 1538, 847, 846, 845, 844, 843, 680, 702, 703, 704, 705, 706, 707, 701, 708, 709, 710, 711, 712, 713, 714, 748, 749, 750, 751, 752, 753, 754, 755, 765, 764, 827, 828, 829
171	Seabrook TD Route 2nd (Seabrook Beach)	839, 858, 1660, 1661, 857, 1650, 859, 861, 866, 867, 868, 870, 872, 873, 903, 1527, 1663, 904, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9

Bus Route Number	Description	Nodes Traversed from Route Start to EPZ Boundary
172	South Hampton TD Route	977, 1153, 1152, 1151, 1150, 1149, 1148, 761, 760, 759, 758, 753, 754, 755, 765, 764, 827, 828, 829
173	Stratham TD Route	614, 473, 472, 471, 443, 469, 1601, 470, 468, 467, 465, 463, 466, 482, 485, 486

Table 8-10. School Evacuation Time Estimates - Good Weather

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
MASSACHUSETTS SCHOOLS									
Amesbury Academy Charter Public School	90	15	5.8	17.3	20	**2:05**	12.2	16	**2:25**
Amesbury Elementary School	90	15	6.5	16.4	24	**2:10**	12.2	16	**2:30**
Amesbury High School	90	15	5.5	36.0	9	**1:55**	12.2	16	**2:15**
Amesbury Middle School	90	15	5.4	33.9	10	**1:55**	12.2	16	**2:15**
Cashman School	90	15	5.9	36.0	10	**1:55**	12.2	16	**2:15**
Sparhawk High School	90	15	5.6	33.9	10	**1:55**	12.2	16	**2:15**
Sparhawk School	90	15	6.4	34.8	11	**2:00**	12.2	16	**2:20**
Dr. FN Sweetsir School	90	15	2.2	42.5	3	**1:50**	22.7	30	**2:20**
Helen R. Donaghue School	90	15	1.1	41.7	2	**1:50**	22.7	30	**2:20**
Newbury Elementary School	90	15	3.7	28.4	8	**1:55**	21.1	28	**2:25**
The Governor's Academy	90	15	0.6	44.0	1	**1:50**	21.1	28	**2:20**
Triton Regional Middle School and High School	90	15	2.6	49.1	3	**1:50**	21.0	28	**2:20**
Bresnahan Elementary School	90	15	6.4	41.9	9	**1:55**	34.1	45	**2:40**
Coastal Alternative School	90	15	5.8	48.9	7	**1:55**	34.1	45	**2:40**
DARE Family Services	90	15	5.4	3.4	95	**3:20**	34.1	45	**4:05**
E.G. Molin Upper Elementary School	90	15	6.0	31.1	12	**2:00**	34.1	45	**2:45**
G.W. Brown School	90	15	8.6	41.9	12	**2:00**	34.1	45	**2:45**
Immaculate Conception School	90	15	8.2	41.9	12	**2:00**	34.1	45	**2:45**
Inn Street Montessori School	90	15	8.3	41.9	12	**2:00**	34.1	45	**2:45**
Newburyport High School	90	15	7.2	47.5	9	**1:55**	34.1	45	**2:40**
River Valley Charter School	90	15	6.0	48.0	8	**1:55**	34.1	45	**2:40**
Rupert A. Nock Middle School	90	15	6.0	47.5	8	**1:55**	34.1	45	**2:40**
Salisbury Elementary School	90	15	10.0	30.1	20	**2:05**	15.1	20	**2:25**
Dr. John C. Page School	90	15	3.5	3.8	55	**2:40**	23.0	33	**3:15**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Pentucket Regional High School	90	15	0.1	5.5	1	**1:50**	23.0	33	**2:25**
Pentucket Regional Middle School	90	15	0.1	5.5	1	**1:50**	23.0	33	**2:25**
MASSACHUSETTS DAYCARES									
Amesbury Country Day School	90	15	6.8	17.3	24	**2:10**	12.2	16	**2:30**
James Place The Next Generation	90	15	5.6	19.9	17	**2:05**	12.2	16	**2:25**
Leaps and Bounds Pre-School	90	15	5.4	55.0	6	**1:55**	12.2	16	**2:15**
Leaps and Bounds Pre-School	90	15	5.4	55.0	6	**1:55**	12.2	16	**2:15**
Little Sprouts Daycare	90	15	5.4	22.4	14	**2:00**	12.2	16	**2:20**
Windmill Country Day School	90	15	5.3	33.9	9	**1:55**	12.2	16	**2:15**
Little People's Pre-School	90	15	0.9	41.7	1	**1:50**	22.7	30	**2:20**
Creative Playhouse	90	15	0.9	55.0	1	**1:50**	21.0	28	**2:20**
Bright Horizons at Newburyport	90	15	5.7	48.9	7	**1:55**	34.1	45	**2:40**
Community Action, Inc. Newburyport Head Start	90	15	6.6	41.4	10	**1:55**	34.1	45	**2:40**
Kinder Care Learning Center	90	15	6.6	49.3	8	**1:55**	34.1	45	**2:40**
Kindercare Learning Center	90	15	5.4	3.4	95	**3:20**	34.1	45	**4:05**
Knoll Edge Nursery	90	15	6.2	49.7	7	**1:55**	34.1	45	**2:40**
Knoll Edge Too!	90	15	5.7	49.7	7	**1:55**	34.1	45	**2:40**
Mrs Murray's Nursery School	90	15	6.3	37.4	10	**1:55**	34.1	45	**2:40**
Newburyport Montessori School	90	15	8.2	41.9	12	**2:00**	34.1	45	**2:45**
YWCA - School's Out Program	90	15	7.9	49.7	10	**1:55**	34.1	45	**2:40**
New Beginnings Learning Center	90	15	8.5	55.0	9	**1:55**	15.1	20	**2:15**
Children's Castle	90	15	3.5	3.8	55	**2:40**	23.0	33	**3:15**
Koinonia PreSchool	90	15	1.5	3.7	24	**2:10**	23.0	33	**2:45**
Learning Tree Preschool	90	15	2.5	3.7	41	**2:30**	23.0	33	**3:05**
Pathways for Learning Preschool	90	15	1.1	5.0	13	**2:00**	23.0	33	**2:35**
MASSACHUSETTS DAY CAMPS									
Camp Bauercrest	90	15	3.5	18.8	11	**2:00**	25.9	35	**2:35**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
James Place	90	15	5.6	19.9	17	**2:05**	12.2	16	**2:25**
Tosh Farrell Soccer Development	90	15	5.4	22.4	14	**2:00**	12.2	16	**2:20**
US Sports Institute	90	15	5.9	36.0	10	**1:55**	12.2	16	**2:15**
Governor's Academy	90	15	0.6	44.0	1	**1:50**	21.1	28	**2:20**
Clipper Girls Basketball Camp	90	15	5.4	3.4	95	**3:20**	34.1	45	**4:05**
Coastal Discoveries Marine	90	15	8.3	41.9	12	**2:00**	34.1	45	**2:45**
Joppa Flats Summer Camp	90	15	3.7	28.4	8	**1:55**	21.1	28	**2:25**
Metro Rock Climbing Camps	90	15	5.7	49.7	7	**1:55**	34.1	45	**2:40**
YWCA Scamper Camp	90	15	8.3	41.9	12	**2:00**	34.1	45	**2:45**
Koinonia Day Camp	90	15	1.5	3.7	24	**2:10**	23.0	33	**2:45**
					MA Maximum:	**3:20**		**MA Maximum:**	**4:05**
					MA Average:	**1:05**		**MA Average:**	**2:40**
NEW HAMPSHIRE SCHOOLS									
Brentwood Christian Academy	90	15	4.5	47.9	6	**1:55**	25.6	34	**2:30**
Seacoast Learning Collaborative	90	15	1.3	7.4	11	**2:00**	24.7	33	**2:35**
Swasey Elementary	90	15	3.6	8.4	26	**2:15**	23.8	32	**2:50**
East Kingston Elementary School	90	15	6.9	17.4	24	**2:10**	25.6	34	**2:45**
Exeter Classical Christian School	90	15	6.2	7.0	53	**2:40**	24.7	33	**3:15**
Exeter High School	90	15	2.8	10.7	16	**2:05**	24.7	33	**2:40**
Great Bay e-Learning Charter School	90	15	5.9	5.7	62	**2:50**	24.7	33	**3:25**
Lincoln Street Elementary School	90	15	5.9	5.7	62	**2:50**	24.7	33	**3:25**
Main Street School	90	15	5.9	6.9	51	**2:40**	24.7	33	**3:15**
Phillips Exeter Academy	90	15	6.0	7.1	51	**2:40**	24.7	33	**3:15**
Greenland Central School	90	15	6.1	2.5	148	**4:15**	8.2	11	**4:30**
Hampton Academy	90	15	13.3	5.4	148	**4:15**	8.2	11	**4:30**
Hampton Centre School	90	15	13.1	5.4	145	**4:10**	8.2	11	**4:25**
Marston School	90	15	13.3	5.4	147	**4:15**	8.2	11	**4:30**
Sacred Heart School	90	15	13.2	5.3	150	**4:15**	8.2	11	**4:30**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Winnacunnet Reg. High School	90	15	13.2	5.4	148	**4:15**	8.2	11	**4:30**
Heronfield Academy	90	15	14.0	5.1	164	**4:30**	8.2	11	**4:45**
Lincoln Akerman School	90	15	15.3	6.2	148	**4:15**	8.2	11	**4:30**
Kensington Elementary School	90	15	10.3	5.1	120	**3:45**	24.7	33	**4:20**
Daniel J. Bakie School	90	15	3.0	39.9	5	**1:50**	25.6	34	**2:25**
Sanborn Regional High School	90	15	1.2	50.2	1	**1:50**	27.5	37	**2:30**
Seacoast Charter School	90	15	2.7	39.9	4	**1:50**	25.6	34	**2:25**
Maude H. Trefethen School	90	15	5.8	3.6	97	**3:25**	8.2	11	**3:40**
Newfields Elementary School	90	15	8.0	9.4	51	**2:40**	24.7	33	**3:15**
Memorial Elementary School	90	15	8.6	40.6	13	**2:00**	25.6	34	**2:35**
Sanborn Regional Middle School	90	15	8.6	50.2	10	**1:55**	25.6	34	**2:30**
North Hampton Elementary School	90	15	10.4	4.4	143	**4:10**	8.2	11	**4:25**
Dondero School	90	15	4.6	2.7	104	**3:30**	18.4	25	**3:55**
Little Harbor School	90	15	4.1	3.9	63	**2:50**	18.4	25	**3:15**
New Franklin School	90	15	2.3	5.9	23	**2:10**	18.4	25	**2:35**
Portsmouth High School	90	15	3.2	4.1	47	**2:35**	18.4	25	**3:00**
Portsmouth Middle School	90	15	3.5	4.9	42	**2:30**	18.4	25	**2:55**
Robert J. Lister Academy	90	15	2.7	2.2	72	**3:00**	18.4	25	**3:25**
St Patrick's School	90	15	2.8	4.9	35	**2:20**	18.4	25	**2:45**
Learning Skills Academy	90	15	7.1	3.0	142	**4:10**	8.2	11	**4:25**
Rye Elementary School	90	15	6.5	2.7	146	**4:15**	8.2	11	**4:30**
Rye Junior High School	90	15	6.9	2.7	151	**4:20**	8.2	11	**4:35**
Seabrook Elementary School	90	15	18.6	12.4	90	**3:15**	24.7	33	**3:50**
Seabrook Middle School	90	15	18.6	12.4	90	**3:15**	24.7	33	**3:50**
Barnard School	90	15	9.5	29.2	20	**2:05**	25.6	34	**2:40**
Seventh Day Adventist Elementary School	90	15	9.5	29.2	20	**2:05**	25.6	34	**2:40**
Acorn School	90	15	11.0	4.0	166	**4:35**	24.7	33	**5:10**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Cooperative Middle School	90	15	8.5	6.2	83	**3:10**	24.7	33	**3:45**
Cornerstone Christian Academy	90	15	9.3	4.6	122	**3:50**	24.7	33	**4:25**
Stratham Memorial School	90	15	11.9	4.9	146	**4:15**	24.7	33	**4:50**
The Cornerstone School	90	15	11.8	4.2	168	**4:35**	24.7	33	**5:10**
NEW HAMPSHIRE DAYCARES									
A Place To Grow	90	15	1.2	36.8	2	**1:50**	23.8	32	**2:25**
Appleseeds Day School	90	15	10.2	4.6	133	**4:00**	24.7	33	**4:35**
Building Block School	90	15	7.4	6.2	72	**3:00**	24.7	33	**3:35**
De Colores Children's Center	90	15	5.0	6.6	45	**2:30**	24.7	33	**3:05**
Exeter Day School	90	15	7.9	4.6	104	**3:30**	24.7	33	**4:05**
Exter Child Care Center/Great Bay Kid's Company	90	15	5.9	5.8	61	**2:50**	24.7	33	**3:25**
Great Bay Kids Company	90	15	5.9	6.9	51	**2:40**	24.7	33	**3:15**
Great Bay Kids Company	90	15	5.9	6.9	51	**2:40**	24.7	33	**3:15**
Montessori School for the Arts & Sciences	90	15	6.2	7.5	50	**2:35**	24.7	33	**3:10**
Community School of SAU 50/Greenland Peak	90	15	6.1	2.5	148	**4:15**	8.2	11	**4:30**
Greenland Live Y'ers	90	15	6.9	2.7	151	**4:20**	8.2	11	**4:35**
Kaleidoscope Home Childcare	90	15	5.8	2.4	147	**4:15**	8.2	11	**4:30**
Fun After School Program	90	15	14.7	5.8	152	**4:20**	8.2	11	**4:35**
Kids Stop Inc	90	15	12.5	5.0	149	**4:15**	8.2	11	**4:30**
My First School	90	15	13.3	5.4	148	**4:15**	8.2	11	**4:30**
Sandbox Preschool Day Care	90	15	11.3	4.6	149	**4:15**	8.2	11	**4:30**
Village Preschool	90	15	13.2	5.3	150	**4:15**	8.2	11	**4:30**
Hampton Falls Child Care Center	90	15	15.0	6.0	150	**4:15**	8.2	11	**4:30**
Robin's Childsplace	90	15	15.1	6.2	147	**4:15**	8.2	11	**4:30**
Seacoast Head Start	90	15	14.9	6.0	149	**4:15**	8.2	11	**4:30**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Bright Start Early Learning	90	15	2.0	48.6	2	**1:50**	25.6	34	**2:25**
Kingston Children's Center	90	15	2.7	39.9	4	**1:50**	25.6	34	**2:25**
Story Brook Station Day School & Offspring Kids	90	15	2.2	48.6	3	**1:50**	25.6	34	**2:25**
Gateway to Learning	90	15	5.9	9.8	36	**2:25**	24.7	33	**3:00**
Nurture & Nature Children Center	90	15	7.1	9.2	46	**2:35**	24.7	33	**3:10**
Newton Learning Center	90	15	2.4	5.3	27	**2:15**	36.7	49	**3:05**
Imprint's Day School	90	15	7.8	3.2	144	**4:10**	8.2	11	**4:25**
Chase Home For Children	90	15	4.0	4.4	55	**2:40**	18.4	25	**3:05**
Children's Garden School	90	15	3.4	4.6	44	**2:30**	18.4	25	**2:55**
Community Child Care Center of Portsmouth	90	15	4.9	2.7	108	**3:35**	18.4	25	**4:00**
Community Day Care Center	90	15	1.8	6.4	17	**2:05**	18.4	25	**2:30**
Discovery Child Enrichment Center	90	15	1.2	8.6	8	**1:55**	18.4	25	**2:20**
Dondero Peak Program	90	15	4.6	2.7	104	**3:30**	18.4	25	**3:55**
Early Learning Center at Temple Israel Preschool	90	15	2.5	2.9	51	**2:40**	18.5	25	**3:05**
Edgewood Early Learning Center	90	15	3.5	4.0	53	**2:40**	18.4	25	**3:05**
Kathleen Tostenson	90	15	2.1	6.4	20	**2:05**	18.4	25	**2:30**
Kindercare Learning Center	90	15	5.4	3.4	95	**3:20**	34.1	45	**4:05**
Little Blessings Day Care	90	15	3.5	3.4	61	**2:50**	18.4	25	**3:15**
Little Harbour Peak Program	90	15	4.0	3.9	62	**2:50**	18.4	25	**3:15**
Live Y'ers Child Care Center	90	15	3.5	4.7	45	**2:30**	18.4	25	**2:55**
New Franklin Peak Program	90	15	2.3	5.9	23	**2:10**	18.4	25	**2:35**
Patricia Katkin	90	15	0.7	10.2	4	**1:50**	18.4	25	**2:15**
Pease Center - Great Bay Kids	90	15	1.6	12.4	8	**1:55**	18.4	25	**2:20**
PEEP School - Pre School	90	15	4.9	2.7	108	**3:35**	18.4	25	**4:00**
Place for Friends and Fun	90	15	4.3	2.6	100	**3:25**	18.4	25	**3:50**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Portsmouth Head Start	90	15	4.8	3.8	76	**3:05**	18.4	25	**3:30**
The Agape Preschool	90	15	3.0	4.1	44	**2:30**	18.4	25	**2:55**
Unalkaya	90	15	3.8	4.0	58	**2:45**	18.4	25	**3:10**
Children's House Montessori	90	15	5.3	2.7	117	**3:45**	8.2	11	**4:00**
Rye Country Day School	90	15	7.1	3.0	142	**4:10**	8.2	11	**4:25**
Over the Rainbow Day School	90	15	18.4	12.1	91	**3:20**	24.7	33	**3:55**
Bright Horizons at Timberland	90	15	9.7	50.0	12	**2:00**	24.7	33	**2:35**
Debbys Day Care	90	15	10.3	4.1	150	**4:15**	24.7	33	**4:50**
Four Pines Childcare	90	15	11.3	4.0	168	**4:35**	24.7	33	**5:10**
Polka Dots Child Care Center	90	15	7.0	6.3	67	**2:55**	24.7	33	**3:30**
Richie Mc Farland Children's Center	90	15	10.9	4.7	139	**4:05**	24.7	33	**4:40**
Stratham Circle Learning Center	90	15	8.4	4.4	115	**3:40**	24.7	33	**4:15**
NEW HAMPSHIRE DAY CAMPS									
YMCA Tricklin' Falls Day Camp	90	15	6.9	9.7	43	**2:30**	25.6	34	**3:05**
Long Tree Scout Reservation	90	15	2.5	50.2	3	**1:50**	27.5	37	**2:30**
YMCA Camp Lincoln Kingston	90	15	1.2	50.2	1	**1:50**	27.5	37	**2:30**
					NH Maximum:	**4:35**		**NH Maximum:**	**5:10**
					NH Average:	**3:10**		**NH Average:**	**3:35**

Table 8-11. School Evacuation Time Estimates - Rain

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
MASSACHUSETTS SCHOOLS									
Amesbury Academy Charter Public School	100	20	5.8	14.9	23	**2:25**	12.2	18	**2:45**
Amesbury Elementary School	100	20	6.5	15.3	26	**2:30**	12.2	18	**2:50**
Amesbury High School	100	20	5.5	33.0	10	**2:10**	12.2	18	**2:30**
Amesbury Middle School	100	20	5.4	30.2	11	**2:15**	12.2	18	**2:35**
Cashman School	100	20	5.9	33.0	11	**2:15**	12.2	18	**2:35**
Sparhawk High School	100	20	5.6	30.2	11	**2:15**	12.2	18	**2:35**
Sparhawk School	100	20	6.4	30.2	13	**2:15**	12.2	18	**2:35**
Dr. FN Sweetsir School	100	20	2.2	9.0	15	**2:15**	22.7	34	**2:50**
Helen R. Donaghue School	100	20	1.1	7.5	9	**2:10**	22.7	34	**2:45**
Newbury Elementary School	100	20	3.7	24.7	9	**2:10**	21.1	32	**2:45**
The Governor's Academy	100	20	0.6	38.6	1	**2:05**	21.1	32	**2:40**
Triton Regional Middle School and High School	100	20	2.6	44.5	4	**2:05**	21.0	32	**2:40**
Bresnahan Elementary School	100	20	6.4	44.7	9	**2:10**	34.1	51	**3:05**
Coastal Alternative School	100	20	5.8	45.6	8	**2:10**	34.1	51	**3:05**
DARE Family Services	100	20	5.4	3.6	91	**3:35**	34.1	51	**4:30**
E.G. Molin Upper Elementary School	100	20	6.0	26.0	14	**2:15**	34.1	51	**3:10**
G.W. Brown School	100	20	8.6	46.2	11	**2:15**	34.1	51	**3:10**
Immaculate Conception School	100	20	8.2	46.2	11	**2:15**	34.1	51	**3:10**
Inn Street Montessori School	100	20	8.3	46.2	11	**2:15**	34.1	51	**3:10**
Newburyport High School	100	20	7.2	44.3	10	**2:10**	34.1	51	**3:05**
River Valley Charter School	100	20	6.0	44.8	8	**2:10**	34.1	51	**3:05**
Rupert A. Nock Middle School	100	20	6.0	44.3	8	**2:10**	34.1	51	**3:05**
Salisbury Elementary School	100	20	10.0	25.9	23	**2:25**	15.1	23	**2:50**
Dr. John C. Page School	100	20	3.5	3.8	55	**2:55**	23.0	37	**3:30**
Pentucket Regional High School	100	20	0.1	9.3	1	**2:05**	23.0	37	**2:40**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Pentucket Regional Middle School	100	20	0.1	9.3	1	**2:05**	23.0	37	**2:40**
MASSACHUSETTS DAYCARES									
Amesbury Country Day School	100	20	6.8	16.1	25	**2:25**	12.2	18	**2:45**
James Place The Next Generation	100	20	5.6	17.2	20	**2:20**	12.2	18	**2:40**
Leaps and Bounds Pre-School	100	20	5.4	50.0	6	**2:10**	12.2	18	**2:30**
Leaps and Bounds Pre-School	100	20	5.4	50.0	6	**2:10**	12.2	18	**2:30**
Little Sprouts Daycare	100	20	5.4	21.3	15	**2:15**	12.2	18	**2:35**
Windmill Country Day School	100	20	5.3	30.2	11	**2:15**	12.2	18	**2:35**
Little People's Pre-School	100	20	0.9	7.5	7	**2:10**	22.7	34	**2:45**
Creative Playhouse	100	20	0.9	50.0	1	**2:05**	21.0	32	**2:40**
Bright Horizons at Newburyport	100	20	5.7	45.6	8	**2:10**	34.1	51	**3:05**
Community Action, Inc. Newburyport Head Start	100	20	6.6	44.4	9	**2:10**	34.1	51	**3:05**
Kinder Care Learning Center	100	20	6.6	47.1	8	**2:10**	34.1	51	**3:05**
Kindercare Learning Center	100	20	5.4	3.6	91	**3:35**	34.1	51	**4:30**
Knoll Edge Nursery	100	20	6.2	46.1	8	**2:10**	34.1	51	**3:05**
Knoll Edge Too!	100	20	5.7	46.1	7	**2:10**	34.1	51	**3:05**
Mrs Murray's Nursery School	100	20	6.3	34.3	11	**2:15**	34.1	51	**3:10**
Newburyport Montessori School	100	20	8.2	46.2	11	**2:15**	34.1	51	**3:10**
YWCA - School's Out Program	100	20	7.9	49.5	10	**2:10**	34.1	51	**3:05**
New Beginnings Learning Center	100	20	8.5	50.0	10	**2:10**	15.1	23	**2:35**
Children's Castle	100	20	3.5	3.8	55	**2:55**	23.0	37	**3:30**
Koinonia PreSchool	100	20	1.5	3.3	27	**2:30**	23.0	37	**3:05**
Learning Tree Preschool	100	20	2.5	3.3	45	**2:45**	23.0	37	**3:20**
Pathways for Learning Preschool	100	20	1.1	5.2	13	**2:15**	23.0	37	**2:50**
MASSACHUSETTS DAY CAMPS									
Camp Bauercrest	100	20	3.5	16.0	13	**2:15**	25.9	39	**2:55**
James Place	100	20	5.6	17.2	20	**2:20**	12.2	18	**2:40**
Tosh Farrell Soccer Development	100	20	5.4	21.3	15	**2:15**	12.2	18	**2:35**
US Sports Institute	100	20	5.9	33.0	11	**2:15**	12.2	18	**2:35**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Governor's Academy	100	20	0.6	38.6	1	**2:05**	21.1	32	**2:40**
Clipper Girls Basketball Camp	100	20	5.4	3.6	91	**3:35**	34.1	51	**4:30**
Coastal Discoveries Marine	100	20	8.3	46.2	11	**2:15**	34.1	51	**3:10**
Joppa Flats Summer Camp	100	20	3.7	24.7	9	**2:10**	21.1	32	**2:45**
Metro Rock Climbing Camps	100	20	5.7	46.1	7	**2:10**	34.1	51	**3:05**
YWCA Scamper Camp	100	20	8.3	46.2	11	**2:15**	34.1	51	**3:10**
Koinonia Day Camp	100	20	1.5	3.3	27	**2:30**	23.0	37	**3:05**
					MA Maximum:	**3:35**		**MA Maximum:**	**4:30**
					MA Average:	**2:20**		**MA Average:**	**3:00**
NEW HAMPSHIRE SCHOOLS									
Brentwood Christian Academy	100	20	4.5	41.7	6	**2:10**	25.6	38	**2:50**
Seacoast Learning Collaborative	100	20	1.3	7.5	10	**2:10**	24.7	37	**2:50**
Swasey Elementary	100	20	3.6	5.9	37	**2:40**	23.8	36	**3:20**
East Kingston Elementary School	100	20	6.9	9.9	42	**2:45**	25.6	38	**3:25**
Exeter Classical Christian School	100	20	6.2	4.1	91	**3:35**	24.7	37	**4:15**
Exeter High School	100	20	2.8	10.6	16	**2:20**	24.7	37	**3:00**
Great Bay e-Learning Charter School	100	20	5.9	3.9	90	**3:30**	24.7	37	**4:10**
Lincoln Street Elementary School	100	20	5.9	3.9	90	**3:30**	24.7	37	**4:10**
Main Street School	100	20	5.9	3.9	90	**3:30**	24.7	37	**4:10**
Phillips Exeter Academy	100	20	6.0	4.0	90	**3:30**	24.7	37	**4:10**
Greenland Central School	100	20	6.1	2.6	140	**4:20**	8.2	12	**4:35**
Hampton Academy	100	20	13.3	6.1	131	**4:15**	8.2	12	**4:30**
Hampton Centre School	100	20	13.1	5.8	135	**4:15**	8.2	12	**4:30**
Marston School	100	20	13.3	6.0	134	**4:15**	8.2	12	**4:30**
Sacred Heart School	100	20	13.2	6.0	133	**4:15**	8.2	12	**4:30**
Winnacunnet Reg. High School	100	20	13.2	6.0	132	**4:15**	8.2	12	**4:30**
Heronfield Academy	100	20	14.0	4.7	180	**5:00**	8.2	12	**5:15**
Lincoln Akerman School	100	20	15.3	6.8	136	**4:20**	8.2	12	**4:35**
Kensington Elementary School	100	20	10.3	4.6	136	**4:20**	24.7	37	**5:00**
Daniel J. Bakie School	100	20	3.0	37.7	5	**2:05**	25.6	38	**2:45**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Sanborn Regional High School	100	20	1.2	45.9	2	**2:05**	27.5	41	**2:50**
Seacoast Charter School	100	20	2.7	37.7	4	**2:05**	25.6	38	**2:45**
Maude H. Trefethen School	100	20	5.8	3.8	92	**3:35**	8.2	12	**3:50**
Newfields Elementary School	100	20	8.0	8.4	57	**3:00**	24.7	37	**3:40**
Memorial Elementary School	100	20	8.6	37.6	14	**2:15**	25.6	38	**2:55**
Sanborn Regional Middle School	100	20	8.6	45.9	11	**2:15**	25.6	38	**2:55**
North Hampton Elementary School	100	20	10.4	4.9	128	**4:10**	8.2	12	**4:25**
Dondero School	100	20	4.6	2.8	97	**3:40**	18.4	28	**4:10**
Little Harbor School	100	20	4.1	3.7	67	**3:10**	18.4	28	**3:40**
New Franklin School	100	20	2.3	6.4	22	**2:25**	18.4	28	**2:55**
Portsmouth High School	100	20	3.2	3.8	50	**2:50**	18.4	28	**3:20**
Portsmouth Middle School	100	20	3.5	4.4	48	**2:50**	18.4	28	**3:20**
Robert J. Lister Academy	100	20	2.7	2.3	70	**3:10**	18.4	28	**3:40**
St Patrick's School	100	20	2.8	4.9	34	**2:35**	18.4	28	**3:05**
Learning Skills Academy	100	20	7.1	3.3	128	**4:10**	8.2	12	**4:25**
Rye Elementary School	100	20	6.5	2.8	139	**4:20**	8.2	12	**4:35**
Rye Junior High School	100	20	6.9	3.0	139	**4:20**	8.2	12	**4:35**
Seabrook Elementary School	100	20	18.6	11.8	94	**3:35**	24.7	37	**4:15**
Seabrook Middle School	100	20	18.6	11.8	94	**3:35**	24.7	37	**4:15**
Barnard School	100	20	9.5	20.9	27	**2:30**	25.6	38	**3:10**
Seventh Day Adventist Elementary School	100	20	9.5	20.9	27	**2:30**	25.6	38	**3:10**
Acorn School	100	20	11.0	3.6	182	**5:05**	24.7	37	**5:45**
Cooperative Middle School	100	20	8.5	6.1	84	**3:25**	24.7	37	**4:05**
Cornerstone Christian Academy	100	20	9.3	3.4	164	**4:45**	24.7	37	**5:25**
Stratham Memorial School	100	20	11.9	4.0	179	**5:00**	24.7	37	**5:40**
The Cornerstone School	100	20	11.8	3.7	189	**5:10**	24.7	37	**5:50**
NEW HAMPSHIRE DAYCARES									
A Place To Grow	100	20	1.2	49.0	1	**2:05**	23.8	36	**2:45**
Appleseeds Day School	100	20	10.2	4.2	147	**4:30**	24.7	37	**5:10**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Building Block School	100	20	7.4	4.3	102	**3:45**	24.7	37	**4:25**
De Colores Children's Center	100	20	5.0	4.5	67	**3:10**	24.7	37	**3:50**
Exeter Day School	100	20	7.9	4.4	107	**3:50**	24.7	37	**4:30**
Exter Child Care Center/Great Bay Kid's Company	100	20	5.9	4.0	89	**3:30**	24.7	37	**4:10**
Great Bay Kids Company	100	20	5.9	3.9	90	**3:30**	24.7	37	**4:10**
Great Bay Kids Company	100	20	5.9	3.9	90	**3:30**	24.7	37	**4:10**
Montessori School for the Arts & Sciences	100	20	6.2	6.2	60	**3:00**	24.7	37	**3:40**
Community School of SAU 50/Greenland Peak	100	20	6.1	2.6	140	**4:20**	8.2	12	**4:35**
Greenland Live Y'ers	100	20	6.9	2.9	144	**4:25**	8.2	12	**4:40**
Kaleidoscope Home Childcare	100	20	5.8	2.6	133	**4:15**	8.2	12	**4:30**
Fun After School Program	100	20	14.7	6.2	142	**4:25**	8.2	12	**4:40**
Kids Stop Inc	100	20	12.5	5.7	132	**4:15**	8.2	12	**4:30**
My First School	100	20	13.3	6.1	131	**4:15**	8.2	12	**4:30**
Sandbox Preschool Day Care	100	20	11.3	5.0	134	**4:15**	8.2	12	**4:30**
Village Preschool	100	20	13.2	6.0	133	**4:15**	8.2	12	**4:30**
Hampton Falls Child Care Center	100	20	15.0	6.7	134	**4:15**	8.2	12	**4:30**
Robin's Childsplace	100	20	15.1	6.7	135	**4:15**	8.2	12	**4:30**
Seacoast Head Start	100	20	14.9	6.7	133	**4:15**	8.2	12	**4:30**
Bright Start Early Learning	100	20	2.0	43.8	3	**2:05**	25.6	38	**2:45**
Kingston Children's Center	100	20	2.7	37.7	4	**2:05**	25.6	38	**2:45**
Story Brook Station Day School & Offspring Kids	100	20	2.2	43.8	3	**2:05**	25.6	38	**2:45**
Gateway to Learning	100	20	5.9	9.0	39	**2:40**	24.7	37	**3:20**
Nurture & Nature Children Center	100	20	7.1	8.4	51	**2:55**	24.7	37	**3:35**
Newton Learning Center	100	20	2.4	4.0	36	**2:40**	36.7	55	**3:35**
Imprint's Day School	100	20	7.8	3.7	127	**4:10**	8.2	12	**4:25**
Chase Home For Children	100	20	4.0	4.2	58	**3:00**	18.4	28	**3:30**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Children's Garden School	100	20	3.4	4.3	47	**2:50**	18.4	28	**3:20**
Community Child Care Center of Portsmouth	100	20	4.9	2.9	101	**3:45**	18.4	28	**4:15**
Community Day Care Center	100	20	1.8	6.4	17	**2:20**	18.4	28	**2:50**
Discovery Child Enrichment Center	100	20	1.2	7.4	10	**2:10**	18.4	28	**2:40**
Dondero Peak Program	100	20	4.6	2.8	97	**3:40**	18.4	28	**4:10**
Early Learning Center at Temple Israel Preschool	100	20	2.5	10.2	15	**2:15**	18.5	28	**2:45**
Edgewood Early Learning Center	100	20	3.5	3.7	57	**3:00**	18.4	28	**3:30**
Kathleen Tostenson	100	20	2.1	6.4	20	**2:20**	18.4	28	**2:50**
Kindercare Learning Center	100	20	5.4	3.6	91	**3:35**	34.1	51	**4:30**
Little Blessings Day Care	100	20	3.5	3.3	63	**3:05**	18.4	28	**3:35**
Little Harbour Peak Program	100	20	4.0	3.7	64	**3:05**	18.4	28	**3:35**
Live Y'ers Child Care Center	100	20	3.5	4.3	49	**2:50**	18.4	28	**3:20**
New Franklin Peak Program	100	20	2.3	6.4	22	**2:25**	18.4	28	**2:55**
Patricia Katkin	100	20	0.7	13.6	3	**2:05**	18.4	28	**2:35**
Pease Center - Great Bay Kids	100	20	1.6	10.7	9	**2:10**	18.4	28	**2:40**
PEEP School - Pre School	100	20	4.9	2.9	101	**3:45**	18.4	28	**4:15**
Place for Friends and Fun	100	20	4.3	2.8	91	**3:35**	18.4	28	**4:05**
Portsmouth Head Start	100	20	4.8	3.8	76	**3:20**	18.4	28	**3:50**
The Agape Preschool	100	20	3.0	3.8	47	**2:50**	18.4	28	**3:20**
Unalkaya	100	20	3.8	3.7	61	**3:05**	18.4	28	**3:35**
Children's House Montessori	100	20	5.3	2.8	115	**3:55**	8.2	12	**4:10**
Rye Country Day School	100	20	7.1	3.3	128	**4:10**	8.2	12	**4:25**
Over the Rainbow Day School	100	20	18.4	11.7	95	**3:35**	24.7	37	**4:15**
Bright Horizons at Timberland	100	20	9.7	45.9	13	**2:15**	24.7	37	**2:55**
Debbys Day Care	100	20	10.3	3.4	180	**5:00**	24.7	37	**5:40**
Four Pines Childcare	100	20	11.3	3.6	189	**5:10**	24.7	37	**5:50**
Polka Dots Child Care Center	100	20	7.0	5.8	72	**3:15**	24.7	37	**3:55**
Richie Mc Farland Children's Center	100	20	10.9	3.7	175	**4:55**	24.7	37	**5:35**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Stratham Circle Learning Center	100	20	8.4	3.5	144	**4:25**	24.7	37	**5:05**
NEW HAMPSHIRE DAY CAMPS									
YMCA Tricklin' Falls Day Camp	100	20	6.9	9.0	46	**2:50**	25.6	38	**3:30**
Long Tree Scout Reservation	100	20	2.5	45.9	3	**2:05**	27.5	41	**2:50**
YMCA Camp Lincoln Kingston	100	20	1.2	45.9	2	**2:05**	27.5	41	**2:50**
					NH Maximum:	**5:10**		**NH Maximum:**	**5:50**
					NH Average:	**3:25**		**NH Average:**	**3:55**

Table 8-12. School Evacuation Time Estimates - Snow

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
MASSACHUSETTS SCHOOLS									
Amesbury Academy Charter Public School	110	25	5.8	18.4	19	**2:35**	12.2	21	**3:00**
Amesbury Elementary School	110	25	6.5	17.4	22	**2:40**	12.2	21	**3:05**
Amesbury High School	110	25	5.5	31.3	11	**2:30**	12.2	21	**2:55**
Amesbury Middle School	110	25	5.4	29.8	11	**2:30**	12.2	21	**2:55**
Cashman School	110	25	5.9	31.3	11	**2:30**	12.2	21	**2:55**
Sparhawk High School	110	25	5.6	29.8	11	**2:30**	12.2	21	**2:55**
Sparhawk School	110	25	6.4	29.8	13	**2:30**	12.2	21	**2:55**
Dr. FN Sweetsir School	110	25	2.2	6.8	19	**2:35**	22.7	39	**3:15**
Helen R. Donaghue School	110	25	1.1	4.9	14	**2:30**	22.7	39	**3:10**
Newbury Elementary School	110	25	3.7	22.7	10	**2:25**	21.1	36	**3:05**
The Governor's Academy	110	25	0.6	37.4	1	**2:20**	21.1	36	**3:00**
Triton Regional Middle School and High School	110	25	2.6	39.6	4	**2:20**	21.0	36	**3:00**
Bresnahan Elementary School	110	25	6.4	44.0	9	**2:25**	34.1	58	**3:25**
Coastal Alternative School	110	25	5.8	40.9	9	**2:25**	34.1	58	**3:25**
DARE Family Services	110	25	5.4	2.9	113	**4:10**	34.1	58	**5:10**
E.G. Molin Upper Elementary School	110	25	6.0	22.7	16	**2:35**	34.1	58	**3:35**
G.W. Brown School	110	25	8.6	44.0	12	**2:30**	34.1	58	**3:30**
Immaculate Conception School	110	25	8.2	44.0	11	**2:30**	34.1	58	**3:30**
Inn Street Montessori School	110	25	8.3	44.0	11	**2:30**	34.1	58	**3:30**
Newburyport High School	110	25	7.2	39.8	11	**2:30**	34.1	58	**3:30**
River Valley Charter School	110	25	6.0	40.2	9	**2:25**	34.1	58	**3:25**
Rupert A. Nock Middle School	110	25	6.0	39.8	9	**2:25**	34.1	58	**3:25**
Salisbury Elementary School	110	25	10.0	22.3	27	**2:45**	15.1	26	**3:15**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Dr. John C. Page School	110	25	3.5	4.1	51	**3:10**	23.0	43	**3:50**
Pentucket Regional High School	110	25	0.1	6.1	1	**2:20**	23.0	43	**3:00**
Pentucket Regional Middle School	110	25	0.1	6.1	1	**2:20**	23.0	43	**3:00**
MASSACHUSETTS DAYCARES									
Amesbury Country Day School	110	25	6.8	18.1	23	**2:40**	12.2	21	**3:05**
James Place The Next Generation	110	25	5.6	22.4	15	**2:30**	12.2	21	**2:55**
Leaps and Bounds Pre-School	110	25	5.4	44.0	7	**2:25**	12.2	21	**2:50**
Leaps and Bounds Pre-School	110	25	5.4	44.0	7	**2:25**	12.2	21	**2:50**
Little Sprouts Daycare	110	25	5.4	24.4	13	**2:30**	12.2	21	**2:55**
Windmill Country Day School	110	25	5.3	29.8	11	**2:30**	12.2	21	**2:55**
Little People's Pre-School	110	25	0.9	4.9	11	**2:30**	22.7	39	**3:10**
Creative Playhouse	110	25	0.9	44.0	1	**2:20**	21.0	36	**3:00**
Bright Horizons at Newburyport	110	25	5.7	40.9	8	**2:25**	34.1	58	**3:25**
Community Action, Inc. Newburyport Head Start	110	25	6.6	44.0	9	**2:25**	34.1	58	**3:25**
Kinder Care Learning Center	110	25	6.6	44.0	9	**2:25**	34.1	58	**3:25**
Kindercare Learning Center	110	25	5.4	2.9	113	**4:10**	34.1	58	**5:10**
Knoll Edge Nursery	110	25	6.2	41.3	9	**2:25**	34.1	58	**3:25**
Knoll Edge Too!	110	25	5.7	41.3	8	**2:25**	34.1	58	**3:25**
Mrs Murray's Nursery School	110	25	6.3	30.5	12	**2:30**	34.1	58	**3:30**
Newburyport Montessori School	110	25	8.2	44.0	11	**2:30**	34.1	58	**3:30**
YWCA - School's Out Program	110	25	7.9	43.9	11	**2:30**	34.1	58	**3:30**
New Beginnings Learning Center	110	25	8.5	44.0	12	**2:30**	15.1	26	**3:00**
Children's Castle	110	25	3.5	4.1	51	**3:10**	23.0	43	**3:50**
Koinonia PreSchool	110	25	1.5	3.4	26	**2:45**	23.0	43	**3:25**
Learning Tree Preschool	110	25	2.5	3.4	44	**3:00**	23.0	43	**3:40**
Pathways for Learning Preschool	110	25	1.1	4.7	14	**2:30**	23.0	43	**3:10**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
MASSACHUSETTS DAY CAMPS									
Camp Bauercrest	110	25	3.5	22.6	9	**2:25**	25.9	44	**3:10**
James Place	110	25	5.6	22.4	15	**2:30**	12.2	21	**2:55**
Tosh Farrell Soccer Development	110	25	5.4	24.4	13	**2:30**	12.2	21	**2:55**
US Sports Institute	110	25	5.9	31.3	11	**2:30**	12.2	21	**2:55**
Governor's Academy	110	25	0.6	37.4	1	**2:20**	21.1	36	**3:00**
Clipper Girls Basketball Camp	110	25	5.4	2.9	113	**4:10**	34.1	58	**5:10**
Coastal Discoveries Marine	110	25	8.3	44.0	11	**2:30**	34.1	58	**3:30**
Joppa Flats Summer Camp	110	25	3.7	22.7	10	**2:25**	21.1	36	**3:05**
Metro Rock Climbing Camps	110	25	5.7	41.3	8	**2:25**	34.1	58	**3:25**
YWCA Scamper Camp	110	25	8.3	44.0	11	**2:30**	34.1	58	**3:30**
Koinonia Day Camp	110	25	1.5	3.4	26	**2:45**	23.0	43	**3:25**
					MA Maximum:	**4:10**		**MA Maximum:**	**5:10**
					MA Average:	**2:40**		**MA Average:**	**3:20**
NEW HAMPSHIRE SCHOOLS									
Brentwood Christian Academy	110	25	4.5	22.3	12	**2:30**	25.6	44	**3:15**
Seacoast Learning Collaborative	110	25	1.3	8.3	9	**2:25**	24.7	42	**3:10**
Swasey Elementary	110	25	3.6	9.7	22	**2:40**	23.8	41	**3:25**
East Kingston Elementary School	110	25	6.9	9.2	45	**3:00**	25.6	44	**3:45**
Exeter Classical Christian School	110	25	6.2	4.1	91	**3:50**	24.7	42	**4:35**
Exeter High School	110	25	2.8	11.2	15	**2:30**	24.7	42	**3:15**
Great Bay e-Learning Charter School	110	25	5.9	3.8	94	**3:50**	24.7	42	**4:35**
Lincoln Street Elementary School	110	25	5.9	3.8	94	**3:50**	24.7	42	**4:35**
Main Street School	110	25	5.9	4.0	89	**3:45**	24.7	42	**4:30**
Phillips Exeter Academy	110	25	6.0	4.1	88	**3:45**	24.7	42	**4:30**
Greenland Central School	110	25	6.1	2.7	136	**4:35**	8.2	14	**4:50**
Hampton Academy	110	25	13.3	5.5	144	**4:40**	8.2	14	**4:55**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Hampton Centre School	110	25	13.1	5.4	145	**4:40**	8.2	14	**4:55**
Marston School	110	25	13.3	5.4	148	**4:45**	8.2	14	**5:00**
Sacred Heart School	110	25	13.2	5.4	147	**4:45**	8.2	14	**5:00**
Winnacunnet Reg. High School	110	25	13.2	5.5	145	**4:40**	8.2	14	**4:55**
Heronfield Academy	110	25	14.0	4.1	206	**5:45**	8.2	14	**6:00**
Lincoln Akerman School	110	25	15.3	6.1	150	**4:45**	8.2	14	**5:00**
Kensington Elementary School	110	25	10.3	4.1	150	**4:45**	24.7	42	**5:30**
Daniel J. Bakie School	110	25	3.0	24.2	7	**2:25**	25.6	44	**3:10**
Sanborn Regional High School	110	25	1.2	40.4	2	**2:20**	27.5	47	**3:10**
Seacoast Charter School	110	25	2.7	24.2	7	**2:25**	25.6	44	**3:10**
Maude H. Trefethen School	110	25	5.8	3.1	112	**4:10**	8.2	14	**4:25**
Newfields Elementary School	110	25	8.0	6.6	73	**3:30**	24.7	42	**4:15**
Memorial Elementary School	110	25	8.6	25.3	20	**2:35**	25.6	44	**3:20**
Sanborn Regional Middle School	110	25	8.6	39.8	13	**2:30**	25.6	44	**3:15**
North Hampton Elementary School	110	25	10.4	4.0	154	**4:50**	8.2	14	**5:05**
Dondero School	110	25	4.6	2.4	117	**4:15**	18.4	32	**4:50**
Little Harbor School	110	25	4.1	3.1	79	**3:35**	18.4	32	**4:10**
New Franklin School	110	25	2.3	4.3	32	**2:50**	18.4	32	**3:25**
Portsmouth High School	110	25	3.2	3.0	64	**3:20**	18.4	32	**3:55**
Portsmouth Middle School	110	25	3.5	3.6	58	**3:15**	18.4	32	**3:50**
Robert J. Lister Academy	110	25	2.7	2.1	77	**3:35**	18.4	32	**4:10**
St Patrick's School	110	25	2.8	3.7	46	**3:05**	18.4	32	**3:40**
Learning Skills Academy	110	25	7.1	2.7	156	**4:55**	8.2	14	**5:10**
Rye Elementary School	110	25	6.5	2.5	158	**4:55**	8.2	14	**5:10**
Rye Junior High School	110	25	6.9	2.4	170	**5:05**	8.2	14	**5:20**
Seabrook Elementary School	110	25	18.6	10.1	110	**4:05**	24.7	42	**4:50**
Seabrook Middle School	110	25	18.6	10.1	110	**4:05**	24.7	42	**4:50**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Barnard School	110	25	9.5	16.8	34	**2:50**	25.6	44	**3:35**
Seventh Day Adventist Elementary School	110	25	9.5	16.8	34	**2:50**	25.6	44	**3:35**
Acorn School	110	25	11.0	3.3	198	**5:35**	24.7	42	**6:20**
Cooperative Middle School	110	25	8.5	5.5	93	**3:50**	24.7	42	**4:35**
Cornerstone Christian Academy	110	25	9.3	3.1	178	**5:15**	24.7	42	**6:00**
Stratham Memorial School	110	25	11.9	3.7	193	**5:30**	24.7	42	**6:15**
The Cornerstone School	110	25	11.8	3.6	194	**5:30**	24.7	42	**6:15**
NEW HAMPSHIRE DAYCARES									
A Place To Grow	110	25	1.2	43.8	2	**2:20**	23.8	41	**3:05**
Appleseeds Day School	110	25	10.2	3.6	172	**5:10**	24.7	42	**5:55**
Building Block School	110	25	7.4	3.8	117	**4:15**	24.7	42	**5:00**
De Colores Children's Center	110	25	5.0	3.8	79	**3:35**	24.7	42	**4:20**
Exeter Day School	110	25	7.9	3.7	130	**4:25**	24.7	42	**5:10**
Exter Child Care Center/Great Bay Kid's Company	110	25	5.9	3.8	94	**3:50**	24.7	42	**4:35**
Great Bay Kids Company	110	25	5.9	4.0	89	**3:45**	24.7	42	**4:30**
Great Bay Kids Company	110	25	5.9	4.0	89	**3:45**	24.7	42	**4:30**
Montessori School for the Arts & Sciences	110	25	6.2	4.5	83	**3:40**	24.7	42	**4:25**
Community School of SAU 50/Greenland Peak	110	25	6.1	2.7	136	**4:35**	8.2	14	**4:50**
Greenland Live Y'ers	110	25	6.9	2.9	144	**4:40**	8.2	14	**4:55**
Kaleidoscope Home Childcare	110	25	5.8	2.6	133	**4:30**	8.2	14	**4:45**
Fun After School Program	110	25	14.7	5.7	154	**4:50**	8.2	14	**5:05**
Kids Stop Inc	110	25	12.5	5.1	147	**4:45**	8.2	14	**5:00**
My First School	110	25	13.3	5.5	144	**4:40**	8.2	14	**4:55**
Sandbox Preschool Day Care	110	25	11.3	4.1	165	**5:00**	8.2	14	**5:15**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
Village Preschool	110	25	13.2	5.4	147	**4:45**	8.2	14	**5:00**
Hampton Falls Child Care Center	110	25	15.0	6.1	148	**4:45**	8.2	14	**5:00**
Robin's Childsplace	110	25	15.1	6.1	149	**4:45**	8.2	14	**5:00**
Seacoast Head Start	110	25	14.9	6.1	147	**4:45**	8.2	14	**5:00**
Bright Start Early Learning	110	25	2.0	36.7	3	**2:20**	25.6	44	**3:05**
Kingston Children's Center	110	25	2.7	24.2	7	**2:25**	25.6	44	**3:10**
Story Brook Station Day School & Offspring Kids	110	25	2.2	36.7	4	**2:20**	25.6	44	**3:05**
Gateway to Learning	110	25	5.9	7.7	46	**3:05**	24.7	42	**3:50**
Nurture & Nature Children Center	110	25	7.1	6.8	63	**3:20**	24.7	42	**4:05**
Newton Learning Center	110	25	2.4	3.8	38	**2:55**	36.7	63	**4:00**
Imprint's Day School	110	25	7.8	3.0	156	**4:55**	8.2	14	**5:10**
Chase Home For Children	110	25	4.0	3.3	74	**3:30**	18.4	32	**4:05**
Children's Garden School	110	25	3.4	3.3	62	**3:20**	18.4	32	**3:55**
Community Child Care Center of Portsmouth	110	25	4.9	2.4	122	**4:20**	18.4	32	**4:55**
Community Day Care Center	110	25	1.8	4.1	26	**2:45**	18.4	32	**3:20**
Discovery Child Enrichment Center	110	25	1.2	17.5	4	**2:20**	18.4	32	**2:55**
Dondero Peak Program	110	25	4.6	2.4	117	**4:15**	18.4	32	**4:50**
Early Learning Center at Temple Israel Preschool	110	25	2.5	3.2	47	**3:05**	18.5	32	**3:40**
Edgewood Early Learning Center	110	25	3.5	3.0	71	**3:30**	18.4	32	**4:05**
Kathleen Tostenson	110	25	2.1	4.3	29	**2:45**	18.4	32	**3:20**
Kindercare Learning Center	110	25	5.4	2.9	113	**4:10**	34.1	58	**5:10**
Little Blessings Day Care	110	25	3.5	2.7	77	**3:35**	18.4	32	**4:10**
Little Harbour Peak Program	110	25	4.0	3.0	80	**3:35**	18.4	32	**4:10**
Live Y'ers Child Care Center	110	25	3.5	3.4	63	**3:20**	18.4	32	**3:55**

School	Driver Mobilization Time (min)	Loading Time (min)	Dist. To EPZ Bdry (mi)	Average Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bdry to S.R.C./H.S. (mi.)	Travel Time from EPZ Bdry to S.R.C./H.S. (min)	ETE to S.R.C./H.S. (hr:min)
New Franklin Peak Program	110	25	2.3	4.3	32	**2:50**	18.4	32	**3:25**
Patricia Katkin	110	25	0.7	7.3	6	**2:25**	18.4	32	**3:00**
Pease Center - Great Bay Kids	110	25	1.6	20.2	5	**2:20**	18.4	32	**2:55**
PEEP School - Pre School	110	25	4.9	2.4	122	**4:20**	18.4	32	**4:55**
Place for Friends and Fun	110	25	4.3	2.3	111	**4:10**	18.4	32	**4:45**
Portsmouth Head Start	110	25	4.8	3.1	94	**3:50**	18.4	32	**4:25**
The Agape Preschool	110	25	3.0	3.1	59	**3:15**	18.4	32	**3:50**
Unalkaya	110	25	3.8	3.0	76	**3:35**	18.4	32	**4:10**
Children's House Montessori	110	25	5.3	2.6	125	**4:20**	8.2	14	**4:35**
Rye Country Day School	110	25	7.1	2.7	156	**4:55**	8.2	14	**5:10**
Over the Rainbow Day School	110	25	18.4	9.9	111	**4:10**	24.7	42	**4:55**
Bright Horizons at Timberland	110	25	9.7	41.0	14	**2:30**	24.7	42	**3:15**
Debbys Day Care	110	25	10.3	3.3	188	**5:25**	24.7	42	**6:10**
Four Pines Childcare	110	25	11.3	3.5	193	**5:30**	24.7	42	**6:15**
Polka Dots Child Care Center	110	25	7.0	4.8	87	**3:45**	24.7	42	**4:30**
Richie Mc Farland Children's Center	110	25	10.9	3.4	192	**5:30**	24.7	42	**6:15**
Stratham Circle Learning Center	110	25	8.4	3.0	169	**5:05**	24.7	42	**5:50**
NEW HAMPSHIRE DAY CAMPS									
YMCA Tricklin' Falls Day Camp	110	25	6.9	7.4	56	**3:15**	25.6	44	**4:00**
Long Tree Scout Reservation	110	25	2.5	40.4	4	**2:20**	27.5	47	**3:10**
YMCA Camp Lincoln Kingston	110	25	1.2	40.4	2	**2:20**	27.5	47	**3:10**
					NH Maximum:	**5:45**		**NH Maximum:**	**6:20**
					NH Average:	**3:50**		**NH Average:**	**4:25**

Table 8-13. Summary of Transit-Dependent Bus Routes

Route	No. of Buses	Route Description	Length (mi.)
Amesbury	11	Solid line routes represented in MA public information calendar.	31.1
Brentwood	3	Solid line routes represented in NH public information calendar.	35.4
East Kingston	2	Solid line routes represented in NH public information calendar. Pick up locations at the intersection of Forest Drive and Willow Rd, Willow Rd and Depot Rd (Rt 107), and the intersection of Giles Rd and North Rd (Rt 108).	4.9
Exeter	9	Solid line routes represented in NH public information calendar. Pick up locations at Exeter Parks and Recreation Complex, Deep Meadow Variety Store, and Park Street Common.	8.4
Greenland	2	Solid line routes represented in NH public information calendar.	22.0
Hampton	5	Solid line routes represented in NH public information calendar.	41.0
Hampton Beach	5	Pick up locations at Hampton Beach Police Station, State Beach Office, State Park Facility, and St. Patrick Church.	8.1
Hampton Falls	1	Solid line routes represented in NH public information calendar.	22.3
Kensington	1	Solid line routes represented in NH public information calendar.	25.8
Kingston	4	Solid line routes represented in NH public information calendar.	46.6
Merrimac	4	Solid line routes represented in MA public information calendar.	17.2
New Castle	1	Solid line routes represented in NH public information calendar.	2.6
Newbury	4	Solid line routes represented in MA public information calendar.	22.8
Newburyport	11	Solid line routes represented in MA public information calendar.	20.8
Newfields	1	Solid line routes represented in NH public information calendar.	10.9
Newton	3	Solid line routes represented in NH public information calendar.	25.0
North Hampton	3	Solid line routes represented in NH public information calendar.	31.3
Portsmouth	14	Solid line routes represented in NH public information calendar.	42.2
Rye	3	Solid line routes represented in NH public information calendar.	35.5
Salisbury	5	Solid line routes represented in MA public information calendar.	26.2
Seabrook	3	Solid line routes represented in NH public information calendar.	21.0
Seabrook Beach	3	Pick up locations at Commercial Fishing Facility and St. Elizabeth Church.	1.5
South Hampton	1	Solid line routes represented in NH public information calendar.	15.4
Stratham	5	Solid line routes represented in NH public information calendar.	34.5
West Newbury	3	Solid line routes represented in MA public information calendar.	21.4
Total:	107		

Table 8-14. Transit-Dependent Evacuation Time Estimates - Good Weather

Route	Bus Number	One-Wave						Two-Wave						
		Mobilization (min)	Route Length (miles)	Speed (mph)	Route Travel Time (min)	Pickup Time (min)	ETE (hr:min)	Distance to R. C. (miles)	Travel Time to R. C. (min)	Unload (min)	Driver Rest (min)	Route Travel Time (min)	Pickup Time (min)	ETE (hr:min)
Amesbury	1-3	120	31.1	22.0	85	36	**4:05**	8.9	12	5	10	102	36	**6:50**
	4-7	140	31.1	24.4	76	36	**4:15**	8.9	12	5	10	101	36	**7:00**
	8-11	160	31.1	27.0	69	36	**4:25**	8.9	12	5	10	101	36	**7:10**
Brentwood	1-3	120	35.4	12.9	164	36	**5:20**	23.7	32	5	10	126	36	**8:50**
East Kingston	1 & 2	120	4.9	20.2	14	36	**2:50**	8.9	12	5	10	26	36	**4:20**
Exeter	1-3	120	8.4	4.5	112	36	**4:30**	24.6	33	5	10	56	36	**6:50**
	5-6	140	8.4	5.2	97	36	**4:35**	24.6	33	5	10	55	36	**6:55**
	7-9	160	8.4	5.9	85	36	**4:45**	24.6	33	5	10	54	36	**7:05**
Greenland	1 & 2	120	22.0	8.0	164	36	**5:20**	8.1	11	5	10	70	36	**7:35**
Hampton	1-5	120	41.0	15.0	164	36	**5:20**	8.1	11	5	10	114	36	**8:20**
Hampton Beach	1-5	120	8.1	11.2	44	36	**3:20**	24.6	33	5	10	61	36	**5:45**
Hampton Falls	1	120	22.3	8.1	165	36	**5:25**	8.1	11	5	10	67	36	**7:35**
Kensington	1	120	25.8	9.0	172	36	**5:30**	24.6	33	5	10	99	36	**8:35**
Kingston	1-4	120	46.6	49.2	57	36	**3:35**	25.6	34	5	10	147	36	**7:30**
Merrimac	1-4	120	17.2	37.5	28	36	**3:05**	8.9	12	5	10	60	36	**5:10**
New Castle	1	120	2.6	3.2	48	36	**3:25**	8.1	11	5	10	26	36	**4:55**
Newbury	1-4	120	22.8	16.6	83	36	**4:00**	8.9	12	5	10	74	36	**6:20**
Newburyport	1-3	120	20.8	55.0	23	36	**3:00**	8.9	12	5	10	62	36	**5:05**
	4-7	140	20.8	54.8	23	36	**3:20**	8.9	12	5	10	62	36	**5:25**
	8-11	160	20.8	55.0	23	36	**3:40**	8.9	12	5	10	62	36	**5:45**
Newfields	1	120	10.9	45.0	15	36	**2:55**	28.1	37	5	10	67	36	**5:35**
Newton	1-3	120	25.0	14.6	103	36	**4:20**	25.6	34	5	10	103	36	**7:30**
North Hampton	1-3	120	31.3	10.5	178	36	**5:35**	8.1	11	5	10	95	36	**8:15**

Route	Bus Number	One-Wave						Two-Wave						
		Mobilization (min)	Route Length (miles)	Speed (mph)	Route Travel Time (min)	Pickup Time (min)	ETE (hr:min)	Distance to R. C. (miles)	Travel Time to R. C. (min)	Unload (min)	Driver Rest (min)	Route Travel Time (min)	Pickup Time (min)	ETE (hr:min)
Portsmouth	1-5	120	42.2	9.7	260	36	**7:00**	18.4	25	5	10	152	36	**10:50**
	6-10	140	42.2	10.4	244	36	**7:00**	18.4	25	5	10	152	36	**10:50**
	11-14	160	42.2	11.7	217	36	**6:55**	18.4	25	5	10	152	36	**10:45**
Rye	1-3	120	35.5	10.9	195	36	**5:55**	8.1	11	5	10	106	36	**8:45**
Salisbury	1-5	120	26.2	20.1	78	36	**3:55**	8.9	12	5	10	77	36	**6:15**
Seabrook	1-3	120	21.0	28.3	44	36	**3:20**	24.6	33	5	10	91	36	**6:15**
Seabrook Beach	1-3	120	1.5	5.4	17	36	**2:55**	8.9	12	5	10	16	36	**4:15**
South Hampton	1	120	15.4	33.6	27	36	**3:05**	25.6	34	5	10	77	36	**5:50**
Stratham	1-5	120	34.5	14.6	142	36	**5:00**	24.6	33	5	10	126	36	**8:30**
West Newbury	1-3	120	21.4	15.6	82	36	**4:00**	8.9	12	5	10	70	36	**6:15**
						Maximum ETE:	**7:00**						**Maximum ETE:**	**10:50**
						Average ETE:	**4:25**						**Average ETE:**	**7:05**

Table 8-15. Transit-Dependent Evacuation Time Estimates - Rain

Route	Bus Number	One-Wave						Two-Wave						
		Mobilization (min)	Route Length (miles)	Speed (mph)	Route Travel Time (min)	Pickup Time (min)	ETE (hr:min)	Distance to R. C. (miles)	Travel Time to R. C. (min)	Unload (min)	Driver Rest (min)	Route Travel Time (min)	Pickup Time (min)	ETE (hr:min)
Amesbury	1-3	130	31.1	16.8	111	46	**4:50**	8.9	13	5	10	107	46	**7:55**
	4-7	150	31.1	18.6	100	46	**5:00**	8.9	13	5	10	107	46	**8:05**
	8-11	170	31.1	20.9	89	46	**5:05**	8.9	13	5	10	107	46	**8:10**
Brentwood	1-3	130	35.4	11.2	190	46	**6:10**	23.7	36	5	10	135	46	**10:05**
East Kingston	1 & 2	130	4.9	9.8	30	46	**3:30**	8.9	13	5	10	28	46	**5:15**
Exeter	1-3	130	8.4	3.8	132	46	**5:10**	24.6	37	5	10	60	46	**7:50**
	5-6	150	8.4	4.3	118	46	**5:15**	24.6	37	5	10	60	46	**7:55**
	7-9	170	8.4	4.8	106	46	**5:25**	24.6	37	5	10	60	46	**8:05**
Greenland	1 & 2	130	22.0	8.4	156	46	**5:35**	8.1	12	5	10	74	46	**8:05**
Hampton	1-5	130	41.0	13.7	180	46	**6:00**	8.1	12	5	10	120	46	**9:15**
Hampton Beach	1-5	130	8.1	11.3	43	46	**3:40**	24.6	37	5	10	72	46	**6:30**
Hampton Falls	1	130	22.3	7.0	191	46	**6:10**	8.1	12	5	10	71	46	**8:35**
Kensington	1	130	25.8	7.8	198	46	**6:15**	24.6	37	5	10	106	46	**9:40**
Kingston	1-4	130	46.6	42.1	66	46	**4:05**	25.6	38	5	10	156	46	**8:25**
Merrimac	1-4	130	17.2	13.8	75	46	**4:15**	8.9	13	5	10	65	46	**6:35**
New Castle	1	130	2.6	2.8	55	46	**3:55**	8.1	12	5	10	27	46	**5:40**
Newbury	1-4	130	22.8	18.2	75	46	**4:15**	8.9	13	5	10	78	46	**6:50**
Newburyport	1-3	130	20.8	50.0	25	46	**3:25**	8.9	13	5	10	66	46	**5:50**
	4-7	150	20.8	49.8	25	46	**3:45**	8.9	13	5	10	66	46	**6:10**
	8-11	170	20.8	49.8	25	46	**4:05**	8.9	13	5	10	66	46	**6:30**
Newfields	1	130	10.9	40.5	16	46	**3:15**	28.1	42	5	10	74	46	**6:15**
Newton	1-3	130	25.0	13.8	108	46	**4:45**	25.6	38	5	10	110	46	**8:15**
North Hampton	1-3	130	31.3	10.4	181	46	**6:00**	8.1	12	5	10	99	46	**8:55**

Route	Bus Number	One-Wave						Two-Wave						
		Mobilization (min)	Route Length (miles)	Speed (mph)	Route Travel Time (min)	Pickup Time (min)	ETE (hr:min)	Distance to R. C. (miles)	Travel Time to R. C. (min)	Unload (min)	Driver Rest (min)	Route Travel Time (min)	Pickup Time (min)	ETE (hr:min)
Portsmouth	1-5	130	42.2	9.7	260	46	**7:20**	18.4	28	5	10	159	46	**11:30**
	6-10	150	42.2	10.4	244	46	**7:20**	18.4	28	5	10	159	46	**11:30**
	11-14	170	42.2	11.1	228	46	**7:25**	18.4	28	5	10	159	46	**11:35**
Rye	1-3	130	35.5	11.5	185	46	**6:05**	8.1	12	5	10	112	46	**9:15**
Salisbury	1-5	130	26.2	16.5	95	46	**4:35**	8.9	13	5	10	81	46	**7:15**
Seabrook	1-3	130	21.0	23.6	53	46	**3:50**	24.6	37	5	10	97	46	**7:05**
Seabrook Beach	1-3	130	1.5	4.9	19	46	**3:15**	8.9	13	5	10	18	46	**4:50**
South Hampton	1	130	15.4	24.6	38	46	**3:35**	25.6	38	5	10	83	46	**6:40**
Stratham	1-5	130	34.5	13.4	154	46	**5:30**	24.6	37	5	10	135	46	**9:25**
West Newbury	1-3	130	21.4	14.9	86	46	**4:25**	8.9	13	5	10	73	46	**6:55**
						Maximum ETE:	**7:25**						**Maximum ETE:**	**11:35**
						Average ETE:	**5:00**						**Average ETE:**	**7:55**

Table 8-16. Transit Dependent Evacuation Time Estimates - Snow

Route	Bus Number	One-Wave						Two-Wave						
		Mobilization (min)	Route Length (miles)	Speed (mph)	Route Travel Time (min)	Pickup Time (min)	ETE (hr:min)	Distance to R. C. (miles)	Travel Time to R. C. (min)	Unload (min)	Driver Rest (min)	Route Travel Time (min)	Pickup Time (min)	ETE (hr:min)
Amesbury	1-3	140	31.1	15.3	122	56	**5:20**	8.9	15	5	10	116	56	**8:45**
	4-7	160	31.1	16.6	113	56	**5:30**	8.9	15	5	10	116	56	**8:55**
	8-11	180	31.1	18.1	103	56	**5:40**	8.9	15	5	10	116	56	**9:05**
Brentwood	1-3	140	35.4	13.2	161	56	**6:00**	23.7	41	5	10	147	56	**10:20**
East Kingston	1 & 2	140	4.9	8.7	34	56	**3:50**	8.9	15	5	10	31	56	**5:50**
Exeter	1-3	140	8.4	3.2	158	56	**5:55**	24.6	42	5	10	66	56	**8:55**
	5-6	160	8.4	3.4	149	56	**6:05**	24.6	42	5	10	66	56	**9:05**
	7-9	180	8.4	3.8	131	56	**6:10**	24.6	42	5	10	66	56	**9:10**
Greenland	1 & 2	140	22.0	7.7	171	56	**6:10**	8.1	14	5	10	81	56	**9:00**
Hampton	1-5	140	41.0	11.8	208	56	**6:45**	8.1	14	5	10	128	56	**10:20**
Hampton Beach	1-5	140	8.1	10.1	48	56	**4:05**	24.6	42	5	10	78	56	**7:20**
Hampton Falls	1	140	22.3	6.1	220	56	**7:00**	8.1	14	5	10	76	56	**9:45**
Kensington	1	140	25.8	7.3	213	56	**6:50**	24.6	42	5	10	116	56	**10:40**
Kingston	1-4	140	46.6	39.1	71	56	**4:30**	25.6	44	5	10	170	56	**9:15**
Merrimac	1-4	140	17.2	16.2	64	56	**4:20**	8.9	15	5	10	71	56	**7:00**
New Castle	1	140	2.6	2.3	67	56	**4:25**	8.1	14	5	10	33	56	**6:25**
Newbury	1-4	140	22.8	16.4	84	56	**4:40**	8.9	15	5	10	85	56	**7:35**
Newburyport	1-3	140	20.8	44.0	28	56	**3:45**	8.9	15	5	10	72	56	**6:25**
	4-7	160	20.8	44.0	28	56	**4:05**	8.9	15	5	10	71	56	**6:45**
	8-11	180	20.8	44.0	28	56	**4:25**	8.9	15	5	10	71	56	**7:05**
Newfields	1	140	10.9	35.9	18	56	**3:35**	28.1	48	5	10	83	56	**7:00**
Newton	1-3	140	25.0	11.9	126	56	**5:25**	25.6	44	5	10	121	56	**9:25**
North Hampton	1-3	140	31.3	9.9	190	56	**6:30**	8.1	14	5	10	107	56	**9:45**

Route	Bus Number	One-Wave						Two-Wave						
		Mobilization (min)	Route Length (miles)	Speed (mph)	Route Travel Time (min)	Pickup Time (min)	ETE (hr:min)	Distance to R. C. (miles)	Travel Time to R. C. (min)	Unload (min)	Driver Rest (min)	Route Travel Time (min)	Pickup Time (min)	ETE (hr:min)
Portsmouth	1-5	140	42.2	9.1	278	56	**7:55**	18.4	32	5	10	164	56	**12:25**
	6-10	160	42.2	9.6	263	56	**8:00**	18.4	32	5	10	164	56	**12:30**
	11-14	180	42.2	10.2	248	56	**8:05**	18.4	32	5	10	164	56	**12:35**
Rye	1-3	140	35.5	9.4	228	56	**7:05**	8.1	14	5	10	122	56	**10:35**
Salisbury	1-5	140	26.2	15.4	102	56	**5:00**	8.9	15	5	10	87	56	**7:55**
Seabrook	1-3	140	21.0	21.1	60	56	**4:20**	24.6	42	5	10	107	56	**8:05**
Seabrook Beach	1-3	140	1.5	5.1	18	56	**3:35**	8.9	15	5	10	20	56	**5:25**
South Hampton	1	140	15.4	20.0	46	56	**4:05**	25.6	44	5	10	91	56	**7:35**
Stratham	1-5	140	34.5	13.5	154	56	**5:50**	24.6	42	5	10	148	56	**10:15**
West Newbury	1-3	140	21.4	14.1	91	56	**4:50**	8.9	15	5	10	79	56	**7:40**
						Maximum ETE:	**8:05**						**Maximum ETE:**	**12:35**
						Average ETE:	**5:30**						**Average ETE:**	**8:45**

Table 8-17. Medical Facility Evacuation Time Estimates - Good Weather

Medical Facility	Patient	Mobilization (min)	Loading Rate (min per person)	People	Total Loading Time (min)	Dist. To EPZ Bdry (mi)	Travel Time to EPZ Boundary (min)	ETE (hr:min)
MASSACHUSETTS MEDICAL FACILITIES								
Amesbury Health Center	Ambulatory	90	1	6	6	5.4	10	**1:50**
Amesbury Residence	Ambulatory	90	1	7	7	5.8	20	**2:00**
Amesbury Village, LLC	Ambulatory	90	1	66	30	5.9	9	**2:10**
	Wheelchair bound	90	15	26	225			**5:25**
	Bedridden	90	30	10	60			**2:40**
Coastal Connections Inc	Ambulatory	90	1	34	30	7.6	8	**2:10**
	Wheelchair bound	90	15	10	150			**4:10**
Elizabeth Calsey House & Assisted Living	Ambulatory	90	1	12	12	6.0	15	**2:00**
	Wheelchair bound	90	15	8	120			**3:45**
Elizabeth Calsey House 2	Ambulatory	90	1	28	28	5.6	7	**2:05**
Hillside Rest Home Inc	Ambulatory	90	1	28	28	5.0	7	**2:05**
Maplewood Care & Rehabilitation Center	Ambulatory	90	1	57	30	5.3	8	**2:10**
	Wheelchair bound	90	15	48	225			**5:25**
	Bedridden	90	30	4	60			**2:40**
Oak Ridge	Ambulatory	90	1	18	18	1.4	2	**1:50**
	Wheelchair bound	90	15	4	60			**2:35**
Quaker Hill	Ambulatory	90	1	24	24	1.5	2	**2:00**
Anna Jaques Hospital	Ambulatory	90	1	24	24	10.8	12	**2:10**
	Wheelchair bound	90	15	44	225			**5:30**
	Bedridden	90	30	16	60			**2:45**
Atria Merrimack Place	Ambulatory	90	1	77	30	9.5	11	**2:15**
	Wheelchair bound	90	15	8	120			**3:45**
Brigham Manor	Ambulatory	90	1	8	8	8.6	15	**1:55**
	Wheelchair bound	90	15	52	225			**5:30**
	Bedridden	90	30	4	60			**2:45**
Country Rehabilitation & Skilled Nursing Center	Ambulatory	90	1	19	19	10.0	11	**2:00**
	Wheelchair bound	90	15	88	225			**5:30**
	Bedridden	90	30	4	60			**2:45**

Medical Facility	Patient	Mobilization (min)	Loading Rate (min per person)	People	Total Loading Time (min)	Dist. To EPZ Bdry (mi)	Travel Time to EPZ Boundary (min)	ETE (hr:min)
Harborside Adult Health @ St. Paul's Church	Ambulatory	90	1	31	30	11.4	12	**2:15**
	Wheelchair bound	90	15	4	60			**2:45**
Home for Aged Men (Griffin House)	Ambulatory	90	1	9	9	9.9	12	**1:55**
Opportunity Works	Ambulatory	90	1	136	30	5.5	6	**2:10**
	Wheelchair bound	90	15	12	180			**4:40**
Port Healthcare Center	Ambulatory	90	1	28	28	6.4	10	**2:10**
	Wheelchair bound	90	15	68	225			**5:25**
	Bedridden	90	30	4	60			**2:40**
Assisted Living Center of Salisbury	Ambulatory	90	1	26	26	9.2	14	**2:10**
	Wheelchair bound	90	15	4	60			**2:45**
NEW HAMPSHIRE MEDICAL FACILITIES								
Rockingham County Nursing Home	Ambulatory	90	1	97	30	2.1	13	**2:15**
	Wheelchair bound	90	15	11	165			**4:30**
	Bedridden	90	30	30	60			**2:45**
Exeter Healthcare	Ambulatory	90	1	6	6	7.6	91	**3:10**
	Wheelchair bound	90	15	12	180			**6:05**
	Bedridden	90	30	8	60			**4:05**
Exeter Hospital	Ambulatory	90	1	64	30	6.2	55	**2:55**
	Bedridden	90	30	36	60			**3:25**
Exeter on Hampton Care and Rehabilitation Center	Ambulatory	90	1	67	30	10.2	126	**4:10**
	Bedridden	90	30	14	60			**4:40**
Langdon Place of Exeter	Ambulatory	90	1	90	30	10.2	126	**4:10**
	Wheelchair bound	90	15	10	150			**6:10**
RiverWoods Continuing Care Retirement Community (CCRC)	Ambulatory	90	1	43	30	7.4	69	**3:10**
	Wheelchair bound	90	15	6	90			**4:10**
	Bedridden	90	30	11	60			**3:40**
The Boulders at Riverwoods	Ambulatory	90	1	435	30	7.4	69	**3:10**
	Wheelchair bound	90	15	51	225			**6:25**
	Bedridden	90	30	134	60			**3:40**

Medical Facility	Patient	Mobilization (min)	Loading Rate (min per person)	People	Total Loading Time (min)	Dist. To EPZ Bdry (mi)	Travel Time to EPZ Boundary (min)	ETE (hr:min)
The Ridge at Riverwoods	Ambulatory	90	1	21	21	7.4	70	**3:05**
	Wheelchair bound	90	15	16	225			**6:25**
Oceanside Center Skilled Nursing	Ambulatory	90	1	174	30	11.5	136	**4:20**
	Wheelchair bound	90	15	20	225			**7:35**
SolAmor Hospice/Sun Healthcare	Ambulatory	90	1	97	30	6.5	78	**3:20**
	Wheelchair bound	90	15	11	165			**5:35**
	Bedridden	90	30	30	60			**3:50**
Clipper Harbor of Portsmouth	Ambulatory	90	1	110	30	4.1	72	**3:15**
	Bedridden	90	30	10	60			**3:45**
Edgewood Centre	Ambulatory	90	1	103	30	3.5	58	**3:00**
	Bedridden	90	30	74	60			**3:30**
Northeast Rehabilitation Hospital at Pease	Wheelchair bound	90	15	13	195	1.5	3	**4:50**
	Bedridden	90	30	20	60			**2:35**
Portsmouth Regional Hospital	Ambulatory	90	1	100	30	2.7	32	**2:35**
	Bedridden	90	30	100	60			**3:05**
The Mark Wentworth Home	Ambulatory	90	1	45	30	3.6	54	**2:55**
	Wheelchair bound	90	15	25	225			**6:10**
Webster-Rye Rehab & Retirement	Ambulatory	90	1	98	30	7.6	147	**4:30**
	Wheelchair bound	90	15	6	90			**5:30**
	Bedridden	90	30	10	60			**5:00**
							Maximum ETE:	**7:35**
							Average ETE:	**3:55**

Table 8-18. Medical Facility Evacuation Time Estimates - Rain

Medical Facility	Patient	Mobilization (min)	Loading Rate (min per person)	People	Total Loading Time (min)	Dist. To EPZ Bdry (mi)	Travel Time to EPZ Boundary (min)	ETE (hr:min)
MASSACHUSETTS MEDICAL FACILITIES								
Amesbury Health Center	Ambulatory	100	1	6	6	5.4	12	**2:00**
Amesbury Residence	Ambulatory	100	1	7	7	5.8	23	**2:10**
Amesbury Village, LLC	Ambulatory	100	1	66	30	5.9	10	**2:20**
	Wheelchair bound	100	15	26	225			**5:35**
	Bedridden	100	30	10	60			**2:50**
Coastal Connections Inc	Ambulatory	100	1	34	30	7.6	9	**2:20**
	Wheelchair bound	100	15	10	150			**4:20**
Elizabeth Calsey House & Assisted Living	Ambulatory	100	1	12	12	6.0	19	**2:15**
	Wheelchair bound	100	15	8	120			**4:00**
Elizabeth Calsey House 2	Ambulatory	100	1	28	28	5.6	8	**2:20**
Hillside Rest Home Inc	Ambulatory	100	1	28	28	5.0	8	**2:20**
Maplewood Care & Rehabilitation Center	Ambulatory	100	1	57	30	5.3	10	**2:20**
	Wheelchair bound	100	15	48	225			**5:35**
	Bedridden	100	30	4	60			**2:50**
Oak Ridge	Ambulatory	100	1	18	18	1.4	2	**2:00**
	Wheelchair bound	100	15	4	60			**2:45**
Quaker Hill	Ambulatory	100	1	24	24	1.5	2	**2:10**
Anna Jaques Hospital	Ambulatory	100	1	24	24	10.8	13	**2:20**
	Wheelchair bound	100	15	44	225			**5:40**
	Bedridden	100	30	16	60			**2:55**
Atria Merrimack Place	Ambulatory	100	1	77	30	9.5	12	**2:25**
	Wheelchair bound	100	15	8	120			**3:55**
Brigham Manor	Ambulatory	100	1	8	8	8.6	14	**2:05**
	Wheelchair bound	100	15	52	225			**5:40**
	Bedridden	100	30	4	60			**2:55**

Medical Facility	Patient	Mobilization (min)	Loading Rate (min per person)	People	Total Loading Time (min)	Dist. To EPZ Bdry (mi)	Travel Time to EPZ Boundary (min)	ETE (hr:min)
Country Rehabilitation & Skilled Nursing Center	Ambulatory	100	1	19	19	10.0	12	**2:15**
	Wheelchair bound	100	15	88	225			**5:40**
	Bedridden	100	30	4	60			**2:55**
Harborside Adult Health @ St. Paul's Church	Ambulatory	100	1	31	30	11.4	14	**2:25**
	Wheelchair bound	100	15	4	60			**2:55**
Home for Aged Men (Griffin House)	Ambulatory	100	1	9	9	9.9	13	**2:05**
Opportunity Works	Ambulatory	100	1	136	30	5.5	7	**2:20**
	Wheelchair bound	100	15	12	180			**4:50**
Port Healthcare Center	Ambulatory	100	1	28	28	6.4	11	**2:20**
	Wheelchair bound	100	15	68	225			**5:40**
	Bedridden	100	30	4	60			**2:55**
Assisted Living Center of Salisbury	Ambulatory	100	1	26	26	9.2	16	**2:25**
	Wheelchair bound	100	15	4	60			**3:00**
NEW HAMPSHIRE MEDICAL FACILITIES								
Rockingham County Nursing Home	Ambulatory	100	1	97	30	2.1	15	**2:25**
	Wheelchair bound	100	15	11	165			**4:40**
	Bedridden	100	30	30	60			**2:55**
Exeter Healthcare	Ambulatory	100	1	6	6	7.6	95	**3:25**
	Wheelchair bound	100	15	12	180			**6:15**
	Bedridden	100	30	8	60			**4:15**
Exeter Hospital	Ambulatory	100	1	64	30	6.2	88	**3:40**
	Bedridden	100	30	36	60			**4:10**
Exeter on Hampton Care and Rehabilitation Center	Ambulatory	100	1	67	30	10.2	143	**4:35**
	Bedridden	100	30	14	60			**5:05**
Langdon Place of Exeter	Ambulatory	100	1	90	30	10.2	143	**4:35**
	Wheelchair bound	100	15	10	150			**6:35**
RiverWoods Continuing Care Retirement Community (CCRC)	Ambulatory	100	1	43	30	7.4	98	**3:50**
	Wheelchair bound	100	15	6	90			**4:50**
	Bedridden	100	30	11	60			**4:20**

Medical Facility	Patient	Mobilization (min)	Loading Rate (min per person)	People	Total Loading Time (min)	Dist. To EPZ Bdry (mi)	Travel Time to EPZ Boundary (min)	ETE (hr:min)
The Boulders at Riverwoods	Ambulatory	100	1	435	30	7.4	98	**3:50**
	Wheelchair bound	100	15	51	225			**7:05**
	Bedridden	100	30	134	60			**4:20**
The Ridge at Riverwoods	Ambulatory	100	1	21	21	7.4	101	**3:45**
	Wheelchair bound	100	15	16	225			**7:10**
Oceanside Center Skilled Nursing	Ambulatory	100	1	174	30	11.5	128	**4:20**
	Wheelchair bound	100	15	20	225			**7:35**
SolAmor Hospice/Sun Healthcare	Ambulatory	100	1	97	30	6.5	75	**3:25**
	Wheelchair bound	100	15	11	165			**5:40**
	Bedridden	100	30	30	60			**3:55**
Clipper Harbor of Portsmouth	Ambulatory	100	1	110	30	4.1	64	**3:15**
	Bedridden	100	30	10	60			**3:45**
Edgewood Centre	Ambulatory	100	1	103	30	3.5	55	**3:05**
	Bedridden	100	30	74	60			**3:35**
Northeast Rehabilitation Hospital at Pease	Wheelchair bound	100	15	13	195	1.5	3	**5:00**
	Bedridden	100	30	20	60			**2:45**
Portsmouth Regional Hospital	Ambulatory	100	1	100	30	2.7	28	**2:40**
	Bedridden	100	30	100	60			**3:10**
The Mark Wentworth Home	Ambulatory	100	1	45	30	3.6	51	**3:05**
	Wheelchair bound	100	15	25	225			**6:20**
Webster-Rye Rehab & Retirement	Ambulatory	100	1	98	30	7.6	138	**4:30**
	Wheelchair bound	100	15	6	90			**5:30**
	Bedridden	100	30	10	60			**5:00**
							Maximum ETE:	**7:35**
							Average ETE:	**3:05**

Table 8-19. Medical Facility Evacuation Time Estimates - Snow

Medical Facility	Patient	Mobilization (min)	Loading Rate (min per person)	People	Total Loading Time (min)	Dist. To EPZ Bdry (mi)	Travel Time to EPZ Boundary (min)	ETE (hr:min)
MASSACHUSETTS MEDICAL FACILITIES								
Amesbury Health Center	Ambulatory	110	1	6	6	5.4	12	**2:10**
Amesbury Residence	Ambulatory	110	1	7	7	5.8	19	**2:20**
Amesbury Village, LLC	Ambulatory	110	1	66	30	5.9	11	**2:35**
	Wheelchair bound	110	15	26	225			**5:50**
	Bedridden	110	30	10	60			**3:05**
Coastal Connections Inc	Ambulatory	110	1	34	30	7.6	10	**2:30**
	Wheelchair bound	110	15	10	150			**4:30**
Elizabeth Calsey House & Assisted Living	Ambulatory	110	1	12	12	6.0	17	**2:20**
	Wheelchair bound	110	15	8	120			**4:10**
Elizabeth Calsey House 2	Ambulatory	110	1	28	28	5.6	11	**2:30**
Hillside Rest Home Inc	Ambulatory	110	1	28	28	5.0	10	**2:30**
Maplewood Care & Rehabilitation Center	Ambulatory	110	1	57	30	5.3	10	**2:30**
	Wheelchair bound	110	15	48	225			**5:45**
	Bedridden	110	30	4	60			**3:00**
Oak Ridge	Ambulatory	110	1	18	18	1.4	2	**2:10**
	Wheelchair bound	110	15	4	60			**2:55**
Quaker Hill	Ambulatory	110	1	24	24	1.5	2	**2:20**
Anna Jaques Hospital	Ambulatory	110	1	24	24	10.8	15	**2:30**
	Wheelchair bound	110	15	44	225			**5:50**
	Bedridden	110	30	16	60			**3:05**
Atria Merrimack Place	Ambulatory	110	1	77	30	9.5	13	**2:35**
	Wheelchair bound	110	15	8	120			**4:05**
Brigham Manor	Ambulatory	110	1	8	8	8.6	14	**2:15**
	Wheelchair bound	110	15	52	225			**5:50**
	Bedridden	110	30	4	60			**3:05**

Medical Facility	Patient	Mobilization (min)	Loading Rate (min per person)	People	Total Loading Time (min)	Dist. To EPZ Bdry (mi)	Travel Time to EPZ Boundary (min)	ETE (hr:min)
Country Rehabilitation & Skilled Nursing Center	Ambulatory	110	1	19	19	10.0	14	**2:25**
	Wheelchair bound	110	15	88	225			**5:50**
	Bedridden	110	30	4	60			**3:05**
Harborside Adult Health @ St. Paul's Church	Ambulatory	110	1	31	30	11.4	16	**2:40**
	Wheelchair bound	110	15	4	60			**3:10**
Home for Aged Men (Griffin House)	Ambulatory	110	1	9	9	9.9	14	**2:15**
Opportunity Works	Ambulatory	110	1	136	30	5.5	8	**2:30**
	Wheelchair bound	110	15	12	180			**5:00**
Port Healthcare Center	Ambulatory	110	1	28	28	6.4	13	**2:35**
	Wheelchair bound	110	15	68	225			**5:50**
	Bedridden	110	30	4	60			**3:05**
Assisted Living Center of Salisbury	Ambulatory	110	1	26	26	9.2	18	**2:35**
	Wheelchair bound	110	15	4	60			**3:10**
NEW HAMPSHIRE MEDICAL FACILITIES								
Rockingham County Nursing Home	Ambulatory	110	1	97	30	2.1	14	**2:35**
	Wheelchair bound	110	15	11	165			**4:50**
	Bedridden	110	30	30	60			**3:05**
Exeter Healthcare	Ambulatory	110	1	6	6	7.6	112	**3:50**
	Wheelchair bound	110	15	12	180			**6:45**
	Bedridden	110	30	8	60			**4:45**
Exeter Hospital	Ambulatory	110	1	64	30	6.2	92	**3:55**
	Bedridden	110	30	36	60			**4:25**
Exeter on Hampton Care and Rehabilitation Center	Ambulatory	110	1	67	30	10.2	171	**5:15**
	Bedridden	110	30	14	60			**5:45**
Langdon Place of Exeter	Ambulatory	110	1	90	30	10.2	171	**5:15**
	Wheelchair bound	110	15	10	150			**7:15**
RiverWoods Continuing Care Retirement Community (CCRC)	Ambulatory	110	1	43	30	7.4	116	**4:20**
	Wheelchair bound	110	15	6	90			**5:20**
	Bedridden	110	30	11	60			**4:50**

Medical Facility	Patient	Mobilization (min)	Loading Rate (min per person)	People	Total Loading Time (min)	Dist. To EPZ Bdry (mi)	Travel Time to EPZ Boundary (min)	ETE (hr:min)
The Boulders at Riverwoods	Ambulatory	110	1	435	30	7.4	116	**4:20**
	Wheelchair bound	110	15	51	225			**7:35**
	Bedridden	110	30	134	60			**4:50**
The Ridge at Riverwoods	Ambulatory	110	1	21	21	7.4	117	**4:10**
	Wheelchair bound	110	15	16	225			**7:35**
Oceanside Center Skilled Nursing	Ambulatory	110	1	174	30	11.5	160	**5:00**
	Wheelchair bound	110	15	20	225			**8:15**
SolAmor Hospice/Sun Healthcare	Ambulatory	110	1	97	30	6.5	84	**3:45**
	Wheelchair bound	110	15	11	165			**6:00**
	Bedridden	110	30	30	60			**4:15**
Clipper Harbor of Portsmouth	Ambulatory	110	1	110	30	4.1	80	**3:40**
	Bedridden	110	30	10	60			**4:10**
Edgewood Centre	Ambulatory	110	1	103	30	3.5	70	**3:30**
	Bedridden	110	30	74	60			**4:00**
Northeast Rehabilitation Hospital at Pease	Wheelchair bound	110	15	13	195	1.5	4	**5:10**
	Bedridden	110	30	20	60			**2:55**
Portsmouth Regional Hospital	Ambulatory	110	1	100	30	2.7	40	**3:00**
	Bedridden	110	30	100	60			**3:30**
The Mark Wentworth Home	Ambulatory	110	1	45	30	3.6	62	**3:25**
	Wheelchair bound	110	15	25	225			**6:40**
Webster-Rye Rehab & Retirement	Ambulatory	110	1	98	30	7.6	175	**5:15**
	Wheelchair bound	110	15	6	90			**6:15**
	Bedridden	110	30	10	60			**5:45**
							Maximum ETE:	**8:15**
							Average ETE:	**4:20**

Table 8-20. Homebound Special Needs Population Evacuation Time Estimates

Vehicle Type	Vehicles deployed	Stops	Weather Conditions	Mobiliza-tion Time (min)	Loading Time at 1st Stop (min)	Travel to Subsequent Stops (min)	Total Loading Time at Subsequent Stops (min)	Travel Time to EPZ Boundary (min)	ETE (hr:min)
Buses	215	30	Good	90	1	261	29	24	**6:45**
			Rain	100		290		27	**7:30**
			Snow	110		319		27	**8:10**
Wheelchair Vans	116	4	Good	90	15	27	45	24	**3:25**
			Rain	100		30		26	**3:40**
			Snow	110		33		26	**3:50**
Ambulances	30	2	Good	90	30	10	30	23	**3:05**
			Rain	100		11		26	**3:20**
			Snow	110		13		26	**3:30**
Maximum ETE:									**8:10**
Average ETE:									**4:50**

Table 8-21. Correctional Facility Evacuation Time Estimate

Correctional Facility	Weather Conditions	Mobilization (min)	Number of Buses	Loading Rate (min per person)	Number of Inmates	Number of Staff	Total Loading Time (min)	Dist. To EPZ Bdry (mi)	Travel Time to EPZ Boundary (min)	ETE (hr:min)
Rockingham County Jail	Good	90	9	1	340	20	44	2.0	2	**2:20**
	Rain	100							2	**2:30**
	Snow	110							3	**2:40**
Maximum ETE:										**2:40**
Average ETE:										**2:30**

9 TRAFFIC MANAGEMENT STRATEGY

This section discusses the suggested 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 transportation agencies have access to the MUTCD, which is available on-line: http://mutcd.fhwa.dot.gov which provides access to the official PDF version.
- A plan that defines all locations, provides 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 safely expedite travel out of the EPZ.
2. Discourage traffic movements that move evacuating vehicles in a direction which takes them significantly closer to the power station, or which interferes with the efficient flow of other evacuees.

The terms "facilitate" and "discourage" are employed 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 prior to evacuating.
- An evacuating driver may be travelling 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 plan is the outcome of the following process:

1. The existing TCPs and ACPs identified by the offsite agencies in their existing emergency plans serve as the basis of the traffic management plan, as per NUREG/CR-7002.
2. Computer analysis of the evacuation traffic flow environment (see Figure 7-3 though Figure 7-8).

   This analysis identifies the best routing and those critical intersections that experience pronounced congestion. Any critical intersections that would benefit from traffic or access control which are not already identified in the existing offsite plans are suggested as additional TCPs and ACPs.
3. The existing TCPs and ACPs, and how they were applied in this study, are discussed in Appendix G.
4. Prioritization of TCPs and ACPs.

   Application of traffic and access control at some TCPs and ACPs will have a more pronounced influence on expediting traffic movements than at other TCPs and ACPs. 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. These priorities should be assigned by state emergency management representatives and by law enforcement personnel.

The ETE simulations discussed in Section 7.3 indicate that the evacuation routes are oversaturated and experience pronounced traffic congestion during evacuation due to the limited capacity of the roadways and the large volume of evacuating traffic. Interstate-95 and SH 101 are the most heavily used evacuation routes. The ramps to these limited access highways are significant bottlenecks. The traffic signals along the state and county routes within population centers are also significant bottlenecks. Nearly all of the traffic signals in the EPZ are actuated traffic signals and will adjust their timing to changing traffic patterns. Traffic control at signalized intersections will not have a pronounced impact on the evacuation process as most of the intersections have significant volume on the east-west approaches as well as the north-south approaches (see Figure 7-4 for several examples – intersection of State Route 125 and Middle Rd; intersection of SH 1A and US 1; intersection of SH 33 and US 1; etc.). Thus, no additional TCPs or ACPs are deemed necessary as a result of this study.

The use of Intelligent Transportation Systems (ITS) technologies (if available) 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 plant. 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 their 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. Consideration should be given that ITS technologies be used to facilitate the evacuation process, and any additional signage placed should consider evacuation needs.

The ETE analysis treated all controlled intersections that are existing TCP locations in the offsite agency plans as being controlled by actuated signals.

Chapters 2N and 5G, and Part 6 of the 2009 MUTCD are particularly relevant and could be reviewed during emergency response training.

The ETE calculations reflect the assumption that all "external-external" trips are interdicted and diverted after 1 hour has elapsed from the ATE.

All transit vehicles and other responders entering the EPZ to support the evacuation are assumed to be unhindered by personnel manning ACPs and TCPs.

Study Assumptions 5 and 6 in Section 2.3 discuss ACP and TCP staffing schedules and operations.

10 EVACUATION ROUTES

Evacuation routes are comprised of two distinct components:

- Routing from a Community being evacuated to the boundary of the Evacuation Region and thence out of the EPZ.
- Routing of transit-dependent evacuees from the EPZ boundary to reception centers.

Evacuees will select routes within the EPZ in such a way as to minimize their exposure to risk. This expectation is met by the DYNEV II model routing traffic away from the location of the plant, to the extent practicable. The DTRAD model satisfies this behavior by routing traffic so as to balance traffic demand relative to the available highway capacity to the extent possible. See Appendices B through D for further discussion.

The routing of transit-dependent evacuees from the EPZ boundary to reception centers or host schools is designed to minimize the amount of travel outside the EPZ, from the points where these routes cross the EPZ boundary.

Figure 10-1 and Figure 10-2 present maps showing the general population and school reception centers/host schools for evacuees. The major evacuation routes for the EPZ are presented in Figure 10-3.

It is assumed that all school evacuees will be taken to the appropriate reception center or host school and subsequently picked up by parents or guardians. Transit-dependent evacuees are transported to the appropriate general population reception center for each Community. This study does not consider the transport of evacuees from reception centers to congregate care centers, if the states do make the decision to relocate evacuees.

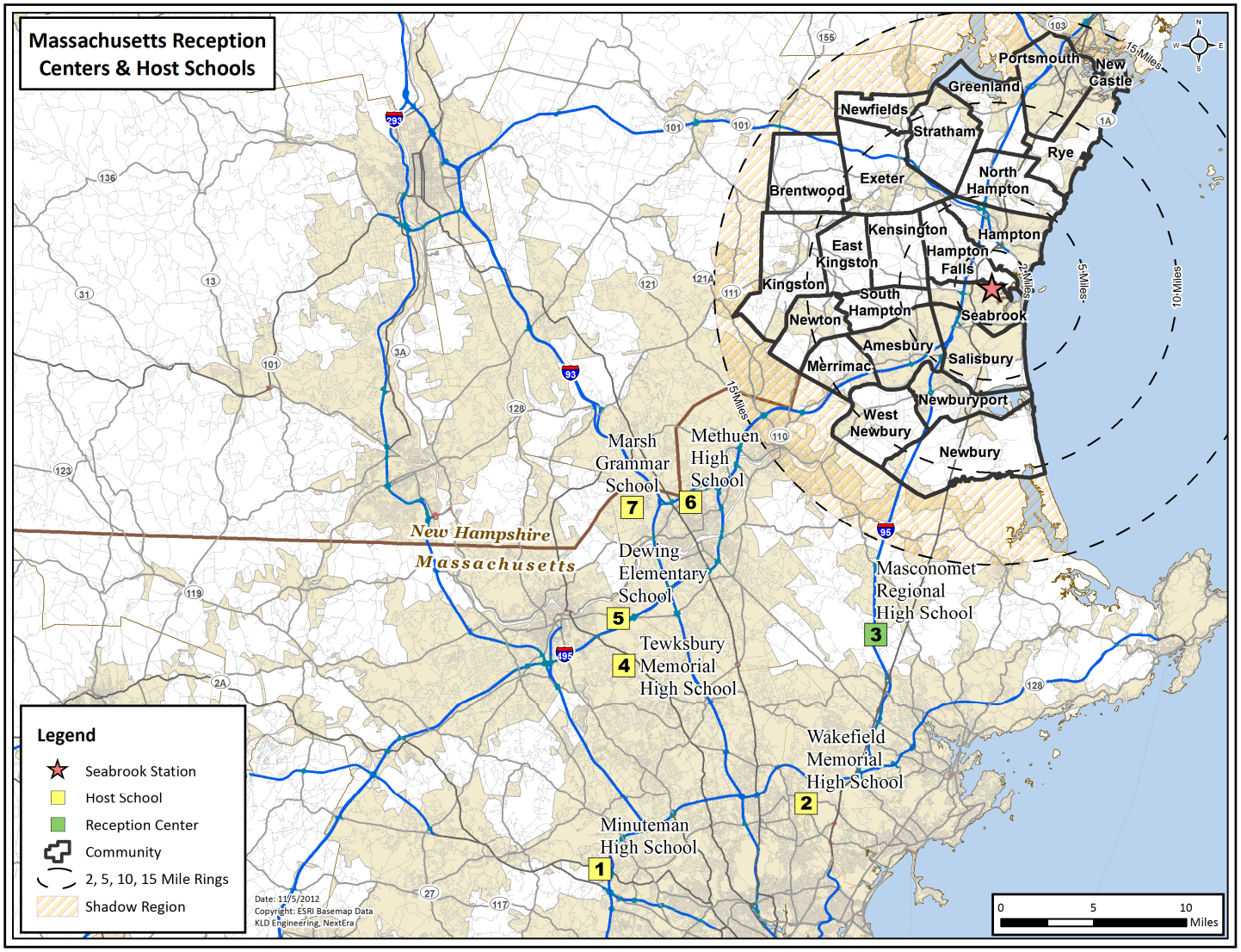


Figure 10-1. General Population Reception Centers and Host Schools for the Massachusetts Portion of the EPZ

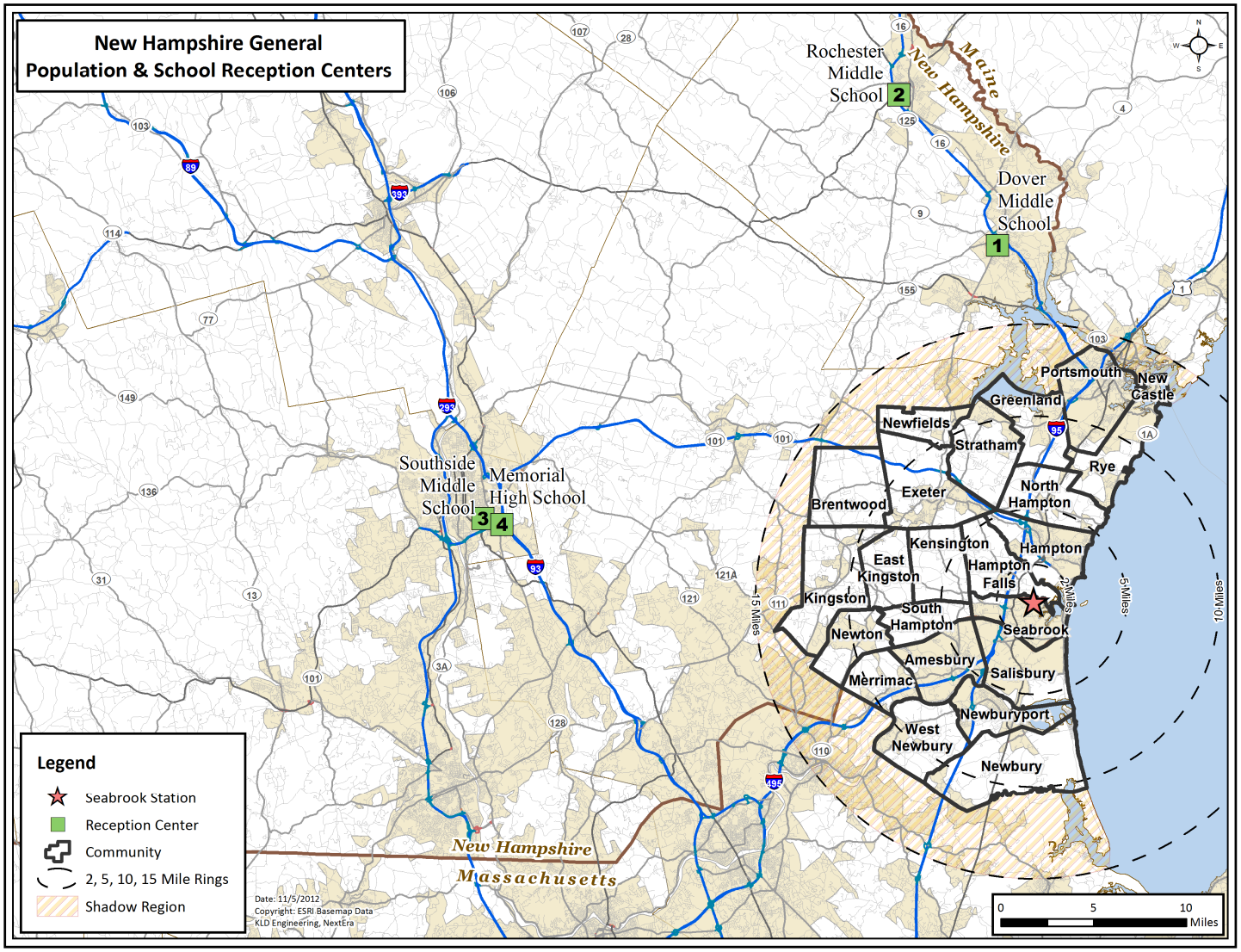


Figure 10-2. General Population and School Reception Centers for the New Hampshire Portion of the EPZ

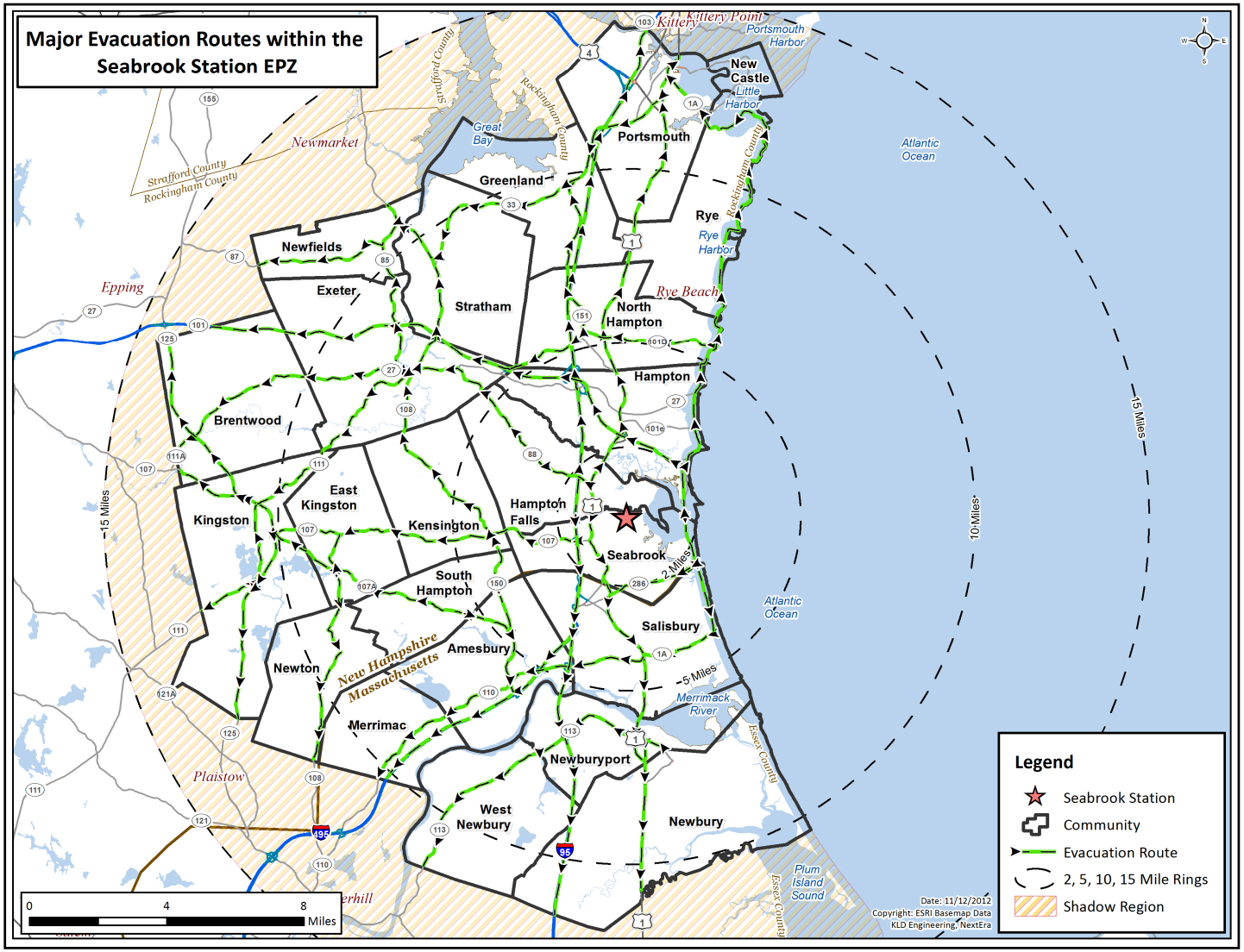


Figure 10-3. Evacuation Route Map

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, if available.
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. Emergency operations centers should be able to 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. Consideration should be given that tow trucks with a supply of gasoline 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.

Consideration should also be given that the state and local emergency management agencies encourage gas stations to remain open during the evacuation.

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. The state radiological emergency plans do not discuss a procedure for confirming evacuation. Should procedures not already exist, the following alternative or complementary approach is suggested.

The suggested procedure 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. 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 3 hours after the Advisory to Evacuate, which is when approximately 90 percent of evacuees have completed their mobilization activities (see Figure 5-4). 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 7½ 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 Communities), then the confirmation process will extend over a timeframe of about 75 minutes. Thus, the confirmation should be completed 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 or other technologies (e.g., reverse 911 or equivalent if available) can significantly reduce the manpower requirements and the time required to undertake this type of confirmation survey.

If this method is indeed used by the offsite agencies, consideration should be given to maintain a list of telephone numbers within the EPZ in the EOC at all times. Such a list could be purchased from vendors and could be periodically updated. As indicated above, the confirmation process should not begin until 3 hours after the Advisory to Evacuate, to ensure that households have had enough time to mobilize. This 3-hour timeframe will enable telephone operators to arrive at their workplace, obtain a call list and prepare to make the necessary phone calls.

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.

Other techniques could also be considered. After traffic volumes decline, the personnel manning TCPs can be redeployed to travel through residential areas to observe and to confirm evacuation activities.

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.) = 65,500
- Est. proportion, F, of households that will not evacuate = 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:

$$n_F = \frac{nN}{n + N - 1} = 307$$

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 = 215.

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:

$$\frac{300[30 + 0.8(36) + 0.2(60) + 20]}{3600} = 7.6$$

APPENDIX A

Glossary of Traffic Engineering Terms

A. GLOSSARY OF TRAFFIC ENGINEERING TERMS

Table A-1. Glossary of Traffic Engineering Terms

Term	Definition
Analysis Network	A graphical representation of the geometric topology of a physical roadway system, which is comprised of directional links and nodes.
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 Region, 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.
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, usually green, yellow, red.

Term	Definition
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.
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 in 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.

APPENDIX B

DTRAD: Dynamic Traffic Assignment and Distribution Model

B. DYNAMIC TRAFFIC ASSIGNMENT AND DISTRIBUTION MODEL

This section describes the integrated dynamic trip assignment and distribution model named DTRAD (Dynamic Traffic Assignment and Distribution) that is expressly designed for use in analyzing evacuation scenarios. DTRAD employs logit-based path-choice principles and is one of the models of the DYNEVII System. The DTRAD module implements path-based *Dynamic Traffic Assignment* (DTA) so that time dependent Origin-Destination (OD) trips are "assigned" to routes over the network based on prevailing traffic conditions.

To apply the DYNEV II System, the analyst must specify the highway network, link capacity information, the time-varying volume of traffic generated at all origin centroids and, optionally, a set of accessible candidate destination nodes on the periphery of the EPZ for selected origins. DTRAD calculates the optimal dynamic trip distribution (i.e., trip destinations) and the optimal dynamic trip assignment (i.e., trip routing) of the traffic generated at each origin node traveling to its set of candidate destination nodes, so as to minimize evacuee travel "cost."

Overview of Integrated Distribution and Assignment 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" routes. The model is designed to identify these "best" routes in a manner that realistically distributes vehicles from origins to destinations and routes them over the highway network, in a consistent and optimal manner, reflecting evacuee behavior.

For each origin, a set of "candidate destination nodes" is selected by the software logic and by the analyst to reflect the desire by evacuees to travel away from the power plant and to access major highways. The specific destination nodes within this set that are selected by travelers and the selection of the connecting paths of travel, are both determined by DTRAD. This determination is made by a logit-based path choice model in DTRAD, so as to minimize the trip "cost", as discussed later.

The traffic loading on the network and the consequent operational traffic environment of the network (density, speed, throughput on each link) vary over time as the evacuation takes place. The DTRAD model, which is interfaced with the DYNEV simulation model, executes a succession of "sessions" wherein it computes the optimal routing and selection of destination nodes for the conditions that exist at that time.

Interfacing the DYNEV Simulation Model with DTRAD

The DYNEV II system reflects NRC guidance that evacuees will seek to travel in a general direction away from the location of the hazardous event. An algorithm was developed to support the DTRAD model in dynamically varying the Trip Table (O-D matrix) over time from one DTRAD session to the next. Another algorithm executes a "mapping" from the specified "geometric" network (link-node analysis network) that represents the physical highway system, to a "path" network that represents the vehicle [turn] movements. DTRAD computations are performed on the "path" network: DYNEV simulation model, on the "geometric" network.

DTRAD Description

DTRAD is the DTA module for the DYNEV II System.

When the road network under study is large, multiple routing options are usually available between trip origins and destinations. The problem of loading traffic demands and propagating them over the network links is called Network Loading and is addressed by DYNEVII using macroscopic traffic simulation modeling. Traffic assignment deals with computing the distribution of the traffic over the road network for given O-D demands and is a model of the route choice of the drivers. Travel demand changes significantly over time, and the road network may have time dependent characteristics, e.g., time-varying signal timing or reduced road capacity because of lane closure, or traffic congestion. To consider these time dependencies, DTA procedures are required.

The DTRAD DTA module represents the dynamic route choice behavior of drivers, using the specification of dynamic origin-destination matrices as flow input. Drivers choose their routes through the network based on the travel cost they experience (as determined by the simulation model). This allows traffic to be distributed over the network according to the time-dependent conditions. The modeling principles of D-TRAD include:

- It is assumed that drivers not only select the best route (i.e., lowest cost path) but some also select less attractive routes. The algorithm implemented by DTRAD archives several "efficient" routes for each O-D pair from which the drivers choose.
- The choice of one route out of a set of possible routes is an outcome of "discrete choice modeling". Given a set of routes and their generalized costs, the percentages of drivers that choose each route is computed. The most prevalent model for discrete choice modeling is the logit model. DTRAD uses a variant of Path-Size-Logit model (PSL). PSL overcomes the drawback of the traditional multinomial logit model by incorporating an additional deterministic path size correction term to address path overlapping in the random utility expression.
- DTRAD executes the TA algorithm on an abstract network representation called "the path network" which is built from the actual physical link-node analysis network. This execution continues until a stable situation is reached: the volumes and travel times on the edges of the path network do not change significantly from one iteration to the next. The criteria for this convergence are defined by the user.
- Travel "cost" plays a crucial role in route choice. In DTRAD, path cost is a linear summation of the generalized cost of each link that comprises the path. The generalized cost for a link, a, is expressed as

  $$c_a = \alpha t_a + \beta l_a + \gamma s_a ,$$

  where c_a is the generalized cost for link a, and α, β, and γ are cost coefficients for link travel time, distance, and supplemental cost, respectively. Distance and supplemental costs are defined as invariant properties of the network model, while travel time is a dynamic property dictated by prevailing traffic conditions. The DYNEV simulation model

computes travel times on all edges in the network and DTRAD uses that information to constantly update the costs of paths. The route choice decision model in the next simulation iteration uses these updated values to adjust the route choice behavior. This way, traffic demands are dynamically re-assigned based on time dependent conditions. The interaction between the DTRAD traffic assignment and DYNEV II simulation models is depicted in Figure B-1. Each round of interaction is called a Traffic Assignment Session (TA session). A TA session is composed of multiple iterations, marked as loop B in the figure.

- The supplemental cost is based on the "survival distribution" (a variation of the exponential distribution).The Inverse Survival Function is a "cost" term in DTRAD to represent the potential risk of travel toward the plant:

  $s_a = - \beta \ln (p), 0 \leq p \leq l ; \beta > 0$

  $p = \frac{d_n}{d_0}$

  d_n = Distance of node, n, from the plant
  d_0 =Distance from the plant where there is zero risk
  β = Scaling factor

The value of d_o = 15 miles, the outer distance of the shadow region. Note that the supplemental cost, s_a, of link, a, is (high, low), if its downstream node, n, is (near, far from) the power plant.

Network Equilibrium

In 1952, John Wardrop wrote:

> *Under equilibrium conditions traffic arranges itself in congested networks in such a way that no individual trip-maker can reduce his path costs by switching routes.*

The above statement describes the "User Equilibrium" definition, also called the "Selfish Driver Equilibrium". It is a hypothesis that represents a [hopeful] condition that evolves over time as drivers search out alternative routes to identify those routes that minimize their respective "costs". It has been found that this "equilibrium" objective to minimize costs is largely realized by most drivers who routinely take the same trip over the same network at the same time (i.e., commuters). Effectively, such drivers "learn" which routes are best for them over time. Thus, the traffic environment "settles down" to a near-equilibrium state.

Clearly, since an emergency evacuation is a sudden, unique event, it does not constitute a long-term learning experience which can achieve an equilibrium state. Consequently, DTRAD was not designed as an equilibrium solution, but to represent drivers in a new and unfamiliar situation, who respond in a flexible manner to real-time information (either broadcast or observed) in such a way as to minimize their respective costs of travel.

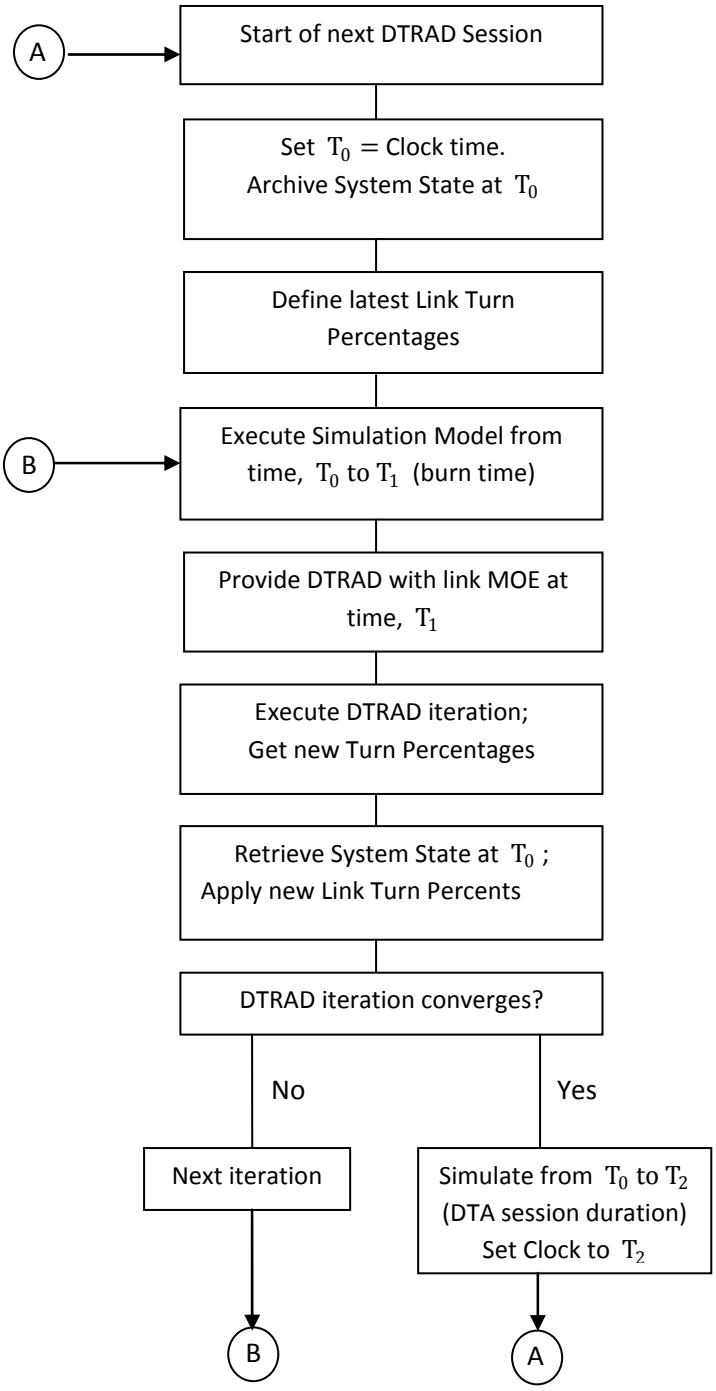


Figure B-1. Flow Diagram of Simulation-DTRAD Interface

APPENDIX C

DYNEV Traffic Simulation Model

C. DYNEV TRAFFIC SIMULATION MODEL

The DYNEV traffic simulation model is a *macroscopic* model that describes the operations of traffic flow in terms of aggregate variables: vehicles, flow rate, mean speed, volume, density, queue length, *on each link*, for each turn movement, during each Time Interval (simulation time step). The model generates trips from "sources" and from Entry Links and introduces them onto the analysis network at rates specified by the analyst based on the mobilization time distributions. The model simulates the movements of all vehicles on all network links over time until the network is empty. At intervals, the model outputs Measures of Effectiveness (MOE) such as those listed in Table C-1.

Model Features Include:

- Explicit consideration is taken of the variation in density over the time step; an iterative procedure is employed to calculate an average density over the simulation time step for the purpose of computing a mean speed for moving vehicles.
- Multiple turn movements can be serviced on one link; a separate algorithm is used to estimate the number of (fractional) lanes assigned to the vehicles performing each turn movement, based, in part, on the turn percentages provided by the DTRAD model.
- At any point in time, traffic flow on a link is subdivided into two classifications: queued and moving vehicles. The number of vehicles in each classification is computed. Vehicle spillback, stratified by turn movement for each network link, is explicitly considered and quantified. The propagation of stopping waves from link to link is computed within each time step of the simulation. There is no "vertical stacking" of queues on a link.
- Any link can accommodate "source flow" from zones via side streets and parking facilities that are not explicitly represented. This flow represents the evacuating trips that are generated at the source.
- The relation between the number of vehicles occupying the link and its storage capacity is monitored every time step for every link and for every turn movement. If the available storage capacity on a link is exceeded by the demand for service, then the simulator applies a "metering" rate to the entering traffic from both the upstream feeders and source node to ensure that the available storage capacity is not exceeded.
- A "path network" that represents the specified traffic movements from each network link is constructed by the model; this path network is utilized by the DTRAD model.
- A two-way interface with DTRAD: (1) provides link travel times; (2) receives data that translates into link turn percentages.
- Provides MOE to animation software, EVAN
- Calculates ETE statistics

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

To provide an efficient framework for defining these specifications, the physical highway environment is represented as a network. The unidirectional links of the network represent roadway sections: rural, multi-lane, urban streets or freeways. The nodes of the network generally represent intersections or points along a section where a geometric property changes (e.g. a lane drop, change in grade or free flow speed).

Figure C-1 is an example of a small network representation. The freeway is defined by the sequence of links, (20,21), (21,22), and (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. Selected Measures of Effectiveness Output by DYNEV II

Measure	Units	Applies To
Vehicles Discharged	Vehicles	Link, Network, Exit Link
Speed	Miles/Hours (mph)	Link, Network
Density	Vehicles/Mile/Lane	Link
Level of Service	LOS	Link
Content	Vehicles	Network
Travel Time	Vehicle-hours	Network
Evacuated Vehicles	Vehicles	Network, Exit Link
Trip Travel Time	Vehicle-minutes/trip	Network
Capacity Utilization	Percent	Exit Link
Attraction	Percent of total evacuating vehicles	Exit Link
Max Queue	Vehicles	Node, Approach
Time of Max Queue	Hours:minutes	Node, Approach
Route Statistics	Length (mi); Mean Speed (mph); Travel Time (min)	Route
Mean Travel Time	Minutes	Evacuation Trips; Network

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

HIGHWAY NETWORK

- Links defined by upstream and downstream node numbers
- Link lengths
- Number of lanes (up to 9) and channelization
- Turn bays (1 to 3 lanes)
- Destination (exit) nodes
- Network topology defined in terms of downstream nodes for each receiving link
- Node Coordinates (X,Y)
- Nuclear Power Plant Coordinates (X,Y)

GENERATED TRAFFIC VOLUMES

- On all entry links and source nodes (origins), by Time Period

TRAFFIC CONTROL SPECIFICATIONS

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

DRIVER'S AND OPERATIONAL CHARACTERISTICS

- Driver's (vehicle-specific) response mechanisms: free-flow speed, discharge headway
- Bus route designation.

DYNAMIC TRAFFIC ASSIGNMENT

- Candidate destination nodes for each origin (optional)
- Duration of DTA sessions
- Duration of simulation "burn time"
- Desired number of destination nodes per origin

INCIDENTS

- Identify and Schedule of closed lanes
- Identify and Schedule of closed links

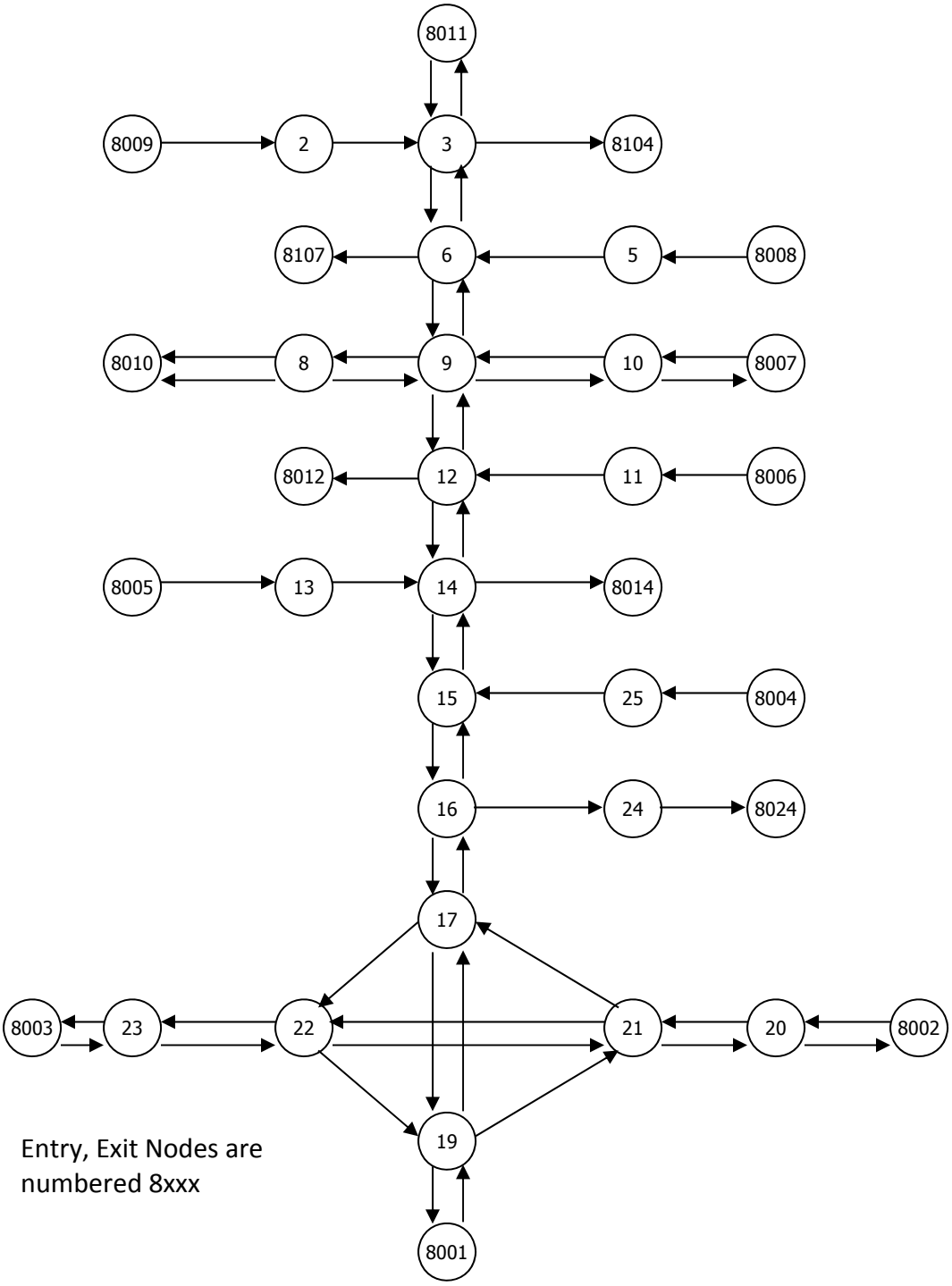


Figure C-1. Representative Analysis Network

C.1 Methodology

C.1.1 The Fundamental Diagram

It is necessary to define the fundamental diagram describing flow-density and speed-density relationships. Rather than "settling for" a triangular representation, a more realistic representation that includes a "capacity drop", (I-R)$Q_{max,}$ at the critical density when flow conditions enter the forced flow regime, is developed and calibrated for each link. This representation, shown in Figure C-2, asserts a constant free speed up to a density, k_f, and then a linear reduction in speed in the range, $k_f \le k \le k_c = 45$ vpm, the density at capacity. In the flow-density plane, a quadratic relationship is prescribed in the range, $k_c < k \le k_s = 95$ vpm which roughly represents the "stop-and-go" condition of severe congestion. The value of flow rate, Q_s, corresponding to k_s, is approximated at $0.7\,RQ_{max}$. A linear relationship between k_s and k_j completes the diagram shown in Figure C-2. Table C-3 is a glossary of terms.

The fundamental diagram is applied to moving traffic on every link. The specified calibration values for each link are: (1) Free speed, v_f ; (2) Capacity, Q_{max} ; (3) Critical density, $k_c = 45$ vpm ; (4) Capacity Drop Factor, R = 0.9 ; (5) Jam density, k_j . Then, $v_c = \frac{Q_{max}}{k_c}$, $k_f = k_c - \frac{(V_f - V_c)\,k_c^2}{Q_{max}}$. Setting $\bar{k} = k - k_c$, then $Q = RQ_{max} - \frac{RQ_{max}}{8333}\,\bar{k}^2$ for $0 \le \bar{k} \le \bar{k}_s = 50$. It can be shown that $Q = (0.98 - 0.0056\,\bar{k})\,RQ_{max}$ for $\bar{k}_s \le \bar{k} \le \bar{k}_j$, where $\bar{k}_s = 50$ and $\bar{k}_j = 175$.

C.1.2 The Simulation Model

The simulation model solves a sequence of "unit problems". Each unit problem computes the movement of traffic on a link, for each specified turn movement, over a specified time interval (TI) which serves as the simulation time step for all links. Figure C-3 is a representation of the unit problem in the time-distance plane. Table C-3 is a glossary of terms that are referenced in the following description of the unit problem procedure.

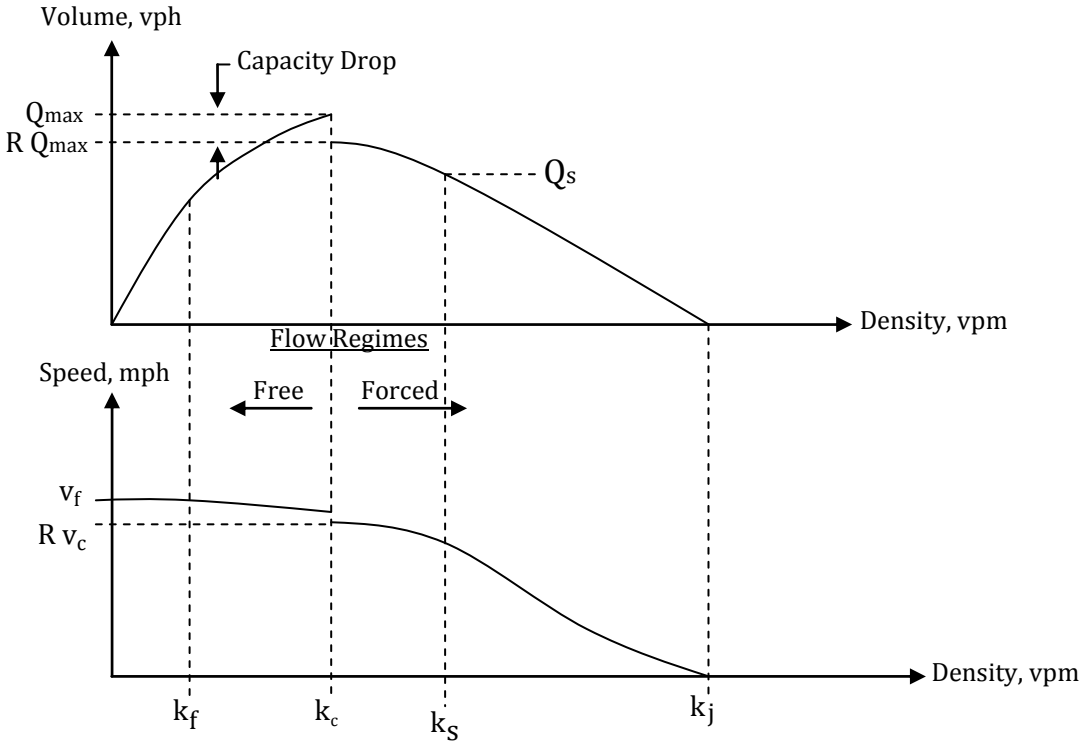


Figure C-2. Fundamental Diagrams

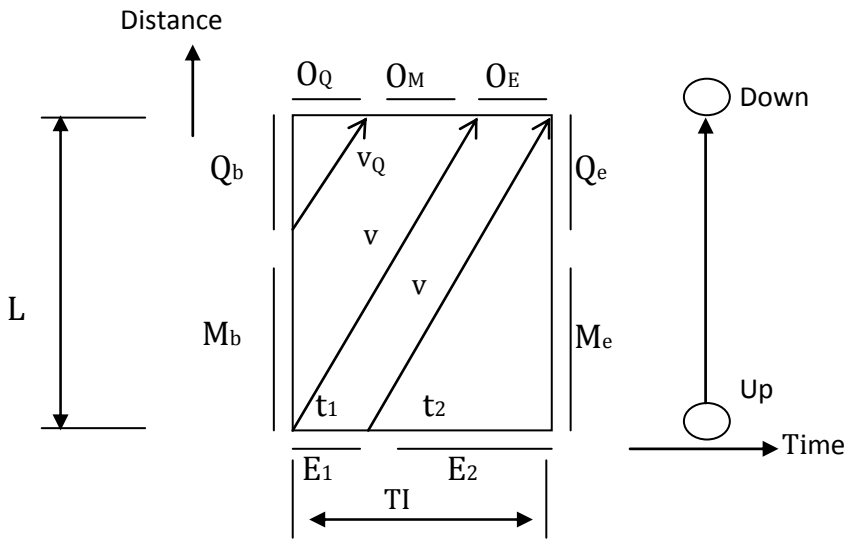


Figure C-3. A UNIT Problem Configuration with $t_1 > 0$

Table C-3. Glossary

Cap	The maximum number of vehicles, of a particular movement, that can discharge from a link within a time interval.
E	The number of vehicles, of a particular movement, that enter the link over the time interval. The portion, E_{TI}, can reach the stop-bar within the TI.
G/C	The green time: cycle time ratio that services the vehicles of a particular turn movement on a link.
h	The mean queue discharge headway, seconds.
k	Density in vehicles per lane per mile.
$\bar{k}$	The average density of moving vehicles of a particular movement over a TI, on a link.
L	The length of the link in feet.
L_b , L_e	The queue length in feet of a particular movement, at the [beginning, end] of a time interval.
LN	The number of lanes, expressed as a floating point number, allocated to service a particular movement on a link.
L_v	The mean effective length of a queued vehicle including the vehicle spacing, feet.
M	Metering factor (Multiplier): 1.
M_b , M_e	The number of moving vehicles on the link, of a particular movement, that are moving at the [beginning, end] of the time interval. These vehicles are assumed to be of equal spacing, over the length of link upstream of the queue.
O	The total number of vehicles of a particular movement that are discharged from a link over a time interval.
O_Q , O_M , O_E	The components of the vehicles of a particular movement that are discharged from a link within a time interval: vehicles that were Queued at the beginning of the TI; vehicles that were Moving within the link at the beginning of the TI; vehicles that Entered the link during the TI.
P_x	The percentage, expressed as a fraction, of the total flow on the link that executes a particular turn movement, x.

Q_b , Q_e	The number of queued vehicles on the link, of a particular turn movement, at the [beginning, end] of the time interval.
Q_{max}	The maximum flow rate that can be serviced by a link for a particular movement in the absence of a control device. It is specified by the analyst as an estimate of link capacity, based upon a field survey, with reference to the HCM.
R	The factor that is applied to the capacity of a link to represent the "capacity drop" when the flow condition moves into the forced flow regime. The lower capacity at that point is equal to RQ_{max} .
RCap	The remaining capacity available to service vehicles of a particular movement after that queue has been completely serviced, within a time interval, expressed as vehicles.
S_x	Service rate for movement x, vehicles per hour (vph).
t_1	Vehicles of a particular turn movement that enter a link over the first t_1 seconds of a time interval, can reach the stop-bar (in the absence of a queue down-stream) within the same time interval.
TI	The time interval, in seconds, which is used as the simulation time step.
v	The mean speed of travel, in feet per second (fps) or miles per hour (mph), of moving vehicles on the link.
v_Q	The mean speed of the last vehicle in a queue that discharges from the link within the TI. This speed differs from the mean speed of moving vehicles, v.
W	The width of the intersection in feet. This is the difference between the link length which extends from stop-bar to stop-bar and the block length.

The formulation and the associated logic presented below are designed to solve the unit problem for each sweep over the network (discussed below), for each turn movement serviced on each link that comprises the evacuation network, and for each TI over the duration of the evacuation.

Given = Q_b , M_b , L , TI , E_0 , LN , G/C , h , L_v , R_0 , L_c , E , M
Compute = O , Q_e , M_e
Define $O = O_Q + O_M + O_E$; $E = E_1 + E_2$

1. For the first sweep, s = 1, of this TI, get initial estimates of mean density, k_0 , the R – factor, R_0 and entering traffic, E_0 , using the values computed for the final sweep of the prior TI. For each subsequent sweep, $s > 1$, calculate $E = \sum_i P_i \ O_i + S$ where P_i , O_i are the relevant turn percentages from feeder link, i , and its total outflow (possibly metered) over this TI; S is the total source flow (possibly metered) during the current TI.
   Set iteration counter, n = 0, $k = k_0$, and $E = E_0$.

2. Calculate v (k) such that $k \leq 130$ using the analytical representations of the fundamental diagram.
   Calculate $Cap = \frac{Q_{max}(TI)}{3600} \left(G/C\right) LN$, in vehicles, this value may be reduced due to metering
   Set $R = 1.0$ if $G/C < 1$ or if $k \leq k_c$; Set $R = 0.9$ only if $G/C = 1$ and $k > k_c$
   Calculate queue length, $L_b = Q_b \frac{L_v}{LN}$

3. Calculate $t_1 = TI - \frac{L}{V}$. If $t_1 < 0$, set $t_1 = E_1 = O_E = 0$; Else, $E_1 = E \frac{t_1}{TI}$.

4. Then $E_2 = E - E_1$; $t_2 = TI - t_1$

5. If $Q_b \geq Cap$, then
   $O_Q = Cap$, $O_M = O_E = 0$
   If $t_1 > 0$, then
   $Q'_e = Q_b + M_b + E_1 - Cap$
   Else
   $Q'_e = Q_b - Cap$
   End if
   Calculate Q_e and M_e using Algorithm A (below)

6. Else $(Q_b < Cap)$
   $O_Q = Q_b$, $RCap = Cap - O_Q$

7. If $M_b \leq RCap$, then

8. If $t_1 > 0$, $O_M = M_b$, $O_E = \min\left(RCap - M_b, \frac{t_1\ Cap}{TI}\right) \geq 0$

$Q'_e = E_1 - O_E$

If $Q'_e > 0$, then

Calculate Q_e, M_e with Algorithm A

Else

$Q_e = 0$, $M_e = E_2$

End if

Else $(t_1 = 0)$

$O_M = \left(\frac{v(TI) - L_b}{L - L_b}\right) M_b$ and $O_E = 0$

$M_e = M_b - O_M + E$; $Q_e = 0$

End if

9. Else $(M_b > RCap)$

$O_E = 0$

If $t_1 > 0$, then

$O_M = RCap$, $Q'_e = M_b - O_M + E_1$

Calculate Q_e and M_e using Algorithm A

10. Else $(t_1 = 0)$

$M_d = \left[\left(\frac{v(TI) - L_b}{L - L_b}\right) M_b\right]$

If $M_d > RCap$, *then*

$O_M = RCap$

$Q'_e = M_d - O_M$

Apply Algorithm A to calculate Q_e and M_e

Else

$O_M = M_d$

$M_e = M_b - O_M + E$ and $Q_e = 0$

End if

End if

End if

End if

11. Calculate a new estimate of average density, $\bar{k}_n = \frac{1}{4}[k_b + 2\,k_m + k_e]$,

where k_b = density at the beginning of the TI

k_e = density at the end of the TI

k_m = density at the mid-point of the TI

All values of density apply only to the moving vehicles.

If $|\bar{k}_n - \bar{k}_{n-1}| > \epsilon$ and $n < N$

where $N = \max$ number of iterations, and ϵ is a convergence criterion, then

12. set $n = n + 1$, and return to step 2 to perform iteration, n, using $k = \bar{k}_n$.
End if

Computation of unit problem is now complete. Check for excessive inflow causing spillback.

13. If $Q_e + M_e > \frac{(L-W)\,LN}{L_v}$, then

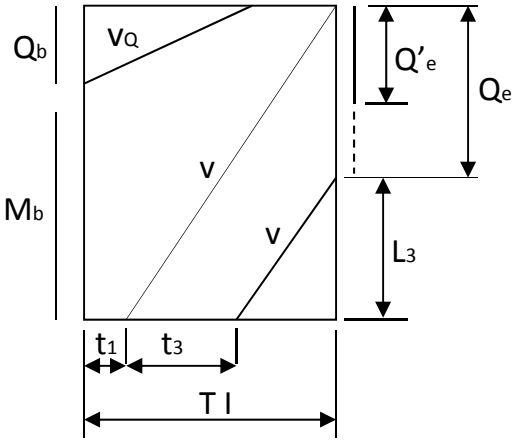
The number of excess vehicles that cause spillback is: $SB = Q_e + M_e - \frac{(L-W)\cdot LN}{L_v}$, where W is the width of the upstream intersection. To prevent spillback, meter the outflow from the feeder approaches and from the source flow, S, during this TI by the amount, SB. That is, set

$$M = 1 - \frac{SB}{(E+S)} \geq 0 \text{ , where M is the metering factor (over all movements).}$$

This metering factor is assigned appropriately to all feeder links and to the source flow, to be applied during the next network sweep, discussed later.

Algorithm A

This analysis addresses the flow environment over a TI during which moving vehicles can join a standing or discharging queue. For the case shown, $Q_b \leq Cap$, with $t_1 > 0$ and a queue of length, Q'_e, formed by that portion of M_b and E that reaches the stop-bar within the TI, but could not discharge due to inadequate capacity. That is, $Q_b + M_b + E_1 > Cap$. This queue length, $Q'_e = Q_b + M_b + E_1 - Cap$ can be extended to Q_e by traffic entering the approach during the current TI, traveling at speed, v, and reaching the rear of the queue within the TI. A portion of the entering vehicles, $E_3 = E\,\frac{t_3}{TI}$, will likely join the queue. This analysis calculates t_3 , Q_e and M_e for the input values of L, TI, v, E, t, L_v, LN, Q'_e .



When $t_1 > 0$ and $Q_b \leq Cap$:

Define: $L'_e = Q'_e\,\frac{L_v}{LN}$. From the sketch, $L_3 = v(TI - t_1 - t_3) = L - (Q'_e + E_3)\frac{L_v}{LN}$. Substituting $E_3 = \frac{t_3}{TI}\,E$ yields: $-vt_3 + \frac{t_3}{TI}\,E\,\frac{L_v}{LN} = L - v(TI - t_1) - L'_e$. Recognizing that the first two terms on the right hand side cancel, solve for t_3 to obtain:

$$t_3 = \frac{L'_e}{\left[v - \frac{E}{TI}\frac{L_v}{LN}\right]} \qquad \text{such that} \quad 0 \le t_3 \le TI - t_1$$

If the denominator, $\left[v - \frac{E}{TI}\frac{L_v}{LN}\right] \le 0$, set $t_3 = TI - t_1$.

$$\text{Then, } Q_e = Q'_e + E\,\frac{t_3}{TI} \quad , \qquad M_e = E\left(1 - \frac{t_1 + t_3}{TI}\right)$$

The complete Algorithm A considers all flow scenarios; space limitation precludes its inclusion, here.

C.1.3 Lane Assignment

The "unit problem" is solved for each turn movement on each link. Therefore it is necessary to calculate a value, LN_x , of allocated lanes for each movement, x. If in fact all lanes are specified by, say, arrows painted on the pavement, either as full lanes or as lanes within a turn bay, then the problem is fully defined. If however there remain un-channelized lanes on a link, then an analysis is undertaken to subdivide the number of these physical lanes into turn movement specific virtual lanes, LN_x.

C.2 Implementation

C.2.1 Computational Procedure

The computational procedure for this model is shown in the form of a flow diagram as Figure C-4. As discussed earlier, the simulation model processes traffic flow for each link independently over TI that the analyst specifies; it is usually 60 seconds or longer. The first step is to execute an algorithm to define the sequence in which the network links are processed so that as many links as possible are processed after their feeder links are processed, within the same network sweep. Since a general network will have many closed loops, it is not possible to guarantee that every link processed will have all of its feeder links processed earlier.

The processing then continues as a succession of time steps of duration, TI, until the simulation is completed. Within each time step, the processing performs a series of "sweeps" over all network links; this is necessary to ensure that the traffic flow is synchronous over the entire network. Specifically, the sweep ensures continuity of flow among all the network links; in the context of this model, this means that the values of E, M, and S are all defined for each link such that they represent the synchronous movement of traffic from each link to all of its outbound links. These sweeps also serve to compute the metering rates that control spillback.

Within each sweep, processing solves the "unit problem" for each turn movement on each link. With the turn movement percentages for each link provided by the DTRAD model, an algorithm

allocates the number of lanes to each movement serviced on each link. The timing at a signal, if any, applied at the downstream end of the link, is expressed as a G/C ratio, the signal timing needed to define this ratio is an input requirement for the model. The model also has the capability of representing, with macroscopic fidelity, the actions of actuated signals responding to the time-varying competing demands on the approaches to the intersection.

The solution of the unit problem yields the values of the number of vehicles, O, that discharge from the link over the time interval and the number of vehicles that remain on the link at the end of the time interval as stratified by queued and moving vehicles: Q_e and M_e. The procedure considers each movement separately (multi-piping). After all network links are processed for a given network sweep, the updated consistent values of entering flows, E; metering rates, M; and source flows, S are defined so as to satisfy the "no spillback" condition. The procedure then performs the unit problem solutions for all network links during the following sweep.

Experience has shown that the system converges (i.e. the values of E, M and S "settle down" for all network links) in just two sweeps if the network is entirely under-saturated or in four sweeps in the presence of extensive congestion with link spillback. (The initial sweep over each link uses the final values of E and M, of the prior TI). At the completion of the final sweep for a TI, the procedure computes and stores all measures of effectiveness for each link and turn movement for output purposes. It then prepares for the following time interval by defining the values of Q_b and M_b for the start of the next TI as being those values of Q_e and M_e at the end of the prior TI. In this manner, the simulation model processes the traffic flow over time until the end of the run. Note that there is no space-discretization other than the specification of network links.

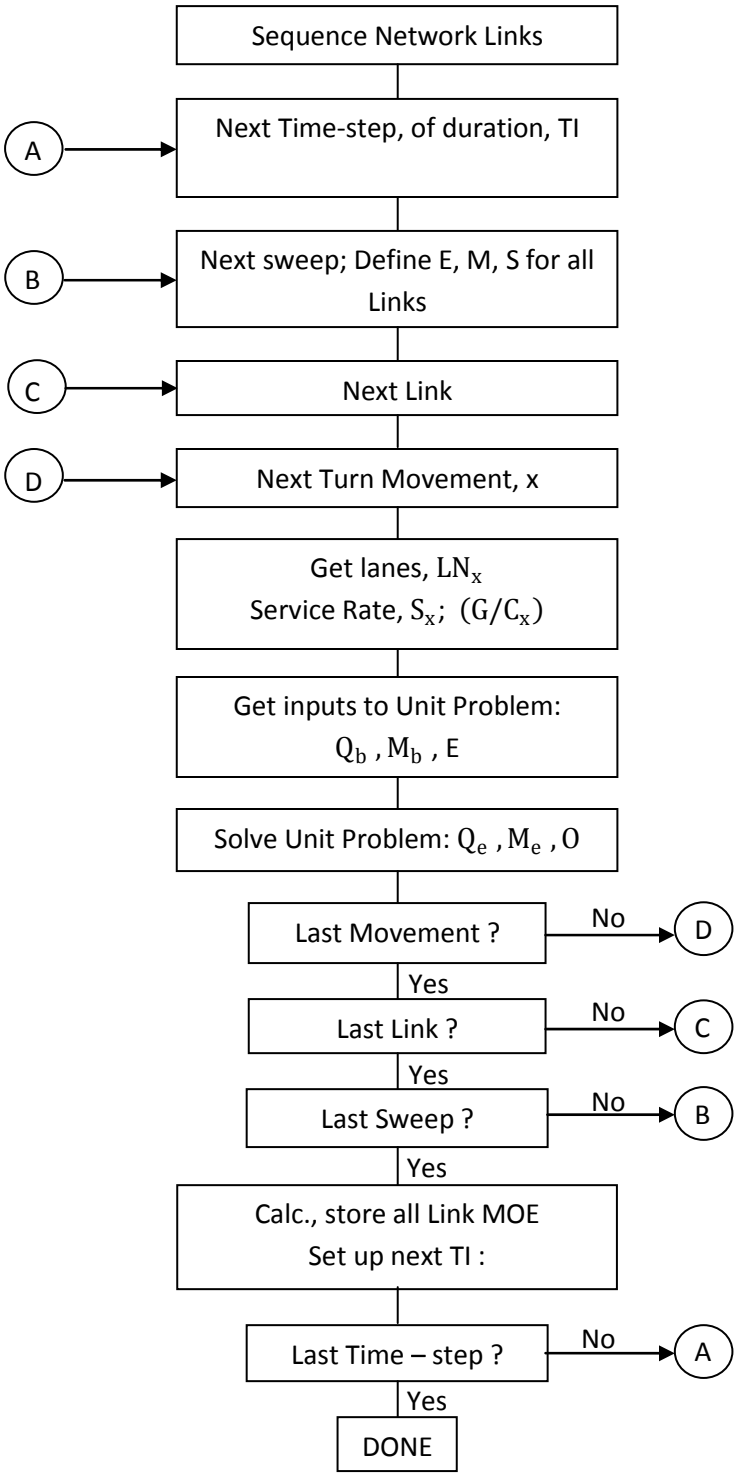


Figure C-4. Flow of Simulation Processing (See Glossary: Table C-3)

C.2.2 Interfacing with Dynamic Traffic Assignment (DTRAD)

The DYNEV II system reflects NRC guidance that evacuees will seek to travel in a general direction away from the location of the hazardous event. Thus, an algorithm was developed to identify an appropriate set of destination nodes for each origin based on its location and on the expected direction of travel. This algorithm also supports the DTRAD model in dynamically varying the Trip Table (O-D matrix) over time from one DTRAD session to the next.

Figure B-1 depicts the interaction of the simulation model with the DTRAD model in the DYNEV II system. As indicated, DYNEV II performs a succession of DTRAD "sessions"; each such session computes the turn link percentages for each link that remain constant for the session duration, $[T_0, T_2]$, specified by the analyst. The end product is the assignment of traffic volumes from each origin to paths connecting it with its destinations in such a way as to minimize the network-wide cost function. The output of the DTRAD model is a set of updated link turn percentages which represent this assignment of traffic.

As indicated in Figure B-1, the simulation model supports the DTRAD session by providing it with operational link MOE that are needed by the path choice model and included in the DTRAD cost function. These MOE represent the operational state of the network at a time, $T_1 \leq T_2$, which lies within the session duration, $[T_0, T_2]$. This "burn time", $T_1 - T_0$, is selected by the analyst. For each DTRAD iteration, the simulation model computes the change in network operations over this burn time using the latest set of link turn percentages computed by the DTRAD model. Upon convergence of the DTRAD iterative procedure, the simulation model accepts the latest turn percentages provided by the DTA model, returns to the origin time, T_0, and executes until it arrives at the end of the DTRAD session duration at time, T_2. At this time the next DTA session is launched and the whole process repeats until the end of the DYNEV II run.

Additional details are presented in Appendix B.

APPENDIX D

Detailed Description of Study Procedure

D. DETAILED DESCRIPTION OF STUDY PROCEDURE

This appendix describes the activities that were performed to compute Evacuation Time Estimates. 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 the flow diagram.

Step 1

The first activity was to obtain EPZ boundary information and create a GIS base map. The base map extends beyond the Shadow Region which extends approximately 15 miles (radially) from the power plant location. The base map incorporates the local roadway topology, a suitable topographic background and the EPZ boundary.

Step 2

2010 Census block information was obtained in GIS format. This information was used to estimate the resident population within the EPZ and Shadow Region and to define the spatial distribution and demographic characteristics of the population within the study area. Employee data were estimated using the U.S. Census Bureau's Longitudinal Employer-Household Dynamics interactive website[1] for New Hampshire, and from phone calls to major employers in Massachusetts. Transient data were obtained from state emergency management agencies, from estimates using aerial imagery, and from phone calls to transient attractions. Information concerning schools, medical and other types of special facilities within the EPZ was obtained from state emergency management agencies augmented by telephone contacts with the identified facilities.

Step 3

A kickoff meeting was conducted with major stakeholders (state and local emergency managers, on-site and off-site utility emergency managers, local and state law enforcement agencies). The purpose of the kickoff meeting was to present an overview of the work effort, identify key agency personnel, and indicate the data requirements for the study. Specific requests for information were presented to state emergency managers. Unique features of the study area were discussed to identify the local concerns that should be addressed by the ETE study.

Step 4

Next, a physical survey of the roadway system in the study area was conducted to determine the geometric properties of the highway sections, 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, gathering signal timings for pre-timed traffic signals, and to make the necessary observations needed to estimate realistic

[1] http://lehdmap.did.census.gov/

values of roadway capacity.

Step 5

A telephone survey of households within the EPZ was conducted to identify household dynamics, trip generation characteristics, and evacuation-related demographic information of the EPZ population. This information was used to determine important study factors including the average number of evacuating vehicles used by each household, and the time required to perform pre-evacuation mobilization activities.

Step 6

A computerized representation of the physical roadway system, called a link-node analysis network, was developed using the UNITES software developed by KLD. Once the geometry of the network was completed, the network was calibrated using the information gathered during the road survey (Step 4). Estimates of highway capacity for each link and other link-specific characteristics were introduced to the network description. Traffic signal timings were input accordingly. The link-node analysis network was imported into a GIS map. 2010 Census data were overlaid in the map, and origin centroids where trips would be generated during the evacuation process were assigned to appropriate links.

Step 7

The EPZ is subdivided into 23 Communities. Based on wind direction and speed, Regions (groupings of Communities) that may be advised to evacuate, were developed.

The need for evacuation can occur over a range of time-of-day, day-of-week, seasonal and weather-related conditions. Scenarios were developed to capture the variation in evacuation demand, highway capacity and mobilization time, for different time of day, day of the week, time of year, and weather conditions.

Step 8

The input stream for the DYNEV II model, which integrates the dynamic traffic assignment and distribution model, DTRAD, with the evacuation simulation model, was created for a prototype evacuation case – the evacuation of the entire EPZ for a representative scenario.

Step 9

After creating this input stream, the DYNEV II System was executed on the prototype evacuation case to compute evacuating traffic routing patterns consistent with the appropriate NRC guidelines. DYNEV II contains an extensive suite of data diagnostics which check the completeness and consistency of the input data specified. The analyst reviews all warning and error messages produced by the model and then corrects the database to create an input stream that properly executes to completion.

The model assigns destinations to all origin centroids consistent with a (general) radial evacuation of the EPZ and Shadow Region. The analyst may optionally supplement and/or replace these model-assigned destinations, based on professional judgment, after studying the topology of the analysis highway network. The model produces link and network-wide

measures of effectiveness as well as estimates of evacuation time.

Step 10

The results generated by the prototype evacuation case are critically examined. The examination includes observing the animated graphics (using the EVAN software which operates on data produced by DYNEV II) and reviewing the statistics output by the 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 bottlenecks 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 high rates of trip generation, improper routing, a shortfall of capacity, or as a quantitative flaw in the way the physical system was represented in the input stream. This examination leads to one of two conclusions:

- The results are satisfactory; or
- The input stream must be modified accordingly.

This decision requires, of course, the application of the user's judgment and experience based upon the results obtained in previous applications of the model and a comparison of the results of the latest prototype evacuation case iteration with the previous ones. If the results are satisfactory in the opinion of the user, then the process continues with Step 13. Otherwise, proceed to Step 11.

Step 11

There are many "treatments" available to the user in resolving apparent problems. These treatments range from decisions to reroute the traffic by assigning additional evacuation destinations for one or more sources, 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. Such "treatments" take the form of modifications to the original prototype evacuation case input stream. All treatments are designed to improve the representation of evacuation behavior.

Step 12

As noted above, the changes to the input stream must be implemented to reflect the modifications undertaken in Step 11. At the completion of this activity, the process returns to Step 9 where the DYNEV II System is again executed.

Step 13

Evacuation of transit-dependent evacuees and special facilities are included in the evacuation analysis. Fixed routing for transit buses and for school buses, ambulances, and other transit vehicles are introduced into the final prototype evacuation case data set. DYNEV II generates

route-specific speeds over time for use in the estimation of evacuation times for the transit dependent and special facility population groups.

Step 14

The prototype evacuation case was used as the basis for generating all region and scenario-specific evacuation cases to be simulated. This process was automated through the UNITES user interface. For each specific case, the population to be evacuated, the trip generation distributions, the highway capacity and speeds, and other factors are adjusted to produce a customized case-specific data set.

Step 15

All evacuation cases are executed using the DYNEV II System to compute ETE. Once results were available, quality control procedures were used to assure the results were consistent, dynamic routing was reasonable, and traffic congestion/bottlenecks were addressed properly.

Step 16

Once vehicular evacuation results are accepted, average travel speeds for transit and special facility routes were used to compute evacuation time estimates for transit-dependent permanent residents, schools, medical facilities, and other special facilities.

Step 17

The simulation results are analyzed, tabulated and graphed. The results were then documented, as required by NUREG/CR-7002.

Step 18

Following the completion of documentation activities, the ETE criteria checklist (see Appendix N) was completed. An appropriate report reference is provided for each criterion provided in the checklist.

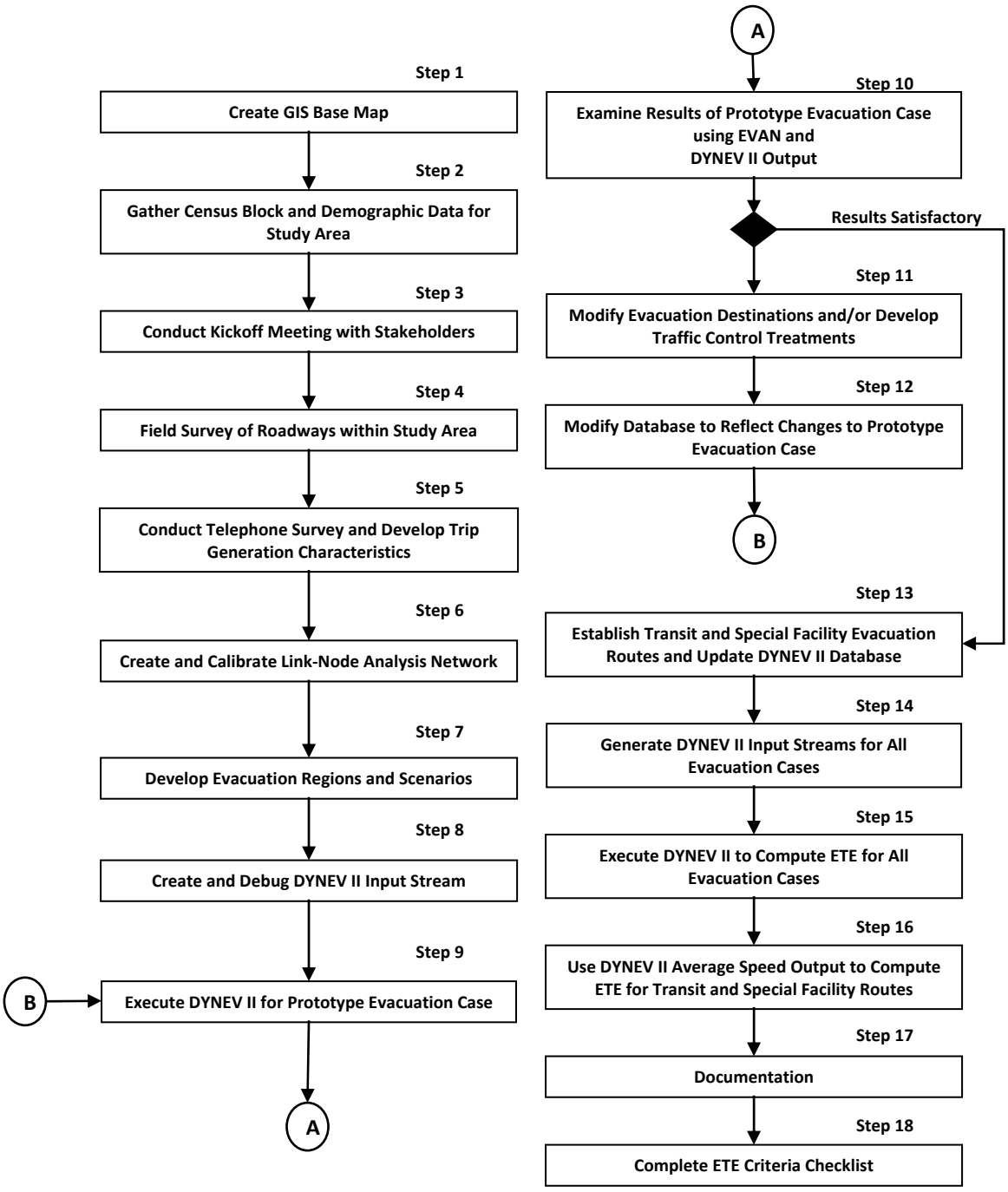


Figure D-1. Flow Diagram of Activities

APPENDIX E

Facility Data

E. FACILITY DATA

The following tables list population information, as of July 2012, for special facilities, transient attractions and major employers that are located within the Seabrook Station EPZ. Special facilities are defined as schools, preschools and licensed daycares, day camps, hospitals and other medical care facilities, and correctional facilities. Transient population data is included in the tables for historical sites, campgrounds, parks, beaches, marinas, golf course, and lodging facilities. Massachusetts employment data is included in the tables for major employers. New Hampshire employment data was obtained using 2010 LEHD Census data; see Section 3.4.

Each table is grouped by state. The location of the facility is defined by its straight-line distance (miles) and direction (magnetic bearing) from the center point of the plant. Maps of each school, preschool and licensed daycare, day camp, medical facility, major employer within MA, recreational area, lodging facility, and correctional facility are also provided.

Table E-1. Schools within the EPZ

Community	Distance (miles)	Direction	School Name	Street Address	Municipality	Enrollment	Staff[1]
MASSACHUSETTS							
Amesbury	5.3	SW	Amesbury Academy Charter Public School	71 Friend Street	Amesbury	50	12
Amesbury	4.7	WSW	Amesbury Elementary School	20 South Hampton Road	Amesbury	442	80
Amesbury	5.8	SW	Amesbury High School	5 Highland Street	Amesbury	620	94
Amesbury	5.4	SW	Amesbury Middle School	220 Main Street	Amesbury	755	94
Amesbury	5.9	WSW	Cashman School	193 Lion's Mouth Road	Amesbury	533	75
Amesbury	5.2	SW	Sparhawk High School	196 Main Street	Amesbury	64	30
Amesbury	4.5	SW	Sparhawk School	259 Elm Street	Amesbury	74	13
Merrimac	9.1	WSW	Dr. FN Sweetsir School	104 Church Street	Merrimac	242	55
Merrimac	9.4	WSW	Helen R. Donaghue School	24 Union Street	Merrimac	384	65
Newbury	7.6	S	Newbury Elementary School	63 Hanover Street	Newbury	660	98
Newbury	10.5	SSW	The Governor's Academy	1 Elm Street	Newbury	401	191
Newbury	11.2	SSW	Triton Regional Middle School and High School	112 Elm Street	Byfield	1,214	196
Newburyport	5.8	SSW	Bresnahan Elementary School	333 High Street	Newburyport	501	91
Newburyport	6.8	SSW	Coastal Alternative School	4 New Pasture Road	Newburyport	16	5
Newburyport	6.4	SSW	DARE Family Services	141 Low Street	Newburyport	22	N/A
Newburyport	6.5	SSW	E.G. Molin Upper Elementary School	70 Low Street	Newburyport	352	55
Newburyport	6.5	S	G.W. Brown School	40 Milk Street	Newburyport	244	50
Newburyport	6.3	S	Immaculate Conception School	1 Washington Street	Newburyport	364	28
Newburyport	6.2	S	Inn Street Montessori School	52 Inn Street	Newburyport	41	6
Newburyport	6.3	SSW	Newburyport High School	241 High Street	Newburyport	710	96
Newburyport	6.6	SSW	River Valley Charter School	2 Perry Way	Newburyport	288	54
Newburyport	6.5	SSW	Rupert A. Nock Middle School	70 Low Street	Newburyport	528	90
Salisbury	3.2	SSW	Salisbury Elementary School	100 Lafayette Road	Salisbury	545	10
West Newbury	8.5	SW	Dr. John C. Page School	694 Main Street	West Newbury	480	80

[1] Staff at MA schools evacuate with students on buses. Staff at NH schools evacuate in personal vehicles. For this reason, school staff data for NH schools was not provided.

Community	Distance (miles)	Direction	School Name	Street Address	Municipality	Enrollment	Staff[1]
West Newbury	11.5	SW	Pentucket Regional High School	24 Main Street	West Newbury	790	90
West Newbury	11.6	SW	Pentucket Regional Middle School	22-24 Main Street	West Newbury	523	70
					MA Subtotals:	*10,843*	*1,728*
NEW HAMPSHIRE							
Brentwood	13.3	WNW	Brentwood Christian Academy	263 New Hampshire 125	Brentwood	120	-
Brentwood	12.0	NW	Seacoast Learning Collaborative	87 State Route 27	Brentwood	52	-
Brentwood	12.5	WNW	Swasey Elementary	355 Middle Road	Brentwood	462	-
East Kingston	7.3	W	East Kingston Elementary School	5 Andrews Lane	East Kingston	204	-
Exeter	7.6	NW	Exeter Classical Christian School	73 Winter Street	Exeter	12	-
Exeter	11.2	NW	Exeter High School	1 Blue Hawk Drive	Exeter	1,904	-
Exeter	7.6	NW	Great Bay e-Learning Charter School	30 Linden Street	Exeter	164	-
Exeter	7.8	NW	Lincoln Street Elementary School	25 Lincoln Street	Exeter	613	-
Exeter	7.8	NW	Main Street School	40 Main Street	Exeter	603	-
Exeter	7.7	NW	Phillips Exeter Academy	20 Main Street	Exeter	1,034	-
Greenland	9.3	N	Greenland Central School	70 Post Road	Greenland	354	-
Hampton	2.8	NNE	Hampton Academy	29 Academy Avenue	Hampton	527	-
Hampton	2.7	NNE	Hampton Centre School	53 Winnacunnet Road	Hampton	480	-
Hampton	3.0	NNE	Marston School	Marston Way	Hampton	475	-
Hampton	2.6	NNE	Sacred Heart School	Lafayette Road	Hampton	332	-
Hampton	2.4	NNE	Winnacunnet Reg. High School	1 Alumni Drive	Hampton	1,520	-
Hampton Falls	5.5	NW	Heronfield Academy	356 Exeter Road	Hampton Falls	90	-
Hampton Falls	1.5	NW	Lincoln Akerman School	8 Exeter Road	Hampton Falls	340	-
Kensington	5.2	WNW	Kensington Elementary School	122 Amesbury Road	Kensington	194	-
Kingston	10.7	WNW	Daniel J. Bakie School	179 Main Street	Kingston	512	-
Kingston	11.4	W	Sanborn Regional High School	17 Danville Road	Kingston	1,313	-
Kingston	10.8	WNW	Seacoast Charter School	13 Church Street	Kingston	170	-
New Castle	13.5	NNE	Maude H. Trefethen School	Cranfield Street	New Castle	54	-
Newfields	10.6	NNW	Newfields Elementary School	9 Piscassic Road	Newfields	150	-

Community	Distance (miles)	Dire-ction	School Name	Street Address	Municipality	Enroll-ment	Staff[1]
Newton	11.2	WSW	Memorial Elementary School	31 West Main Street	Newton	343	-
Newton	11.2	WSW	Sanborn Regional Middle School	31A West Main Street	Newton	409	-
North Hampton	5.2	NNE	North Hampton Elementary School	201 Atlantic Avenue	North Hampton	473	-
Portsmouth	10.4	NNE	Dondero School	32 Van Buren Avenue	Portsmouth	339	-
Portsmouth	12.6	NNE	Little Harbor School	50 Clough Drive	Portsmouth	379	-
Portsmouth	12.8	NNE	New Franklin School	1 Franklin Drive	Portsmouth	286	-
Portsmouth	11.8	NNE	Portsmouth High School	50 Andrew Jarvis Drive	Portsmouth	1,109	-
Portsmouth	12.9	NNE	Portsmouth Middle School	155 Parrott Avenue	Portsmouth	508	-
Portsmouth	11.3	NNE	Robert J. Lister Academy	35 Sherburne Road	Portsmouth	25	-
Portsmouth	12.7	NNE	St Patrick's School	125 Austin Street	Portsmouth	212	-
Rye	7.7	NNE	Learning Skills Academy	1247 Washington Road	Rye	44	-
Rye	10.2	NNE	Rye Elementary School	461 Sagamore Road	Rye	407	-
Rye	8.9	NNE	Rye Junior High School	501 Washington Road	Rye	245	-
Seabrook	1.2	S	Seabrook Elementary School	256 Walton Road	Seabrook	483	-
Seabrook	1.4	S	Seabrook Middle School	236 Walton Road	Seabrook	374	-
South Hampton	6.0	WSW	Barnard School	219 Main Avenue	South Hampton	97	-
South Hampton	5.6	WSW	Seventh Day Adventist Elementary School	285 Main Avenue	South Hampton	23	-
Stratham	8.0	NNW	Acorn School	136 Winnicutt Road	Stratham	54	-
Stratham	6.3	NNW	Cooperative Middle School	100 Academic Way	Stratham	1,558	-
Stratham	9.2	NNW	Cornerstone Christian Academy	8 Winnicutt Road	Stratham	10	-
Stratham	9.3	N	Stratham Memorial School	39 Gifford Farm Road	Stratham	766	-
Stratham	8.6	N	The Cornerstone School	146 High Street	Stratham	165	-
					NH Subtotals:	*19,988*	*N/A*
					TOTAL:	**30,831**	**1,728**

Table E-2. Preschools within the EPZ

Community	Distance (miles)	Direction	School Name	Street Address	Municipality	Enrollment	Staff[1]
MASSACHUSETTS							
Amesbury	4.5	WSW	Amesbury Country Day School	186 Market Street	Amesbury	20	2
Amesbury	5.2	SW	James Place The Next Generation	146 Main Street	Amesbury	46	8
Amesbury	4.6	SW	Leaps and Bounds Pre-School	239 Elm Street	Amesbury	24	3
Amesbury	6.4	SW	Leaps and Bounds Pre-School	69 Haverhill Road	Amesbury	24	3
Amesbury	5.4	SW	Little Sprouts Daycare	36 Sparhawk Street	Amesbury	85	16
Amesbury	5.4	SW	Windmill Country Day School	4 Rosedale Street	Amesbury	73	10
Merrimac	9.5	WSW	Little People's Pre-School	61 West Main Street	Merrimac	50	6
Newbury	11.0	SSW	Creative Playhouse	10 Kent Way	Byfield	16	3
Newburyport	6.6	SSW	Bright Horizons at Newburyport	2 Graf Road	Newburyport	70	16
Newburyport	5.5	SSW	Community Action, Inc. Newburyport Head Start	447 Merrimac Street	Newburyport	54	11
Newburyport	6.4	SSW	Kinder Care Learning Center	151 Low Street	Newburyport	71	16
Newburyport	6.7	SSW	Kindercare Learning Center	1 Daniel Lucy Way	Newburyport	80	20
Newburyport	6.5	S	Knoll Edge Nursery	13 Pond Street	Newburyport	85	16
Newburyport	6.9	SSW	Knoll Edge Too!	188 U.S. 1	Newburyport	20	4
Newburyport	6.7	SSW	Mrs Murray's Nursery School	11 Hale Street	Newburyport	33	7
Newburyport	6.2	S	Newburyport Montessori School	20 R Pleasant Street	Newburyport	107	18
Newburyport	6.2	SSW	YWCA - School's Out Program	13 Market Street	Newburyport	65	8
Salisbury	2.6	SW	New Beginnings Learning Center	58 Main Street	Salisbury	30	6
West Newbury	8.5	SW	Children's Castle	694 Main Street	West Newbury	95	17
West Newbury	10.2	SW	Koinonia PreSchool	308 Main Street	West Newbury	50	12
West Newbury	9.3	SW	Learning Tree Preschool	491 Main Street	West Newbury	22	3
West Newbury	10.8	SW	Pathways for Learning Preschool	9 Pleasant Street	West Newbury	18	5
					MA Subtotals:	*1,138*	*210*
NEW HAMPSHIRE							
Brentwood	13.8	WNW	A Place To Grow	24 Commercial Drive	Brentwood	35	-
Exeter	6.2	NNW	Appleseeds Day School	15 Hampton Road	Exeter	144	-
Exeter	8.5	WNW	Building Block School	125 Kingston Road	Exeter	40	-
Exeter	8.6	NW	De Colores Children's Center	87 Epping Road	Exeter	13	-
Exeter	7.3	NW	Exeter Day School	11 Marlboro Street	Exeter	85	-

Community	Distance (miles)	Dire-ction	School Name	Street Address	Municipality	Enroll-ment	Staff[1]
Exeter	7.8	NW	Exeter Child Care Center/Great Bay Kid's Company	13 School Street	Exeter	90	-
Exeter	7.8	NW	Great Bay Kids Company	25 Lincoln Street	Exeter	60	-
Exeter	7.8	NW	Great Bay Kids Company	40 Main Street	Exeter	60	-
Exeter	8.1	NW	Montessori School for the Arts & Sciences	2 Newfields Road	Exeter	80	-
Greenland	9.4	N	Community School of SAU 50/Greenland Peak	70 Post Road	Greenland	30	-
Greenland	9.0	N	Greenland Live Y'ers	176 Tuttle Lane	Greenland	50	-
Greenland	9.6	N	Kaleidoscope Home Childcare	468 Portsmouth Avenue	Greenland	17	-
Hampton	2.8	NNE	Fun After School Program	127 Winnacunnet Road	Hampton	99	-
Hampton	3.2	N	Kids Stop Inc	1 Merrill Industrial Drive	Hampton	80	-
Hampton	2.8	NNE	My First School	137 Winnacunnet Road	Hampton	53	-
Hampton	3.7	NNE	Sandbox Preschool Day Care	830 Lafayette Road	Hampton	21	-
Hampton	3.0	NNE	Village Preschool	200 High Street	Hampton	20	-
Hampton Falls	1.5	NNW	Hampton Falls Child Care Center	98 Lafayette Road	Hampton Falls	42	-
Hampton Falls	1.4	NNW	Robin's Childsplace	105 Lafayette Road	Hampton Falls	192	-
Hampton Falls	1.5	NNW	Seacoast Head Start	137 Lafayette Road	Hampton Falls	37	-
Kingston	11.2	WNW	Bright Start Early Learning	2 Marshall Road	Kingston	20	-
Kingston	10.8	WNW	Kingston Children's Center	12 Church Street	Kingston	75	-
Kingston	11.0	WNW	Story Brook Station Day School & Offspring Kids	43 Church Street	Kingston	74	-
Newfields	10.7	NNW	Gateway to Learning	12 Main Street	Newfields	24	-
Newfields	9.8	NNW	Nurture & Nature Children Center	171 Exeter Road	Newfields	45	-
Newton	9.9	WSW	Newton Learning Center	31 South Main Street	Newton	63	-
North Hampton	7.0	NNE	Imprint's Day School	2 Lafayette Road	North Hampton	130	-
Portsmouth	11.6	NNE	Chase Home For Children	698 Middle Road	Portsmouth	25	-
Portsmouth	11.3	NNE	Children's Garden School	290 Peverly Hill Road	Portsmouth	32	-
Portsmouth	10.2	NNE	Community Child Care Center of Portsmouth	100 Campus Drive	Portsmouth	43	-
Portsmouth	12.7	NNE	Community Day Care Center	1 Franklin Drive	Portsmouth	140	-
Portsmouth	12.8	N	Discovery Child Enrichment Center	30 Rye Street	Portsmouth	78	-
Portsmouth	10.4	NNE	Dondero Peak Program	Van Buren Ave	Portsmouth	30	-
Portsmouth	13.1	NNE	Early Learning Center at Temple Israel Preschool	200 State Street	Portsmouth	12	-

Community	Distance (miles)	Dire-ction	School Name	Street Address	Municipality	Enroll-ment	Staff[1]
Portsmouth	12.3	NNE	Edgewood Early Learning Center	928 South Street	Portsmouth	38	-
Portsmouth	12.7	NNE	Kathleen Tostenson	306 Thornton Street	Portsmouth	6	-
Portsmouth	11.0	NNE	Kindercare Learning Center	72 Mirona Road	Portsmouth	156	-
Portsmouth	11.0	NNE	Little Blessings Day Care	1035 Lafayette Road	Portsmouth	71	-
Portsmouth	12.6	NNE	Little Harbour Peak Program	Clough Drive	Portsmouth	45	-
Portsmouth	11.1	NNE	Live Y'ers Child Care Center	550 Peverly Hill Road	Portsmouth	30	-
Portsmouth	12.7	NNE	New Franklin Peak Program	1 Franklin Drive	Portsmouth	30	-
Portsmouth	13.3	NNE	Patricia Katkin	1400 Woodbury Avenue	Portsmouth	12	-
Portsmouth	12.3	N	Pease Center - Great Bay Kids	81 New Hampshire Avenue	Portsmouth	270	-
Portsmouth	10.2	NNE	PEEP School - Pre School	100 Campus Drive	Portsmouth	13	-
Portsmouth	10.3	NNE	Place for Friends and Fun	400 Coolidge Drive	Portsmouth	9	-
Portsmouth	10.2	NNE	Portsmouth Head Start	100 Campus Drive	Portsmouth	51	-
Portsmouth	11.8	NNE	The Agape Preschool	397 Lafayette Road	Portsmouth	36	-
Portsmouth	12.5	NNE	Unalkaya	374 Lincoln Avenue	Portsmouth	13	-
Rye	11.3	NNE	Children's House Montessori	80 Sagamore Road	Rye	44	-
Rye	7.7	NNE	Rye Country Day School	1245 Washington Road	Rye	99	-
Seabrook	3.0	W	Over the Rainbow Day School	3 Dandiview Acres	Seabrook	17	-
Stratham	5.8	NNW	Bright Horizons at Timberland	200 Domain Drive	Stratham	120	-
Stratham	9.0	NNW	Debby's Day Care	2 Pond View Road	Stratham	9	-
Stratham	8.4	N	Four Pines Childcare	145 Union Road	Stratham	9	-
Stratham	7.5	NNW	Polka Dots Child Care Center	7 Stoney Brook Lane	Stratham	36	-
Stratham	10.3	NNW	Richie Mc Farland Children's Center	11 Sandy Point Road	Stratham	18	-
Stratham	8.9	NNW	Stratham Circle Learning Center	10 Emery Lane	Stratham	46	-
					NH Subtotals:	*3,217*	*N/A*
					TOTAL:	**4,355**	**210**

Table E-3. Day Camps within the EPZ

Community	Distance (miles)	Dire-ction	School Name	Street Address	Municipality	Enroll-ment
MASSACHUSETTS						
Amesbury	7.585	WSW	Camp Bauercrest	20 Normandy Drive	Amesbury	250
Amesbury	6.6746	WSW	James Place	8 West Whitehall Road	Amesbury	46
Amesbury	6.4693	SW	Tosh Farrell Soccer Development	12 South Hunt Road	Amesbury	196
Amesbury	6.0535	WSW	US Sports Institute	222 Lion's Mouth Road	Amesbury	196
Newbury	10.463	SSW	Governor's Academy	1 Elm Street	Byfield	117
Newburyport	6.1858	SSW	Clipper Girls Basketball Camp	241 High Street	Newburyport	196
Newburyport	6.1342	S	Coastal Discoveries Marine	55 Merrimac Street	Newburyport	24
Newburyport	6.8998	S	Joppa Flats Summer Camp	1 Plum Island Turnpike	Newburyport	196
Newburyport	7.0027	SSW	Metro Rock Climbing Camps	40 Parker Street	Newburyport	196
Newburyport	6.1738	SSW	YWCA Scamper Camp	13 Market Street	Newburyport	65
West Newbury	10.227	SW	Koinonia Day Camp	308 Main Street	West Newbury	196
					MA Subtotals:	*1,678*
NEW HAMPSHIRE						
East Kingston	8.5	W	YMCA Tricklin' Falls Day Camp	140 Haverhill Road	East Kingston	200
Kingston	11.5	W	Long Tree Scout Reservation	12 West Shore Park Road	Kingston	196
Kingston	11.6	W	YMCA Camp Lincoln Kingston	67 Ball Road	Kingston	500
					NH Subtotals:	*896*
					TOTAL:	**2,574**

Table E-4. Medical Facilities within the EPZ

Community	Distance (miles)	Direction	Facility Name	Street Address	Municipality	Current Census	Ambulatory Patients	Wheelchair Patients	Bedridden Patients
MASSACHUSETTS									
Amesbury	5.5	SW	Amesbury Health Center	24 Morrill Place	Amesbury	6	6	0	0
Amesbury	5.2	SW	Amesbury Residence	30 Field Street	Amesbury	7	7	0	0
Amesbury	5.6	WSW	Amesbury Village, LLC	22 Maple Street	Amesbury	102	66	26	10
Amesbury	4.9	SW	Coastal Connections Inc.	35 Water Street	Amesbury	44	34	10	0
Amesbury	6.0	WSW	Elizabeth Calsey House & Assisted Living	15 Elizabeth Street	Amesbury	20	12	8	0
Amesbury	7.0	WSW	Elizabeth Calsey House 2	286 Lions Mouth Road	Amesbury	28	28	0	0
Amesbury	5.7	SW	Hillside Rest Home Inc.	29 Hillside Avenue	Amesbury	28	28	0	0
Amesbury	5.4	SW	Maplewood Care & Rehabilitation Center	6 Morrill Place	Amesbury	109	57	48	4
Merrimac	9.0	WSW	Church Street House	40 Church Street	Merrimac	5	5	0	0
Merrimac	10.1	WSW	Harbor School/Easter Seals Merrimac Boys	102 W Main Street	Merrimac	16	16	0	0
Merrimac	10.1	WSW	Harbor Schools Star Program	100 W Main Street	Merrimac	12	12	0	0
Merrimac	8.8	WSW	Merrimac House	2 Prospect Hill Street	Merrimac	4	4	0	0
Newbury	10.5	SSW	Oak Ridge	84 Main Street	Byfield	22	18	4	0
Newbury	10.4	SSW	Quaker Hill	115 Main Street	Newbury	24	24	0	0
Newburyport	6.2	SSW	Anna Jaques Hospital	25 Highland Avenue	Newburyport	84	24	44	16
Newburyport	6.4	SSW	Atria Merrimack Place	85 Storey Avenue	Newburyport	85	77	8	0
Newburyport	6.6	S	Brigham Manor	77 High Street	Newburyport	64	8	52	4
Newburyport	6.2	SSW	Country Rehabilitation & Skilled Nursing Center	180 Low Street	Newburyport	111	19	88	4
Newburyport	6.6	S	Harbor Schools Newburyport Youth Home	72 High Street	Newburyport	5	5	0	0
Newburyport	6.3	SSW	Harborside Adult Health at St. Paul's Church	166 High Street	Newburyport	35	31	4	0
Newburyport	6.5	SSW	Heritage House	32 Low Street	Newburyport	128	80	43	5
Newburyport	5.8	SSW	Home for Aged Men (Griffin House)	361 High Street	Newburyport	9	9	0	0

Community	Distance (miles)	Dire-ction	Facility Name	Street Address	Municipality	Current Census	Ambul-atory Patients	Wheel-chair Patients	Bed-ridden Patients
Newburyport	6.3	S	James Steam Mill Elderly Housing	1 Charles Street	Newburyport	126	79	42	5
Newburyport	6.2	SSW	Newburyport Residence	17 Simmons Drive	Newburyport	8	8	0	0
Newburyport	7.0	SSW	Opportunity Works	10 Opportunity Way	Newburyport	148	136	12	0
Newburyport	6.5	SSW	Port Healthcare Center	113 Low Street	Newburyport	100	28	68	4
Newburyport	6.6	SSW	Turning Point Inc.	5 Perry Way	Newburyport	51	51	0	0
Salisbury	4.0	S	Assisted Living Center of Salisbury	19 Beach Road	Salisbury	30	26	4	0
					MA Subtotals:	*1,411*	*898*	*461*	*52*
NEW HAMPSHIRE									
Brentwood	12.9	NW	Rockingham County Nursing Home	117 North Road	Brentwood	138	97	11	30
Exeter	7.3	NW	Exeter Healthcare	4 Alumni Drive	Exeter	26	6	12	8
Exeter	7.5	NW	Exeter Hospital	10 Buzzell Avenue	Exeter	100	64	0	36
Exeter	6.2	NNW	Exeter on Hampton Care and Rehabilitation Center	8 Hampton Road	Exeter	81	67	0	14
Exeter	6.2	NNW	Langdon Place of Exeter	17 Hampton Road	Exeter	100	90	10	0
Exeter	8.1	WNW	RiverWoods Continuing Care Retirement Community (CCRC)	7 Riverwoods Drive	Exeter	60	43	6	11
Exeter	8.8	NW	The Boulders at Riverwoods	5 Timer Lane	Exeter	620	435	51	134
Exeter	8.5	NW	The Ridge at Riverwoods	10 White Oak Drive	Exeter	37	21	16	0
Hampton	3.6	NNE	Oceanside Center Skilled Nursing	777 Lafayette Road # A	Hampton	194	174	20	0
Hampton	1.8	N	SolAmor Hospice/Sun Healthcare	65 LaFayette Road Suite 302	North Hampton	138	97	11	30
Portsmouth	12.1	NNE	Clipper Harbor of Portsmouth	188 Jones Avenue	Portsmouth	120	110	0	10
Portsmouth	12.3	NNE	Edgewood Centre	928 South Street	Portsmouth	177	103	0	74
Portsmouth	13.0	N	Northeast Rehabilitation Hospital at Pease	105 Corporate Drive	Portsmouth	33	0	13	20

Community	Distance (miles)	Dire-ction	Facility Name	Street Address	Municipality	Current Census	Ambul-atory Patients	Wheel-chair Patients	Bed-ridden Patients
Portsmouth	11.8	NNE	Portsmouth Regional Hospital	333 Borthwick Avenue #200	Portsmouth	200	100	0	100
Portsmouth	13.0	NNE	The Mark Wentworth Home	346 Pleasant Street	Portsmouth	70	45	25	0
Rye	8.1	NNE	Webster-Rye Rehab & Retirement	795 Washington Road	Rye	114	98	6	10
					NH Subtotals:	*2,208*	*1,550*	*181*	*477*
					TOTAL:	**3,619**	**2,448**	**642**	**529**

Table E-5. Major Employers within the Massachusetts Portion of the EPZ

Community	Distance (miles)	Direction	Facility Name	Street Address	Municipality	Employees (max shift)	% Non-EPZ	Employees (Non EPZ)
MASSACHUSETTS								
Amesbury	4.8	SW	ARC Technologies	11 Chestnut Street	Amesbury	106	80%	85
Amesbury	4.9	SW	Bartley Machine & Manufacturing Co	35 Water Street	Amesbury	41	65%	27
Amesbury	6.6	SW	E F Shea New England Concrete	87 Haverhill Road	Amesbury	53	50%	27
Amesbury	4.1	SW	Munters Corporation	79 Monroe Street	Amesbury	497	65%	325
Newburyport	6.2	SSW	Anna Jaques Hospital	25 Highland Avenue	Newburyport	941	65%	614
Newburyport	7.4	SSW	Arwood Machine Corporation	95 Parker Street	Newburyport	204	65%	133
Newburyport	7.1	SSW	Berkshire Manufactured Produce	116 Parker Street	Newburyport	148	90%	133
Newburyport	7.2	SSW	Bradford Bigelow	3 Perkins Way	Newburyport	94	65%	61
Newburyport	7.4	SSW	Cabot Stains	100 Hale Street	Newburyport	81	65%	53
Newburyport	7.1	SSW	Home Made Brand Foods Co Inc.	2 Opportunity Way	Newburyport	204	65%	133
Newburyport	7.4	SSW	ITW Foils	5 Malcolm Hoyt Drive	Newburyport	30	50%	15
Newburyport	7.2	SSW	Journeymen Press Inc.	11 Malcolm Hoyt Drive	Newburyport	81	65%	53
Newburyport	7.3	SSW	L-3 Maritime Systems	9 Malcolm Hoyt Drive	Newburyport	94	65%	61
Newburyport	5.6	SSW	Mersen USA Newburyport-MA LLC	374 Merrimac Street	Newburyport	215	80%	172
Newburyport	7.0	SSW	Opportunity Workshop Greater	10 Opportunity Way	Newburyport	82	20%	16
Newburyport	6.9	SSW	PCI Synthesis	9 Opportunity Way	Newburyport	60	50%	30
Salisbury	3.5	SW	Andover Healthcare Inc.	9 Fanaras Drive	Salisbury	147	65%	96
Salisbury	3.6	SW	Cambridgeport Air Systems INC	8 Fanaras Drive	Salisbury	25	50%	13
Salisbury	4.1	SSW	SPS New England Inc.	98 Elm Street	Salisbury	61	65%	40
Salisbury	4.4	SSW	Vaughn Manufacturing Corporation	26 Old Elm Street	Salisbury	62	65%	40
					MA Subtotals:	*3,226*	-	*2,127*
					TOTAL:	**3,226**	**-**	**2,127**

Table E-6. Historical Sites, Campgrounds, and Parks within the EPZ

Community	Distance (miles)	Direction	Facility Name	Street Address	Municipality	Transients	Vehicles
MASSACHUSETTS							
Amesbury	6.5	SW	Amesbury Sports Park	125 Hunt Road	Amesbury	2,000	797
Amesbury	5.5	SW	Mary Baker Eddy Historical House	277 Main Street	Amesbury	20	11
Newbury	7.3	S	Spencer-Peirce-Little Farm	5 Littles Lane	Newbury	20	11
Salisbury	4.0	S	Beach Rose RV Park	147 Beach Road	Salisbury	115	106
Salisbury	2.4	SW	Black Bear Camp Grounds	54 Main Street	Salisbury	502	400
Salisbury	4.6	S	Pines Camping Area	28 CCC Road	Salisbury	800	800
Salisbury	3.3	SSW	Rusnik Campground	115 Lafayette Road	Salisbury	600	300
Salisbury	5.4	SSE	Salisbury Beach State Reservation	Beach Road Route 1A	Salisbury	1,180	940
					MA Subtotals:	*5,237*	*3,365*
NEW HAMPSHIRE							
Brentwood	13.1	NW	Three Ponds Campground	146 North Road	Brentwood	341	272
Exeter	7.6	NW	American Independence Museum	1 Governors Lane	Exeter	30	12
Exeter	6.8	NW	Exeter Elms Campground	190 Court Street	Exeter	1,020	408
Exeter	6.9	NW	The Green Gate Camping Area	185 Court Street	Exeter	274	218
Hampton	1.8	E	Hampton Beach State RV Park	Hampton Harbor	Hampton	70	56
Hampton	2.1	N	Tidewater Campground	160 Lafayette Road	Hampton	1,190	476
Hampton Falls	4.8	NW	Wakeda Campground	294 Exeter Road	Hampton Falls	1,004	800
Kingston	11.6	W	Mill Brook RV Park	99 New Hampshire 125	Kingston	227	189
New Castle	13.8	NNE	Fort Constitution	-	New Castle	20	11
Newfields	11.1	NNW	Great Bay Camping	50-60 Route 108	Newfields	238	190
North Hampton	5.8	N	Shel-Al Campground	115 Lafayette Road	North Hampton	502	400
Portsmouth	10.0	NNE	Water Country	2300 Lafayette Road	Portsmouth	3,500	2,000
Portsmouth	12.6	NNE	Wentworth Coolidge Mansion	375 Little Harbor Road	Portsmouth	9	4
South Hampton	6.7	WSW	Tuxbury Pond Campground	88 Whitehall Road	South Hampton	798	636
Stratham	9.3	NNW	Stratham Historical Society	158 Portsmouth Avenue	Stratham	20	11
					NH Subtotals:	*9,243*	*5,683*
					TOTAL:	**14,480**	**9,048**

Table E-7. Beaches, Marinas, and Golf Courses within the EPZ

Community	Distance (miles)	Direction	Facility Name	Street Address	Municipality	Transients	Vehicles
MASSACHUSETTS							
Amesbury	5.6	SW	Larry's Marina	14 Merrimac Street	Amesbury	169	68
Amesbury	4.3	SW	Bass River Golf Course	2 Country Club Road	Amesbury	77	29
Amesbury	4.3	SW	Amesbury Golf & Country Club	46 Monroe Street	Amesbury	33	29
Newbury	10.3	SSW	Old Newbury Golf Club	319 Newburyport Turnpike	Newbury	44	29
Newburyport	5.6	SSW	Yankee Landing Marina	386 Merrimac Street	Newburyport	113	45
Newburyport	6.0	SSE	Plum Island[2]	-	Newburyport	138	55
Newburyport	6.1	SSW	Evergreen Valley Golf Course	18 Boyd Drive	Newburyport	57	29
Salisbury	5.3	SSE	Salisbury State Beach[2]	-	Salisbury	1,868	744
Salisbury	4.6	SSW	Rangeway Golf	299 Elm Street	Salisbury	57	29
					MA Subtotals:	*2,556*	*1,057*
NEW HAMPSHIRE							
East Kingston	6.9	W	Apple Hill Golf Club	69 East Road	East Kingston	25	13
Exeter	7.9	NW	Exeter Country Club	58 Jady Hill Road	Exeter	20	15
Greenland	9.3	N	Bramber Valley Golf	75 Bramber Valley Drive	Greenland	27	14
Greenland	7.9	NNE	Breakfast Hill Golf Club	339 Breakfast Hill Road	Greenland	99	45
Greenland	9.6	N	Golf & Ski Warehouse Inc.	1680 Greenland Road	Greenland	57	29
Greenland	7.4	N	Golf Club of New England	167 Winnicutt Road	Stratham	57	29
Greenland	10.3	N	Portsmouth Country Club	80 Country Club Lane	Greenland	57	29
Hampton	3.6	NNE	Captain's Cove Adventure Golf	814 Lafayette Road	Hampton	57	28
Hampton	2.0	ENE	Hampton Beach[2]	-	Hampton	2,692	1,073
Hampton	1.6	E	Hampton River Marina	55 Harbor Road	Hampton	208	83
Hampton	4.1	NE	North Beach[2]	-	Hampton	538	215
Hampton	4.5	NE	Plaice Cove[2]	-	Hampton	97	39
Kingston	12.4	WSW	Granite Fields Golf Club	7 New Hampshire 125	Kingston	10	8
Kingston	9.6	WNW	Kingston Fairways Golf Club	65 Depot Road	Kingston	5	3
New Castle	12.8	NNE	Wentworth By the Sea-Marina	116 Morgans Way	New Castle	151	60

[2] Google 2012 aerial imagery was used to estimate the number of parking spaces at beach parking lots within the EPZ.

Community	Distance (miles)	Dire-ction	Facility Name	Street Address	Municipality	Transients	Vehicles
North Hampton	6.3	NNE	First Tee of New Hampshire	22 North Road	North Hampton	57	29
North Hampton	5.6	NE	Little Boar's Head[2]	-	North Hampton	35	14
North Hampton	5.2	NE	North Hampton State Beach[2]	-	North Hampton	146	58
North Hampton	6.5	N	Sagamore Golf	101 North Road	North Hampton	70	38
Portsmouth	11.2	N	Pease Golf Course	200 Grafton Drive	Portsmouth	225	113
Rye	6.5	NE	Bass Beach[2]	-	Rye	55	22
Rye	7.4	NE	Jenness Beach[2]	2280 Ocean Boulevard	Rye	106	42
Rye	7.0	NE	Sawyers Beach (Rye Beach)[2]	-	Rye	141	56
Rye	8.4	NE	Straws Point[2]	-	Rye	235	94
Rye	10.8	NNE	Wallis Sands[2]	Ocean Boulevard	Rye	745	297
Seabrook	1.9	SE	Seabrook Beach[2]	-	Seabrook	718	286
					NH Subtotals:	*6,633*	*2,732*
					TOTAL:	**9,189**	**3,789**

Table E-8. Lodging Facilities within the EPZ

Community	Distance (miles)	Direction	Facility Name	Street Address	Municipality	Transients	Vehicles
MASSACHUSETTS							
Amesbury	4.7	SW	Fairfield Inn Amesbury	35 Clarks Road	Amesbury	420	105
Newbury	7.6	SSE	Blue the Inn on the Beach	20 Fordham Way	Newbury	45	23
Newburyport	6.2	S	Essex Street Inn and Suites	7 Essex Street	Newburyport	67	33
Newburyport	6.2	S	Garrison Inn Boutique Hotel	11 Brown Square	Newburyport	81	20
Newburyport	6.7	S	Greenleaf Inn	141 State Street	Newburyport	14	5
					MA Subtotals:	*627*	*186*
NEW HAMPSHIRE							
Exeter	7.5	NW	Fairfield Inn & Suites Portsmouth Exeter	138 Portsmouth Avenue	Exeter	180	60
Exeter	7.4	NW	Hampton Inn and Suites Exeter	59 Portsmouth Avenue	Exeter	281	94
Exeter	7.5	NW	Inn by the Bandstand	4 Front Street	Exeter	10	5
Exeter	7.6	NW	The Exeter Inn	90 Front Street	Exeter	116	39
Hampton	2.2	ENE	Ashworth by the Sea Hotel	295 Ocean Boulevard	Hampton	403	101
Hampton	2.6	ENE	Atlantic Breeze Suites	429 Ocean Boulevard	Hampton Beach	45	15
Hampton	2.0	ENE	Beach View Inn	101 Ocean Boulevard	Hampton	65	22
Hampton	3.7	NNE	Best Western Plus the Inn at Hampton	815 Lafayette Road	Hampton	202	67
Hampton	2.0	ENE	Grayhurst Hotel	11 F Street	Hampton	29	10
Hampton	1.8	E	Hampton Harbor Motel	210 Ashworth Avenue	Hampton	44	11
Hampton	2.3	ENE	Hampton House Hotel	333 Ocean Boulevard	Hampton	26	13
Hampton	3.3	NNE	Hampton Village Resort Motor	660 Lafayette Road	Hampton	128	96
Hampton	1.9	ENE	Harris Sea Ranch Motel	75 Ocean Boulevard	Hampton Beach	113	23
Hampton	2.6	ENE	Jonathan's On The Oceanfront	415 Ocean Boulevard	Hampton Beach	38	13
Hampton	2.3	ENE	Kentville On the Ocean	315 Ocean Boulevard	Hampton	152	38
Hampton	3.0	N	Lamie's Inn & Tavern	490 Lafayette Road	Hampton	58	29
Hampton	2.1	ENE	Ships Inn Resort	15 A Street	Hampton Beach	312	78
Hampton	3.9	NNE	Stone Gable Inn	869 Lafayette Road	Hampton	89	30
Hampton	3.5	NE	The Victoria Inn Bed & Breakfast and Pavilion	430 High Street	Hampton	12	6
New Castle	13.1	NNE	Wentworth by the Sea Marriott Hotel and Spa	588 Wentworth Road	New Castle	644	322
Portsmouth	12.7	NNE	America's Best Inns & Suites	383 Woodbury Avenue	Portsmouth	180	60

Community	Distance (miles)	Dire-ction	Facility Name	Street Address	Municipality	Transients	Vehicles
Portsmouth	12.5	NNE	Best Western Wynwood Hotel & Suites	580 US Highway 1 Bypass	Portsmouth	285	142
Portsmouth	10.9	NNE	Comfort Inn	1190 Lafayette Road	Portsmouth	306	102
Portsmouth	13.3	NNE	Courtyard by Marriott	1000 Market Street	Portsmouth	266	133
Portsmouth	13.4	NNE	Hampton Inn Portsmouth	99 Durgin Lane	Portsmouth	475	119
Portsmouth	13.2	NNE	Hilton Garden Inn Portsmouth Downtown	100 High Street	Portsmouth	241	121
Portsmouth	12.6	NNE	Holiday Inn Portsmouth	300 Woodbury Avenue	Portsmouth	221	111
Portsmouth	12.3	NNE	Port Inn	505 US Highway 1 Bypass	Portsmouth	205	51
Portsmouth	13.2	NNE	Sheraton Portsmouth Harborside Hotel	250 Market Street	Portsmouth	360	180
Portsmouth	12.9	NNE	Sise Inn	40 Court Street	Portsmouth	86	29
Seabrook	1.9	W	Best Western Seabrook Inn	9 Stard Road	Seabrook	530	133
Seabrook	1.0	W	Holiday Inn Express Hotel & Suites Seabrook	11 Rocks Road	Seabrook	308	77
					NH Subtotals:	*6,410*	*2,330*
					TOTAL:	**7,037**	**2,516**

Table E-9. Correctional Facilities within the EPZ

Community	Distance (miles)	Direction	Facility Name	Street Address	Municipality	Capacity	Staff
NEW HAMPSHIRE							
Brentwood	12.935	NW	Rockingham County Jail	99 North Road	Brentwood	340	20
					NH Subtotal:	*340*	*20*
					TOTAL:	**340**	**20**

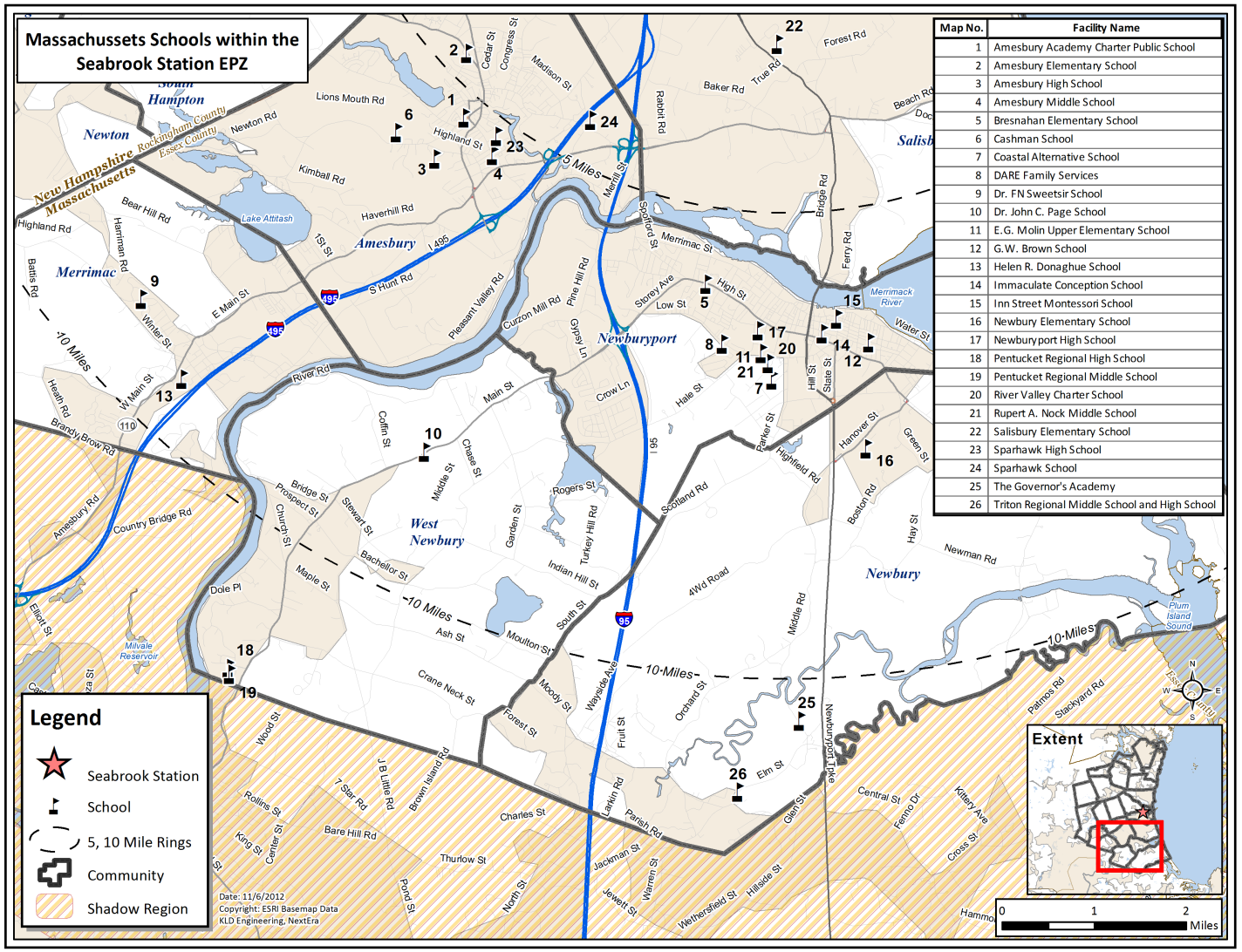


Figure E-1. Schools within the MA Portion of the EPZ

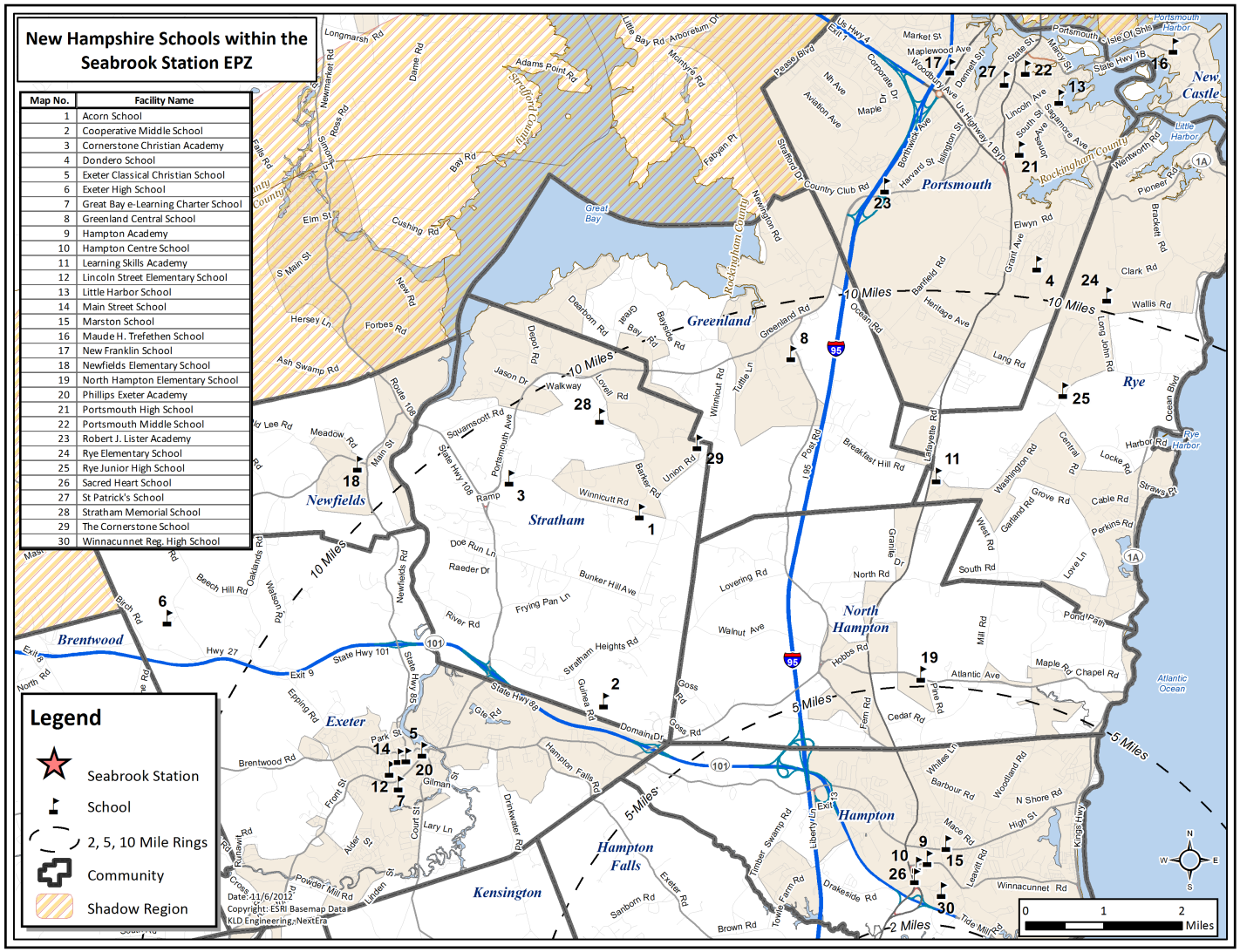


Figure E-2. Schools within the NH Portion (Exeter, Greenland, Hampton, Newfields, New Castle, North Hampton, Portsmouth, Rye, Stratham) of the EPZ

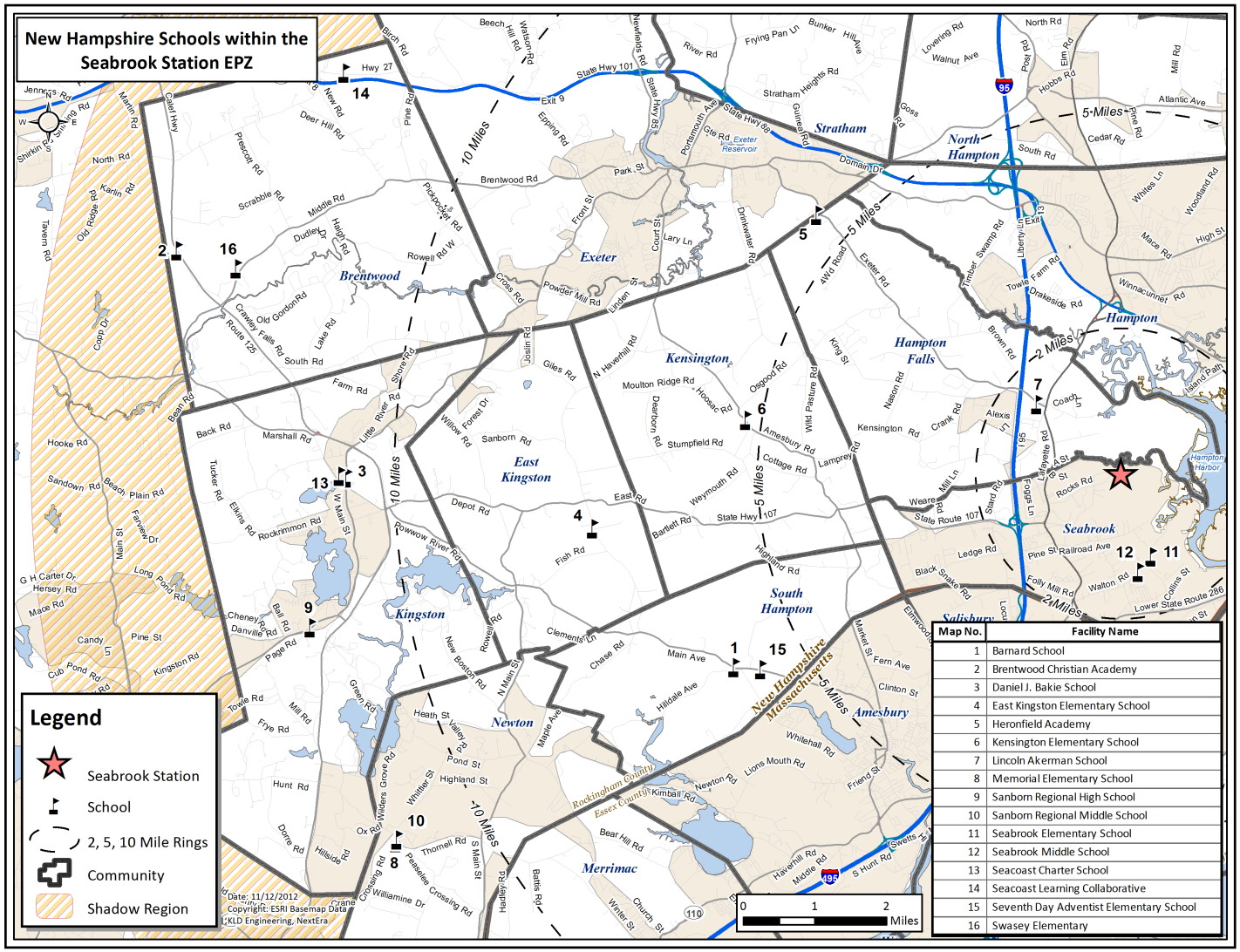
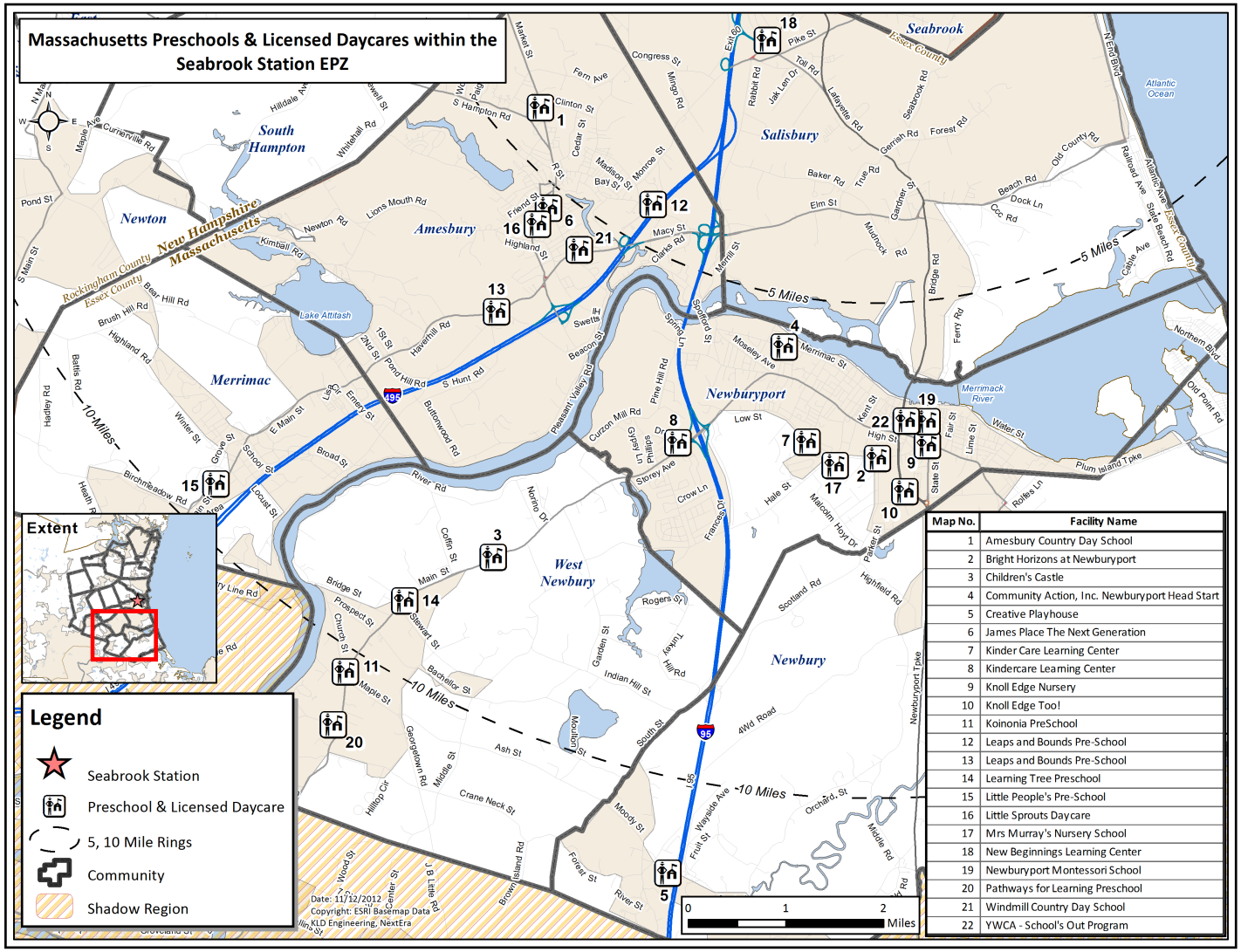


Figure E-3. Schools within the NH Portion (Brentwood, East Kingston, Hampton Falls, Kensington, Kingston, Newton, Seabrook, South Hampton) of the EPZ



Map No.	Facility Name
1	Amesbury Country Day School
2	Bright Horizons at Newburyport
3	Children's Castle
4	Community Action, Inc. Newburyport Head Start
5	Creative Playhouse
6	James Place The Next Generation
7	Kinder Care Learning Center
8	Kindercare Learning Center
9	Knoll Edge Nursery
10	Knoll Edge Too!
11	Koinonia PreSchool
12	Leaps and Bounds Pre-School
13	Leaps and Bounds Pre-School
14	Learning Tree Preschool
15	Little People's Pre-School
16	Little Sprouts Daycare
17	Mrs Murray's Nursery School
18	New Beginnings Learning Center
19	Newburyport Montessori School
20	Pathways for Learning Preschool
21	Windmill Country Day School
22	YWCA - School's Out Program

Figure E-4. Preschools and Licensed Daycares within the MA Portion of the EPZ

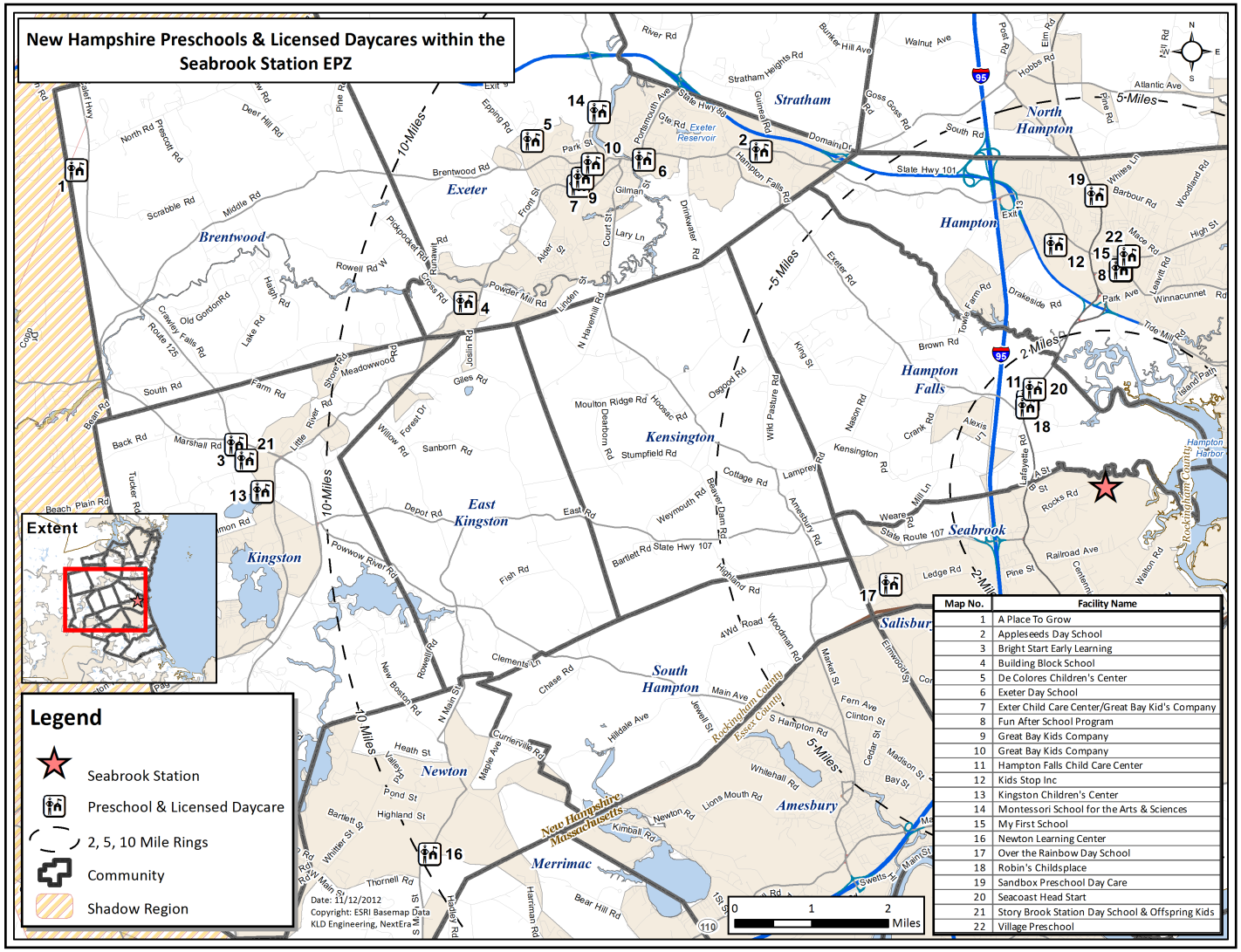


Figure E-5. Preschools and Licensed Daycares within the NH Portion (Brentwood, Exeter, Hampton, Hampton Falls, Kingston, Newton, Seabrook) of the EPZ

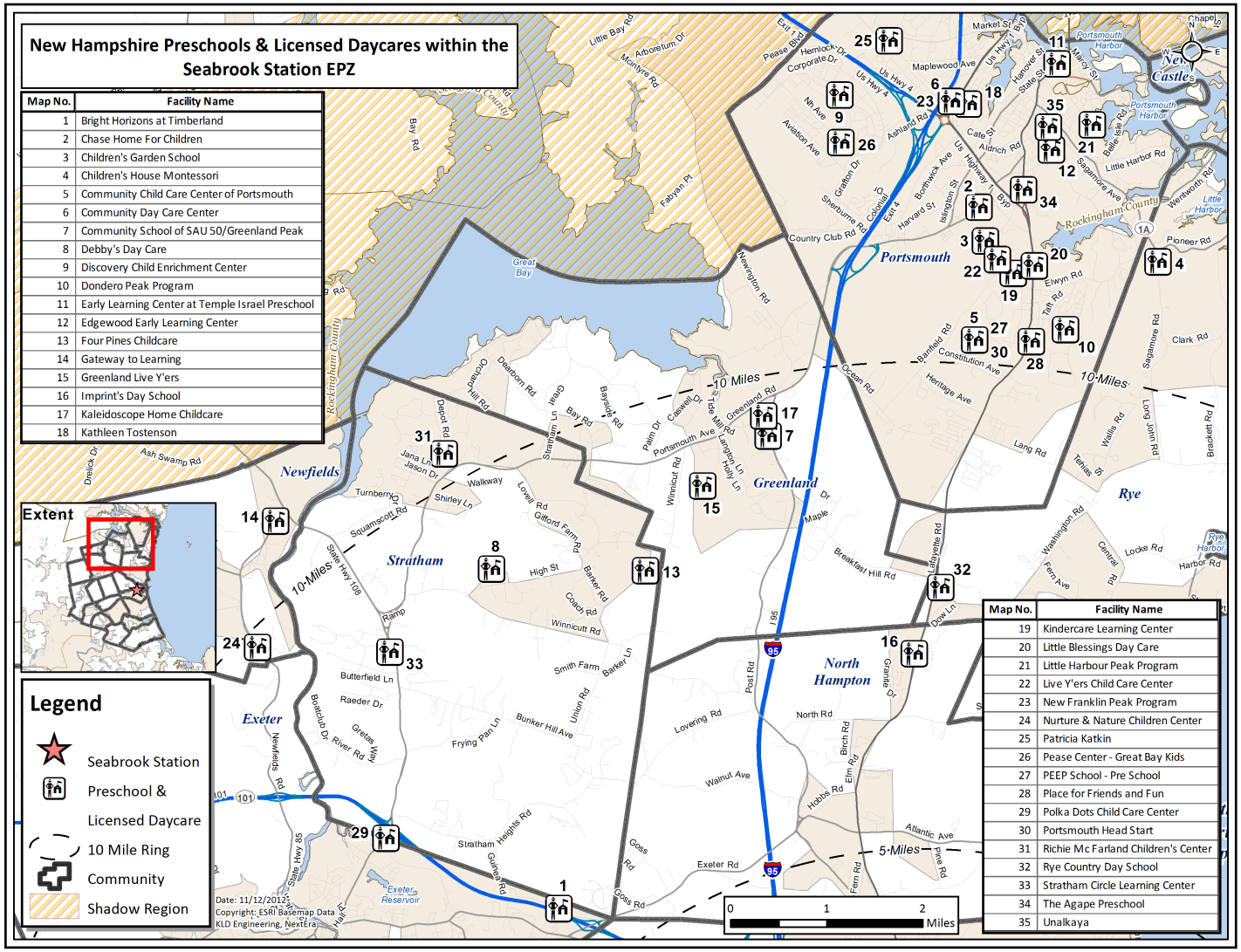


Figure E-6. Preschools and Licensed Daycares within the NH Portion (Greenland, Newfields, North Hampton, Portsmouth, Rye, Stratham) of the EPZ

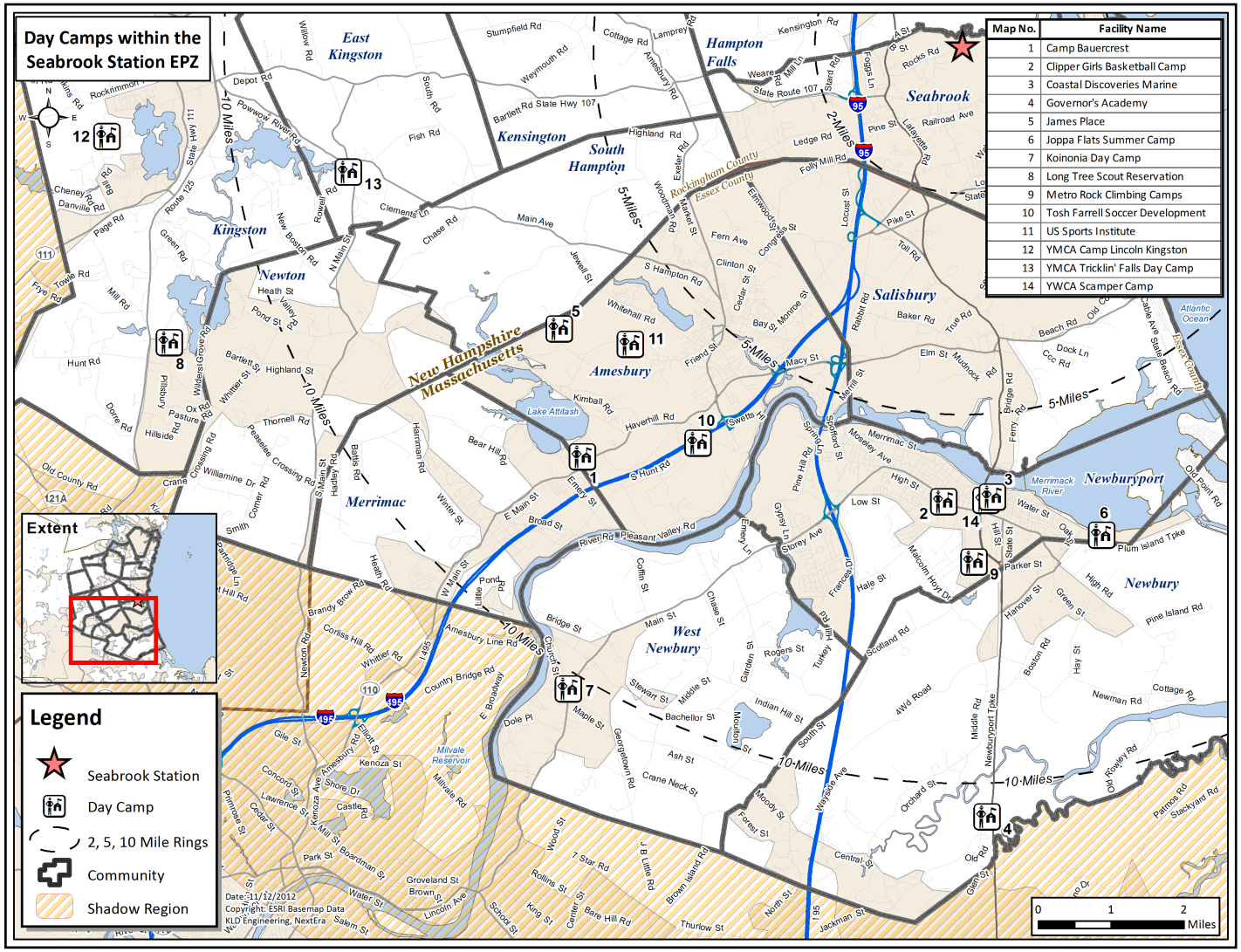


Figure E-7. Day Camps within the EPZ

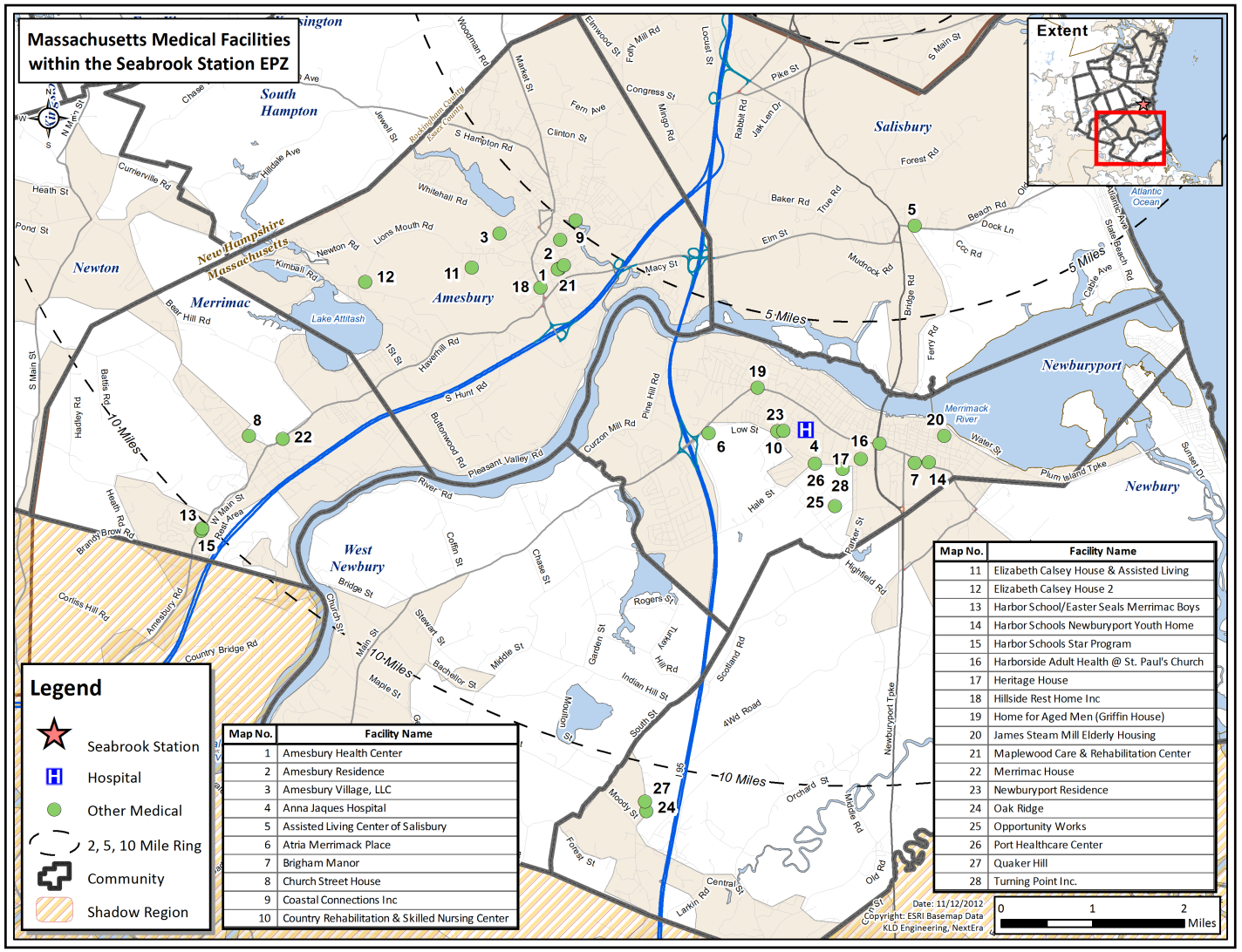


Figure E-8. Medical Facilities within the MA Portion of the EPZ

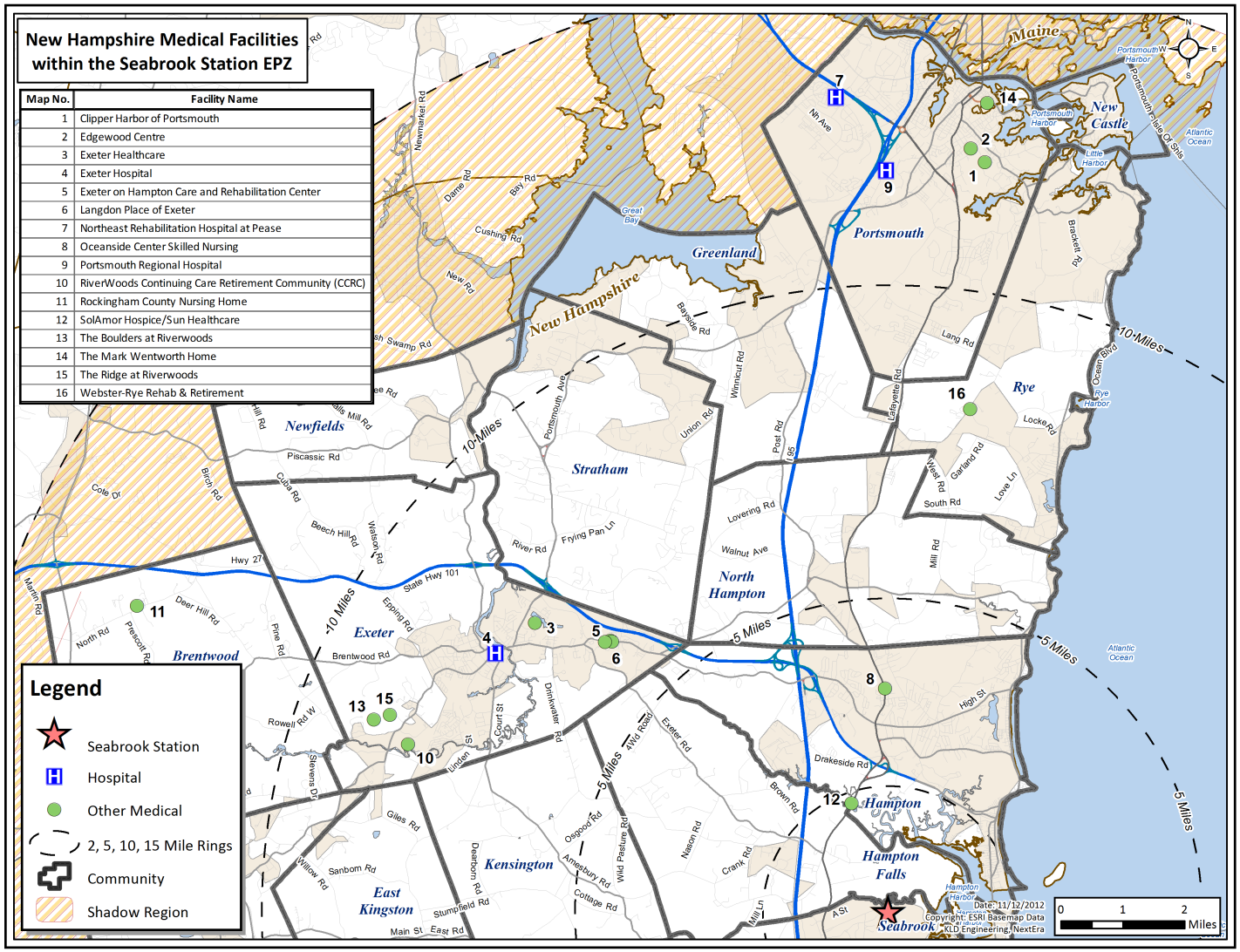


Figure E-9. Medical Facilities within the NH Portion of the EPZ

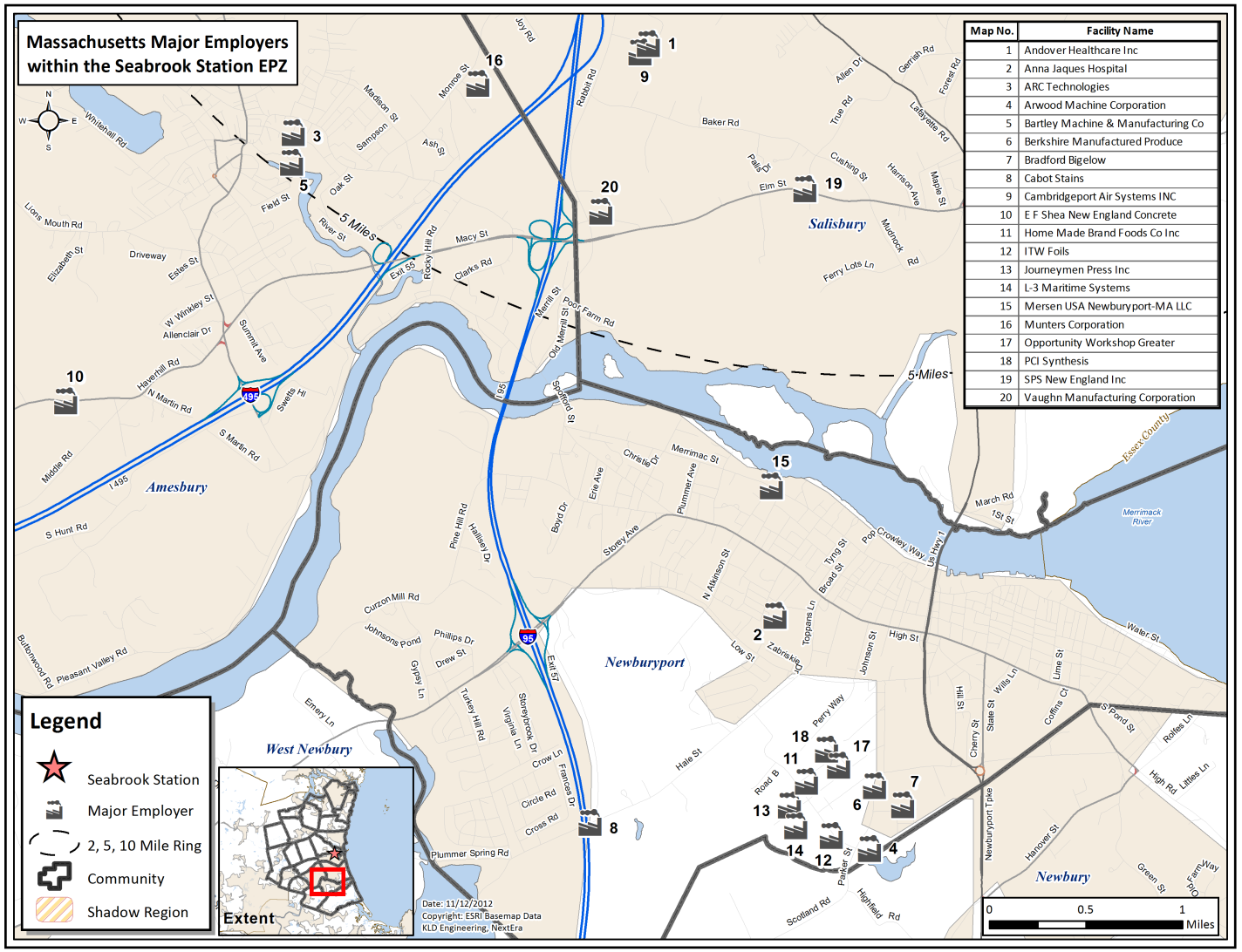


Figure E-10. Major Employers within the MA Portion of the EPZ

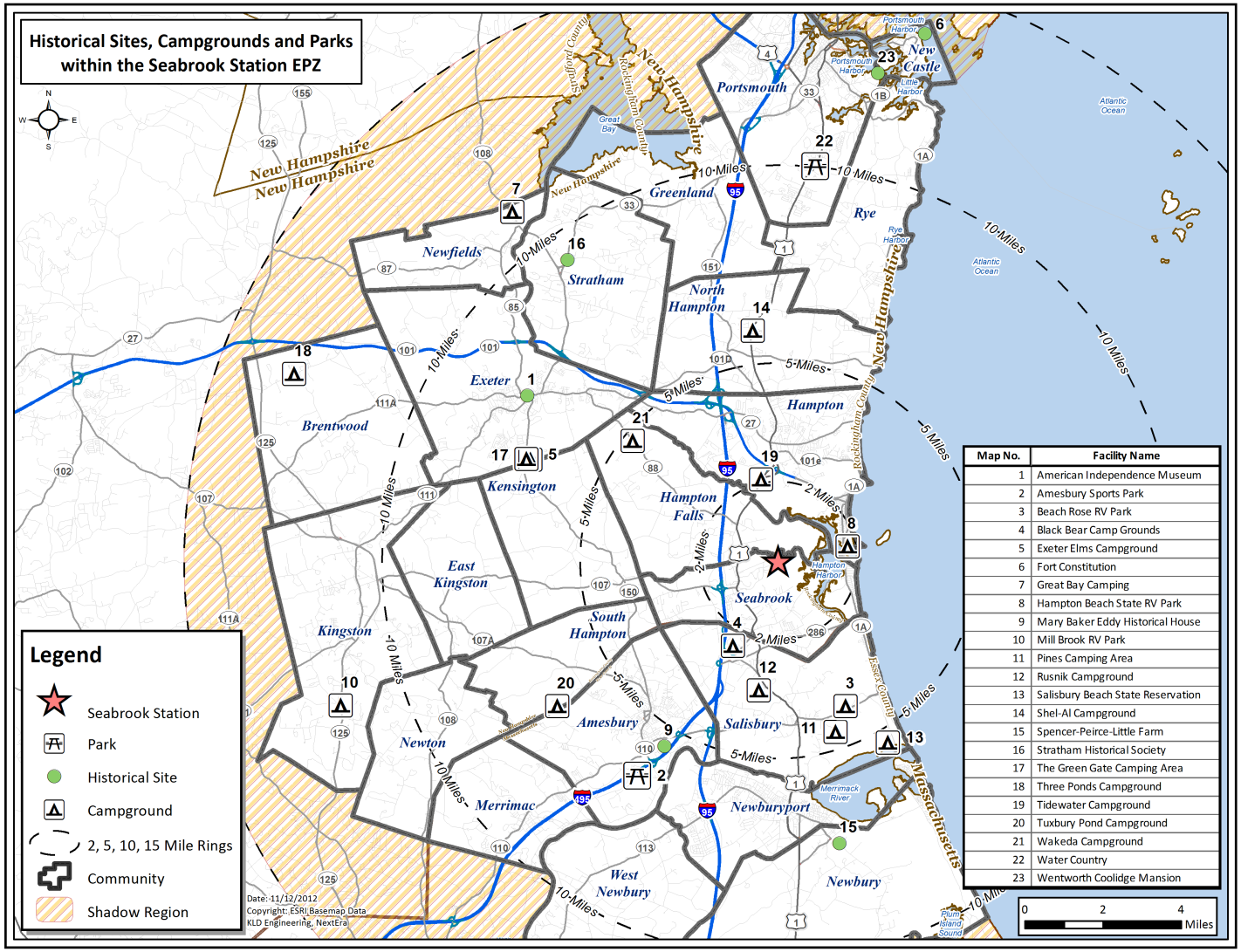


Figure E-11. Historical Sites, Campgrounds, and Parks within the EPZ

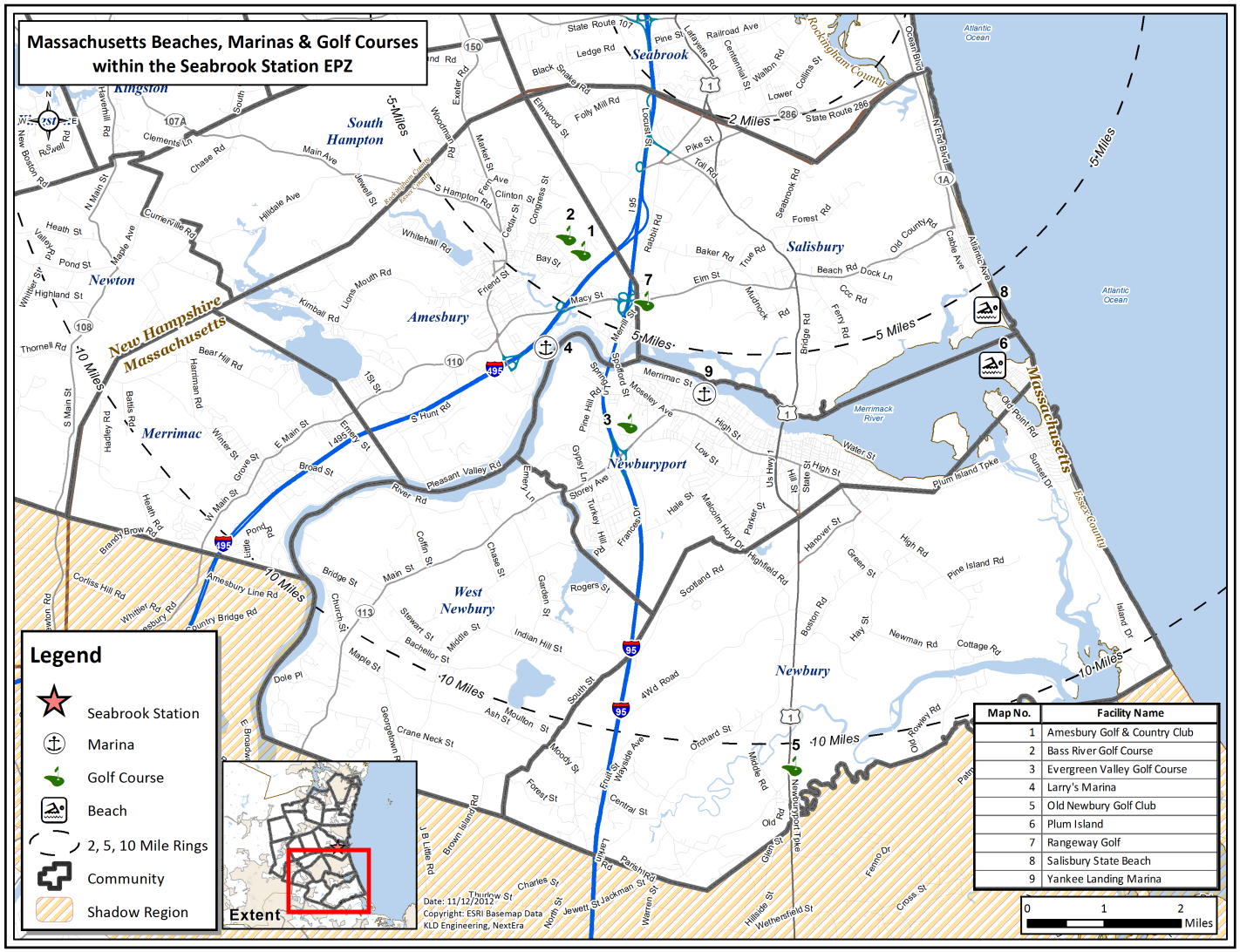


Figure E-12. Beaches, Marinas, and Golf Courses within MA Portion of the EPZ

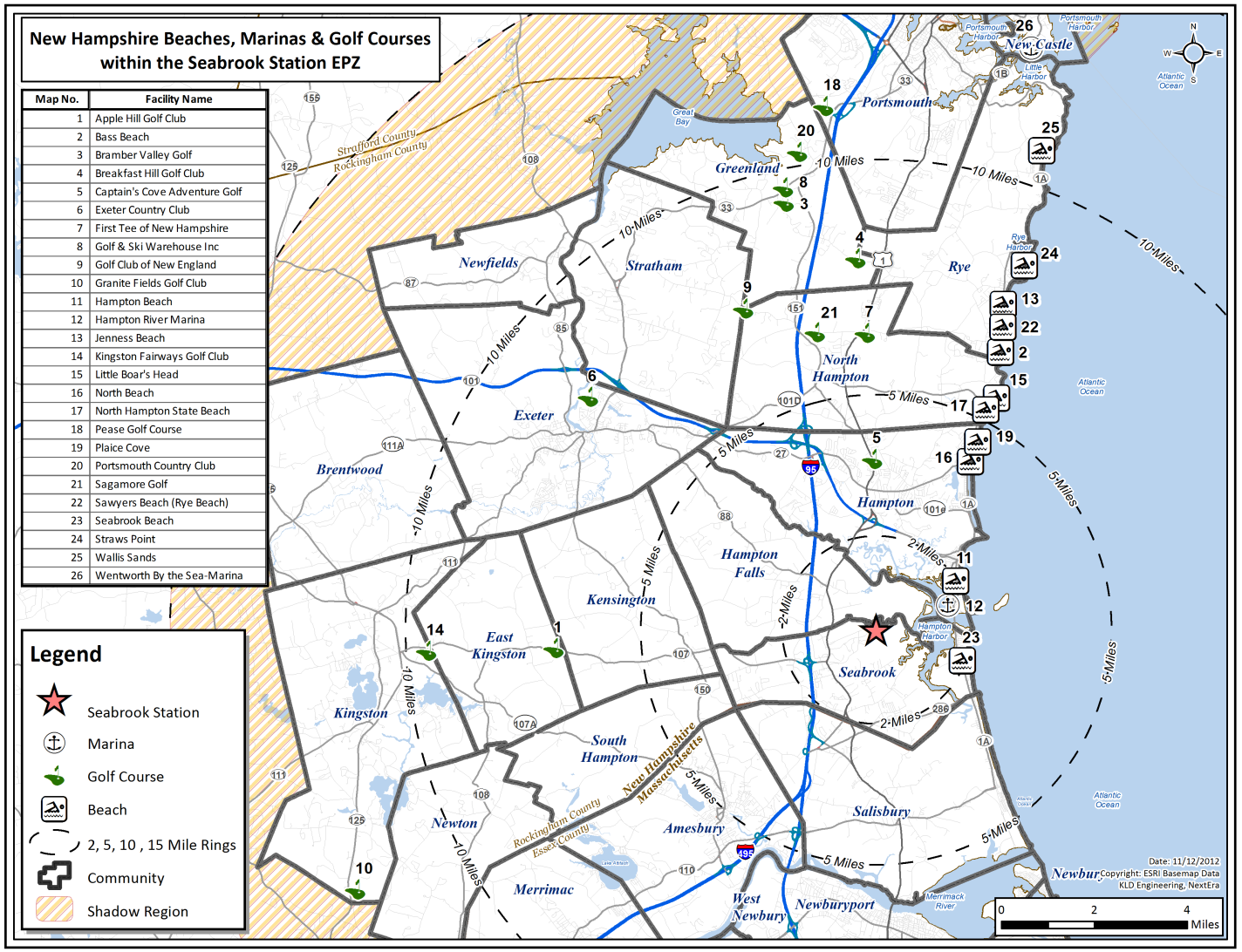


Figure E-13. Beaches, Marinas, and Golf Courses within NH Portion of the EPZ

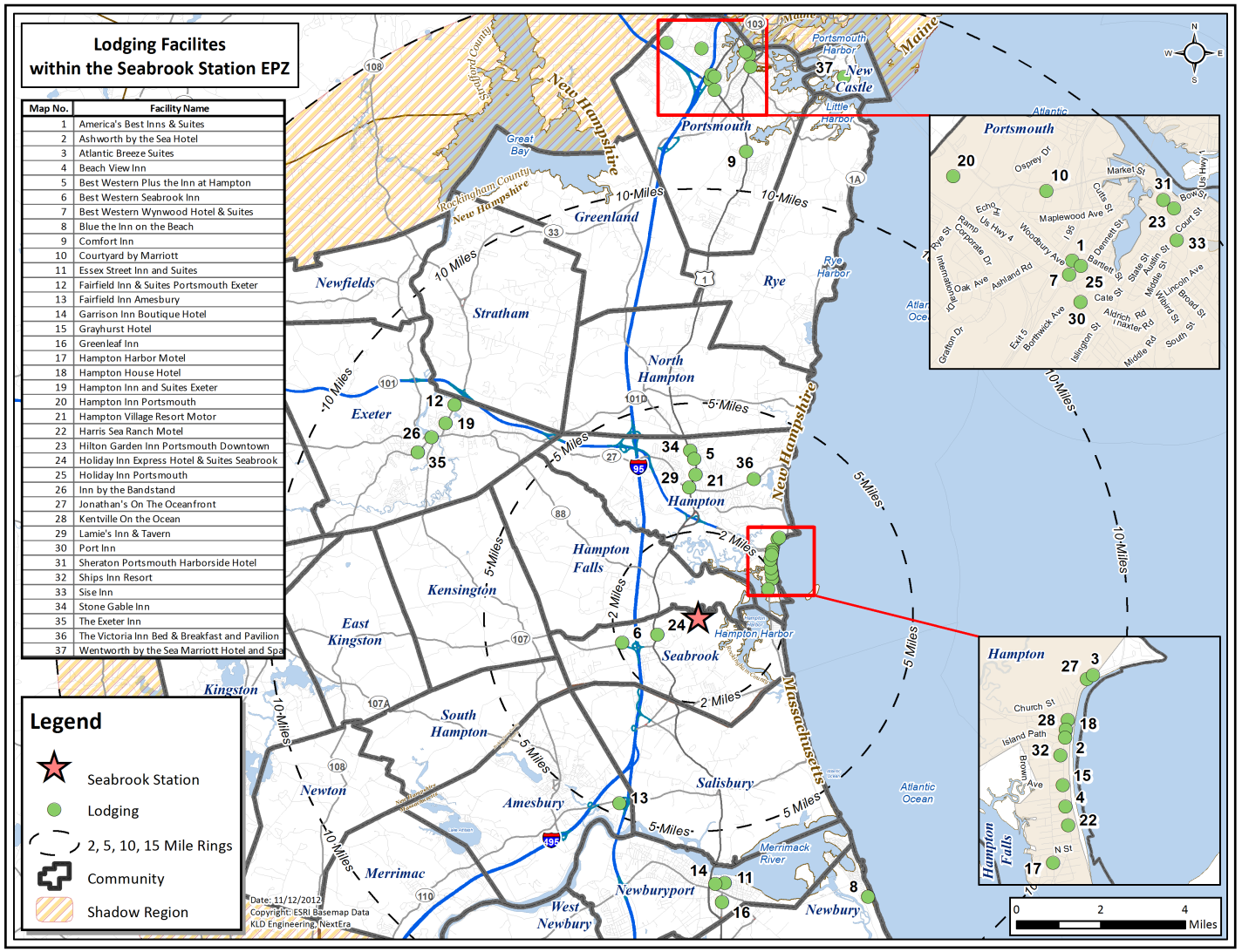


Figure E-14. Lodging Facilities within the EPZ

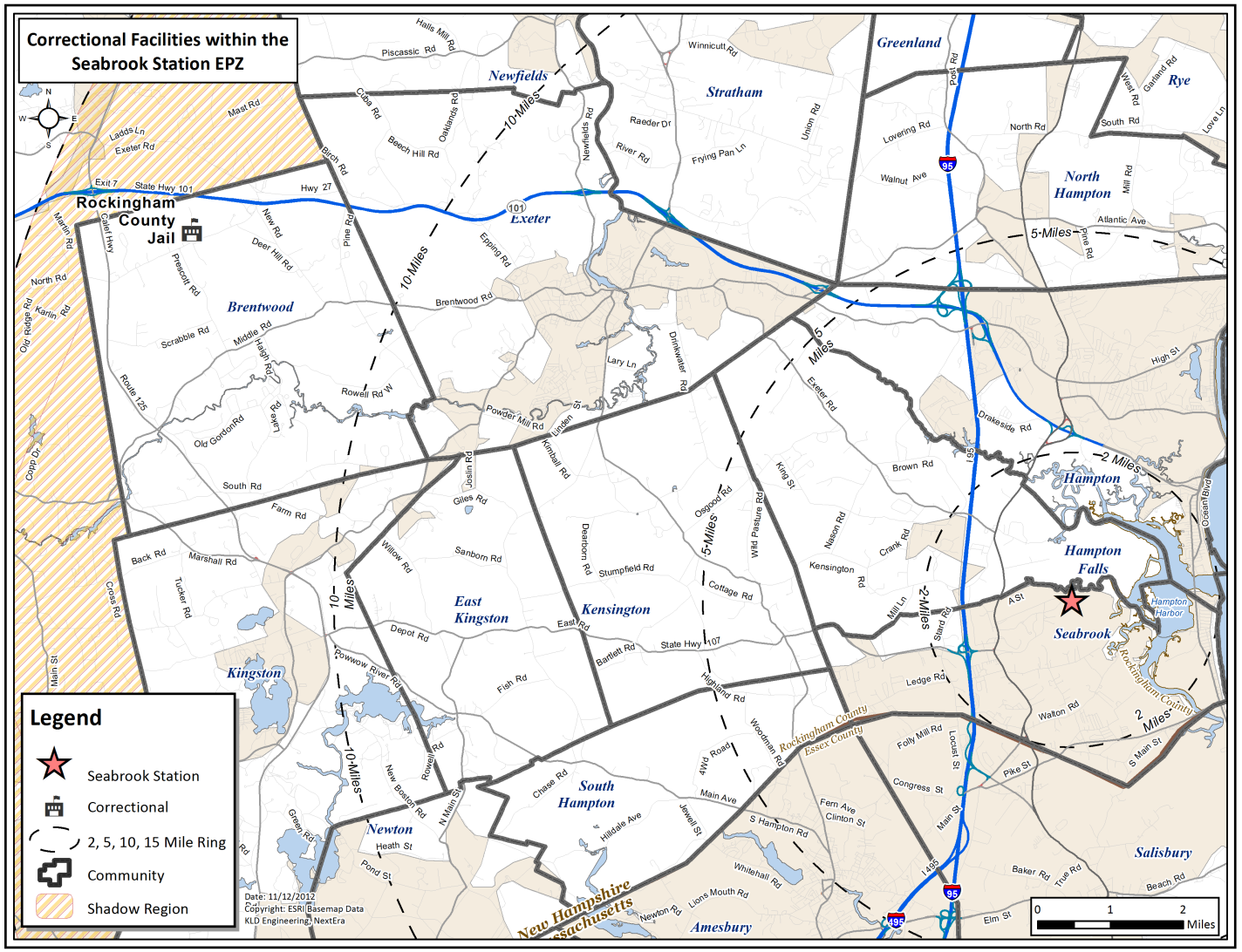


Figure E-15. Correctional Facilities within the EPZ

APPENDIX F

Telephone Survey

F. TELEPHONE SURVEY

F.1 Introduction

The development of evacuation time estimates for the Seabrook Station EPZ requires the identification of travel patterns, car ownership and household size of the population within the EPZ. Demographic information can be 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 (mobilization) that must be undertaken prior to evacuating the area. Secondly, 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 conducting a telephone survey of a representative sample of the EPZ population. 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 …?”)

F.2 Survey Instrument and Sampling Plan

Attachment A presents the final survey instrument used in this study. A draft of the instrument was submitted to stakeholders for comment. Comments were received and the survey instrument was modified accordingly, prior to conducting the survey.

Following the completion of the instrument, a sampling plan was developed. A sample size of approximately 500 **completed** survey forms yields results with a sampling error of ±4.5% at the 95% confidence level. The sample must be drawn from the EPZ population. Consequently, a list of zip codes in the EPZ was developed using GIS software. This list is shown in Table F-1. Along with each zip code, an estimate of the population and number of households in each area was determined by overlaying Census data and the EPZ boundary, again using GIS software. The proportional number of desired completed survey interviews for each area was identified, as shown in Table F-1. Note that the average household size computed in Table F-1 was an estimate for sampling purposes and was not used in the ETE study.

The completed survey adhered to the sampling plan.

Table F-1. Seabrook Telephone Survey Sampling Plan

ZIP CODE	EPZ POP IN ZIP FOR 2010	EPZ HOUSEHOLDS IN ZIP FOR 2010	REQUIRED SAMPLE
01830	2	1	0
01833	0	0	0
01834	0	0	0
01860	6,330	2,416	18
01913	16,241	6,631	49
01922	3,080	1,064	8
01950	17,376	7,607	56
01951	3,606	1,533	11
01952	8,344	3,461	25
01969	0	0	0
01985	4,235	1,508	11
03042	62	21	0
03044	18	7	0
03801	20,782	10,015	73
03819	2	1	0
03826	150	58	0
03827	3,003	1,120	8
03833	20,965	8,204	60
03840	3,559	1,376	10
03842	15,346	6,819	50
03844	2,232	832	6
03848	6,061	2,302	17
03854	968	449	3
03856	1,679	575	4
03857	0	0	0
03858	4,528	1,633	12
03862	4,301	1,760	13
03865	10	3	0
03870	4,997	2,124	16
03871	273	118	1
03874	8,777	3,756	28
03885	7,280	2,878	21
Total	**164,207**	**68,272**	**500**
	Avg HH Size:	**2.41**	

F.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, as discussed in Section 5.

A review of the survey instrument reveals that several questions have a "don't know" (DK) or "refused" entry for a response. It is accepted practice in conducting surveys of this type to accept the answers of a respondent who offers a DK response for a few questions or who refuses to answer a few questions. To address the issue of occasional DK/refused responses from a large sample, the practice is to assume that the distribution of these responses is the same as the underlying distribution of the positive responses. In effect, the DK/refused responses are ignored and the distributions are based upon the positive data that is acquired.

F.3.1 Household Demographic Results

Household Size

Figure F-1 presents the distribution of household size within the EPZ. The average household contains 2.51 people. The estimated household size (2.41 persons) used to determine the survey sample (Table F-1) was drawn from Census data. The close agreement (well within the sampling error) between the average household size obtained from the survey and from the Census is an indication of the reliability of the survey.

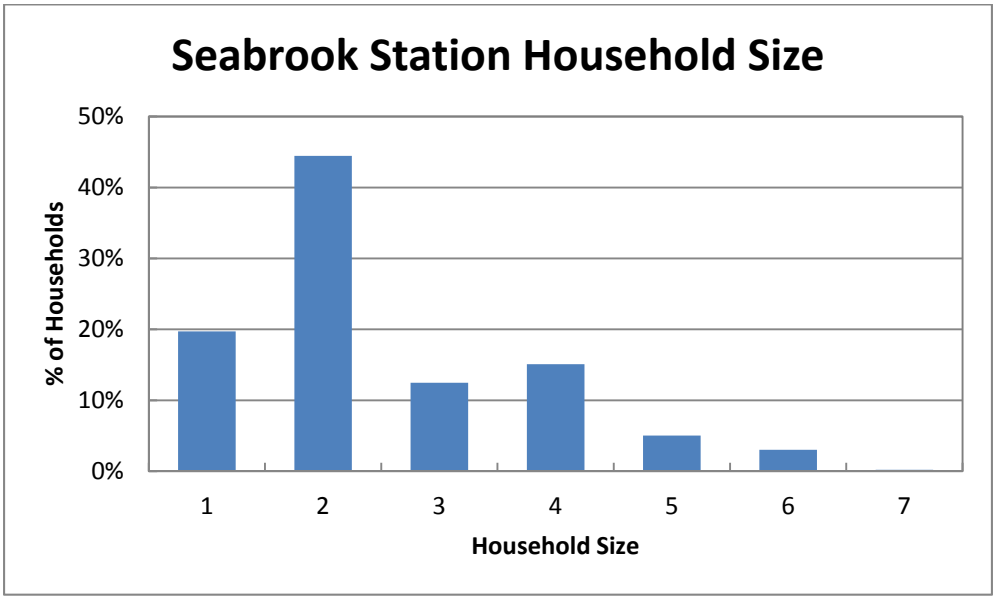


Figure F-1. Household Size in the EPZ

Automobile Ownership

The average number of automobiles available per household in the EPZ is 1.99. It should be noted that 2.21 percent of households do not have access to an automobile. The distribution of automobile ownership is presented in Figure F-2. Figure F-3 and Figure F-4 present the automobile availability by household size. Note that nearly all households without access to a car are single person households. As expected, nearly all households of 2 or more people have access to at least one vehicle.

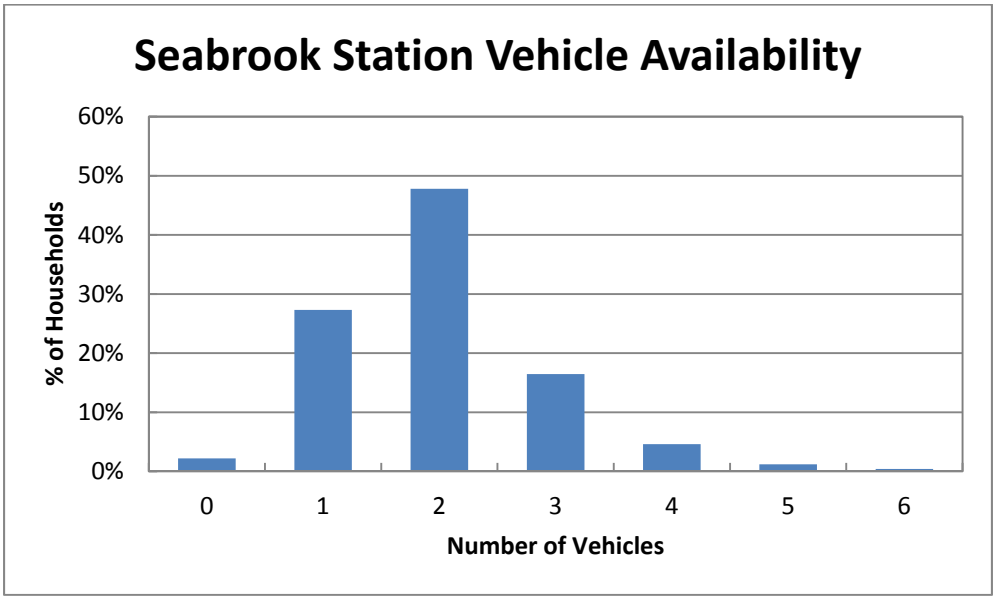


Figure F-2. Household Vehicle Availability

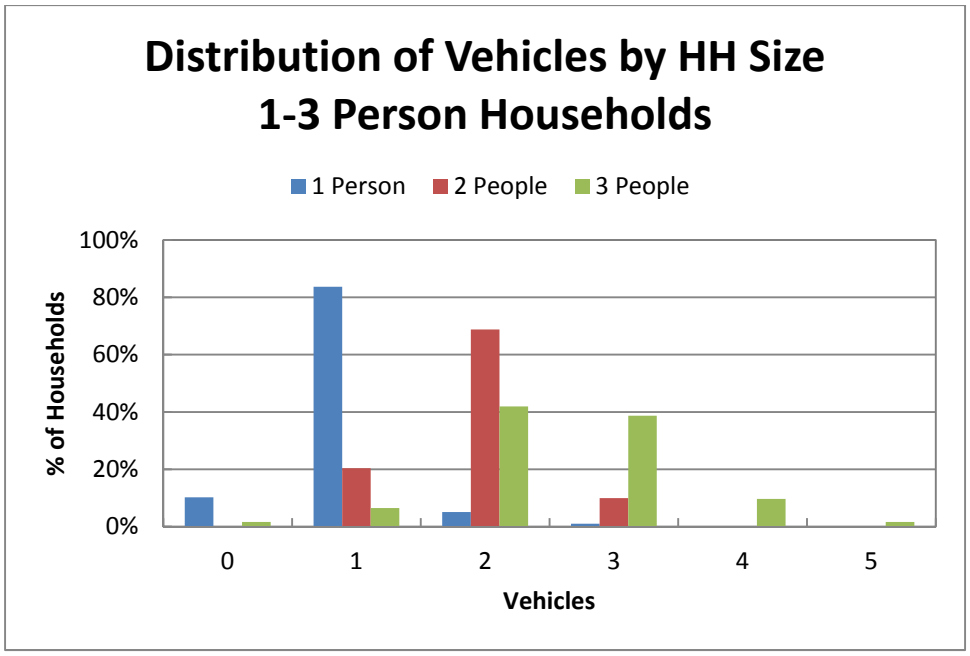


Figure F-3. Vehicle Availability - 1 to 3 Person Households

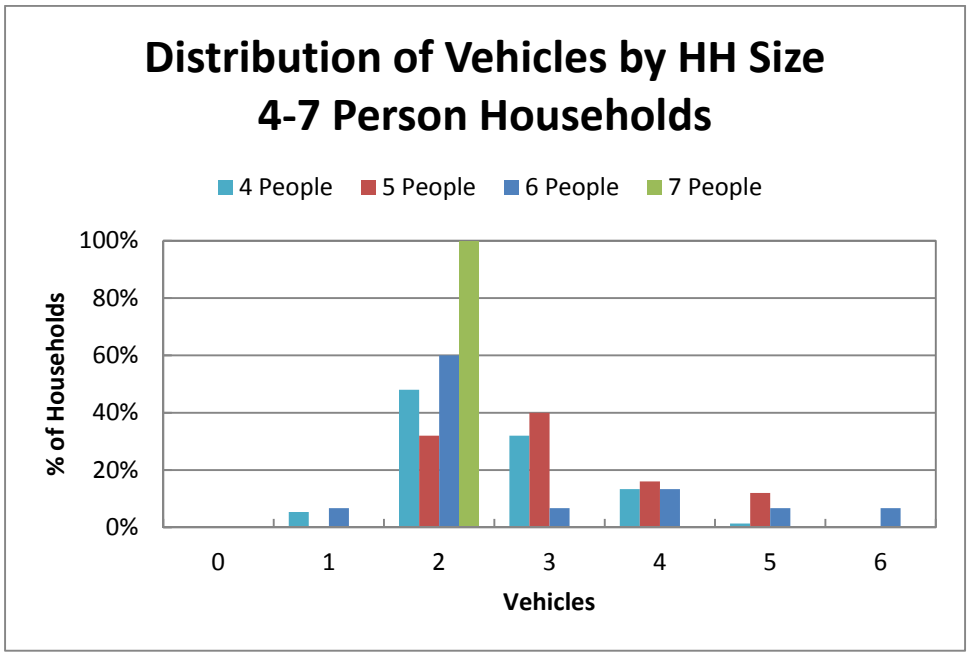


Figure F-4. Vehicle Availability - 4 to 7 Person Households

Ridesharing

70% of the households surveyed (who do not own a vehicle) responded that they would share a ride with a neighbor, relative, or friend if a car was not available to them when advised to evacuate in the event of an emergency. Note, however, that only those households with no access to a vehicle – 11 total out of the sample size of 500 – answered this question. Thus, the results are not statistically significant. As such, the NRC recommendation of 50% ridesharing is used throughout this study. Figure F-5 presents this response.

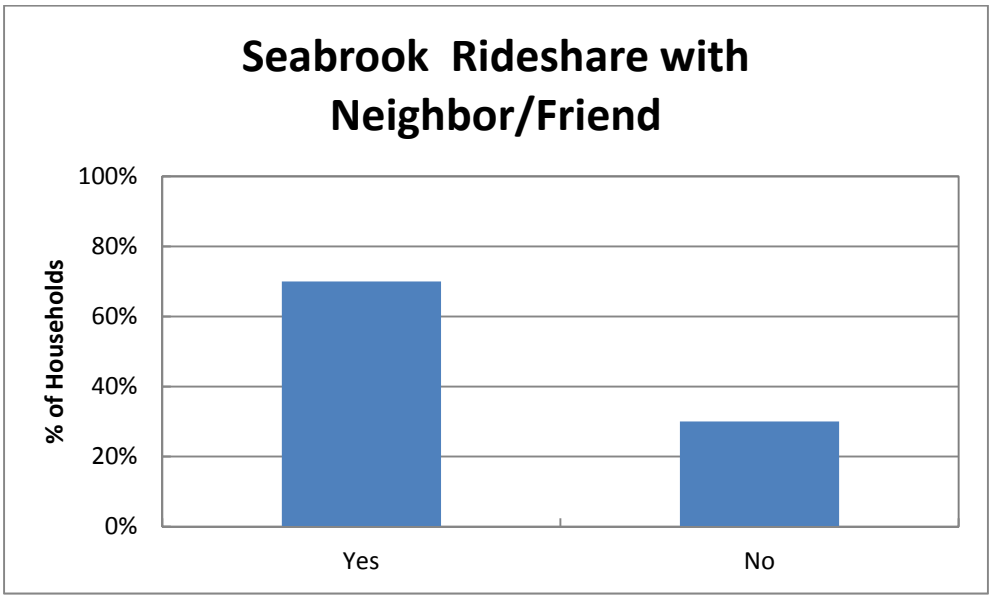


Figure F-5. Household Ridesharing Preference

Commuters

Figure F-6 presents the distribution of the number of commuters in each household. Commuters are defined as household members who travel to work or college on a daily basis. The data shows an average of 1.10 commuters in each household in the EPZ, and 61% of households have at least one commuter.

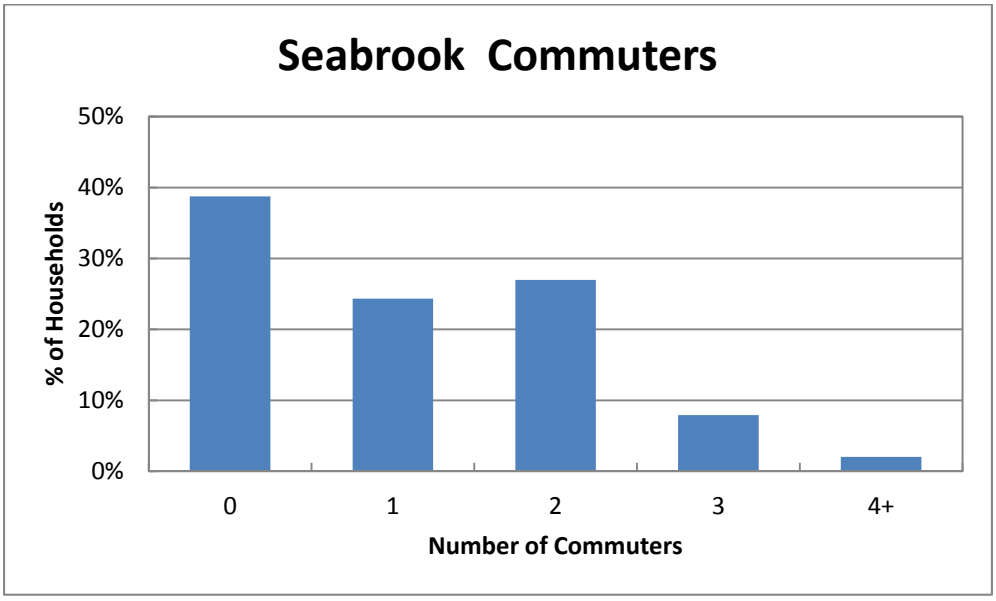


Figure F-6. Commuters in Households in the EPZ

Commuter Travel Modes

Figure F-7 presents the mode of travel that commuters use on a daily basis. The vast majority of commuters use their private automobiles to travel to work. The data shows an average of 1.06 employees per vehicle, assuming 2 people per vehicle – on average – for carpools.

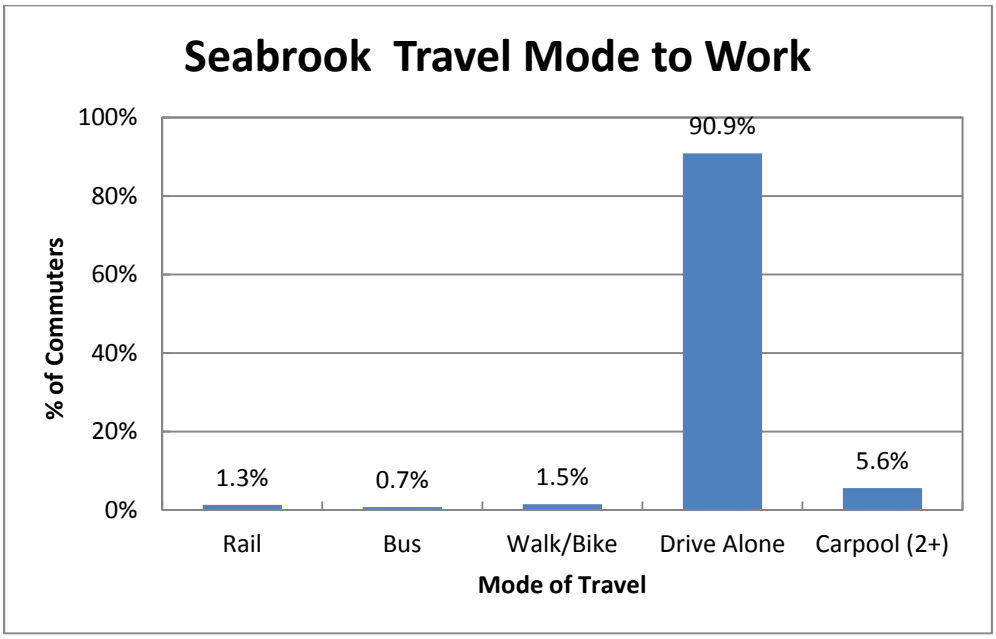


Figure F-7. Modes of Travel in the EPZ

F.3.2 Evacuation Response

Several questions were asked to gauge the population's response to an emergency. These are now discussed:

"How many of the vehicles would your household use during an evacuation?" The response is shown in Figure F-8. On average, evacuating households would use 1.31 vehicles.

"Would your family await the return of other family members prior to evacuating the area?" Of the survey participants who responded, 41 percent said they would await the return of other family members before evacuating and 59 percent indicated that they would not await the return of other family members.

"If you had a household pet, would you take your pet with you if you were asked to evacuate the area?" Based on the responses to the survey, 71 percent of households have a family pet. Of the households with pets, 90 percent of them indicated that they would take their pets with them, as shown in Figure F-9.

"When evacuating with your household pet, would you evacuate to a reception center if they do not accept pets?" As shown in Figure F-10, 11 percent of households would evacuate to a reception center with their pet even if the reception center does not accept pets.

"Do you have a service animal?" Based on the responses to the survey, 2 percent of households have a service animal.

"When evacuating with your service animal, would you evacuate to a reception center?" Of the households with service animals, 40 percent indicated they would evacuate to a reception center, 20 percent would remain at home and 40 percent would evacuate to a different destination.

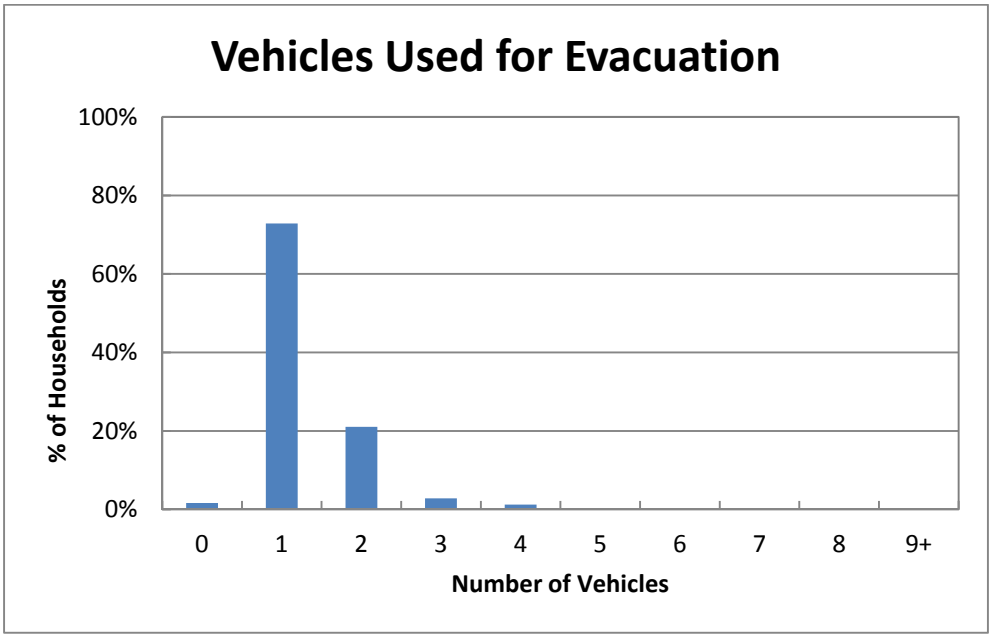


Figure F-8. Number of Vehicles Used for Evacuation

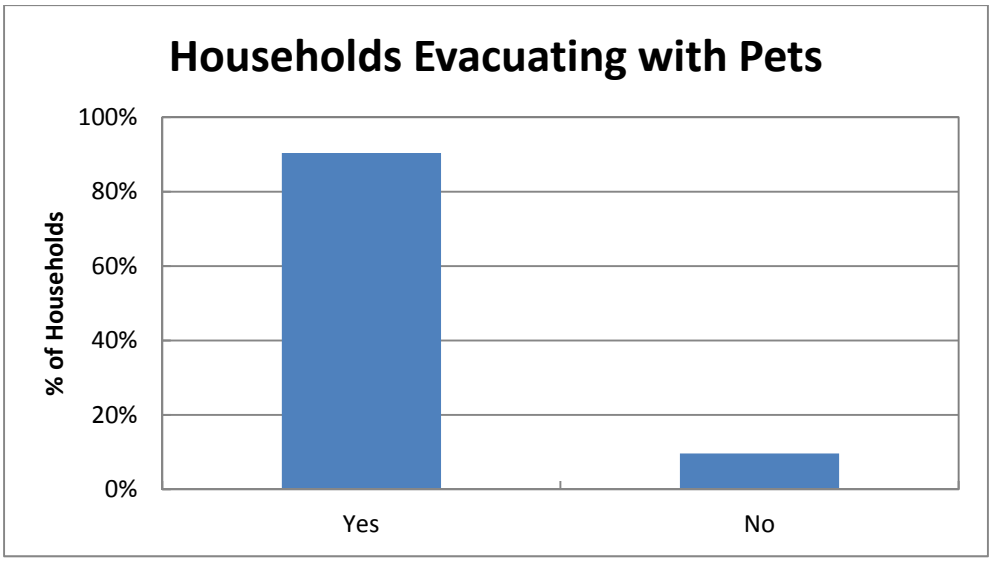


Figure F-9. Households Evacuating with Pets

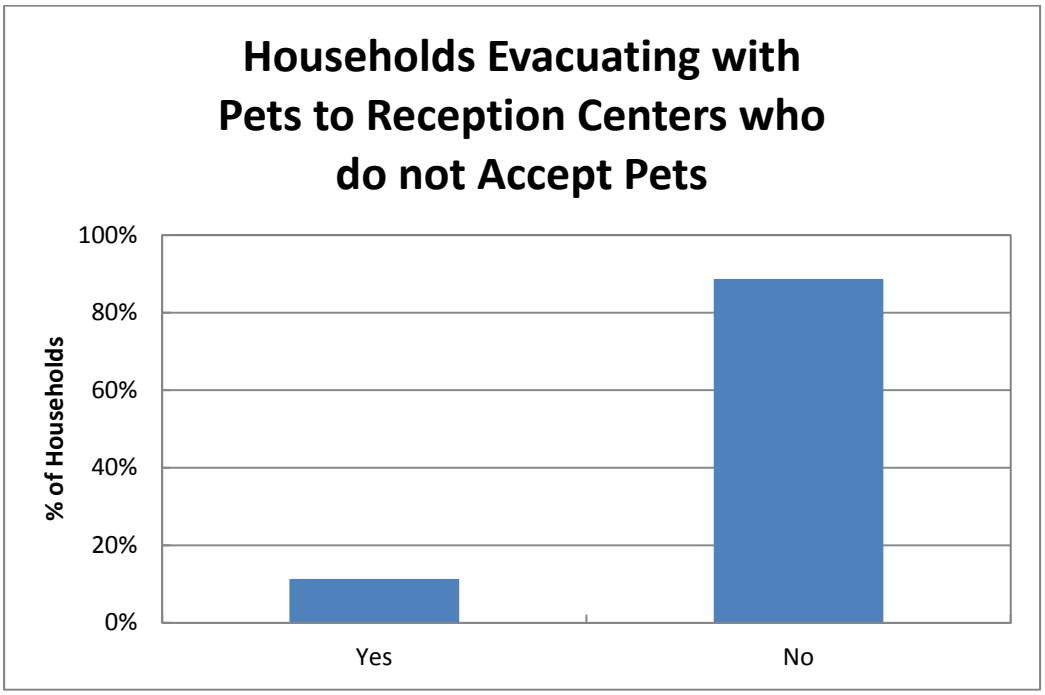


Figure F-10. Households evacuating with Pets to Reception Centers

"Emergency officials advise you to take shelter at home in an emergency. Would you?" This question is designed to elicit information regarding compliance with instructions to shelter in place. The results indicate that 84 percent of households who are advised to shelter in place would do so; the remaining 16 percent would choose to evacuate the area. Note the baseline ETE study assumes 20 percent of households will not comply with the shelter advisory, as per

Section 2.5.2 of NUREG/CR-7002. Thus, the data obtained from the survey is slightly less than the federal guidance recommendation. As indicated in Appendix M (Table M-2), a sensitivity study was conducted to estimate the impact of shadow evacuation (non-compliance of shelter advisory) on ETE. The results indicate that the ETE is not significantly impacted by a reduction in shadow evacuation.

"Emergency officials advise you to take shelter at home now in an emergency and possibly evacuate later while people in other areas are advised to evacuate now. Would you?" This question is designed to elicit information specifically related to the possibility of a staged evacuation. That is, asking a population to shelter in place now and then to evacuate after a specified period of time. Results indicate that 70 percent of households would follow instructions and delay the start of evacuation until so advised, while the balance of 30 percent would choose to begin evacuating immediately.

F.3.3 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.

The mobilization distributions provided below are the result of having applied the analysis described in Section 5.4.1 on the component activities of the mobilization.

"How long does it take the commuter to complete preparation for leaving work?" Figure F-11 presents the cumulative distribution; in all cases, the activity is completed within 75 minutes. About ninety percent can leave within 30 minutes.

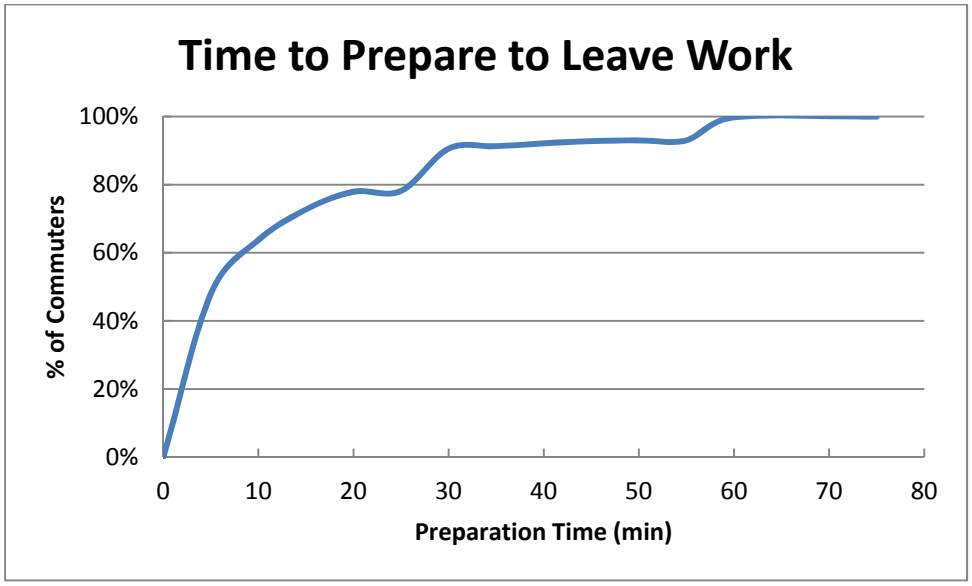


Figure F-11. Time Required to Prepare to Leave Work/School

"How long would it take the commuter to travel home?" Figure F-12 presents the work to home travel time for the EPZ. About 96 percent of commuters can arrive home within 60 minutes of leaving work; all within 120 minutes.

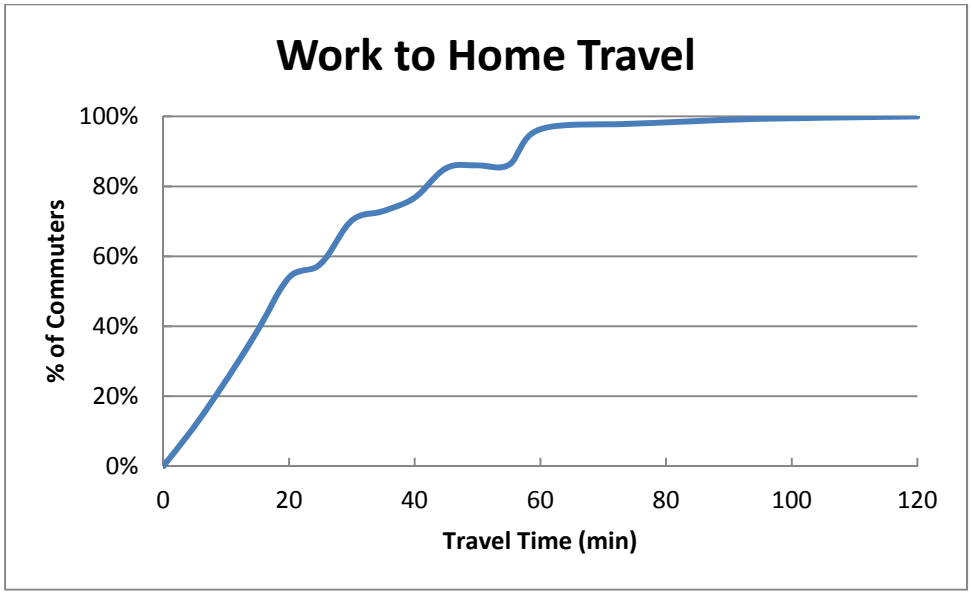


Figure F-12. Work to Home Travel Time

"How long would it take the family to pack clothing, secure the house, and load the car?" Figure F-13 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-13 has a long "tail." About 88 percent of households can be ready to leave home within 90 minutes; the remaining households require up to an additional 1 hour and 45 minutes.

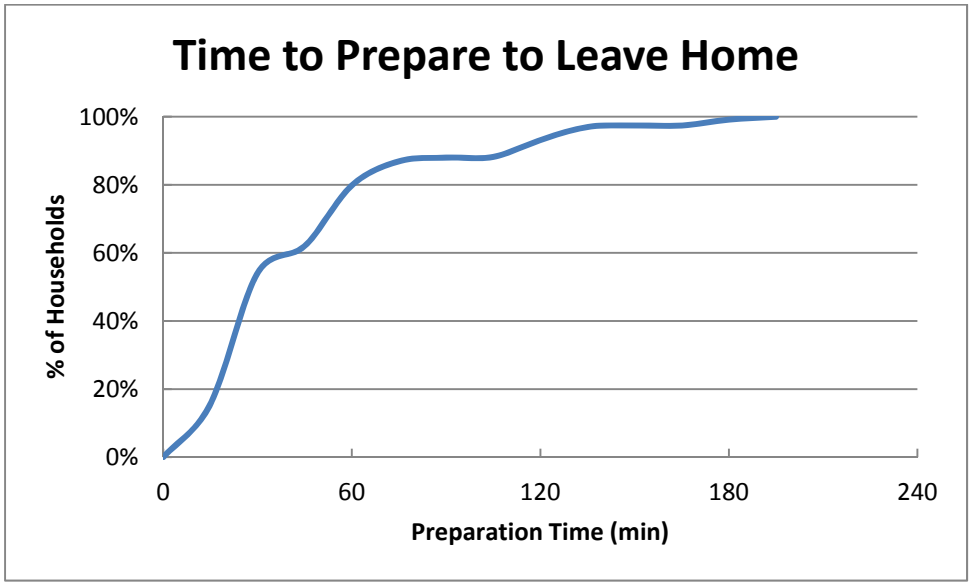


Figure F-13. Time to Prepare Home for Evacuation

"How long would it take you to clear 6 to 8 inches of snow from your driveway?" During adverse, snowy weather conditions, an additional activity must be performed before residents can depart on the evacuation trip. Although snow scenarios assume that the roads and highways have been plowed and are passable (albeit at lower speeds and capacities), it may be necessary to clear a private driveway prior to leaving the home so that the vehicle can access the street. Figure F-14 presents the time distribution for removing 6 to 8 inches of snow from a driveway. The time distribution for clearing the driveway has a long tail; about 90 percent of driveways are passable within 1 hour. The last driveway is cleared 3 hours after the start of this activity. Note that those respondents (47%) who answered that they would not take time to clear their driveway were assumed to be ready immediately at the start of this activity. Essentially they would drive through the snow on the driveway to access the roadway and begin their evacuation trip.

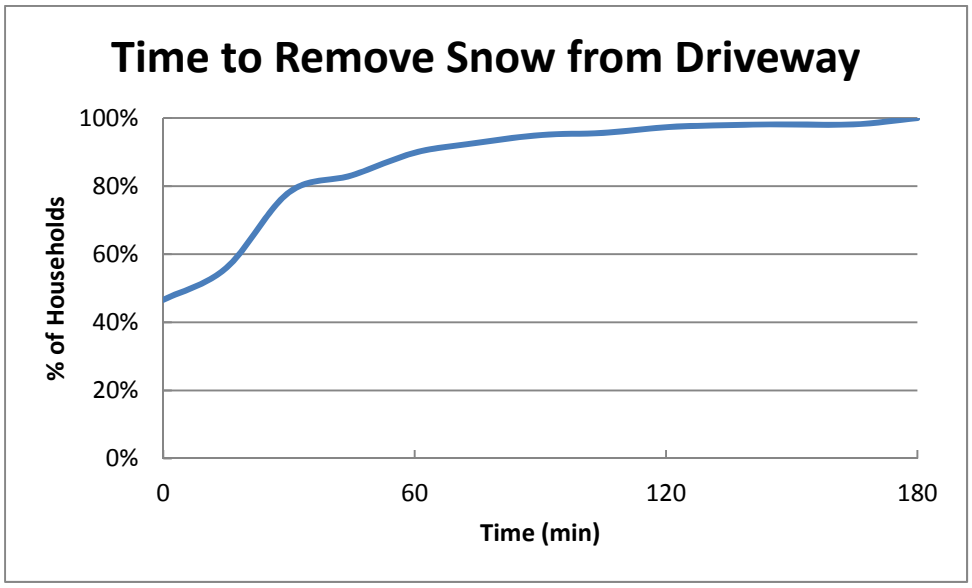


Figure F-14. Time to Clear Driveway of 6"-8" of Snow

F.4 Conclusions

The telephone survey provides valuable, relevant data associated with the EPZ population, which have been used to quantify demographics specific to the EPZ, and "mobilization time" which can influence evacuation time estimates.

ATTACHMENT A

Telephone Survey Instrument

Telephone Survey Instrument

Hello, my name is _____ and I'm conducting a survey for the State Emergency Management Agencies of New Hampshire and Massachusetts. The information you provide will be used for emergency planning to enhance local response plans. Emergency planning for some hazards may require evacuation. Your answers to my questions will greatly contribute to this effort. I will not ask for your name.

COL. 1 Unused

COL. 2 Unused

COL. 3 Unused

COL. 4 Unused

COL. 5 Unused

COL. 8 Sex

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	
3A.	In total, how many cars, or other vehicles are usually available to the household? (DO NOT READ ANSWERS)	COL. 20	SKIP TO
		1 ONE	Q. 4
		2 TWO	Q. 4
		3 THREE	Q. 4
		4 FOUR	Q. 4
		5 FIVE	Q. 4
		6 SIX	Q. 4
		7 SEVEN	Q. 4
		8 EIGHT	Q. 4
		9 NINE OR MORE	Q. 4
		0 ZERO (NONE)	Q. 3B
		X DON'T KNOW/REFUSED	Q. 3B
3B.	In an emergency, could you get a ride out of the area with a neighbor or friend?	COL. 21	
		1 YES	
		2 NO	
		X DON'T KNOW/REFUSED	

4. How many people usually live in this household? (DO NOT READ ANSWERS)	COL. 22		COL. 23
	1	ONE	0 TEN
	2	TWO	1 ELEVEN
	3	THREE	2 TWELVE
	4	FOUR	3 THIRTEEN
	5	FIVE	4 FOURTEEN
	6	SIX	5 FIFTENN
	7	SEVEN	6 SIXTEEN
	8	EIGHT	7 SEVENTEEN
	9	NINE	8 EIGHTEEN
			9 NINETEEN OR MORE
			X DON'T KNOW/REFUSED

5. How many adults in the household commute to a job, or to college on a daily basis?	COL. 24		SKIP TO
	0	ZERO	Q. 9
	1	ONE	Q. 6
	2	TWO	Q. 6
	3	THREE	Q. 6
	4	FOUR OR MORE	Q. 6
	5	DON'T KNOW/REFUSED	Q. 9

INTERVIEWER: For each person identified in Question 5, ask Questions 6, 7, and 8.

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

	Commuter #1	Commuter #2	Commuter #3	Commuter #4
	COL. 25	COL. 26	COL. 27	COL. 28
Rail	1	1	1	1
Bus	2	2	2	2
Walk/Bicycle	3	3	3	3
Drive Alone	4	4	4	4
Carpool-2 or more people	5	5	5	5
Don't know/Refused	6	6	6	6

7. How much time on average, would it take Commuter #1 to travel home from work or college? (REPEAT QUESTION FOR EACH COMMUTER) (DO NOT READ ANSWERS)

COMMUTER #1				COMMUTER #2			
COL. 29		COL. 30		COL. 31		COL. 32	
1	5 MINUTES OR LESS	1	46-50 MINUTES	1	5 MINUTES OR LESS	1	46-50 MINUTES
2	6-10 MINUTES	2	51-55 MINUTES	2	6-10 MINUTES	2	51-55 MINUTES
3	11-15 MINUTES	3	56 - 1 HOUR	3	11-15 MINUTES	3	56 - 1 HOUR
4	16-20 MINUTES	4	OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES	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	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	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	7	31-35 MINUTES	7	BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)	8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)
9	41-45 MINUTES	9		9	41-45 MINUTES	9	
		0				0	
		X	DON'T KNOW /REFUSED			X	DON'T KNOW /REFUSED

COMMUTER #3

COL. 33		COL. 34		COL. 35		COL. 36	
1	5 MINUTES OR LESS	1	46-50 MINUTES	1	5 MINUTES OR LESS	1	46-50 MINUTES
2	6-10 MINUTES	2	51-55 MINUTES	2	6-10 MINUTES	2	51-55 MINUTES
3	11-15 MINUTES	3	56 - 1 HOUR	3	11-15 MINUTES	3	56 - 1 HOUR
4	16-20 MINUTES	4	OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES	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	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	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	7	31-35 MINUTES	7	BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)	8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)
9	41-45 MINUTES	9		9	41-45 MINUTES	9	
		0				0	
		X	DON'T KNOW /REFUSED			X	DON'T KNOW /REFUSED

8. Approximately how much time 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. 37		COL. 38		COL. 39		COL. 40	
1	5 MINUTES OR LESS	1	46-50 MINUTES	1	5 MINUTES OR LESS	1	46-50 MINUTES
2	6-10 MINUTES	2	51-55 MINUTES	2	6-10 MINUTES	2	51-55 MINUTES
3	11-15 MINUTES	3	56 - 1 HOUR	3	11-15 MINUTES	3	56 - 1 HOUR

4	16-20 MINUTES	4	OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES	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	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	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	7	31-35 MINUTES	7	BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)	8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)
9	41-45 MINUTES	9		9	41-45 MINUTES	9	
		X	DON'T KNOW /REFUSED			X	DON'T KNOW /REFUSED

COMMUTER #3

COL. 41		COL. 42		COL. 43		COL. 44	
1	5 MINUTES OR LESS	1	46-50 MINUTES	1	5 MINUTES OR LESS	1	46-50 MINUTES
2	6-10 MINUTES	2	51-55 MINUTES	2	6-10 MINUTES	2	51-55 MINUTES
3	11-15 MINUTES	3	56 - 1 HOUR	3	11-15 MINUTES	3	56 - 1 HOUR
4	16-20 MINUTES	4	OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES	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	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	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	7	31-35 MINUTES	7	BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)	8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)
9	41-45 MINUTES	9		9	41-45 MINUTES	9	
		X	DON'T KNOW /REFUSED			X	DON'T KNOW /REFUSED

9. If you were advised by local authorities to evacuate, how much time would it take the household to pack clothing, medications, secure the house, load the car, and complete preparations prior to evacuating the area? (DO NOT READ ANSWERS)

COL. 45		COL. 46	
1	LESS THAN 15 MINUTES	1	3 HOURS TO 3 HOURS 15 MINUTES
2	15-30 MINUTES	2	3 HOURS 16 MINUTES TO 3 HOURS 30 MINUTES
3	31-45 MINUTES	3	3 HOURS 31 MINUTES TO 3 HOURS 45 MINUTES

4	46 MINUTES - 1 HOUR	4	3 HOURS 46 MINUTES TO 4 HOURS
5	1 HOUR TO 1 HOUR 15 MINUTES	5	4 HOURS TO 4 HOURS 15 MINUTES
6	1 HOUR 16 MINUTES TO 1 HOUR 30 MINUTES	6	4 HOURS 16 MINUTES TO 4 HOURS 30 MINUTES
7	1 HOUR 31 MINUTES TO 1 HOUR 45 MINUTES	7	4 HOURS 31 MINUTES TO 4 HOURS 45 MINUTES
8	1 HOUR 46 MINUTES TO 2 HOURS	8	4 HOURS 46 MINUTES TO 5 HOURS
9	2 HOURS TO 2 HOURS 15 MINUTES	9	5 HOURS TO 5 HOURS 30 MINUTES
0	2 HOURS 16 MINUTES TO 2 HOURS 30 MINUTES	0	5 HOURS 31 MINUTES TO 6 HOURS
X	2 HOURS 31 MINUTES TO 2 HOURS 45 MINUTES	X	OVER 6 HOURS (SPECIFY _____)
Y	2 HOURS 46 MINUTES TO 3 HOURS		

COL. 47

1 DON'T KNOW/REFUSED

---

10. If there is 6-8" of snow on your driveway or curb, would you need to shovel out to evacuate? If yes, how much time, on average, would it take you to clear the 6-8" of snow to move the car from the driveway or curb to begin the evacuation trip? Assume the roads are passable. (DO NOT READ RESPONSES)

COL. 48

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
Z	NO, WILL NOT SHOVEL OUT

COL. 49

1	OVER 3 HOURS (SPECIFY _____)
2	DON'T KNOW/REFUSED

---

11. Please choose one of the following (READ ANSWERS):

A. I would await the return of household commuters to evacuate together.

B. I would evacuate independently and meet other household members later.

COL. 50

1	A
2	B
X	DON'T KNOW/REFUSED

12. How many vehicles would your household use during an evacuation? (DO NOT READ ANSWERS)

COL. 51	
1	ONE
2	TWO
3	THREE
4	FOUR
5	FIVE
6	SIX
7	SEVEN
8	EIGHT
9	NINE OR MORE
0	ZERO (NONE)
X	DON'T KNOW/REFUSED

13A. Emergency officials advise you to take shelter at home in an emergency. Would you: (READ ANSWERS)

A. SHELTER; or

B. EVACUATE

COL. 52	
1	A
2	B
X	DON'T KNOW/REFUSED

13B. Emergency officials advise you to take shelter at home now in an emergency and possibly evacuate later while people in other areas are advised to evacuate now. Would you: (READ ANSWERS)

A. SHELTER; or

B. EVACUATE

COL. 53	
1	A
2	B
X	DON'T KNOW/REFUSED

14A If you have a household pet, would you take your pet with you if you were asked to evacuate the area? (READ ANSWERS)

COL. 54		SKIP TO
1	DON'T HAVE A PET	Q. 15A
2	YES	Q. 14B
3	NO	Q. 15A
X	DON'T KNOW/REFUSED	Q. 15A

14B When evacuating with your household pet, would you evacuate to a **reception center** if they do not accept pets? (READ ANSWERS)

COL. 55	
1	YES
2	NO, WOULD REMAIN AT HOME
3	NO, WOULD EVACUATE TO A LOCATION WHERE I COULD TAKE MY PET
X	DON'T KNOW/REFUSED

15A Do you have a service animal? (READ ANSWER)

COL. 56		SKIP TO
1	YES	Q. 15B
2	NO	END SURVEY
X	DON'T KNOW/REFUSED	END SURVEY

15B When evacuating with your service animal, would you evacuate to a **reception center**? (READ ANSWERS)

COL. 57

1 YES

2 NO, WOULD REMAIN AT HOME

3 NO, WOULD EVACUATE TO A DIFFERENT LOCATION

X DON'T KNOW/REFUSED

Thank you very much. _____

(TELEPHONE NUMBER CALLED)

IF REQUESTED:

For additional information, contact your State Emergency Management Agency during normal business hours.

State	EMA Phone
Massachusetts	508-820-2002
New Hampshire	603-271-2231

APPENDIX G

Traffic Management Plan

G. TRAFFIC MANAGEMENT PLAN

NUREG/CR-7002 indicates that the existing TCPs and ACPs identified by the offsite agencies should be used in the evacuation simulation modeling. The traffic and access control plans for the EPZ were provided by each state.

These plans were reviewed and the TCPs and ACPs were modeled accordingly.

G.1 Traffic Control Points

As discussed in Section 9, traffic control points at intersections (which are controlled) are modeled as actuated signals. If an intersection has a pre-timed signal, stop, or yield control, and the intersection is identified as a traffic control point, the control type was changed to an actuated signal in the DYNEV II system. Table K-2 provides the control type and node number for those nodes which are controlled. If the existing control was changed due to the point being a Traffic Control Point, the control type is indicated as a TCP in Table K-2.

As discussed in Section 9, there is significant traffic congestion in competing directions (east-west and north-south) at intersections within the population centers of the EPZ and Shadow Region. Assigning police officers to perform traffic control at these intersections will have little benefit due to the heavy congestion along competing approaches. The main thoroughfare on Interstate 95 through Portsmouth is operating at LOS F for most of the evacuation, as shown in Figures 7-3 through 7-8. Positioning police officers at ramps to facilitate access to the interstate would have minimal benefit as the main thoroughfare is already heavily congested.

Figure G-1 and Figure G-2 map the TCPs identified in the states' traffic management plans. These TCPS are concentrated along US 1, I-95, and within population centers. These TCPs would be manned during evacuation by traffic guides who would direct evacuees in the proper direction and facilitate the flow of traffic through the intersections.

G.2 Access Control Points

Based on discussions with the offsite agencies, ACPs will be established within 1 hour of the advisory to evacuate to discourage through travelers from using major through routes which traverse the EPZ. Figure G-3 maps the ACPs for the Seabrook Station EPZ as defined in the states' traffic management plans. As discussed in Section 3.6, external traffic was considered on four routes which traverse the EPZ – Interstate-95, Interstate-495, State Highway 101, and US 4 – in this analysis. The generation of these external trips ceased at 1 hour after the advisory to evacuate in the simulation.

As discussed in Section 9, no additional TCPs or ACPs are deemed necessary as a result of this study.

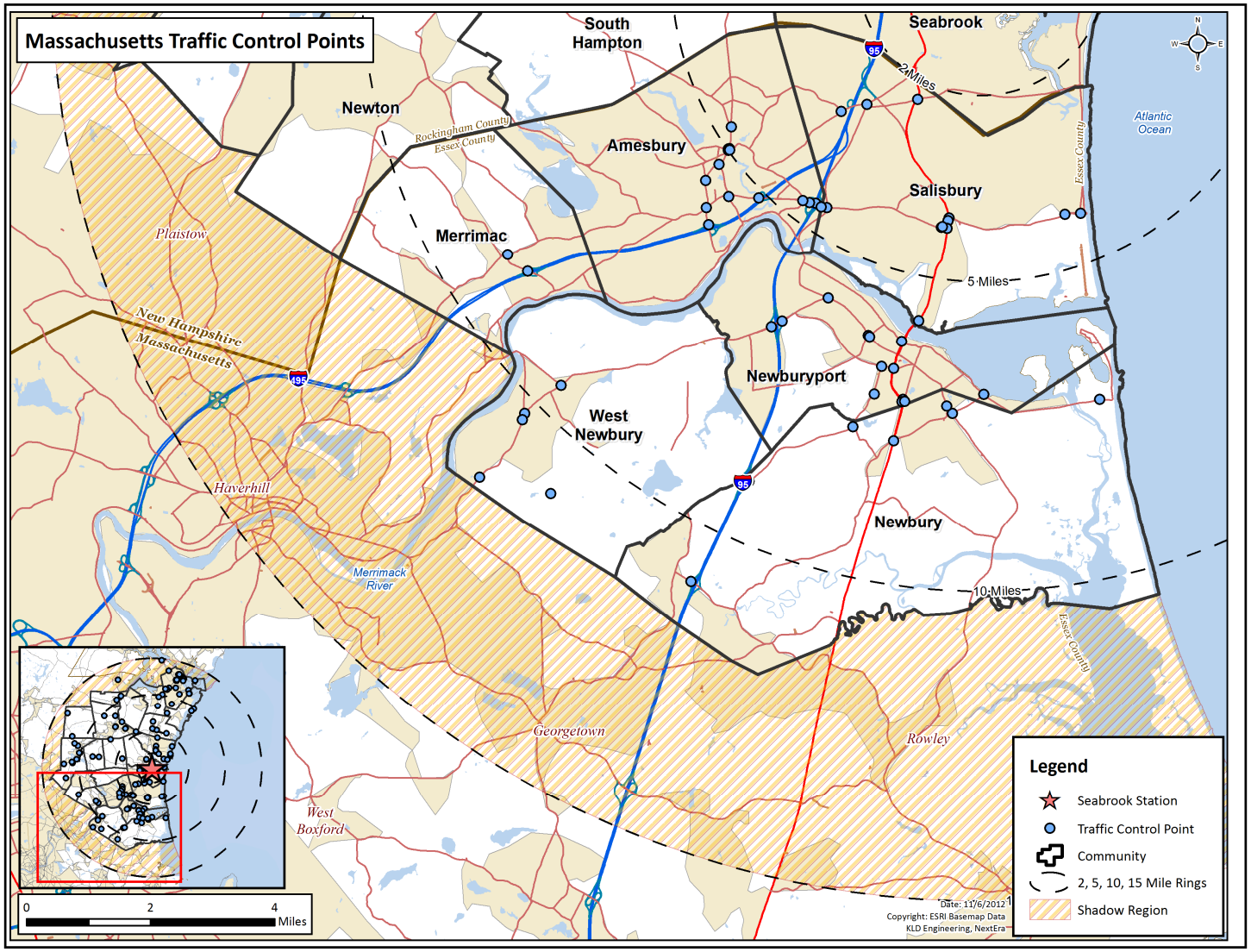


Figure G-1. Traffic Control Points within the MA Portion of the EPZ

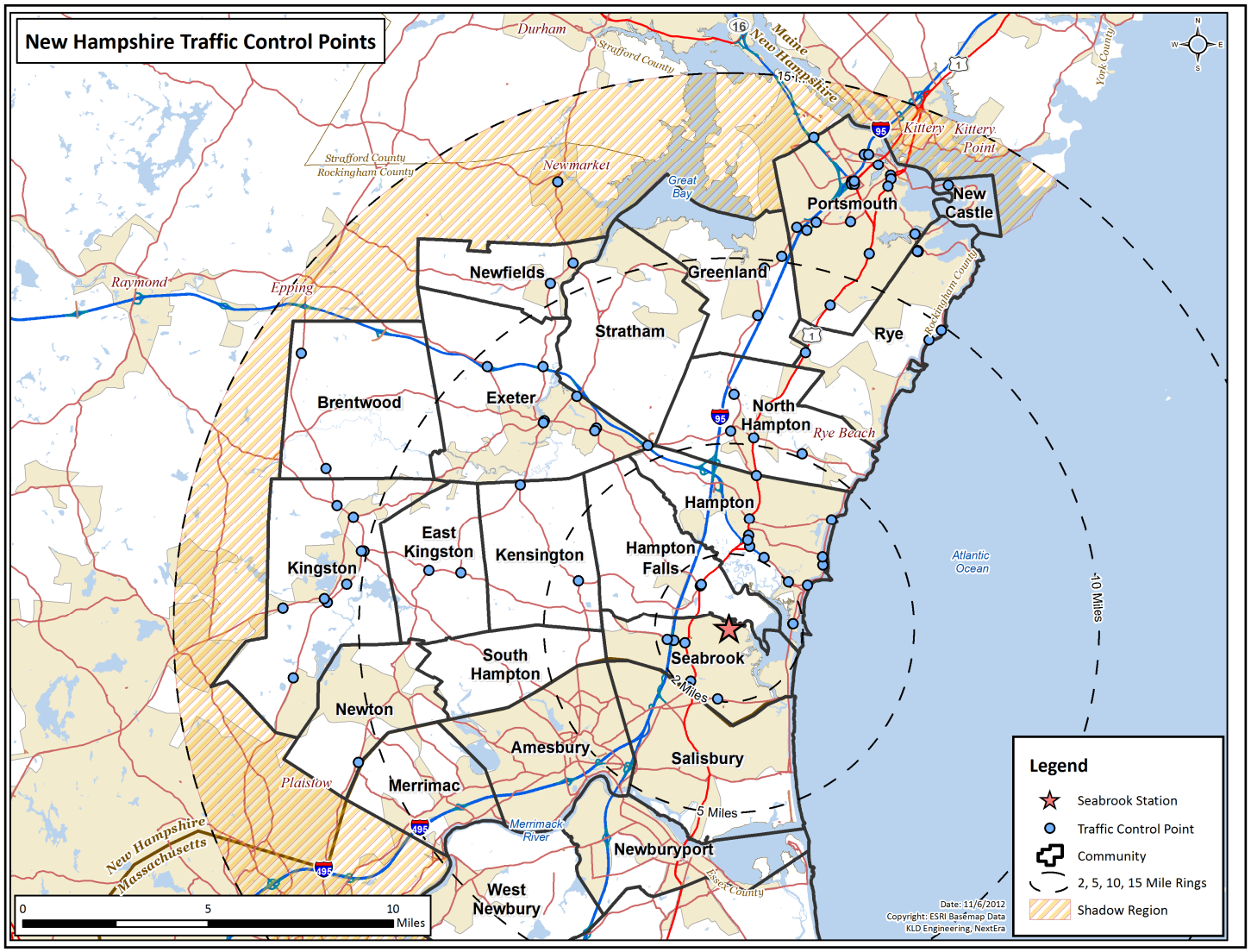


Figure G-2. Traffic Control Points within the NH Portion of the EPZ

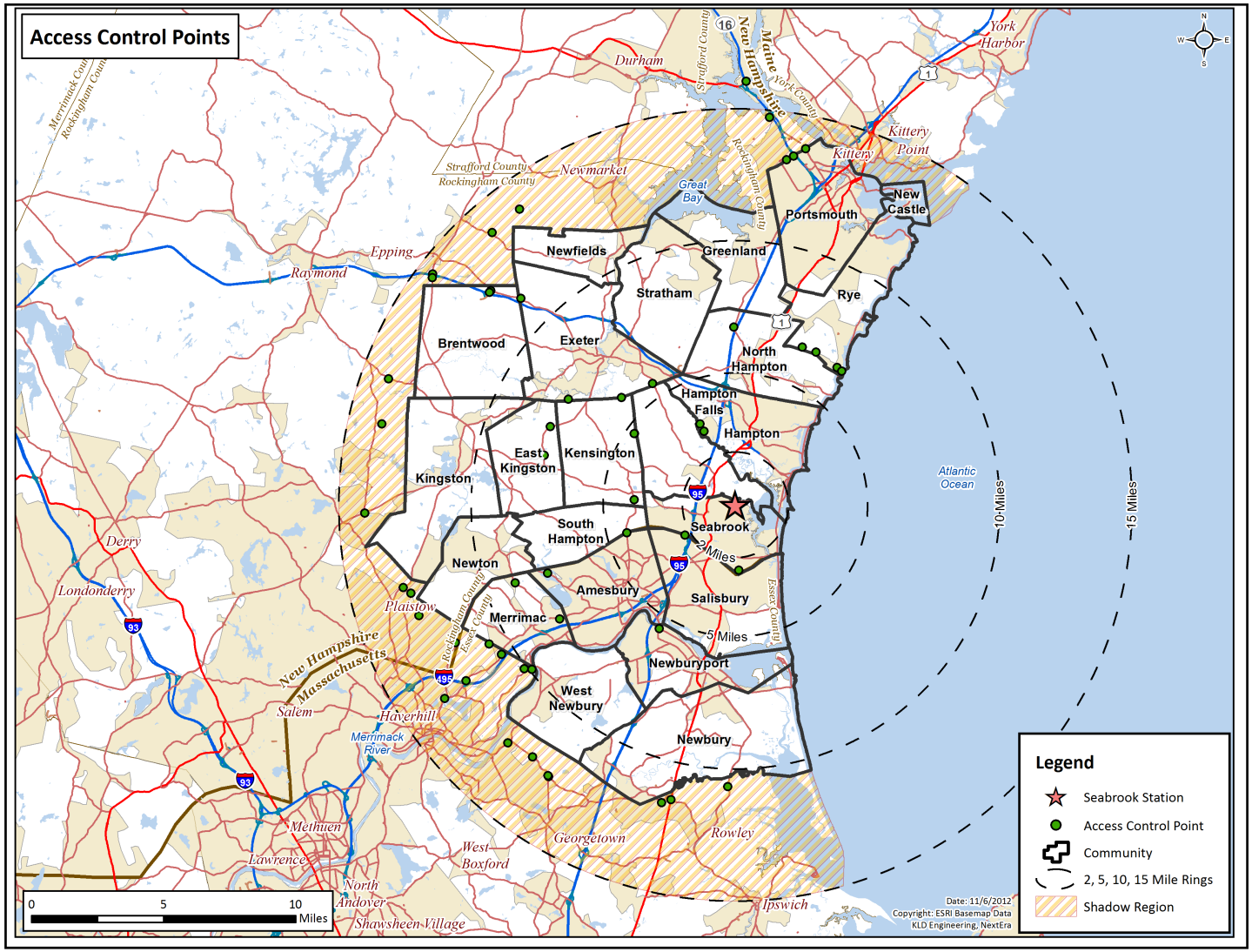


Figure G-3. Access Control Points for the Seabrook Station EPZ

APPENDIX H

Evacuation Regions

H. EVACUATION REGIONS

This appendix presents the evacuation percentages for each Evacuation Region and maps of all Evacuation Regions. Communities are grouped into ERPA. Table H-1 presents the Communities that comprise each ERPA. ERPA are then grouped into Evacuation Regions (Table H-2). Table H-2 also presents the evacuation percentages for each ERPA. The percentages presented in Table H-2 are based on the methodology discussed in assumption 5 of Section 2.2 and shown in Figure 2-1.

Note the baseline ETE study assumes 20 percent of households will not comply with the shelter advisory, as per Section 2.5.2 of NUREG/CR-7002.

Table H-1. ERPA Designations

Community	ERPA
NEW HAMPSHIRE	
Seabrook	A
Hampton Falls	
Kensington	C
South Hampton	
Hampton	D
North Hampton	
Brentwood	F
East Kingston	
Exeter	
Newfields	
Newton	
Kingston	
Greenland	G
Stratham	
Rye	
New Castle	
Portsmouth	
MASSACHUSETTS	
Amesbury	B
Salisbury	
Merrimac	E
Newburyport	
Newbury	
West Newbury	

Table H-2. Percent of ERPA Population Evacuating for Each Region

Region[1]	Description	ERPA						
		NH					MA	
		A	C	D	F	G	B	E
R01	2-Mile Region	100%	20%	20%	20%	20%	20%	20%
R02	5-Mile Region	100%	100%	100%	20%	20%	100%	20%
R03	Full EPZ	100%	100%	100%	100%	100%	100%	100%
Evacuate 2-Mile Region and Downwind to 5 Miles								
Region	Wind Direction From:	ERPA						
		NH					MA	
		A	C	D	F	G	B	E
R04	NW, NNW, N, NNE	100%	20%	20%	20%	20%	100%	20%
R05	NE, ENE, E	100%	100%	20%	20%	20%	100%	20%
R06	ESE	100%	100%	20%	20%	20%	20%	20%
R07	SE, SSE	100%	100%	100%	20%	20%	20%	20%
R08	S, SSW, SW, WSW, W	100%	20%	100%	20%	20%	20%	20%
N/A	WNW	Refer to Region R01						
Evacuate 5-Mile Region and Downwind to the EPZ Boundary								
Region	Wind Direction From:	ERPA						
		NH					MA	
		A	C	D	F	G	B	E
R09	NW, NNW, N, NNE	100%	100%	100%	20%	20%	100%	100%
R10	NE, ENE, E	100%	100%	100%	100%	20%	100%	100%
R11	ESE	100%	100%	100%	100%	20%	100%	20%
R12	SE, SSE, S	100%	100%	100%	100%	100%	100%	20%
R13	SSW, SW, WSW	100%	100%	100%	20%	100%	100%	20%
N/A	W, WNW	Refer to Region R02						
Staged Evacuation - 2-Mile Region Evacuates, then Evacuate Downwind to 5 Miles								
Region	Wind Direction From:	ERPA						
		NH					MA	
		A	C	D	F	G	B	E
R14	5-Mile Region	100%	100%	100%	20%	20%	100%	20%
R15	NW, NNW, N, NNE	100%	20%	20%	20%	20%	100%	20%
R16	NE, ENE, E	100%	100%	20%	20%	20%	100%	20%
R17	ESE	100%	100%	20%	20%	20%	20%	20%
R18	SE, SSE	100%	100%	100%	20%	20%	20%	20%
R19	S, SSW, SW, WSW, W	100%	20%	100%	20%	20%	20%	20%
N/A	WNW	Refer to Region R01						

ERPA(s) Shelter-in-Place until 90% ETE for R01, then Evacuate[2]	ERPA(s) Shelter-in-Place	ERPA(s) Evacuate

[1] The town of Hampton Beach along SH 1A, as well as all New Hampshire and Massachusetts beaches within the EPZ, evacuates for all Regions.

[2] 20% of population in these Communities will not comply with the shelter advisory, as per Section 2.5.2 of NUREG/CR-7002. Once 90% of the 2-mile Region has evacuated, the remaining population in these Communities will evacuate.

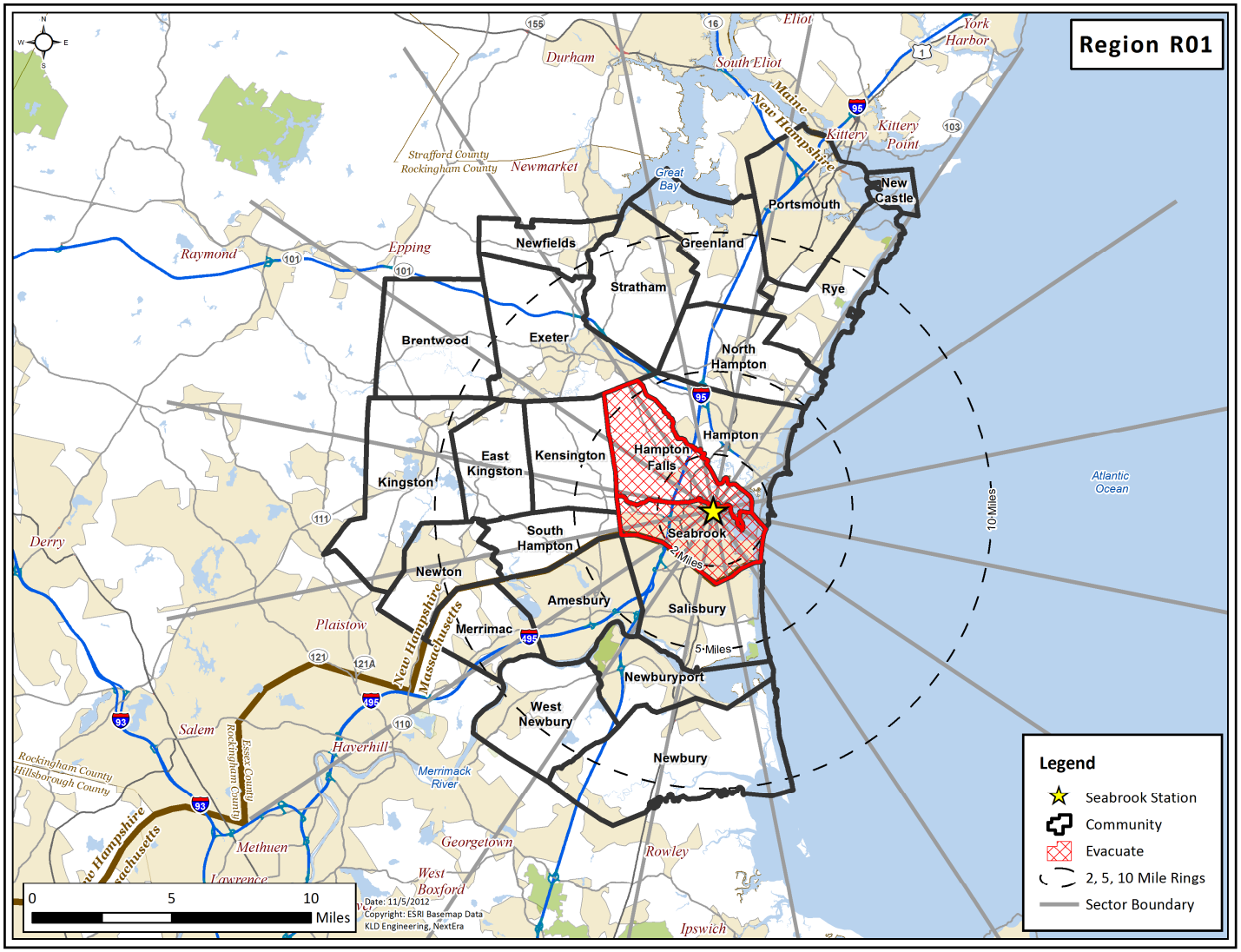


Figure H-1. Region R01

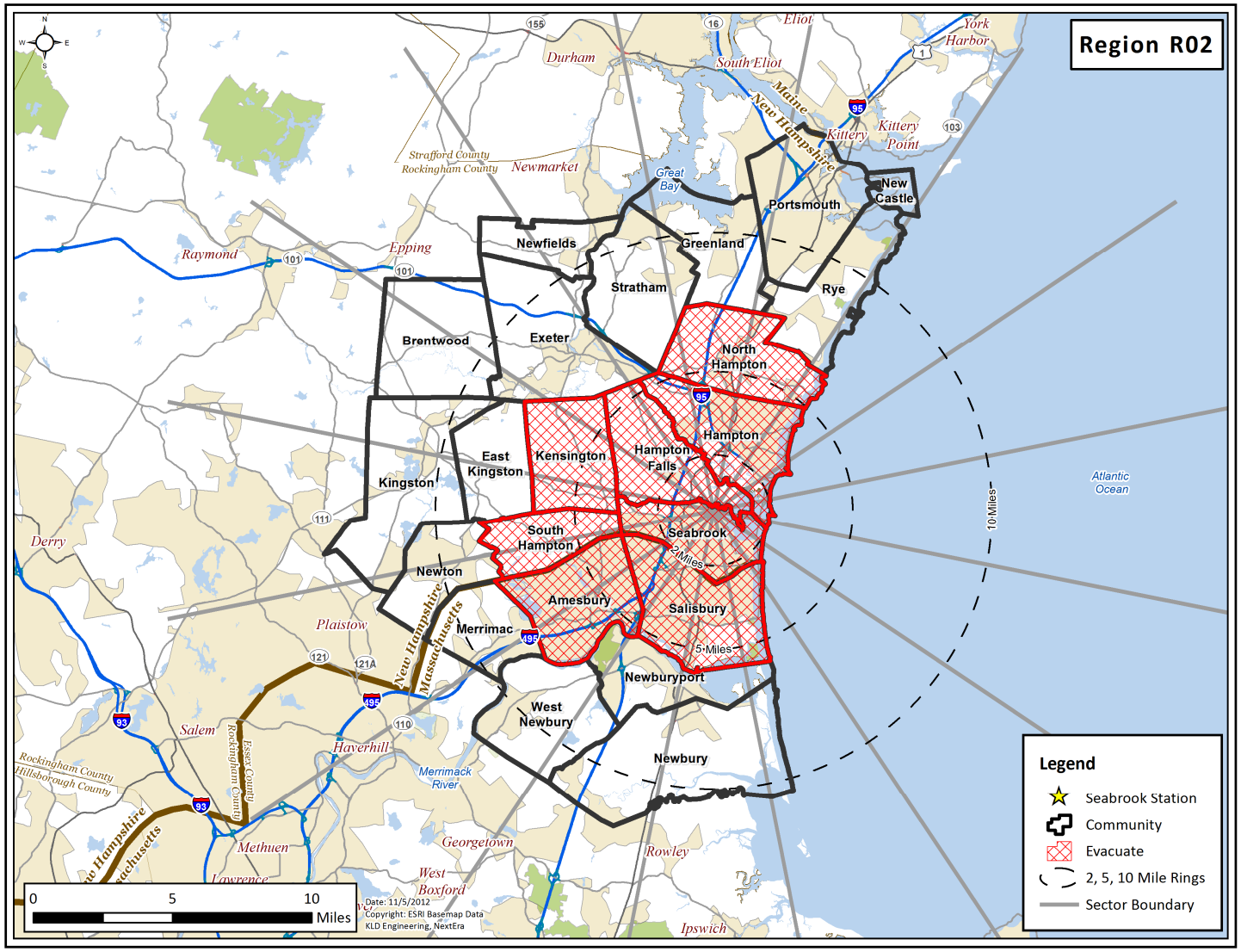


Figure H-2. Region R02

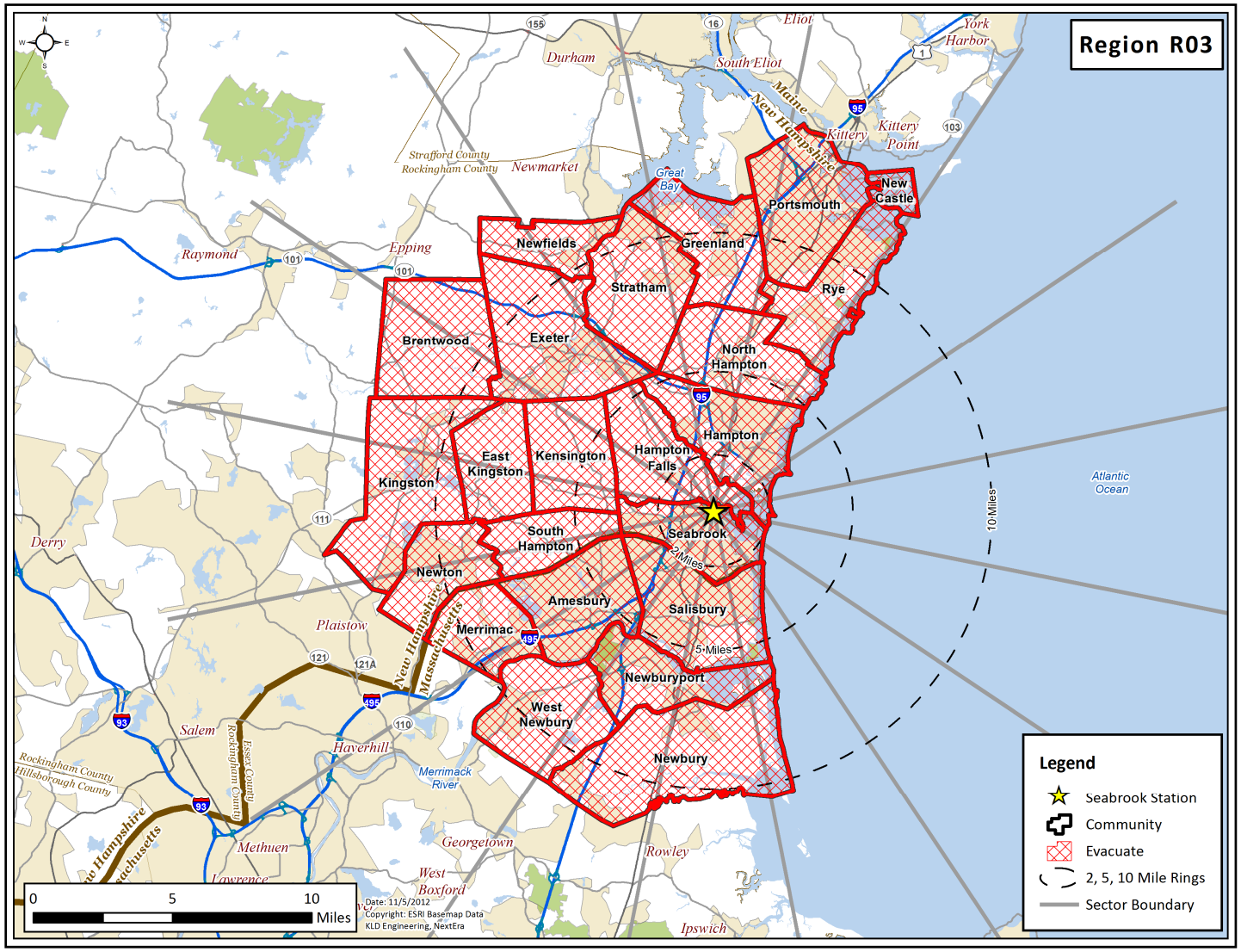


Figure H-3. Region R03

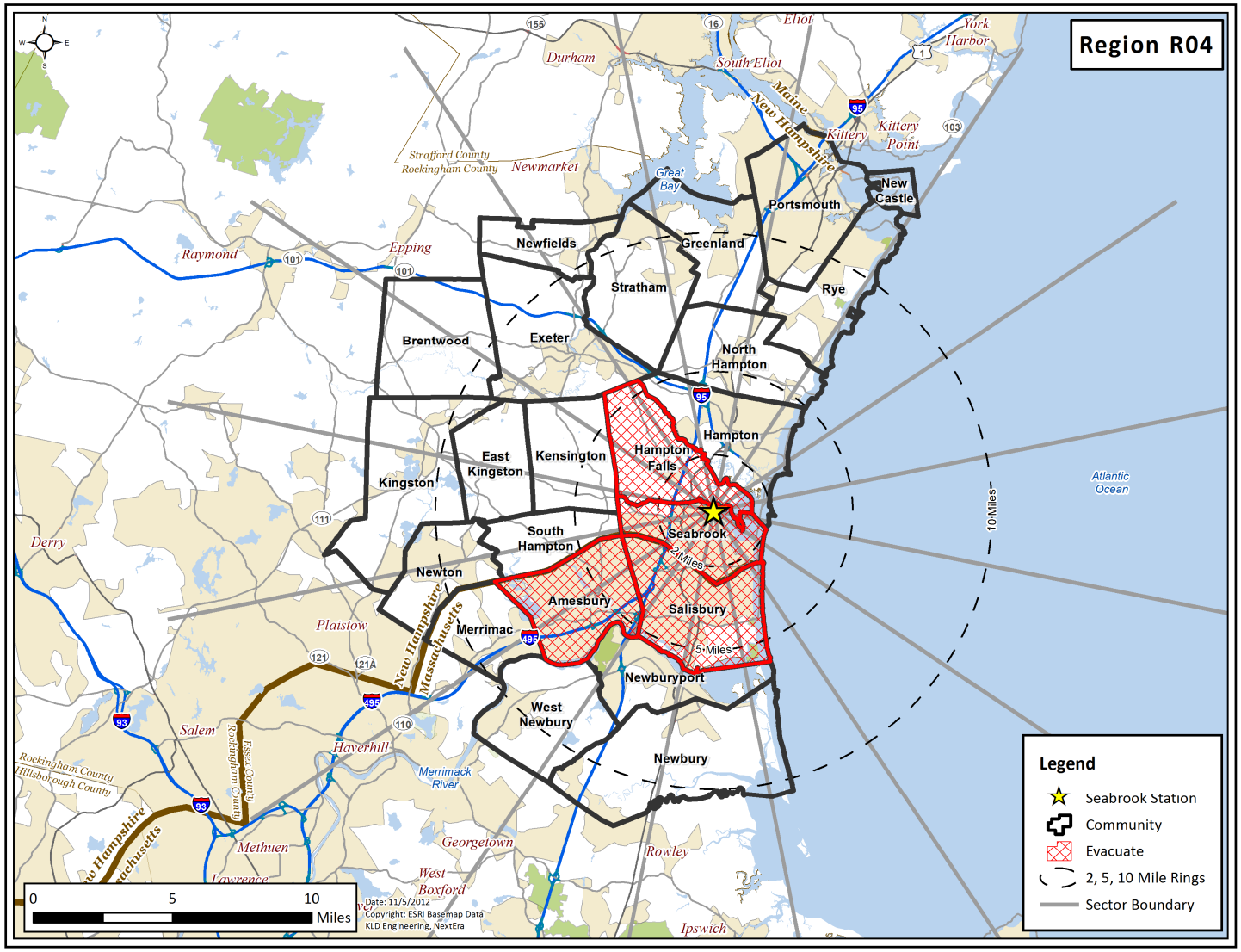


Figure H-4. Region R04

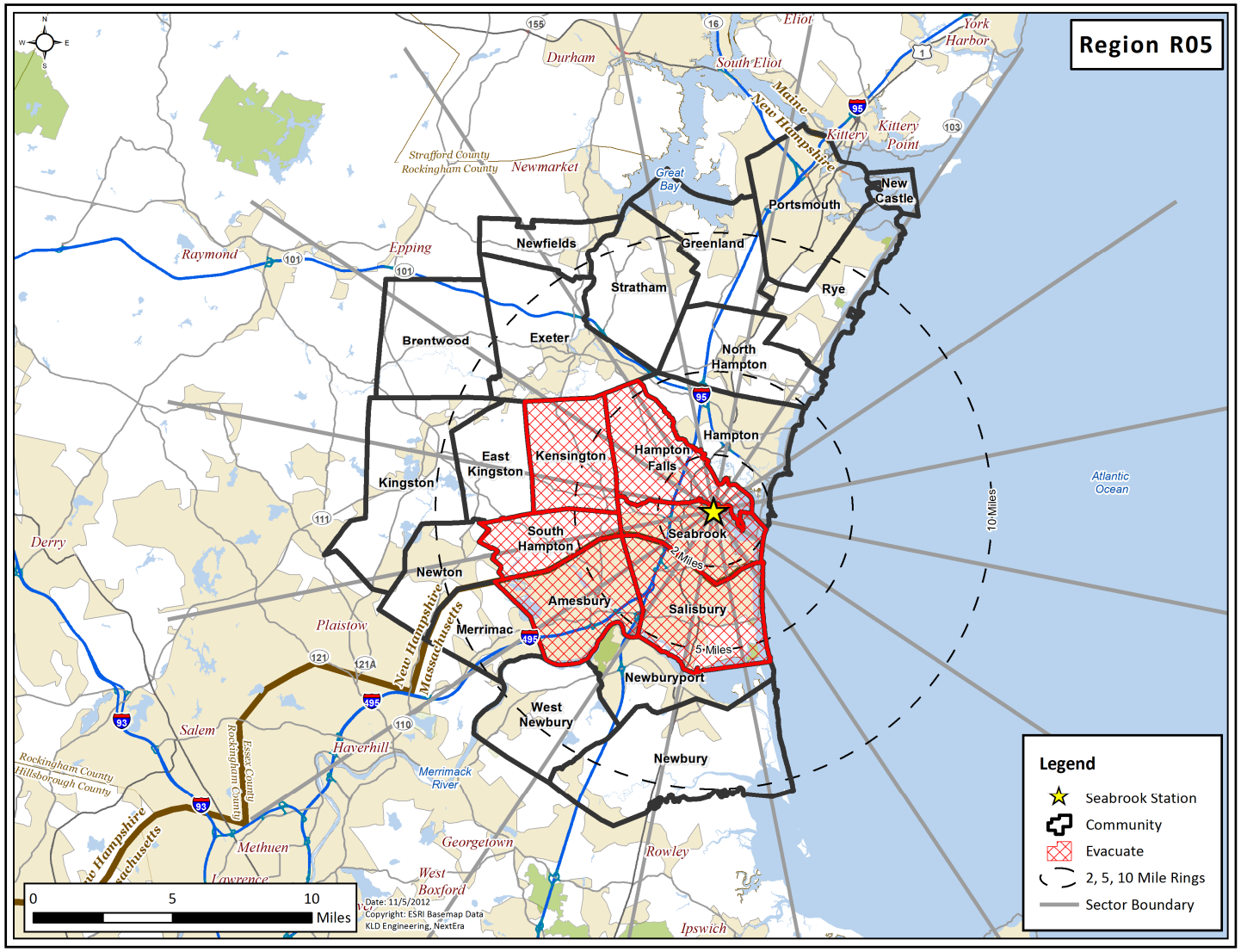


Figure H-5. Region R05

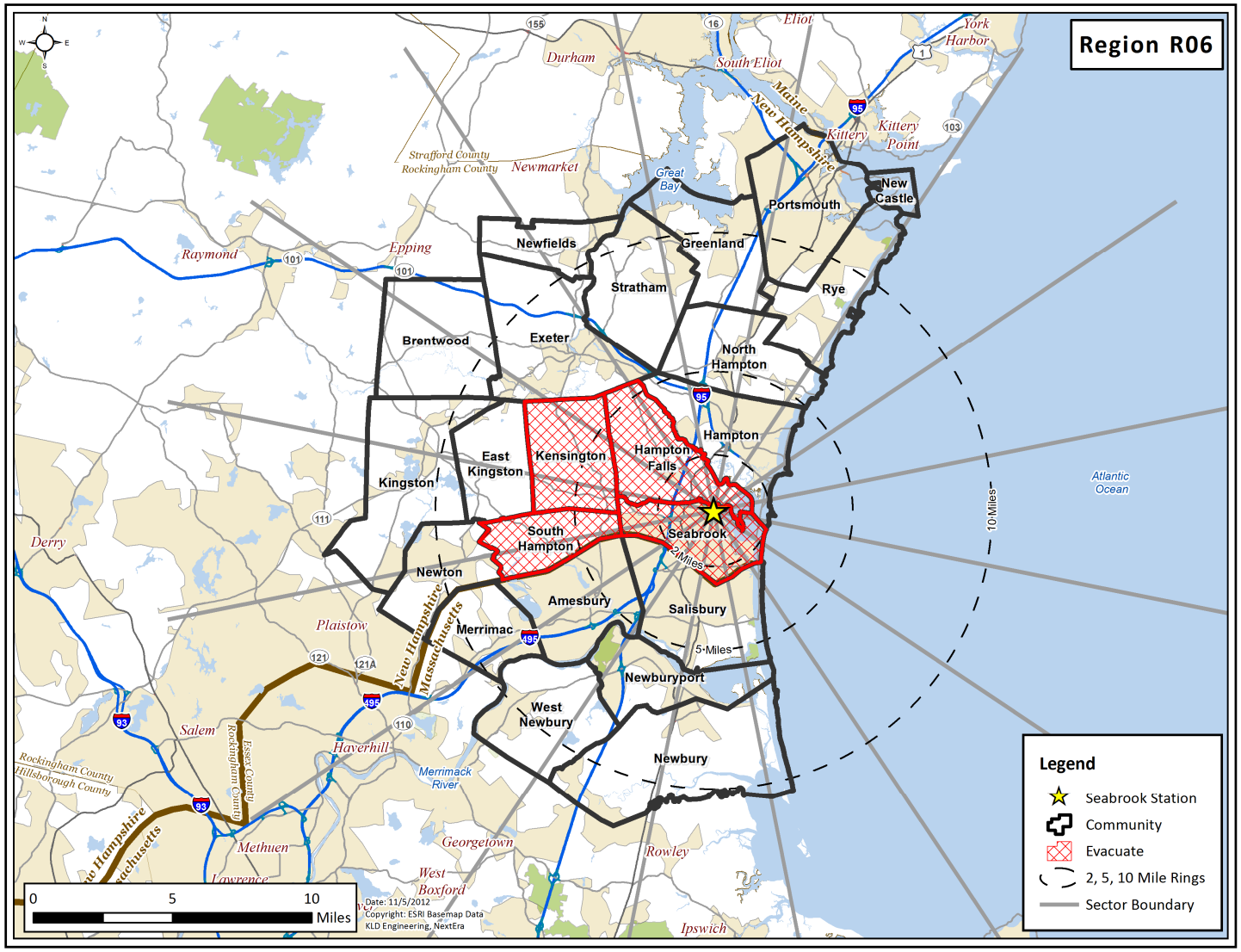


Figure H-6. Region R06

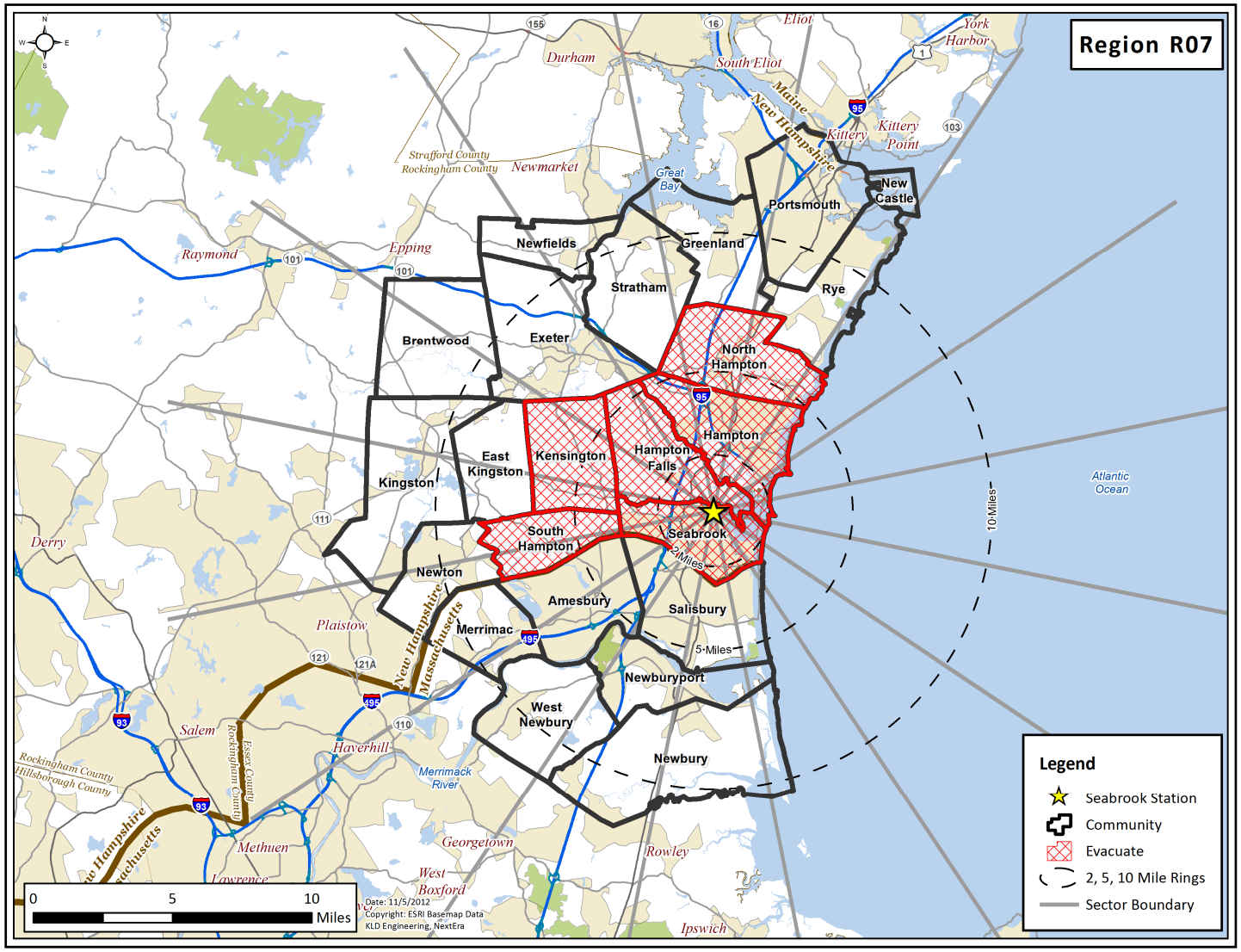


Figure H-7. Region R07

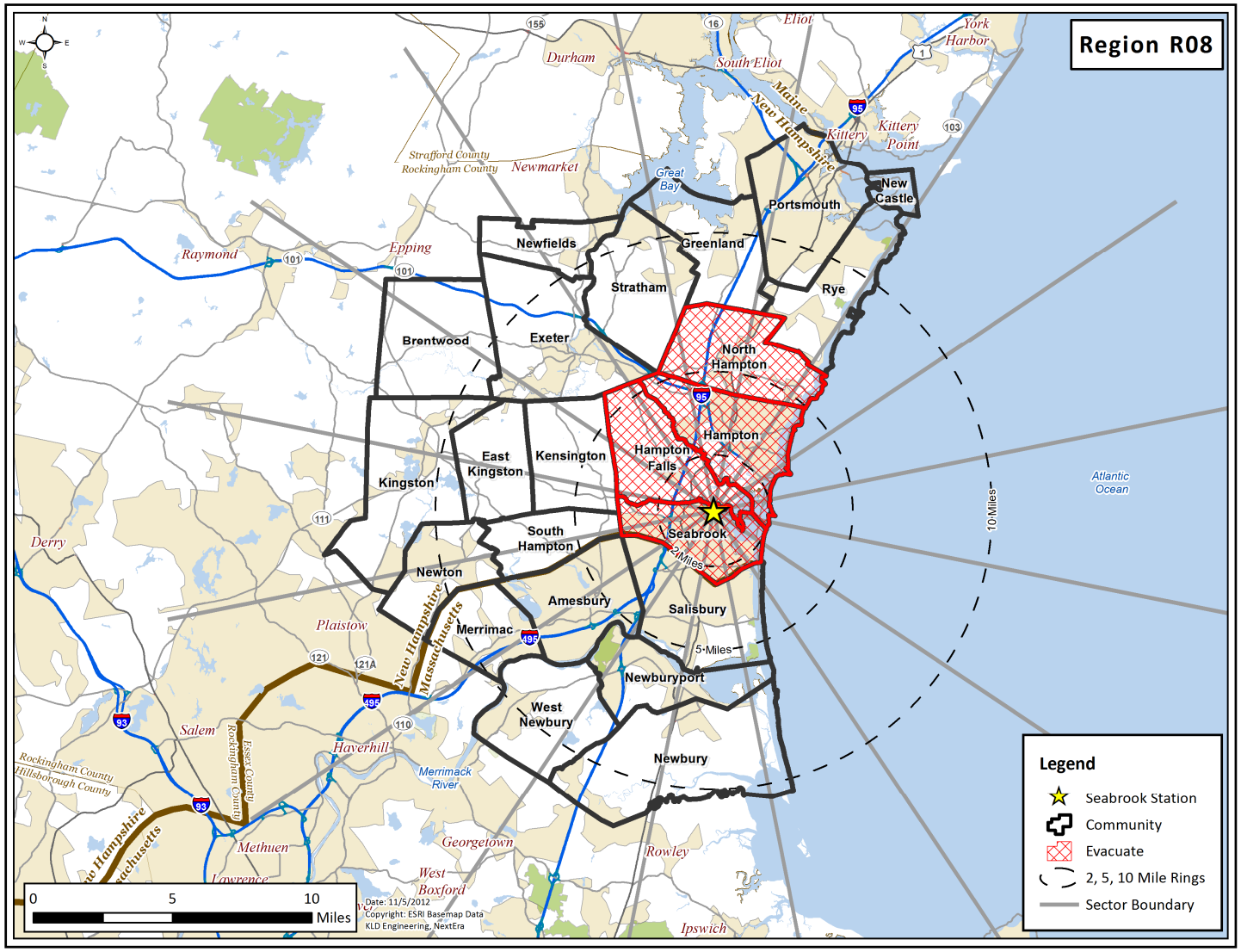


Figure H-8. Region R08

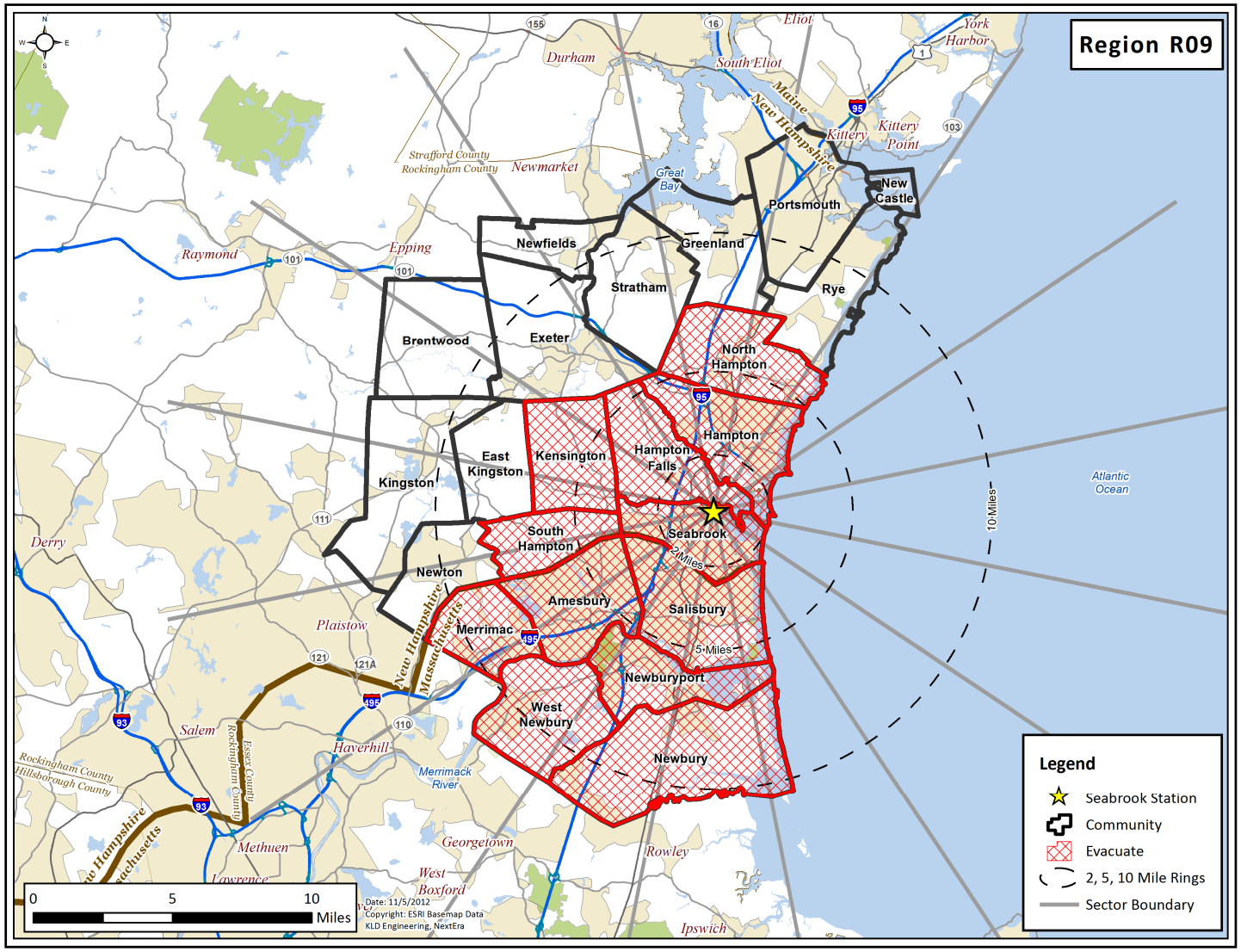


Figure H-9. Region R09

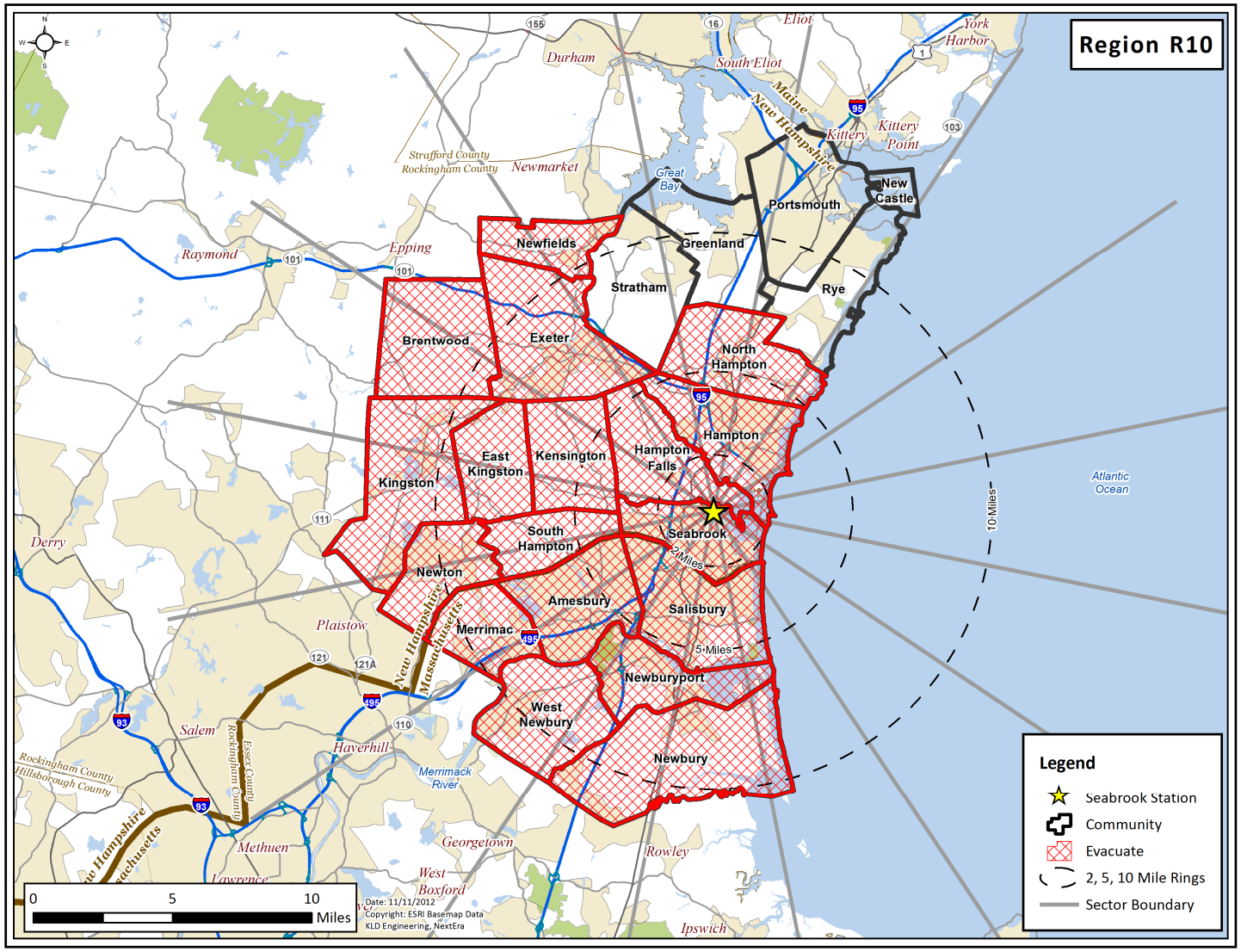


Figure H-10. Region R10

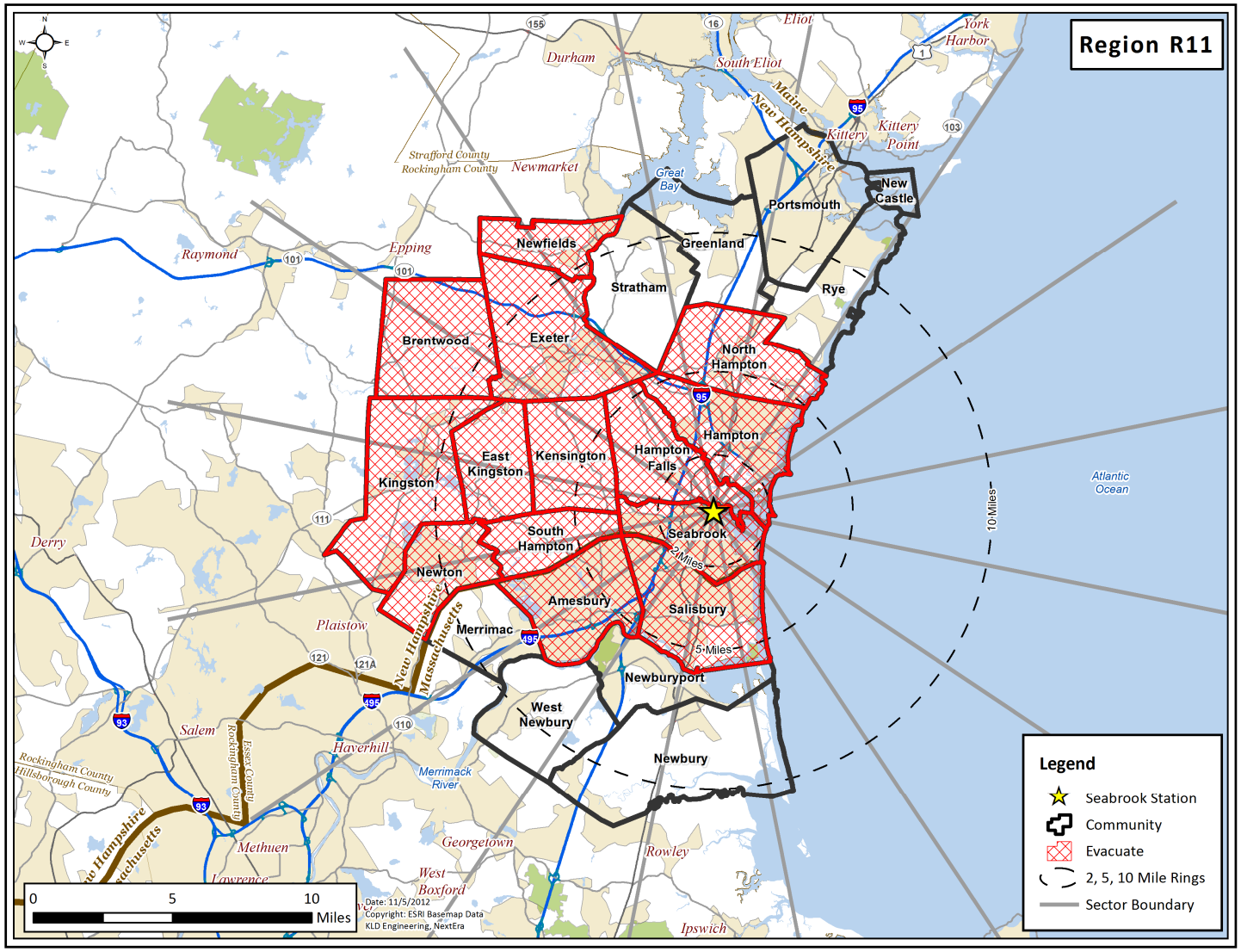


Figure H-11. Region R11

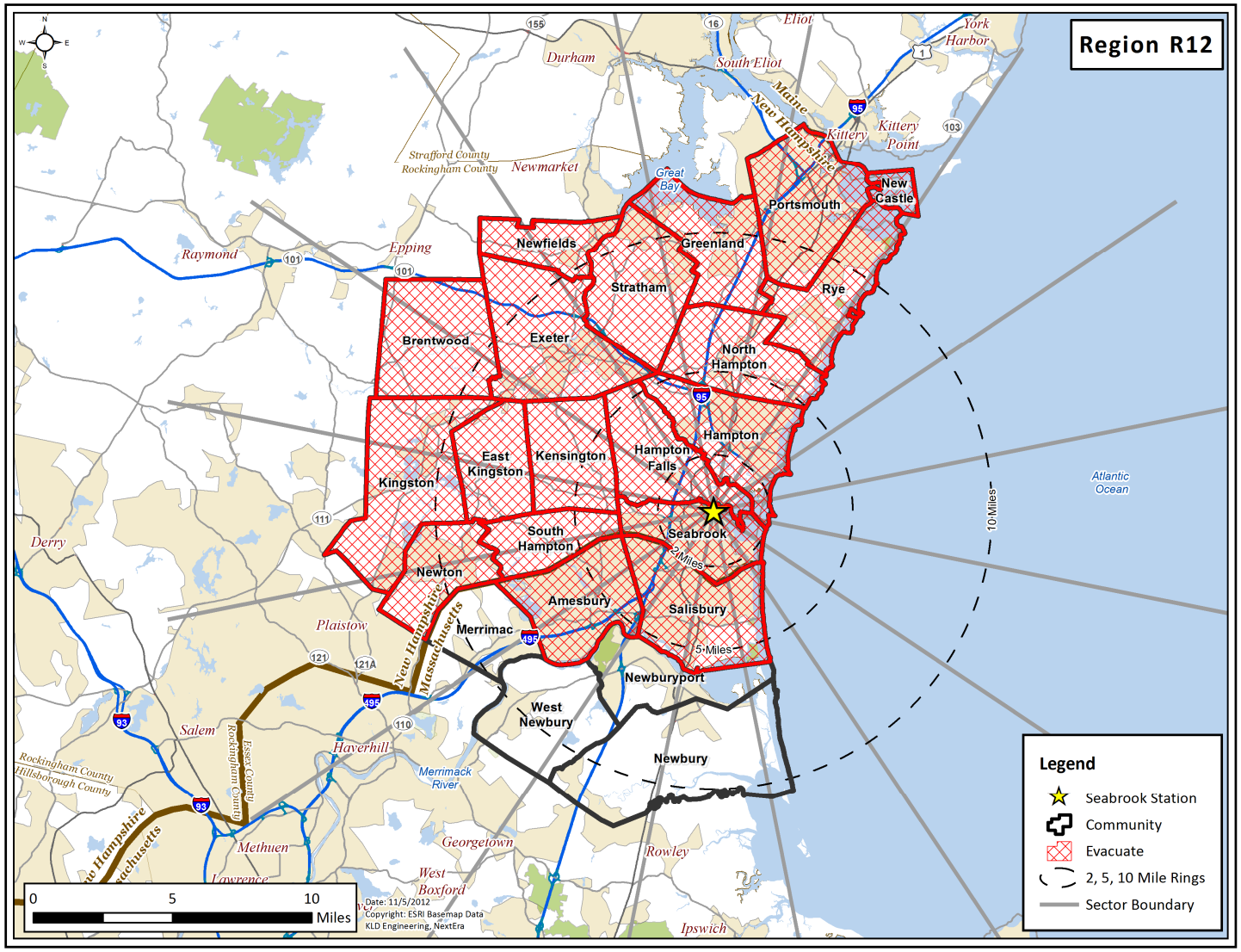


Figure H-12. Region R12

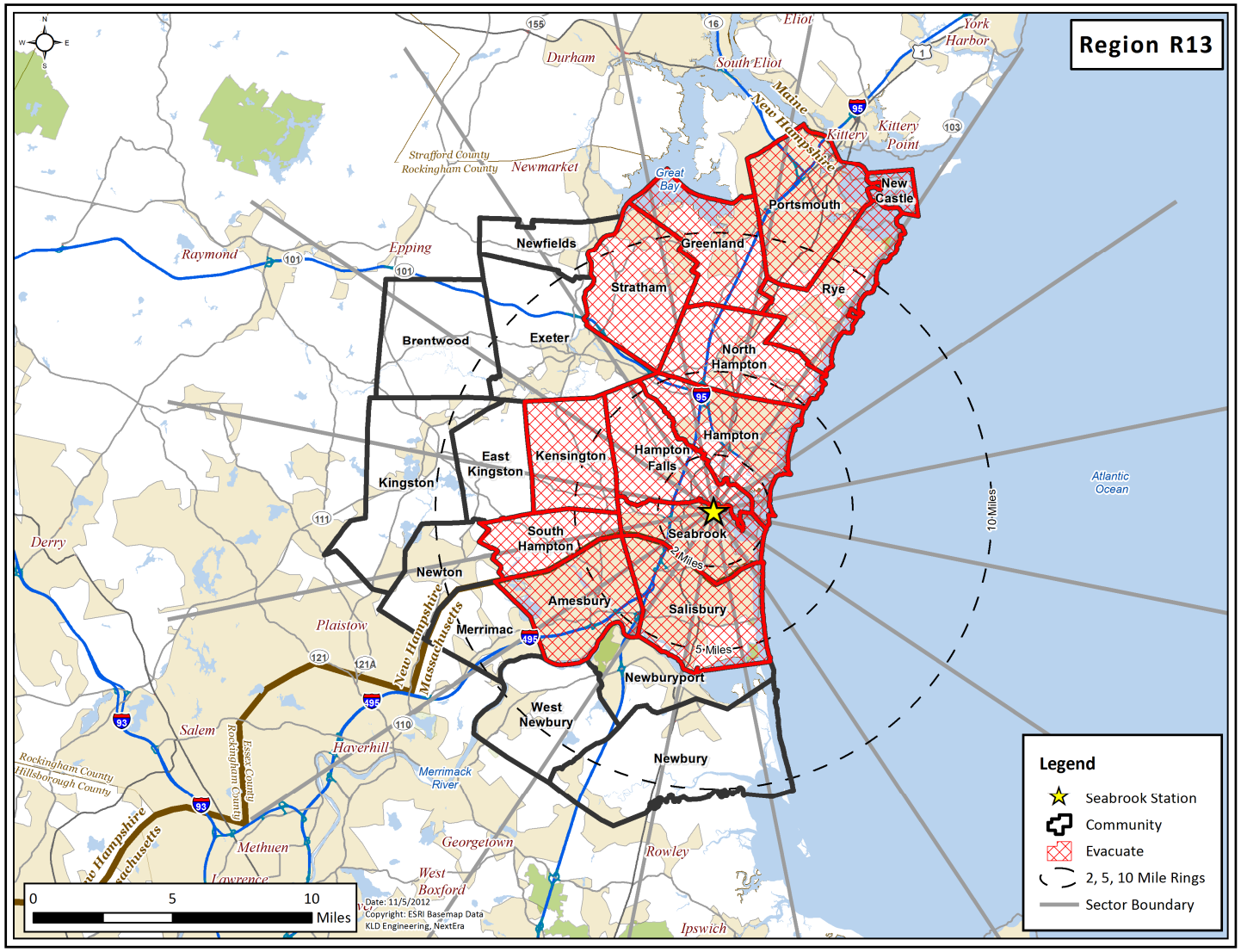


Figure H-13. Region R13

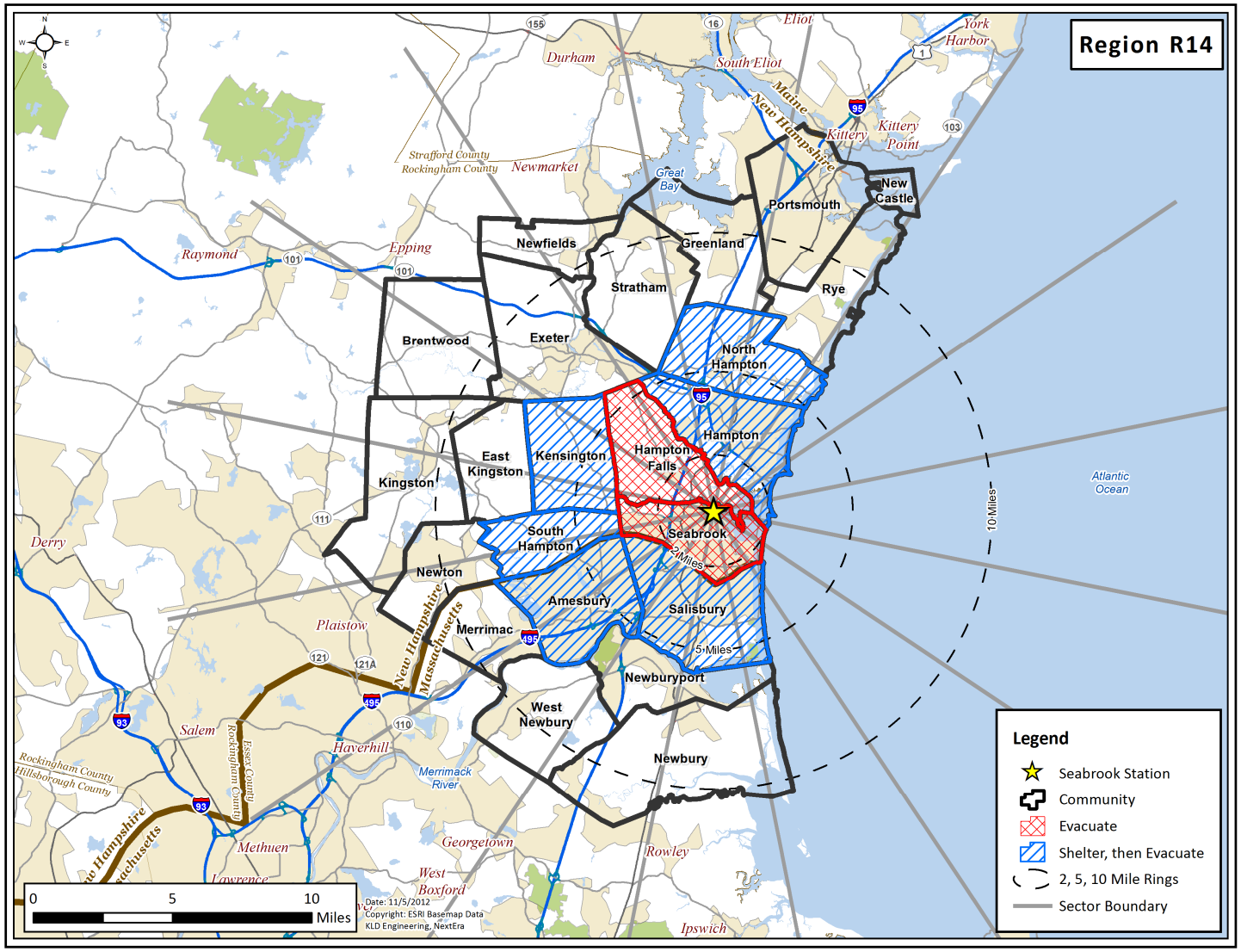


Figure H-14. Region R14

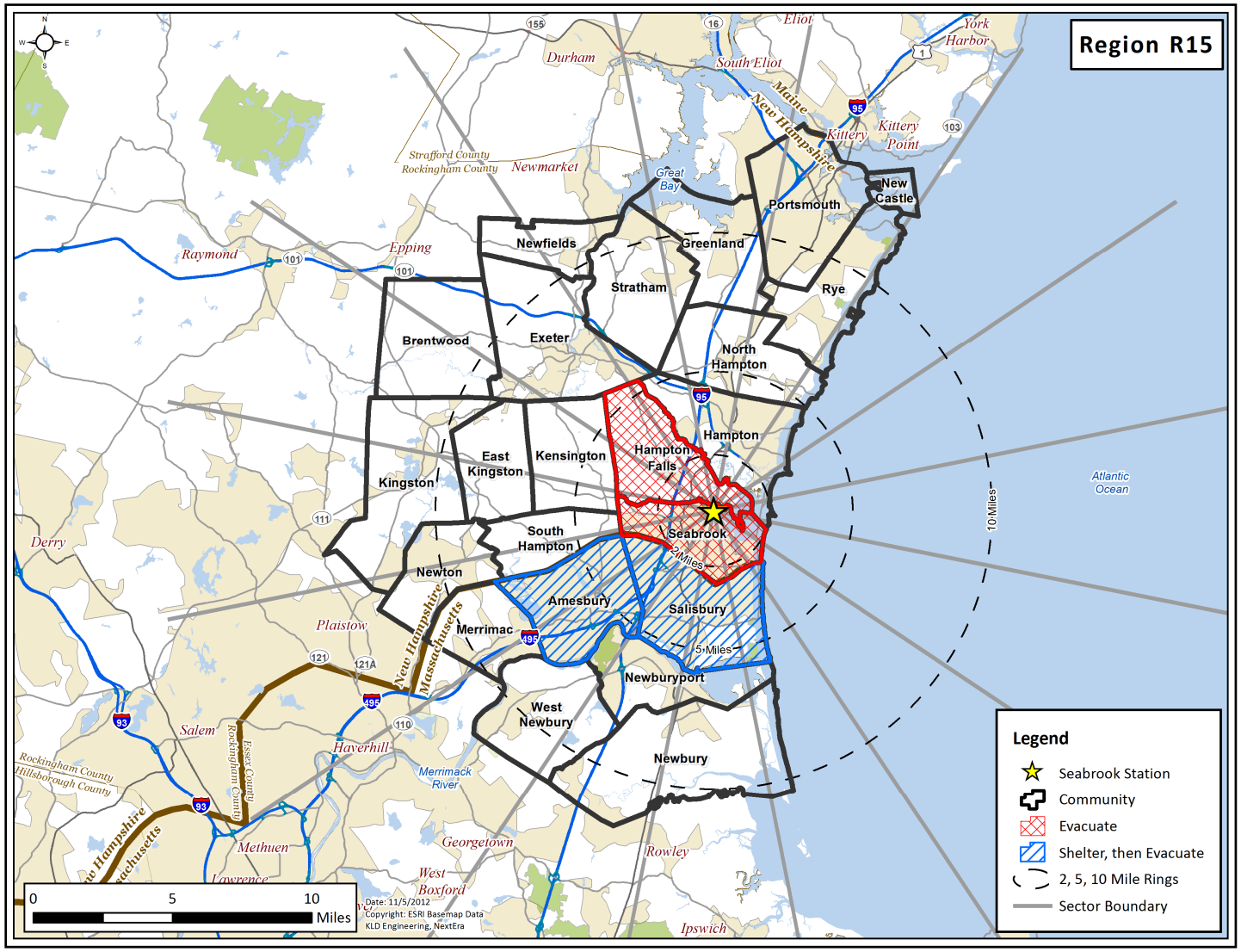


Figure H-15. Region R15

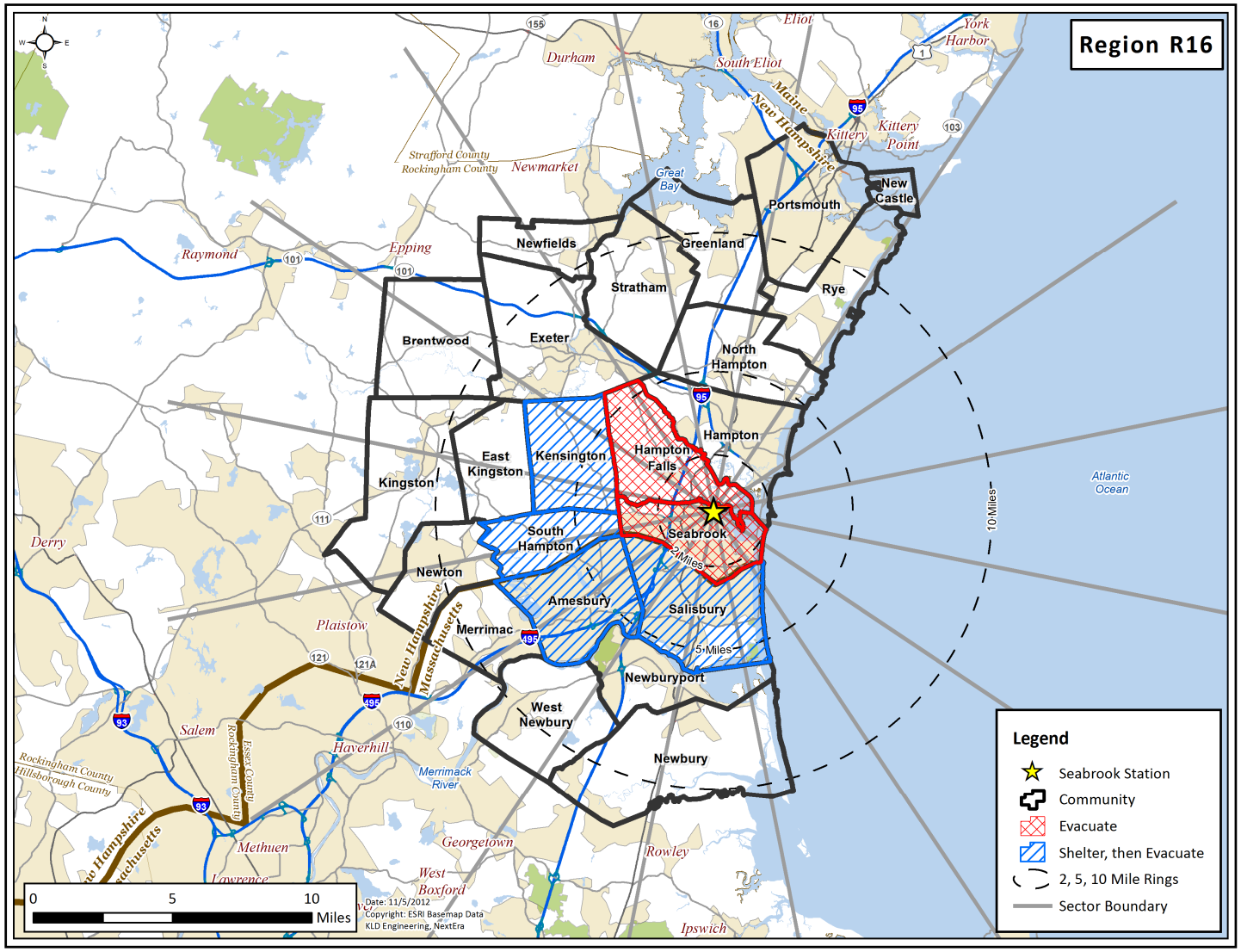


Figure H-16. Region R16

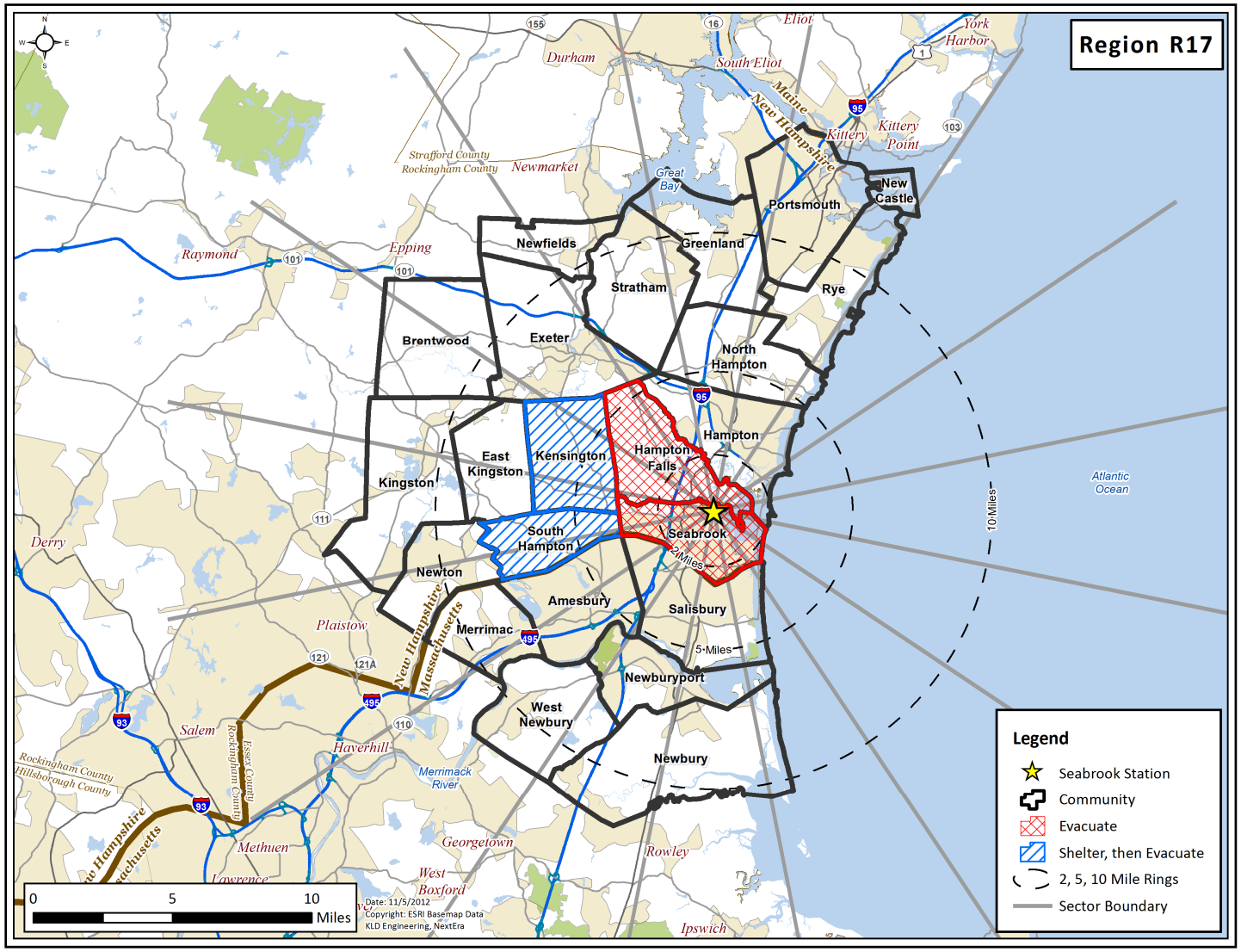


Figure H-17. Region R17

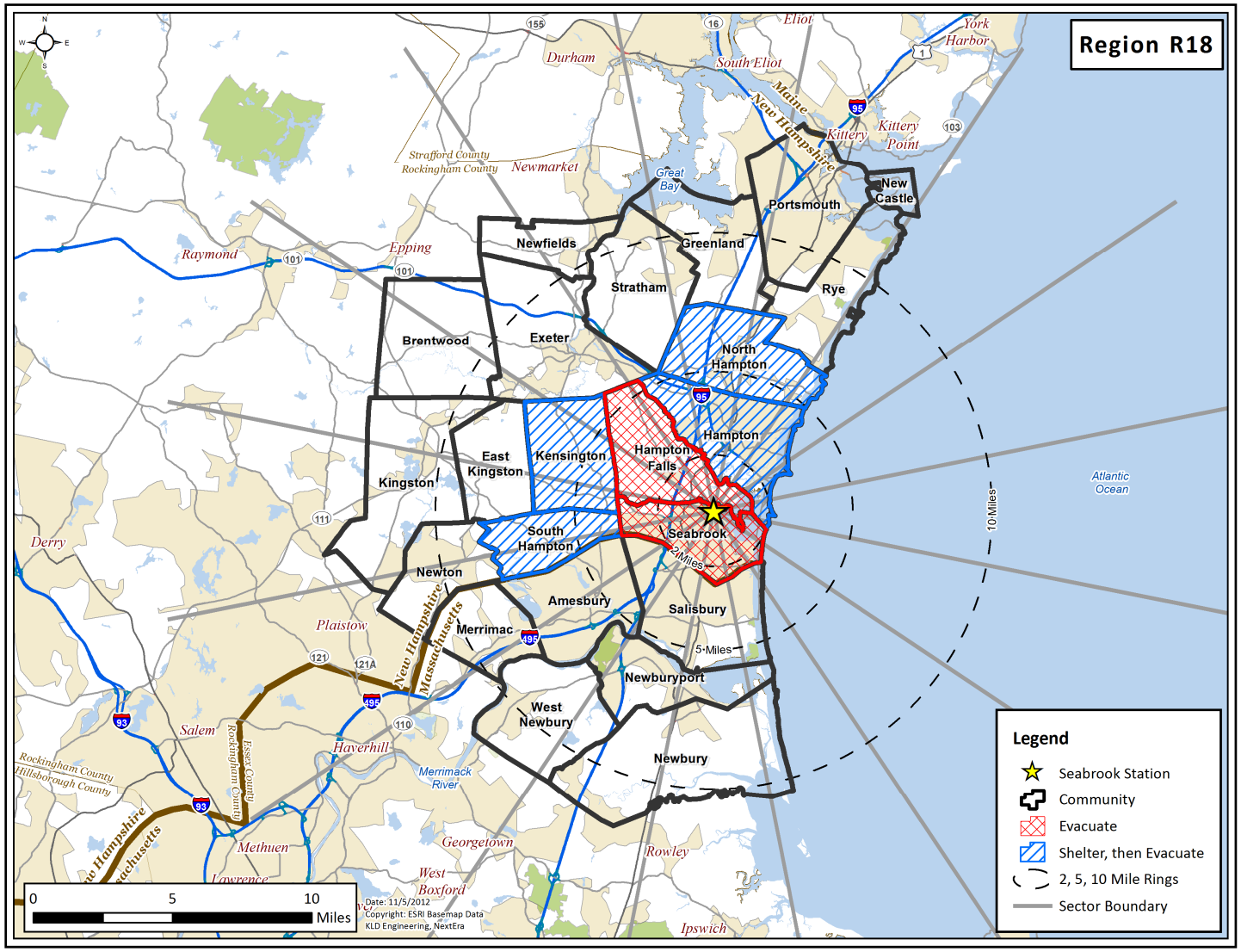


Figure H-18. Region R18

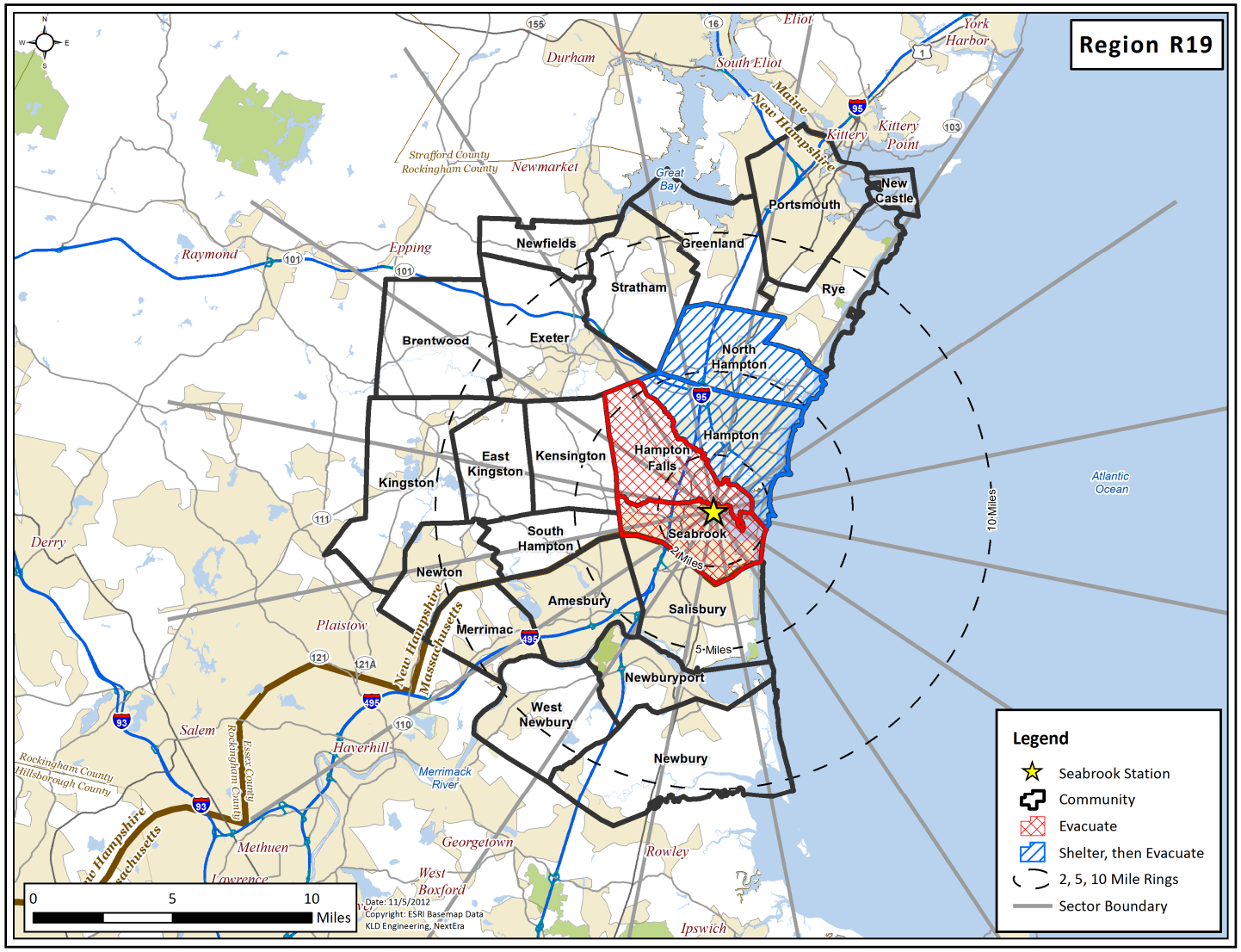


Figure H-19. Region R19

APPENDIX J

Representative Inputs to and Outputs from the DYNEV II System

J. REPRESENTATIVE INPUTS TO AND OUTPUTS FROM THE DYNEV II SYSTEM

This appendix presents data input to and output from the DYNEV II System. Table J-1 provides the volume and queues for the ten highest volume signalized intersections in the study area. Refer to Table K-2 and the figures in Appendix K for a map showing the geographic location of each intersection.

Table J-2 provides source (vehicle loading) and destination information for several roadway segments (links) in the analysis network. Refer to Table K-1 and the figures in Appendix K for a map showing the geographic location of each link.

Table J-3 provides network–wide statistics (average travel time, average speed and number of vehicles) for an evacuation of the entire EPZ (Region R03) for each scenario. As expected, adverse weather scenarios exhibit slower average speeds and longer average travel times. The roadway impact scenario (14) has a slower average speed and longer average travel time than the comparable scenario (1).

Table J-4 provides statistics (average speed and travel time) for the major evacuation routes – I-95, I-495, US-1, US-4 and SH 101 – for an evacuation of the entire EPZ (Region R03) under Scenario 1 conditions. As discussed in Section 7.3 and shown in Figures 7-3 through 7-8, SH 101 westbound and I-95 northbound are congested for most of the evacuation. As such, the average speeds are comparably slower (and travel times longer) than other evacuation routes. Note that all routes are operating near free speed at 6 hours after the ATE, when the congestion in the EPZ has cleared.

Table J-5 provides the number of vehicles discharged and the cumulative percent of total vehicles discharged for each link exiting the analysis network for an evacuation of the entire EPZ (Region R03) under Scenario 1 conditions. Refer to Table K-1 and the figures in Appendix K for a map showing the geographic location of each link. Note that I-95 southbound (Exit Link 5), I-95 northbound (Exit Link 111), I-495 southbound (Exit Link 191) and SH 101 westbound (Exit Link 2256) service 65% of the evacuating vehicles.

Figure J-1 through Figure J-14 plot the trip generation time versus the ETE for each of the 14 Scenarios considered. The distance between the trip generation and ETE curves is the travel time. Plots of trip generation versus ETE are indicative of the level of traffic congestion during evacuation. For low population density sites, the curves are close together, indicating short travel times and minimal traffic congestion. For higher population density sites, the curves are farther apart indicating longer travel times and the presence of traffic congestion. As seen in Figure J-1 through Figure J-14, the curves are significantly spatially separated as a result of the traffic congestion in the EPZ, which was discussed in detail in Section 7.3. For example, the average travel time during peak congestion for Scenario 1 is about 2 hours.

Table J-1. Characteristics of the Ten Highest Volume Signalized Intersections

Node	Location	Intersection Control	Approach (Up Node)	Total Volume (Veh)	Max. Turn Queue (Veh)
303	Gosling Rd & Spaulding Turnpike SB Ramps	TCP - Actuated	304	5,797	1,056
			302	8,038	713
			58	0	0
			TOTAL	13,835	-
136	Market St & I-95 NB Ramps	TCP - Actuated	1560	10,008	97
			133	3,754	149
			43	0	0
			TOTAL	13,762	-
1559	US-1 Bypass & Albacore Park	Actuated	116	0	0
			117	10,727	412
			1560	2,701	84
			TOTAL	13,428	-
302	Gosling Rd & Spaulding Turnpike NB Ramps	TCP - Actuated	1589	4,222	204
			303	2,803	1,103
			1586	6,280	1,111
			TOTAL	13,305	-
1560	Market St & Albacore Park	Actuated	1563	8,538	68
			1559	4,134	130
			TOTAL	12,672	-
135	Market St & Woodbury Ave	Actuated	134	4,720	196
			132	0	0
			203	5,998	54
			TOTAL	10,718	-
256	US-1 Bypass & Coakly Rd	Actuated	121	0	0
			257	7,441	691
			1578	159	8
			208	2,830	33
			TOTAL	10,430	-
1561	US-1 Bypass & Gorges Rd	Actuated	114	0	0
			115	9,315	0
			1562	0	0
			TOTAL	9,315	-
1058	SH 113/SH 110 & SH 125	Actuated	1057	2,712	21
			1088	5,897	363
			TOTAL	8,609	-
1563	Market St & Unnamed Rd (Noble's Island)	Actuated	137	8,526	221
			1564	0	0
			TOTAL	8,526	-

Table J-2. Sample Simulation Model Input

Link Number	Vehicles Entering Network on this Link	Directional Preference	Destination Nodes	Destination Capacity
187	39	NE	8050	6,750
			8001	3,800
			8140	1,700
486	265	N	8050	6,750
			8301	1,700
			8051	4,500
1162	23	W	8061	4,500
			8675	1,700
774	162	NW	8061	4,500
1036	5	W	8090	6,750
1298	68	SW	8090	6,750
			8064	2,374
			8637	1,572
1472	58	W	8821	1,569
			8108	1,700
			8090	6,750
1679	64	SW	8090	6,750
			8064	2,374
			8637	1,572
1125	50	NW	8548	1,672
			8551	725
			8550	724
2018	9	SW	8460	1,700
			8003	9,000

Table J-3. Selected Model Outputs for the Evacuation of the Entire EPZ (Region R03)

Scenario	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Network-Wide Average Travel Time (Min/Veh-Mi)	5.0	5.6	4.1	4.5	3.8	4.8	5.3	5.4	3.8	4.4	4.3	3.6	3.9	5.4
Network-Wide Average Speed (mph)	12.1	10.8	14.8	13.3	15.9	12.6	11.3	11.1	15.8	13.6	13.9	16.9	15.3	11.0
Total Vehicles Exiting Network	167,103	168,130	139,892	140,734	122,205	163,933	164,748	166,243	131,328	132,147	133,172	117,247	153,750	166,808

Table J-4. Average Speed (mph) and Travel Time (min) for Major Evacuation Routes (Region R03, Scenario 1)

Elapsed Time (hours)													
		1		2		3		4		5		6	
Route	Length (miles)	Speed (mph)	Travel Time (min)	Speed	Travel Time	Speed	Travel Time	Speed	Travel Time	Speed	Travel Time	Speed	Travel Time
US-4 EB	5.8	16.6	20.8	21.6	16.0	18.0	19.2	25.8	13.4	17.2	20.0	59.6	5.8
US-4 WB	5.8	7.6	46.0	19.9	17.4	7.8	44.6	8.4	41.2	15.6	22.3	59.2	5.9
SH 101 EB	14.2	26.1	32.6	70.0	12.2	70.0	12.2	70.0	12.2	70.0	12.2	70.0	12.2
SH 101 WB	14.2	21.1	40.3	9.4	90.8	11.4	74.7	13.6	62.5	24.4	34.9	66.5	12.8
I-495 NB	14.6	70.0	12.5	70.0	12.5	70.0	12.5	70.0	12.5	70.0	12.5	70.0	12.5
I-495 SB	14.6	42.5	20.6	23.4	37.5	22.7	38.5	32.0	27.3	69.9	12.5	70.0	12.5
I-95 NB	34.5	32.1	64.3	16.8	123.0	15.4	134.0	34.0	60.7	70.5	29.3	70.6	29.3
I-95 SB	34.5	13.2	156.1	20.4	101.4	48.7	42.4	69.4	29.8	68.8	30.1	62.5	33.1
US-1 SB	34.4	16.0	129.2	25.3	81.6	38.5	53.6	42.9	48.1	43.1	47.9	45.1	45.8
US-1 NB	34.4	7.2	284.6	7.8	264.4	13.7	150.3	17.9	115.3	32.5	63.5	44.7	46.2

Table J-5. Simulation Model Outputs at Network Exit Links for Region R03, Scenario 1

Network Exit Link	Elapsed Time (hours)					
	1	2	3	4	5	6
	Cumulative Vehicles Discharged by the Indicated Time					
	Cumulative Percent of Vehicles Discharged by the Indicated Time					
2	518	856	1,054	1,340	1,661	1,964
	2%	1%	1%	1%	1%	1%
3	265	494	853	1,116	1,297	1,470
	1%	1%	1%	1%	1%	1%
5	5,335	13,175	17,701	20,869	22,341	22,364
	16%	18%	16%	15%	14%	13%
111	6,609	12,728	18,769	24,760	30,314	34,246
	20%	17%	17%	18%	19%	20%
113	1,939	4,059	4,946	5,661	6,037	6,174
	6%	5%	5%	4%	4%	4%
191	5,218	11,819	18,275	24,669	29,815	30,083
	16%	16%	17%	18%	18%	18%
301	77	208	257	319	399	410
	0%	0%	0%	0%	0%	0%
352	23	153	213	232	239	239
	0%	0%	0%	0%	0%	0%
358	14	96	132	143	145	145
	0%	0%	0%	0%	0%	0%
360	11	86	119	130	134	134
	0%	0%	0%	0%	0%	0%
526	1,130	2,545	3,363	3,877	4,283	4,451
	3%	3%	3%	3%	3%	3%
798	781	1,857	3,033	4,428	5,207	5,214
	2%	2%	3%	3%	3%	3%
843	234	535	739	953	1,245	1,292
	1%	1%	1%	1%	1%	1%
845	164	486	814	1,149	1,305	1,367
	1%	1%	1%	1%	1%	1%
846	257	701	1,047	1,396	1,659	1,752
	1%	1%	1%	1%	1%	1%
847	367	825	1,109	1,309	1,499	1,553
	1%	1%	1%	1%	1%	1%
849	171	530	886	1,228	1,380	1,453
	1%	1%	1%	1%	1%	1%
862	438	1,288	1,885	2,317	2,776	2,912
	1%	2%	2%	2%	2%	2%
878	2	16	22	25	25	25
	0%	0%	0%	0%	0%	0%

Network Exit Link	Elapsed Time (hours)					
	1	2	3	4	5	6
	Cumulative Vehicles Discharged by the Indicated Time					
	Cumulative Percent of Vehicles Discharged by the Indicated Time					
881	304	836	1,266	1,625	1,846	1,954
	1%	1%	1%	1%	1%	1%
1178	992	2,536	4,153	4,522	4,688	4,691
	3%	3%	4%	3%	3%	3%
1525	432	1,071	1,669	2,275	2,649	2,652
	1%	1%	2%	2%	2%	2%
1527	554	1,215	1,827	2,378	2,914	2,918
	2%	2%	2%	2%	2%	2%
1542	586	1,730	2,701	3,253	3,467	3,471
	2%	2%	2%	2%	2%	2%
1577	518	1,488	1,869	1,945	1,978	1,978
	2%	2%	2%	1%	1%	1%
1781	442	1,391	1,931	2,284	2,513	2,514
	1%	2%	2%	2%	2%	1%
1818	174	720	926	989	1,006	1,006
	1%	1%	1%	1%	1%	1%
1999	569	1,687	2,475	2,769	2,832	2,833
	2%	2%	2%	2%	2%	2%
2229	63	257	382	419	444	445
	0%	0%	0%	0%	0%	0%
2256	3,861	8,327	12,787	17,258	21,731	23,857
	12%	11%	12%	12%	13%	14%
2262	574	1,489	2,442	3,416	4,271	4,444
	2%	2%	2%	2%	3%	3%

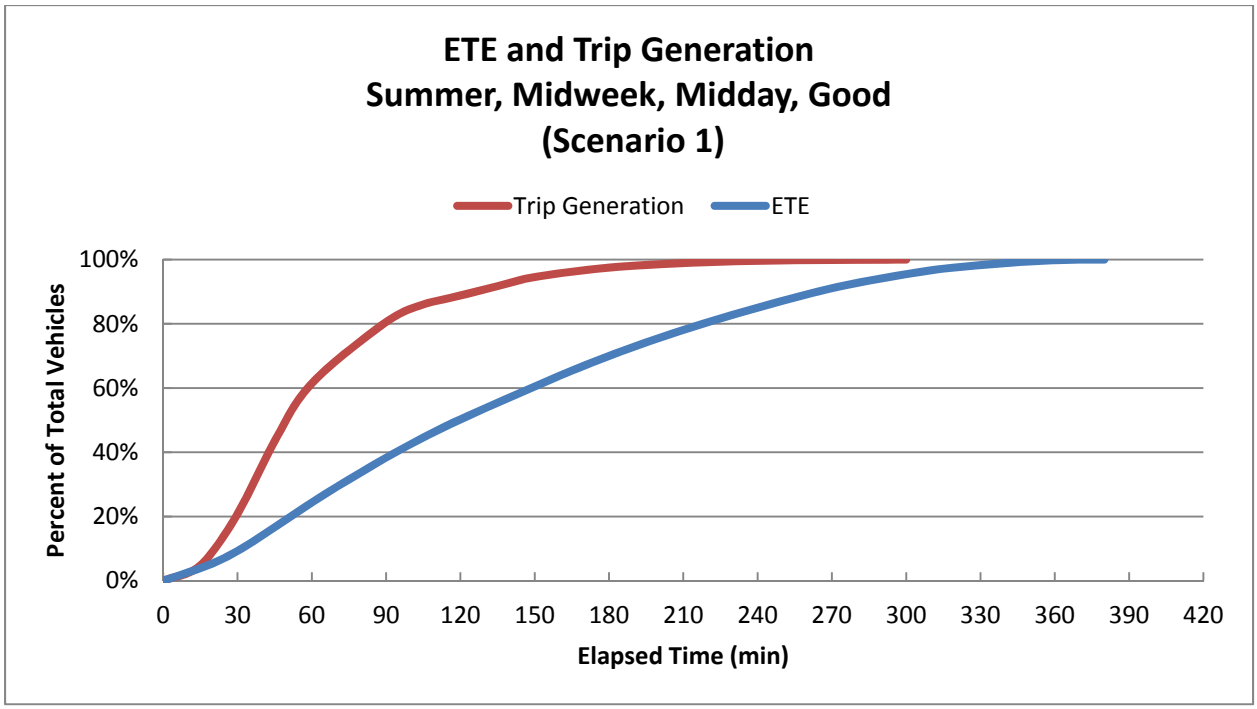


Figure J-1. ETE and Trip Generation: Summer, Midweek, Midday, Good Weather (Scenario 1)

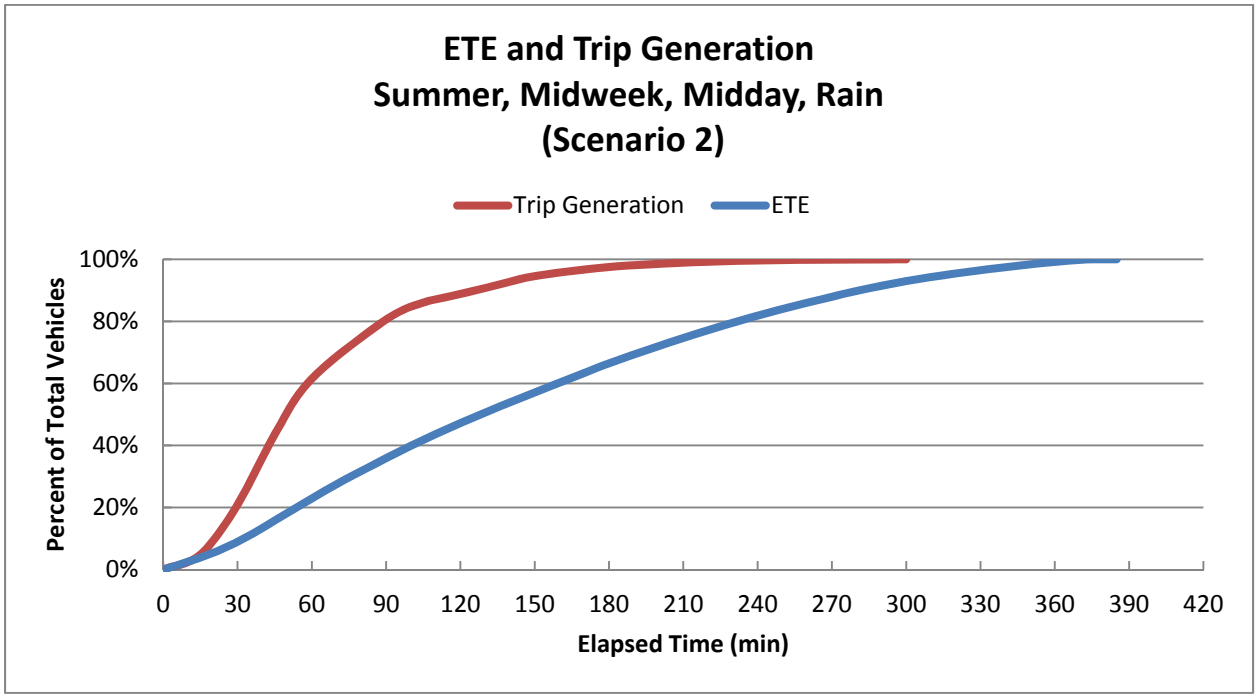


Figure J-2. ETE and Trip Generation: Summer, Midweek, Midday, Rain (Scenario 2)

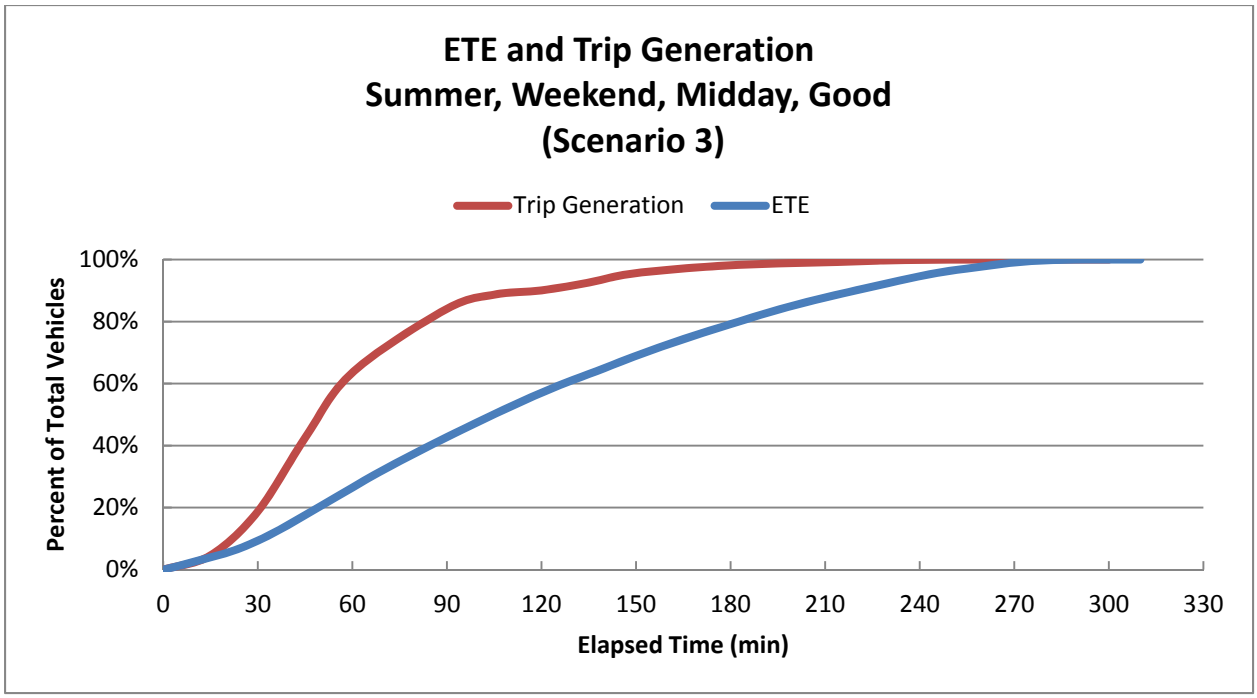


Figure J-3. ETE and Trip Generation: Summer, Weekend, Midday, Good Weather (Scenario 3)

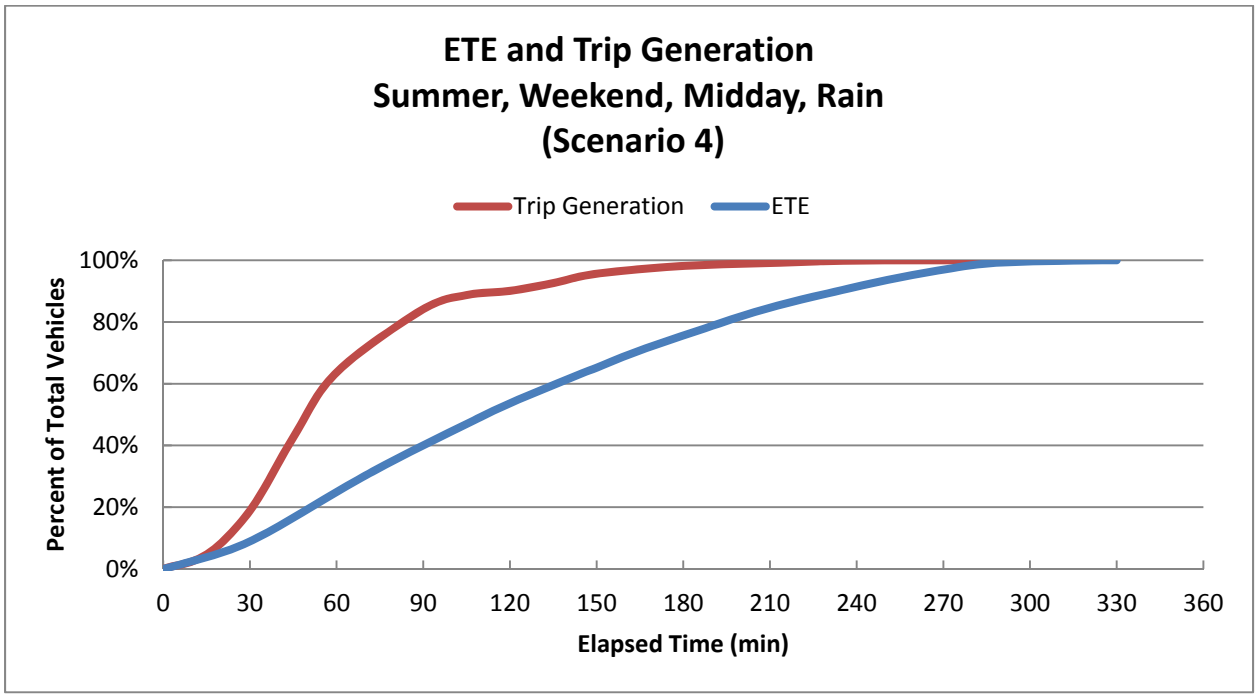


Figure J-4. ETE and Trip Generation: Summer, Weekend, Midday, Rain (Scenario 4)

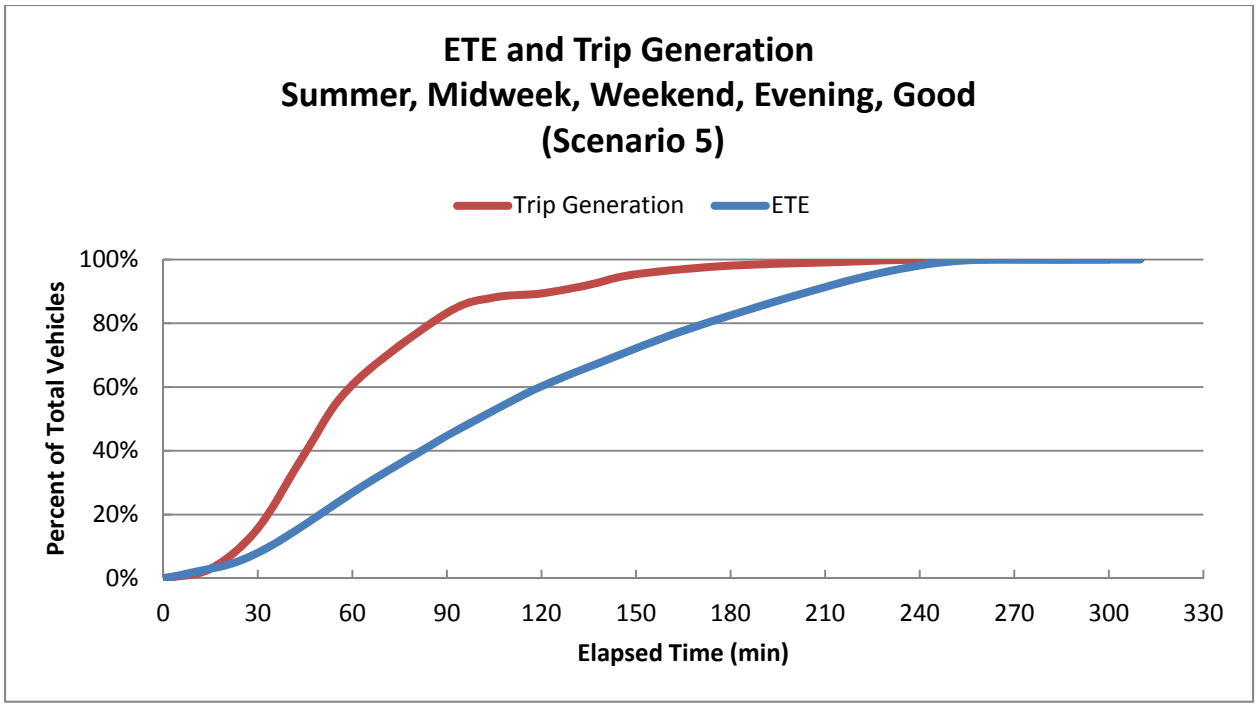


Figure J-5. ETE and Trip Generation: Summer, Midweek, Weekend, Evening, Good Weather (Scenario 5)

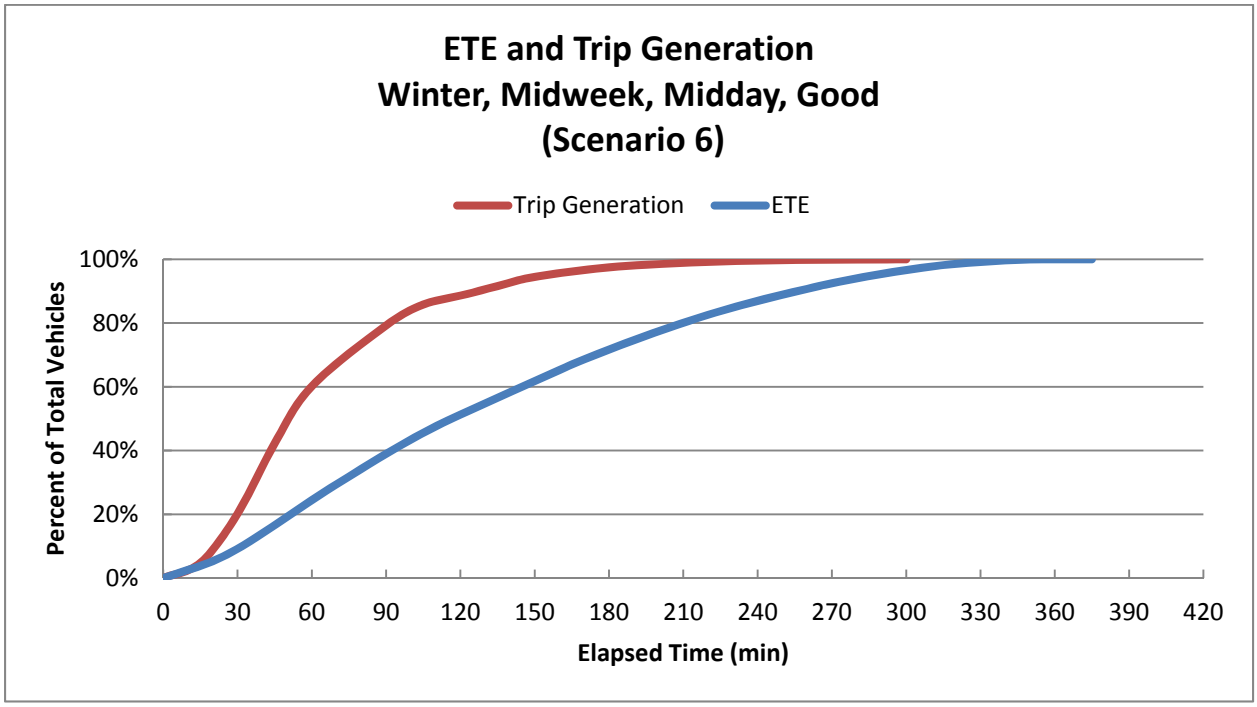


Figure J-6. ETE and Trip Generation: Winter, Midweek, Midday, Good Weather (Scenario 6)

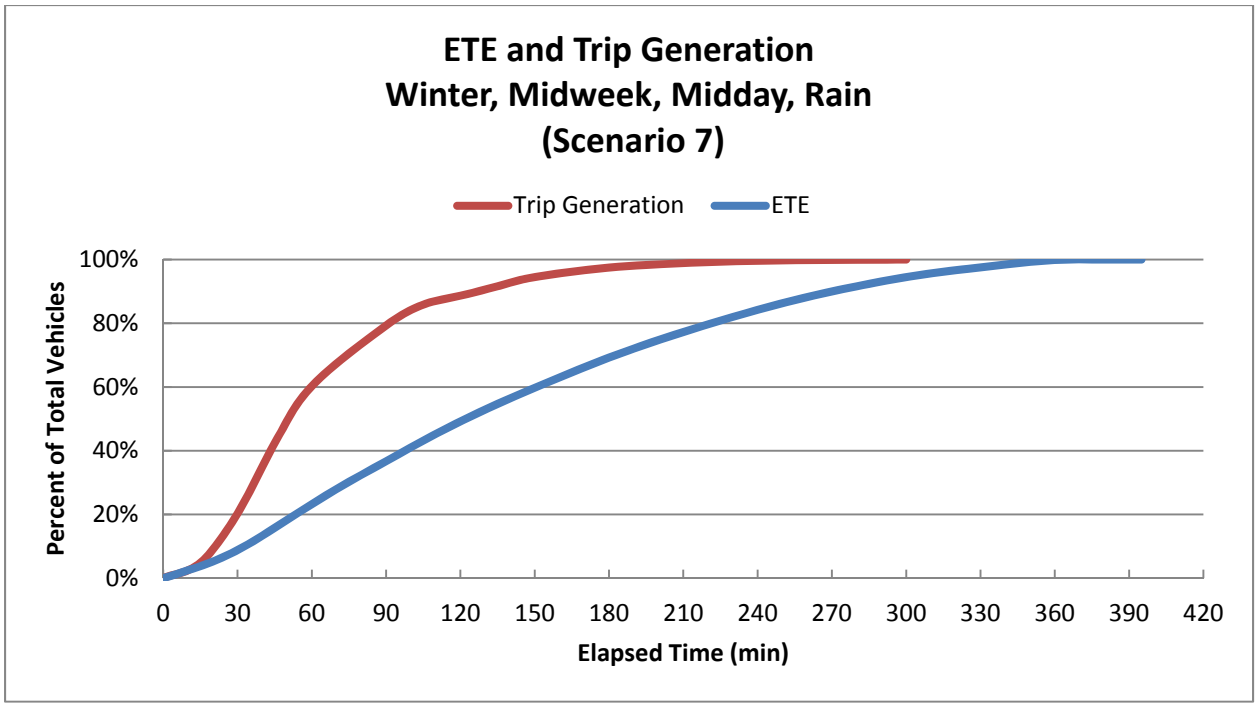


Figure J-7. ETE and Trip Generation: Winter, Midweek, Midday, Rain (Scenario 7)

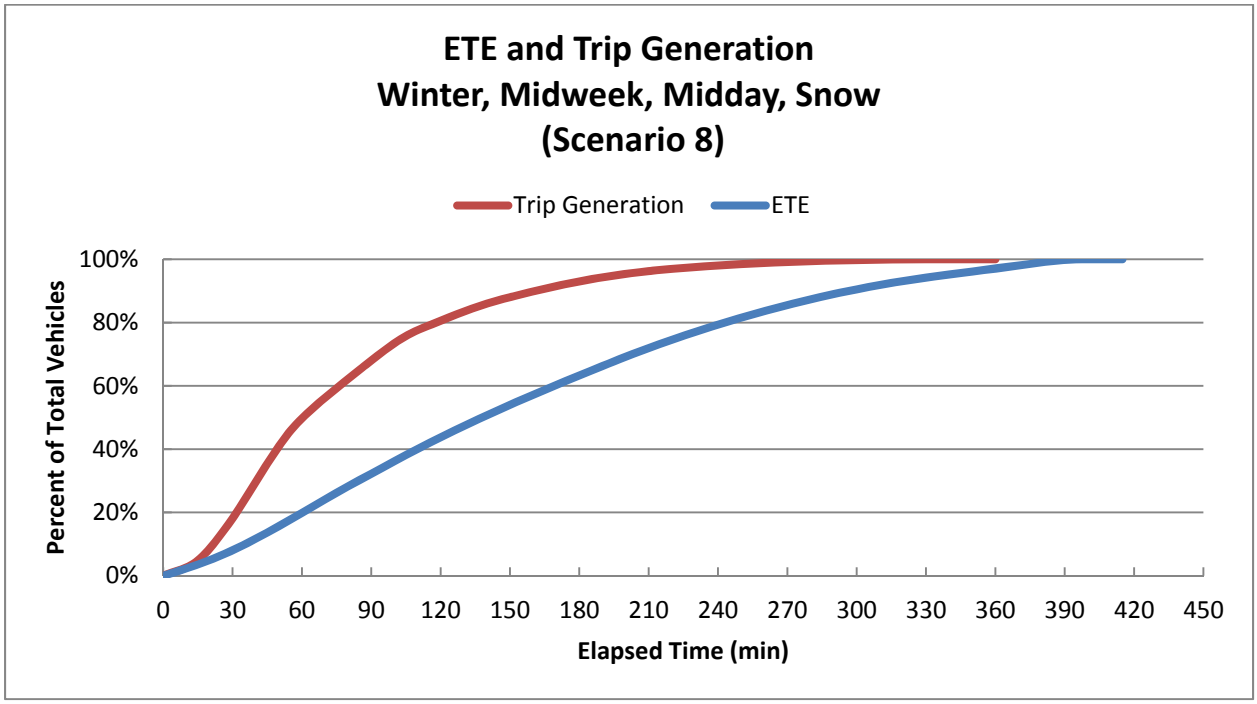


Figure J-8. ETE and Trip Generation: Winter, Midweek, Midday, Snow (Scenario 8)

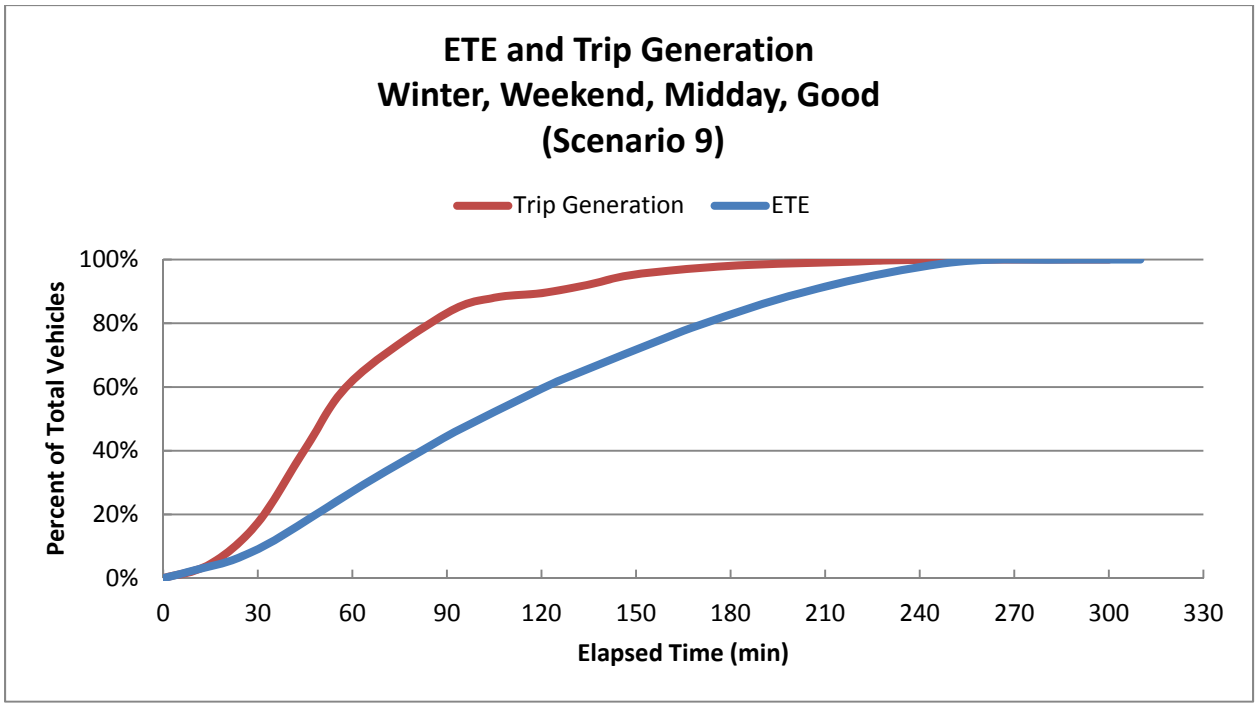


Figure J-9. ETE and Trip Generation: Winter, Weekend, Midday, Good Weather (Scenario 9)

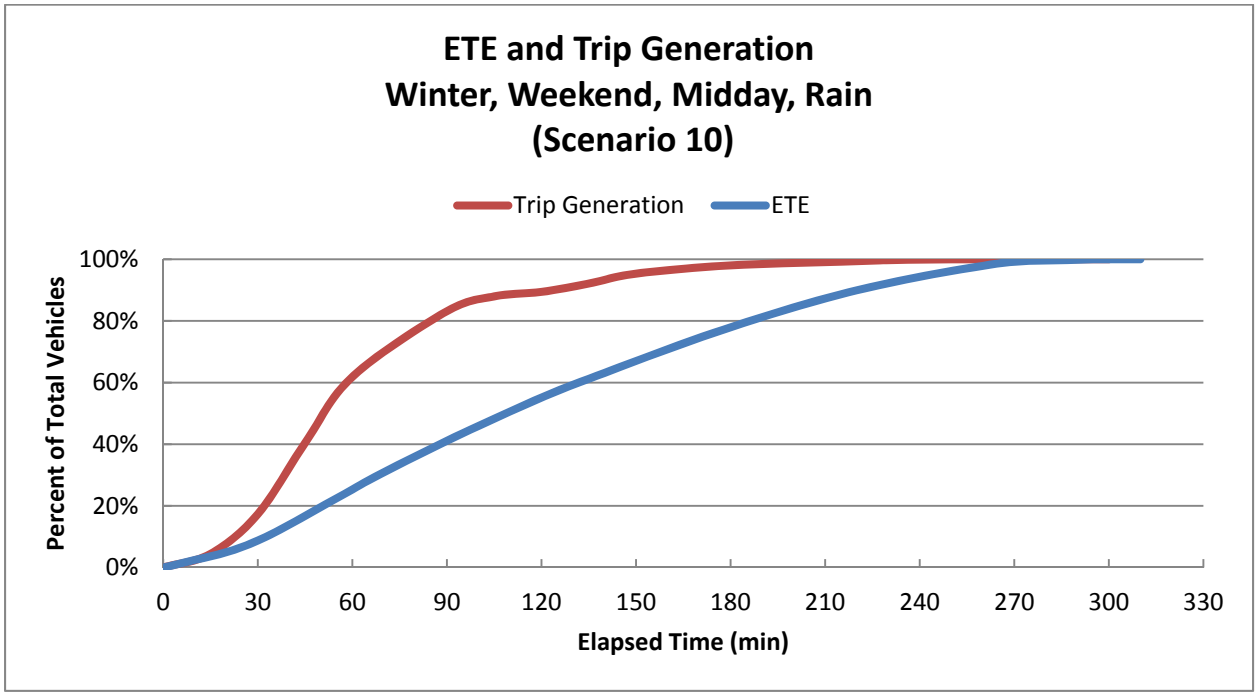


Figure J-10. ETE and Trip Generation: Winter, Weekend, Midday, Rain (Scenario 10)

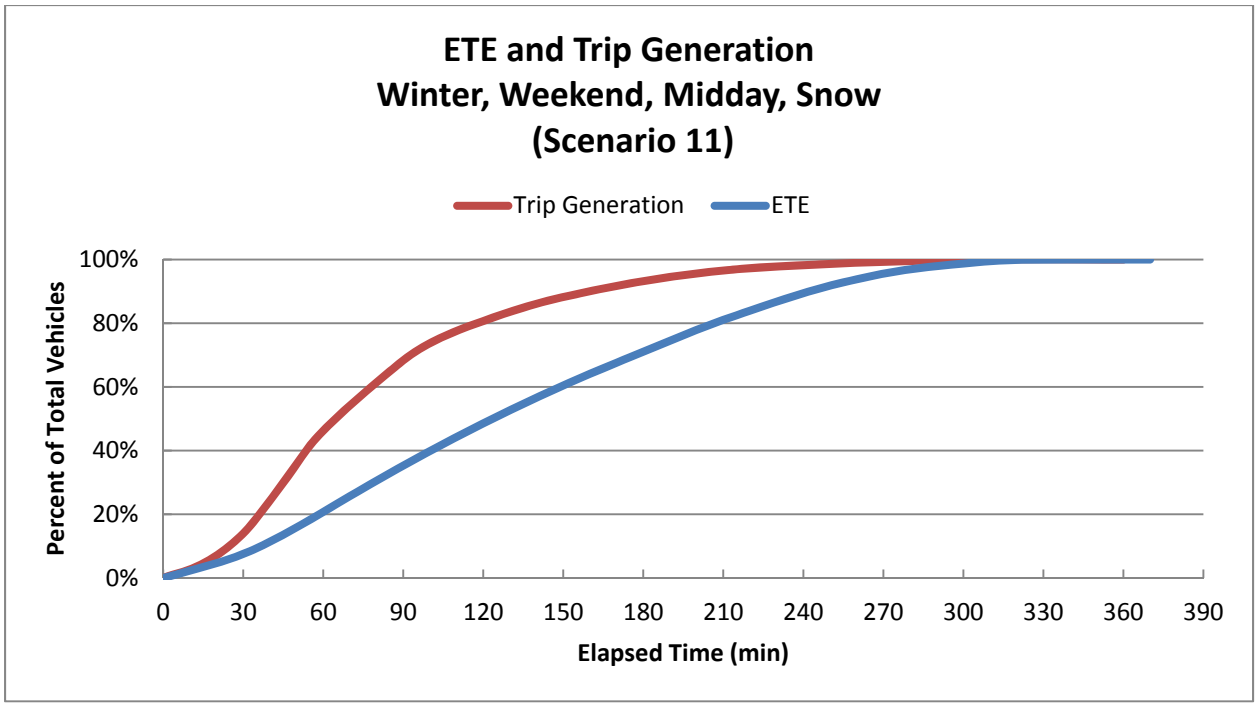


Figure J-11. ETE and Trip Generation: Winter, Weekend, Midday, Snow (Scenario 11)

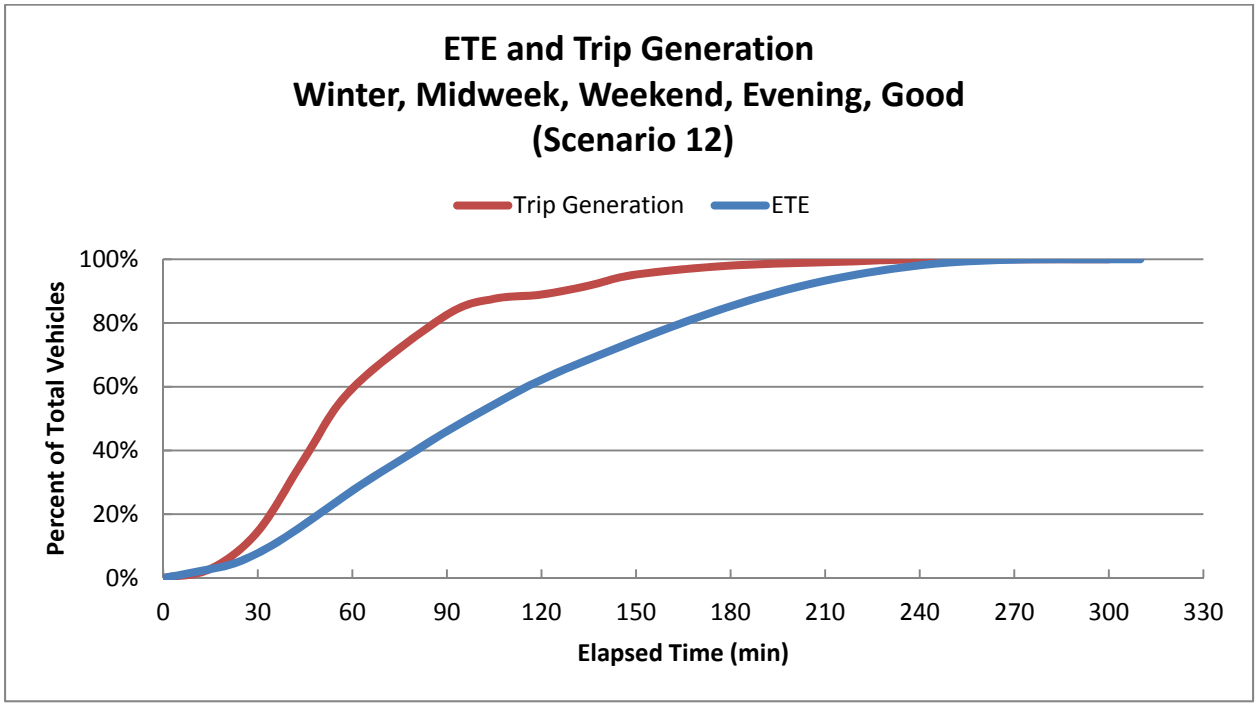


Figure J-12. ETE and Trip Generation: Winter, Midweek, Weekend, Evening, Good Weather (Scenario 12)

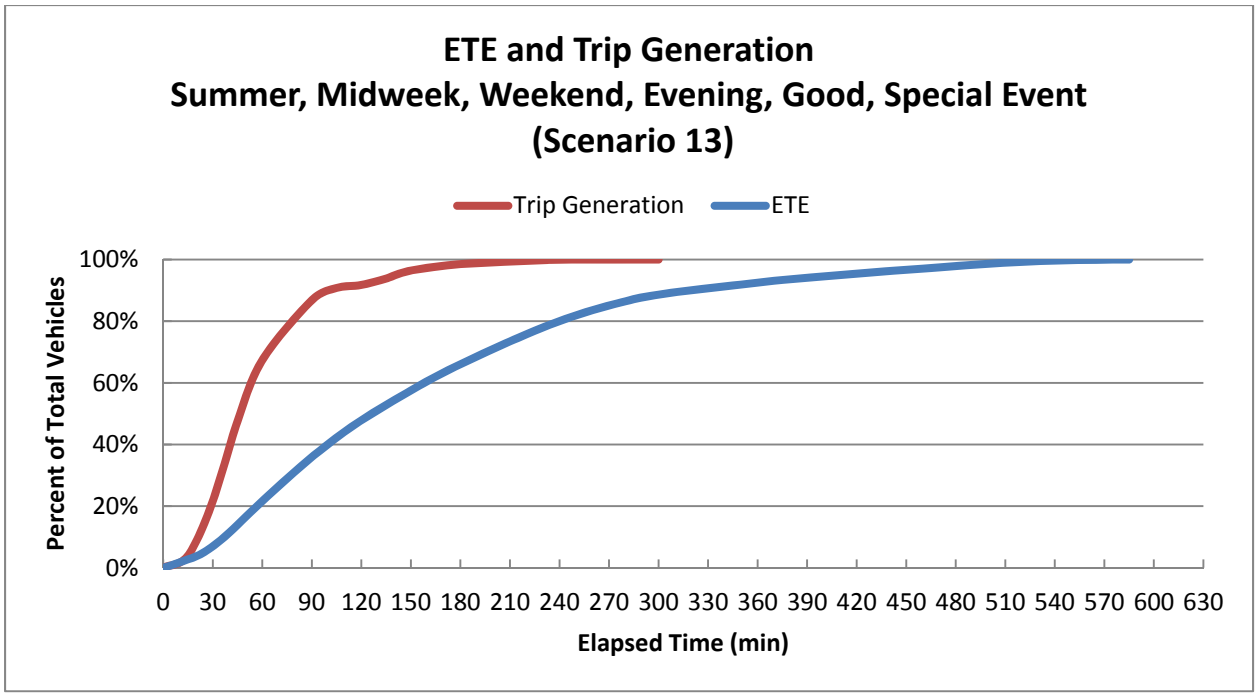


Figure J-13. ETE and Trip Generation: Summer, Weekend, Evening, Good Weather, Special Event (Scenario 13)

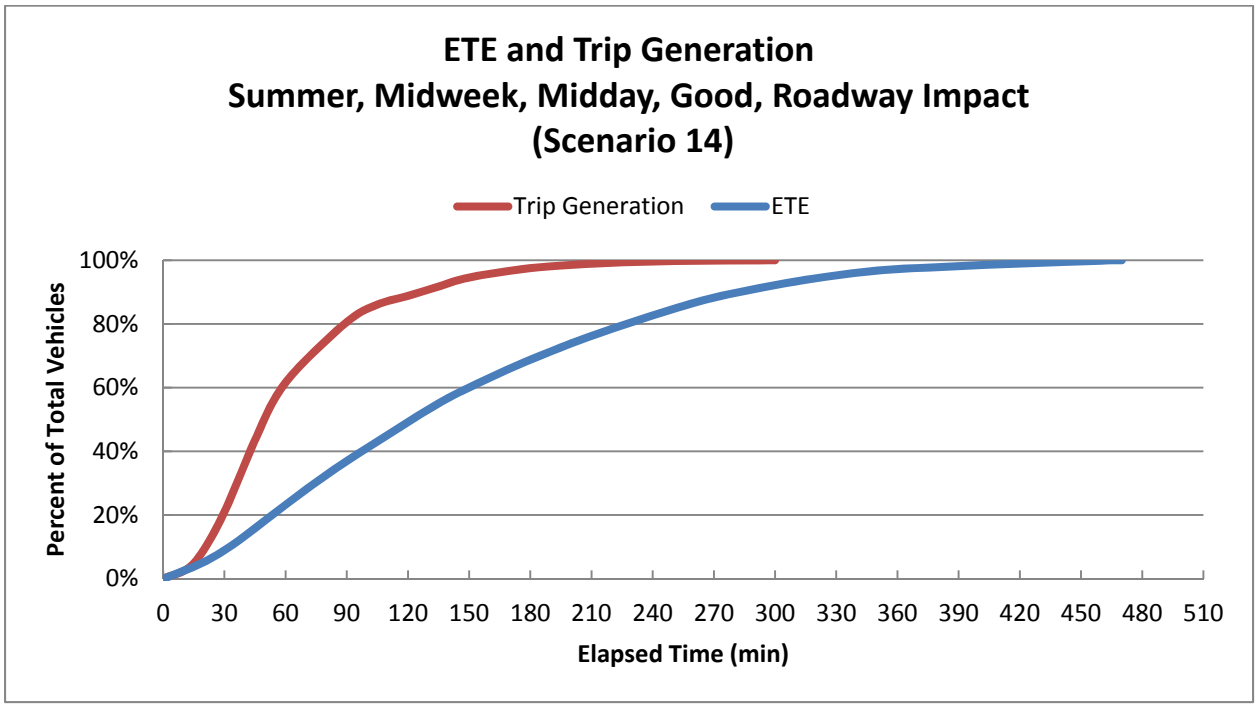


Figure J-14. ETE and Trip Generation: Summer, Midweek, Midday, Good Weather, Roadway Impact (Scenario 14)

APPENDIX K

Evacuation Roadway Network

K. EVACUATION ROADWAY NETWORK

As discussed in Section 1.3, a link-node analysis network was constructed to model the roadway network within the study area. Figure K-1 provides an overview of the link-node analysis network. The figure has been divided up into 58 more detailed figures (Figure K-2 through Figure K-59) which show each of the links and nodes in the network.

The analysis network was calibrated using the observations made during the field surveys conducted in February and April 2012. Table K-1 lists the characteristics of each roadway section modeled in the ETE analysis. Each link is identified by its road name and the upstream and downstream node numbers. The geographic location of each link can be observed by referencing the grid map number provided in Table K-1. The roadway type identified in Table K-1 is generally based on the following criteria:

- Freeway: limited access highway, 2 or more lanes in each direction, high free flow speeds
- Freeway ramp: ramp on to or off of a limited access highway
- Major arterial: 3 or more lanes in each direction
- Minor arterial: 2 or more lanes in each direction
- Collector: single lane in each direction
- Local roadways: single lane in each direction, local roads with low free flow speeds

The term, "No. of Lanes" in Table K-1 identifies the number of lanes that extend throughout the length of the link. Many links have additional lanes on the immediate approach to an intersection (turn pockets); these have been recorded and entered into the input stream for the DYNEV II System.

As discussed in Section 1.3, lane width and shoulder width were not physically measured during the road survey. Rather, estimates of these measures were based on visual observations and recorded images.

Table K-2 identifies each node in the network that is controlled and the type of control (stop sign, yield sign, pre-timed signal, actuated signal, traffic control point) at that node. Uncontrolled nodes are not included in Table K-2. The location of each node can be observed by referencing the grid map number provided.

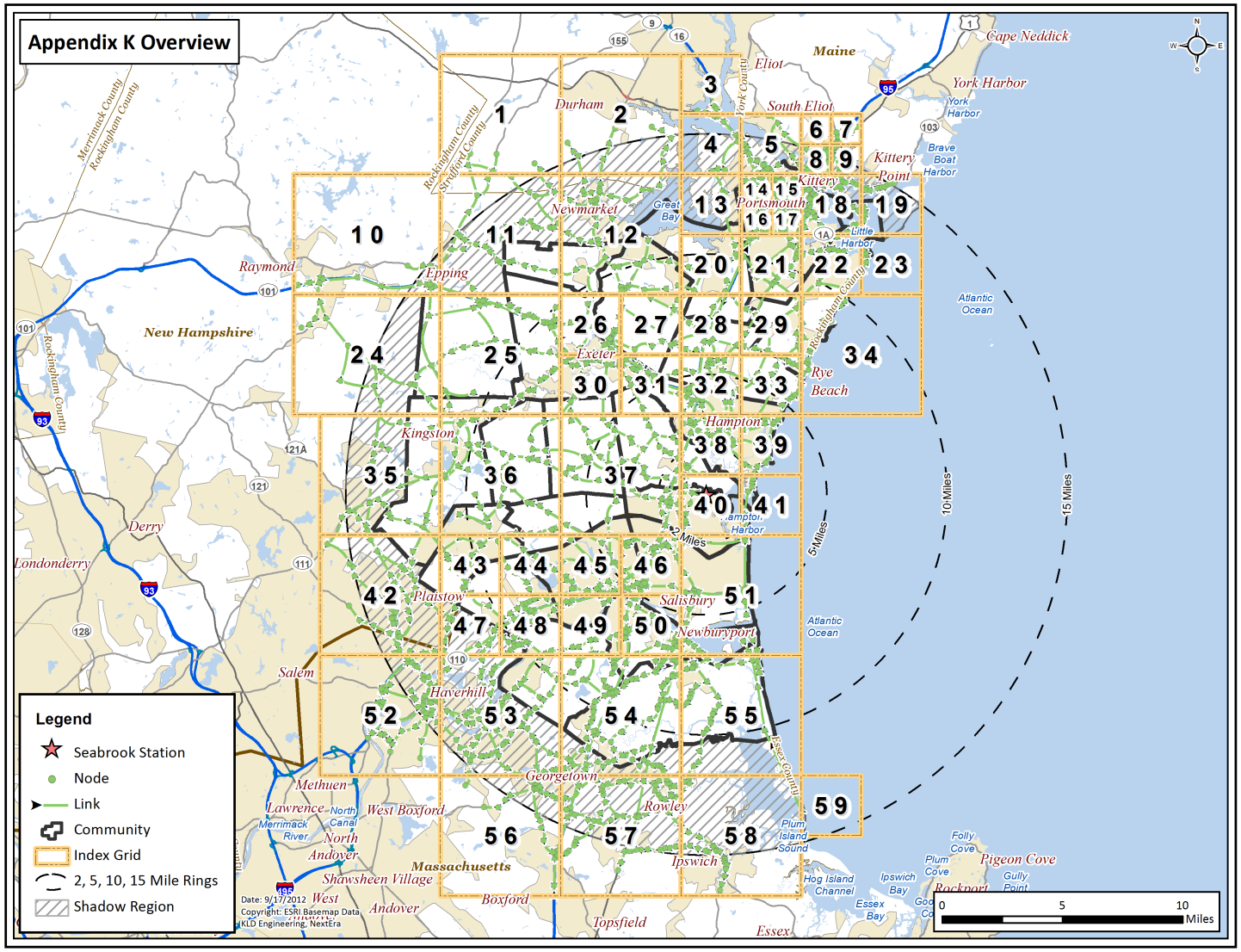


Figure K-1. Seabrook Station Link-Node Analysis Network

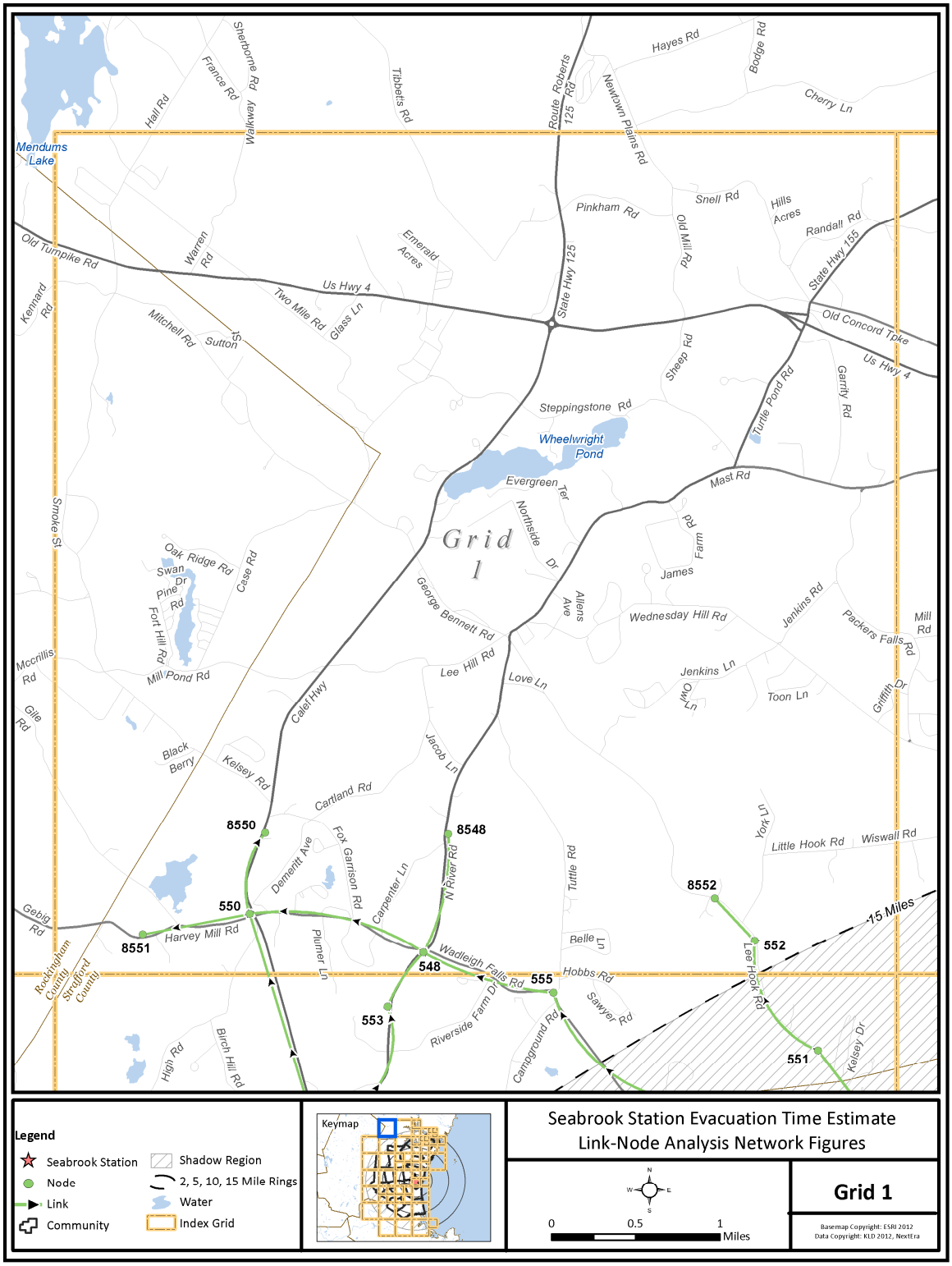


Figure K-2. Link-Node Analysis Network – Grid 1

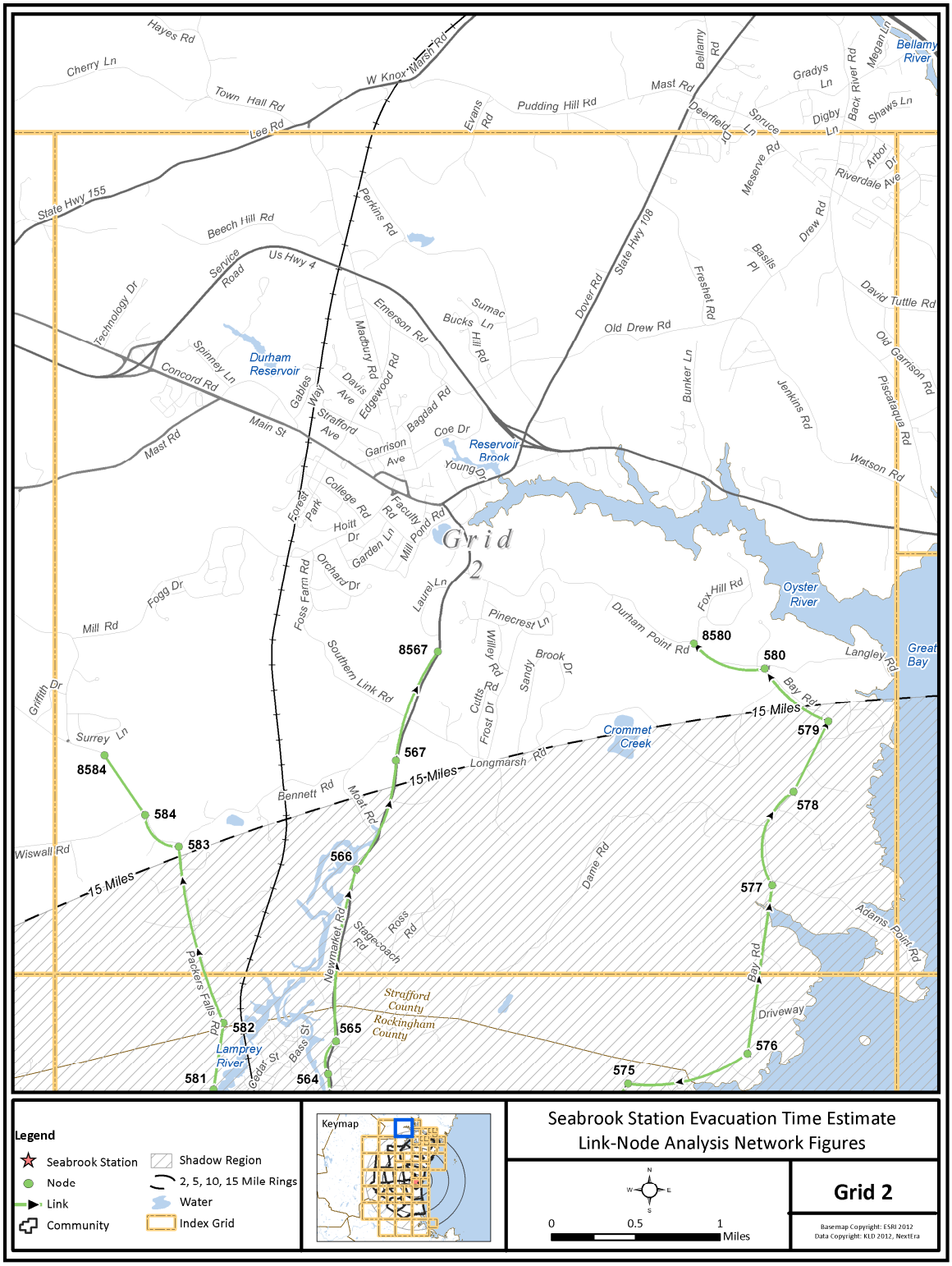


Figure K-3. Link-Node Analysis Network – Grid 2

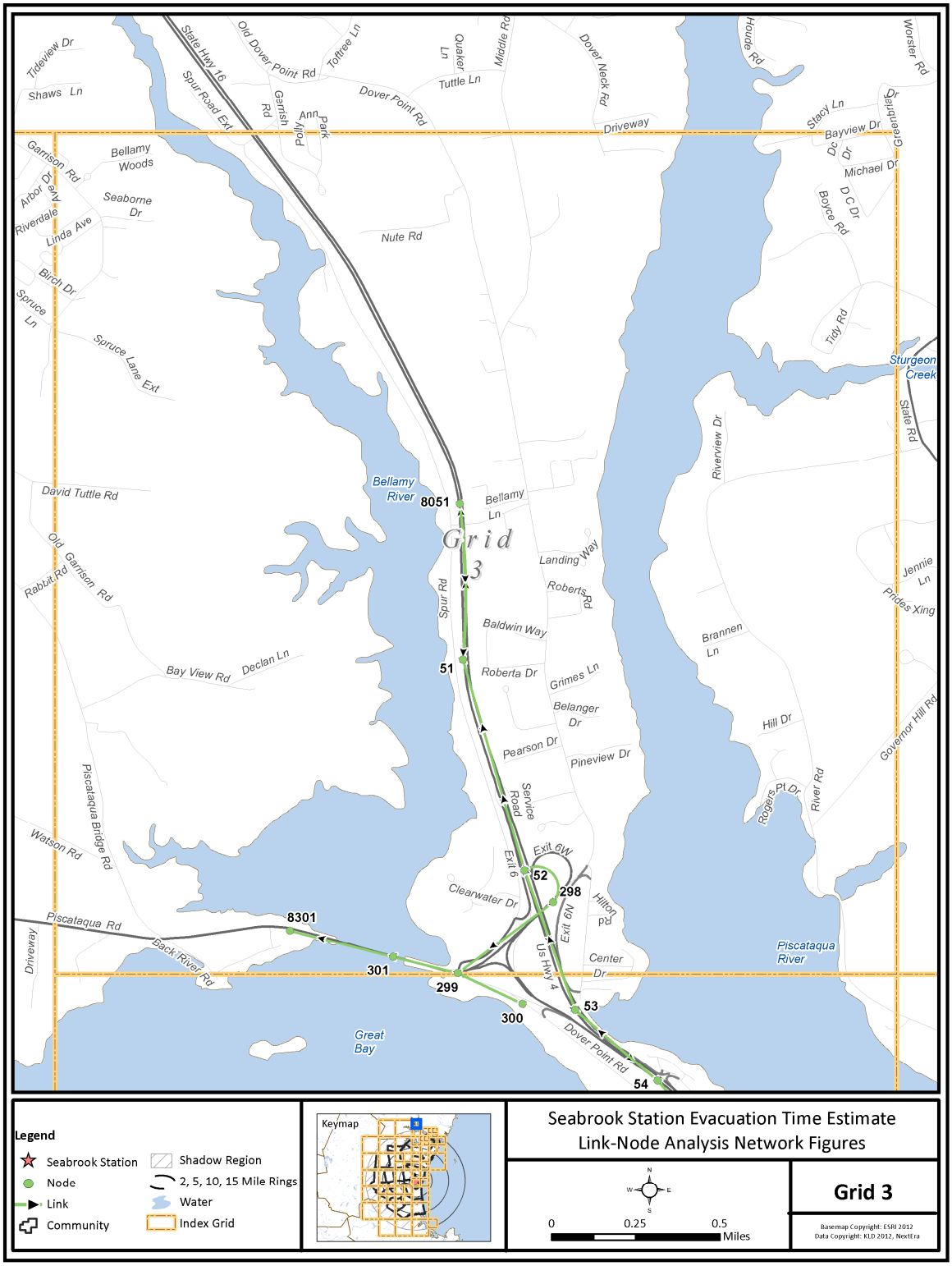


Figure K-4. Link-Node Analysis Network – Grid 3

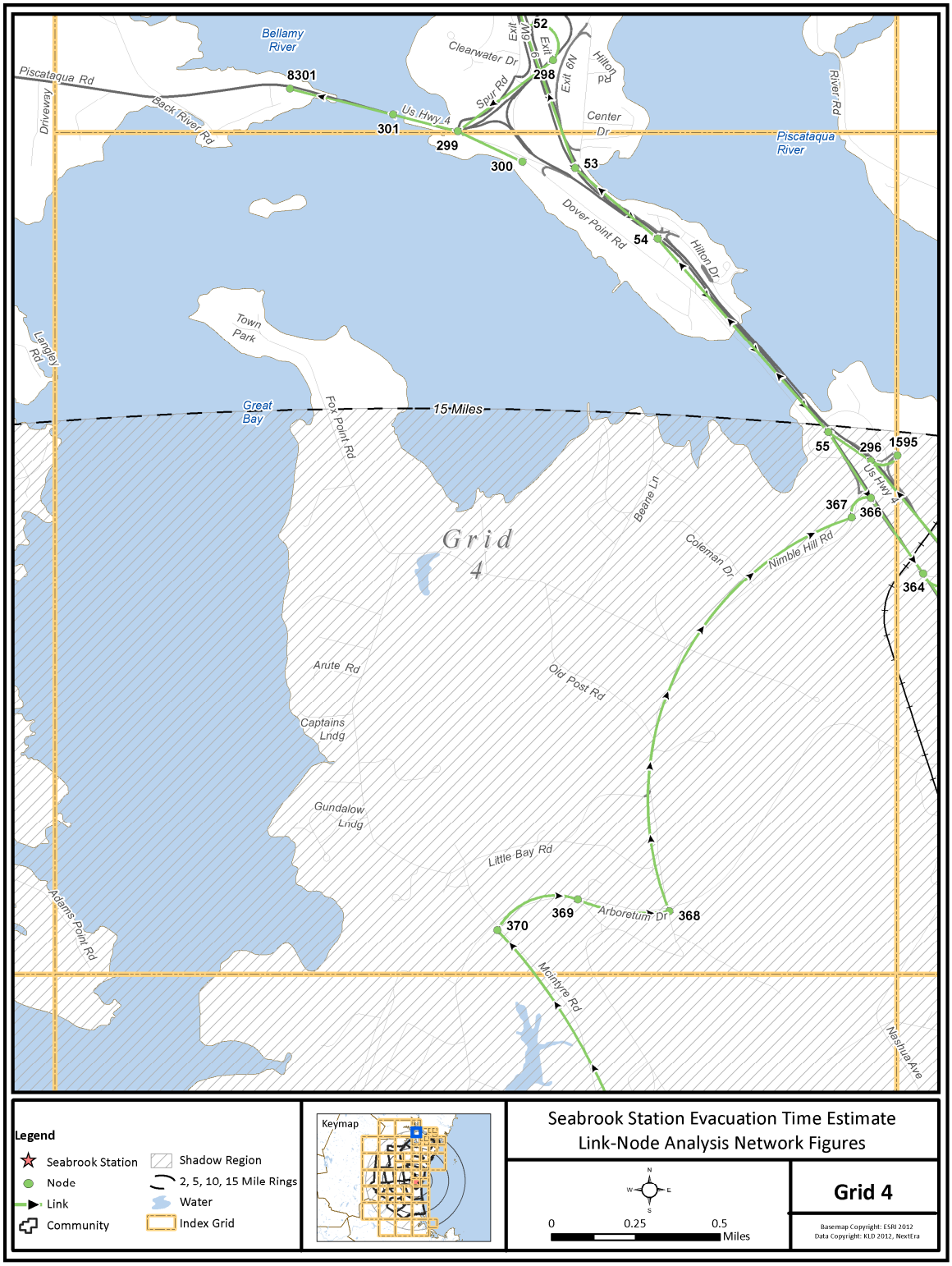


Figure K-5. Link-Node Analysis Network – Grid 4

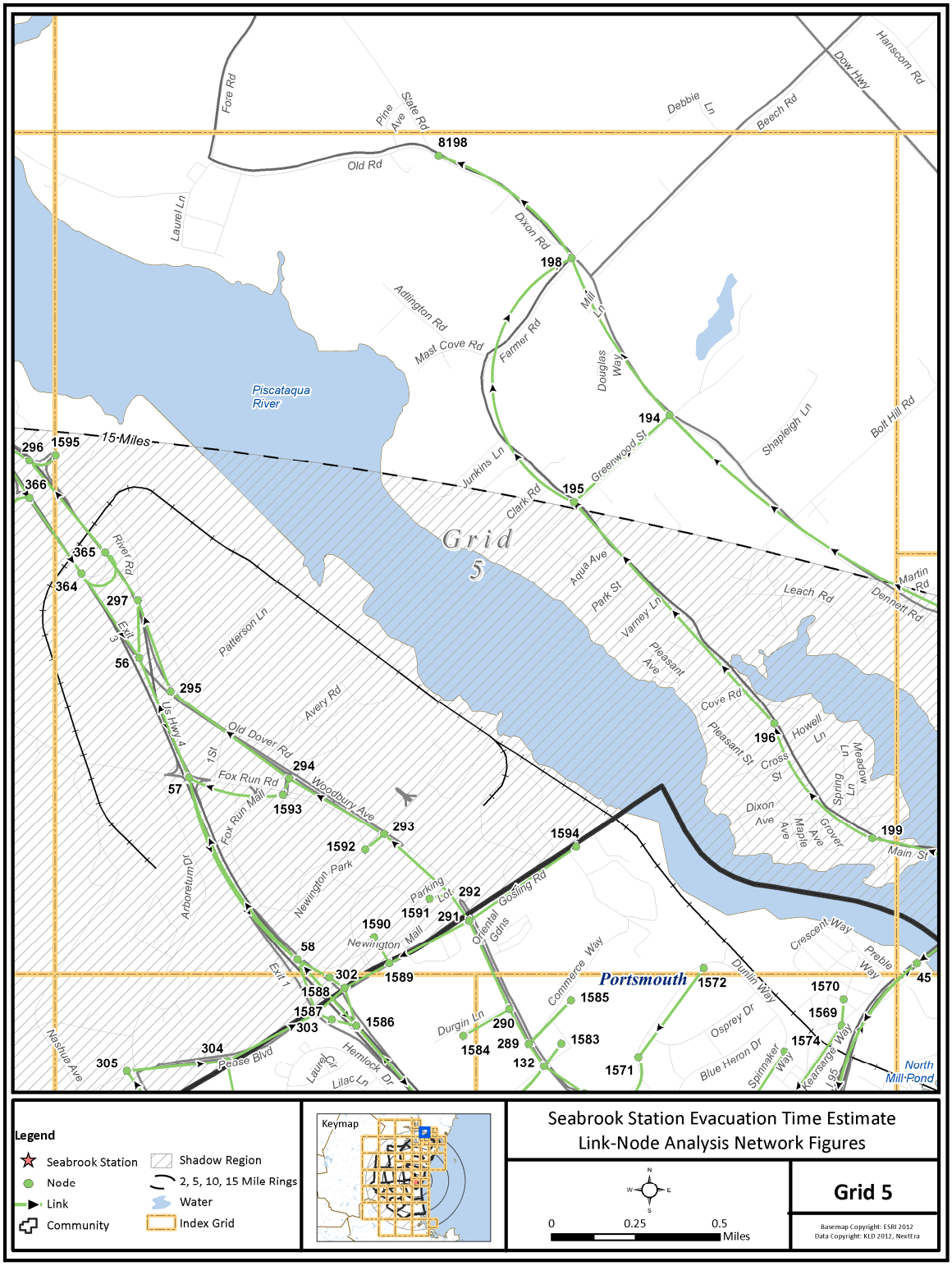


Figure K-6. Link-Node Analysis Network – Grid 5

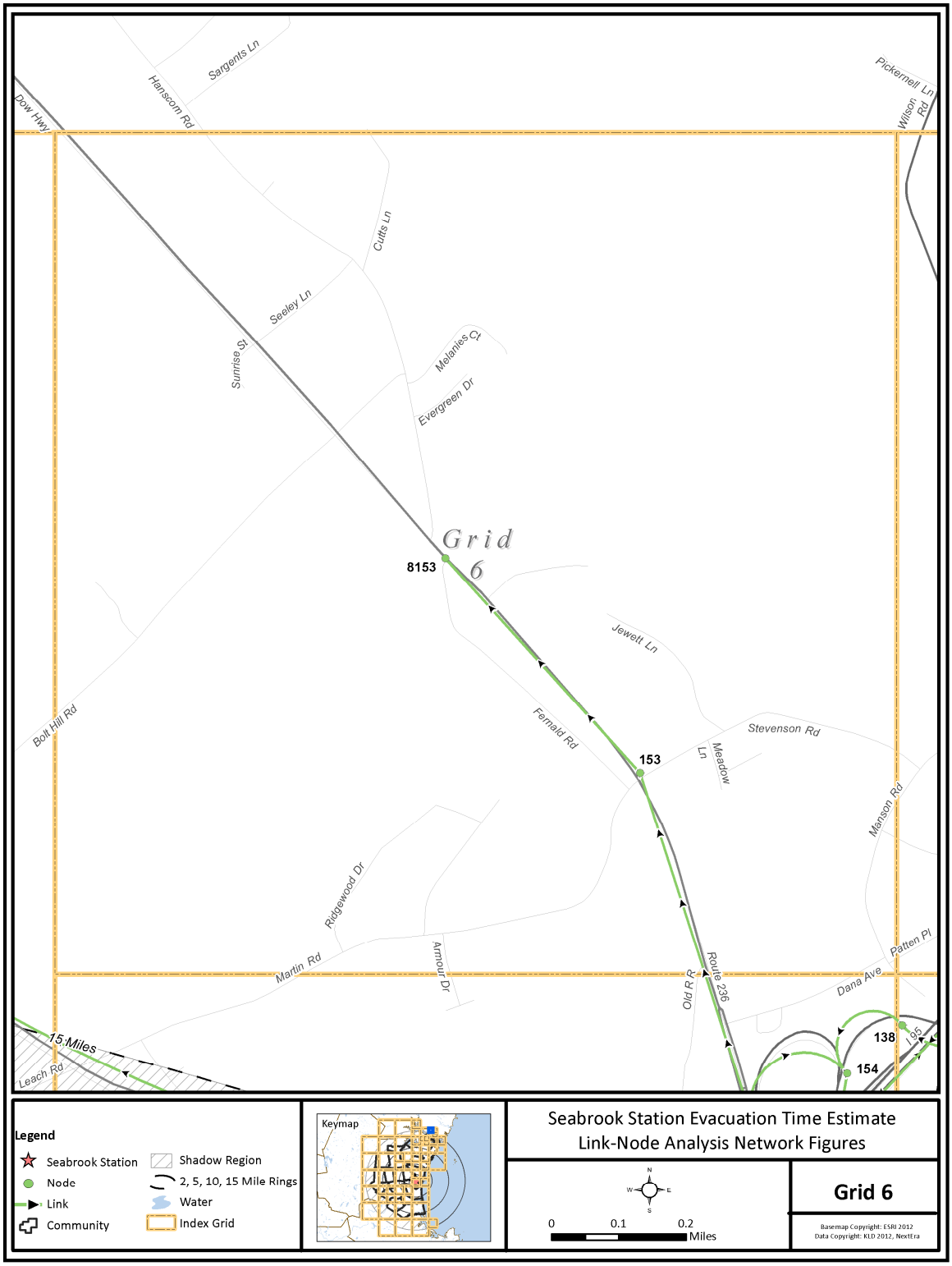


Figure K-7. Link-Node Analysis Network – Grid 6

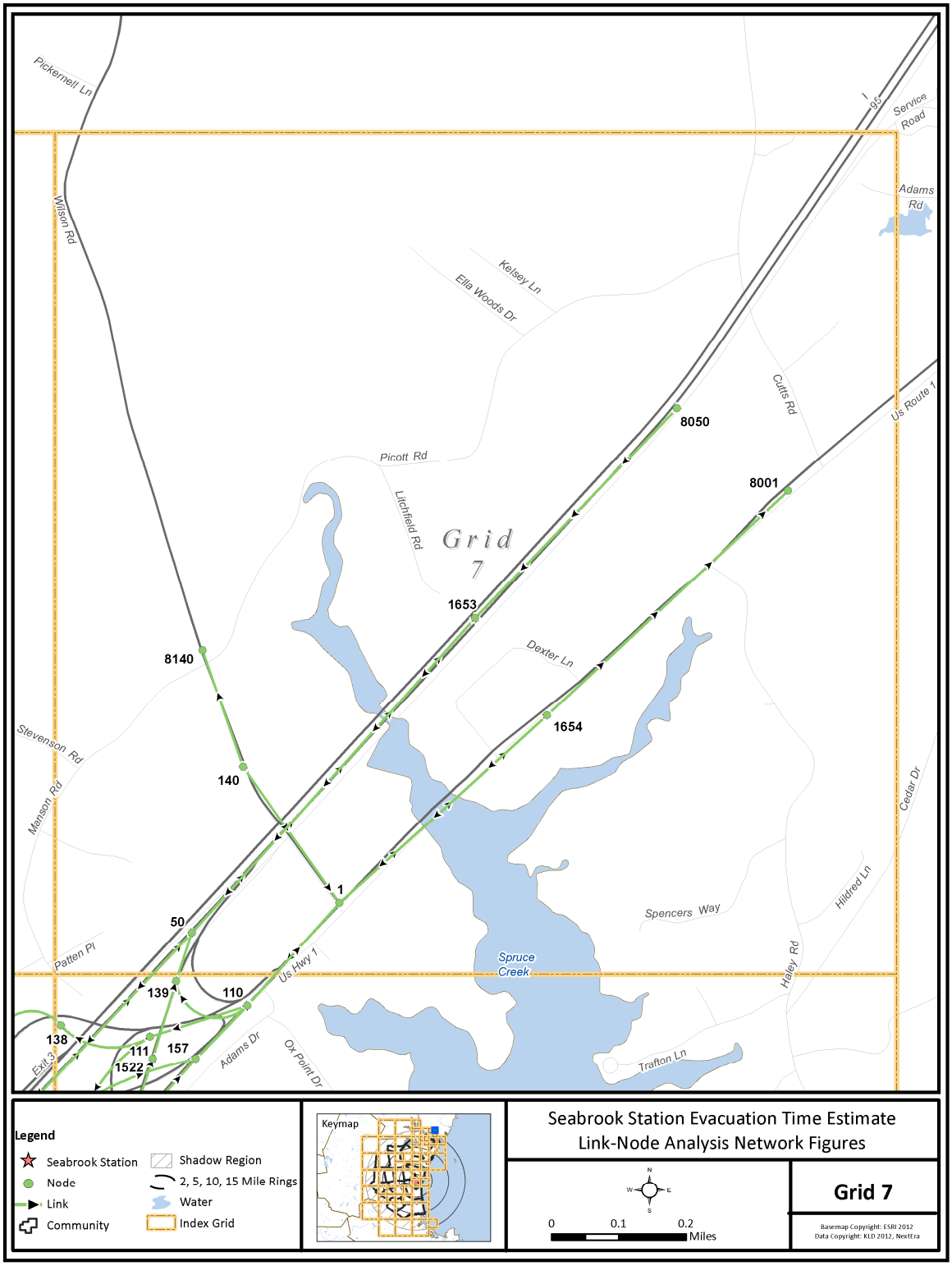


Figure K-8. Link-Node Analysis Network – Grid 7

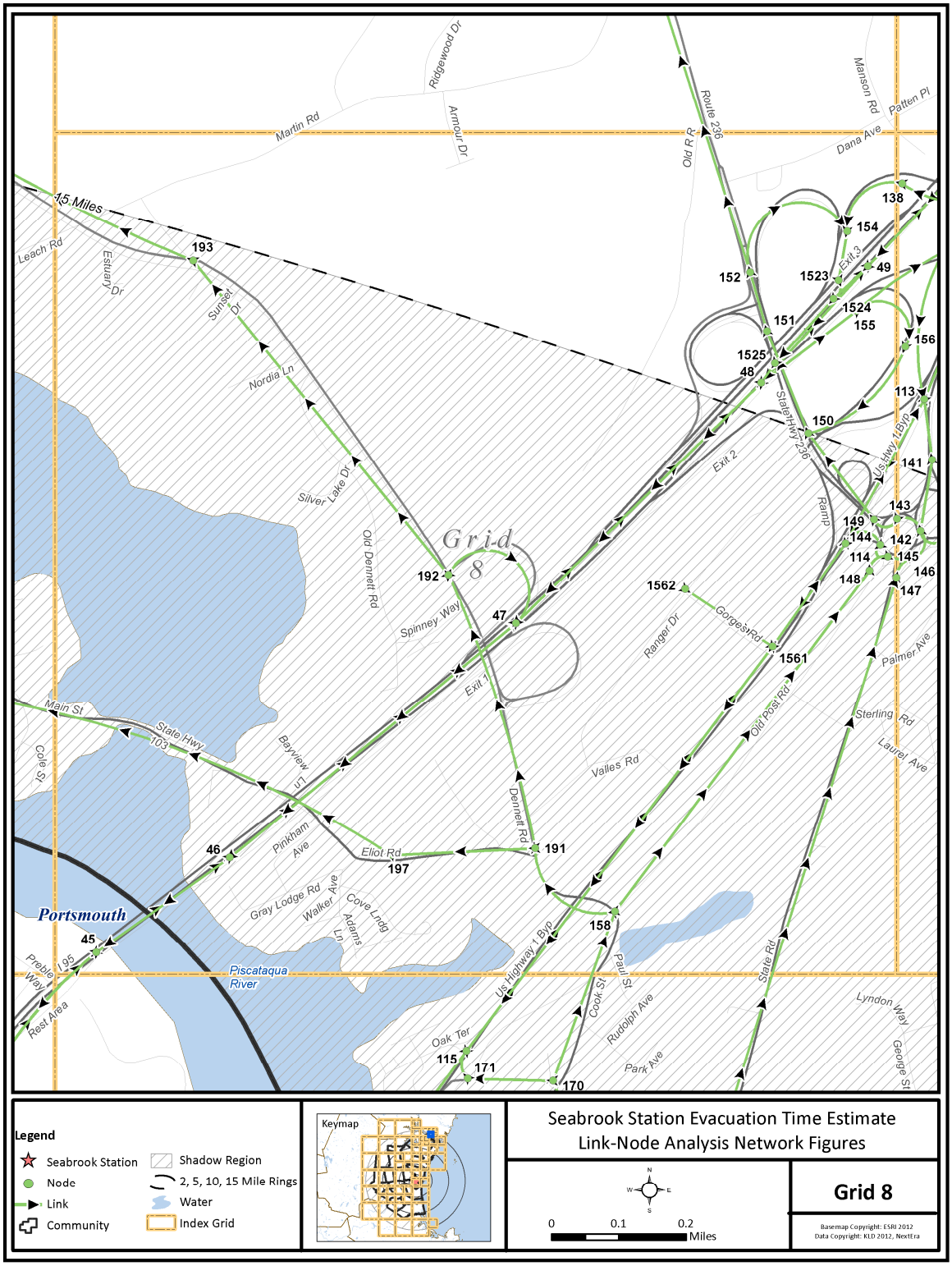


Figure K-9. Link-Node Analysis Network – Grid 8

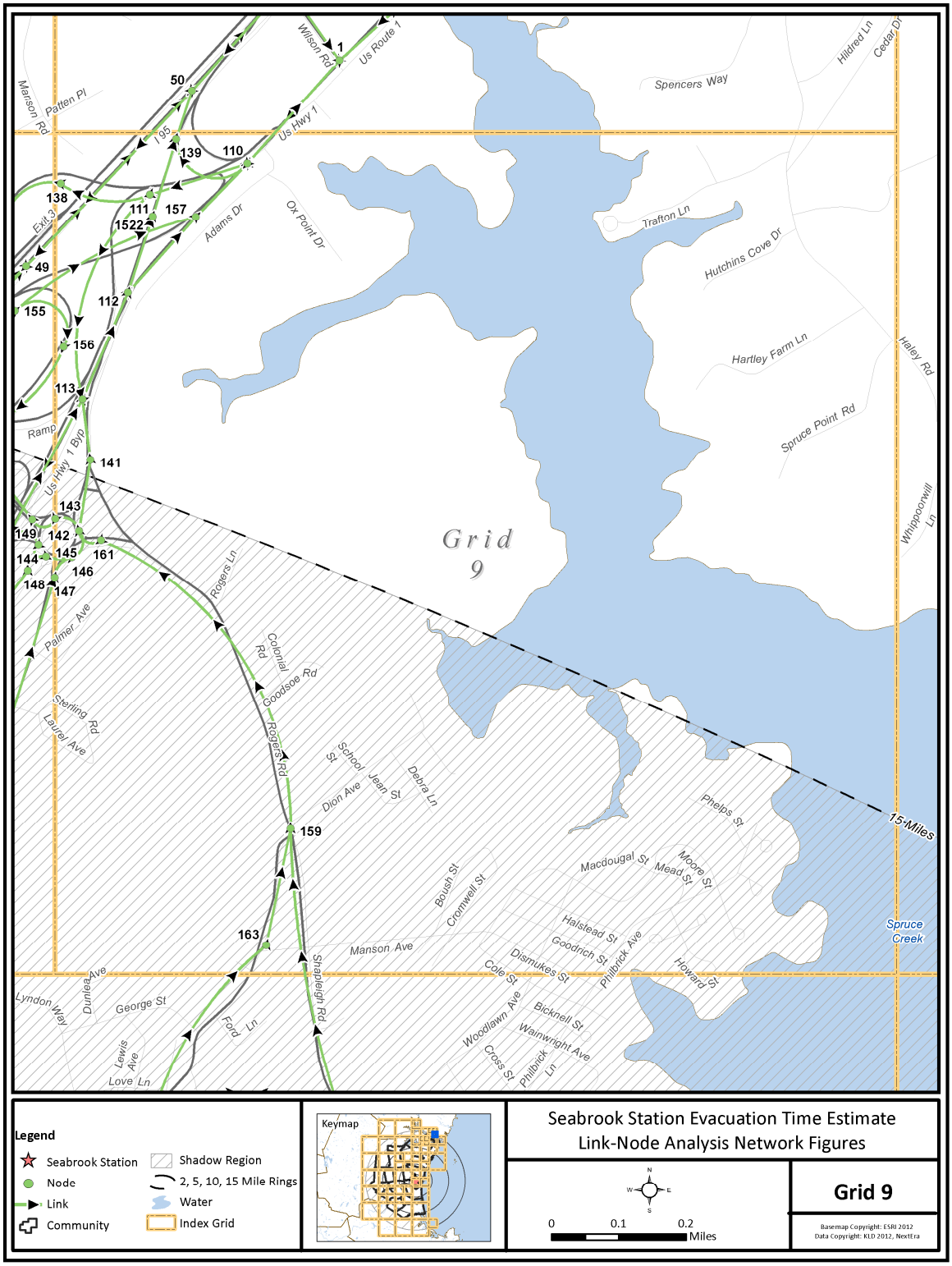


Figure K-10. Link-Node Analysis Network – Grid 9

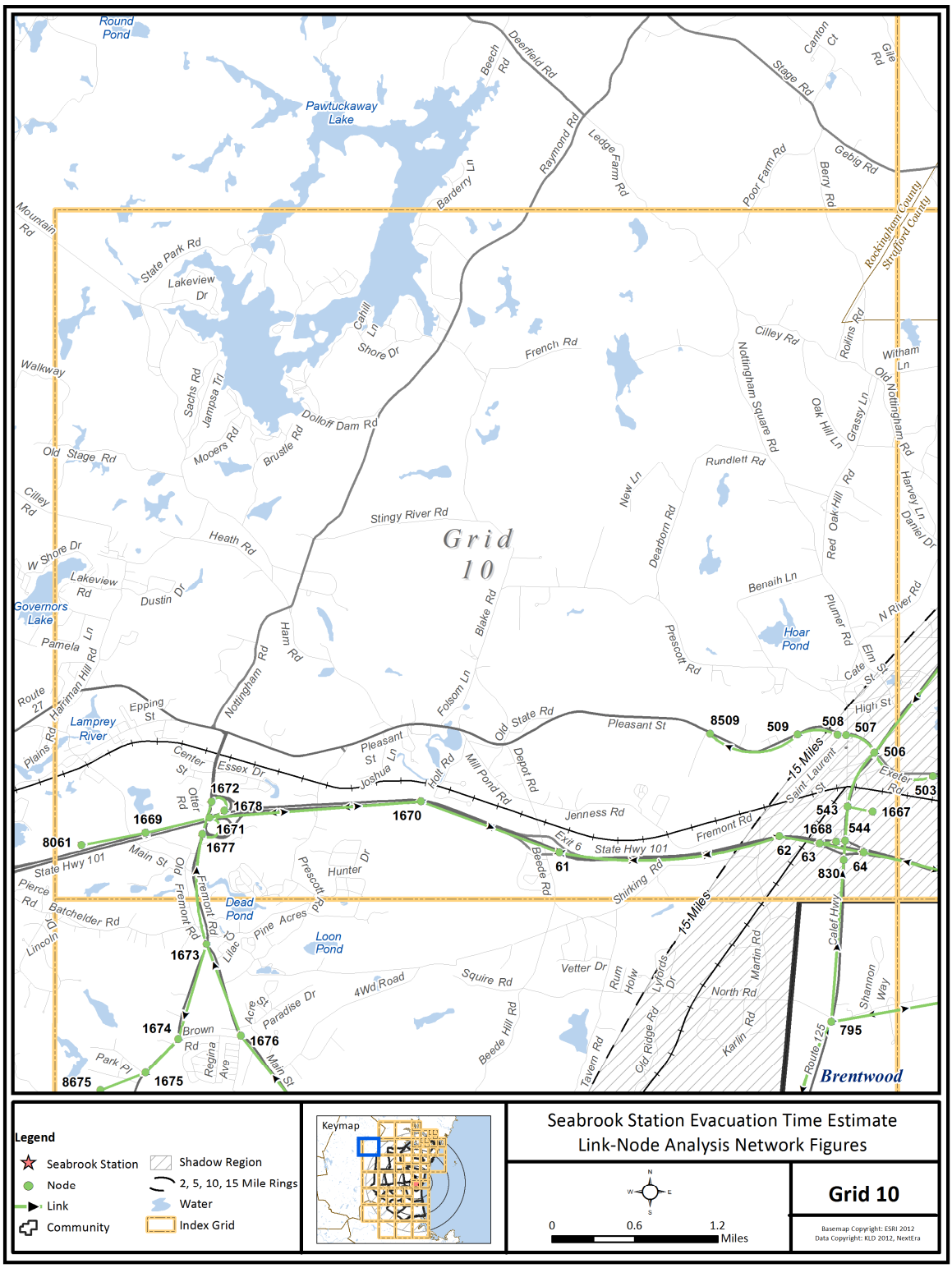


Figure K-11. Link-Node Analysis Network – Grid 10

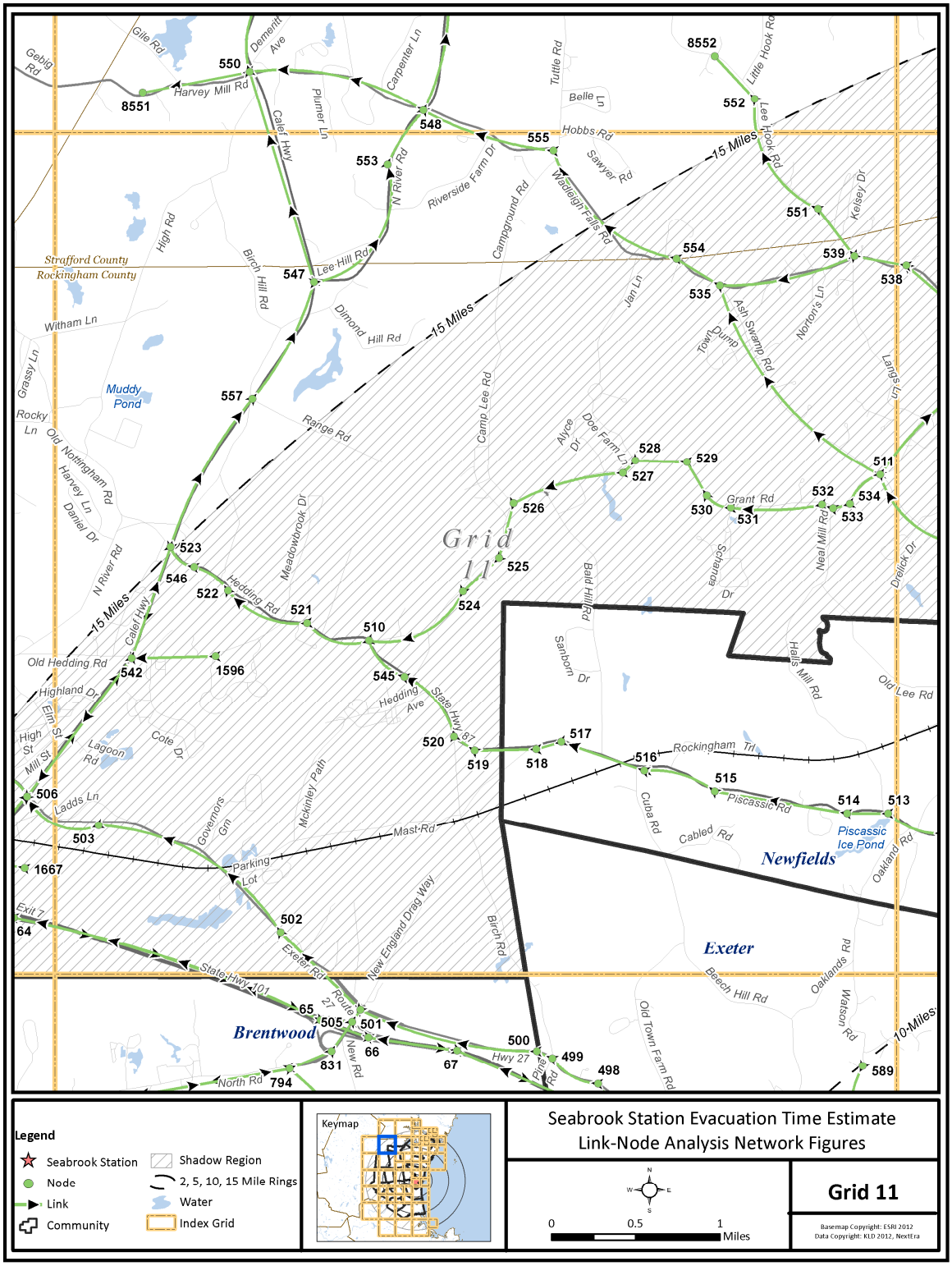


Figure K-12. Link-Node Analysis Network – Grid 11

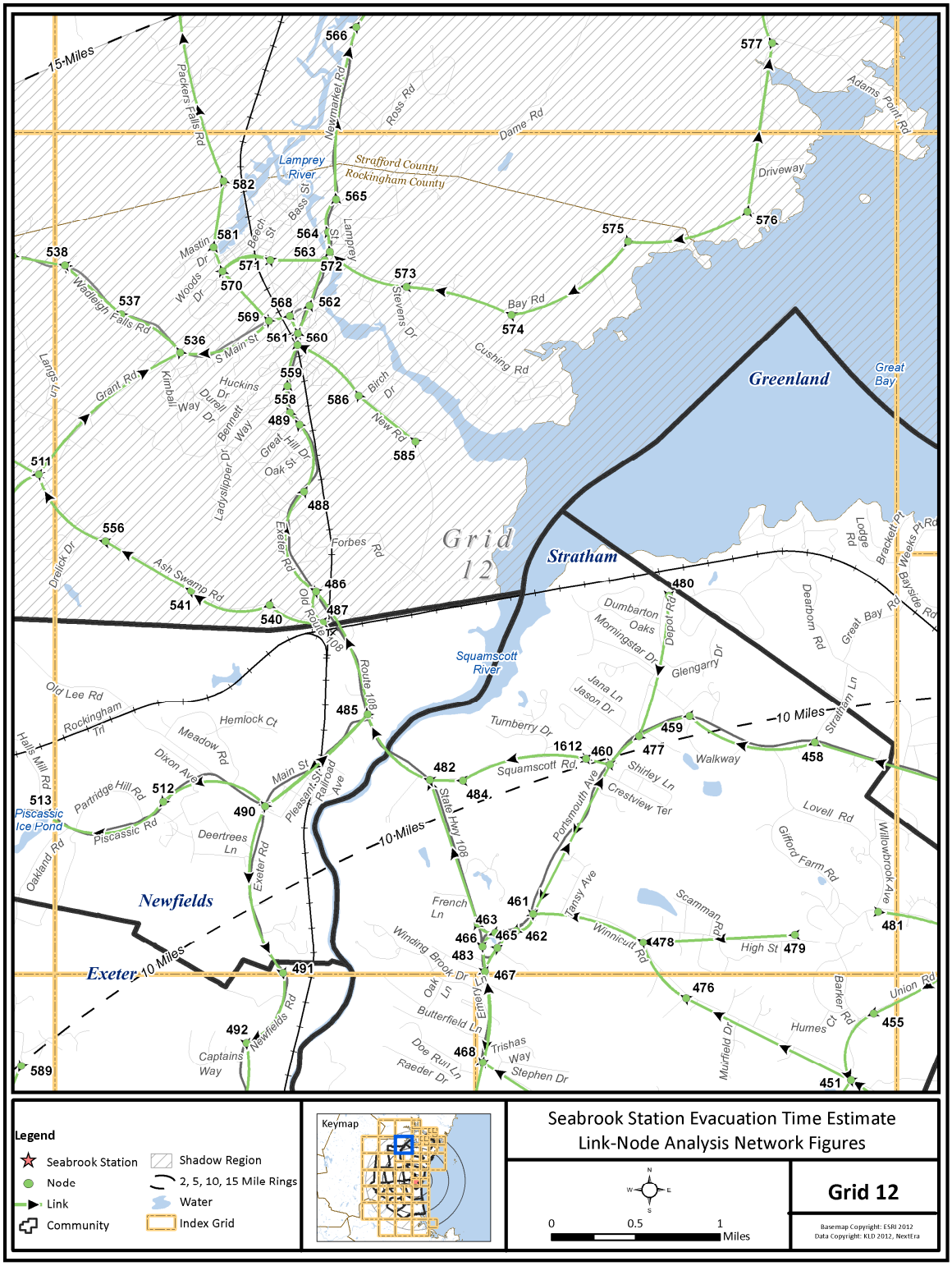


Figure K-13. Link-Node Analysis Network – Grid 12

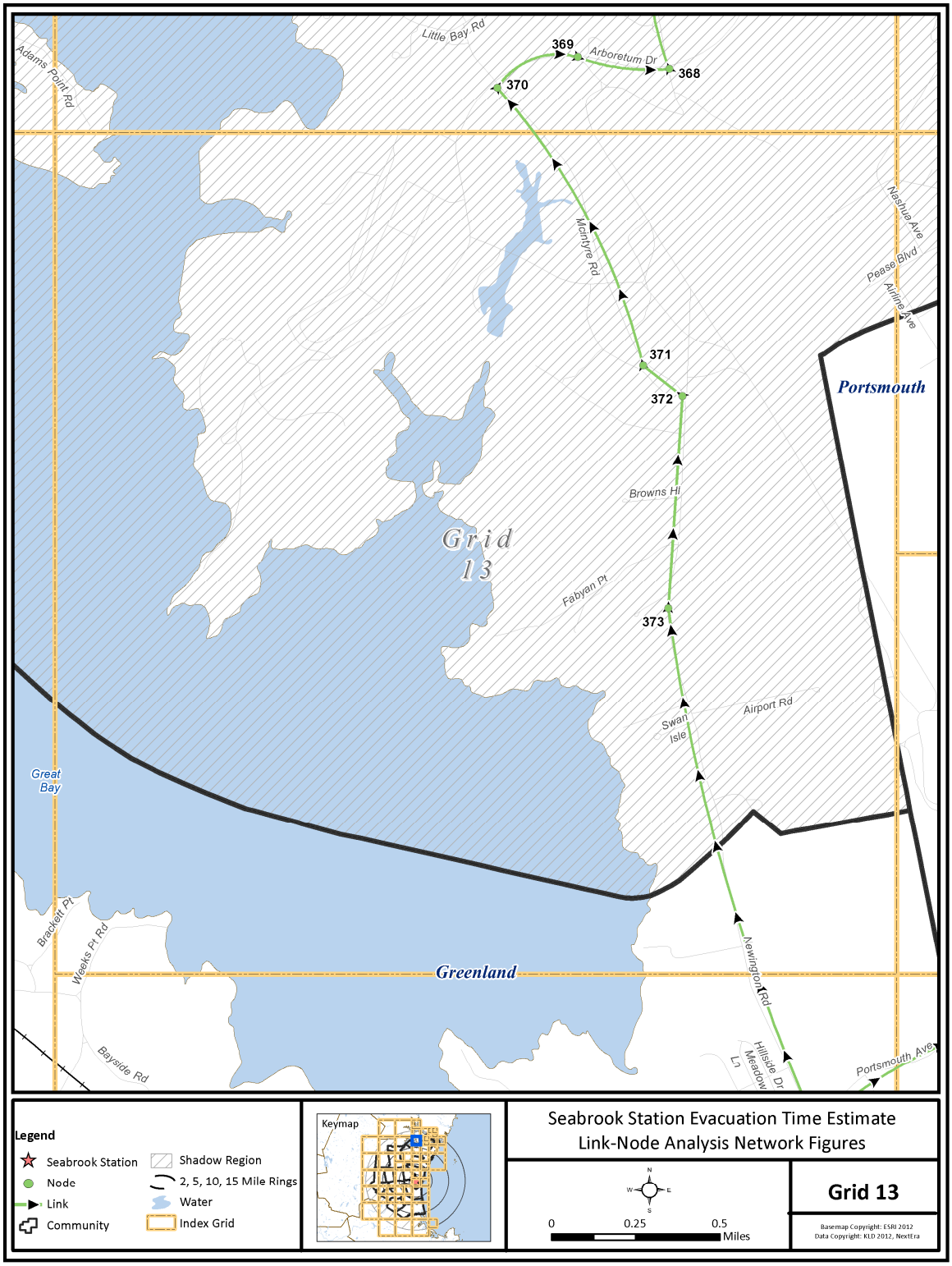


Figure K-14. Link-Node Analysis Network – Grid 13

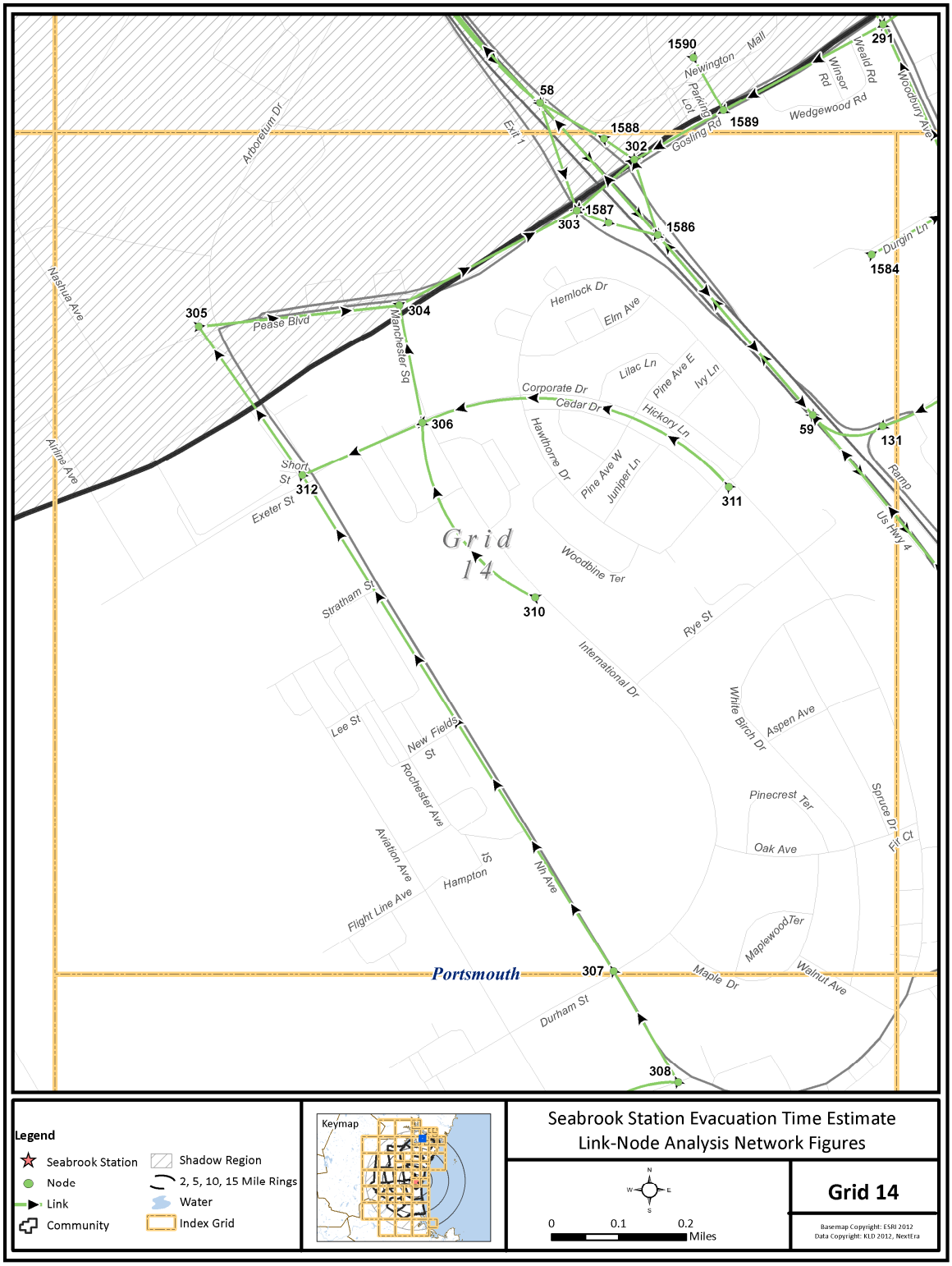


Figure K-15. Link-Node Analysis Network – Grid 14

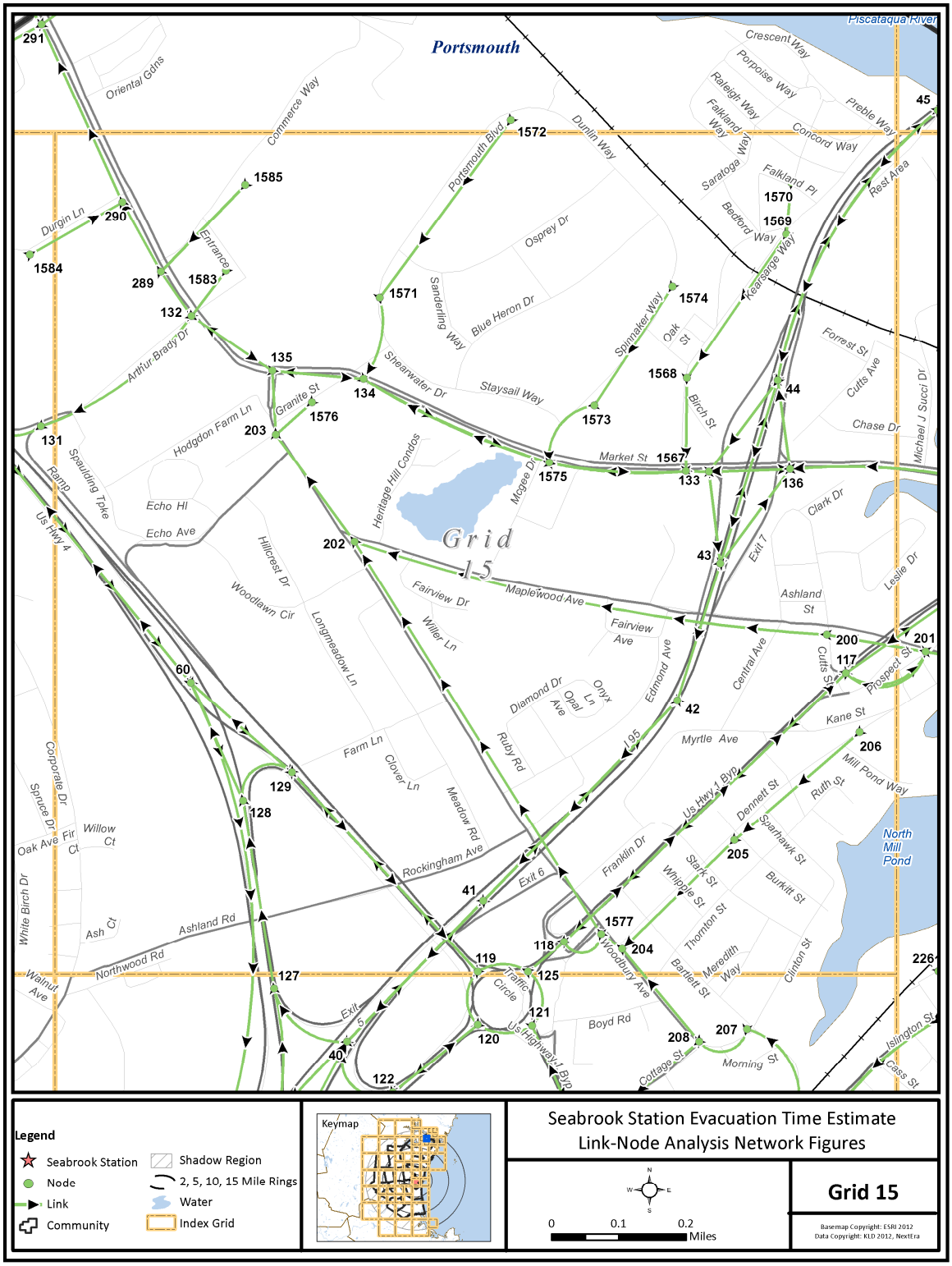


Figure K-16. Link-Node Analysis Network – Grid 15

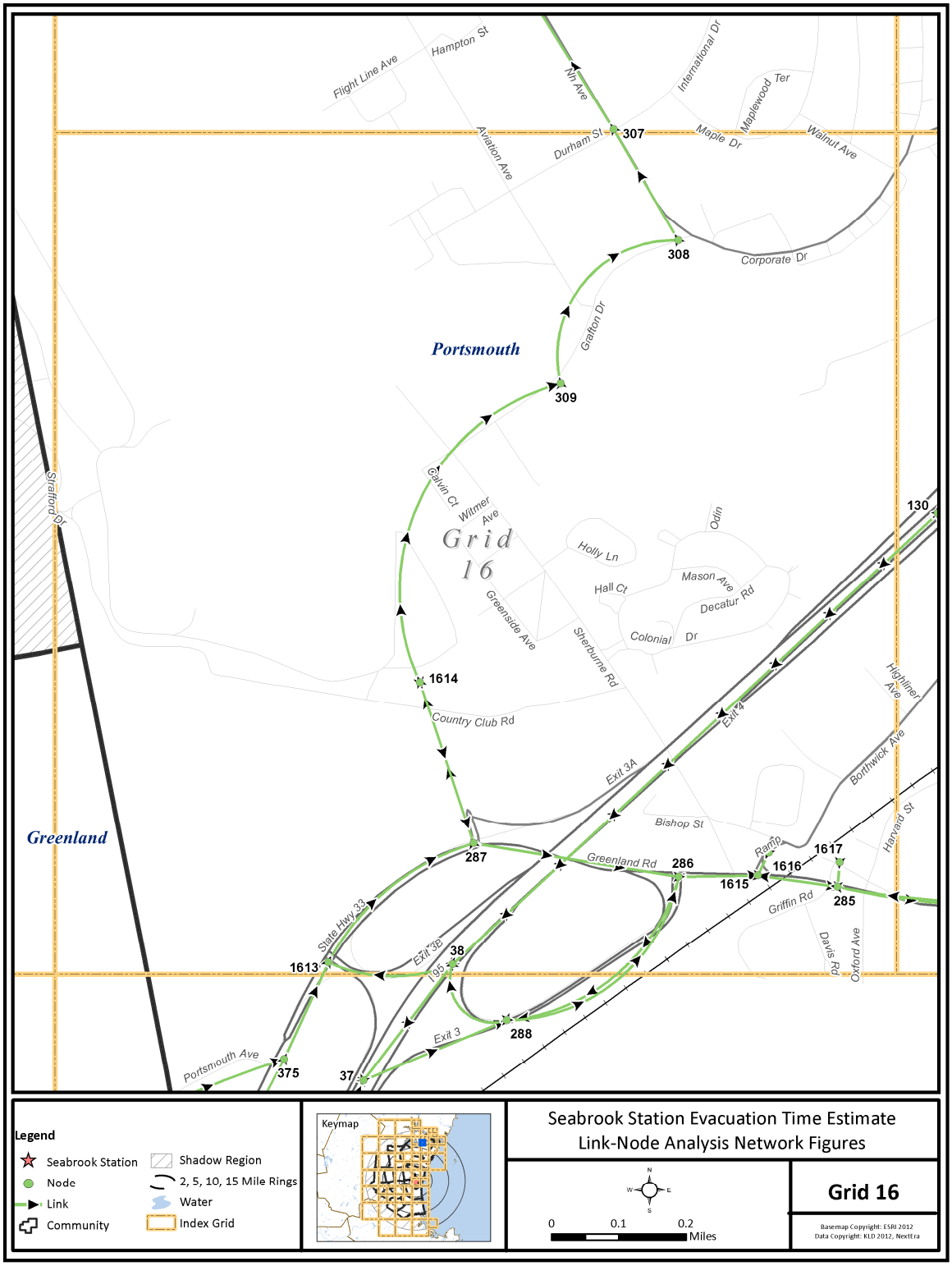


Figure K-17. Link-Node Analysis Network – Grid 16

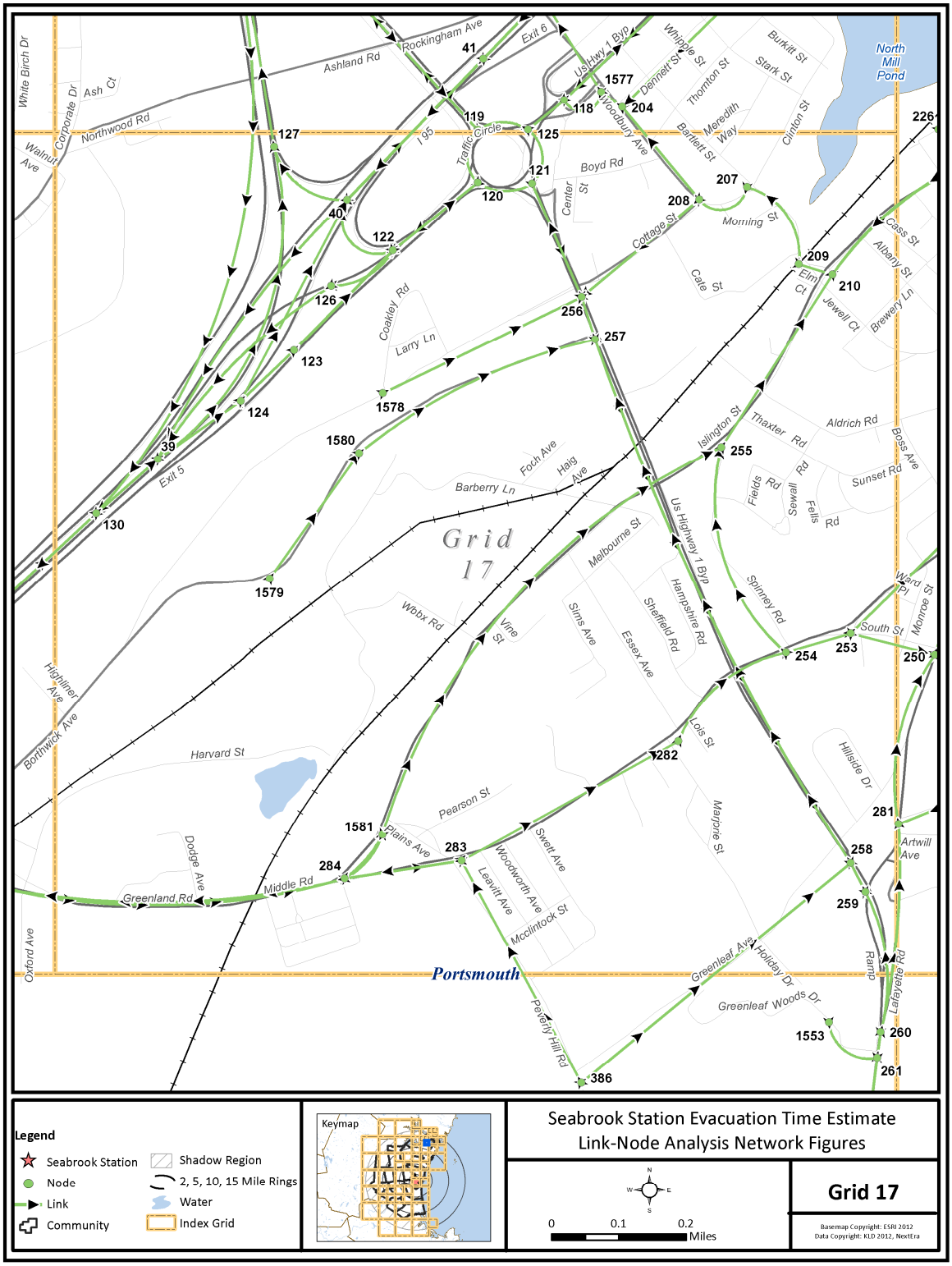


Figure K-18. Link-Node Analysis Network – Grid 17

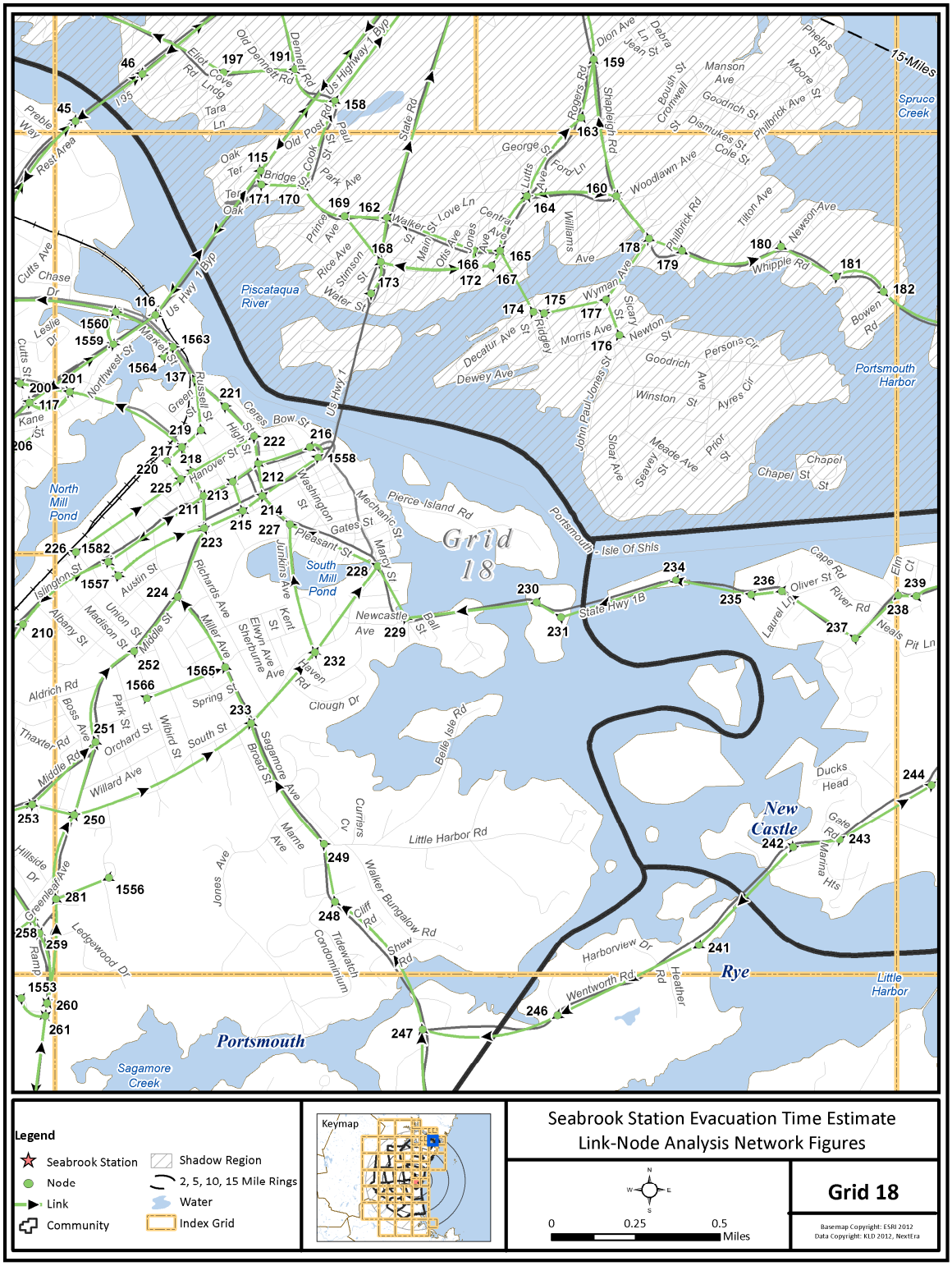


Figure K-19. Link-Node Analysis Network – Grid 18

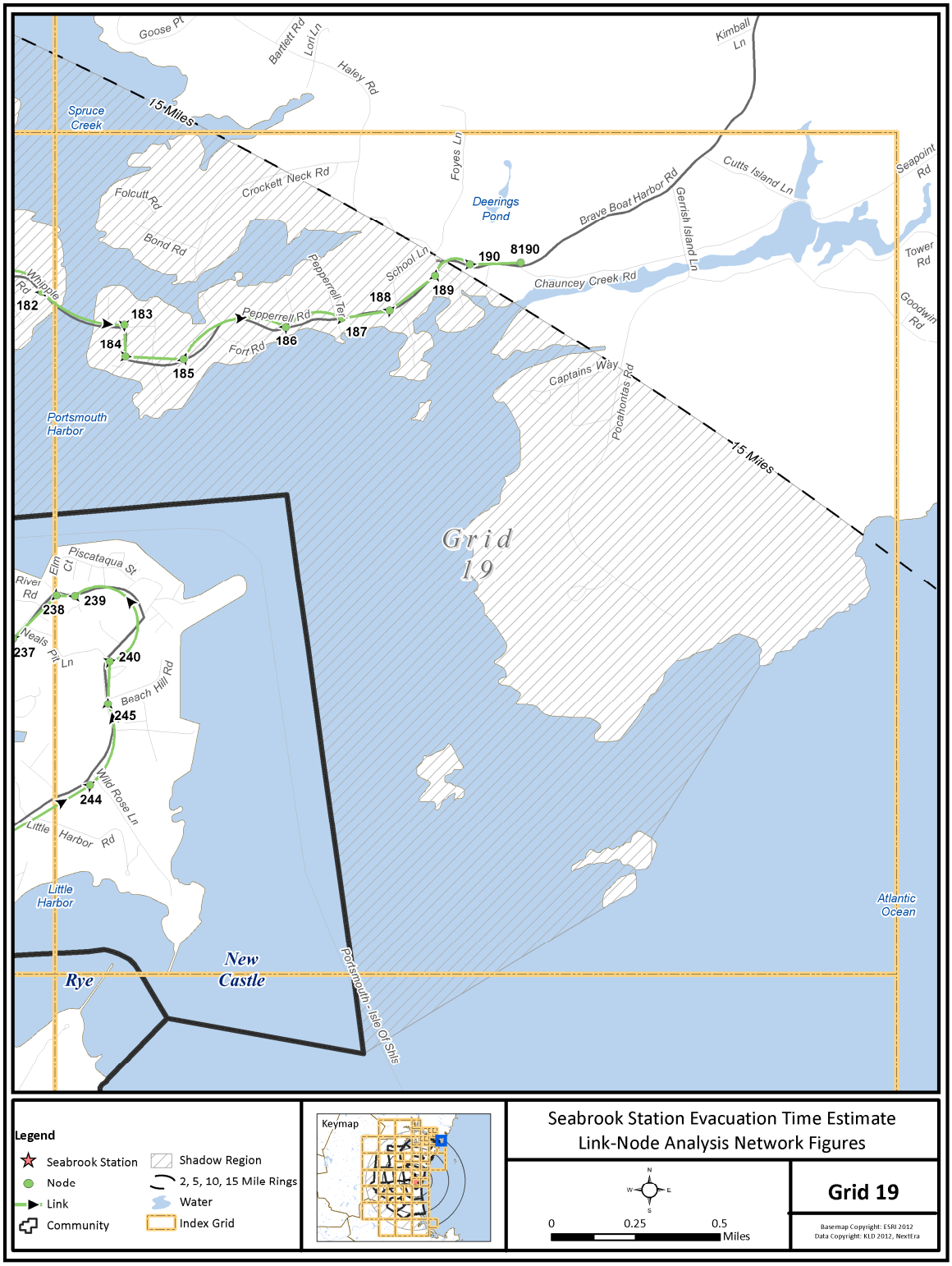


Figure K-20. Link-Node Analysis Network – Grid 19

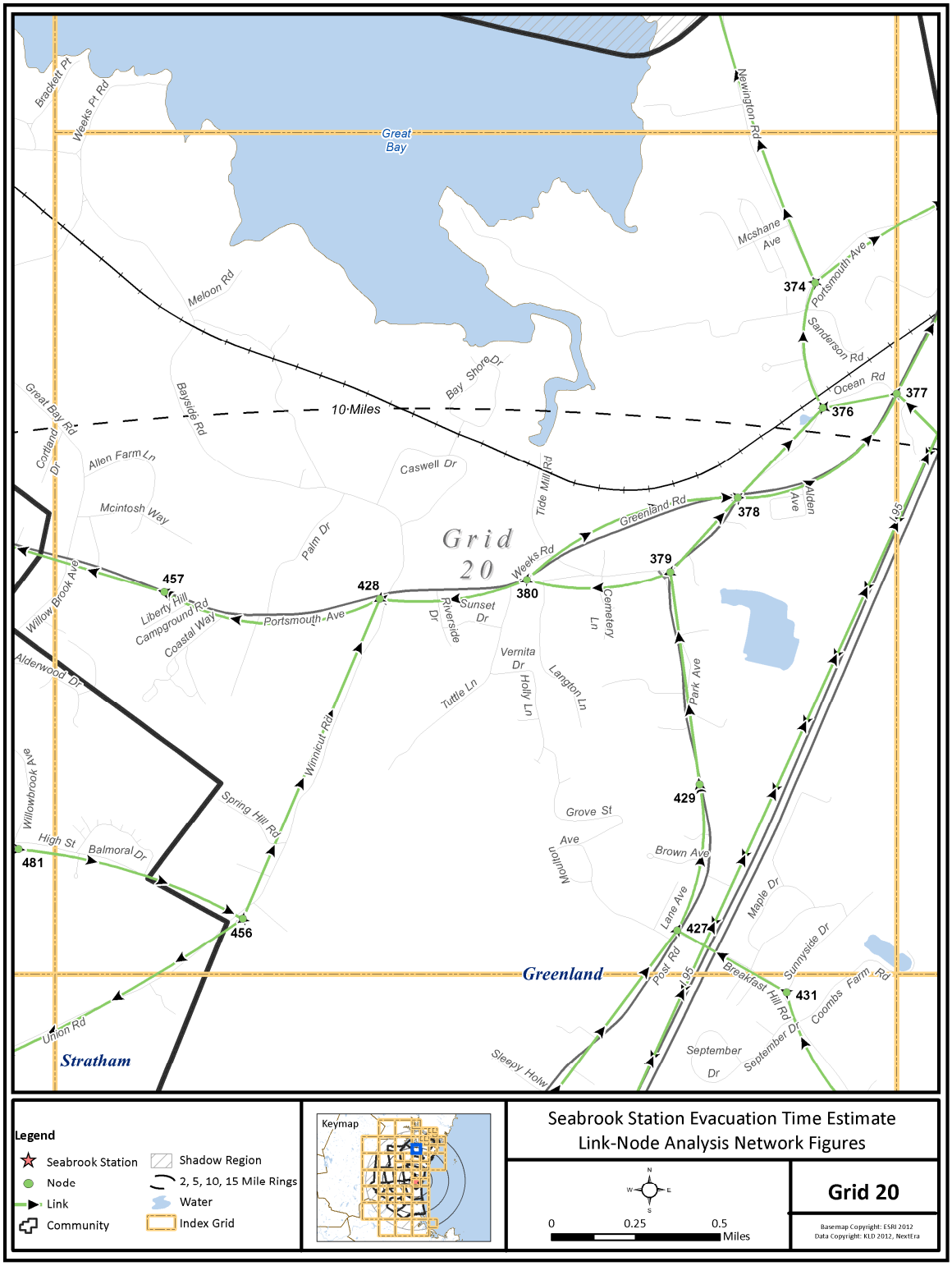


Figure K-21. Link-Node Analysis Network – Grid 20

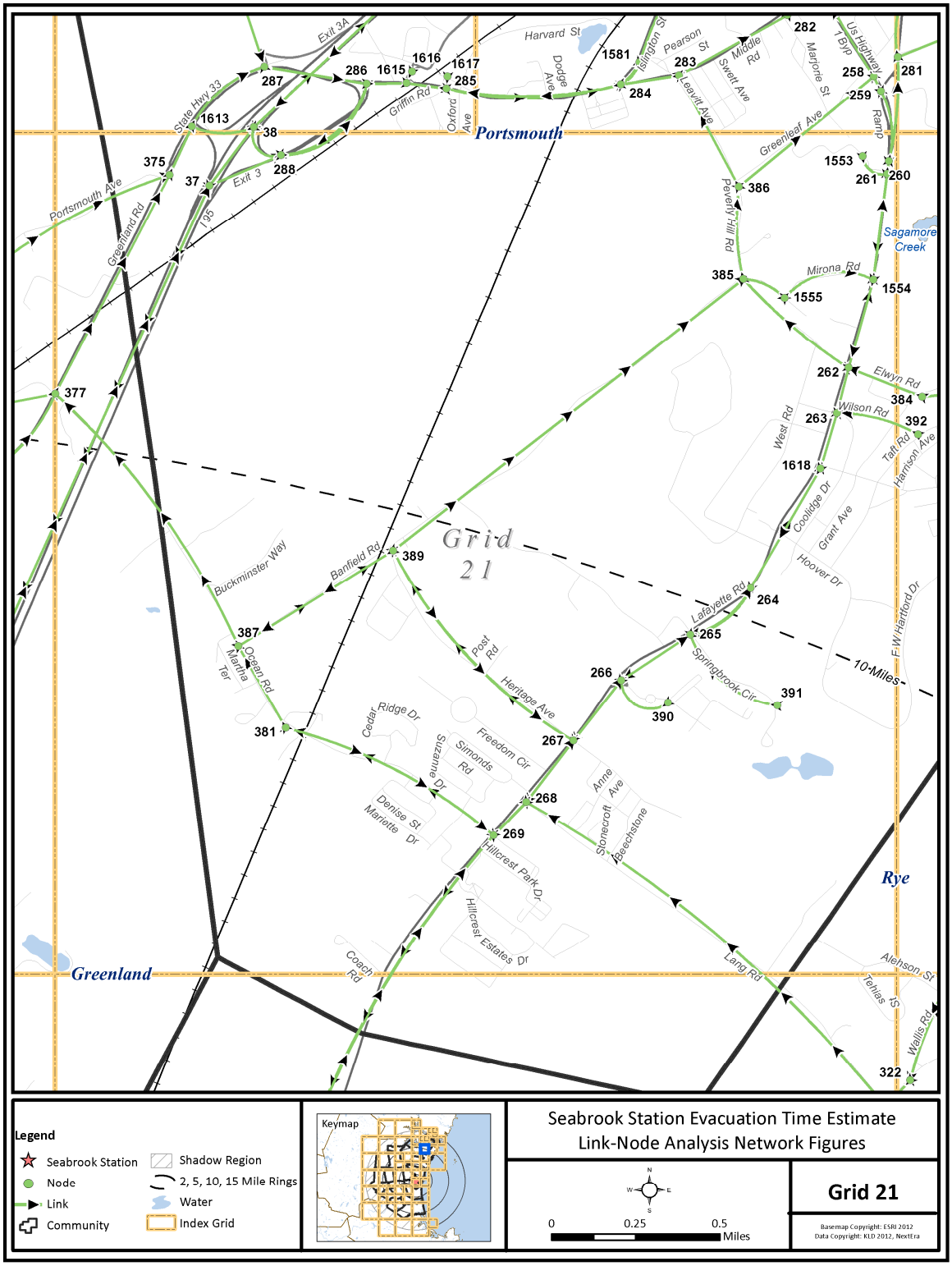


Figure K-22. Link-Node Analysis Network – Grid 21

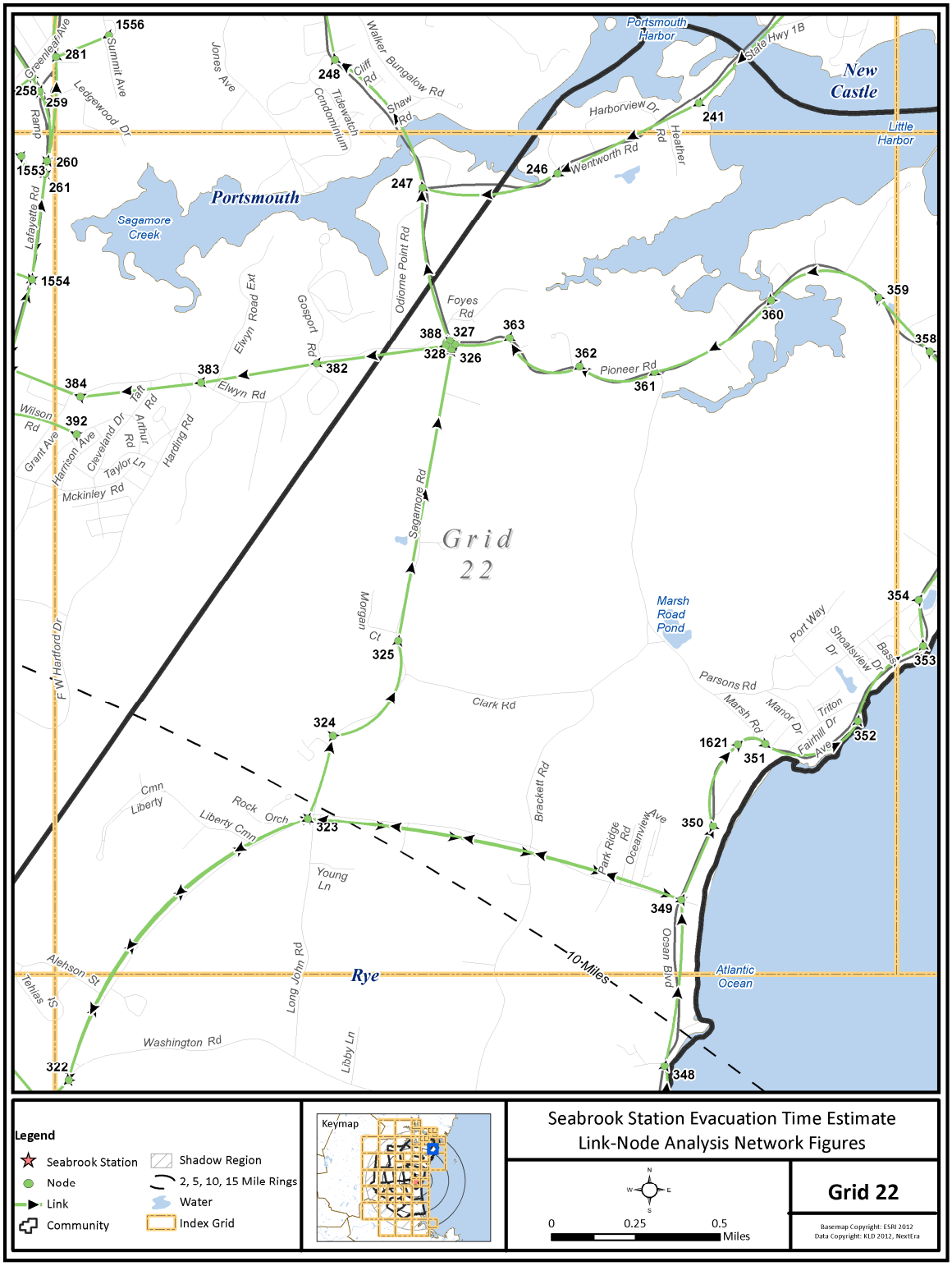


Figure K-23. Link-Node Analysis Network – Grid 22

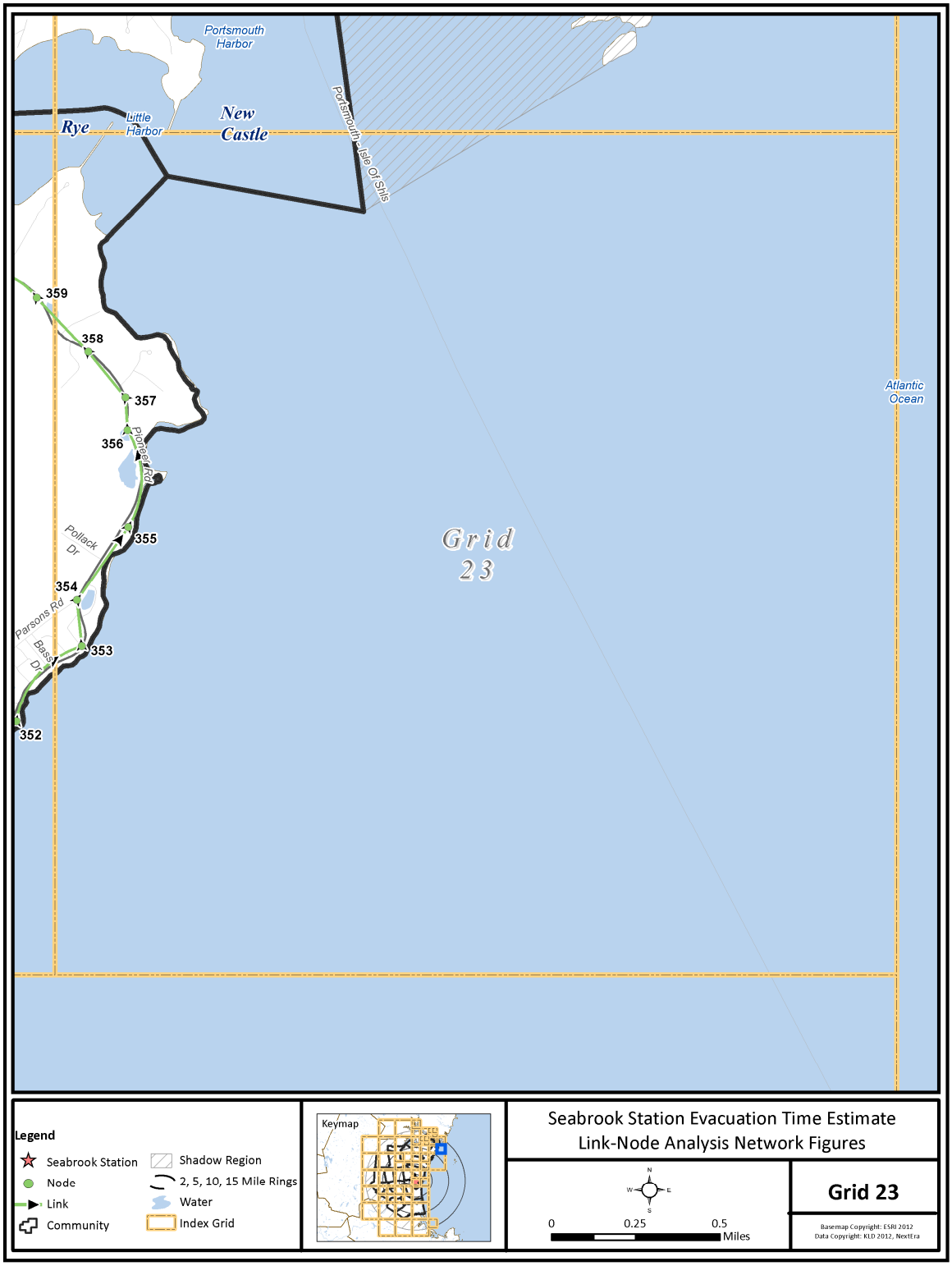


Figure K-24. Link-Node Analysis Network – Grid 23

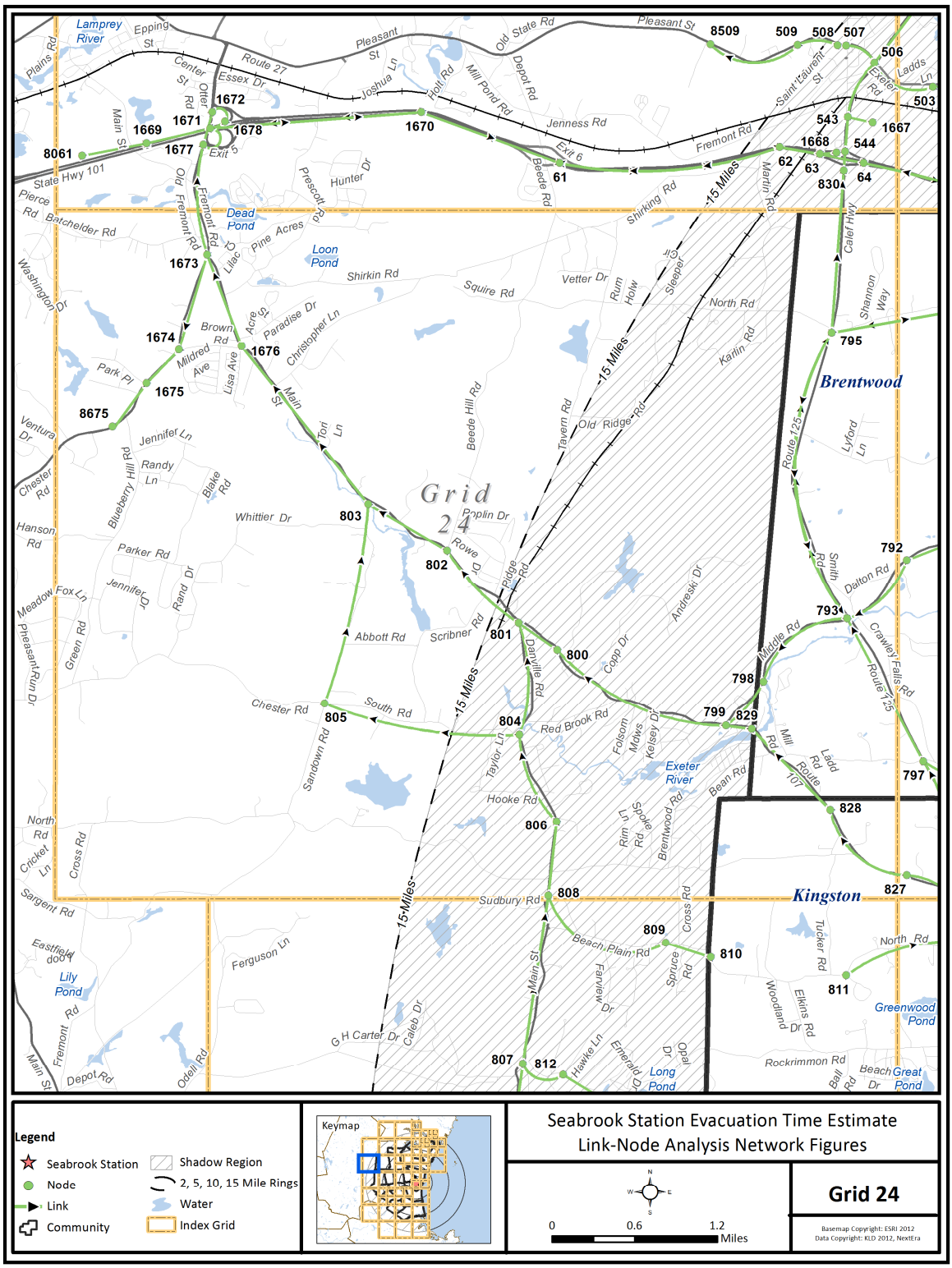


Figure K-25. Link-Node Analysis Network – Grid 24

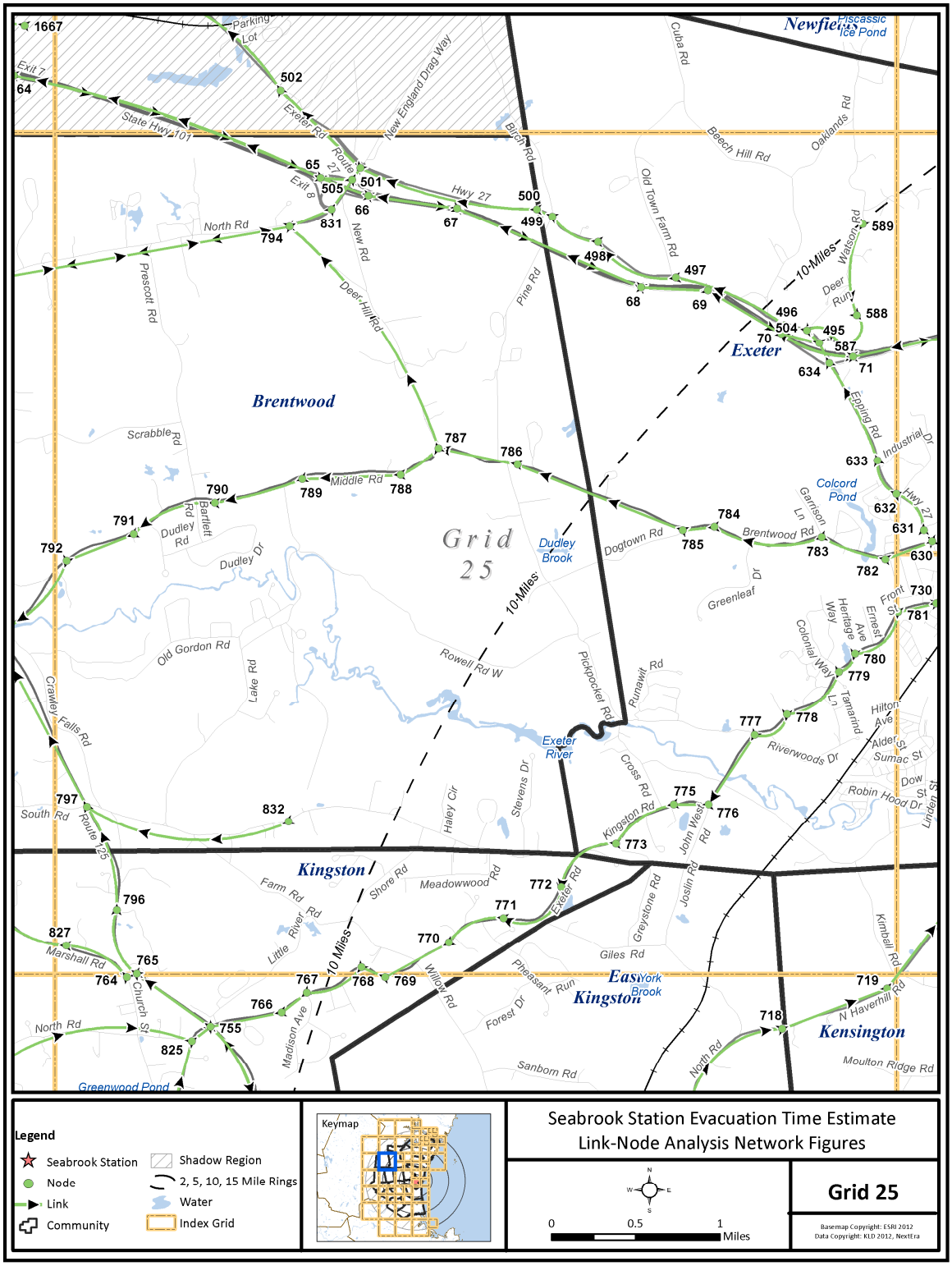


Figure K-26. Link-Node Analysis Network – Grid 25

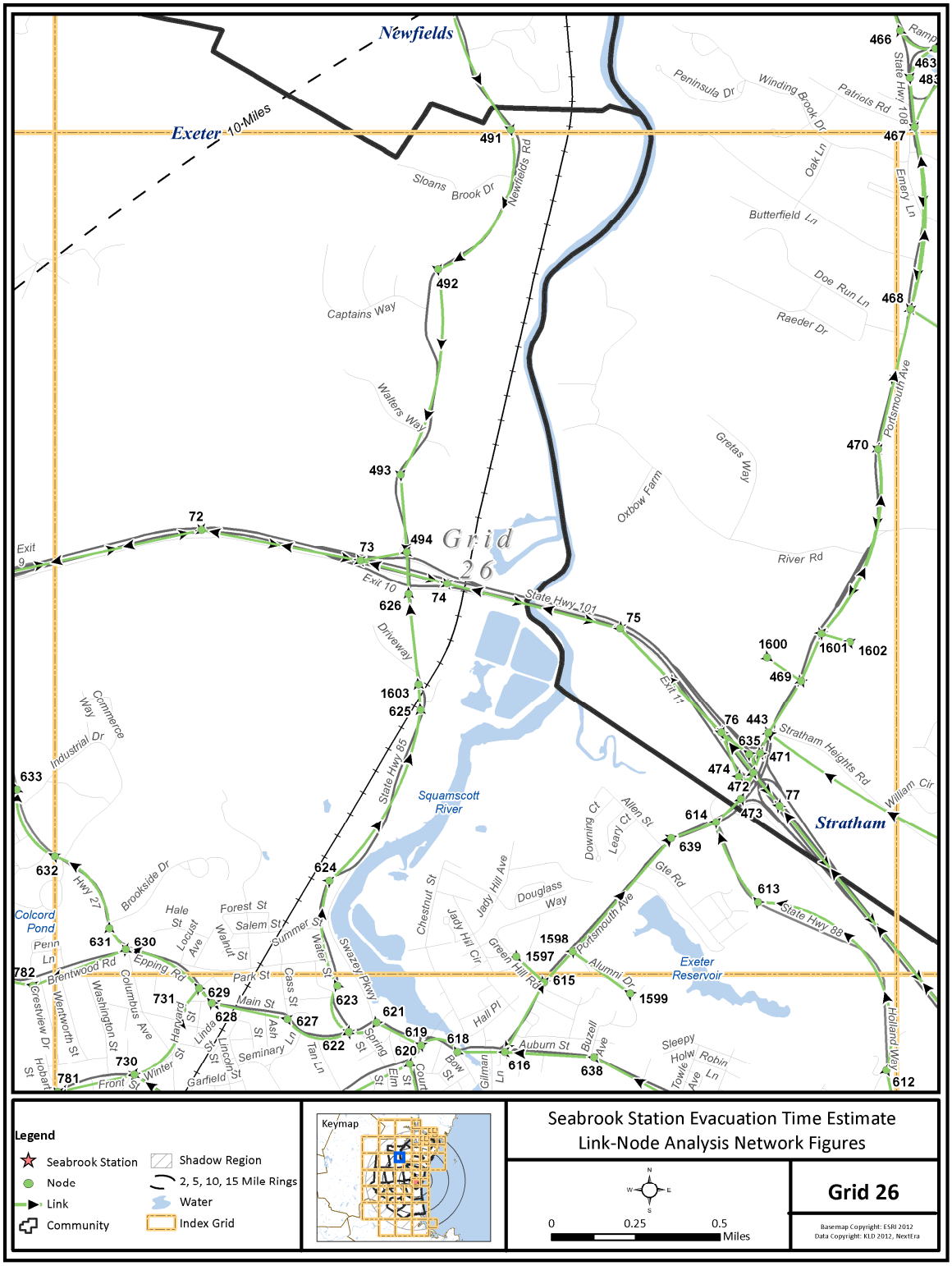


Figure K-27. Link-Node Analysis Network – Grid 26

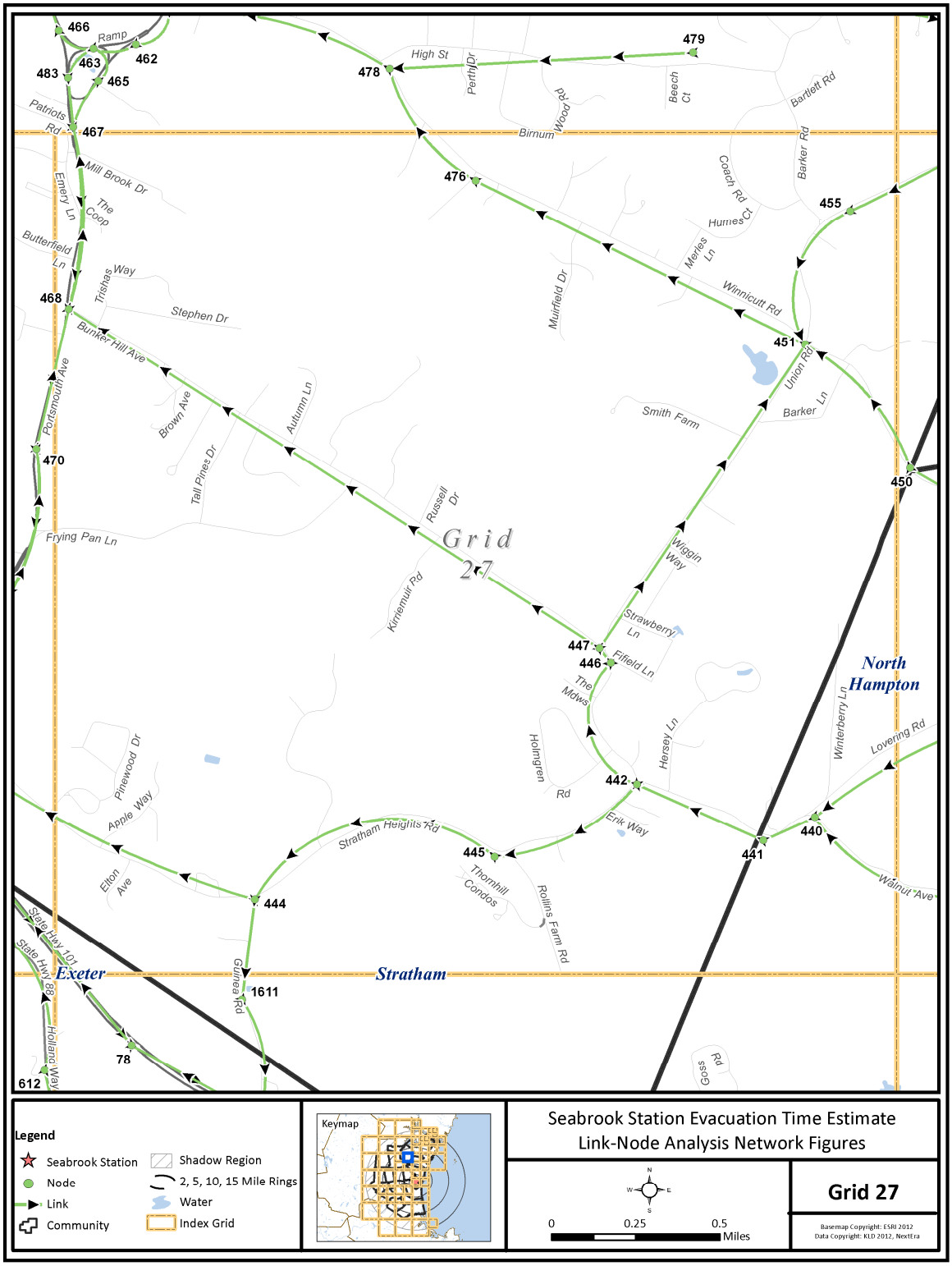


Figure K-28. Link-Node Analysis Network – Grid 27

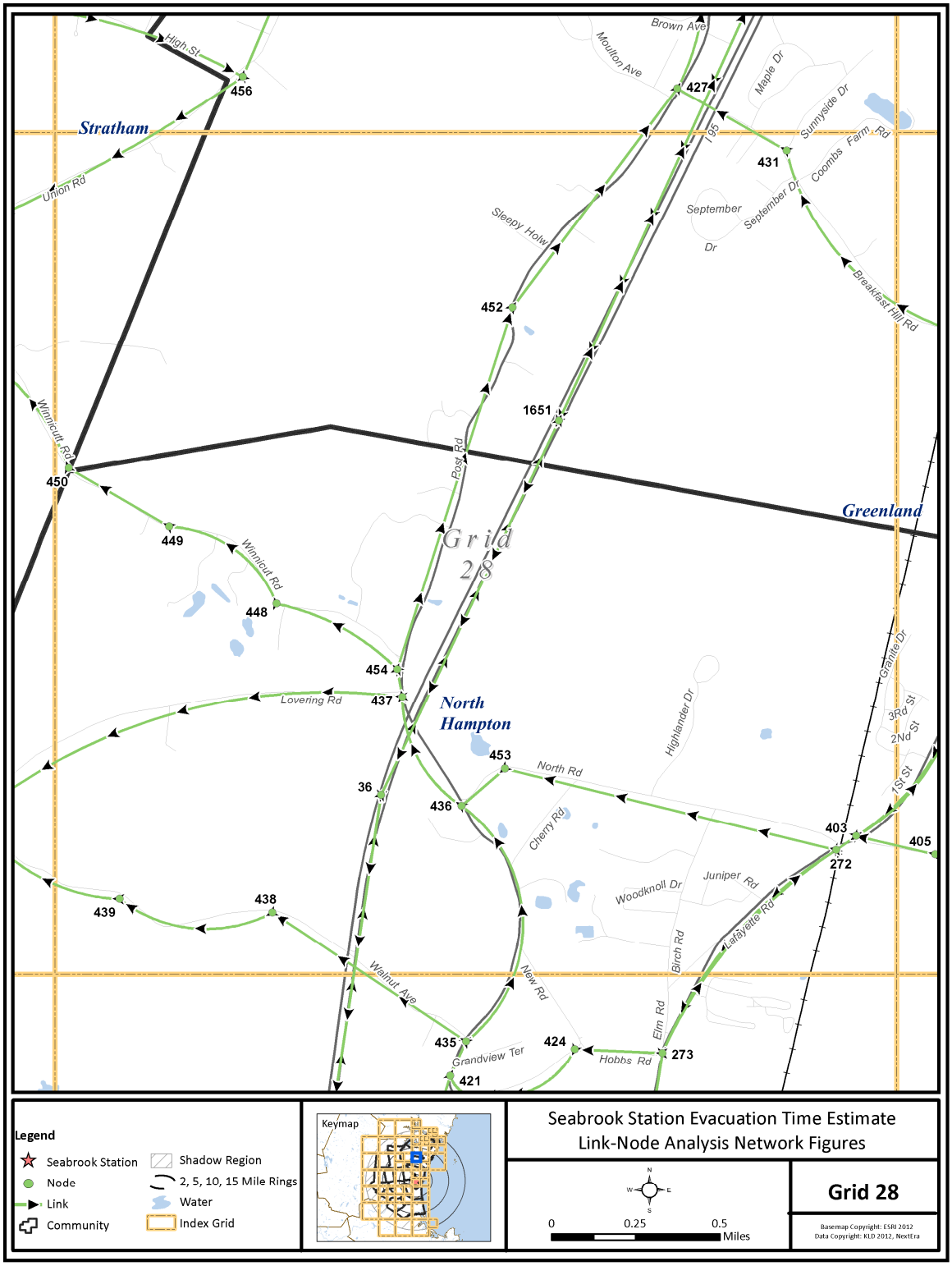


Figure K-29. Link-Node Analysis Network – Grid 28

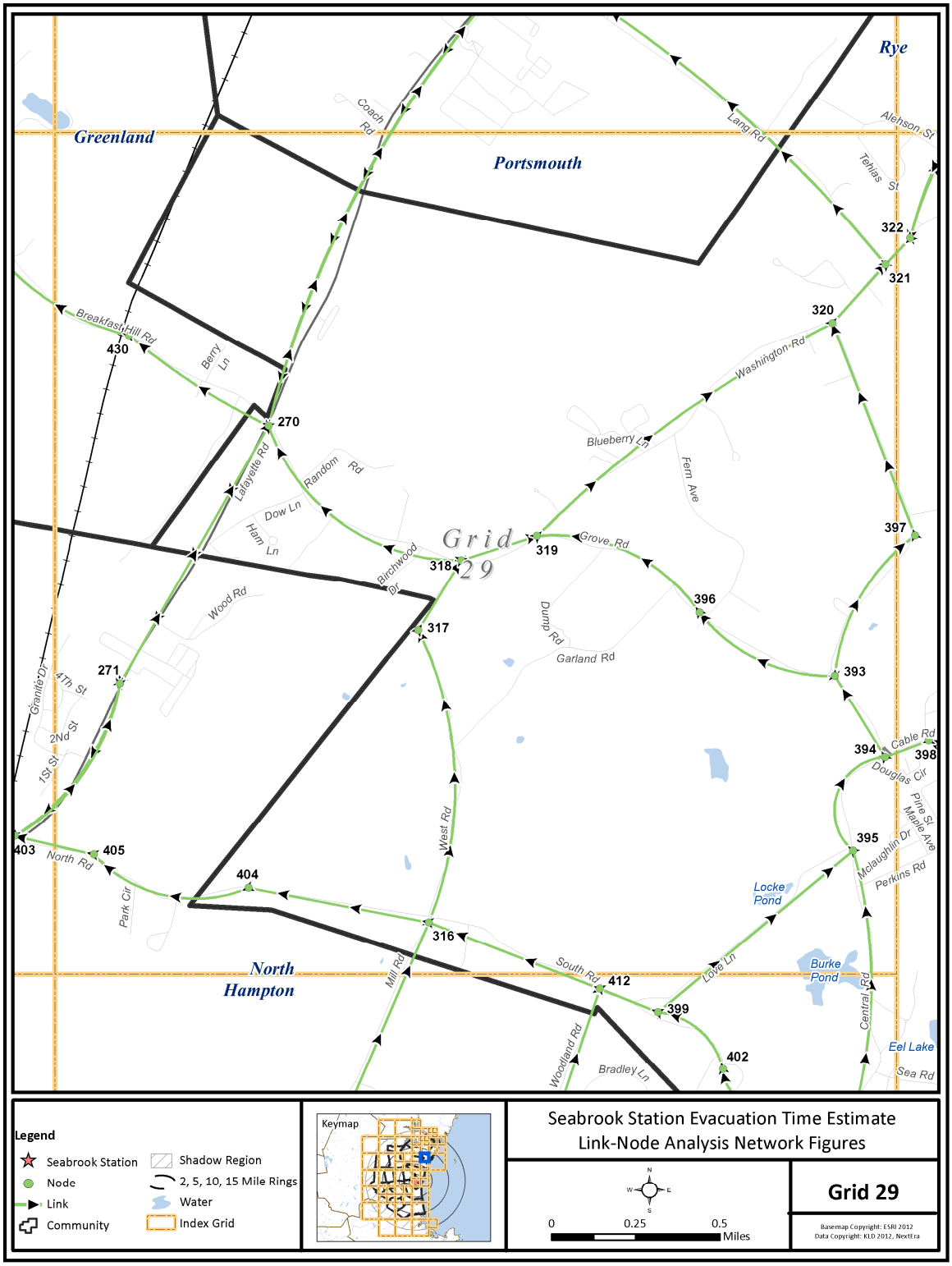


Figure K-30. Link-Node Analysis Network – Grid 29

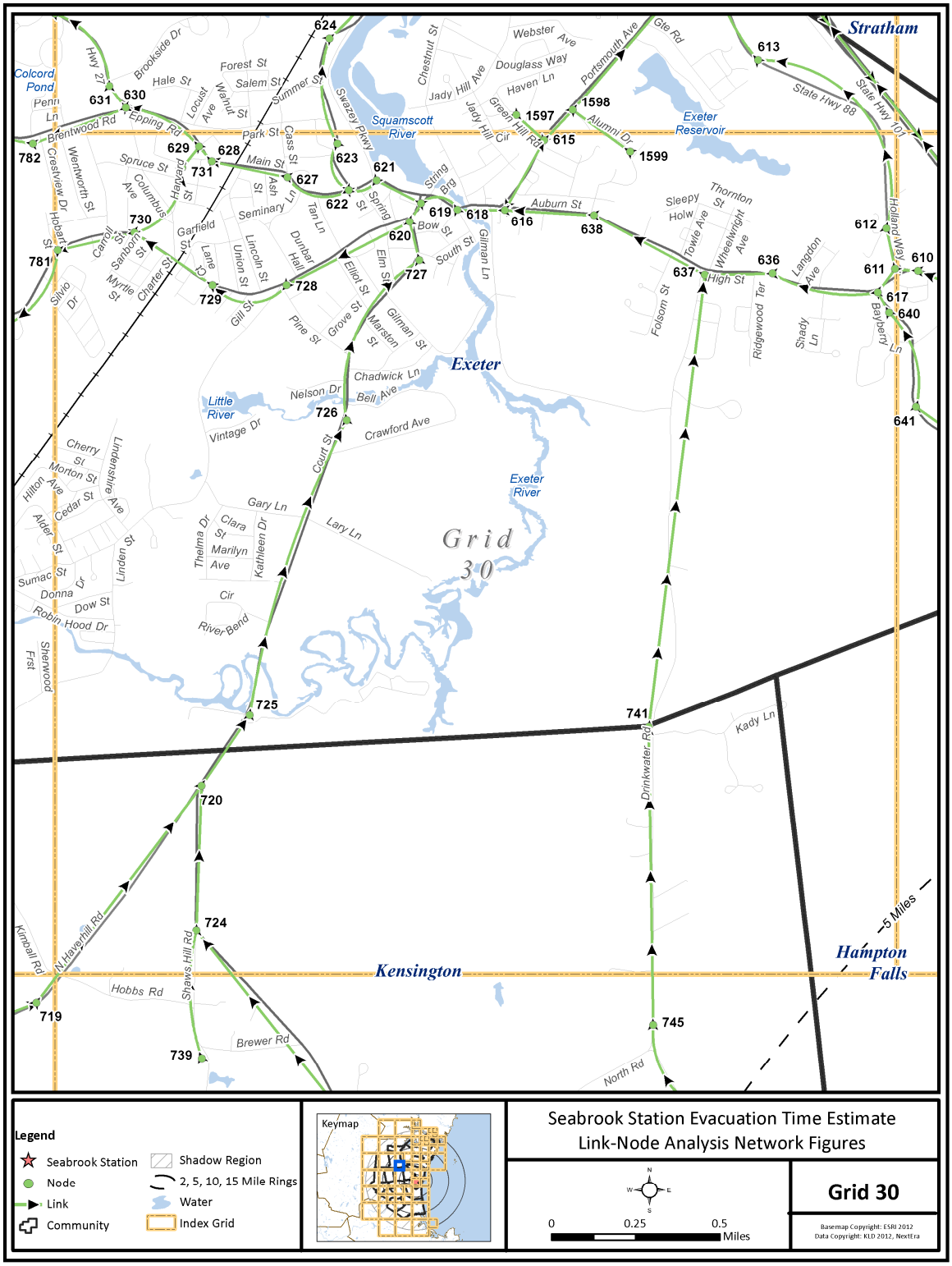
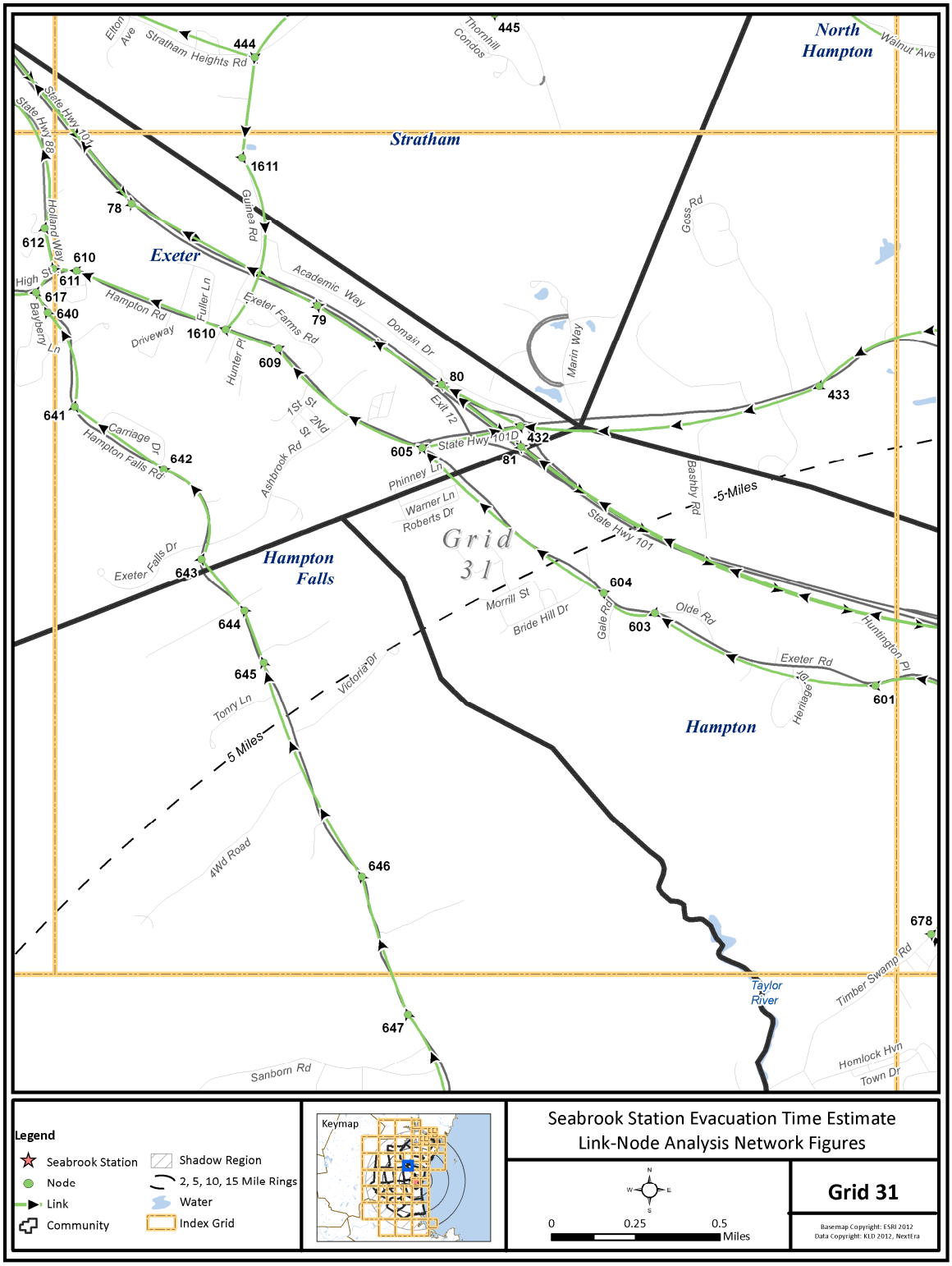


Figure K-31. Link-Node Analysis Network – Grid 30



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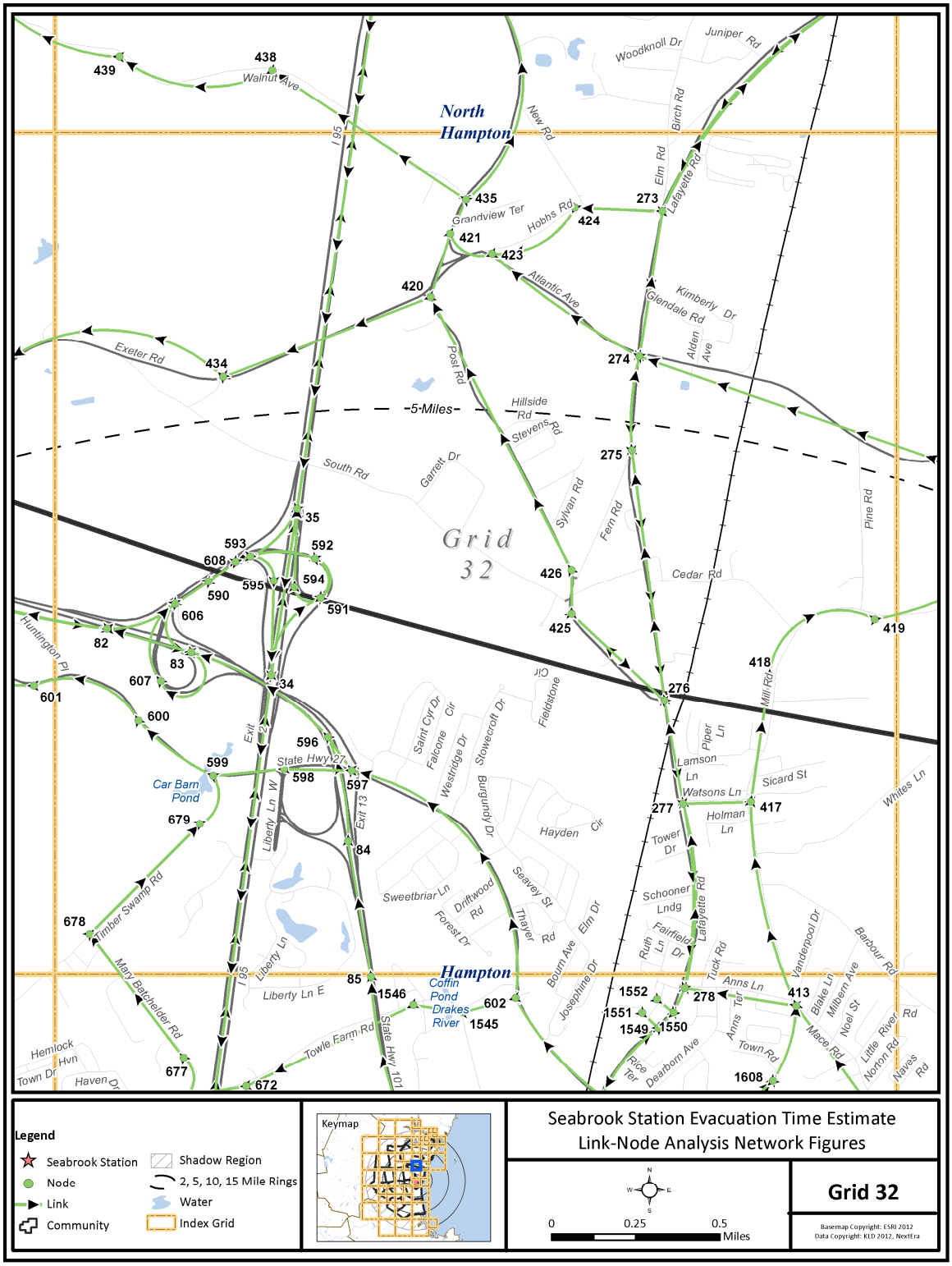

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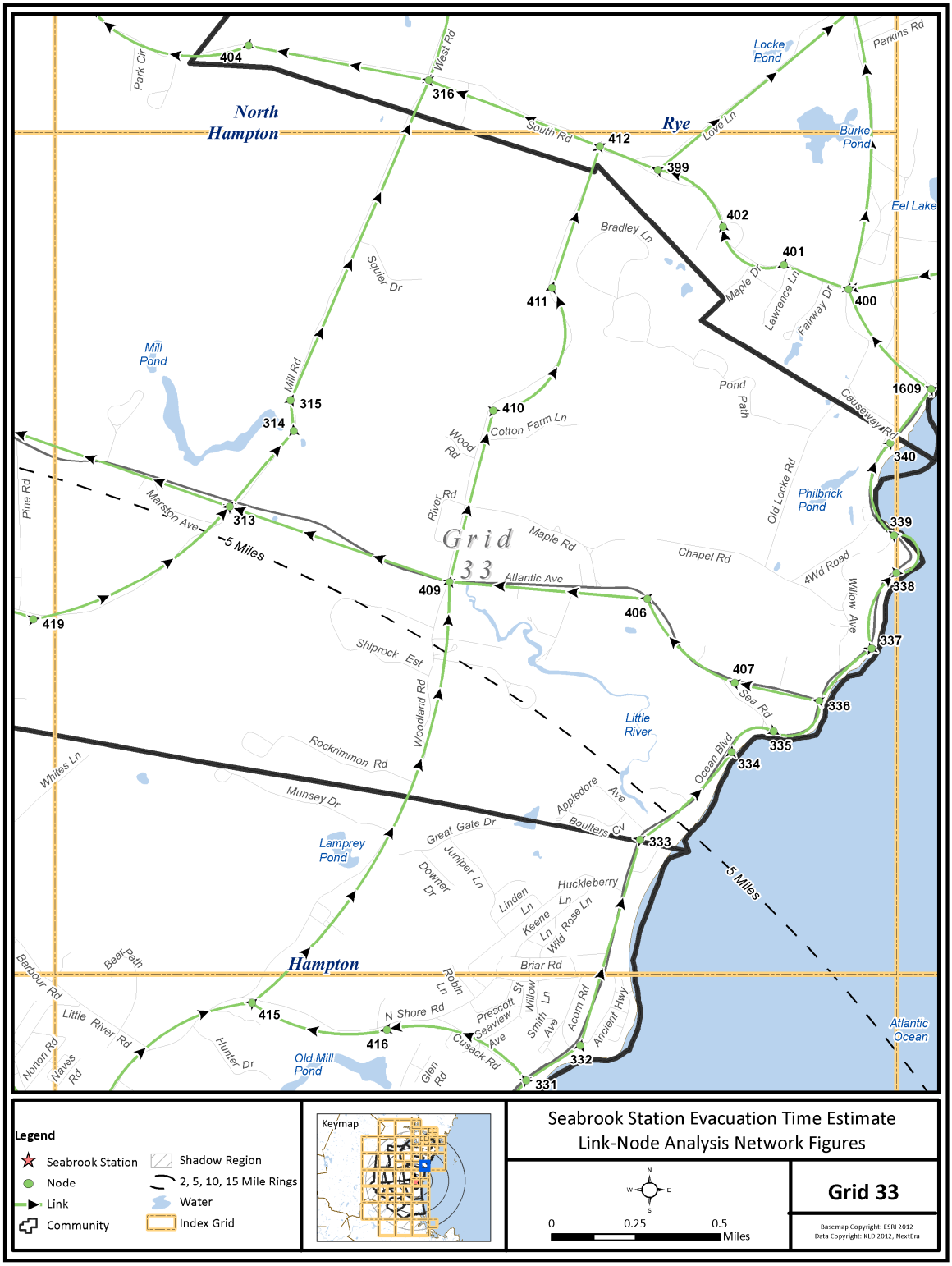


Figure K-34. Link-Node Analysis Network – Grid 33

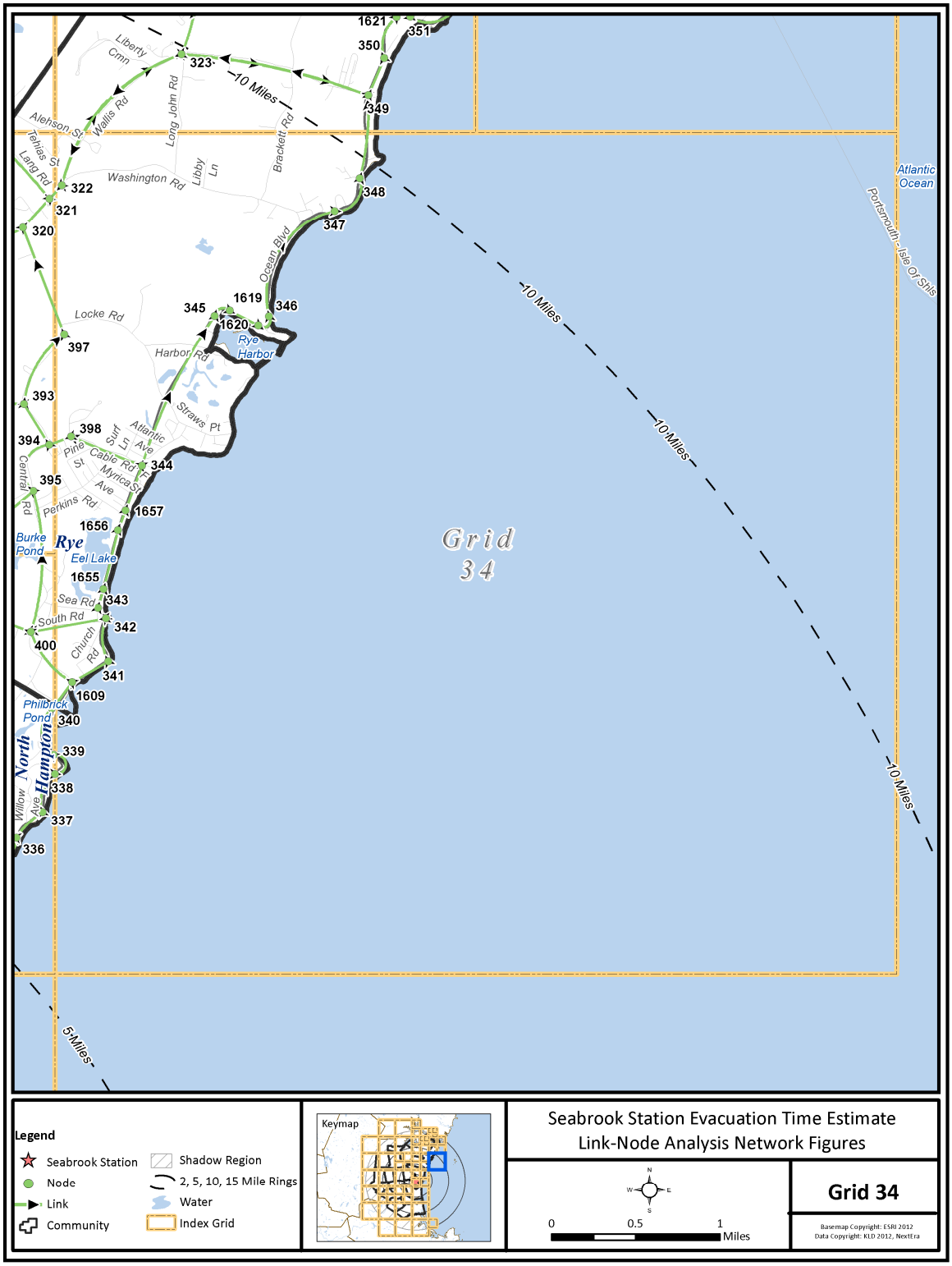
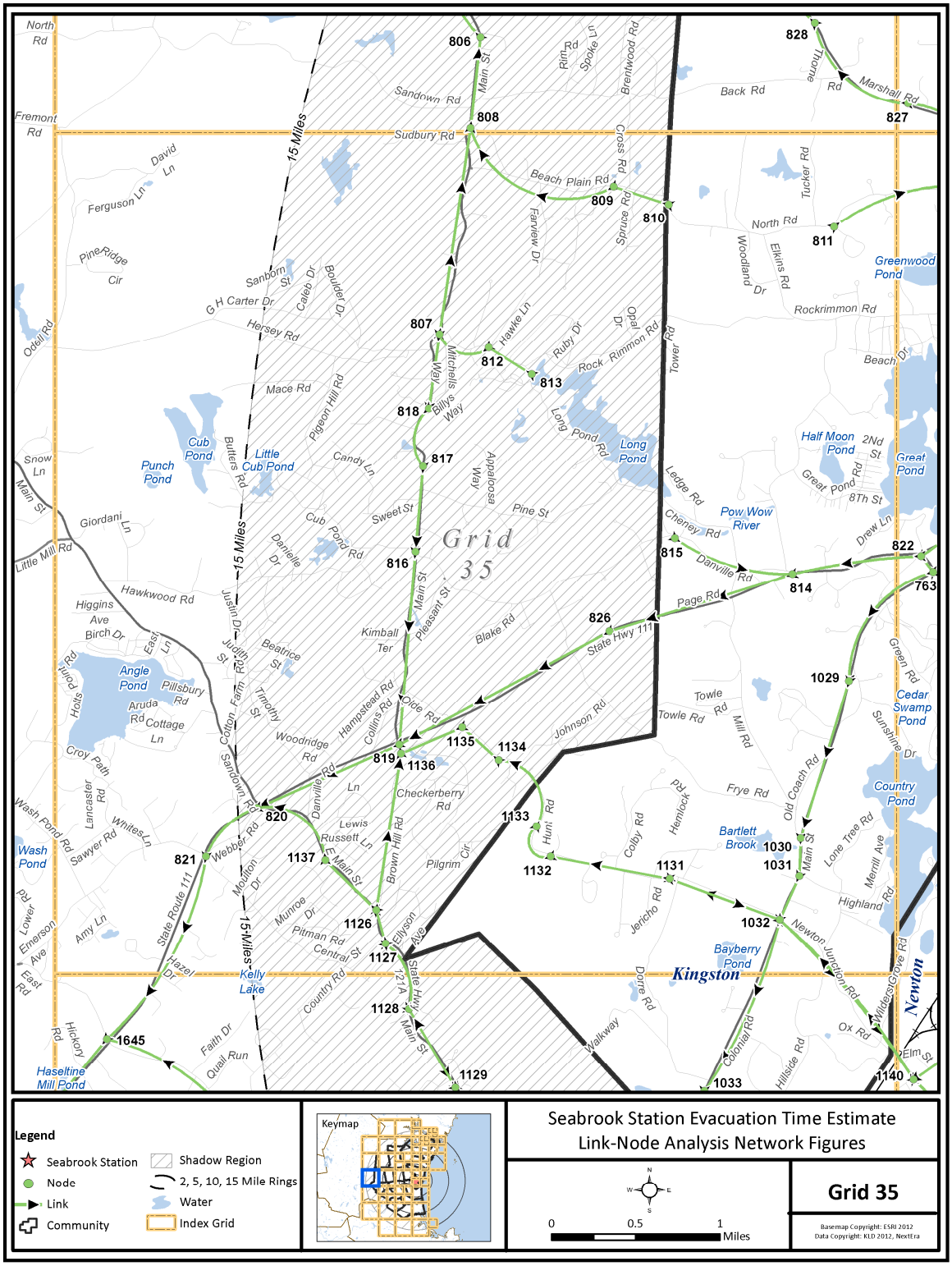


Figure K-35. Link-Node Analysis Network – Grid 34


Grid 35
Legend
Seabrook Station
Node
Link
Community
Shadow Region
2, 5, 10, 15 Mile Rings
Water
Index Grid
Keymap
Seabrook Station Evacuation Time Estimate
Link-Node Analysis Network Figures
Grid 35
0
0.5
1
Miles
Basemap Copyright: ESRI 2012
Data Copyright: KLD 2012, NextEra
15 Miles
Kingston
Newton
Kelly Lake
Haseltine Mill Pond
Angle Pond
Cub Pond
Little Cub Pond
Punch Pond
Long Pond
Half Moon Pond
Great Pond
Greenwood Pond
Pow Wow River
Cedar Swamp Pond
Country Pond
Bayberry Pond
Bartlett Brook
Wash Pond
Sandown Rd
Main St
Danville Rd
Page Rd
State Hwy 111
State Route 111
Sudbury Rd
Beach Plain Rd
Rockrimmon Rd
Hawkwood Rd
Little Mill Rd
Fremont Rd
Pine St
Sweet St
Blake Rd
Johnson Rd
Towle Rd
Frye Rd
Highland Rd
Newton Junction Rd
Walkway
Colonial Rd
Hillside Rd
Ox Rd
Elm St
Main St
Pleasant St
Kimball Ter
Olde Rd
Woodridge Rd
Checkerberry Rd
Lewis Russett Ln
Brown Hill Rd
E Main St
Pilgrim Cir
Ellyson Ave
Central St
Pitman Rd
Munroe Dr
Moulton Dr
Webber Rd
Sawyer Rd
Lancaster Rd
Croy Path
Cottage Ln
Aruda Rd
Pillsbury Rd
Hoits Point Rd
Higgins Ave
Birch Dr
East Ln
Giordani Ln
Snow Ln
Ferguson Ln
David Ln
Pine Ridge Cir
G H Carter Dr
Hersey Rd
Odell Rd
Mace Rd
Pigeon Hill Rd
Butters Rd
Candy Ln
Cub Pond Rd
Danielle Dr
Justin Dr
Judith St
Timothy St
Colton Farm Rd
Beatrice St
Hampstead Rd
Collins Rd
Danville Ln
Lower Emerson Rd
Amy Ln
Hazel Dr
Hickory Rd
Faith Dr
Quail Run
Country Rd
Route 121A
Doore Rd
Colby Rd
Hemlock Rd
Hunt Rd
Jericho Rd
Old Coach Rd
Mill Rd
Lone Tree Rd
Merrill Ave
Main St
Wilders Grove Rd
Green Rd
Sunshine Dr
Drew Ln
Cheney Rd
Ledge Rd
Tower Rd
Long Pond Rd
Ruby Dr
Rock Rimmon Rd
Mitchells Way
Billys Way
Hawke Ln
Appaloosa Way
Caleb Dr
Boulder Dr
Sanborn St
Fairview Dr
Spruce Rd
Cross Rd
Brentwood Rd
Spoke Ln
Rim Rd
Tucker Rd
Elkins Rd
Woodland Dr
Beach Dr
2Nd St
8Th St
Great Pond Rd
Thorne Rd
Marshall Rd
Back Rd
North Rd
Lancaster Rd
Wash Pond Rd
Sawyer Rd
Whites Ln
Lower Emerson Ave
East Rd
Hickory Rd
Haseltine Mill Pond
Faith Dr
Quail Run
Hazel Dr
Amy Ln
Kelly Lake
Country Rd
Route 121A
Main St
Ellyson Ave
Central St
Pitman Rd
Munroe Dr
Moulton Dr
Webber Rd
Sawyer Rd
Whites Ln
Lancaster Rd
Croy Path
Cottage Ln
Aruda Rd
Pillsbury Rd
Hoits Point Rd
Higgins Ave
Birch Dr
East Ln
Giordani Ln
Snow Ln
Ferguson Ln
David Ln
Pine Ridge Cir
G H Carter Dr
Hersey Rd
Odell Rd
Mace Rd
Pigeon Hill Rd
Butters Rd
Candy Ln
Cub Pond Rd
Danielle Dr
Justin Dr
Judith St
Timothy St
Colton Farm Rd
Beatrice St
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Faith Dr
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Route 121A
Doore Rd
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Green Rd
Sunshine Dr
Drew Ln
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Ruby Dr
Rock Rimmon Rd
Mitchells Way
Billys Way
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Appaloosa Way
Caleb Dr
Boulder Dr
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Fairview Dr
Spruce Rd
Cross Rd
Brentwood Rd
Spoke Ln
Rim Rd
Tucker Rd
Elkins Rd
Woodland Dr
Beach Dr
2Nd St
8Th St
Great Pond Rd
Thorne Rd
Marshall Rd
Back Rd
North Rd
Fremont Rd
Sudbury Rd
Sandown Rd
Main St
Danville Rd
Page Rd
State Hwy 111
State Route 111
Beach Plain Rd
Rockrimmon Rd
Hawkwood Rd
Little Mill Rd
Pine St
Sweet St
Blake Rd
Johnson Rd
Towle Rd
Frye Rd
Highland Rd
Newton Junction Rd
Walkway
Colonial Rd
Hillside Rd
Ox Rd
Elm St
Main St
Pleasant St
Kimball Ter
Olde Rd
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Checkerberry Rd
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Sawyer Rd

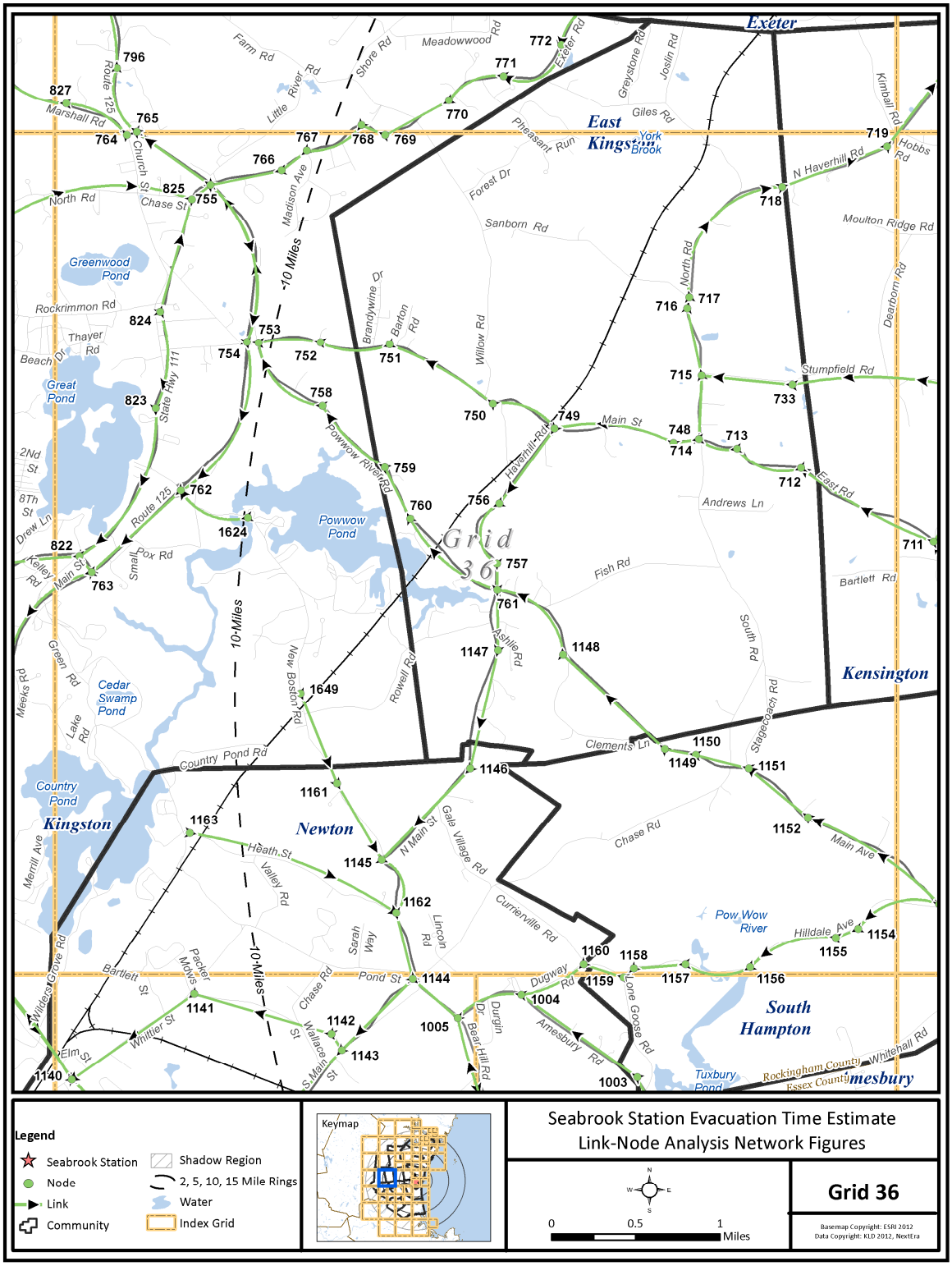

Figure K-37. Link-Node Analysis Network – Grid 36

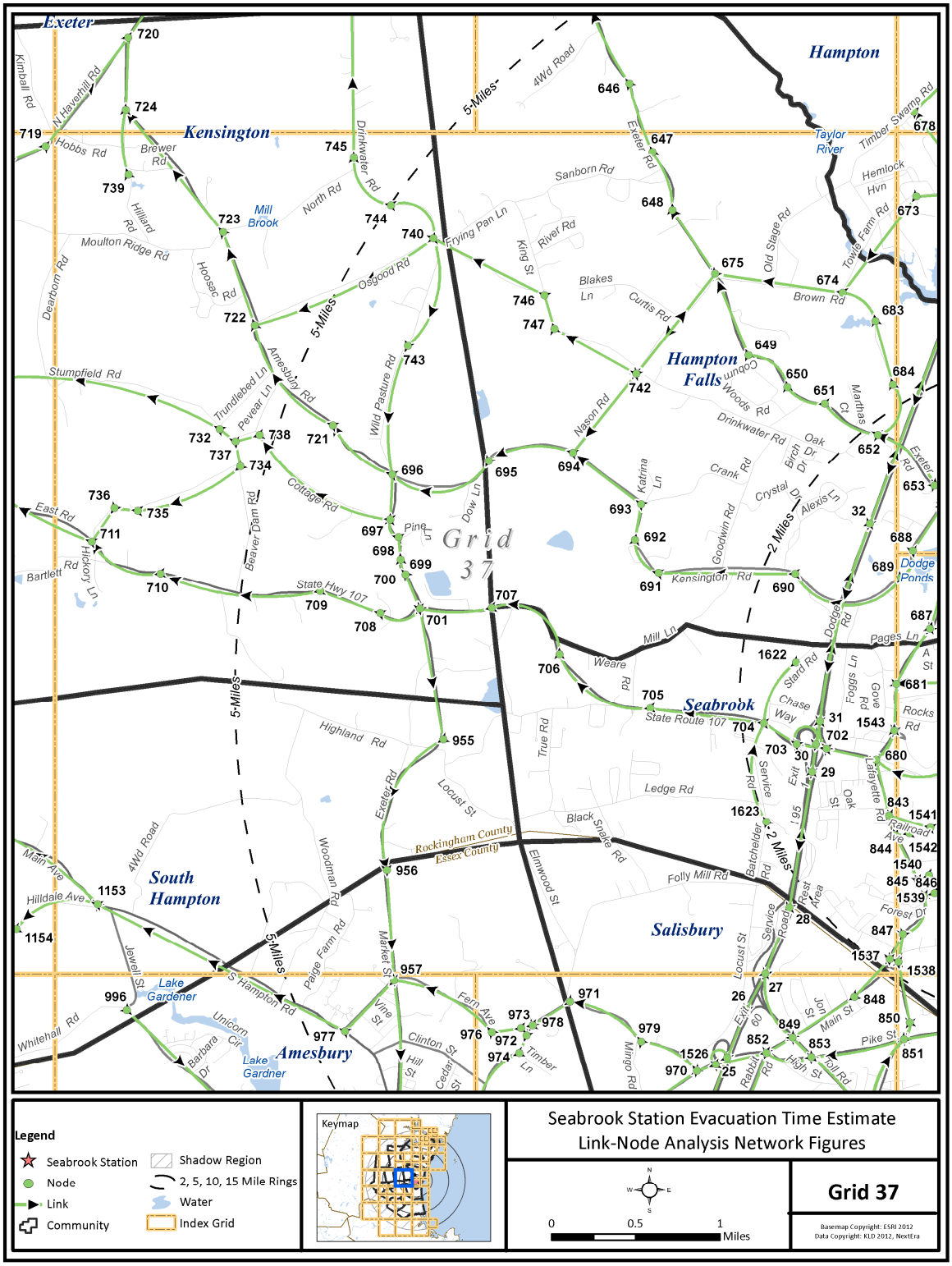

Figure K-38. Link-Node Analysis Network – Grid 37

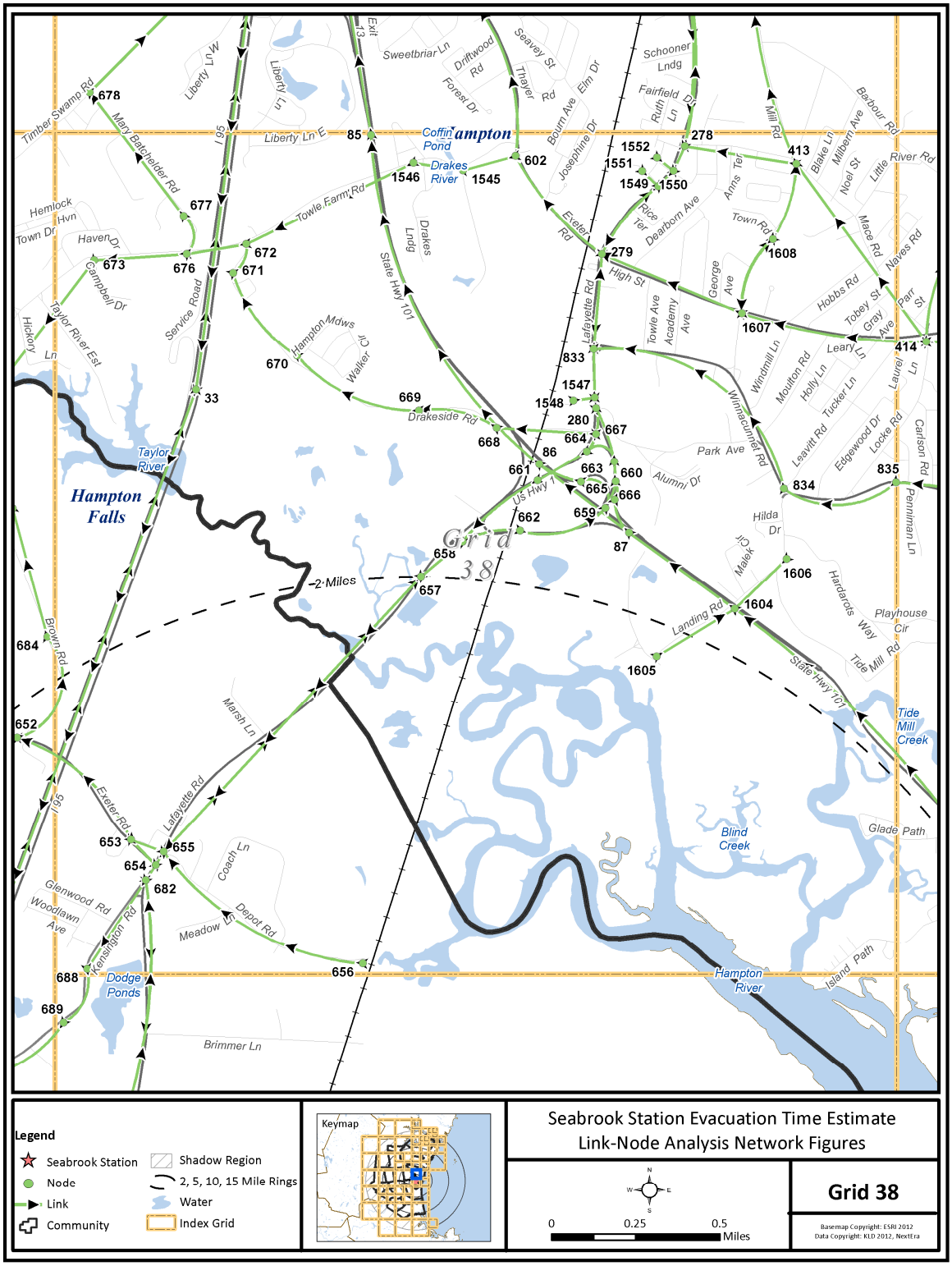

Figure K-39. Link-Node Analysis Network – Grid 38

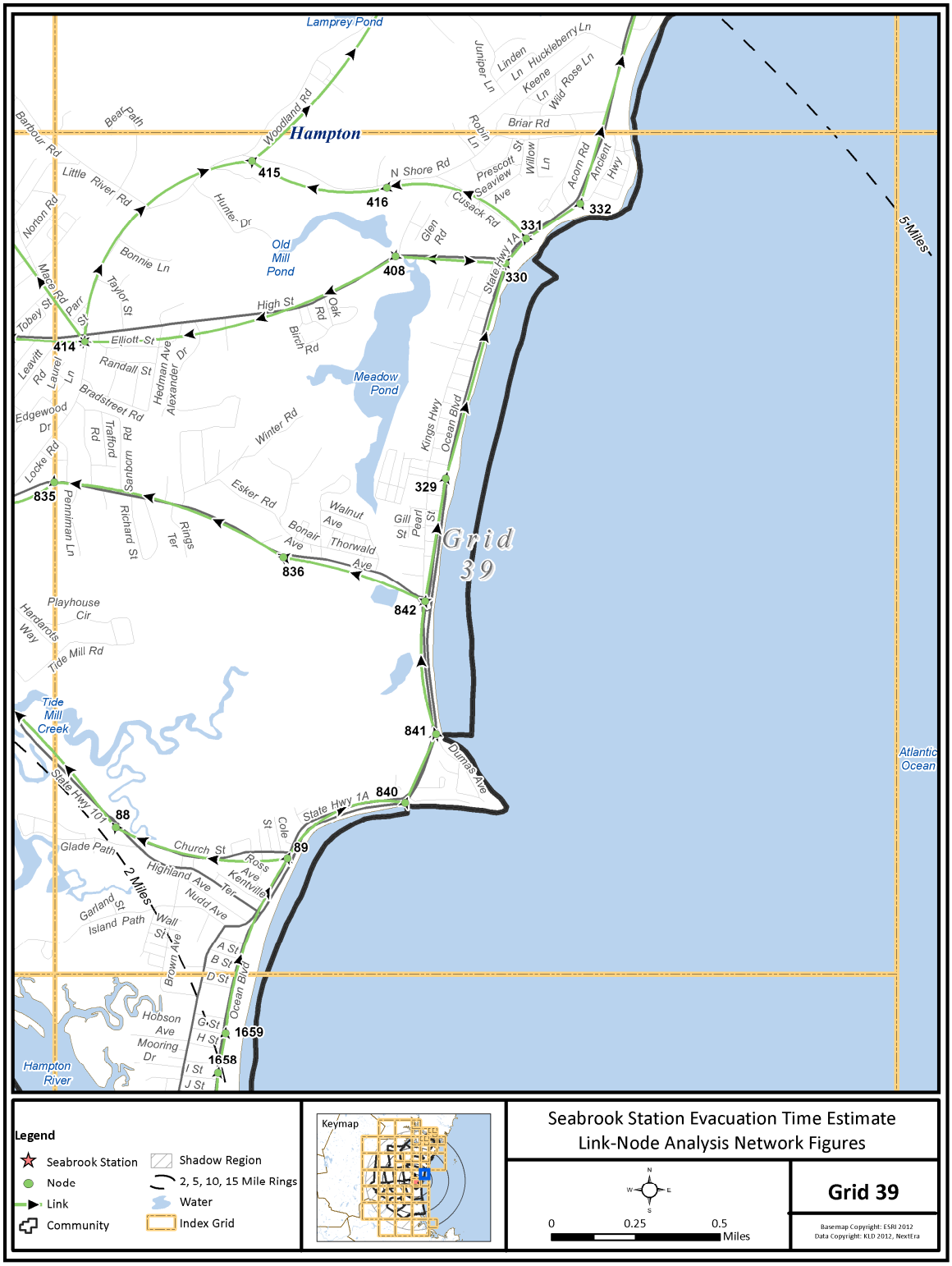

Figure K-40. Link-Node Analysis Network – Grid 39

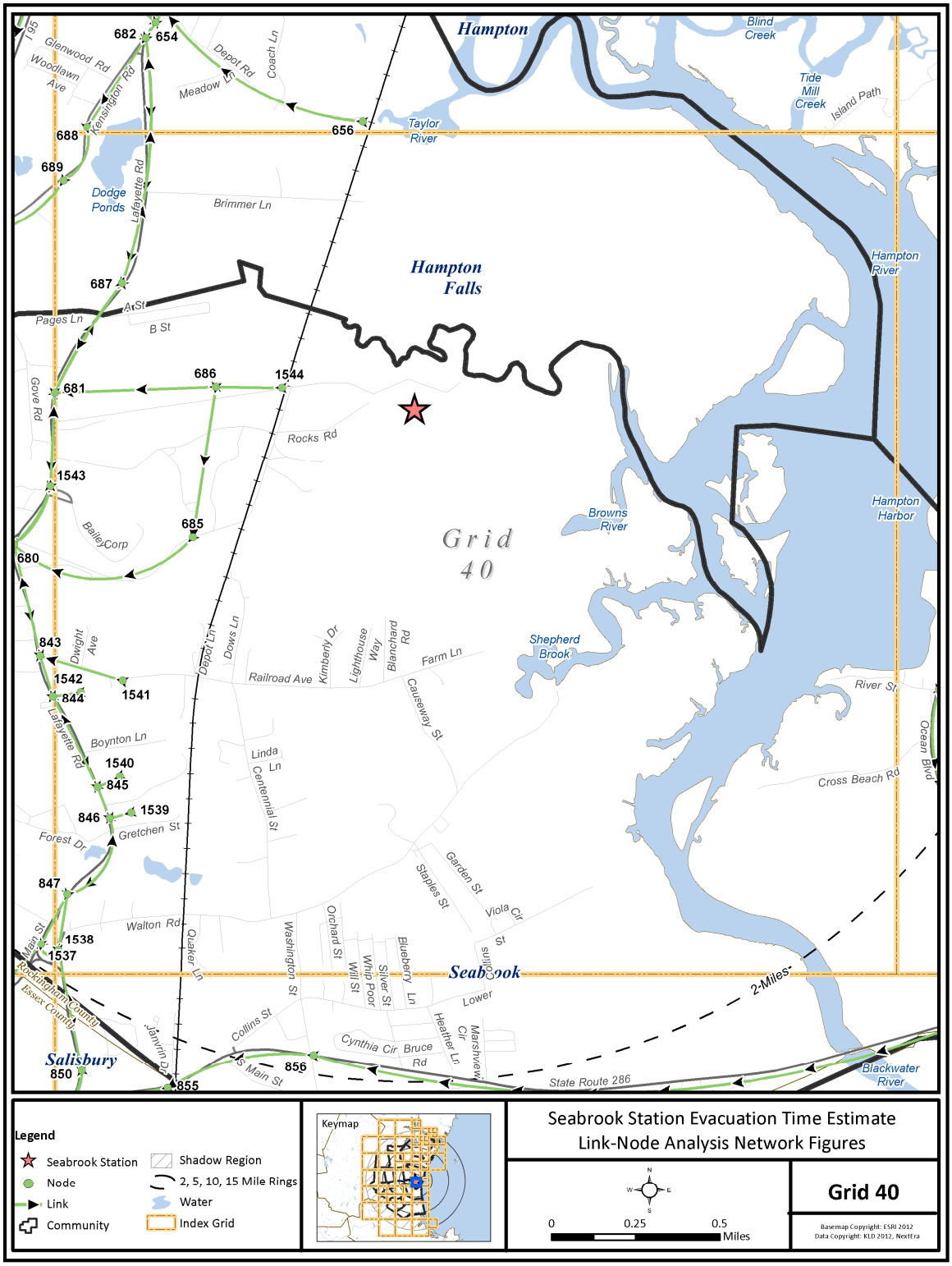

Figure K-41. Link-Node Analysis Network – Grid 40

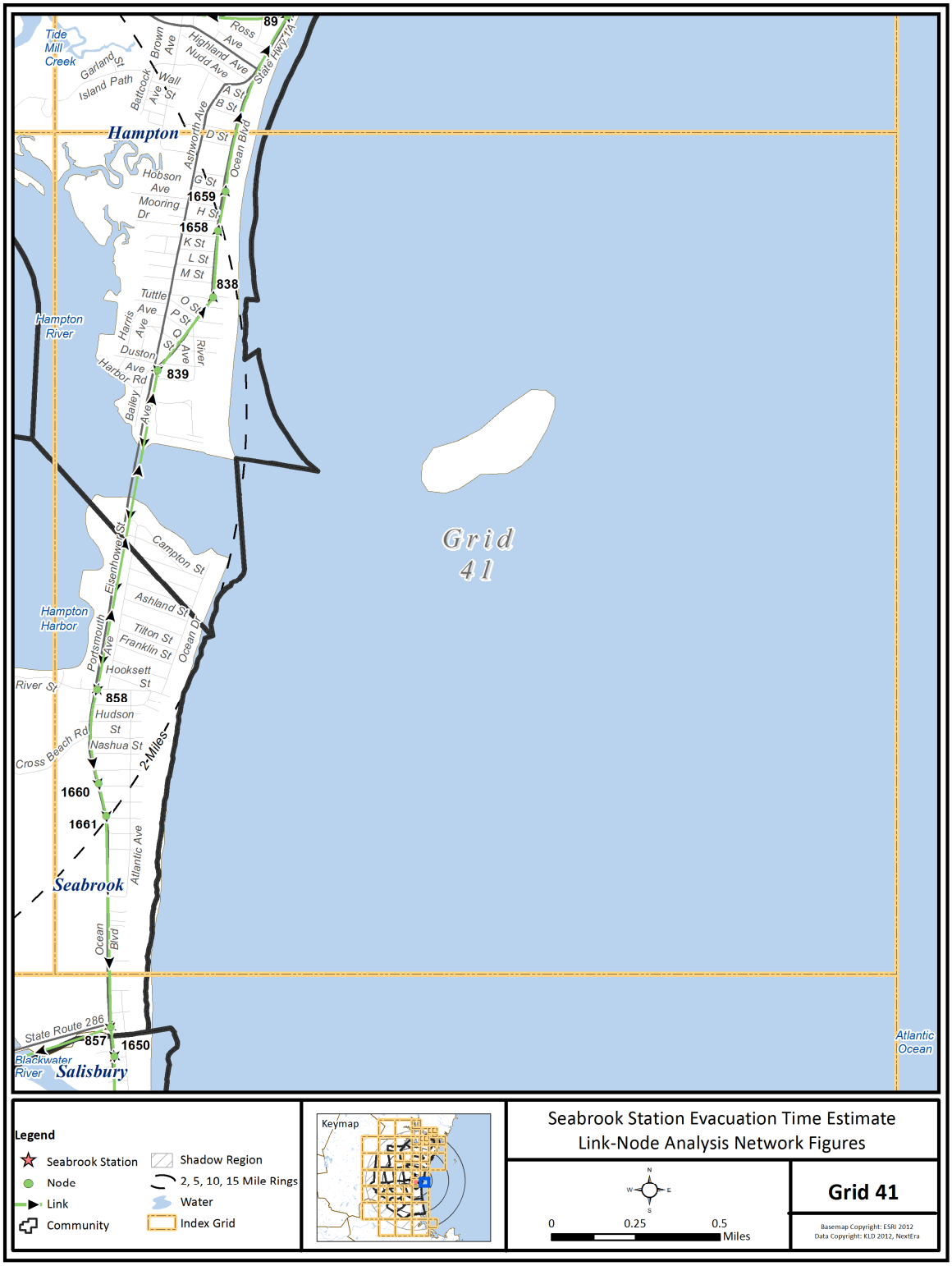

Figure K-42. Link-Node Analysis Network – Grid 41

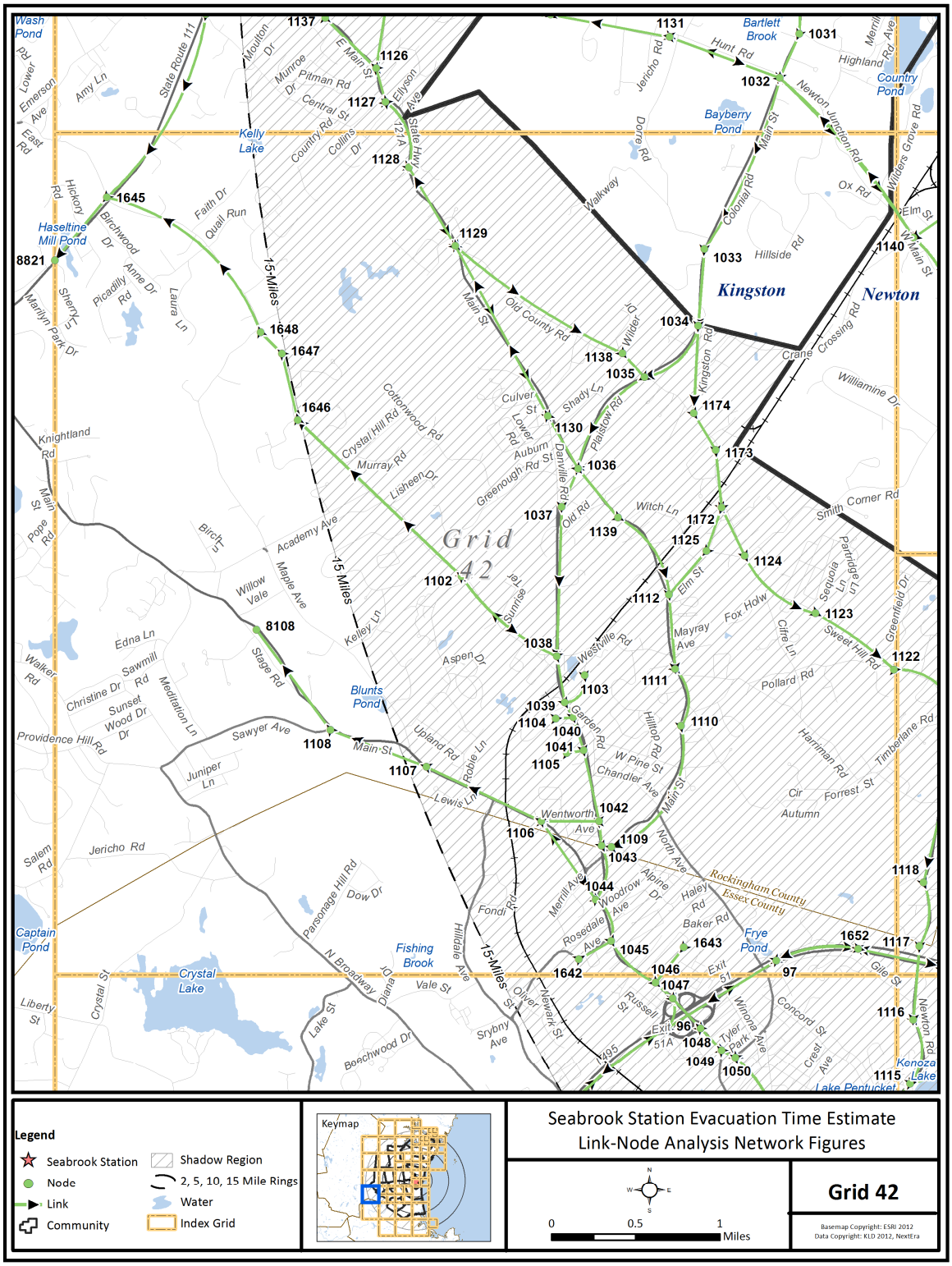

Figure K-43. Link-Node Analysis Network – Grid 42

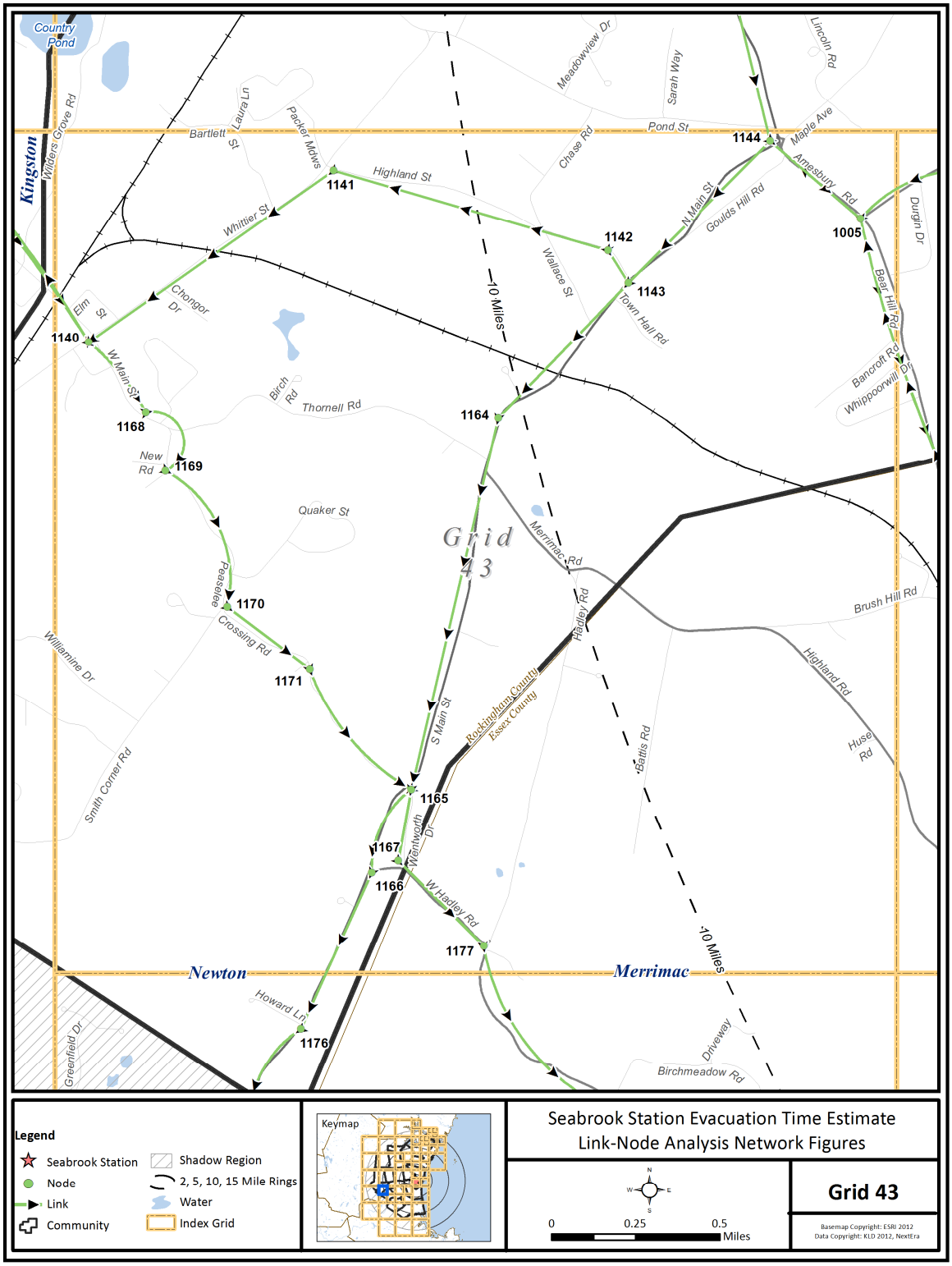

Figure K-44. Link-Node Analysis Network – Grid 43

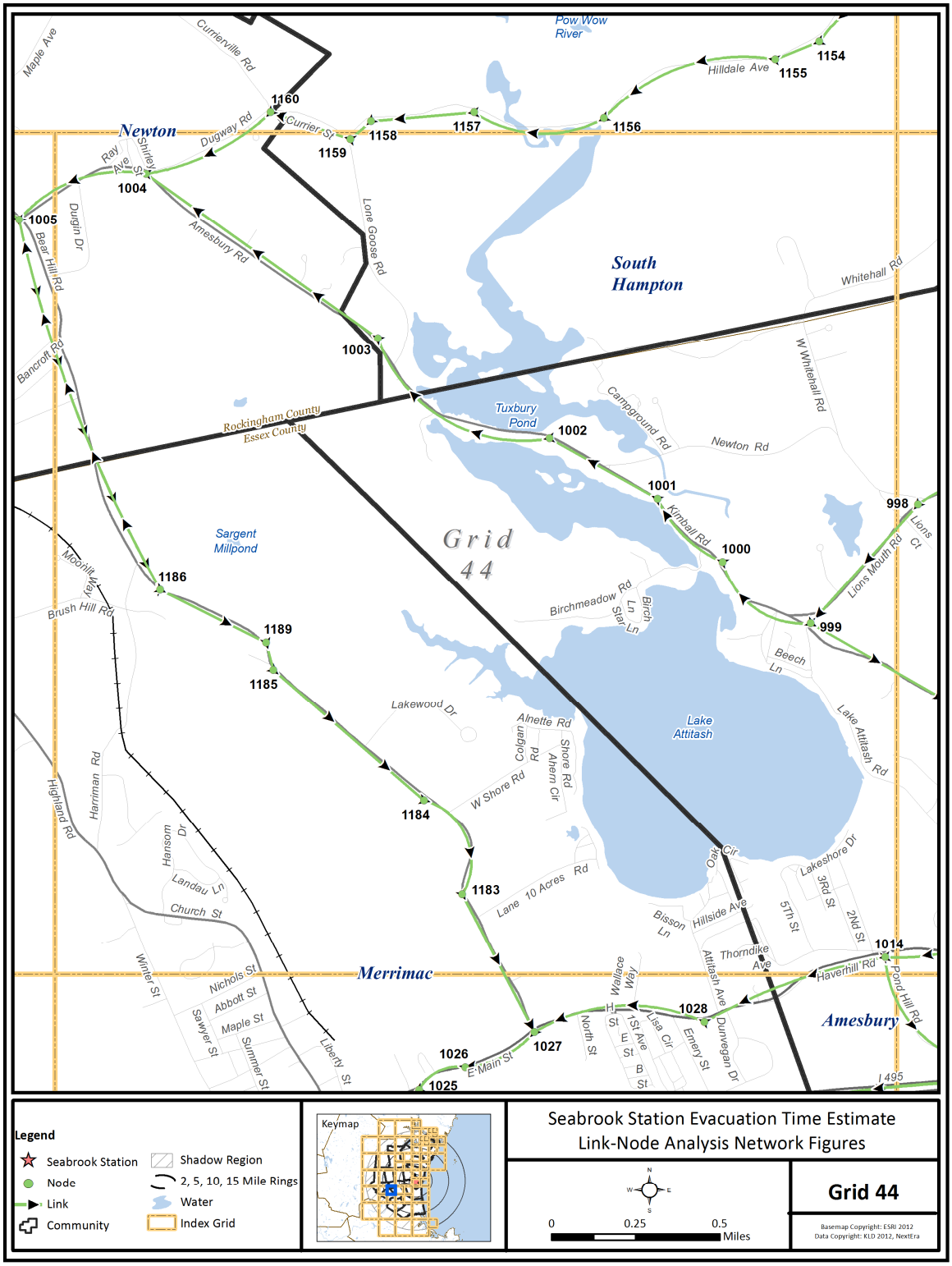

Figure K-45. Link-Node Analysis Network – Grid 44

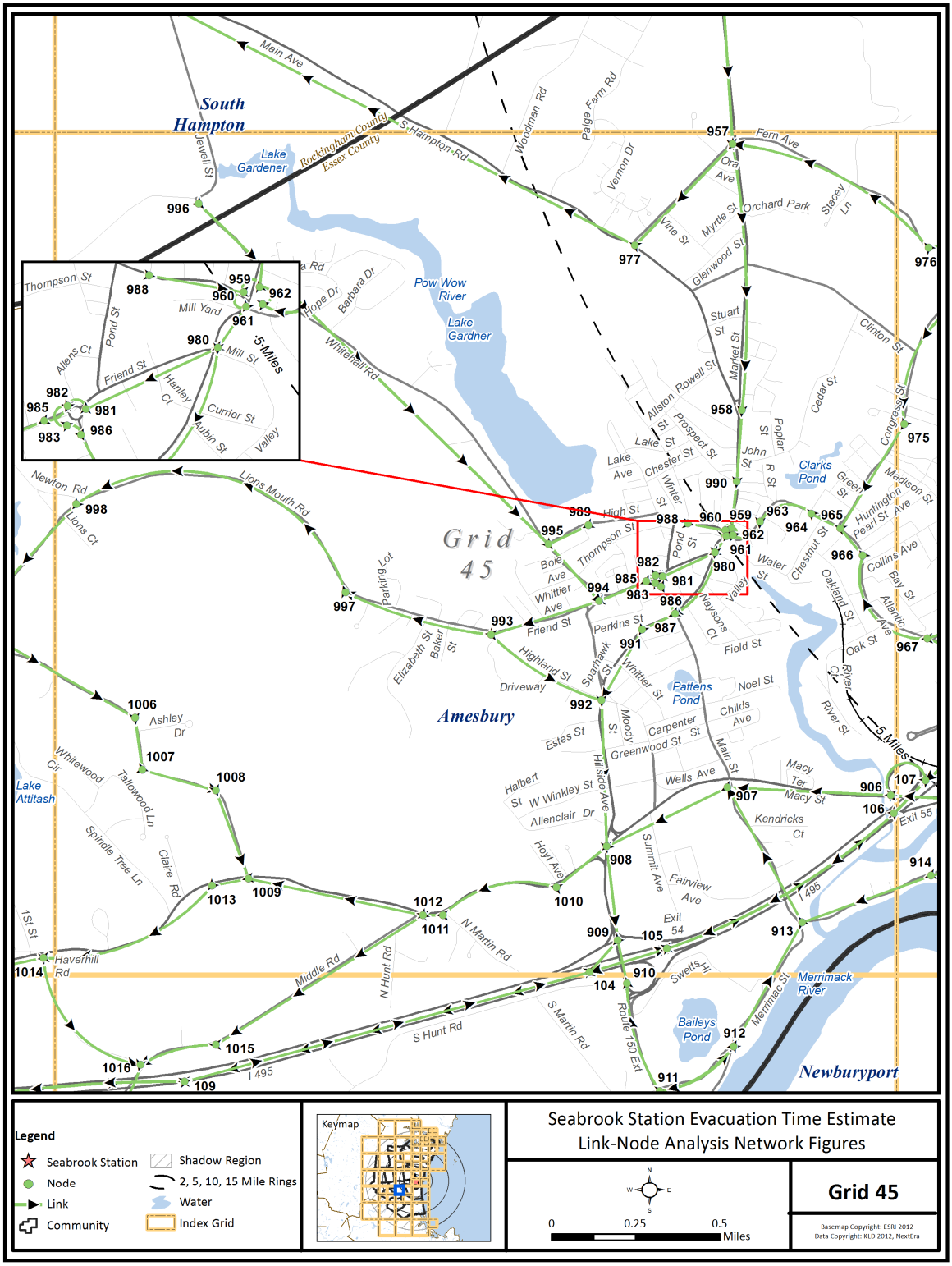

Figure K-46. Link-Node Analysis Network – Grid 45

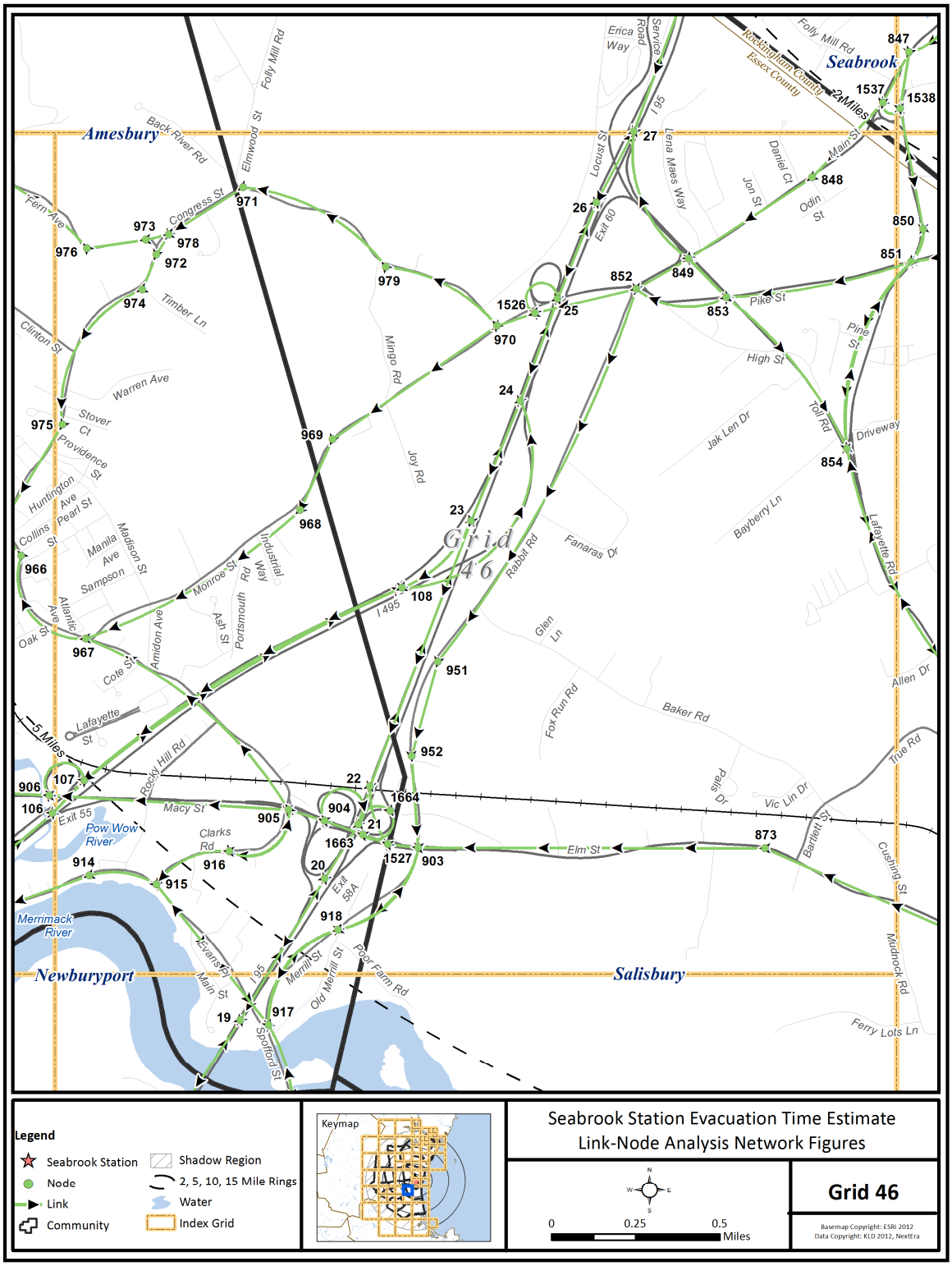

Figure K-47. Link-Node Analysis Network – Grid 46

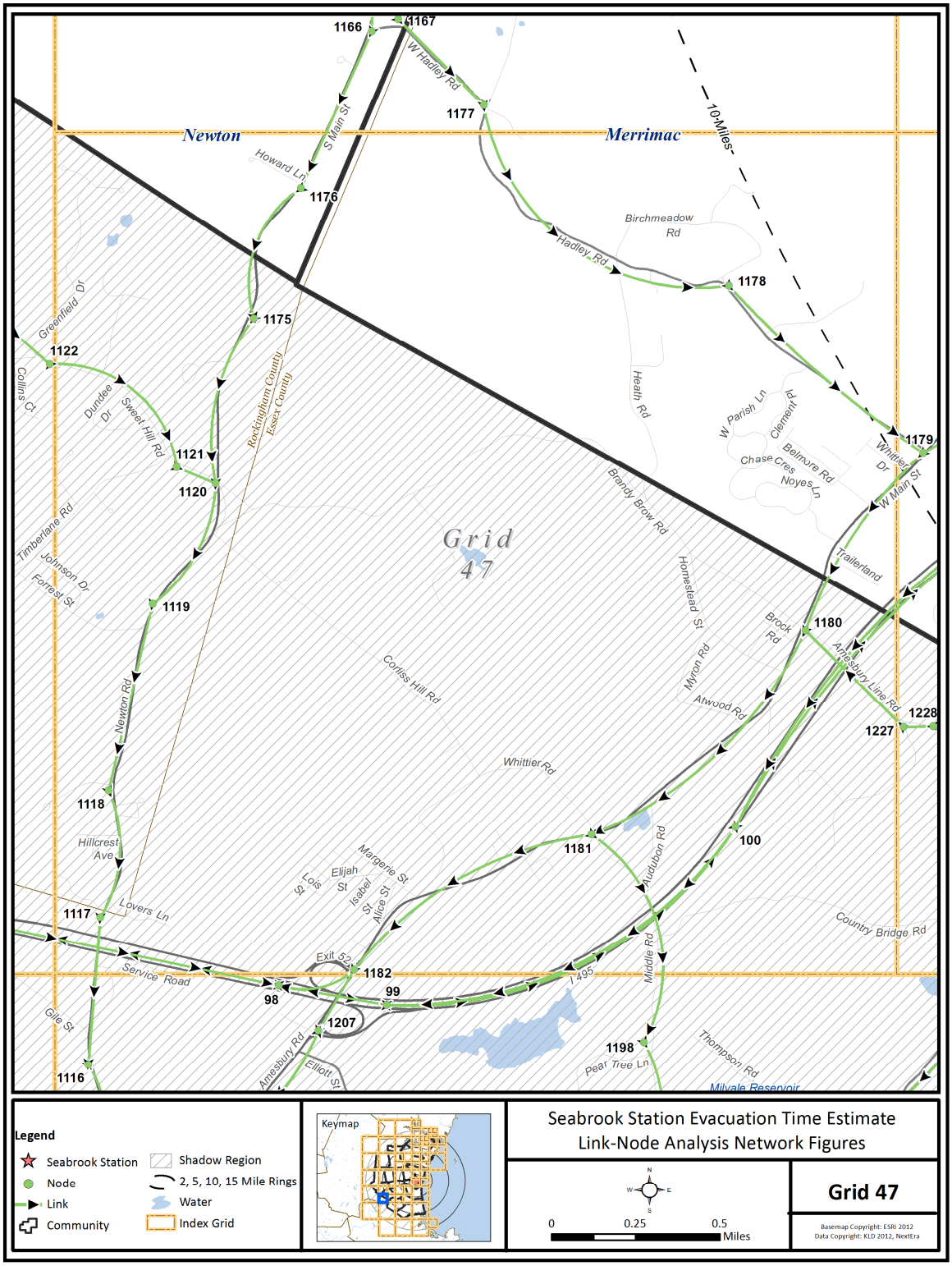

Figure K-48. Link-Node Analysis Network – Grid 47

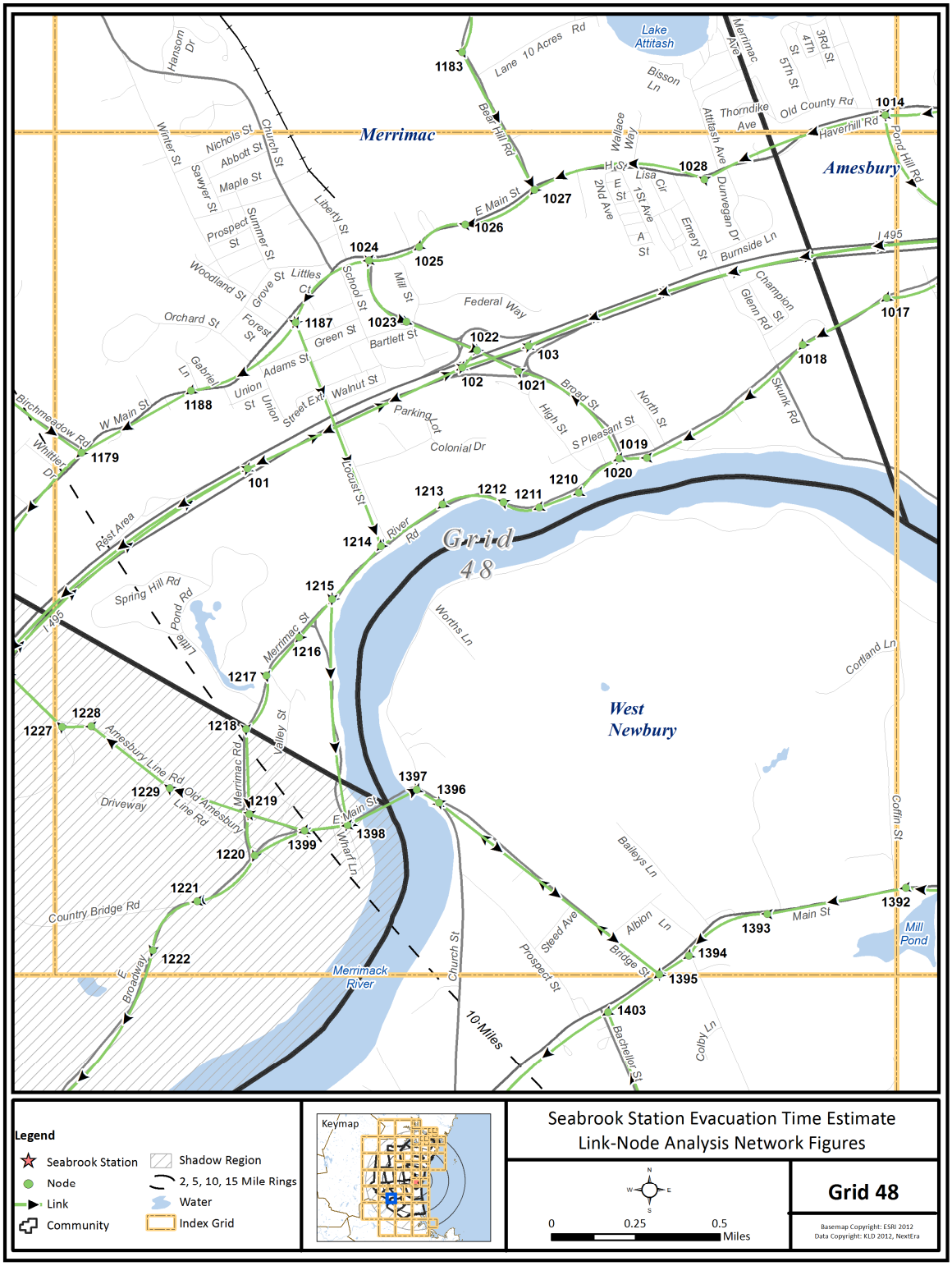

Figure K-49. Link-Node Analysis Network – Grid 48

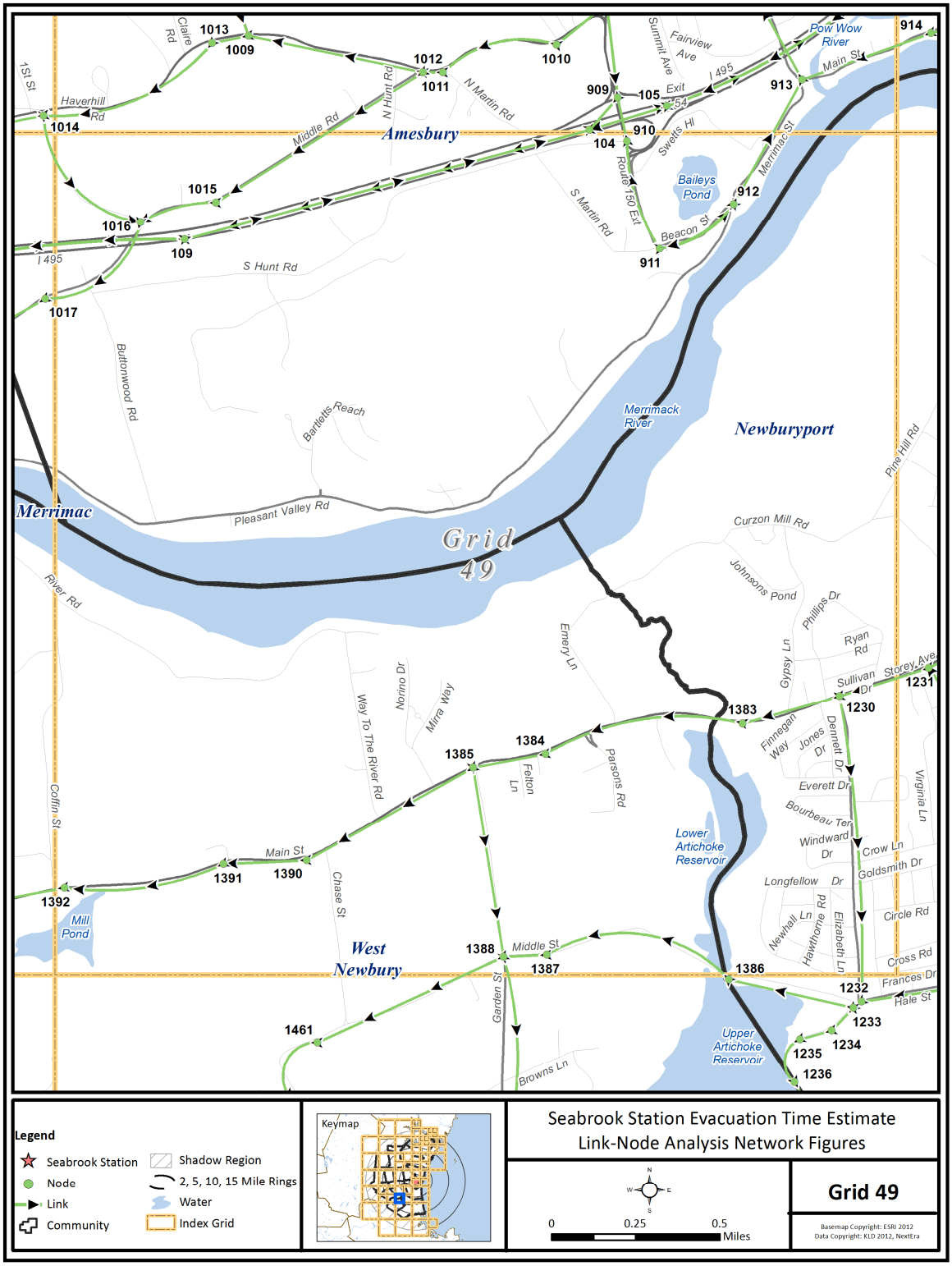

Figure K-50. Link-Node Analysis Network – Grid 49

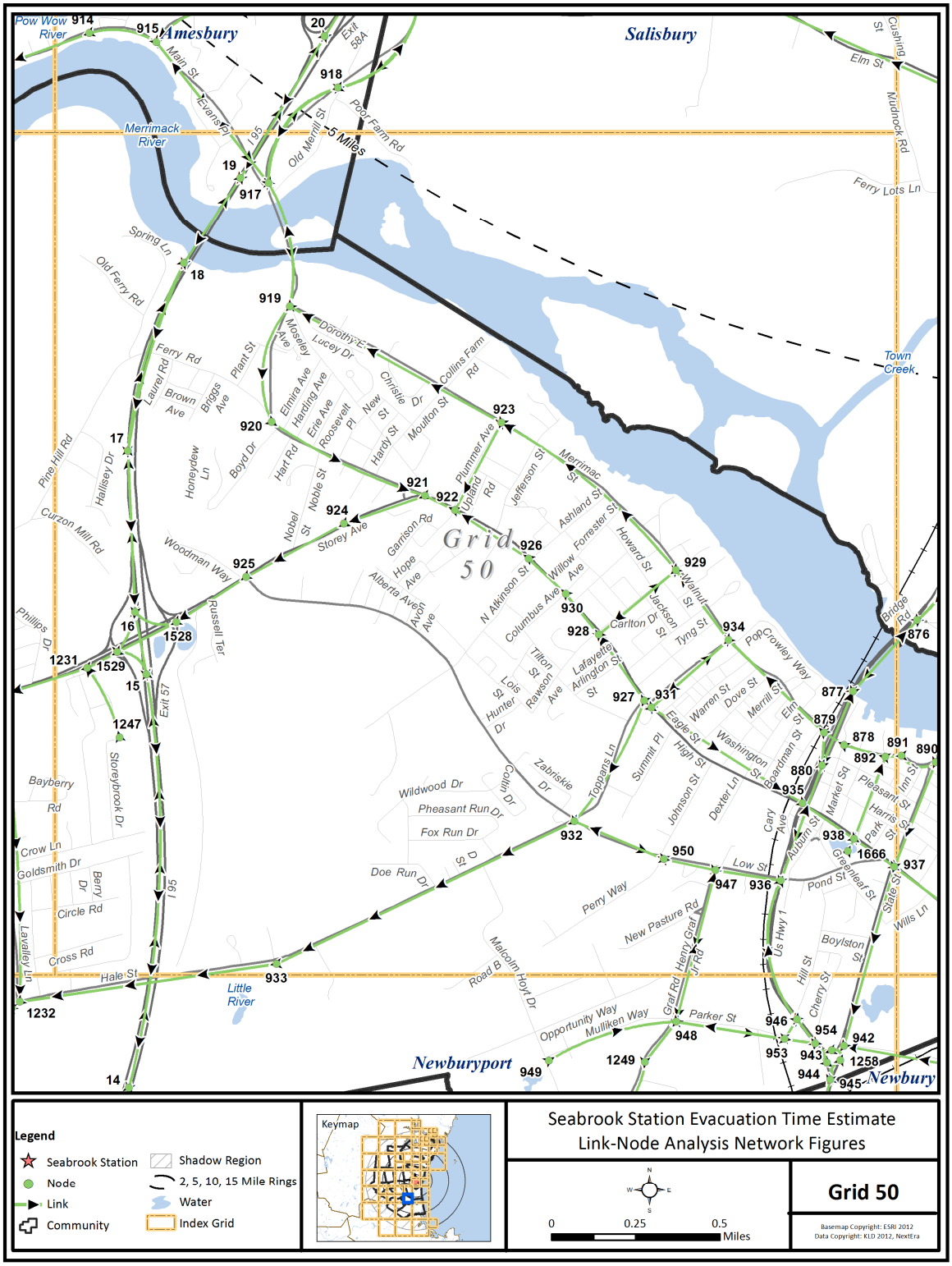

Figure K-51. Link-Node Analysis Network – Grid 50

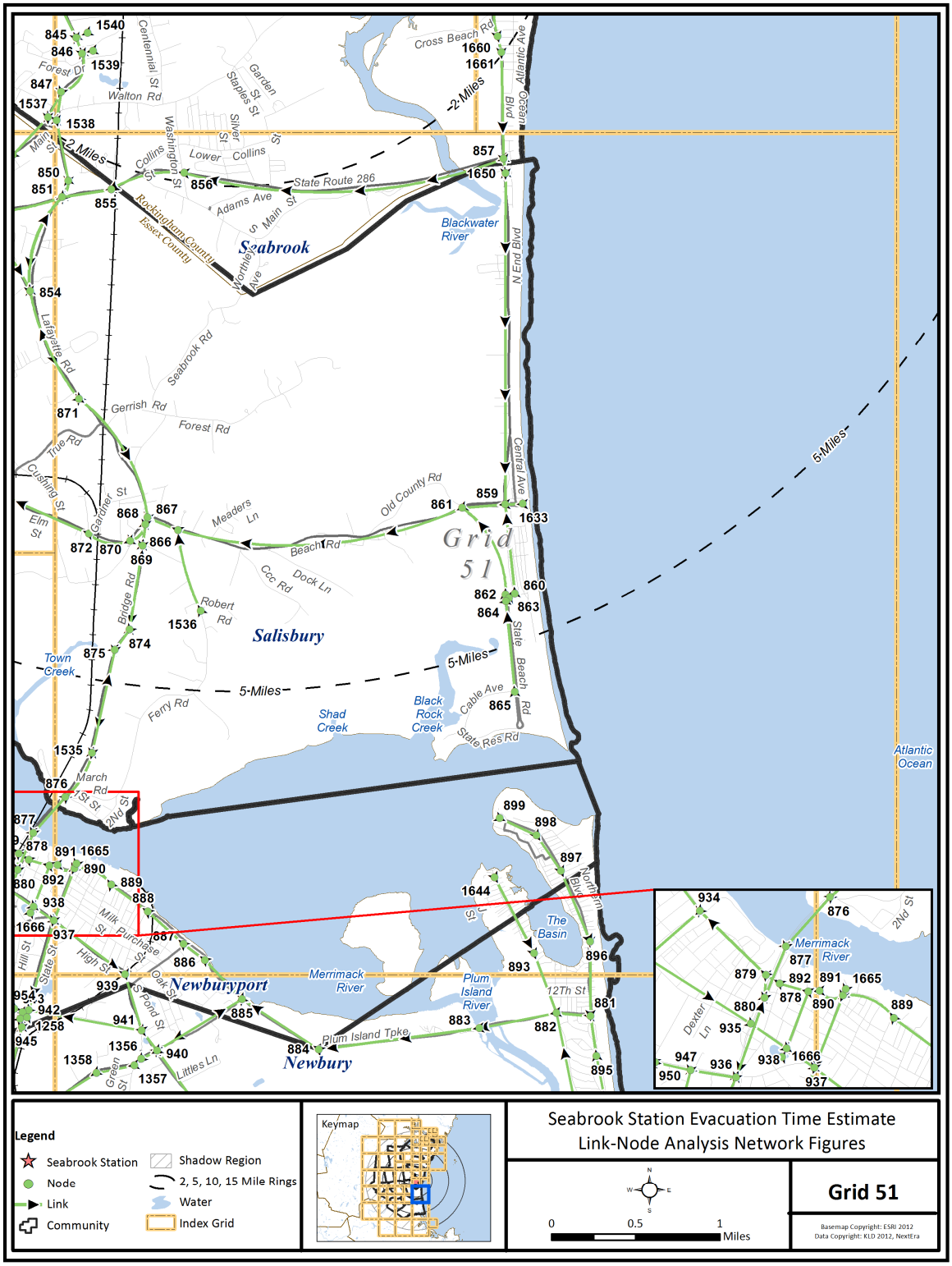

Figure K-52. Link-Node Analysis Network – Grid 51

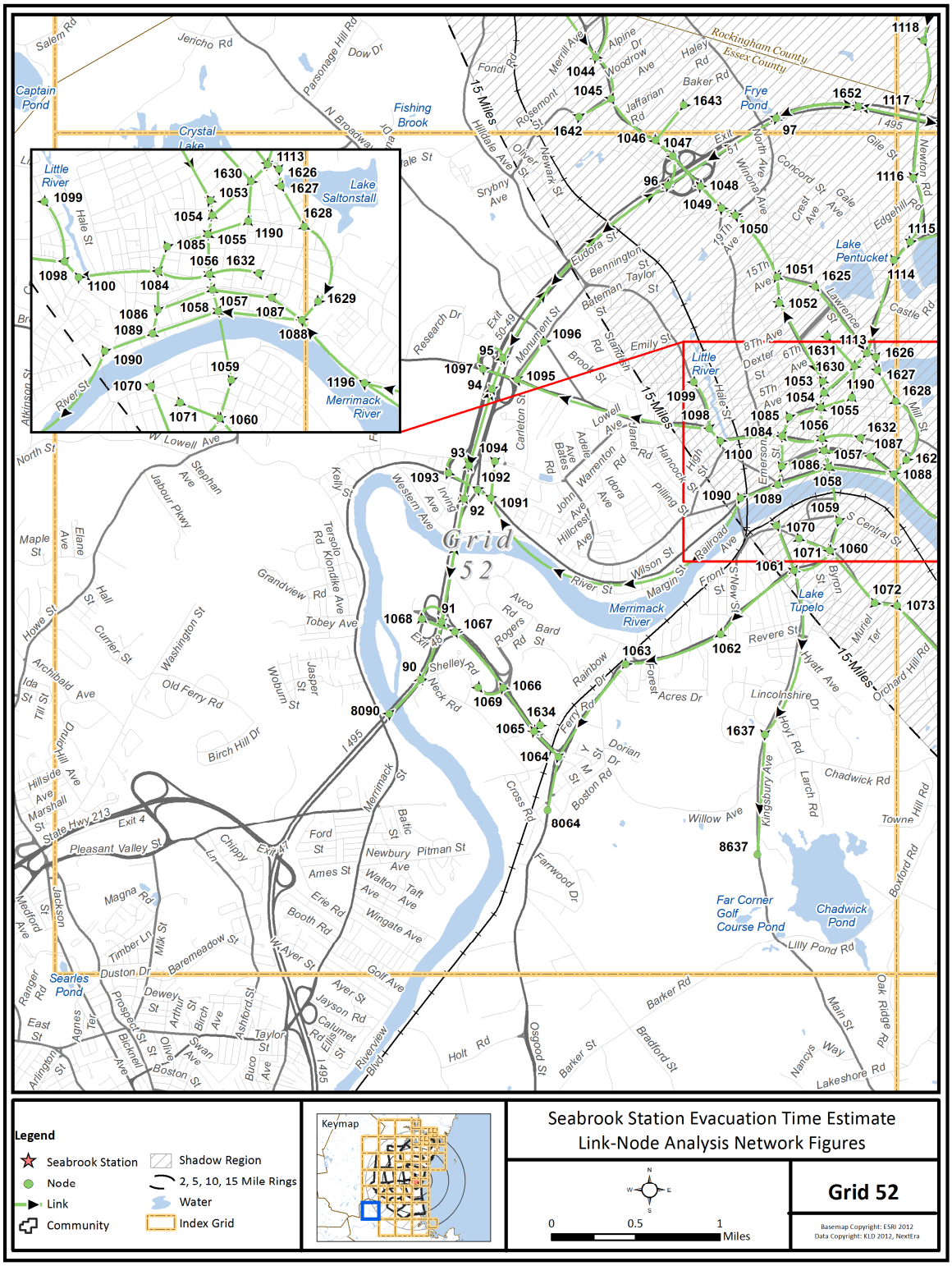

Figure K-53. Link-Node Analysis Network – Grid 52

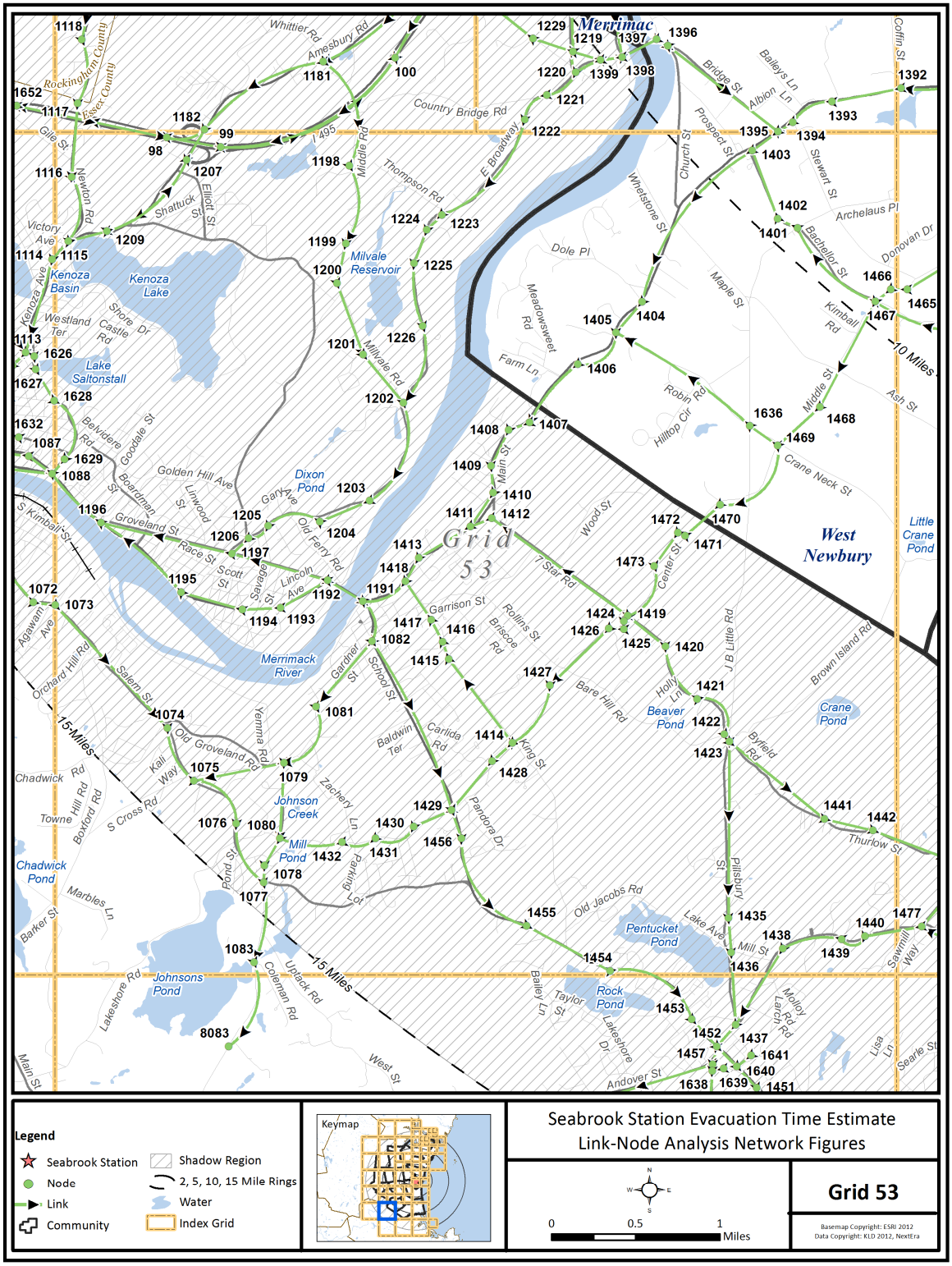

Figure K-54. Link-Node Analysis Network – Grid 53

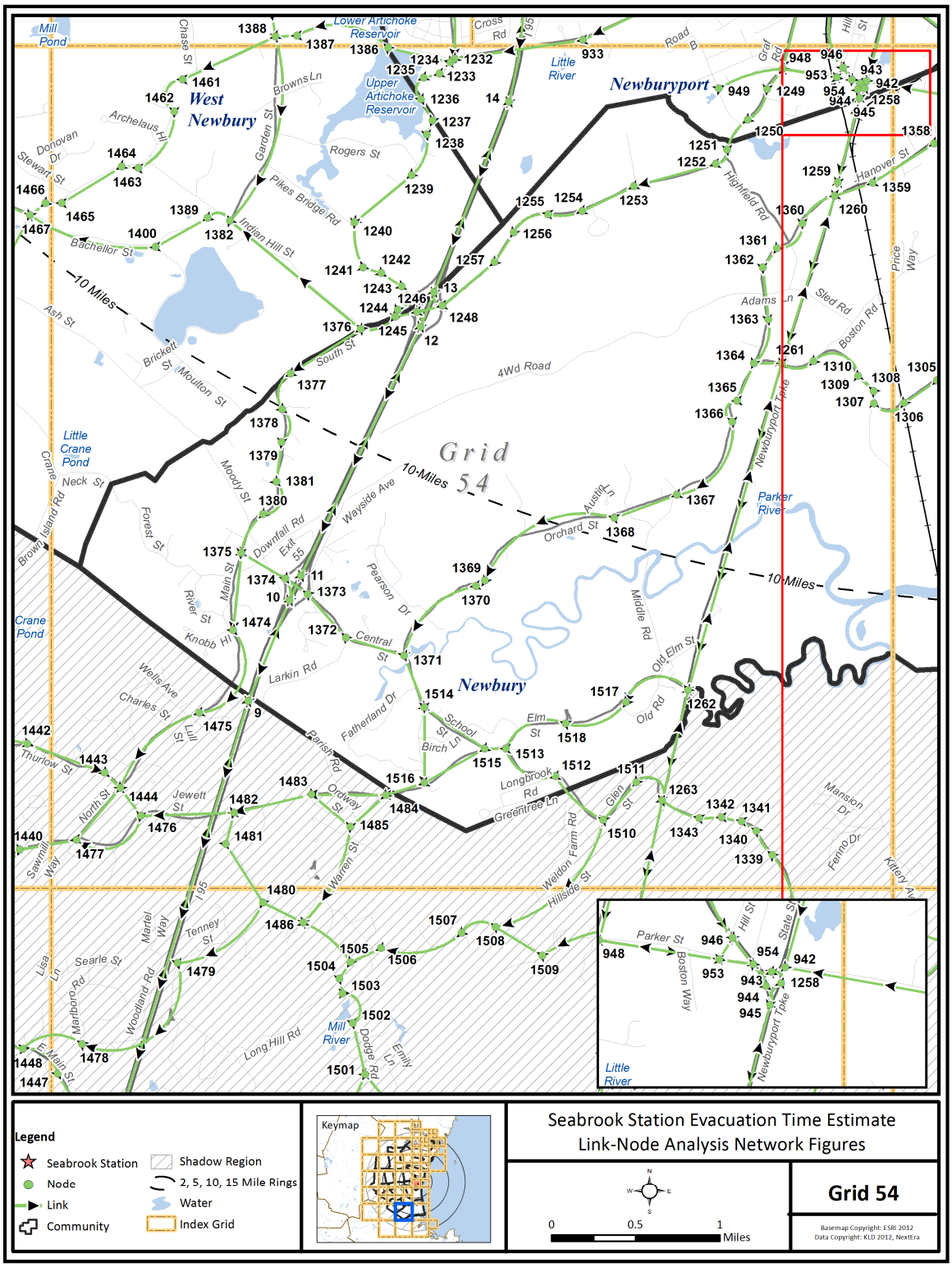

Figure K-55. Link-Node Analysis Network – Grid 54

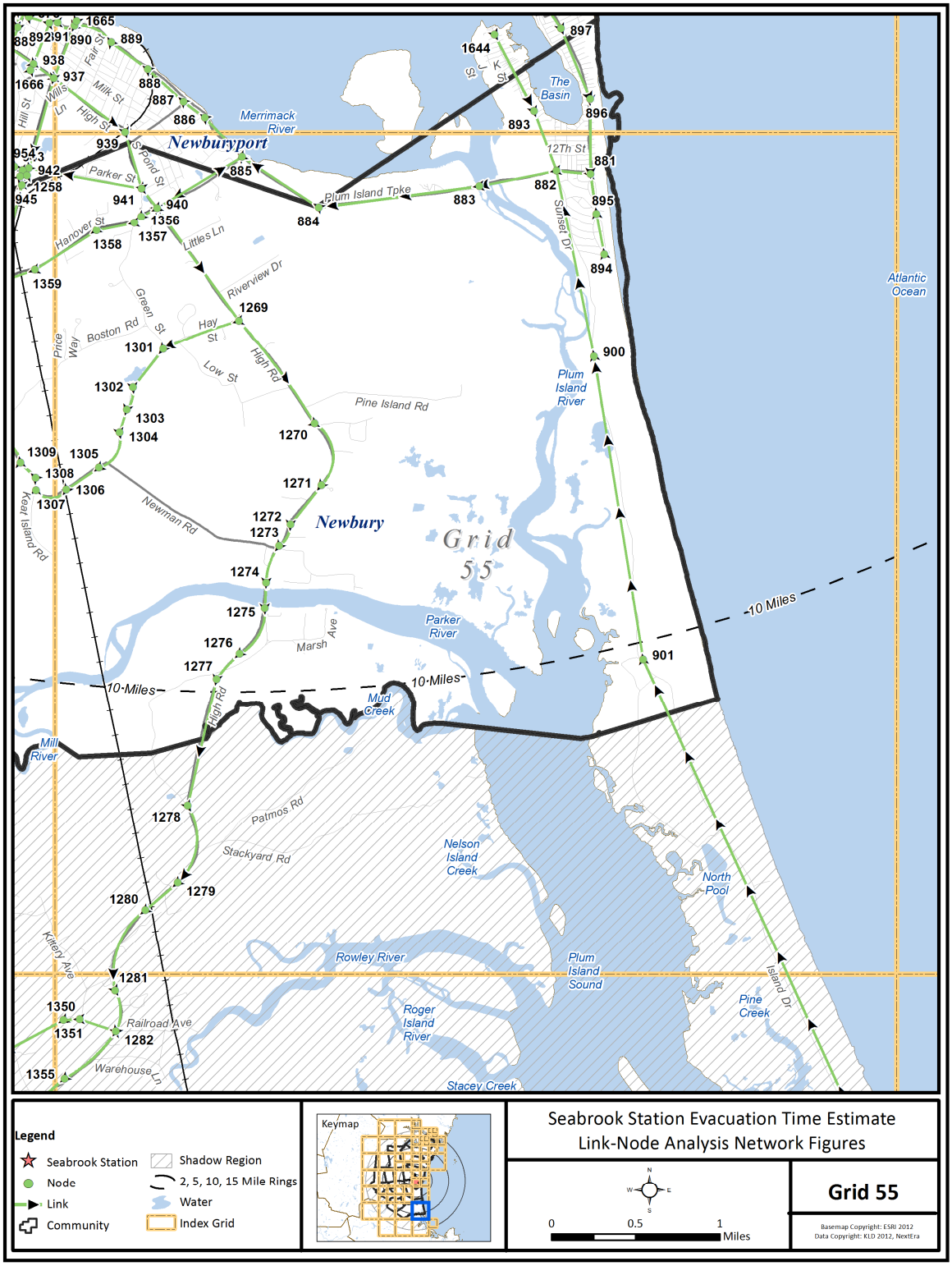

Figure K-56. Link-Node Analysis Network – Grid 55

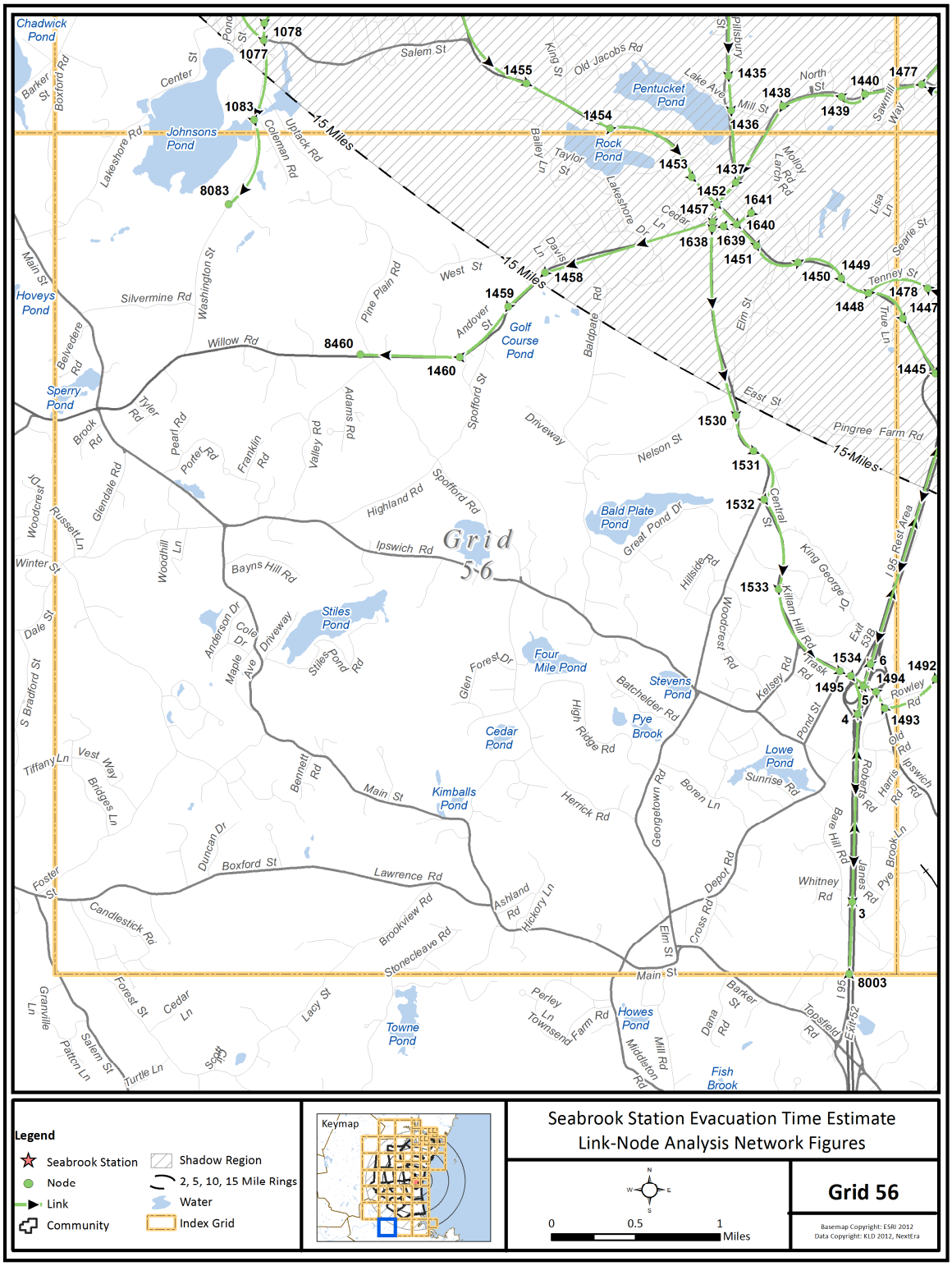

Figure K-57. Link-Node Analysis Network – Grid 56

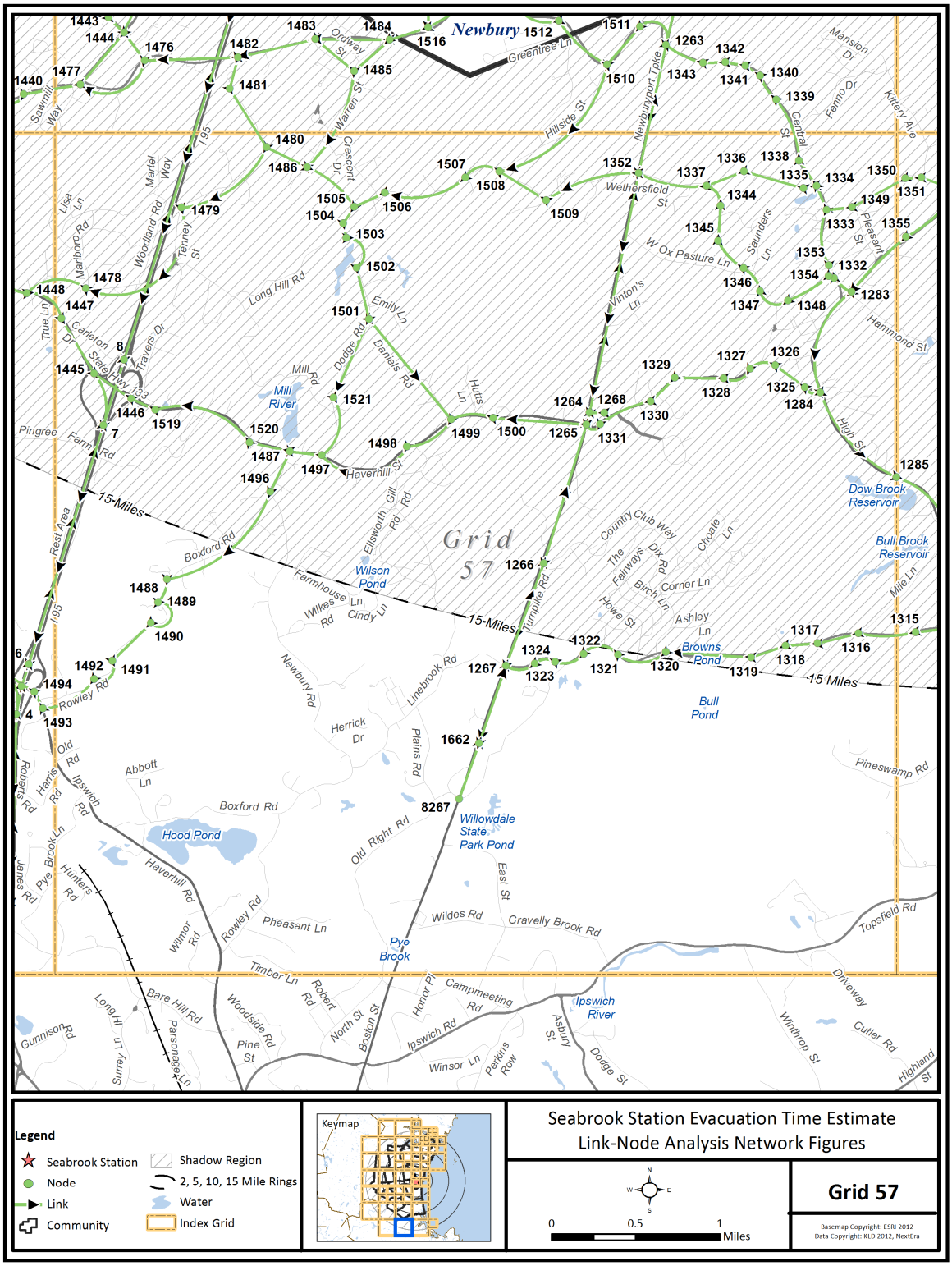

Figure K-58. Link-Node Analysis Network – Grid 57

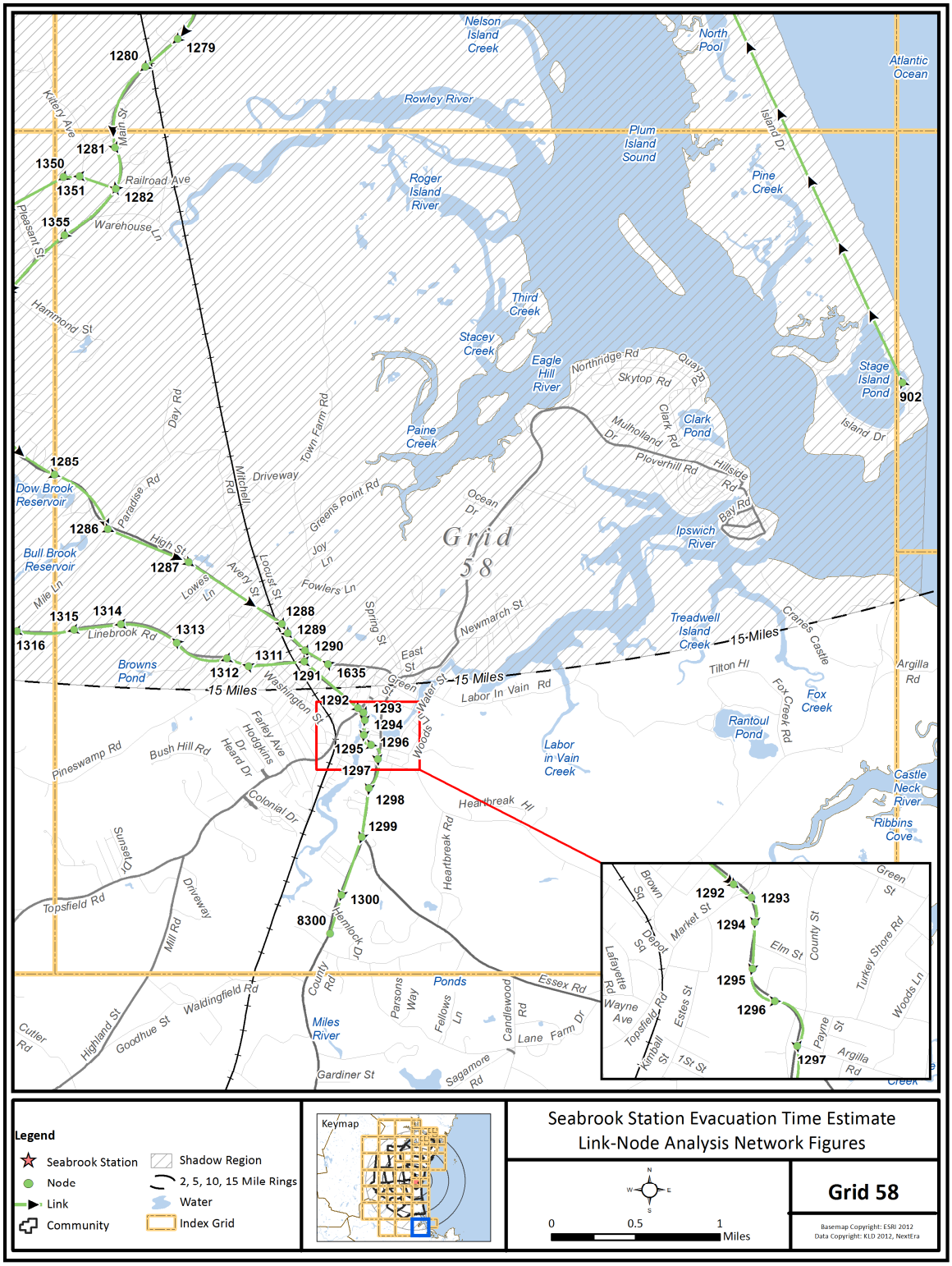

Figure K-59. Link-Node Analysis Network – Grid 58

Table K-1. Evacuation Roadway Network Characteristics

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1	1	110	US 1	MINOR ARTERIAL	1083	2	12	4	1900	45	7
2	1	140	SH 101	COLLECTOR	1307	1	12	4	1700	45	7
3	1	1654	US 1	MINOR ARTERIAL	2191	2	12	4	1900	45	7
4	3	4	I-95	FREEWAY	5911	4	12	8	2250	75	56
5	4	3	I-95	FREEWAY	5911	4	12	8	2250	75	56
6	4	5	I-95	FREEWAY	891	4	12	8	2250	75	56
7	5	4	I-95	FREEWAY	891	4	12	8	2250	75	56
8	5	6	I-95	FREEWAY	721	4	12	8	2250	75	56
9	6	5	I-95	FREEWAY	721	4	12	8	2250	75	56
10	6	7	I-95	FREEWAY	7842	4	12	8	2250	75	57
11	7	6	I-95	FREEWAY	7842	4	12	8	2250	75	57
12	7	8	I-95	FREEWAY	2155	4	12	8	2250	75	57
13	8	7	I-95	FREEWAY	2155	4	12	8	2250	75	57
14	8	9	I-95	FREEWAY	13577	4	12	8	2250	75	57
15	9	8	I-95	FREEWAY	13577	4	12	8	2250	75	57
16	9	10	I-95	FREEWAY	3417	4	12	8	2250	75	54
17	10	9	I-95	FREEWAY	3417	4	12	8	2250	75	54
18	10	11	I-95	FREEWAY	852	4	12	8	2250	75	54
19	11	10	I-95	FREEWAY	852	4	12	8	2250	75	54
20	11	12	I-95	FREEWAY	8648	4	12	8	2250	75	54
21	12	11	I-95	FREEWAY	8648	4	12	8	2250	75	54
22	12	13	I-95	FREEWAY	1170	4	12	8	2250	70	54
23	13	12	I-95	FREEWAY	1170	4	12	8	2250	70	54
24	13	14	I-95	FREEWAY	6409	4	12	8	2250	70	54
25	14	13	I-95	FREEWAY	6409	4	12	8	2250	70	54
26	14	15	I-95	FREEWAY	6519	4	12	8	2250	70	50
27	15	14	I-95	FREEWAY	6519	4	12	8	2250	70	50
28	15	16	I-95	FREEWAY	994	4	12	8	2250	70	50
29	16	15	I-95	FREEWAY	994	4	12	8	2250	70	50

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
30	16	17	I-95	FREEWAY	2528	3	12	8	2250	70	50
31	16	1529	I-95 OFF RAMP	FREEWAY RAMP	690	1	12	4	1750	40	50
32	17	16	I-95	FREEWAY	2528	3	12	8	2250	70	50
33	17	18	I-95	FREEWAY	3089	3	12	8	2250	70	50
34	18	17	I-95	FREEWAY	3080	3	12	8	2250	70	50
35	18	19	I-95	FREEWAY	1602	3	12	8	2250	70	50
36	19	18	I-95	FREEWAY	1602	3	12	8	2250	70	50
37	19	20	I-95	FREEWAY	2583	3	12	8	2250	70	46
38	20	19	I-95	FREEWAY	2583	3	12	8	2250	70	46
39	20	21	I-95	FREEWAY	1004	3	12	8	2250	70	46
40	21	20	I-95	FREEWAY	1004	3	12	8	2250	70	46
41	21	22	I-95	FREEWAY	623	3	12	8	2250	75	46
42	21	1664	I-95 OFF RAMP	FREEWAY RAMP	660	1	12	4	1350	30	46
43	22	21	I-95	FREEWAY	623	3	12	8	2250	75	46
44	22	23	I-95	FREEWAY	4454	3	12	8	2250	75	46
45	23	22	I-95	FREEWAY	4454	3	12	8	2250	75	46
46	23	24	I-95	FREEWAY	2031	4	12	8	2250	75	46
47	23	108	I-495 ON RAMP FROM I-95	FREEWAY RAMP	1542	2	12	4	1900	45	46
48	24	23	I-95	FREEWAY RAMP	2031	4	12	8	2250	75	46
49	24	25	I-95	FREEWAY	1702	4	12	8	2250	75	46
50	25	24	I-95	FREEWAY	1702	4	12	8	2250	75	46
51	25	26	I-95	FREEWAY	1632	4	12	8	2250	70	46
52	26	25	I-95	FREEWAY	1632	4	12	8	2250	70	46
53	26	27	I-95	FREEWAY	1258	4	12	8	2250	70	46
54	27	26	I-95	FREEWAY	1258	4	12	8	2250	70	46
55	27	28	I-95	FREEWAY	2214	4	12	8	2250	75	37
56	28	27	I-95	FREEWAY	2214	4	12	8	2250	75	37
57	28	29	I-95	FREEWAY	4324	4	12	8	2250	75	37
58	29	28	I-95	FREEWAY	4324	4	12	8	2250	75	37

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
59	29	30	I-95	FREEWAY	871	4	12	8	2250	75	37
60	30	29	I-95	FREEWAY	871	4	12	8	2250	75	37
61	30	31	I-95	FREEWAY	719	4	12	8	2250	70	37
62	31	30	I-95	FREEWAY	719	4	12	8	2250	70	37
63	31	32	I-95	FREEWAY	6405	4	12	8	2250	70	37
64	32	31	I-95	FREEWAY	6401	4	12	8	2250	70	37
65	32	33	I-95	FREEWAY	8790	4	12	8	2250	70	38
66	33	32	I-95	FREEWAY	8790	4	12	8	2250	70	38
67	33	34	I-95	FREEWAY	8806	5	12	8	2250	70	32
68	34	33	I-95	FREEWAY	8806	4	12	8	2250	70	32
69	34	35	I-95	FREEWAY	2636	5	12	8	2250	70	32
70	34	591	I-95 OFF RAMP FROM SH 101	FREEWAY RAMP	1512	1	12	4	1700	45	32
71	35	34	I-95	FREEWAY	2636	4	12	8	2250	70	32
72	35	36	I-95	FREEWAY	8824	4	12	8	2250	70	32
73	35	608	I-95 OFF RAMP TO SR 101	FREEWAY RAMP	1305	1	12	4	1350	30	32
74	36	35	I-95	FREEWAY	8824	4	12	8	2250	70	32
75	36	1651	I-95	FREEWAY	6490	4	12	4	2250	70	28
76	37	38	I-95	FREEWAY	1148	4	12	4	2250	70	21
77	37	288	I-95 RAMP	FREEWAY RAMP	1218	1	12	4	1700	45	21
78	37	1651	I-95	FREEWAY	18567	4	12	4	2250	70	20
79	38	37	I-95	FREEWAY	1148	4	12	4	2250	70	21
80	38	130	I-95	FREEWAY	5191	4	12	8	2250	65	16
81	38	1613	I-95 OFF RAMP TO SH 33	FREEWAY RAMP	997	1	12	4	1750	45	21
82	39	124	I-95	FREEWAY	794	3	12	8	2250	65	17
83	39	127	US 4 ON RAMP FROM I-95	FREEWAY RAMP	2750	2	12	4	1900	45	17
84	39	130	I-95	FREEWAY	644	4	12	8	2250	65	17
85	40	39	I-95	FREEWAY	2532	3	12	8	2250	65	17
86	40	41	I-95	FREEWAY	1536	3	12	8	2250	65	15
87	40	127	US 4 ON RAMP FROM I-95	FREEWAY RAMP	753	1	12	4	1700	45	17
88	41	40	I-95	FREEWAY	1536	3	12	8	2250	65	15

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
89	41	42	I-95	FREEWAY	2185	3	12	8	2250	65	15
90	42	41	I-95	FREEWAY	2185	3	12	8	2250	65	15
91	42	43	I-95	FREEWAY	1128	3	12	8	2250	65	15
92	43	42	I-95	FREEWAY	1128	3	12	8	2250	65	15
93	43	44	I-95	FREEWAY	1503	3	12	8	2250	65	15
94	43	136	I-95 RAMP	FREEWAY RAMP	916	1	12	4	1700	45	15
95	44	43	I-95	FREEWAY	1503	3	12	8	2250	65	15
96	44	45	I-95	FREEWAY	2501	3	12	8	2250	65	15
97	44	133	I-95 RAMP	FREEWAY RAMP	899	1	12	4	1700	45	15
98	45	44	I-95	FREEWAY	2498	3	12	8	2250	65	15
99	45	46	I-95	FREEWAY	1286	3	12	8	2250	65	8
100	46	45	I-95	FREEWAY	1286	3	12	8	2250	65	8
101	46	47	I-95	FREEWAY	2898	3	12	8	2250	65	8
102	47	46	I-95	FREEWAY	2898	3	12	8	2250	65	8
103	47	48	I-95	FREEWAY	2695	3	12	8	2250	65	8
104	48	47	I-95	FREEWAY	2695	3	12	8	2250	65	8
105	48	49	I-95	FREEWAY	1239	3	12	8	2250	65	8
106	48	155	I-95 OFF RAMP ONTO US 1/SH 236	FREEWAY RAMP	937	1	12	4	1700	45	8
107	49	48	I-95	FREEWAY	1239	3	12	8	2250	65	8
108	49	50	I-95	FREEWAY	1891	3	12	8	2250	65	9
109	49	1524	I-95	FREEWAY	370	2	12	4	1900	55	8
110	50	49	I-95	FREEWAY	1891	3	12	8	2250	65	9
111	50	1653	I-95	FREEWAY	3319	3	12	8	2250	65	7
112	51	52	SPAULDING TURNPIKE	FREEWAY	3441	2	12	8	2250	60	3
113	52	51	SPAULDING TURNPIKE	FREEWAY	3441	2	12	8	2250	60	3
114	52	53	US 4	FREEWAY	2328	2	12	8	2250	60	3
115	52	298	US 4 OFF RAMP	FREEWAY RAMP	1381	1	12	4	1575	35	3
116	53	52	US 4	FREEWAY	2328	2	12	8	2250	60	3
117	53	54	US 4	FREEWAY	1709	2	12	8	2250	60	4
118	54	53	US 4	FREEWAY	1709	2	12	8	2250	60	4

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
119	54	55	US 4	FREEWAY	4040	2	12	8	2250	60	4
120	55	54	US 4	FREEWAY	4040	2	12	8	2250	60	4
121	55	366	US 4	FREEWAY	1239	2	12	8	2250	60	4
122	56	57	US 4	FREEWAY	2032	2	12	8	2250	60	5
123	56	297	US 4	FREEWAY	898	2	12	8	2250	60	5
124	57	56	US 4	FREEWAY	2032	2	12	8	2250	60	5
125	57	58	US 4	FREEWAY	3381	2	12	8	2250	60	5
126	58	57	US 4	FREEWAY	3372	2	12	8	2250	60	5
127	58	303	SPAULDING TURNPIKE RAMP	FREEWAY RAMP	887	2	12	4	1750	45	14
128	58	1586	US 4	FREEWAY	1384	3	12	8	2250	70	14
129	59	60	US 4	FREEWAY	2715	3	12	8	2250	70	15
130	59	1586	US 4	FREEWAY	1864	3	12	8	2250	70	14
131	60	59	US 4	FREEWAY	2715	3	12	8	2250	70	15
132	60	129	US 4	FREEWAY	1056	2	12	4	1900	45	15
133	60	130	US 4 ON RAMP FROM I-95	FREEWAY RAMP	5617	2	12	4	1900	45	17
134	61	62	SH 101	FREEWAY	8539	2	12	4	2250	70	10
135	61	1670	SH 101	FREEWAY	5645	2	12	4	2250	70	10
136	62	61	SH 101	FREEWAY	8538	2	12	4	2250	70	10
137	62	63	SH 101	FREEWAY	1565	2	12	4	2250	70	10
138	63	62	SH 101	FREEWAY	1565	2	12	4	2250	70	10
139	63	64	SH 101	FREEWAY	1711	2	12	4	2250	70	10
140	64	63	SH 101	FREEWAY	1711	2	12	4	2250	70	10
141	64	65	SH 101	FREEWAY	10169	2	12	4	2250	70	11
142	65	64	SH 101	FREEWAY	10174	2	12	4	2250	70	11
143	65	66	SH 101	FREEWAY	1591	2	12	4	2250	70	25
144	66	65	SH 101	FREEWAY	1591	2	12	4	2250	70	25
145	66	67	SH 101	FREEWAY	2816	2	12	4	2250	70	25
146	67	66	SH 101	FREEWAY	2816	2	12	4	2250	70	25
147	67	68	SH 101	FREEWAY	6281	2	12	4	2250	70	25
148	68	67	SH 101	FREEWAY	6281	2	12	4	2250	70	25

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
149	68	69	SH 101	FREEWAY	2086	2	12	4	2250	70	25
150	69	68	SH 101	FREEWAY	2086	2	12	4	2250	70	25
151	69	70	SH 101	FREEWAY	2681	2	12	4	2250	70	25
152	70	69	SH 101	FREEWAY	2681	2	12	4	2250	70	25
153	70	71	SH 101	FREEWAY	2385	2	12	4	2250	70	25
154	71	70	SH 101	FREEWAY	2390	2	12	4	2250	70	25
155	71	72	SH 101	FREEWAY	3754	2	12	4	2250	70	26
156	72	71	SH 101	FREEWAY	3754	2	12	4	2250	70	26
157	72	73	SH 101	FREEWAY	2536	2	12	4	2250	70	26
158	73	72	SH 101	FREEWAY	2536	2	12	4	2250	70	26
159	73	74	SH 101	FREEWAY	1408	2	12	4	2250	70	26
160	74	73	SH 101	FREEWAY	1408	2	12	4	2250	70	26
161	74	75	SH 101	FREEWAY	2807	2	12	4	2250	70	26
162	75	74	SH 101	FREEWAY	2807	2	12	4	2250	70	26
163	75	76	SH 101	FREEWAY	2276	2	12	4	2250	70	26
164	76	75	SH 101	FREEWAY	2276	2	12	4	2250	70	26
165	76	77	SH 101	FREEWAY	1458	2	12	4	2250	70	26
166	76	474	SH 101 RAMP	FREEWAY RAMP	738	1	12	4	1700	45	26
167	77	76	SH 101	FREEWAY	1458	2	12	4	2250	70	26
168	77	78	SH 101	FREEWAY	4838	2	12	4	2250	70	26
169	78	77	SH 101	FREEWAY	4838	2	12	4	2250	70	26
170	78	79	SH 101	FREEWAY	3324	2	12	4	2250	70	31
171	79	78	SH 101	FREEWAY	3324	2	12	4	2250	70	31
172	79	80	SH 101	FREEWAY	2312	2	12	4	2250	70	31
173	80	79	SH 101	FREEWAY	2312	2	12	4	2250	70	31
174	80	81	SH 101	FREEWAY	1583	2	12	4	2250	70	31
175	81	80	SH 101	FREEWAY	1583	2	12	4	2250	70	31
176	81	82	SH 101	FREEWAY	7373	2	12	4	2250	70	31
177	82	81	SH 101	FREEWAY	7364	2	12	4	2250	70	31
178	82	83	SH 101	FREEWAY	1369	2	12	4	2250	70	32

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
179	83	82	SH 101	FREEWAY	1369	2	12	4	2250	70	32
180	83	606	I-95 ON RAMP FROM SH 101	FREEWAY RAMP	997	1	12	4	1575	35	32
181	83	607	I-95 ON RAMP FROM SH 101	FREEWAY RAMP	1487	1	12	4	1350	30	32
182	84	596	SH 101	FREEWAY	1673	2	12	4	2250	60	32
183	85	84	SH 101	FREEWAY	2161	2	12	4	2250	60	32
184	86	85	SH 101	COLLECTOR	5952	1	12	4	1700	60	38
185	87	86	SH 101	COLLECTOR	1764	1	12	4	1700	50	38
186	87	665	SH 101 OFF RAMP TO US 1	FREEWAY RAMP	567	1	12	4	1700	40	38
187	88	1604	SH 101 OFF RAMP TO US 1	FREEWAY RAMP	4909	1	12	8	1750	40	38
188	89	88	SH 101	COLLECTOR	2777	1	12	8	1700	40	39
189	89	840	SH 1A	MINOR ARTERIAL	2170	2	12	4	1900	35	39
190	90	91	I-495	FREEWAY	1920	3	12	8	2250	70	52
191	91	90	I-495	FREEWAY	1918	3	12	8	2250	70	52
192	91	92	I-495	FREEWAY	3917	3	12	8	2250	70	52
193	92	91	I-495	FREEWAY	3917	3	12	8	2250	70	52
194	92	93	I-495	FREEWAY	1057	3	12	8	2250	70	52
195	93	92	I-495	FREEWAY	1057	3	12	8	2250	70	52
196	93	94	I-495	FREEWAY	2489	3	12	8	2250	70	52
197	94	93	I-495	FREEWAY	2489	3	12	8	2250	70	52
198	94	95	I-495	FREEWAY	1030	3	12	8	2250	70	52
199	95	94	I-495	FREEWAY	1030	3	12	8	2250	70	52
200	95	96	I-495	FREEWAY	7578	3	12	8	2250	70	52
201	96	95	I-495	FREEWAY	7574	3	12	8	2250	70	52
202	96	97	I-495	FREEWAY	4006	3	12	8	2250	70	52
203	97	96	I-495	FREEWAY	4006	3	12	8	2250	70	52
204	97	1652	I-495	FREEWAY	2641	3	12	8	2250	70	42
205	98	99	I-495	FREEWAY	1718	3	12	8	2250	70	53
206	98	1652	I-495	FREEWAY	4814	3	12	8	2250	70	47
207	99	98	I-495	FREEWAY	1718	3	12	8	2250	70	53
208	99	100	I-495	FREEWAY	6400	3	12	8	2250	70	47

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
209	100	99	I-495	FREEWAY	6379	3	12	8	2250	70	47
210	100	101	I-495	FREEWAY	8001	3	12	8	2250	70	47
211	101	100	I-495	FREEWAY	8025	3	12	8	2250	70	47
212	101	102	I-495	FREEWAY	3717	3	12	8	2250	70	48
213	102	101	I-495	FREEWAY	3717	3	12	8	2250	70	48
214	102	103	I-495	FREEWAY	1094	3	12	8	2250	70	48
215	103	102	I-495	FREEWAY	1094	3	12	8	2250	70	48
216	103	109	I-495	FREEWAY	8044	3	12	8	2250	70	48
217	104	105	I-495	FREEWAY	1265	3	12	8	2250	70	45
218	104	109	I-495	FREEWAY	6582	3	12	8	2250	70	49
219	105	104	I-495	FREEWAY	1265	3	12	8	2250	70	45
220	105	106	I-495	FREEWAY	4174	3	12	8	2250	70	45
221	106	105	I-495	FREEWAY	4172	3	12	8	2250	70	45
222	106	107	I-495	FREEWAY	714	3	12	8	2250	70	46
223	107	106	I-495	FREEWAY	714	3	12	8	2250	70	46
224	107	108	I-495	FREEWAY	5844	2	12	8	2250	70	46
225	108	24	I-495 OFF RAMP ONTO I-95	FREEWAY RAMP	4012	2	12	4	1900	45	46
226	108	107	I-495	FREEWAY	5852	2	12	8	2250	70	46
227	109	103	I-495	FREEWAY	8046	3	12	8	2250	70	48
228	109	104	I-495	FREEWAY	6577	3	12	8	2250	70	49
229	110	1	US 1	MINOR ARTERIAL	1083	2	12	4	1750	45	7
230	110	111	US 1	MINOR ARTERIAL	800	2	12	4	1900	45	9
231	110	139	I-95 ON RAMP FOM US 1	FREEWAY RAMP	750	1	12	4	1350	30	9
232	111	113	US 1	MINOR ARTERIAL	1765	2	12	4	1900	45	9
233	111	138	I-95 ON RAMP FROM US 1	FREEWAY RAMP	730	1	12	4	1700	45	9
234	112	157	US 1	COLLECTOR	796	1	12	4	1700	45	9
235	112	1522	I-95 ON RAMP FOM US 1	FREEWAY RAMP	623	2	12	4	1900	45	9
236	113	112	US 1	MINOR ARTERIAL	911	2	12	4	1900	45	9
237	113	114	US 1 BYPASS	MINOR ARTERIAL	1287	2	12	4	1900	45	8
238	114	113	US 1 BYPASS	MINOR ARTERIAL	1287	2	12	4	1900	45	8

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
239	114	144	US 1 BYPASS/US 1	COLLECTOR	363	1	12	4	1350	30	8
240	114	1561	US 1 BYPASS	MINOR ARTERIAL	990	2	12	4	1750	45	8
241	115	116	US 1 BYPASS	COLLECTOR	2797	1	12	4	1700	40	18
242	115	1561	US 1 BYPASS	MINOR ARTERIAL	3976	2	12	4	1750	45	8
243	116	115	US 1 BYPASS	COLLECTOR	2797	1	12	4	1700	40	18
244	116	1559	US 1 BYPASS	COLLECTOR	805	1	12	4	1750	45	18
245	117	118	US 1 BYPASS	MINOR ARTERIAL	3056	2	12	4	1900	45	15
246	117	201	US 1 BYPASS OFF RAMP	COLLECTOR	718	1	12	4	1700	40	15
247	117	1559	US 1 BYPASS	MINOR ARTERIAL	1602	2	12	4	1750	45	18
248	118	117	US 1 BYPASS	MINOR ARTERIAL	3056	2	12	4	1900	45	15
249	118	125	US 1 BYPASS	MINOR ARTERIAL	367	2	12	4	1900	45	15
250	119	120	I-95/US 1 ROUNDABOUT	MINOR ARTERIAL	436	2	12	4	1350	30	17
251	119	129	US 4	MINOR ARTERIAL	2142	2	12	4	1900	45	15
252	120	121	I-95/US 1 ROUNDABOUT	MINOR ARTERIAL	439	2	12	4	1350	30	17
253	120	122	US 1	MINOR ARTERIAL	850	2	12	4	1900	45	17
254	121	125	I-95/US 1 ROUNDABOUT	MINOR ARTERIAL	453	2	12	4	1350	30	17
255	121	256	US 1 BYPASS	MINOR ARTERIAL	968	2	12	4	1750	45	17
256	122	40	I-95 ON RAMP FROM US 1	FREEWAY RAMP	711	1	12	4	1350	30	17
257	122	120	US 1	MINOR ARTERIAL	850	2	12	4	1900	45	17
258	122	126	I-95 ON RAMP FROM US 1	FREEWAY RAMP	576	2	12	4	1900	45	17
259	123	122	I-95 OFF RAMP TO US 1	MINOR ARTERIAL	1100	2	12	4	1900	45	17
260	124	40	I-95	FREEWAY RAMP	1787	3	12	8	2250	65	17
261	124	123	I-95 OFF RAMP TO US 1	MINOR ARTERIAL	580	1	12	4	1900	45	17
262	125	118	US 1 BYPASS	MINOR ARTERIAL	367	2	12	4	1900	45	15
263	125	119	I-95/US 1 ROUNDABOUT	MINOR ARTERIAL	406	2	12	4	1350	30	15
264	126	39	I-95 ON RAMP FROM US 1	FREEWAY RAMP	1938	2	12	4	1900	45	17
265	127	128	US 4 ON RAMP FROM I-95	FREEWAY RAMP	1499	2	12	4	1900	45	15
266	128	60	US 4	FREEWAY	1009	2	12	4	2250	45	15
267	128	129	US 4	COLLECTOR	594	1	12	4	1700	45	15
268	129	60	US 4	FREEWAY	1056	1	12	4	1700	45	15

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
269	129	119	US 4	MINOR ARTERIAL	2142	2	12	4	1700	45	15
270	130	38	I-95	FREEWAY	5191	5	12	8	2250	65	16
271	130	39	I-95	FREEWAY	643	4	12	8	2250	65	17
272	131	59	ARTHUR F BRADY DR	FREEWAY RAMP	601	1	12	4	1700	45	14
273	132	131	ARTHUR F BRADY DR	COLLECTOR	1482	1	12	4	1700	45	15
274	132	135	MARKET ST	MINOR ARTERIAL	768	2	12	4	1750	45	15
275	132	289	MARKET ST	MINOR ARTERIAL	422	2	12	4	1750	30	15
276	133	43	I-95 RAMP	FREEWAY RAMP	719	1	12	4	1700	45	15
277	133	136	MARKET ST	COLLECTOR	636	1	12	4	1900	45	15
278	133	1567	MARKET ST	MINOR ARTERIAL	182	2	12	4	1750	45	15
279	134	135	MARKET ST	MINOR ARTERIAL	719	2	12	4	1750	45	15
280	134	1575	MARKET ST	MINOR ARTERIAL	1601	2	12	4	1900	45	15
281	135	132	MARKET ST	MINOR ARTERIAL	768	2	12	4	1750	45	15
282	135	134	MARKET ST	MINOR ARTERIAL	719	2	12	4	1750	45	15
283	136	44	I-95 RAMP	FREEWAY RAMP	707	1	12	4	1700	45	15
284	136	133	MARKET ST	MINOR ARTERIAL	636	2	12	4	1900	45	15
285	137	1563	MARKET ST	COLLECTOR	632	2	12	4	1750	45	18
286	138	154	I-95 ON RAMP FROM US 1	FREEWAY RAMP	634	1	12	4	1700	45	8
287	139	50	I-95 ON RAMP FOM US 1	FREEWAY RAMP	401	1	12	4	1700	45	7
288	140	1	SH 101	COLLECTOR	1307	1	12	4	1750	45	7
289	141	113	US 1	FREEWAY RAMP	480	1	12	4	1700	40	9
290	142	141	US 1	COLLECTOR	564	1	12	4	1700	40	9
291	142	143	US 1 BYPASS/US 1	COLLECTOR	216	1	12	4	1125	25	9
292	143	149	US 1 BYPASS/US 1	COLLECTOR	238	1	12	4	1350	30	8
293	144	145	US 1 BYPASS/US 1	COLLECTOR	114	1	12	4	1125	25	8
294	145	146	US 1 BYPASS/US 1	COLLECTOR	202	1	12	4	1125	25	9
295	146	142	US 1 BYPASS/US 1	COLLECTOR	225	1	12	4	1125	25	9
296	147	146	US 1	COLLECTOR	217	1	12	4	1700	40	9
297	148	145	OLD POST RD	COLLECTOR	199	1	12	4	1700	40	8
298	149	150	SH 236	COLLECTOR	851	1	12	4	1700	45	8

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
299	150	151	SH 236	MINOR ARTERIAL	867	2	12	4	1900	45	8
300	151	152	SH 236	MINOR ARTERIAL	477	2	12	4	1900	45	8
301	152	153	SH 236	MINOR ARTERIAL	2814	2	12	4	1900	45	6
302	152	154	I-95 ON RAMP FROM SH 236	FREEWAY RAMP	1240	1	12	4	1350	30	8
303	154	1523	I-95 ON RAMP FROM US 1/SH 236	FREEWAY RAMP	388	1	12	4	1700	45	8
304	155	156	I-95 OFF RAMP ONTO SH 236	COLLECTOR	719	1	12	4	1350	30	9
305	155	157	I-95 OFF RAMP ONTO US 1	COLLECTOR	1609	1	12	4	1700	45	9
306	156	150	I-95 OFF RAMP ONTO SH 236	COLLECTOR	1051	1	12	4	1700	45	8
307	157	110	US 1	MINOR ARTERIAL	580	2	12	4	1900	45	9
308	158	148	OLD POST RD	COLLECTOR	3336	1	12	4	1700	40	8
309	158	191	SH 103	COLLECTOR	900	1	12	4	1700	45	8
310	159	161	SH 236	COLLECTOR	2843	1	12	4	1700	45	9
311	160	159	SH 236	COLLECTOR	2175	1	12	4	1700	45	9
312	160	164	SH 103	COLLECTOR	1411	1	12	4	1700	45	18
313	160	178	SH 103	COLLECTOR	846	1	12	4	1700	45	18
314	161	142	SH 236	COLLECTOR	225	1	12	4	1700	40	9
315	162	147	US 1	COLLECTOR	4659	1	12	4	1700	40	8
316	162	169	WALKER ST	COLLECTOR	665	1	12	4	1350	30	18
317	163	159	ROGERS RD	COLLECTOR	936	1	12	4	1700	45	9
318	164	160	SH 103	COLLECTOR	1412	1	12	4	1700	45	18
319	164	163	ROGERS RD	COLLECTOR	1508	1	12	4	1700	45	18
320	165	164	SH 103	COLLECTOR	986	1	12	4	1700	45	18
321	165	166	WALKER ST	COLLECTOR	419	1	12	4	1350	30	18
322	166	162	WALKER ST	COLLECTOR	1451	1	12	4	1750	30	18
323	167	165	SH 103	COLLECTOR	265	1	12	4	1750	30	18
324	168	162	US 1	COLLECTOR	699	2	12	4	1750	40	18
325	168	169	SH 103	COLLECTOR	915	1	12	4	1350	30	18
326	168	172	SH 103	COLLECTOR	1480	1	12	4	1350	30	18
327	169	170	SH 103	COLLECTOR	835	1	12	4	1700	45	18
328	170	158	SH 103	COLLECTOR	1412	1	12	4	1700	45	18

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
329	170	171	BRIDGE ST	COLLECTOR	670	1	12	4	1700	45	18
330	171	115	BRIDGE ST	COLLECTOR	232	1	12	4	1350	30	18
331	172	166	JONES AVE	COLLECTOR	245	1	12	4	1350	30	18
332	172	167	SH 103	COLLECTOR	274	1	12	4	1350	30	18
333	172	168	SH 103	COLLECTOR	1480	1	12	4	1750	30	18
334	173	168	US 1	COLLECTOR	525	1	12	4	1750	40	18
335	174	165	WALKER ST	COLLECTOR	1081	1	12	4	1750	40	18
336	175	174	WYMAN AVE	COLLECTOR	168	1	12	4	1700	40	18
337	175	177	WYMAN AVE	COLLECTOR	992	1	12	4	1700	40	18
338	176	177	SICARD ST	COLLECTOR	587	1	12	4	1700	40	18
339	177	178	WYMAN AVE	COLLECTOR	1163	1	12	4	1700	40	18
340	178	160	SH 103	COLLECTOR	846	1	12	4	1700	45	18
341	178	179	SH 103	COLLECTOR	555	1	12	4	1700	45	18
342	179	180	SH 103	COLLECTOR	1627	1	12	4	1700	45	18
343	180	181	SH 103	COLLECTOR	983	1	12	4	1700	45	18
344	181	182	SH 103	COLLECTOR	891	1	12	4	1700	45	18
345	182	183	SH 103	COLLECTOR	1420	1	12	4	1700	45	19
346	183	184	SH 103	COLLECTOR	504	1	12	4	900	20	19
347	184	185	SH 103	COLLECTOR	916	1	12	4	1700	40	19
348	185	186	SH 103	COLLECTOR	1862	1	12	4	1700	40	19
349	186	187	SH 103	COLLECTOR	952	1	12	4	1700	40	19
350	187	188	SH 103	COLLECTOR	762	1	12	4	1700	40	19
351	188	189	SH 103	COLLECTOR	890	1	12	4	1700	40	19
352	189	190	SH 103	COLLECTOR	693	1	12	4	1700	40	19
353	191	192	DENNETT RD	COLLECTOR	2252	1	12	4	1700	45	8
354	191	197	SH 103	COLLECTOR	1125	1	12	4	1700	45	8
355	192	47	I-95 ON RAMP FROM DENNETT RD	FREEWAY RAMP	1197	1	12	4	1700	45	8
356	192	193	DENNETT RD	COLLECTOR	3173	1	12	4	1700	45	8
357	193	194	DENNETT RD	COLLECTOR	5661	1	12	4	1700	45	5
358	194	198	DENNETT RD	COLLECTOR	2914	1	12	4	1700	45	5

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
359	195	194	BOLT HILL RD	COLLECTOR	2030	1	12	4	1700	45	5
360	195	198	SH 103	COLLECTOR	4771	1	12	4	1700	45	5
361	196	195	SH 103	COLLECTOR	4675	1	12	4	1700	45	5
362	197	199	SH 103	COLLECTOR	3269	1	12	4	1700	45	8
363	199	196	SH 103	COLLECTOR	2427	1	12	4	1700	45	5
364	200	202	MAPLEWOOD AVE	COLLECTOR	3783	1	12	4	1700	45	15
365	201	117	US 1 BYPASS ON RAMP	COLLECTOR	766	1	12	4	1350	30	15
366	201	200	MAPLEWOOD AVE	COLLECTOR	787	1	12	4	1700	45	15
367	202	203	WOODBURY AVE	COLLECTOR	1042	1	12	4	1750	35	15
368	203	135	WOODBURY AVE	COLLECTOR	501	1	12	4	1750	35	15
369	204	1577	WOODBURY AVE	COLLECTOR	204	1	12	4	1575	35	15
370	205	204	DENNETT ST	COLLECTOR	1229	1	12	4	1700	45	15
371	206	205	DENNETT ST	COLLECTOR	1294	1	12	4	1700	45	15
372	207	208	WOODBURY AVE	COLLECTOR	479	1	12	3	1700	45	17
373	208	204	WOODBURY AVE	COLLECTOR	942	1	12	3	1700	45	17
374	208	256	COTTAGE ST	LOCAL ROADWAY	1196	1	12	4	1750	40	17
375	209	207	BARTLETT ST	COLLECTOR	772	1	12	3	1700	45	17
376	209	210	BARTLETT ST	COLLECTOR	277	1	12	4	1750	45	17
377	210	209	BARTLETT ST	COLLECTOR	277	1	12	4	1700	45	17
378	210	1582	ISLINGTON ST	COLLECTOR	1687	1	12	4	1750	30	18
379	211	218	MAPLEWOOD AVE	COLLECTOR	413	2	12	4	1900	35	18
380	211	1582	ISLINGTON ST	COLLECTOR	1810	1	12	4	1750	30	18
381	212	213	DANIELS ST	COLLECTOR	494	1	14	10	1900	30	18
382	212	222	MARKET ST	COLLECTOR	439	1	12	4	1350	30	18
383	213	211	DANIELS ST	COLLECTOR	508	1	14	10	1900	30	18
384	213	215	FLEET ST	COLLECTOR	482	1	12	4	1900	30	18
385	214	212	PLEASANT ST	COLLECTOR	513	1	12	4	1350	30	18
386	214	1558	STATE ST	MINOR ARTERIAL	1062	2	12	4	1900	30	18
387	215	213	FLEET ST	COLLECTOR	482	1	12	4	1900	30	18
388	215	214	STATE ST	MINOR ARTERIAL	386	2	12	12	1900	30	18

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
389	216	212	DANIELS ST	COLLECTOR	851	1	14	10	1350	30	18
390	217	201	MAPLEWOOD AVE	COLLECTOR	1988	1	12	4	1700	45	18
391	217	219	DEER ST	LOCAL ROADWAY	398	1	12	4	1575	35	18
392	218	217	MAPLEWOOD AVE	MINOR ARTERIAL	432	2	12	4	1900	35	18
393	218	222	HANOVER ST	COLLECTOR	1130	1	12	4	1350	30	18
394	219	137	RUSSELL ST	COLLECTOR	787	1	12	4	1700	45	18
395	220	217	DEER ST	LOCAL ROADWAY	322	1	12	4	1900	35	18
396	220	225	BRIDGE ST	LOCAL ROADWAY	364	1	12	4	1575	35	18
397	221	137	MARKET ST	COLLECTOR	598	1	12	4	1700	45	18
398	222	218	HANOVER ST	COLLECTOR	1130	1	12	4	1900	30	18
399	222	221	MARKET ST	COLLECTOR	600	1	12	4	1350	30	18
400	223	211	MAPLEWOOD AVE	COLLECTOR	499	1	12	4	1900	35	18
401	223	215	STATE ST	MINOR ARTERIAL	660	2	12	12	1900	30	18
402	224	223	US 1	MINOR ARTERIAL	1158	1	15	0	1900	45	18
403	225	218	HANOVER ST	COLLECTOR	207	1	12	4	1900	35	18
404	226	225	HANOVER ST	COLLECTOR	1999	1	12	4	1575	35	18
405	227	214	SH 1B	COLLECTOR	620	1	12	4	1900	30	18
406	228	227	SH 1B	COLLECTOR	1520	1	12	4	1350	30	18
407	229	228	SH 1B	COLLECTOR	934	1	12	4	1700	40	18
408	230	229	SH 1B	COLLECTOR	2058	1	12	4	1700	40	18
409	231	230	SH 1B	COLLECTOR	446	1	12	4	1575	35	18
410	232	227	JUNKINS AVE	COLLECTOR	2051	1	12	4	1700	45	18
411	232	228	SH 33	COLLECTOR	1675	1	12	4	1700	45	18
412	233	232	SH 33	COLLECTOR	1502	1	12	4	1700	45	18
413	233	1565	SH 1A	COLLECTOR	970	1	12	4	1700	45	18
414	234	231	SH 1B	COLLECTOR	1894	1	12	4	1700	45	18
415	235	234	SH 1B	COLLECTOR	1203	1	12	4	1700	45	18
416	236	235	SH 1B	COLLECTOR	484	1	12	4	1700	45	18
417	237	236	SH 1B	COLLECTOR	1361	1	12	4	900	20	18
418	238	237	SH 1B	COLLECTOR	950	1	12	4	900	20	18

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
419	239	238	SH 1B	COLLECTOR	285	1	12	4	1125	25	19
420	240	239	SH 1B	COLLECTOR	1985	1	12	4	900	20	19
421	241	246	SH 1B	COLLECTOR	2474	1	12	0	1700	40	22
422	242	241	SH 1B	COLLECTOR	2137	1	12	0	1700	40	18
423	242	243	SH 1B	COLLECTOR	741	1	12	4	1575	35	18
424	243	244	SH 1B	COLLECTOR	1678	1	12	4	1575	35	18
425	244	245	SH 1B	COLLECTOR	1374	1	12	4	1575	35	19
426	245	240	SH 1B	COLLECTOR	670	1	12	4	1575	35	19
427	246	247	SH 1B	COLLECTOR	2175	1	12	0	1750	40	22
428	247	248	SH 1A	COLLECTOR	2493	1	12	3	1700	40	18
429	248	249	SH 1A	COLLECTOR	924	1	12	3	1700	40	18
430	249	233	SH 1A	COLLECTOR	2230	1	12	3	1750	40	18
431	250	233	SH 33	COLLECTOR	3138	1	12	4	1750	45	18
432	250	251	US 1	COLLECTOR	1186	1	15	0	1700	40	18
433	251	252	US 1	COLLECTOR	1687	1	15	0	1700	40	18
434	252	224	US 1	COLLECTOR	1093	1	15	0	1700	40	18
435	253	250	SOUTH RD	COLLECTOR	681	1	12	4	1900	45	17
436	253	251	SH 33	COLLECTOR	1391	1	12	4	1700	45	18
437	254	253	SH 33	COLLECTOR	528	1	12	4	1700	45	17
438	254	255	SPINNEY RD	LOCAL ROADWAY	1762	1	12	4	1575	35	17
439	255	210	ISLINGTON ST	COLLECTOR	1611	1	12	4	1750	30	17
440	256	121	US 1 BYPASS	MINOR ARTERIAL	968	2	12	4	1700	45	17
441	256	257	US 1 BYPASS	MINOR ARTERIAL	350	2	12	4	1750	50	17
442	257	256	US 1 BYPASS	MINOR ARTERIAL	350	2	12	4	1750	50	17
443	257	258	US 1 BYPASS	MINOR ARTERIAL	4577	2	12	4	1750	50	17
444	258	257	US 1 BYPASS	MINOR ARTERIAL	4577	2	12	4	1750	50	17
445	258	259	US 1 BYPASS	MINOR ARTERIAL	257	2	12	4	1900	45	17
446	259	258	US 1 BYPASS	MINOR ARTERIAL	257	2	12	4	1750	45	17
447	259	260	US 1 BYPASS	COLLECTOR	1125	1	12	4	1700	45	17
448	260	259	US 1 BYPASS	COLLECTOR	1124	1	12	4	1700	45	17

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
449	260	261	US 1	MINOR ARTERIAL	202	2	12	4	1750	45	21
450	260	281	US 1	COLLECTOR	1643	1	12	4	1750	45	18
451	261	260	US 1	MINOR ARTERIAL	202	2	12	4	1900	45	21
452	261	1554	US 1	MINOR ARTERIAL	1666	2	12	4	1750	45	21
453	262	263	US 1	MINOR ARTERIAL	735	2	12	4	1750	45	21
454	262	385	PEVERLY HILL RD	COLLECTOR	2169	1	12	4	1750	45	21
455	262	1554	US 1	MINOR ARTERIAL	1438	2	12	4	1750	45	21
456	263	262	US 1	MINOR ARTERIAL	735	2	12	4	1750	45	21
457	263	1618	US 1	COLLECTOR	914	1	12	4	1700	40	21
458	264	265	US 1	MINOR ARTERIAL	1224	2	12	4	1750	40	21
459	264	1618	US 1	COLLECTOR	2167	1	12	4	1700	40	21
460	265	264	US 1	COLLECTOR	1228	1	12	4	1700	40	21
461	265	266	US 1	MINOR ARTERIAL	1299	2	12	4	1750	50	21
462	266	265	US 1	MINOR ARTERIAL	1299	2	12	4	1750	50	21
463	266	267	US 1	COLLECTOR	1202	1	12	4	1750	50	21
464	267	266	US 1	MINOR ARTERIAL	1202	2	12	4	1750	50	21
465	267	268	US 1	COLLECTOR	1212	1	12	4	1700	50	21
466	267	389	HERITAGE AVE	COLLECTOR	4150	1	12	4	1700	45	21
467	268	267	US 1	COLLECTOR	1212	1	12	4	1750	50	21
468	268	269	US 1	COLLECTOR	734	1	12	4	1750	50	21
469	269	268	US 1	COLLECTOR	734	1	12	4	1700	50	21
470	269	270	US 1	COLLECTOR	7711	1	12	4	1700	50	29
471	269	381	OCEAN RD	COLLECTOR	3692	1	12	0	1575	35	21
472	270	269	US 1	COLLECTOR	7707	1	12	4	1750	50	29
473	270	271	US 1	COLLECTOR	4659	1	12	4	1700	50	29
474	270	430	WASHINGTON RD	COLLECTOR	2616	1	12	4	1575	35	29
475	271	270	US 1	COLLECTOR	4659	1	12	4	1700	50	29
476	271	403	US 1	COLLECTOR	2978	1	12	4	1700	50	29
477	272	273	US 1	COLLECTOR	4251	1	12	4	1700	50	28
478	272	403	US 1	COLLECTOR	382	1	12	4	1700	50	28

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
479	272	453	NORTH RD	COLLECTOR	5350	1	11	0	1350	35	28
480	273	272	US 1	COLLECTOR	4240	1	12	4	1700	50	28
481	273	274	US 1	COLLECTOR	2307	1	12	4	1750	50	32
482	273	424	HOBBS RD	COLLECTOR	1378	1	12	4	1700	45	32
483	274	273	US 1	COLLECTOR	2307	1	12	4	1700	50	32
484	274	275	US 1	COLLECTOR	1485	1	12	4	1700	40	32
485	274	423	SH 111	COLLECTOR	2813	1	12	4	1700	45	32
486	275	274	US 1	COLLECTOR	1485	2	12	4	1750	40	32
487	275	276	US 1	COLLECTOR	3957	1	12	4	1750	40	32
488	276	275	US 1	COLLECTOR	3957	1	12	4	1700	40	32
489	276	277	US 1	COLLECTOR	1632	1	12	4	1700	40	32
490	276	425	SH 151	COLLECTOR	1991	1	12	4	1700	45	32
491	277	276	US 1	COLLECTOR	1632	1	12	4	1750	40	32
492	277	278	US 1	COLLECTOR	2921	1	12	4	1750	40	32
493	278	277	US 1	COLLECTOR	2930	1	12	4	1700	40	32
494	278	1550	US 1	COLLECTOR	424	1	12	4	1750	40	38
495	279	602	SH 27	COLLECTOR	2064	1	12	1	1700	40	38
496	279	833	US 1	COLLECTOR	1495	1	12	4	1700	40	38
497	279	1549	US 1	COLLECTOR	1395	1	12	4	1750	40	38
498	280	667	US 1	COLLECTOR	406	1	12	4	1700	30	38
499	280	1547	US 1	COLLECTOR	170	1	12	4	1750	40	38
500	281	250	US 1	COLLECTOR	1387	1	15	0	1700	40	18
501	282	254	SH 33	COLLECTOR	1129	1	12	4	1700	45	17
502	283	282	SH 33	COLLECTOR	1942	1	12	4	1700	45	17
503	283	284	SH 33	MINOR ARTERIAL	927	2	12	4	1750	45	17
504	284	283	SH 33	COLLECTOR	927	1	12	4	1750	45	17
505	284	285	SH 33	COLLECTOR	2755	1	12	4	1750	45	17
506	284	1581	ISLINGTON ST	COLLECTOR	461	1	12	4	1575	35	17
507	285	284	SH 33	COLLECTOR	2761	1	12	4	1750	45	17
508	285	1615	SH 33	MINOR ARTERIAL	630	2	12	4	1750	45	16

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
509	286	288	I-95 RAMP	FREEWAY RAMP	1852	1	12	4	1700	45	21
510	286	1615	SH 33	MINOR ARTERIAL	623	2	12	4	1750	45	16
511	287	286	SH 33	MINOR ARTERIAL	1629	2	12	4	1750	45	16
512	287	1614	GRAFTON RD	LOCAL ROADWAY	1330	1	12	4	1575	35	16
513	288	38	I-95 RAMP	FREEWAY RAMP	749	1	12	4	1700	45	21
514	288	286	I-95 RAMP	FREEWAY RAMP	1871	1	12	4	1750	45	21
515	289	290	MARKET ST	MINOR ARTERIAL	622	2	12	4	1750	30	15
516	290	291	MARKET ST	MINOR ARTERIAL	1529	2	12	4	1750	30	5
517	291	292	MARKET ST	MINOR ARTERIAL	521	2	12	4	1750	30	5
518	291	1589	GOSLING RD	MINOR ARTERIAL	1421	2	12	4	1750	45	5
519	292	293	MARKET ST	MINOR ARTERIAL	1389	2	12	4	1750	30	5
520	293	294	MARKET ST	MINOR ARTERIAL	1722	1	12	4	1750	30	5
521	294	295	MARKET ST	MINOR ARTERIAL	2312	1	12	4	1700	30	5
522	295	297	MARKET ST	FREEWAY RAMP	1508	1	12	4	1350	30	5
523	296	55	US 4	FREEWAY	807	2	12	8	2250	60	4
524	297	365	US 4	FREEWAY	910	3	12	8	2250	60	5
525	298	299	US 4 OFF RAMP	COLLECTOR	1866	1	12	4	1750	50	3
526	299	301	US 4	COLLECTOR	1044	1	12	4	1700	45	3
527	300	299	BOSTON HARBOR RD	COLLECTOR	1124	1	12	4	1750	45	4
528	302	303	GOSLING RD	MINOR ARTERIAL	601	2	12	4	1750	45	14
529	302	1588	SPAULDING TURNPIKE RAMP	FREEWAY RAMP	289	2	12	4	1900	45	14
530	303	302	GOSLING RD	MINOR ARTERIAL	601	2	12	4	1750	45	14
531	303	1587	SPAULDING TURNPIKE RAMP	FREEWAY RAMP	267	2	12	4	1900	45	14
532	304	303	GOSLING RD	MINOR ARTERIAL	1578	2	12	4	1750	45	14
533	305	304	GOSLING RD	MINOR ARTERIAL	1581	2	12	4	1750	45	14
534	306	304	INTERNATIONAL DR	MINOR ARTERIAL	941	2	12	4	1750	30	14
535	306	312	EXETER ST	COLLECTOR	1028	1	12	0	1575	35	14
536	307	312	NEW HAMPSHIRE	COLLECTOR	4589	1	12	0	1575	35	14
537	308	307	NEW HAMPSHIRE	COLLECTOR	1005	1	12	4	1575	35	16
538	309	308	GRAFTON RD	LOCAL ROADWAY	1653	1	12	4	1575	35	16

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
539	310	306	INTERNATIONAL DR	MINOR ARTERIAL	1711	2	12	4	1750	30	14
540	311	306	EXETER ST	COLLECTOR	2605	1	12	0	1750	30	14
541	312	305	NEW HAMPSHIRE	COLLECTOR	1430	1	12	0	1575	35	14
542	313	274	SH 111	COLLECTOR	7175	1	12	4	1750	45	32
543	313	314	MILL RD	COLLECTOR	1559	1	12	4	1700	45	33
544	314	315	MILL RD	COLLECTOR	480	1	12	4	1700	45	33
545	315	316	MILL RD	COLLECTOR	5466	1	12	4	1750	45	33
546	316	317	MILL RD	COLLECTOR	4699	1	12	4	1700	45	29
547	316	404	NORTH RD	COLLECTOR	2878	1	12	0	1350	35	29
548	317	318	MILL RD	COLLECTOR	1285	1	12	4	1700	45	29
549	318	270	WASHINGTON RD	COLLECTOR	3903	1	12	0	1575	35	29
550	318	319	WASHINGTON RD	COLLECTOR	1252	1	12	0	1575	35	29
551	319	320	WASHINGTON RD	COLLECTOR	5730	1	12	0	1575	35	29
552	320	321	WASHINGTON RD	COLLECTOR	1239	1	12	0	1575	35	29
553	321	268	LANG RD	COLLECTOR	7427	1	10	0	1700	40	21
554	321	322	WASHINGTON RD	COLLECTOR	567	1	12	0	1575	35	34
555	322	321	WASHINGTON RD	COLLECTOR	567	1	12	0	1575	35	34
556	322	323	WASHINGTON RD	COLLECTOR	5769	1	12	0	1575	35	22
557	323	322	WASHINGTON RD	COLLECTOR	5782	1	12	0	1575	35	22
558	323	324	SAGAMORE RD	COLLECTOR	1350	1	12	4	1575	35	22
559	323	349	WALLIS RD	COLLECTOR	6017	1	12	4	1575	35	22
560	324	325	SAGAMORE RD	COLLECTOR	2013	1	12	4	1575	35	22
561	325	326	SAGAMORE RD	COLLECTOR	4647	1	12	4	1575	35	22
562	326	327	SH 1A	COLLECTOR	99	1	12	4	1140	25	22
563	327	328	SH 1A	COLLECTOR	112	1	12	4	1140	25	22
564	328	247	SH 1A	COLLECTOR	2457	1	12	4	1750	45	22
565	328	388	SH 1A	COLLECTOR	115	1	12	4	675	15	22
566	329	330	SH 1A	MINOR ARTERIAL	3511	1	12	4	1750	35	39
567	330	331	SH 1A	COLLECTOR	498	1	12	4	1700	40	39
568	330	408	SH 27	COLLECTOR	1730	1	12	1	1700	40	39

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
569	331	332	SH 1A	COLLECTOR	1016	1	12	4	1700	40	39
570	331	416	N SHORE RD	COLLECTOR	2446	1	12	4	1350	35	39
571	332	333	SH 1A	COLLECTOR	3354	1	12	4	1700	40	33
572	333	334	SH 1A	COLLECTOR	1997	1	12	4	1700	40	33
573	334	335	SH 1A	COLLECTOR	856	1	12	4	1700	40	33
574	335	336	SH 1A	COLLECTOR	1017	1	12	4	1700	40	33
575	336	337	SH 1A	COLLECTOR	1168	1	12	4	1575	35	33
576	336	407	SH 111	COLLECTOR	1357	1	12	4	1700	40	33
577	337	338	SH 1A	COLLECTOR	1321	1	12	4	1575	35	33
578	338	339	SH 1A	COLLECTOR	969	1	12	4	1125	35	34
579	339	340	SH 1A	COLLECTOR	1622	1	12	4	1575	35	33
580	340	1609	SH 1A	COLLECTOR	1057	1	12	4	1575	35	34
581	341	342	SH 1A	COLLECTOR	1368	1	12	4	1575	35	34
582	342	343	SH 1A	COLLECTOR	407	1	12	4	1575	35	34
583	342	400	SOUTH RD	COLLECTOR	2387	1	12	0	1350	35	34
584	343	1655	SH 1A	COLLECTOR	612	1	12	4	1575	35	34
585	344	345	SH 1A	COLLECTOR	5270	1	12	4	1575	35	34
586	344	398	CABLE RD	COLLECTOR	2410	1	12	0	1350	30	34
587	345	1619	SH 1A	COLLECTOR	617	1	12	4	1125	25	34
588	346	347	SH 1A	COLLECTOR	4283	1	12	4	1575	35	34
589	347	348	SH 1A	COLLECTOR	1473	1	12	4	1575	35	34
590	348	349	SH 1A	COLLECTOR	2628	1	12	4	1575	35	34
591	349	323	WALLIS RD	COLLECTOR	6020	1	12	4	1575	35	22
592	349	350	SH 1A	COLLECTOR	1258	1	12	4	1700	45	22
593	350	1621	SH 1A	COLLECTOR	1411	1	12	4	1700	45	22
594	351	352	SH 1A	COLLECTOR	1641	1	12	4	1700	45	22
595	352	353	SH 1A	COLLECTOR	1640	1	12	4	1700	45	22
596	353	354	SH 1A	COLLECTOR	722	1	12	4	1700	45	23
597	354	355	SH 1A	COLLECTOR	1398	1	12	4	1700	45	23
598	355	356	SH 1A	COLLECTOR	1584	1	12	4	1575	35	23

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
599	356	357	SH 1A	COLLECTOR	513	1	12	4	1575	35	23
600	357	358	SH 1A	COLLECTOR	927	1	12	4	1575	35	23
601	358	359	SH 1A	COLLECTOR	1170	1	12	4	1575	35	23
602	359	360	SH 1A	COLLECTOR	1921	1	12	4	1575	35	22
603	360	361	SH 1A	COLLECTOR	2180	1	12	4	1575	35	22
604	361	362	SH 1A	COLLECTOR	1238	1	12	4	1575	35	22
605	362	363	SH 1A	COLLECTOR	1341	1	12	4	1125	25	22
606	363	327	SH 1A	COLLECTOR	871	1	12	4	1350	30	22
607	364	56	US 4	FREEWAY	1602	2	12	8	2250	60	5
608	364	365	US 4	FREEWAY RAMP	832	1	12	4	1575	35	5
609	365	296	US 4	FREEWAY	1869	2	12	8	2250	60	5
610	366	364	US 4	FREEWAY	1431	3	12	8	2250	60	5
611	367	366	US 4 ON RAMP	FREEWAY RAMP	528	1	12	4	1350	30	4
612	368	367	NIMBLE HILL RD	COLLECTOR	7503	1	12	4	1700	45	4
613	369	368	LITTLE BAY RD	COLLECTOR	1457	1	12	4	1700	45	4
614	370	369	LITTLE BAY RD	COLLECTOR	1434	1	12	4	1700	45	4
615	371	370	MC INTYRE RD	COLLECTOR	4962	1	12	4	1700	45	13
616	372	371	MC INTYRE RD	COLLECTOR	779	1	12	4	1700	45	13
617	373	372	MC INTYRE RD	COLLECTOR	3336	1	12	4	1700	45	13
618	374	373	MC INTYRE RD	COLLECTOR	8437	1	12	4	1700	45	13
619	374	375	PORTSMOUTH AVE	COLLECTOR	3525	1	12	4	1750	45	21
620	375	1613	SH 33	MINOR ARTERIAL	833	2	12	4	1750	45	21
621	376	374	PORTSMOUTH AVE	COLLECTOR	2034	1	12	4	1700	45	20
622	377	375	SH 33	MINOR ARTERIAL	3871	2	12	4	1750	45	21
623	377	376	OCEAN RD	COLLECTOR	1182	1	12	4	1700	45	20
624	378	376	PORTSMOUTH AVE	COLLECTOR	1945	1	12	4	1700	45	20
625	378	377	SH 33	MINOR ARTERIAL	3137	2	12	4	1750	45	20
626	379	378	PORTSMOUTH AVE	COLLECTOR	1570	1	12	4	1750	45	20
627	379	380	PORTSMOUTH AVE	COLLECTOR	2293	1	12	4	1700	45	20
628	380	378	SH 33	MINOR ARTERIAL	3634	2	12	4	1750	45	20

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
629	380	428	SH 33	COLLECTOR	2350	1	12	4	1750	45	20
630	381	269	OCEAN RD	COLLECTOR	3693	1	12	0	1750	35	21
631	381	387	OCEAN RD	COLLECTOR	1479	1	12	0	1575	35	21
632	382	383	ELWIN RD	COLLECTOR	1836	1	12	4	1575	35	22
633	383	384	ELWIN RD	COLLECTOR	1907	1	12	4	1575	35	22
634	384	262	ELWIN RD	COLLECTOR	1239	1	12	4	1750	45	21
635	385	386	PEVERLY HILL RD	COLLECTOR	1450	1	12	4	1575	35	21
636	386	258	GREENLEAF AVE	COLLECTOR	2729	1	12	4	1750	45	17
637	386	283	PEVERLY HILL RD	COLLECTOR	1979	1	12	4	1750	35	17
638	387	377	OCEAN RD	COLLECTOR	4919	1	12	4	1750	45	21
639	387	389	BANFIELD RD	COLLECTOR	2852	1	12	4	1700	45	21
640	388	382	ELWIN RD	COLLECTOR	2041	1	12	4	1575	35	22
641	389	267	HERITAGE AVE	COLLECTOR	4148	1	12	4	1750	45	21
642	389	385	BANFIELD RD	COLLECTOR	6939	1	12	4	1750	45	21
643	389	387	BANFIELD RD	COLLECTOR	2852	1	12	4	1700	45	21
644	390	266	WHITE CEDAR BLVD	COLLECTOR	977	1	12	4	1750	45	21
645	391	265	SPRINGBROOK CIR	COLLECTOR	1833	1	12	4	1750	45	21
646	392	263	WILSON RD	COLLECTOR	1326	1	12	4	1750	45	21
647	393	396	GROVE RD	COLLECTOR	2414	1	12	4	1700	45	29
648	393	397	CENTRAL RD	COLLECTOR	2597	1	12	4	1700	40	29
649	394	393	CENTRAL RD	COLLECTOR	1497	1	12	4	1700	40	29
650	395	394	CENTRAL RD	COLLECTOR	1951	1	12	4	1700	40	29
651	396	319	GROVE RD	COLLECTOR	2933	1	12	4	1700	45	29
652	397	320	CENTRAL RD	COLLECTOR	3576	1	12	4	1700	40	29
653	398	394	CABLE RD	COLLECTOR	572	1	12	0	1350	30	34
654	399	395	LOVE LN	COLLECTOR	3972	1	12	4	1700	45	29
655	399	412	SOUTH RD	COLLECTOR	986	1	12	0	1750	35	33
656	400	395	CENTRAL RD	COLLECTOR	4450	1	12	4	1700	40	33
657	400	401	SOUTH RD	COLLECTOR	1084	1	12	0	1350	35	33
658	401	402	SOUTH RD	COLLECTOR	1280	1	12	0	1350	35	33

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
659	402	399	SOUTH RD	COLLECTOR	1423	1	12	0	1350	35	33
660	403	271	US 1	COLLECTOR	2990	1	12	4	1700	50	29
661	403	272	US 1	COLLECTOR	382	1	12	4	1700	50	28
662	404	405	NORTH RD	COLLECTOR	2624	1	12	0	1350	35	29
663	405	403	NORTH RD	COLLECTOR	1273	1	12	0	1350	35	28
664	406	409	SH 111	COLLECTOR	3114	1	12	4	1700	40	33
665	407	406	SH 111	COLLECTOR	1943	1	12	4	1700	40	33
666	408	330	SH 27	COLLECTOR	1730	1	12	4	1750	40	39
667	408	414	SH 27	COLLECTOR	5115	1	12	1	1700	40	39
668	409	313	SH 111	COLLECTOR	3594	1	12	4	1700	45	33
669	409	410	WOODLAND RD	COLLECTOR	2774	1	12	4	1700	40	33
670	410	411	WOODLAND RD	COLLECTOR	2488	1	12	4	1350	30	33
671	411	412	WOODLAND RD	COLLECTOR	2333	1	12	4	1750	40	33
672	412	316	SOUTH RD	COLLECTOR	2876	1	12	0	1750	35	29
673	413	278	ANNS LN	COLLECTOR	1769	1	12	4	1750	45	38
674	413	417	MILL RD	COLLECTOR	3305	1	12	4	1700	45	32
675	414	413	MACE RD	COLLECTOR	3454	1	12	4	1700	40	38
676	414	415	WOODLAND RD	COLLECTOR	4198	1	12	4	1700	40	39
677	414	1607	SH 27	COLLECTOR	2939	1	12	1	1750	40	38
678	415	409	WOODLAND RD	COLLECTOR	7508	1	12	4	1700	40	33
679	416	415	N SHORE RD	COLLECTOR	2210	1	12	4	1350	35	39
680	417	277	WASTON LN	COLLECTOR	1060	1	12	4	1700	45	32
681	417	418	MILL RD	COLLECTOR	1998	1	12	4	1700	45	32
682	418	419	MILL RD	COLLECTOR	2183	1	12	4	1700	45	32
683	419	313	MILL RD	COLLECTOR	3605	1	12	4	1700	45	33
684	420	421	SH 111	COLLECTOR	1030	1	12	4	1700	45	32
685	420	434	SH 111	COLLECTOR	3485	1	12	4	1700	45	32
686	421	435	SH 151	COLLECTOR	599	1	12	4	1700	45	32
687	423	421	SH 111	COLLECTOR	799	1	12	4	1700	45	32
688	424	423	HOBBS RD	COLLECTOR	1565	1	12	4	1700	45	32

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
689	425	276	SH 151	COLLECTOR	1991	1	12	4	1750	45	32
690	425	426	SH 151	COLLECTOR	693	1	12	4	1700	45	32
691	426	420	SH 151	COLLECTOR	4634	1	12	4	1700	45	32
692	427	429	SH 151	COLLECTOR	2360	1	12	4	1700	40	20
693	428	457	SH 33	COLLECTOR	3507	1	12	4	1700	55	20
694	429	379	SH 151	COLLECTOR	3354	1	12	4	1700	40	20
695	430	431	WASHINGTON RD	COLLECTOR	4270	1	12	4	1575	35	28
696	431	427	WASHINGTON RD	COLLECTOR	1925	1	12	4	1750	35	20
697	432	80	SH 101 ON RAMP	FREEWAY RAMP	1398	1	12	4	1700	45	31
698	433	432	SH 111	COLLECTOR	4776	1	12	4	1700	50	31
699	434	433	SH 111	COLLECTOR	4227	1	12	4	1700	50	32
700	435	436	SH 151	COLLECTOR	4199	1	12	4	1750	40	28
701	435	438	WALNUT AVE	COLLECTOR	3650	1	12	4	1575	35	32
702	436	437	SH 151	COLLECTOR	2004	1	12	4	1700	40	28
703	437	440	LOVERING RD	COLLECTOR	7158	1	12	4	1575	35	28
704	437	454	SH 151	COLLECTOR	440	1	12	4	1700	40	28
705	438	439	WALNUT AVE	COLLECTOR	2521	1	12	4	1575	35	28
706	439	440	WALNUT AVE	COLLECTOR	2714	1	12	4	1575	35	27
707	440	441	LOVERING RD	COLLECTOR	887	1	12	4	1575	35	27
708	441	442	LOVERING RD	COLLECTOR	2166	1	12	4	1575	35	27
709	442	445	STRATHAM HEIGHTS RD	COLLECTOR	2563	1	12	0	1575	35	27
710	442	446	BUNKER HILL AVE	COLLECTOR	2294	1	12	0	1575	35	27
711	443	469	SH 108	MINOR ARTERIAL	962	3	12	4	1750	30	26
712	443	471	SH 108	COLLECTOR	347	1	12	4	1700	45	26
713	444	443	STRATHAM HEIGHTS RD	COLLECTOR	5799	1	12	0	1750	35	27
714	444	1611	GUINEA RD	LOCAL ROADWAY	1585	1	12	4	1575	35	27
715	445	444	STRATHAM HEIGHTS RD	COLLECTOR	4284	1	12	0	1575	35	27
716	446	447	BUNKER HILL AVE	COLLECTOR	289	1	12	0	1575	35	27
717	447	451	UNION RD	COLLECTOR	5752	1	10	4	1575	35	27
718	447	468	BUNKER HILL AVE	COLLECTOR	9878	1	12	0	1575	35	27

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
719	448	449	WINNICUTT RD	COLLECTOR	2172	1	12	0	1575	35	28
720	449	450	WINNICUTT RD	COLLECTOR	1822	1	12	0	1700	40	28
721	450	451	WINNICUTT RD	COLLECTOR	2595	1	12	0	1700	40	27
722	451	476	WINNICUTT RD	COLLECTOR	5772	1	12	0	1700	40	27
723	452	427	SH 151	COLLECTOR	4145	1	12	4	1750	40	28
724	453	436	NORTH RD	COLLECTOR	898	1	11	0	1750	35	28
725	454	448	WINNICUTT RD	COLLECTOR	2179	1	12	0	1575	35	28
726	454	452	SH 151	COLLECTOR	5909	1	12	4	1700	40	28
727	455	451	UNION RD	COLLECTOR	2440	1	12	4	1700	40	27
728	456	428	WINNICUTT RD	COLLECTOR	5451	1	12	4	1700	40	20
729	456	455	UNION RD	COLLECTOR	4232	1	12	4	1700	40	28
730	457	458	SH 33	COLLECTOR	4474	1	12	4	1700	55	12
731	458	459	SH 33	COLLECTOR	4187	1	12	4	1700	45	12
732	459	477	SH 33	COLLECTOR	1712	1	12	4	1700	45	12
733	460	461	SH 33	COLLECTOR	5265	1	12	4	1700	45	12
734	460	1612	SQUAMSCOTT RD	COLLECTOR	760	1	12	4	1700	45	12
735	461	460	SH 33	COLLECTOR	5265	1	12	4	1750	45	12
736	461	462	SH 33	COLLECTOR	821	1	12	4	1700	45	12
737	462	463	SH 33	COLLECTOR	681	1	12	4	1700	45	12
738	463	466	SH 108	COLLECTOR	650	1	12	4	1700	45	12
739	463	483	SH 108	COLLECTOR	616	1	12	4	1700	45	12
740	465	463	SH 108	COLLECTOR	599	1	12	4	1700	45	12
741	466	482	SH 108	COLLECTOR	4759	1	12	4	1700	50	12
742	467	465	SH 108	COLLECTOR	838	1	12	4	1700	45	12
743	467	468	SH 108	COLLECTOR	2861	1	12	4	1700	45	27
744	468	467	SH 108	COLLECTOR	2871	1	12	4	1700	45	27
745	468	470	SH 108	COLLECTOR	2260	1	12	4	1700	45	26
746	469	443	SH 108	COLLECTOR	961	2	12	4	1750	45	26
747	469	1601	SH 108	MINOR ARTERIAL	803	2	12	4	1750	30	26
748	470	468	SH 108	COLLECTOR	2260	1	12	4	1700	45	26

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
749	470	1601	SH 108	COLLECTOR	3119	1	12	4	1750	45	26
750	471	443	SH 108	MINOR ARTERIAL	347	3	12	4	1750	30	26
751	471	635	SH 101 RAMP	FREEWAY RAMP	210	1	12	4	1575	35	26
752	472	471	SH 108	MINOR ARTERIAL	322	3	12	4	1900	30	26
753	472	635	SH 101 RAMP	FREEWAY RAMP	302	2	12	4	1900	35	26
754	473	472	SH 108	MINOR ARTERIAL	449	2	12	4	1750	45	26
755	474	472	SH 101 RAMP	FREEWAY RAMP	258	1	12	4	1750	45	26
756	476	478	WINNICUTT RD	COLLECTOR	2264	1	12	0	1700	40	27
757	477	460	SH 33	COLLECTOR	1288	1	12	4	1750	45	12
758	478	461	WINNICUTT RD	COLLECTOR	3615	1	12	0	1700	40	12
759	479	478	HIGH ST	COLLECTOR	4770	1	12	4	1700	45	12
760	480	477	DEPOT RD	COLLECTOR	4506	1	12	4	1350	30	12
761	481	456	HIGH ST	LOCAL ROADWAY	3706	1	12	4	1350	30	20
762	482	485	SH 108	COLLECTOR	2929	1	12	4	1750	40	12
763	483	467	SH 108	COLLECTOR	786	1	12	4	1700	45	12
764	484	482	SQUAMSCOTT RD	COLLECTOR	1026	1	12	4	1700	45	12
765	485	486	SH 108	COLLECTOR	4221	1	12	4	1700	45	12
766	485	490	SH 85	COLLECTOR	4308	1	12	3	1700	40	12
767	486	487	ASH SWAMP RD	COLLECTOR	1082	1	12	4	1125	25	12
768	486	488	SH 108	COLLECTOR	3586	1	12	4	1700	45	12
769	487	486	ASH SWAMP RD	COLLECTOR	1096	1	12	4	1125	25	12
770	487	540	ASH SWAMP RD	COLLECTOR	1799	1	12	4	1700	45	12
771	488	489	SH 108	COLLECTOR	2246	1	12	4	1700	45	12
772	489	558	SH 108	COLLECTOR	483	1	12	4	1700	45	12
773	490	485	SH 85	COLLECTOR	4311	1	12	3	1700	40	12
774	490	491	SH 85	COLLECTOR	5523	1	12	3	1700	40	12
775	490	512	SH 87	COLLECTOR	3538	1	12	2	1700	45	12
776	491	492	SH 85	COLLECTOR	2657	1	12	4	1700	45	26
777	492	493	SH 85	COLLECTOR	3339	1	12	4	1700	45	26
778	493	494	SH 85	COLLECTOR	1210	1	12	4	1700	45	26

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
779	494	73	US 101 ON RAMP	FREEWAY RAMP	743	1	12	4	1700	45	26
780	495	70	US 101 ON RAMP	FREEWAY RAMP	1228	1	12	4	1700	45	25
781	496	497	SH 27	COLLECTOR	3738	1	12	4	1700	45	25
782	497	498	SH 27	COLLECTOR	2813	1	12	4	1700	50	25
783	498	499	SH 27	COLLECTOR	1681	1	12	4	1700	50	25
784	499	500	SH 27	COLLECTOR	543	1	12	4	1700	45	25
785	500	501	SH 27	COLLECTOR	5725	1	12	4	1700	45	25
786	501	502	SH 27	COLLECTOR	3489	1	12	3	1700	50	11
787	501	505	NORTH RD	COLLECTOR	455	1	12	4	1700	40	25
788	502	503	SH 27	COLLECTOR	6863	1	12	3	1700	50	11
789	503	506	SH 27	COLLECTOR	2634	1	12	3	1750	50	11
790	504	495	SH 27	COLLECTOR	558	1	12	4	1700	45	25
791	504	496	SH 27	COLLECTOR	734	1	12	4	1700	45	25
792	505	65	US 101 ON RAMP	FREEWAY RAMP	986	1	12	4	1700	45	25
793	505	501	NORTH RD	COLLECTOR	455	1	12	4	1700	40	25
794	506	507	SH 27	COLLECTOR	1332	1	12	3	1700	50	10
795	506	542	SH 125	COLLECTOR	5426	1	12	4	1700	40	11
796	506	543	SH 125	COLLECTOR	2339	1	12	4	1750	55	10
797	507	508	SH 27	COLLECTOR	326	1	12	3	1700	50	10
798	508	509	SH 27	COLLECTOR	1575	1	12	3	1700	50	10
799	510	521	SH 87	COLLECTOR	2121	1	12	2	1700	45	11
800	511	534	GRANT RD	COLLECTOR	1371	1	12	4	1700	40	11
801	511	535	ASH SWAMP RD	COLLECTOR	7989	1	12	4	1700	45	11
802	511	536	GRANT RD	COLLECTOR	5927	1	12	4	1700	40	12
803	512	513	SH 87	COLLECTOR	4090	1	12	2	1700	45	12
804	513	514	SH 87	COLLECTOR	1289	1	12	2	1700	45	11
805	514	515	SH 87	COLLECTOR	4204	1	12	2	1700	45	11
806	515	516	SH 87	COLLECTOR	2350	1	12	2	1700	45	11
807	516	517	SH 87	COLLECTOR	2753	1	12	2	1700	45	11
808	517	518	SH 87	COLLECTOR	816	1	12	2	1700	45	11

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
809	518	519	SH 87	COLLECTOR	1936	1	12	2	1700	45	11
810	519	520	SH 87	COLLECTOR	780	1	12	2	1700	45	11
811	520	545	SH 87	COLLECTOR	2522	1	12	2	1700	45	11
812	521	522	SH 87	COLLECTOR	2782	1	12	2	1700	45	11
813	522	546	SH 87	COLLECTOR	1322	1	12	2	1700	45	11
814	523	542	SH 125	COLLECTOR	3695	1	12	4	1700	50	11
815	523	557	SH 125	COLLECTOR	5328	1	12	4	1700	55	11
816	524	510	GRANT RD	COLLECTOR	3541	1	12	4	1750	40	11
817	525	524	GRANT RD	COLLECTOR	1549	1	12	4	1700	40	11
818	526	525	GRANT RD	COLLECTOR	1766	1	12	4	1700	40	11
819	527	526	GRANT RD	COLLECTOR	3586	1	12	4	1700	40	11
820	528	527	GRANT RD	COLLECTOR	554	1	12	4	1700	40	11
821	529	528	GRANT RD	COLLECTOR	1615	1	12	4	1700	40	11
822	530	529	GRANT RD	COLLECTOR	1228	1	12	4	1700	40	11
823	531	530	GRANT RD	COLLECTOR	869	1	12	4	1700	40	11
824	532	531	GRANT RD	COLLECTOR	2868	1	12	4	1700	40	11
825	533	532	GRANT RD	COLLECTOR	364	1	12	4	1350	30	11
826	534	533	GRANT RD	COLLECTOR	548	1	12	4	1350	30	11
827	535	554	SH 152	COLLECTOR	1597	1	12	4	1700	45	11
828	536	537	SH 152	COLLECTOR	2253	1	12	4	1700	45	12
829	537	538	SH 152	COLLECTOR	2335	1	12	4	1700	45	12
830	538	539	SH 152	COLLECTOR	1663	1	12	4	1700	45	11
831	539	535	SH 152	COLLECTOR	4349	1	12	4	1700	45	11
832	539	551	LEE HOOK RD	COLLECTOR	1879	1	12	4	1700	45	11
833	540	541	ASH SWAMP RD	COLLECTOR	2640	1	12	4	1700	45	12
834	541	556	ASH SWAMP RD	COLLECTOR	3109	1	12	4	1700	45	12
835	542	506	SH 125	COLLECTOR	5426	1	12	4	1750	40	11
836	542	523	SH 125	COLLECTOR	3695	1	12	4	1700	50	11
837	543	506	SH 125	COLLECTOR	2337	1	12	4	1750	55	10
838	543	544	SH 125	COLLECTOR	1313	1	12	4	1700	55	10

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
839	544	543	SH 125	MINOR ARTERIAL	1312	2	12	4	1750	55	10
840	544	1668	US 101 ON RAMP	FREEWAY RAMP	333	2	12	4	1700	45	10
841	545	510	SH 87	COLLECTOR	1631	1	12	2	1750	45	11
842	546	523	SH 87	COLLECTOR	1011	1	12	2	1700	45	11
843	547	550	SH 125	COLLECTOR	6892	1	12	4	1750	55	11
844	547	553	SH 155	COLLECTOR	4835	1	12	4	1700	45	11
845	548	550	SH 152	COLLECTOR	5685	1	12	4	1750	45	1
846	551	552	LEE HOOK RD	COLLECTOR	4200	1	12	4	1700	45	11
847	553	548	SH 155	COLLECTOR	2046	1	12	4	1700	45	11
848	554	555	SH 152	COLLECTOR	5353	1	12	4	1700	45	11
849	555	548	SH 152	COLLECTOR	4286	1	12	4	1700	45	11
850	556	511	ASH SWAMP RD	COLLECTOR	3066	1	12	4	1700	45	12
851	557	547	SH 125	COLLECTOR	4173	1	12	4	1700	55	11
852	558	559	SH 108	COLLECTOR	850	1	12	4	1700	45	12
853	559	560	SH 108	COLLECTOR	1335	1	12	4	1750	45	12
854	560	561	SH 108	COLLECTOR	390	1	12	4	1700	45	12
855	561	562	SH 108	COLLECTOR	940	1	12	10	1350	30	12
856	561	568	GERRY AVE	COLLECTOR	595	1	12	4	1575	35	12
857	562	563	SH 108	COLLECTOR	1494	1	12	10	1350	30	12
858	563	571	ELM ST	COLLECTOR	1707	1	12	4	1575	35	12
859	563	572	SH 108	COLLECTOR	297	1	12	4	1700	45	12
860	564	565	SH 108	COLLECTOR	1131	1	12	4	1700	40	12
861	565	566	SH 108	COLLECTOR	5450	1	12	1	1700	50	2
862	566	567	SH 108	COLLECTOR	3687	1	12	1	1700	50	2
863	568	569	SH 152	COLLECTOR	677	1	12	4	1575	35	12
864	569	536	SH 152	COLLECTOR	3078	1	12	4	1700	45	12
865	569	570	PACKERS FALLS RD	COLLECTOR	2118	1	12	4	1700	40	12
866	570	571	ELM ST	COLLECTOR	1634	1	12	4	1575	35	12
867	570	581	PACKERS FALLS RD	COLLECTOR	792	1	12	4	1700	40	12
868	571	563	ELM ST	COLLECTOR	1707	1	12	4	1575	35	12

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
869	571	570	ELM ST	COLLECTOR	1653	1	12	4	1575	35	12
870	572	564	SH 108	COLLECTOR	623	1	12	4	1575	35	12
871	573	572	BAY RD	COLLECTOR	2689	1	12	4	1350	30	12
872	574	573	BAY RD	COLLECTOR	3429	1	12	4	1350	30	12
873	575	574	BAY RD	COLLECTOR	4406	1	12	4	1350	30	12
874	576	575	BAY RD	COLLECTOR	3941	1	12	4	1350	30	12
875	576	577	BAY RD	COLLECTOR	5328	1	12	4	1350	30	2
876	577	578	BAY RD	COLLECTOR	3294	1	11	0	1350	30	2
877	578	579	BAY RD	COLLECTOR	2447	1	11	0	1350	30	2
878	579	580	BAY RD	COLLECTOR	2628	1	11	0	1350	30	2
879	581	582	PACKERS FALLS RD	COLLECTOR	2114	1	12	4	1700	45	12
880	582	583	PACKERS FALLS RD	COLLECTOR	5725	1	12	4	1700	45	2
881	583	584	PACKERS FALLS RD	COLLECTOR	1583	1	12	4	1700	45	2
882	585	586	NEW RD	COLLECTOR	2290	1	12	4	1700	45	12
883	586	560	NEW RD	COLLECTOR	2522	1	12	4	1750	45	12
884	587	504	WATSON RD	COLLECTOR	812	1	12	4	1700	45	25
885	588	587	WATSON RD	COLLECTOR	1745	1	12	4	1700	45	25
886	589	588	WATSON RD	COLLECTOR	2929	1	12	4	1700	45	25
887	590	606	I-95 OFF RAMP TO SR 101	COLLECTOR	629	1	12	4	1700	45	32
888	590	608	I-95 ON RAMP FROM SH 101	COLLECTOR	528	1	12	4	1700	45	32
889	591	592	I-95 OFF RAMP FROM SH 101	FREEWAY RAMP	729	1	12	4	1700	40	32
890	591	594	I-95 ON RAMP FROM SH 101	FREEWAY RAMP	530	1	12	4	1350	30	32
891	592	591	I-95 OFF RAMP FROM SH 101	FREEWAY RAMP	725	1	12	4	1350	30	32
892	592	608	I-95 OFF RAMP FROM SH 101	COLLECTOR	1276	1	12	4	1700	45	32
893	593	592	I-95 ON RAMP FROM SH 101	COLLECTOR	1036	1	12	4	1700	45	32
894	593	595	I-95 ON RAMP FROM SH 101	COLLECTOR	596	1	12	4	1350	30	32
895	594	35	I-95 ON RAMP FROM SH 101	FREEWAY RAMP	1231	1	12	4	1700	45	32
896	595	34	I-95 ON RAMP FROM SH 101	FREEWAY RAMP	1474	1	12	4	1700	45	32
897	596	83	SH 101	FREEWAY	2553	2	12	4	2250	60	32
898	597	596	SH 101 ON RAMP	FREEWAY RAMP	643	1	12	4	1700	45	32

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
899	597	598	SH 27	COLLECTOR	1063	1	12	1	1700	40	32
900	598	599	SH 27	COLLECTOR	1122	1	12	1	1700	40	32
901	599	600	SH 27	COLLECTOR	1454	1	12	1	1700	45	32
902	600	601	SH 27	COLLECTOR	1873	1	12	1	1700	45	32
903	601	603	SH 27	COLLECTOR	3694	1	12	1	1700	45	31
904	602	597	SH 27	COLLECTOR	4784	1	12	1	1700	40	32
905	602	1545	TOWLE FARM RD	COLLECTOR	854	1	12	4	1700	45	38
906	603	604	SH 27	COLLECTOR	921	1	12	1	1700	45	31
907	604	605	SH 27	COLLECTOR	3656	1	12	1	1700	45	31
908	605	432	SH 111	COLLECTOR	1575	1	12	4	1700	50	31
909	605	609	SH 27	COLLECTOR	2785	1	12	1	1700	40	31
910	606	82	I-95 OFF RAMP TO SR 101	FREEWAY RAMP	1156	1	12	4	1700	45	32
911	606	590	I-95 ON RAMP FROM SH 101	COLLECTOR	631	1	12	4	1350	30	32
912	607	606	I-95 ON RAMP FROM SH 101	COLLECTOR	1363	1	12	4	1700	45	32
913	608	590	I-95 OFF RAMP TO SR 101	COLLECTOR	528	1	12	4	900	20	32
914	608	593	I-95 ON RAMP FROM SH 101	COLLECTOR	244	1	12	4	1700	45	32
915	609	1610	SH 27	COLLECTOR	887	1	12	1	1700	40	31
916	610	611	SH 27	COLLECTOR	366	1	12	1	1575	35	31
917	611	612	HOLLAND WAY	COLLECTOR	650	1	12	4	1700	40	30
918	611	617	SH 27	COLLECTOR	454	1	12	4	1750	35	30
919	612	613	HOLLAND WAY	COLLECTOR	3769	1	12	4	1700	40	26
920	613	614	HOLLAND WAY	COLLECTOR	1432	1	12	4	1750	40	26
921	614	473	SH 108	MINOR ARTERIAL	534	2	12	4	1900	30	26
922	615	616	SH 108	COLLECTOR	1250	1	12	3	1750	40	30
923	615	1598	SH 108	COLLECTOR	656	1	12	3	1750	40	26
924	616	615	SH 108	COLLECTOR	1250	1	12	3	1750	40	30
925	616	618	SH 111A	COLLECTOR	740	1	12	4	1350	30	30
926	617	611	SH 27	COLLECTOR	454	1	12	4	1575	35	30
927	617	636	SH 111	COLLECTOR	1701	1	12	4	1700	40	30
928	618	619	SH 111A	COLLECTOR	644	1	12	4	1750	30	30

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
929	619	621	SH 111A	COLLECTOR	783	1	12	4	1125	25	30
930	620	619	SH 111	COLLECTOR	341	1	12	4	1750	35	30
931	620	728	SH 111	COLLECTOR	2172	1	12	10	1125	25	30
932	621	622	SH 111A	COLLECTOR	486	1	12	4	1125	25	30
933	622	623	SH 85	COLLECTOR	829	1	10	0	1125	25	30
934	622	627	SH 111A	COLLECTOR	1063	1	12	4	1350	30	30
935	623	624	SH 85	COLLECTOR	1695	1	10	0	1700	45	26
936	624	625	SH 85	COLLECTOR	3091	1	10	0	1700	45	26
937	625	1603	SH 85	COLLECTOR	406	1	12	4	675	15	26
938	626	494	SH 85	COLLECTOR	661	1	12	4	1700	45	26
939	627	628	SH 111A	COLLECTOR	1214	1	12	4	1350	30	30
940	628	629	SH 111A	COLLECTOR	303	1	12	4	1575	35	30
941	629	630	SH 111A	COLLECTOR	1322	1	12	4	1575	35	26
942	630	631	SH 27	COLLECTOR	433	1	12	4	1700	45	26
943	630	782	SH 111A	COLLECTOR	1565	1	12	4	1575	35	26
944	631	632	SH 27	COLLECTOR	1488	1	12	4	1700	45	26
945	632	633	SH 27	COLLECTOR	1272	1	12	4	1700	45	25
946	633	634	SH 27	COLLECTOR	3425	1	12	4	1700	45	25
947	634	495	SH 27	COLLECTOR	711	1	12	4	1700	45	25
948	635	76	SH 101 RAMP	FREEWAY RAMP	549	1	12	4	1700	45	26
949	636	637	SH 111	COLLECTOR	1068	1	12	4	1700	40	30
950	637	638	SH 111	COLLECTOR	1970	1	12	4	1700	40	30
951	638	616	SH 111	COLLECTOR	1403	1	12	4	1750	40	30
952	639	614	SH 108	COLLECTOR	679	2	12	3	1750	40	26
953	640	617	SH 88	COLLECTOR	364	1	12	4	1750	35	30
954	641	640	SH 88	COLLECTOR	1594	1	12	4	1575	35	31
955	642	641	SH 88	COLLECTOR	1720	1	12	4	1575	35	31
956	643	642	SH 88	COLLECTOR	1702	1	12	4	1700	40	31
957	644	643	SH 88	COLLECTOR	1051	1	12	4	1700	45	31
958	645	644	SH 88	COLLECTOR	868	1	12	4	1700	45	31

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
959	646	645	SH 88	COLLECTOR	3707	1	12	4	1700	45	31
960	647	646	SH 88	COLLECTOR	2280	1	12	4	1700	45	31
961	648	647	SH 88	COLLECTOR	1933	1	12	4	1700	45	37
962	649	675	SH 88	COLLECTOR	2764	1	12	4	1700	40	37
963	650	649	SH 88	COLLECTOR	1691	1	12	4	1700	40	37
964	651	650	SH 88	COLLECTOR	1337	1	12	4	1700	40	37
965	652	651	SH 88	COLLECTOR	1969	1	12	4	1700	40	37
966	652	684	BROWN RD	COLLECTOR	1900	1	12	4	1700	45	38
967	653	652	SH 88	COLLECTOR	2453	1	12	4	1700	40	38
968	653	654	SH 88	COLLECTOR	558	1	12	4	1750	45	38
969	654	655	US 1	COLLECTOR	239	1	12	4	1750	40	38
970	654	682	US 1	COLLECTOR	286	1	12	4	1700	40	38
971	655	653	SH 88	COLLECTOR	546	1	12	4	1700	45	38
972	655	654	US 1	COLLECTOR	239	1	12	4	1750	40	38
973	655	657	US 1	COLLECTOR	5911	1	12	4	1700	40	38
974	656	655	DEPOT RD	COLLECTOR	3684	1	12	4	1750	30	38
975	657	655	US 1	COLLECTOR	5911	1	12	4	1750	40	38
976	657	658	US 1	MINOR ARTERIAL	847	2	12	4	1900	40	38
977	658	657	US 1	COLLECTOR	847	1	12	4	1700	40	38
978	658	662	US 1	MINOR ARTERIAL	928	2	12	4	1900	40	38
979	659	663	SH 101 ON RAMP FROM US 1	COLLECTOR	703	1	12	4	1700	40	38
980	659	666	US 1	MINOR ARTERIAL	449	2	12	4	1900	30	38
981	660	280	US 1	COLLECTOR	886	1	12	4	1700	45	38
982	660	664	US 1	COLLECTOR	549	1	12	4	1700	45	38
983	661	658	US 1	MINOR ARTERIAL	1525	2	12	4	1900	40	38
984	662	659	US 1	MINOR ARTERIAL	1435	2	12	4	1900	40	38
985	663	86	SH 101 ON RAMP FROM US 1	FREEWAY RAMP	711	1	12	4	1700	40	38
986	664	661	US 1	MINOR ARTERIAL	641	2	12	4	1900	40	38
987	665	666	SH 101 OFF RAMP TO US 1	COLLECTOR	290	1	12	4	1700	40	38
988	666	660	US 1	MINOR ARTERIAL	307	2	12	4	1900	45	38

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
989	667	664	US 1	COLLECTOR	313	1	12	4	1700	30	38
990	667	668	DRAKESIDE RD	COLLECTOR	1560	1	12	4	1700	45	38
991	668	669	DRAKESIDE RD	COLLECTOR	1275	1	12	4	1700	45	38
992	669	670	DRAKESIDE RD	COLLECTOR	2154	1	12	4	1700	45	38
993	670	671	DRAKESIDE RD	COLLECTOR	1666	1	12	4	1700	45	38
994	671	672	DRAKESIDE RD	COLLECTOR	513	1	12	4	1700	45	38
995	672	676	TOWLE FARM RD	COLLECTOR	948	1	12	4	1700	45	38
996	673	674	TOWLE FARM RD	COLLECTOR	3795	1	12	4	1700	45	37
997	674	675	BROWN RD	COLLECTOR	4044	1	12	4	1700	45	37
998	675	648	SH 88	COLLECTOR	2411	1	12	4	1700	45	37
999	675	742	NASON RD	COLLECTOR	3991	1	12	4	1700	40	37
1000	676	673	TOWLE FARM RD	COLLECTOR	1452	1	12	4	1700	45	38
1001	676	677	MARYBATCHELDER RD	COLLECTOR	651	1	12	4	1700	40	38
1002	677	678	MARYBATCHELDER RD	COLLECTOR	2437	1	12	4	1700	40	38
1003	678	679	TIMBER SWAMP RD	COLLECTOR	2448	1	12	4	1700	40	32
1004	679	599	TIMBER SWAMP RD	COLLECTOR	859	1	12	4	1700	40	32
1005	680	702	SH 107	COLLECTOR	1594	2	12	4	1700	45	37
1006	680	843	US 1	MINOR ARTERIAL	1789	1	12	4	1750	35	37
1007	680	1543	US 1	MINOR ARTERIAL	1089	2	12	4	1900	35	37
1008	681	687	US 1	COLLECTOR	2021	1	12	4	1700	40	40
1009	681	1543	US 1	COLLECTOR	1476	1	12	4	1700	35	37
1010	682	654	US 1	COLLECTOR	286	1	12	4	1750	40	38
1011	682	687	US 1	COLLECTOR	3887	1	12	4	1700	40	40
1012	682	688	SH 84	COLLECTOR	1672	1	12	4	1575	35	38
1013	683	674	BROWN RD	COLLECTOR	1427	1	12	4	1700	45	37
1014	684	683	BROWN RD	COLLECTOR	1938	1	12	4	1700	45	37
1015	685	680	THE PROVIDENT WAY	COLLECTOR	3087	1	12	4	1750	40	40
1016	686	681	PLANT ACCESS RD	LOCAL ROADWAY	2529	1	12	4	1750	40	40
1017	686	685	THE PROVIDENT WAY	COLLECTOR	2388	1	12	4	1700	40	40
1018	687	681	US 1	COLLECTOR	2023	1	12	4	1750	40	40

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1019	687	682	US 1	COLLECTOR	3888	1	12	4	1700	40	40
1020	688	689	SH 84	COLLECTOR	969	1	12	4	1350	30	40
1021	689	690	SH 84	COLLECTOR	3901	1	12	4	1700	40	37
1022	690	691	SH 84	COLLECTOR	4286	1	12	4	1700	40	37
1023	691	692	SH 84	COLLECTOR	1341	1	12	4	1350	30	37
1024	692	693	SH 84	COLLECTOR	1134	1	12	4	1575	35	37
1025	693	694	SH 84	COLLECTOR	2681	1	12	4	1700	40	37
1026	694	695	SH 84	COLLECTOR	2739	1	12	4	1700	40	37
1027	695	696	SH 84	COLLECTOR	3483	1	12	4	1750	40	37
1028	696	721	SH 150	COLLECTOR	2481	1	12	1	1350	30	37
1029	697	696	SH 150	COLLECTOR	1406	1	12	4	1750	40	37
1030	697	738	COTTAGE RD	LOCAL ROADWAY	5054	1	12	4	1575	35	37
1031	698	697	SH 150	COLLECTOR	674	1	12	4	1700	40	37
1032	699	698	SH 150	COLLECTOR	706	1	12	4	1575	35	37
1033	700	699	SH 150	COLLECTOR	503	1	12	4	1575	35	37
1034	701	700	SH 150	COLLECTOR	1162	1	12	4	1700	40	37
1035	701	708	SH 107	COLLECTOR	1402	1	12	4	1700	40	37
1036	701	955	SH 150	COLLECTOR	4161	1	12	4	1700	50	37
1037	702	31	I-95 ON RAMP FROM SH 107	FREEWAY RAMP	903	1	12	4	1700	40	37
1038	702	703	SH 107	COLLECTOR	946	1	12	4	1700	45	37
1039	703	30	I-95 ON RAMP FROM SH 107	FREEWAY RAMP	1632	1	12	4	1350	30	37
1040	703	704	SH 107	COLLECTOR	1217	1	12	4	1750	45	37
1041	704	705	SH 107	COLLECTOR	3596	1	12	4	1700	45	37
1042	705	706	SH 107	COLLECTOR	3528	1	12	4	1700	45	37
1043	706	707	SH 107	COLLECTOR	2952	1	12	4	1700	45	37
1044	707	701	SH 107	COLLECTOR	2269	1	12	4	1700	45	37
1045	708	709	SH 107	COLLECTOR	2006	1	12	4	1700	40	37
1046	709	710	SH 107	COLLECTOR	5116	1	12	4	1700	40	37
1047	710	711	SH 107	COLLECTOR	2503	1	12	4	1700	40	37
1048	711	712	SH 107	COLLECTOR	4760	1	12	4	1700	40	36

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1049	712	713	SH 107	COLLECTOR	2218	1	12	4	1350	30	36
1050	713	714	SH 107	COLLECTOR	1263	1	12	4	1350	30	36
1051	714	715	SH 108	COLLECTOR	1996	1	12	4	1750	45	36
1052	714	748	SH 107	COLLECTOR	810	1	12	4	1575	35	36
1053	715	716	SH 108	COLLECTOR	2170	1	12	4	1700	45	36
1054	716	717	SH 108	COLLECTOR	344	1	12	4	1700	45	36
1055	717	718	SH 108	COLLECTOR	5061	1	12	4	1700	45	36
1056	718	719	SH 108	COLLECTOR	3528	1	12	4	1700	45	36
1057	719	720	SH 108	COLLECTOR	4283	1	12	4	1750	45	30
1058	720	725	SH 108	COLLECTOR	1336	1	12	4	1700	45	30
1059	721	722	SH 150	COLLECTOR	4133	1	12	1	1575	35	37
1060	722	723	SH 150	COLLECTOR	3062	1	12	4	1700	45	37
1061	723	724	SH 150	COLLECTOR	4899	1	12	4	1700	45	37
1062	724	720	SH 150	COLLECTOR	2270	1	12	4	1750	40	30
1063	725	726	SH 108	COLLECTOR	4886	1	12	4	1700	45	30
1064	726	727	SH 108	COLLECTOR	2907	1	12	4	1700	40	30
1065	727	620	SH 108	COLLECTOR	621	1	12	4	1350	30	30
1066	728	729	SH 111	COLLECTOR	1299	1	12	10	1125	25	30
1067	729	730	SH 111	COLLECTOR	1476	1	12	10	1125	25	30
1068	730	731	KINGSTON RD	COLLECTOR	1349	1	12	4	1575	35	30
1069	730	781	SH 111	COLLECTOR	1233	1	12	4	1350	30	30
1070	731	629	KINGSTON RD	COLLECTOR	421	1	12	4	1350	30	30
1071	732	733	STUMPFIELD RD	LOCAL ROADWAY	8718	1	12	4	1575	35	37
1072	733	715	STUMPFIELD RD	LOCAL ROADWAY	2861	1	12	4	1750	35	36
1073	734	735	MUDDY POND RD	LOCAL ROADWAY	3554	1	12	4	1350	30	37
1074	735	736	MUDDY POND RD	LOCAL ROADWAY	738	1	12	4	1350	30	37
1075	736	711	MUDDY POND RD	LOCAL ROADWAY	1262	1	12	4	1350	30	37
1076	737	732	STUMPFIELD RD	LOCAL ROADWAY	635	1	12	4	1575	35	37
1077	737	734	MUDDY POND RD	LOCAL ROADWAY	800	1	12	4	1350	30	37
1078	738	737	COTTAGE RD	LOCAL ROADWAY	783	1	12	4	1575	35	37

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1079	739	724	SHAW HILL RD	LOCAL ROADWAY	2031	1	12	4	1350	30	37
1080	740	722	OSGOOD RD	COLLECTOR	6250	1	12	4	1700	40	37
1081	740	743	WILD PASTURE RD	COLLECTOR	3636	1	12	4	1700	40	37
1082	740	744	DRINKWATER RD	COLLECTOR	2001	1	12	4	1700	40	37
1083	741	637	DRINKWATER RD	COLLECTOR	7146	1	12	4	1700	40	30
1084	742	675	NASON RD	COLLECTOR	3990	1	12	4	1700	40	37
1085	742	694	NASON RD	COLLECTOR	3183	1	12	4	1700	40	37
1086	742	747	DRINKWATER RD	COLLECTOR	2942	1	12	4	1700	40	37
1087	743	696	WILD PASTURE RD	COLLECTOR	4144	1	12	4	1750	40	37
1088	744	745	DRINKWATER RD	COLLECTOR	2044	1	12	4	1700	40	37
1089	745	741	DRINKWATER RD	COLLECTOR	4673	1	12	4	1700	40	30
1090	746	740	DRINKWATER RD	COLLECTOR	3902	1	12	4	1700	40	37
1091	747	746	DRINKWATER RD	COLLECTOR	1095	1	12	4	1700	40	37
1092	748	749	SH 107	COLLECTOR	3834	1	12	4	1575	35	36
1093	749	750	SH 107	COLLECTOR	2178	1	12	4	1575	35	36
1094	749	756	SH 108	COLLECTOR	2923	1	12	4	1700	50	36
1095	750	751	SH 107	COLLECTOR	3757	1	12	4	1700	40	36
1096	751	752	SH 107	COLLECTOR	2214	1	12	4	1700	40	36
1097	752	753	SH 107	COLLECTOR	1956	1	12	4	1750	40	36
1098	753	754	SH 107	COLLECTOR	371	1	12	4	1750	40	36
1099	754	755	SH 125	COLLECTOR	5352	1	12	4	1750	55	36
1100	754	762	SH 125	COLLECTOR	5422	1	12	4	1750	55	36
1101	755	754	SH 125	COLLECTOR	5345	1	12	4	1750	55	36
1102	755	765	SH 125	COLLECTOR	2843	1	12	4	1750	55	36
1103	756	757	SH 108	COLLECTOR	2212	1	12	4	1700	50	36
1104	757	761	SH 108	COLLECTOR	845	1	12	4	1700	50	36
1105	758	753	SH 107A	COLLECTOR	3009	1	12	4	1750	40	36
1106	759	758	SH 107A	COLLECTOR	2781	1	12	4	1700	40	36
1107	760	759	SH 107A	COLLECTOR	1795	1	12	4	1700	40	36
1108	761	760	SH 107A	COLLECTOR	3604	1	12	4	1700	40	36

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1109	761	1147	SH 108	COLLECTOR	1880	1	12	4	1700	40	36
1110	762	763	SH 125	COLLECTOR	3783	1	12	4	1750	55	36
1111	763	822	SH 111	COLLECTOR	628	1	12	4	1750	40	36
1112	763	1029	SH 125	COLLECTOR	4594	1	12	4	1700	55	35
1113	764	765	SH 107	COLLECTOR	329	1	12	4	1750	45	36
1114	764	827	SH 107	COLLECTOR	2193	1	12	4	1700	45	25
1115	765	764	SH 107	COLLECTOR	329	1	12	4	1700	45	36
1116	765	796	SH 125	COLLECTOR	2233	1	12	4	1700	55	25
1117	766	755	SH 111	COLLECTOR	2278	1	12	4	1750	45	36
1118	767	766	SH 111	COLLECTOR	997	1	12	4	1700	45	36
1119	768	767	SH 111	COLLECTOR	1965	1	12	4	1700	45	36
1120	769	768	SH 111	COLLECTOR	804	1	12	4	1700	45	25
1121	770	769	SH 111	COLLECTOR	2277	1	12	4	1700	45	25
1122	771	770	SH 111	COLLECTOR	1959	1	12	4	1700	45	25
1123	772	771	SH 111	COLLECTOR	2418	1	12	4	1700	45	25
1124	773	772	SH 111	COLLECTOR	2375	1	12	4	1700	45	25
1125	775	773	SH 111	COLLECTOR	2251	1	12	4	1700	40	25
1126	776	775	SH 111	COLLECTOR	1088	1	12	4	1700	40	25
1127	777	776	SH 111	COLLECTOR	2611	1	12	4	1700	40	25
1128	778	777	SH 111	COLLECTOR	1347	1	12	4	1700	40	25
1129	779	778	SH 111	COLLECTOR	2210	1	12	4	1700	40	25
1130	780	779	SH 111	COLLECTOR	787	1	12	4	1700	40	25
1131	781	780	SH 111	COLLECTOR	2022	1	12	4	1700	40	25
1132	782	783	SH 111A	COLLECTOR	2124	1	12	4	1700	40	25
1133	783	784	SH 111A	COLLECTOR	3484	1	12	4	1700	40	25
1134	784	785	SH 111A	COLLECTOR	998	1	12	4	1700	40	25
1135	785	786	SH 111A	COLLECTOR	5580	1	12	4	1700	40	25
1136	786	787	SH 111A	COLLECTOR	2533	1	12	4	1700	40	25
1137	787	788	SH 111A	COLLECTOR	1461	1	12	4	1700	40	25
1138	787	794	DEERHILL RD	COLLECTOR	8474	1	12	4	1700	40	25

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1139	788	789	SH 111A	COLLECTOR	3083	1	12	4	1700	40	25
1140	789	790	SH 111A	COLLECTOR	2847	1	12	4	1700	40	25
1141	790	791	SH 111A	COLLECTOR	2796	1	12	4	1700	40	25
1142	791	792	SH 111A	COLLECTOR	2269	1	12	4	1700	40	25
1143	792	793	SH 111A	COLLECTOR	3295	1	12	4	1750	40	24
1144	793	795	SH 125	COLLECTOR	11589	1	12	4	1700	55	24
1145	793	798	SH 111A	COLLECTOR	4281	1	12	4	1700	40	24
1146	794	795	NORTH RD	COLLECTOR	10029	1	12	4	1750	40	25
1147	794	831	NORTH RD	COLLECTOR	1423	1	12	4	1700	40	25
1148	795	793	SH 125	COLLECTOR	11610	1	12	4	1750	55	24
1149	795	794	NORTH RD	COLLECTOR	10029	1	12	4	1700	40	25
1150	795	830	SH 125	COLLECTOR	6210	1	12	4	1700	55	24
1151	796	797	SH 125	COLLECTOR	3433	1	12	4	1750	55	25
1152	797	793	SH 125	COLLECTOR	6187	1	12	4	1750	55	24
1153	798	799	SH 111A	COLLECTOR	2225	1	12	4	1700	40	24
1154	799	800	SH 107	COLLECTOR	7247	1	12	1	1700	50	24
1155	800	801	SH 107	COLLECTOR	1802	1	12	4	1700	40	24
1156	801	802	SH 107	COLLECTOR	3932	1	12	4	1575	35	24
1157	802	803	SH 107	COLLECTOR	3497	1	12	4	1575	35	24
1158	803	1676	SH 107	COLLECTOR	7763	1	12	4	1700	40	24
1159	804	801	SH 111A	COLLECTOR	4350	1	12	0	1700	45	24
1160	804	805	SOUTH RD	COLLECTOR	7615	1	12	4	1700	40	24
1161	805	803	SANDOWN RD	COLLECTOR	7831	1	12	4	1700	40	24
1162	806	804	SH 111A	COLLECTOR	3665	1	12	0	1700	45	24
1163	807	808	SH 111A	COLLECTOR	6523	1	12	4	1700	45	35
1164	807	818	SH 111A	COLLECTOR	2362	1	12	4	1575	35	35
1165	808	806	SH 111A	COLLECTOR	2859	1	12	0	1700	45	24
1166	809	808	BEACH PLAIN RD	LOCAL ROADWAY	5461	1	12	4	1350	30	35
1167	810	809	BEACH PLAIN RD	LOCAL ROADWAY	1816	1	12	4	1350	30	35
1168	811	825	CHASE ST	LOCAL ROADWAY	6548	1	12	4	1350	30	36

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1169	812	807	LONG POND RD	LOCAL ROADWAY	1814	1	12	4	1350	30	35
1170	813	812	LONG POND RD	LOCAL ROADWAY	1593	1	12	4	1350	30	35
1171	814	826	SH 111	COLLECTOR	6019	1	12	4	1700	55	35
1172	815	814	DANVILLE RD	COLLECTOR	3913	1	12	4	1700	45	35
1173	816	819	SH 111A	COLLECTOR	6061	1	12	4	1750	40	35
1174	817	816	SH 111A	COLLECTOR	2673	1	12	4	1700	40	35
1175	818	817	SH 111A	COLLECTOR	1985	1	12	4	1575	35	35
1176	819	820	SH 111	COLLECTOR	4873	1	12	4	1750	55	35
1177	820	821	SH 111	COLLECTOR	2284	1	12	4	1700	55	35
1178	821	1645	SH 111	COLLECTOR	6634	1	12	4	1750	45	35
1179	822	763	SH 111	COLLECTOR	629	1	12	4	1750	40	36
1180	822	814	SH 111	COLLECTOR	4071	1	12	4	1700	45	35
1181	823	822	SH 111	COLLECTOR	5446	1	12	4	1750	35	36
1182	824	823	SH 111	COLLECTOR	3104	1	12	4	1757	35	36
1183	824	825	SH 111	COLLECTOR	3659	1	12	4	1757	35	36
1184	825	755	SH 111	COLLECTOR	619	1	12	4	1750	45	36
1185	826	819	SH 111	COLLECTOR	7424	1	12	4	1750	55	35
1186	827	828	SH 107	COLLECTOR	4124	1	12	1	1700	50	24
1187	828	829	SH 107	COLLECTOR	4313	1	12	1	1700	50	24
1188	829	799	SH 107	COLLECTOR	1002	1	12	1	1700	50	24
1189	830	544	SH 125	MINOR ARTERIAL	732	2	12	4	1900	55	10
1190	831	505	NORTH RD	COLLECTOR	1128	1	12	4	1700	40	25
1191	832	797	SOUTH ST	LOCAL ROADWAY	6575	1	12	4	1750	30	25
1192	833	279	US 1	COLLECTOR	1498	1	12	4	1750	40	38
1193	833	1547	US 1	COLLECTOR	762	1	12	4	1750	40	38
1194	834	833	SH 101E	COLLECTOR	3999	1	12	4	1700	35	38
1195	835	834	SH 101E	COLLECTOR	1874	1	12	4	1700	40	38
1196	836	835	SH 101E	COLLECTOR	3816	1	12	4	1700	40	39
1197	838	1658	SH 1A	MINOR ARTERIAL	1034	2	12	4	1900	35	41
1198	839	838	SH 1A	MINOR ARTERIAL	1439	2	12	4	1900	35	41

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1199	839	858	SH 1A	COLLECTOR	5086	1	12	4	1700	35	41
1200	840	841	SH 1A	MINOR ARTERIAL	1175	2	12	4	1900	35	39
1201	841	842	SH 1A	MINOR ARTERIAL	2103	2	12	4	1900	35	39
1202	842	329	SH 1A	MINOR ARTERIAL	1919	2	12	4	1900	35	39
1203	842	836	SH 101E	COLLECTOR	2336	1	12	4	1700	40	39
1204	843	680	US 1	MINOR ARTERIAL	1789	2	12	4	1750	35	37
1205	843	844	US 1	MINOR ARTERIAL	665	2	12	4	1750	35	37
1206	844	843	US 1	MINOR ARTERIAL	665	2	12	4	1750	35	37
1207	844	845	US 1	MINOR ARTERIAL	1580	2	12	4	1750	35	40
1208	845	844	US 1	MINOR ARTERIAL	1580	2	12	4	1750	35	40
1209	845	846	US 1	COLLECTOR	524	2	12	4	1750	30	40
1210	846	845	US 1	COLLECTOR	524	2	12	4	1750	30	40
1211	846	847	US 1	COLLECTOR	1523	1	12	4	1575	35	40
1212	847	846	US 1	COLLECTOR	1504	1	12	4	1750	35	40
1213	847	1537	US 1	MINOR ARTERIAL	892	2	12	4	1900	45	37
1214	848	849	MAIN ST	COLLECTOR	2316	1	12	4	1750	45	46
1215	849	27	I-95 ON RAMP FROM TOLL RD	FREEWAY RAMP	2270	1	12	4	1700	40	46
1216	849	852	MAIN ST	COLLECTOR	953	1	12	4	1750	45	46
1217	849	853	TOLL RD	COLLECTOR	848	1	12	4	1750	45	46
1218	850	851	US 1	COLLECTOR	554	1	12	4	1750	45	51
1219	850	1538	US 1	COLLECTOR	1920	1	12	4	1700	45	51
1220	851	850	US 1	COLLECTOR	558	1	12	4	1700	45	51
1221	851	853	SH 286	COLLECTOR	2960	1	12	4	1750	45	46
1222	851	854	US 1	COLLECTOR	3198	1	12	4	1750	45	46
1223	852	951	RABBIT RD	COLLECTOR	6644	1	12	4	1700	45	46
1224	852	1526	SH 286	COLLECTOR	1634	1	12	4	1700	45	46
1225	853	849	TOLL RD	COLLECTOR	849	1	12	4	1750	40	46
1226	853	852	SH 286	COLLECTOR	1485	1	12	4	1750	45	46
1227	853	854	TOLL RD	COLLECTOR	3056	1	12	4	1750	45	46
1228	854	851	US 1	COLLECTOR	3188	1	12	4	1750	45	46

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1229	854	871	US 1	COLLECTOR	3758	1	12	5	1700	45	46
1230	855	851	SH 286	COLLECTOR	1559	1	12	4	1750	45	51
1231	856	855	SH 286	COLLECTOR	2383	1	12	4	1700	45	51
1232	857	856	SH 286	COLLECTOR	10175	1	12	4	1700	45	51
1233	857	1650	SH 1A	COLLECTOR	456	1	12	4	1700	35	51
1234	858	839	SH 1A	COLLECTOR	5086	1	12	4	1700	35	41
1235	858	1660	SH 1A	MINOR ARTERIAL	1495	2	12	4	1750	35	41
1236	859	861	SH 1A	COLLECTOR	1349	2	12	4	1750	40	51
1237	860	859	MURRAY ST	COLLECTOR	2812	1	12	4	1750	35	51
1238	861	866	SH 1A	COLLECTOR	9104	1	12	4	1750	40	51
1239	862	861	STATE BEACH RD	LOCAL ROADWAY	3145	1	12	4	1750	35	51
1240	863	862	STATE BEACH RD	LOCAL ROADWAY	157	1	12	4	1575	35	51
1241	864	863	STATE BEACH RD	LOCAL ROADWAY	142	1	12	4	1575	35	51
1242	865	864	STATE BEACH RD	LOCAL ROADWAY	2856	1	12	4	1575	35	51
1243	866	867	SH 1A	COLLECTOR	1041	1	12	4	1750	40	51
1244	867	868	US 1	MINOR ARTERIAL	226	2	12	4	1750	30	51
1245	867	871	US 1	COLLECTOR	4406	1	12	4	1700	45	51
1246	868	867	US 1	MINOR ARTERIAL	226	2	12	4	1750	30	51
1247	868	869	US 1	COLLECTOR	673	1	12	4	1750	30	51
1248	868	870	SH 110	MINOR ARTERIAL	737	2	12	4	1900	40	51
1249	869	868	US 1	MINOR ARTERIAL	673	2	12	4	1750	30	51
1250	869	874	US 1	COLLECTOR	2659	1	12	4	1700	45	51
1251	870	869	SH 110	COLLECTOR	423	2	12	4	1750	45	51
1252	870	872	SH 110	COLLECTOR	1369	1	12	4	1700	45	51
1253	871	854	US 1	COLLECTOR	3758	1	12	5	1750	45	46
1254	871	867	US 1	MINOR ARTERIAL	4407	1	12	4	1750	30	51
1255	872	873	SH 110	COLLECTOR	3416	1	12	4	1700	45	46
1256	873	903	SH 110	COLLECTOR	5440	1	12	4	1750	45	46
1257	874	869	US 1	COLLECTOR	2659	1	12	4	1750	45	51
1258	874	875	US 1	COLLECTOR	787	1	12	4	1700	45	51

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1259	875	874	US 1	COLLECTOR	787	1	12	4	1700	45	51
1260	875	1535	US 1	COLLECTOR	3300	1	12	4	1700	45	51
1261	876	877	US 1	MINOR ARTERIAL	1502	2	14	4	1900	50	50
1262	876	1535	US 1	COLLECTOR	1643	1	12	4	1700	45	51
1263	877	876	US 1	MINOR ARTERIAL	1502	2	14	4	1900	50	50
1264	877	880	US 1	MINOR ARTERIAL	1259	2	12	4	1900	50	50
1265	878	879	WATER ST	COLLECTOR	368	1	12	0	1350	30	50
1266	879	880	US 1 ON RAMP	FREEWAY RAMP	515	1	12	4	1350	30	50
1267	879	934	WATER ST	COLLECTOR	2086	1	12	0	1350	30	50
1268	880	877	US 1	MINOR ARTERIAL	1259	2	12	4	1900	50	50
1269	880	936	US 1	MINOR ARTERIAL	1914	2	12	4	1750	50	50
1270	881	882	PLUM ISLAND TURNPIKE	COLLECTOR	1070	1	12	4	1750	40	55
1271	882	883	PLUM ISLAND TURNPIKE	COLLECTOR	2471	1	12	4	1700	40	55
1272	883	884	PLUM ISLAND TURNPIKE	COLLECTOR	5078	1	12	4	1700	40	55
1273	884	885	WATER ST	COLLECTOR	2879	1	12	4	1750	40	55
1274	885	886	WATER ST	COLLECTOR	1689	1	12	4	1700	40	55
1275	885	940	ROLFES LN	LOCAL ROADWAY	3118	1	12	4	1750	30	55
1276	886	887	WATER ST	COLLECTOR	836	1	12	4	1700	40	51
1277	887	888	WATER ST	COLLECTOR	1508	1	12	4	1700	40	51
1278	888	889	WATER ST	COLLECTOR	1426	1	12	0	1700	40	51
1279	889	890	WATER ST	COLLECTOR	1314	1	12	0	1750	40	51
1280	890	891	WATER ST	COLLECTOR	597	1	12	0	1125	25	51
1281	890	937	STATE ST	COLLECTOR	1757	1	12	4	1750	40	51
1282	891	892	WATER ST	COLLECTOR	258	1	12	0	1350	30	50
1283	892	878	WATER ST	COLLECTOR	674	1	12	0	1350	30	50
1284	893	882	SUNSET DRIVE	LOCAL ROADWAY	1989	1	12	4	1750	30	55
1285	894	895	NORTHERN BLVD	LOCAL ROADWAY	1306	1	12	4	1350	30	55
1286	895	881	NORTHERN BLVD	LOCAL ROADWAY	1267	1	12	4	1350	30	55
1287	896	881	NORTHERN BLVD	LOCAL ROADWAY	2332	1	12	4	1350	30	55
1288	897	896	NORTHERN BLVD	LOCAL ROADWAY	2394	1	12	4	1350	30	51

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1289	898	897	NORTHERN BLVD	LOCAL ROADWAY	1354	1	12	4	1350	30	51
1290	899	898	NORTHERN BLVD	LOCAL ROADWAY	1270	1	12	4	1350	30	51
1291	900	882	SUNSET DRIVE	LOCAL ROADWAY	5948	1	12	4	1750	30	55
1292	901	900	SUNSET DRIVE	LOCAL ROADWAY	9614	1	12	4	1350	30	55
1293	902	901	SUNSET DRIVE	LOCAL ROADWAY	19546	1	12	4	1350	30	55
1294	903	918	MERRILL ST	COLLECTOR	1887	1	12	4	1700	40	46
1295	903	1527	SH 110	COLLECTOR	480	2	12	4	1700	45	46
1296	904	21	I-95 ON RAMP FROM SH 110	FREEWAY RAMP	1611	1	12	4	1700	45	46
1297	904	905	SH 110	COLLECTOR	592	1	12	4	1750	45	46
1298	905	906	SH 110	COLLECTOR	3757	1	12	4	1700	45	46
1299	905	916	CLARKS RD	COLLECTOR	1361	1	12	4	1575	35	46
1300	905	967	ELM ST	COLLECTOR	4225	1	12	4	1350	30	46
1301	906	107	I-495 ON RAMP	FREEWAY RAMP	1203	1	12	4	1575	35	46
1302	906	907	SH 110	COLLECTOR	2566	1	12	4	1750	45	45
1303	907	908	SH 110	COLLECTOR	2110	1	12	4	1750	40	45
1304	908	909	SH 150	COLLECTOR	1480	1	12	4	1575	35	45
1305	908	1010	SH 110	COLLECTOR	1014	1	12	4	1700	40	45
1306	909	104	I-495 ON RAMP	FREEWAY RAMP	666	1	12	4	1700	45	45
1307	910	909	SH 150	COLLECTOR	693	1	12	4	1575	35	45
1308	911	910	SH 150	COLLECTOR	1780	1	12	4	1575	35	49
1309	911	912	BEACON ST	COLLECTOR	1386	1	12	4	1700	40	49
1310	912	911	BEACON ST	COLLECTOR	1382	1	12	4	1700	40	49
1311	912	913	BEACON ST	COLLECTOR	2220	1	12	4	1700	40	49
1312	913	907	EVANS ST	COLLECTOR	2415	1	12	4	1750	40	45
1313	914	913	EVANS ST	COLLECTOR	2151	1	12	4	1700	40	45
1314	915	914	EVANS ST	COLLECTOR	1082	1	12	4	1700	40	46
1315	915	917	EVANS ST	COLLECTOR	2821	1	12	4	1750	40	46
1316	916	905	CLARKS RD	COLLECTOR	1341	1	12	4	1750	35	46
1317	916	915	CLARKS RD	COLLECTOR	1302	1	12	4	1575	35	46
1318	917	915	EVANS ST	COLLECTOR	2821	1	12	4	1700	40	46

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1319	917	918	MERRILL ST	COLLECTOR	1964	1	12	4	1700	40	46
1320	917	919	SPOFFORD ST	COLLECTOR	1993	1	12	4	1750	30	50
1321	918	903	MERRILL ST	COLLECTOR	1893	1	12	4	1750	40	46
1322	918	917	MERRILL ST	COLLECTOR	1971	1	12	4	1750	40	46
1323	919	917	SPOFFORD ST	COLLECTOR	1991	1	12	4	1750	30	50
1324	919	920	SPOFFORD ST	COLLECTOR	1930	1	12	4	1575	35	50
1325	920	921	FERRY ST	COLLECTOR	2676	1	14	10	1750	35	50
1326	921	924	SH 113	COLLECTOR	1344	1	12	4	1700	30	50
1327	922	921	HIGH ST	COLLECTOR	517	1	12	6	1750	35	50
1328	923	919	WATER ST	COLLECTOR	3790	1	15	0	1750	40	50
1329	923	922	PLUMMER AVE	LOCAL ROADWAY	1551	1	12	4	1575	35	50
1330	924	925	SH 113	COLLECTOR	1750	1	12	4	1700	30	50
1331	925	1528	SH 113	COLLECTOR	1302	1	12	4	1700	45	50
1332	926	922	HIGH ST	COLLECTOR	1385	1	12	6	1575	35	50
1333	927	928	HIGH ST	COLLECTOR	1258	1	12	4	1575	35	50
1334	927	932	TOPPANS LN	COLLECTOR	2190	1	12	4	1750	35	50
1335	928	929	RAWSON AVE	LOCAL ROADWAY	1572	1	12	4	1350	30	50
1336	928	930	HIGH ST	COLLECTOR	820	1	12	6	1575	35	50
1337	929	923	WATER ST	COLLECTOR	3598	1	15	0	1700	40	50
1338	929	928	RAWSON AVE	LOCAL ROADWAY	1572	1	12	4	1575	35	50
1339	930	926	HIGH ST	COLLECTOR	802	1	12	6	1575	35	50
1340	931	927	HIGH ST	COLLECTOR	157	1	12	4	1575	35	50
1341	931	934	BROAD ST	LOCAL ROADWAY	1606	1	12	4	1350	30	50
1342	931	935	HIGH ST	COLLECTOR	2802	1	12	4	1575	35	50
1343	932	933	HALE ST	COLLECTOR	5179	1	12	4	1700	40	50
1344	932	950	LOW ST	COLLECTOR	1521	1	12	4	1700	40	50
1345	933	1232	HALE ST	COLLECTOR	4068	1	12	4	1700	40	54
1346	934	929	WATER ST	COLLECTOR	1371	1	12	4	1700	40	50
1347	934	931	BROAD ST	LOCAL ROADWAY	1606	1	12	4	1350	30	50
1348	935	938	HIGH ST	COLLECTOR	982	1	12	4	1750	35	50

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1349	936	880	US 1	FREEWAY RAMP	1914	2	12	4	1900	50	50
1350	936	946	US 1	MINOR ARTERIAL	2293	2	12	4	1750	50	50
1351	937	939	HIGH ST	COLLECTOR	2802	1	12	4	1575	35	51
1352	937	942	STATE ST	COLLECTOR	2917	1	14	12	1700	30	50
1353	938	892	GREEN ST	COLLECTOR	1373	1	12	4	1700	45	50
1354	938	937	HIGH ST	COLLECTOR	769	1	12	4	1750	35	50
1355	939	941	HIGH ST	COLLECTOR	1833	1	12	4	1575	35	55
1356	940	885	ROLFES LN	LOCAL ROADWAY	3118	1	12	4	1750	30	55
1357	940	941	HIGH ST	COLLECTOR	787	1	12	4	1575	35	55
1358	940	1269	HIGH ST	COLLECTOR	4364	1	12	4	1575	35	55
1359	940	1356	HANOVER ST	COLLECTOR	556	1	12	4	1700	45	55
1360	941	940	HIGH ST	COLLECTOR	787	1	12	4	1750	35	55
1361	941	942	PARKER ST	COLLECTOR	3596	1	12	4	1700	30	55
1362	942	943	US 1	COLLECTOR	215	1	12	4	1575	35	54
1363	943	944	US 1	COLLECTOR	249	1	12	4	1350	30	54
1364	943	954	US 1	MINOR ARTERIAL	304	2	12	4	1900	35	54
1365	944	945	US 1	MINOR ARTERIAL	289	2	12	4	1900	35	54
1366	945	1258	US 1	MINOR ARTERIAL	361	2	12	4	1900	35	54
1367	945	1259	US 1	MINOR ARTERIAL	2723	2	12	4	1900	60	54
1368	946	936	US 1	MINOR ARTERIAL	2292	2	12	4	1750	50	50
1369	946	953	PARKER ST	COLLECTOR	361	1	12	4	1700	40	54
1370	946	954	US 1	MINOR ARTERIAL	472	2	12	4	1900	50	54
1371	947	936	LOW ST	COLLECTOR	1040	1	12	4	1750	40	50
1372	947	948	GRAFT RD	COLLECTOR	2449	1	12	4	1750	40	50
1373	948	947	GRAFT RD	COLLECTOR	2449	1	12	4	1750	45	50
1374	948	953	PARKER ST	COLLECTOR	1718	1	12	4	1700	40	54
1375	948	1249	SCOTTLAND RD	COLLECTOR	804	1	12	4	1700	45	54
1376	949	948	MULLIKEN WAY	COLLECTOR	2109	1	12	4	1750	40	54
1377	950	932	LOW ST	COLLECTOR	1521	1	12	4	1750	40	50
1378	950	947	LOW ST	COLLECTOR	827	1	12	4	1750	40	50

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1379	951	952	RABBIT RD	COLLECTOR	1536	1	12	4	1700	45	46
1380	952	903	RABBIT RD	COLLECTOR	1441	1	12	4	1750	45	46
1381	953	948	PARKER ST	COLLECTOR	1718	1	12	4	1750	40	54
1382	953	954	PARKER ST	COLLECTOR	487	1	12	4	1700	40	54
1383	954	944	US 1	MINOR ARTERIAL	358	2	12	4	1575	35	54
1384	954	946	US 1	COLLECTOR	472	2	12	4	1750	50	54
1385	955	956	SH 150	COLLECTOR	4784	1	12	4	1700	40	37
1386	956	957	SH 150	COLLECTOR	3472	1	12	4	1700	40	37
1387	957	958	SH 150	COLLECTOR	4181	1	12	4	1575	35	45
1388	957	977	FERN AVE	LOCAL ROADWAY	2212	1	12	4	1575	35	45
1389	958	990	SH 150	COLLECTOR	1120	1	12	4	1575	35	45
1390	959	960	ELM ST	COLLECTOR	110	1	12	0	1140	25	45
1391	960	961	SH 150	COLLECTOR	95	1	12	0	1140	25	45
1392	961	980	SH 150	COLLECTOR	310	1	12	4	1575	35	45
1393	962	959	ELM ST	COLLECTOR	113	1	12	0	1750	25	45
1394	963	962	ELM ST	COLLECTOR	566	1	12	4	1125	25	45
1395	964	963	ELM ST	COLLECTOR	909	1	12	4	1350	30	45
1396	965	964	ELM ST	COLLECTOR	505	1	12	4	1350	30	45
1397	966	965	ELM ST	COLLECTOR	554	1	12	4	1350	30	45
1398	967	966	ELM ST	COLLECTOR	1916	1	12	4	1350	30	45
1399	968	967	SH 286	COLLECTOR	3947	1	12	4	1700	45	46
1400	969	968	SH 286	COLLECTOR	1217	1	12	4	1700	45	46
1401	970	969	SH 286	COLLECTOR	3131	1	12	4	1700	45	46
1402	970	979	CONGRESS ST	COLLECTOR	2016	1	14	0	1400	40	46
1403	971	978	CONGRESS ST	COLLECTOR	1380	1	12	4	1575	35	46
1404	972	974	CONGRESS ST	COLLECTOR	591	1	12	4	1700	40	46
1405	973	976	FERN AVE	LOCAL ROADWAY	931	1	12	4	1575	35	46
1406	974	975	CONGRESS ST	COLLECTOR	2617	1	12	4	1700	40	46
1407	975	965	CONGRESS ST	COLLECTOR	1912	1	12	4	1700	40	45
1408	976	957	FERN AVE	LOCAL ROADWAY	3546	1	12	4	1575	35	45

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1409	977	1153	SH 107A	COLLECTOR	8724	1	12	4	1700	40	37
1410	978	972	CONGRESS ST	COLLECTOR	369	1	12	4	1700	40	46
1411	978	973	FERN AVE	LOCAL ROADWAY	352	1	12	4	1575	35	46
1412	979	971	CONGRESS ST	COLLECTOR	2625	1	14	0	1400	40	46
1413	980	981	FRIEND ST	COLLECTOR	904	1	12	4	1575	35	45
1414	980	987	SH 150	COLLECTOR	1185	1	12	4	1750	35	45
1415	981	982	FRIEND ST	COLLECTOR	117	1	12	4	1575	35	45
1416	982	983	FRIEND ST	COLLECTOR	147	1	12	4	1575	35	45
1417	982	985	FRIEND ST	COLLECTOR	175	1	12	4	1575	35	45
1418	983	986	FRIEND ST	COLLECTOR	111	1	12	4	1575	35	45
1419	985	994	FRIEND ST	COLLECTOR	801	1	12	4	1575	35	45
1420	986	987	FRIEND ST	COLLECTOR	477	1	12	4	1750	35	45
1421	987	991	SH 150	COLLECTOR	570	1	12	4	1575	35	45
1422	988	960	ELM ST	COLLECTOR	597	1	12	4	1350	30	45
1423	989	995	HIGH ST	COLLECTOR	695	1	12	4	1575	35	45
1424	990	959	SH 150	COLLECTOR	736	1	12	10	1750	35	45
1425	991	992	SH 150	COLLECTOR	1279	1	12	4	1750	35	45
1426	992	908	SH 150	COLLECTOR	2289	1	12	4	1750	35	45
1427	993	992	HIGHLAND ST	COLLECTOR	2030	1	12	4	1750	35	45
1428	993	997	LIONS MOUNTAIN RD	COLLECTOR	2389	1	12	4	1575	35	45
1429	994	993	FRIEND ST	COLLECTOR	1775	1	12	4	1575	35	45
1430	995	994	WHITEHALL RD	COLLECTOR	1194	1	12	4	1575	35	45
1431	996	995	WHITEHALL RD	COLLECTOR	7649	1	12	4	1575	35	45
1432	997	998	LIONS MOUNTAIN RD	COLLECTOR	5063	1	12	4	1575	35	45
1433	998	999	LIONS MOUNTAIN RD	COLLECTOR	2513	1	12	4	1700	40	44
1434	999	1000	AMESBURY RD	COLLECTOR	1802	1	12	4	1700	40	44
1435	999	1006	AMESBURY RD	COLLECTOR	2995	1	12	4	1700	40	44
1436	1000	1001	AMESBURY RD	COLLECTOR	1450	1	12	4	1700	40	44
1437	1001	1002	AMESBURY RD	COLLECTOR	1940	1	12	4	1700	40	44
1438	1002	1003	AMESBURY RD	COLLECTOR	3348	1	12	4	1700	40	44

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1439	1003	1004	AMESBURY RD	COLLECTOR	4458	1	12	4	1700	40	44
1440	1004	1005	AMESBURY RD	COLLECTOR	2202	1	12	4	1700	40	44
1441	1005	1144	BEAR HILL RD	COLLECTOR	1869	1	12	4	1575	35	43
1442	1005	1186	BEAR HILL RD	COLLECTOR	6229	1	12	4	1700	40	44
1443	1006	1007	AMESBURY RD	COLLECTOR	817	1	12	4	1700	40	45
1444	1007	1008	AMESBURY RD	COLLECTOR	1202	1	12	4	1700	40	45
1445	1008	1009	AMESBURY RD	COLLECTOR	1474	1	12	4	1700	40	45
1446	1009	1013	SH 110	COLLECTOR	584	1	12	4	1700	40	45
1447	1010	1011	SH 110	COLLECTOR	1909	1	12	4	1700	40	45
1448	1011	1012	SH 110	COLLECTOR	311	1	12	4	1700	40	45
1449	1012	1009	SH 110	COLLECTOR	2798	1	12	4	1700	40	45
1450	1012	1015	MIDDLE ST	COLLECTOR	3830	1	12	4	1700	40	49
1451	1013	1014	SH 110	COLLECTOR	2964	1	12	4	1700	40	45
1452	1014	1016	POND HILL RD	LOCAL ROADWAY	2407	1	12	4	1700	40	49
1453	1014	1028	SH 110	COLLECTOR	3023	1	12	4	1700	45	48
1454	1015	1016	MIDDLE ST	COLLECTOR	1235	1	12	4	1700	40	49
1455	1016	1017	MIDDLE ST	COLLECTOR	2044	1	12	4	1700	40	49
1456	1017	1018	MIDDLE ST	COLLECTOR	1511	1	12	4	1700	40	48
1457	1018	1019	MIDDLE ST	COLLECTOR	3036	1	12	4	1700	40	48
1458	1019	1020	MIDDLE ST	COLLECTOR	436	1	12	4	1700	40	48
1459	1020	1021	BROAD ST	COLLECTOR	2162	1	12	4	1700	40	48
1460	1020	1210	RIVER RD	COLLECTOR	841	1	12	4	1700	45	48
1461	1021	1022	BROAD ST	COLLECTOR	724	1	12	4	1700	40	48
1462	1022	102	I-495 ON RAMP	FREEWAY RAMP	357	1	12	4	1700	45	48
1463	1023	1022	BROAD ST	COLLECTOR	1196	1	12	4	1700	40	48
1464	1024	1023	BROAD ST	COLLECTOR	1213	1	12	4	1700	40	48
1465	1024	1187	SH 110	COLLECTOR	1582	1	12	4	1350	30	48
1466	1025	1024	SH 110	COLLECTOR	822	1	12	4	1700	40	48
1467	1026	1025	SH 110	COLLECTOR	840	1	12	4	1700	40	48
1468	1027	1026	SH 110	COLLECTOR	1238	1	12	4	1700	40	48

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1469	1028	1027	SH 110	COLLECTOR	2764	1	12	4	1700	45	48
1470	1029	1030	SH 125	COLLECTOR	5158	1	12	4	1700	55	35
1471	1030	1031	SH 125	COLLECTOR	1191	1	12	4	1700	55	35
1472	1031	1032	SH 125	COLLECTOR	1505	2	12	4	1750	55	35
1473	1032	1033	SH 125	COLLECTOR	5889	1	12	4	1700	55	42
1474	1032	1131	HUNT RD	LOCAL ROADWAY	3688	1	12	4	1700	40	35
1475	1032	1140	PEASELEE CROSSING RD	LOCAL ROADWAY	6551	1	12	4	1575	35	42
1476	1033	1034	SH 125	COLLECTOR	2407	1	12	4	1700	55	42
1477	1034	1035	SH 125	COLLECTOR	2452	1	12	4	1750	55	42
1478	1034	1174	KINGSTON RD	LOCAL ROADWAY	2751	1	12	4	1575	35	42
1479	1035	1036	SH 125	COLLECTOR	3648	1	12	4	1750	55	42
1480	1036	1037	SH 125	COLLECTOR	1304	1	12	4	1700	55	42
1481	1036	1130	SH 121A	COLLECTOR	1896	1	12	4	1700	45	42
1482	1036	1139	SH 121A	COLLECTOR	1986	1	12	4	1700	45	42
1483	1037	1038	SH 125	COLLECTOR	4683	2	12	4	1750	55	42
1484	1038	1039	SH 125	COLLECTOR	1476	2	12	4	1750	55	42
1485	1038	1102	EAST RD	COLLECTOR	3934	1	12	4	1700	40	42
1486	1039	1040	SH 125	COLLECTOR	528	2	12	4	1750	55	42
1487	1040	1041	SH 125	COLLECTOR	1085	2	12	4	1750	55	42
1488	1041	1042	SH 125	COLLECTOR	2281	1	12	4	1750	55	42
1489	1042	1043	SH 125	COLLECTOR	772	1	12	4	1750	55	42
1490	1042	1106	WENTWORTH AVE	LOCAL ROADWAY	1807	1	12	4	1575	35	42
1491	1043	1044	SH 125	COLLECTOR	1774	1	12	4	1750	55	42
1492	1044	1045	SH 125	COLLECTOR	1468	1	12	4	1750	55	42
1493	1044	1106	SH 121	COLLECTOR	2988	1	12	4	1700	45	42
1494	1045	1046	SH 125	COLLECTOR	1928	1	12	4	1750	55	42
1495	1046	1047	SH 125	COLLECTOR	738	1	12	4	1700	55	52
1496	1047	96	I-495 ON RAMP	FREEWAY RAMP	965	1	12	4	1700	45	52
1497	1047	1048	SH 125	COLLECTOR	1282	1	12	4	1700	55	52
1498	1048	1047	SH 125	COLLECTOR	1282	1	12	4	1700	55	52

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1499	1048	1049	SH 125	COLLECTOR	953	1	12	4	1700	55	52
1500	1049	1048	SH 125	COLLECTOR	953	1	12	4	1700	55	52
1501	1049	1050	SH 125	COLLECTOR	489	1	12	4	1700	55	52
1502	1050	1049	SH 125	COLLECTOR	488	1	12	4	1700	55	52
1503	1050	1051	SH 125	COLLECTOR	2352	1	12	4	1700	55	52
1504	1051	1050	SH 125	COLLECTOR	2350	1	12	4	1700	55	52
1505	1051	1052	SH 125	COLLECTOR	812	1	12	4	1700	55	52
1506	1051	1625	LAWRENCE ST	COLLECTOR	1240	1	12	4	1700	40	52
1507	1052	1051	SH 125	COLLECTOR	811	1	12	4	1700	55	52
1508	1052	1053	SH 125	COLLECTOR	2809	1	12	4	1700	55	52
1509	1053	1052	SH 125	COLLECTOR	2808	1	12	4	1700	55	52
1510	1053	1054	SH 125	COLLECTOR	362	1	12	4	1750	55	52
1511	1054	1053	SH 125	COLLECTOR	362	1	12	4	1700	55	52
1512	1054	1055	SH 125	MINOR ARTERIAL	475	2	12	4	1750	30	52
1513	1055	1056	SH 125	COLLECTOR	974	1	12	4	1750	35	52
1514	1055	1085	CHARLES ST	COLLECTOR	1044	1	12	4	1700	40	52
1515	1056	1057	SH 125	MAJOR ARTERIAL	382	2	12	4	1750	35	52
1516	1056	1084	SH 97	COLLECTOR	1275	1	12	4	1575	35	52
1517	1057	1058	SH 125	MINOR ARTERIAL	545	2	12	4	1750	35	52
1518	1057	1086	GINTY BLVD	COLLECTOR	1418	1	12	4	1575	35	52
1519	1058	1059	SH 125	COLLECTOR	1707	1	12	4	1575	35	52
1520	1058	1089	SH 110	COLLECTOR	1693	1	12	4	1750	45	52
1521	1059	1060	SH 125	COLLECTOR	970	1	12	4	1750	35	52
1522	1060	1061	SH 125	COLLECTOR	1355	1	12	4	1750	45	52
1523	1060	1072	SALEM ST	COLLECTOR	2167	1	12	4	1575	35	52
1524	1061	1062	SH 125	COLLECTOR	3057	1	12	4	1700	45	52
1525	1061	1637	KINGSBURY AVE	COLLECTOR	5409	1	12	4	1575	35	52
1526	1062	1063	SH 125	COLLECTOR	3147	1	12	4	1700	45	52
1527	1063	1064	SH 125	COLLECTOR	3589	2	12	4	1750	45	52
1528	1064	1065	INDUSTRIAL AVE	MINOR ARTERIAL	1103	2	12	4	1750	45	52

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1529	1065	1064	INDUSTRIAL AVE	MINOR ARTERIAL	1103	1	12	4	1750	45	52
1530	1065	1066	INDUSTRIAL AVE	MINOR ARTERIAL	1674	2	12	4	1750	45	52
1531	1066	1067	INDUSTRIAL AVE	MINOR ARTERIAL	2320	2	12	4	1900	45	52
1532	1067	1068	INDUSTRIAL AVE	MINOR ARTERIAL	1108	2	12	4	1900	45	52
1533	1068	91	I-495 ON RAMP	FREEWAY RAMP	1315	1	12	4	1575	35	52
1534	1069	1066	WARD HILL AVE	COLLECTOR	883	2	12	4	1750	40	52
1535	1070	1061	S PROSPECT ST	LOCAL ROADWAY	1509	1	12	4	1750	30	52
1536	1071	1060	ELM ST	LOCAL ROADWAY	1039	1	12	4	1750	30	52
1537	1072	1073	SALEM ST	COLLECTOR	698	1	12	4	1575	35	52
1538	1073	1074	SALEM ST	COLLECTOR	5217	1	12	4	1575	35	53
1539	1074	1075	SALEM ST	COLLECTOR	1889	1	12	4	1575	35	53
1540	1075	1076	SALEM ST	COLLECTOR	2080	1	12	4	1575	35	53
1541	1076	1077	SALEM ST	COLLECTOR	2116	1	12	4	1575	35	53
1542	1077	1083	WASHINGTON ST	COLLECTOR	2552	1	12	4	1575	35	53
1543	1078	1077	WASHINGTON ST	COLLECTOR	534	1	12	4	1575	35	53
1544	1079	1075	MAIN ST	COLLECTOR	2880	1	12	4	1575	35	53
1545	1079	1080	WASHINGTON ST	COLLECTOR	2367	1	12	4	1575	35	53
1546	1080	1078	WASHINGTON ST	COLLECTOR	978	1	12	4	1575	35	53
1547	1081	1079	MAIN ST	COLLECTOR	2362	1	12	4	1575	35	53
1548	1082	1081	MAIN ST	COLLECTOR	2700	1	12	4	1575	35	53
1549	1082	1429	SH 97	COLLECTOR	5864	1	12	4	1700	40	53
1550	1084	1086	EMERSON ST	LOCAL ROADWAY	938	1	12	4	1575	35	52
1551	1084	1100	SH 97	COLLECTOR	1946	1	12	4	1700	40	52
1552	1085	1084	EMERSON ST	LOCAL ROADWAY	636	1	12	4	1575	35	52
1553	1086	1089	EMERSON ST	LOCAL ROADWAY	589	1	12	4	1750	35	52
1554	1087	1057	GINTY BLVD	COLLECTOR	1458	1	12	4	1750	35	52
1555	1088	1058	SH 113	COLLECTOR	2046	1	12	4	1750	35	52
1556	1088	1087	GINTY BLVD	COLLECTOR	921	1	12	4	1700	40	52
1557	1089	1090	SH 110	COLLECTOR	1238	1	12	4	1700	45	52
1558	1090	1091	SH 110	COLLECTOR	9879	1	12	4	1750	45	52

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1559	1091	1092	SH 110	COLLECTOR	489	2	12	4	1700	45	52
1560	1092	1093	SH 110	COLLECTOR	1053	1	12	4	1700	45	52
1561	1093	93	I-495 ON RAMP	FREEWAY RAMP	1270	1	12	4	1575	35	52
1562	1094	1091	LOWELL AVE	LOCAL ROADWAY	1157	2	12	4	1750	30	52
1563	1095	1097	SH 97	COLLECTOR	1127	1	12	4	1700	40	52
1564	1096	1095	MONUMENT ST	LOCAL ROADWAY	1453	1	12	4	1750	30	52
1565	1097	95	I-495 ON RAMP	FREEWAY RAMP	1596	1	12	4	1575	35	52
1566	1098	1095	SH 97	COLLECTOR	6245	1	12	4	1750	40	52
1567	1099	1098	HILLDALE AVE	LOCAL ROADWAY	1573	1	12	4	1750	35	52
1568	1100	1098	SH 97	COLLECTOR	523	1	12	4	1750	40	52
1569	1102	1038	EAST RD	COLLECTOR	3931	1	12	4	1750	40	42
1570	1102	1646	EAST RD	COLLECTOR	7100	1	12	4	1700	40	42
1571	1103	1039	WESTVILLE RD	LOCAL ROADWAY	1180	1	12	4	1750	30	42
1572	1104	1040	MALL ENTRANCE	LOCAL ROADWAY	552	1	12	4	1750	35	42
1573	1105	1041	KOHL'S ENTRANCE	LOCAL ROADWAY	534	1	12	4	1750	35	42
1574	1106	1042	WENTWORTH AVE	LOCAL ROADWAY	1807	1	12	4	1750	35	42
1575	1106	1044	SH 121	COLLECTOR	2988	1	12	4	1750	45	42
1576	1106	1107	SH 121	COLLECTOR	3988	1	12	4	1700	45	42
1577	1107	1108	SH 121	COLLECTOR	3227	1	12	4	1700	45	42
1578	1109	1043	SH 121A	COLLECTOR	317	1	12	4	1750	45	42
1579	1110	1109	SH 121A	COLLECTOR	4742	1	12	4	1700	45	42
1580	1111	1110	SH 121A	COLLECTOR	1921	1	12	4	1700	45	42
1581	1112	1111	SH 121A	COLLECTOR	2338	1	12	4	1900	45	42
1582	1113	1626	MILL ST	COLLECTOR	349	1	12	4	1700	40	52
1583	1113	1630	SH 110	COLLECTOR	576	1	14	1	1750	45	52
1584	1114	1113	SH 110	COLLECTOR	3035	1	14	1	1750	45	52
1585	1115	1114	SH 110	COLLECTOR	758	1	14	1	1700	45	53
1586	1115	1209	SH 110	COLLECTOR	1251	1	12	6	1700	45	53
1587	1116	1115	SH 108	COLLECTOR	2132	1	12	4	1750	40	53
1588	1117	1116	SH 108	COLLECTOR	2315	1	12	4	1700	40	53

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1589	1118	1117	SH 108	COLLECTOR	2064	1	12	4	1700	45	47
1590	1119	1118	SH 108	COLLECTOR	2998	1	12	4	1700	45	47
1591	1120	1119	SH 108	COLLECTOR	2191	1	12	4	1700	45	47
1592	1121	1120	SWEET HILL RD	LOCAL ROADWAY	661	1	12	4	1750	35	47
1593	1122	1121	SWEET HILL RD	LOCAL ROADWAY	2798	1	12	4	1575	35	47
1594	1123	1122	SWEET HILL RD	LOCAL ROADWAY	3032	1	12	4	1575	35	42
1595	1124	1123	SWEET HILL RD	LOCAL ROADWAY	2945	1	12	4	1575	35	42
1596	1125	1112	KINGSTON RD	LOCAL ROADWAY	1800	1	12	4	1575	35	42
1597	1126	1127	SH 121A	COLLECTOR	1095	1	12	4	1700	45	35
1598	1126	1136	BROWN HILL RD	COLLECTOR	4974	1	12	4	1575	35	35
1599	1126	1137	SH 121A	COLLECTOR	2239	1	12	4	1700	45	35
1600	1127	1126	SH 121A	COLLECTOR	1095	1	12	4	1700	45	35
1601	1127	1128	SH 121A	COLLECTOR	2305	1	12	4	1700	45	35
1602	1128	1127	SH 121A	COLLECTOR	2292	1	12	4	1700	45	35
1603	1128	1129	SH 121A	COLLECTOR	2865	1	12	4	1700	45	42
1604	1129	1128	SH 121A	COLLECTOR	2865	1	12	4	1700	45	42
1605	1129	1130	SH 121A	COLLECTOR	6072	1	12	4	1700	45	42
1606	1129	1138	OLD COUNTY RD	COLLECTOR	6245	1	12	4	1700	40	42
1607	1130	1036	SH 121A	COLLECTOR	1897	1	12	4	1750	45	42
1608	1130	1129	SH 121A	COLLECTOR	6073	1	12	4	1700	45	42
1609	1131	1032	HUNT RD	COLLECTOR	3688	1	12	4	1750	40	35
1610	1131	1132	HUNT RD	LOCAL ROADWAY	3791	1	12	4	1700	40	35
1611	1132	1133	HUNT RD	LOCAL ROADWAY	1509	1	12	4	1350	30	35
1612	1133	1134	HUNT RD	LOCAL ROADWAY	2778	1	12	4	1700	40	35
1613	1134	1135	HUNT RD	LOCAL ROADWAY	1536	1	12	4	1700	40	35
1614	1135	1136	HUNT RD	LOCAL ROADWAY	2091	1	12	4	1700	40	35
1615	1136	819	BROWN HILL RD	COLLECTOR	288	1	12	4	1750	35	35
1616	1137	820	SH 121A	COLLECTOR	2988	1	12	4	1700	45	35
1617	1138	1035	OLD COUNTY RD	COLLECTOR	988	1	12	4	1750	40	42
1618	1139	1112	SH 121A	COLLECTOR	3009	1	12	4	1700	45	42

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1619	1140	1032	PEASELEE CROSSING RD	LOCAL ROADWAY	6559	1	12	4	1750	35	42
1620	1140	1168	PEASELEE CROSSING RD	LOCAL ROADWAY	1430	1	12	4	1575	35	43
1621	1141	1140	HIGHLAND RD	LOCAL ROADWAY	4682	1	12	4	1350	30	43
1622	1142	1141	HIGHLAND RD	LOCAL ROADWAY	4482	1	12	4	1350	30	43
1623	1142	1143	HIGHLAND RD	LOCAL ROADWAY	604	1	12	4	1350	30	43
1624	1143	1164	SH 108	COLLECTOR	2940	1	12	4	1700	45	43
1625	1144	1005	BEAR HILL RD	COLLECTOR	1869	1	12	4	1575	30	43
1626	1144	1143	SH 108	COLLECTOR	3142	1	12	4	1700	45	43
1627	1145	1162	SH 108	COLLECTOR	1981	1	12	4	1575	35	36
1628	1146	1145	SH 108	COLLECTOR	3996	1	12	4	1700	40	36
1629	1147	1146	SH 108	COLLECTOR	3803	1	12	4	1700	40	36
1630	1148	761	SH 107A	COLLECTOR	3111	1	12	4	1700	40	36
1631	1149	1148	SH 107A	COLLECTOR	4354	1	12	4	1700	40	36
1632	1150	1149	SH 107A	COLLECTOR	990	1	12	4	1700	40	36
1633	1151	1150	SH 107A	COLLECTOR	1717	1	12	4	1700	40	36
1634	1152	1151	SH 107A	COLLECTOR	2399	1	12	4	1700	40	36
1635	1153	1152	SH 107A	COLLECTOR	4975	1	12	4	1700	40	36
1636	1153	1154	HILLDALE AVE	COLLECTOR	2838	1	12	4	1700	40	36
1637	1154	1155	HILLDALE AVE	COLLECTOR	747	1	12	4	1700	40	36
1638	1155	1156	HILLDALE AVE	COLLECTOR	2940	1	12	4	1700	40	36
1639	1156	1157	HILLDALE AVE	COLLECTOR	2127	1	12	4	1700	40	44
1640	1157	1158	HILLDALE AVE	COLLECTOR	1625	1	12	4	1700	40	36
1641	1158	1159	HILLDALE AVE	COLLECTOR	427	1	12	4	1700	40	36
1642	1159	1160	HILLDALE AVE	COLLECTOR	1317	1	12	4	1700	40	36
1643	1160	1004	HILLDALE AVE	COLLECTOR	2204	1	12	4	1700	40	44
1644	1161	1145	NEW BOSTON RD	LOCAL ROADWAY	2784	1	12	4	1575	35	36
1645	1162	1144	SH 108	COLLECTOR	2151	1	12	4	1700	45	36
1646	1163	1162	HEAM ST	LOCAL ROADWAY	6992	1	12	4	1575	35	36
1647	1164	1165	SH 108	COLLECTOR	5979	1	12	4	1750	45	43
1648	1165	1166	SH 108	COLLECTOR	1493	1	12	4	1700	45	43

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1649	1165	1167	MEADOW RD	LOCAL ROADWAY	1138	1	12	4	1350	30	43
1650	1166	1176	SH 108	COLLECTOR	2691	1	12	4	1700	45	43
1651	1167	1177	MEADOW RD	LOCAL ROADWAY	1899	1	12	4	1575	35	43
1652	1168	1169	PEASELEE CROSSING RD	LOCAL ROADWAY	1423	1	12	4	1125	25	43
1653	1169	1170	PEASELEE CROSSING RD	LOCAL ROADWAY	2491	1	12	4	1575	35	43
1654	1170	1171	PEASELEE CROSSING RD	LOCAL ROADWAY	1618	1	12	4	1575	35	43
1655	1171	1165	PEASELEE CROSSING RD	LOCAL ROADWAY	2510	1	12	4	1750	35	43
1656	1172	1124	SWEET HILL RD	LOCAL ROADWAY	1672	1	12	4	1575	35	42
1657	1172	1125	KINGSTON RD	LOCAL ROADWAY	1442	1	12	4	1575	35	42
1658	1173	1172	KINGSTON RD	LOCAL ROADWAY	1812	1	12	4	1575	35	42
1659	1174	1173	KINGSTON RD	LOCAL ROADWAY	1349	1	12	4	1575	35	42
1660	1175	1120	SH 108	COLLECTOR	2737	1	12	4	1750	45	47
1661	1176	1175	SH 108	COLLECTOR	2296	1	12	4	1700	45	47
1662	1177	1178	MEADOW RD	LOCAL ROADWAY	5199	1	12	4	1575	35	47
1663	1178	1179	MEADOW RD	LOCAL ROADWAY	4033	1	12	4	1575	35	47
1664	1179	1180	SH 110	COLLECTOR	3368	1	12	4	1750	45	47
1665	1180	1181	SH 110	COLLECTOR	4725	1	12	4	1700	45	47
1666	1181	1182	SH 110	COLLECTOR	4386	1	12	6	1700	45	47
1667	1181	1198	MIDDLE RD	COLLECTOR	3649	1	12	4	1700	45	47
1668	1182	98	I-495 ON RAMP	FREEWAY RAMP	1253	1	12	4	1700	45	53
1669	1182	1207	SH 110	COLLECTOR	1099	1	12	6	1700	45	53
1670	1183	1027	BEAR HILL RD	COLLECTOR	2441	1	12	4	1700	40	44
1671	1184	1183	BEAR HILL RD	COLLECTOR	1816	1	12	4	1700	40	44
1672	1185	1184	BEAR HILL RD	COLLECTOR	3118	1	12	4	1700	40	44
1673	1186	1005	BEAR HILL RD	COLLECTOR	6230	1	12	4	1700	40	44
1674	1186	1189	BEAR HILL RD	COLLECTOR	1855	1	12	4	1700	40	44
1675	1187	1188	SH 110	COLLECTOR	2009	1	12	4	1700	45	48
1676	1187	1214	LOCUST ST	COLLECTOR	3747	1	12	4	1700	45	48
1677	1188	1179	SH 110	COLLECTOR	1973	1	12	4	1700	45	48
1678	1189	1185	BEAR HILL RD	COLLECTOR	296	1	12	4	1700	40	44

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1679	1190	1055	ARLINGTON ST	COLLECTOR	1032	1	12	4	1750	30	52
1680	1190	1630	WEBSTER ST	COLLECTOR	977	1	12	4	1750	40	52
1681	1191	1082	SH 97	COLLECTOR	1373	1	12	4	1700	45	53
1682	1191	1192	SH 97	COLLECTOR	1284	1	12	4	1125	25	53
1683	1192	1193	SH 113	COLLECTOR	1708	1	12	4	1700	35	53
1684	1192	1197	GROVELAND ST	COLLECTOR	3112	1	12	4	1700	45	53
1685	1193	1194	SH 113	COLLECTOR	1198	1	12	4	1700	35	53
1686	1194	1195	SH 113	COLLECTOR	1989	1	12	4	1700	35	53
1687	1195	1196	SH 113	COLLECTOR	3352	1	12	4	1750	35	53
1688	1196	1088	SH 113	COLLECTOR	2175	1	12	4	1750	35	53
1689	1197	1196	GROVELAND ST	COLLECTOR	4226	1	12	4	1750	45	53
1690	1198	1199	MIDDLE RD	COLLECTOR	2553	1	12	4	1700	45	53
1691	1199	1200	MIDDLE RD	COLLECTOR	1270	1	12	4	1700	45	53
1692	1200	1201	MIDDLE RD	COLLECTOR	2377	1	12	4	1700	45	53
1693	1201	1202	MIDDLE RD	COLLECTOR	1970	1	12	4	1700	45	53
1694	1202	1203	E BROADWAY AVE	COLLECTOR	3487	1	12	4	1700	45	53
1695	1203	1204	E BROADWAY AVE	COLLECTOR	1688	1	12	4	1700	45	53
1696	1204	1205	E BROADWAY AVE	COLLECTOR	1755	1	12	4	1700	45	53
1697	1205	1206	E BROADWAY AVE	COLLECTOR	756	1	12	4	1700	45	53
1698	1206	1197	E BROADWAY AVE	COLLECTOR	718	1	12	4	1700	45	53
1699	1207	1182	SH 110	COLLECTOR	1099	1	12	6	1700	45	53
1700	1207	1209	SH 110	COLLECTOR	3448	1	12	6	1700	45	53
1701	1209	1115	SH 110	COLLECTOR	1251	1	12	6	1750	45	53
1702	1209	1207	SH 110	COLLECTOR	3450	1	12	6	1700	45	53
1703	1210	1211	RIVER RD	COLLECTOR	659	1	12	4	1700	45	48
1704	1211	1212	RIVER RD	COLLECTOR	595	1	12	4	1700	45	48
1705	1212	1213	RIVER RD	COLLECTOR	980	1	12	4	1700	45	48
1706	1213	1214	RIVER RD	COLLECTOR	1165	1	12	4	1700	45	48
1707	1214	1215	RIVER RD	COLLECTOR	1132	1	12	4	1700	45	48
1708	1215	1216	MERIMAC RD	COLLECTOR	791	1	12	4	1700	45	48

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1709	1215	1398	RIVER RD	COLLECTOR	3558	1	12	4	1750	45	48
1710	1216	1217	MERIMAC RD	COLLECTOR	792	1	12	4	1700	45	48
1711	1217	1218	MERIMAC RD	COLLECTOR	932	1	12	4	1700	45	48
1712	1218	1219	MERIMAC RD	COLLECTOR	1334	1	12	4	1750	45	48
1713	1219	1220	MERIMAC RD	COLLECTOR	671	1	12	4	1700	45	48
1714	1219	1229	OLD AMESBURY RD	COLLECTOR	1313	1	12	4	1700	45	48
1715	1220	1221	E BROADWAY ST	COLLECTOR	1189	1	12	4	1700	45	48
1716	1221	1222	E BROADWAY ST	COLLECTOR	1104	1	12	4	1700	45	48
1717	1222	1223	E BROADWAY ST	COLLECTOR	4095	1	12	4	1700	45	53
1718	1223	1224	E BROADWAY ST	COLLECTOR	659	1	12	4	1700	45	53
1719	1224	1225	E BROADWAY ST	COLLECTOR	1123	1	12	4	1700	45	53
1720	1225	1226	E BROADWAY ST	COLLECTOR	2003	1	12	4	1700	45	53
1721	1226	1202	E BROADWAY ST	COLLECTOR	2577	1	12	4	1700	45	53
1722	1227	1180	OLD AMESBURY RD	COLLECTOR	2154	1	12	4	1750	45	47
1723	1228	1227	OLD AMESBURY RD	COLLECTOR	463	1	12	4	1700	45	48
1724	1229	1228	OLD AMESBURY RD	COLLECTOR	1565	1	12	4	1700	45	48
1725	1230	1232	TURKEY HILL RD	COLLECTOR	4803	1	12	4	1350	30	49
1726	1230	1383	SH 113	COLLECTOR	1581	1	12	4	1700	55	49
1727	1231	1230	SH 113	COLLECTOR	1465	1	12	4	1700	45	49
1728	1232	1233	TURKEY HILL RD	COLLECTOR	163	1	12	4	1700	45	54
1729	1233	1234	TURKEY HILL RD	COLLECTOR	493	1	10	4	1125	25	54
1730	1233	1386	MIDDLE ST	COLLECTOR	2005	1	12	4	1575	35	54
1731	1234	1235	TURKEY HILL RD	COLLECTOR	514	1	10	4	1125	25	54
1732	1235	1236	TURKEY HILL RD	COLLECTOR	776	1	10	4	1125	25	54
1733	1236	1237	TURKEY HILL RD	COLLECTOR	756	1	10	4	1125	25	54
1734	1237	1238	TURKEY HILL RD	COLLECTOR	483	1	10	4	1125	25	54
1735	1238	1239	TURKEY HILL RD	COLLECTOR	1403	1	10	4	1125	25	54
1736	1239	1240	TURKEY HILL RD	COLLECTOR	2325	1	10	4	1125	25	54
1737	1240	1241	TURKEY HILL RD	COLLECTOR	1451	1	12	4	1125	25	54
1738	1241	1242	TURKEY HILL RD	COLLECTOR	598	1	12	4	1125	25	54

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1739	1242	1243	TURKEY HILL RD	COLLECTOR	760	1	12	4	1125	25	54
1740	1243	1244	TURKEY HILL RD	COLLECTOR	955	1	12	4	1125	25	54
1741	1244	1245	TURKEY HILL RD	COLLECTOR	233	1	12	4	1125	25	54
1742	1245	1246	SCOTTLAND RD	COLLECTOR	704	1	12	4	1700	45	54
1743	1245	1376	SOUTH ST	COLLECTOR	1190	1	12	4	1700	45	54
1744	1246	12	I-95 ON RAMP FROM SCOTTLAND RD	FREEWAY RAMP	533	1	12	4	1700	45	54
1745	1246	1245	TURKEY HILL RD	COLLECTOR	704	1	12	4	1700	45	54
1746	1247	1231	DANIEL LUCY WAY	COLLECTOR	1210	1	12	4	1750	45	50
1747	1248	13	I-95 ON RAMP FROM SCOTTLAND RD	FREEWAY RAMP	575	1	12	4	1700	45	54
1748	1248	1246	SCOTTLAND RD	COLLECTOR	822	1	12	4	1700	45	54
1749	1249	1250	SCOTTLAND RD	COLLECTOR	1164	1	12	4	1700	45	54
1750	1250	1251	SCOTTLAND RD	COLLECTOR	1161	1	12	4	1700	45	54
1751	1251	1252	SCOTTLAND RD	COLLECTOR	630	1	12	4	1700	45	54
1752	1252	1253	SCOTTLAND RD	COLLECTOR	2660	1	12	4	1700	45	54
1753	1253	1254	SCOTTLAND RD	COLLECTOR	1797	1	12	4	1700	45	54
1754	1254	1255	SCOTTLAND RD	COLLECTOR	1079	1	12	4	1700	45	54
1755	1255	1256	SCOTTLAND RD	COLLECTOR	1286	1	12	4	1700	45	54
1756	1256	1257	SCOTTLAND RD	COLLECTOR	1107	1	12	4	1700	45	54
1757	1257	1248	SCOTTLAND RD	COLLECTOR	2134	1	12	4	1700	45	54
1758	1258	943	US 1	COLLECTOR	235	1	12	4	1350	30	54
1759	1259	945	US 1	MINOR ARTERIAL	2723	2	12	4	1900	60	54
1760	1259	1260	US 1	COLLECTOR	441	1	12	4	1750	60	54
1761	1260	1259	US 1	COLLECTOR	441	1	12	4	1700	60	54
1762	1260	1261	US 1	COLLECTOR	5505	1	12	4	1700	60	54
1763	1260	1360	MIDDLE RD	COLLECTOR	1380	1	12	4	1700	40	54
1764	1261	1260	US 1	COLLECTOR	5505	1	12	4	1750	60	54
1765	1261	1262	US 1	COLLECTOR	10650	1	12	4	1700	55	54
1766	1261	1364	BOSTON RD	COLLECTOR	872	1	12	4	1700	45	54

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1767	1262	1261	US 1	COLLECTOR	10650	1	12	4	1700	55	54
1768	1262	1263	US 1	COLLECTOR	3554	1	12	4	1750	50	54
1769	1262	1517	ELM ST	COLLECTOR	2357	1	12	4	1575	35	54
1770	1263	1262	US 1	COLLECTOR	3554	1	12	4	1700	50	54
1771	1263	1352	US 1	COLLECTOR	4107	1	12	4	1700	50	54
1772	1263	1511	CENTRAL ST	COLLECTOR	1341	1	12	4	1700	45	54
1773	1264	1265	US 1	COLLECTOR	382	1	12	4	1750	50	57
1774	1264	1352	US 1	COLLECTOR	7659	1	12	4	1700	50	57
1775	1265	1264	US 1	COLLECTOR	382	1	12	4	1750	50	57
1776	1265	1266	US 1	COLLECTOR	4553	1	12	4	1700	50	57
1777	1265	1500	SH 133	COLLECTOR	2931	1	12	4	1700	45	57
1778	1266	1265	US 1	COLLECTOR	4553	1	12	4	1750	50	57
1779	1266	1267	US 1	COLLECTOR	3418	1	12	4	1750	50	57
1780	1267	1266	US 1	COLLECTOR	3418	1	12	4	1700	50	57
1781	1267	1662	US 1	COLLECTOR	2569	1	12	4	1700	50	57
1782	1268	1264	MALL ACCESS RD	COLLECTOR	465	1	12	4	1750	45	57
1783	1269	1270	SH 1A	COLLECTOR	4007	1	12	4	1700	45	55
1784	1269	1301	HAY ST	COLLECTOR	2536	1	12	4	1700	45	55
1785	1270	1271	SH 1A	COLLECTOR	2197	1	12	4	1700	45	55
1786	1271	1272	SH 1A	COLLECTOR	1569	1	12	4	1700	45	55
1787	1272	1273	SH 1A	COLLECTOR	774	1	12	4	1700	45	55
1788	1273	1274	SH 1A	COLLECTOR	1241	1	12	4	1700	45	55
1789	1274	1275	SH 1A	COLLECTOR	803	1	12	4	1700	45	55
1790	1275	1276	SH 1A	COLLECTOR	1704	1	12	4	1700	45	55
1791	1276	1277	SH 1A	COLLECTOR	1072	1	12	4	1700	40	55
1792	1277	1278	SH 1A	COLLECTOR	4069	1	12	4	1700	50	55
1793	1278	1279	SH 1A	COLLECTOR	2623	1	12	4	1700	50	55
1794	1279	1280	SH 1A	COLLECTOR	1335	1	12	4	1700	50	55
1795	1280	1281	SH 1A	COLLECTOR	2827	1	12	4	1700	50	55
1796	1281	1282	SH 1A	COLLECTOR	1327	1	12	4	1700	50	58

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1797	1282	1351	CROSS ST	COLLECTOR	1196	1	12	4	1700	45	58
1798	1282	1355	SH 1A	COLLECTOR	2202	1	12	4	1700	45	58
1799	1283	1284	SH 1A	COLLECTOR	3520	1	12	4	1700	40	57
1800	1283	1332	CENTRAL ST	COLLECTOR	699	1	12	4	1700	45	57
1801	1284	1285	SH 1A	COLLECTOR	3639	1	12	4	1700	45	57
1802	1284	1325	SH 133	COLLECTOR	550	1	12	4	1575	35	57
1803	1285	1286	SH 1A	COLLECTOR	2470	1	12	4	1700	45	58
1804	1286	1287	SH 1A	COLLECTOR	2742	1	12	4	1700	40	58
1805	1287	1288	SH 1A	COLLECTOR	3498	1	12	4	1700	40	58
1806	1288	1289	SH 1A	COLLECTOR	347	1	12	4	1700	40	58
1807	1289	1290	SH 1A	COLLECTOR	768	1	12	4	1750	40	58
1808	1290	1291	SH 1A	COLLECTOR	355	1	12	4	1350	30	58
1809	1291	1292	SH 1A	COLLECTOR	2227	1	12	4	1350	30	58
1810	1291	1311	LINEBROOK RD	COLLECTOR	1762	1	12	4	1700	45	58
1811	1292	1293	SH 1A	COLLECTOR	221	1	12	4	1350	30	58
1812	1293	1294	SH 1A	COLLECTOR	246	1	12	4	1350	30	58
1813	1294	1295	SH 1A	COLLECTOR	461	1	12	4	1350	30	58
1814	1295	1296	SH 1A	COLLECTOR	417	1	12	4	1350	30	58
1815	1296	1297	SH 1A	COLLECTOR	599	1	12	4	1700	45	58
1816	1297	1298	SH 1A	COLLECTOR	981	1	12	4	1700	45	58
1817	1298	1299	SH 1A	COLLECTOR	1547	1	12	4	1700	45	58
1818	1299	1300	SH 1A	COLLECTOR	1915	1	12	4	1700	45	58
1819	1301	1302	HAY ST	COLLECTOR	1534	1	12	4	1700	45	55
1820	1302	1303	HAY ST	COLLECTOR	746	1	12	4	1700	45	55
1821	1303	1304	HAY ST	COLLECTOR	750	1	12	4	1700	45	55
1822	1304	1305	HAY ST	COLLECTOR	1385	1	12	4	1700	45	55
1823	1305	1306	HAY ST	COLLECTOR	1240	1	12	4	1700	45	55
1824	1306	1307	HAY ST	COLLECTOR	1097	1	12	4	1700	45	54
1825	1307	1308	HAY ST	COLLECTOR	386	1	12	4	1700	45	54
1826	1308	1309	HAY ST	COLLECTOR	672	1	12	4	1700	45	54

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1827	1309	1310	HAY ST	COLLECTOR	1767	1	12	4	1700	45	54
1828	1310	1261	BOSTON RD	COLLECTOR	1084	1	12	4	1700	45	54
1829	1311	1312	LINEBROOK RD	COLLECTOR	720	1	12	4	1700	45	58
1830	1312	1313	LINEBROOK RD	COLLECTOR	1741	1	12	4	1700	45	58
1831	1313	1314	LINEBROOK RD	COLLECTOR	1874	1	12	4	1700	45	58
1832	1314	1315	LINEBROOK RD	COLLECTOR	1487	1	12	4	1700	45	58
1833	1315	1316	LINEBROOK RD	COLLECTOR	1800	1	12	4	1700	45	57
1834	1316	1317	LINEBROOK RD	COLLECTOR	1325	1	12	4	1700	45	57
1835	1317	1318	LINEBROOK RD	COLLECTOR	1004	1	12	4	1700	45	57
1836	1318	1319	LINEBROOK RD	COLLECTOR	1144	1	12	4	1700	45	57
1837	1319	1320	LINEBROOK RD	COLLECTOR	2674	1	12	4	1700	45	57
1838	1320	1321	LINEBROOK RD	COLLECTOR	1615	1	12	4	1700	45	57
1839	1321	1322	LINEBROOK RD	COLLECTOR	1206	1	12	4	1700	45	57
1840	1322	1323	LINEBROOK RD	COLLECTOR	977	1	12	4	1700	45	57
1841	1323	1324	LINEBROOK RD	COLLECTOR	673	1	12	4	1700	45	57
1842	1324	1267	LINEBROOK RD	COLLECTOR	959	1	12	4	1750	45	57
1843	1325	1326	SH 133	COLLECTOR	1158	1	12	4	1575	35	57
1844	1326	1327	SH 133	COLLECTOR	845	1	12	4	1575	35	57
1845	1327	1328	SH 133	COLLECTOR	977	1	12	4	1575	35	57
1846	1328	1329	SH 133	COLLECTOR	1537	1	12	4	1575	35	57
1847	1329	1330	SH 133	COLLECTOR	1058	1	12	4	1575	35	57
1848	1330	1331	SH 133	COLLECTOR	1754	1	12	4	1575	35	57
1849	1331	1265	SH 133	COLLECTOR	585	1	12	4	1750	35	57
1850	1332	1283	CENTRAL ST	COLLECTOR	701	1	12	4	1750	45	57
1851	1332	1353	CENTRAL ST	COLLECTOR	435	1	12	4	1700	45	57
1852	1332	1354	CENTRAL ST	COLLECTOR	200	1	12	4	1700	45	57
1853	1333	1334	CENTRAL ST	COLLECTOR	817	1	12	4	1700	45	57
1854	1333	1353	CENTRAL ST	COLLECTOR	1788	1	12	4	1700	45	57
1855	1334	1335	BENNETT HILL RD	COLLECTOR	409	1	12	4	1575	35	57
1856	1334	1338	CENTRAL ST	COLLECTOR	965	1	12	4	1700	45	57

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1857	1335	1336	BENNETT HILL RD	COLLECTOR	1940	1	12	4	1575	35	57
1858	1336	1337	BENNETT HILL RD	COLLECTOR	1270	1	12	4	1575	35	57
1859	1337	1352	WETHERSFIELD ST	COLLECTOR	2191	1	12	4	1700	45	57
1860	1338	1339	CENTRAL ST	COLLECTOR	2063	1	12	4	1700	45	54
1861	1339	1340	CENTRAL ST	COLLECTOR	915	1	12	4	1700	45	54
1862	1340	1341	CENTRAL ST	COLLECTOR	558	1	12	4	1700	45	54
1863	1341	1342	CENTRAL ST	COLLECTOR	639	1	12	4	1700	45	54
1864	1342	1343	CENTRAL ST	COLLECTOR	702	1	12	4	1700	45	54
1865	1343	1263	CENTRAL ST	COLLECTOR	1302	1	12	4	1750	45	54
1866	1344	1337	WETHERSFIELD ST	COLLECTOR	804	1	12	4	1700	45	57
1867	1345	1344	WETHERSFIELD ST	COLLECTOR	1106	1	12	4	1700	45	57
1868	1346	1345	WETHERSFIELD ST	COLLECTOR	1182	1	12	4	1700	45	57
1869	1347	1346	WETHERSFIELD ST	COLLECTOR	915	1	12	4	1700	45	57
1870	1348	1347	WETHERSFIELD ST	COLLECTOR	1075	1	12	4	1700	45	57
1871	1349	1333	CROSS ST	COLLECTOR	800	1	12	4	1700	45	57
1872	1350	1349	CROSS ST	COLLECTOR	1897	1	12	4	1700	45	57
1873	1351	1350	CROSS ST	COLLECTOR	506	1	12	4	1700	45	58
1874	1352	1263	US 1	COLLECTOR	4107	1	12	4	1750	50	54
1875	1352	1264	US 1	COLLECTOR	7659	1	12	4	1750	50	57
1876	1352	1509	WETHERSFIELD ST	COLLECTOR	3061	1	12	4	1700	45	57
1877	1353	1354	CENTRAL ST	COLLECTOR	342	1	12	4	1700	45	57
1878	1354	1348	WETHERSFIELD ST	COLLECTOR	1492	1	12	4	1700	45	57
1879	1355	1283	SH 1A	COLLECTOR	2436	1	12	4	1750	40	57
1880	1356	1357	HANOVER ST	COLLECTOR	297	1	12	4	1700	45	55
1881	1357	1358	HANOVER ST	COLLECTOR	1215	1	12	4	1700	45	55
1882	1358	1359	HANOVER ST	COLLECTOR	2287	1	12	4	1700	45	55
1883	1359	1260	HANOVER ST	COLLECTOR	1256	1	12	4	1750	45	54
1884	1360	1361	MIDDLE RD	COLLECTOR	1236	1	12	4	1700	40	54
1885	1361	1362	MIDDLE RD	COLLECTOR	746	1	12	4	1700	40	54
1886	1362	1363	MIDDLE RD	COLLECTOR	1638	1	12	4	1700	40	54

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1887	1363	1364	MIDDLE RD	COLLECTOR	1505	1	12	4	1700	40	54
1888	1364	1365	MIDDLE RD	COLLECTOR	1285	1	12	4	1700	40	54
1889	1365	1366	MIDDLE RD	COLLECTOR	882	1	12	4	1575	35	54
1890	1366	1367	MIDDLE RD	COLLECTOR	3135	1	12	4	1700	40	54
1891	1367	1368	ORCHARD ST	COLLECTOR	2090	1	12	4	1700	40	54
1892	1368	1369	ORCHARD ST	COLLECTOR	4888	1	12	4	1700	40	54
1893	1369	1370	ORCHARD ST	COLLECTOR	340	1	12	4	1700	40	54
1894	1370	1371	ORCHARD ST	COLLECTOR	3298	1	12	4	1700	40	54
1895	1371	1372	CENTRAL ST	COLLECTOR	1914	1	12	4	1700	40	54
1896	1371	1514	CENTRAL ST	COLLECTOR	1736	1	12	4	1575	35	54
1897	1372	1373	CENTRAL ST	COLLECTOR	1810	1	12	4	1700	40	54
1898	1373	1374	CENTRAL ST	COLLECTOR	860	1	12	4	1700	40	54
1899	1374	10	I-95 ON RAMP FROM CENTRAL ST	FREEWAY RAMP	718	1	12	4	1700	45	54
1900	1375	1374	CENTRAL ST	COLLECTOR	1596	1	12	4	1700	40	54
1901	1375	1474	NORTH ST	COLLECTOR	2428	1	12	4	1700	45	54
1902	1376	1377	SOUTH ST	COLLECTOR	2604	1	12	4	1700	45	54
1903	1376	1382	INDIAN HILL ST	COLLECTOR	5328	1	12	4	1700	45	54
1904	1377	1378	MAIN ST	COLLECTOR	1265	1	12	4	1700	45	54
1905	1378	1379	MAIN ST	COLLECTOR	1166	1	12	4	1700	45	54
1906	1379	1381	MAIN ST	COLLECTOR	1253	1	12	4	1700	45	54
1907	1380	1375	MAIN ST	COLLECTOR	1424	1	12	4	1700	45	54
1908	1381	1380	MAIN ST	COLLECTOR	1379	1	12	4	1700	45	54
1909	1382	1389	BACHELOR ST	COLLECTOR	813	1	12	4	1700	45	54
1910	1383	1384	SH 113	COLLECTOR	3196	1	12	4	1700	55	49
1911	1384	1385	SH 113	COLLECTOR	1151	1	12	4	1700	55	49
1912	1385	1388	GARDEN ST	COLLECTOR	3009	1	12	4	1700	45	49
1913	1385	1390	SH 113	COLLECTOR	2993	1	12	4	1700	45	49
1914	1386	1387	MIDDLE ST	COLLECTOR	3083	1	12	4	1350	30	49
1915	1387	1388	MIDDLE ST	COLLECTOR	676	1	12	4	1575	35	49
1916	1388	1382	GARDEN ST	COLLECTOR	6175	1	12	4	1700	45	54

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1917	1388	1461	MIDDLE ST	COLLECTOR	3213	1	12	4	1575	35	54
1918	1389	1400	BACHELOR ST	COLLECTOR	1862	1	12	4	1700	45	54
1919	1390	1391	SH 113	COLLECTOR	1306	1	12	4	1700	45	49
1920	1391	1392	SH 113	COLLECTOR	2549	1	12	4	1700	45	49
1921	1392	1393	SH 113	COLLECTOR	2213	1	12	4	1700	40	48
1922	1393	1394	SH 113	COLLECTOR	1449	1	12	4	1700	40	48
1923	1394	1395	SH 113	COLLECTOR	546	1	12	4	1750	40	48
1924	1395	1396	BRIDGE ST	COLLECTOR	4372	1	12	4	1700	45	48
1925	1395	1403	SH 113	COLLECTOR	1002	1	12	4	1700	45	53
1926	1396	1395	BRIDGE ST	COLLECTOR	4372	1	12	4	1750	45	48
1927	1396	1397	BRIDGE ST	COLLECTOR	409	1	12	4	1700	45	48
1928	1397	1396	BRIDGE ST	COLLECTOR	409	1	12	4	1700	45	48
1929	1397	1398	BRIDGE ST	COLLECTOR	1217	1	12	4	1750	45	48
1930	1398	1397	BRIDGE ST	COLLECTOR	1217	1	12	4	1700	45	48
1931	1398	1399	BRIDGE ST	COLLECTOR	679	1	12	4	1700	45	48
1932	1399	1219	OLD AMESBURY RD	COLLECTOR	906	1	12	4	1750	45	48
1933	1399	1220	E BROADWAY ST	COLLECTOR	877	1	12	4	1700	45	48
1934	1400	1467	BACHELOR ST	COLLECTOR	4141	1	12	4	1700	45	54
1935	1401	1402	BACHELOR ST	COLLECTOR	686	1	12	4	1700	45	53
1936	1402	1403	BACHELOR ST	COLLECTOR	2275	1	12	4	1700	45	53
1937	1403	1404	SH 113	COLLECTOR	6013	1	12	4	1700	45	53
1938	1404	1405	SH 113	COLLECTOR	1266	1	12	4	1750	45	53
1939	1405	1406	SH 113	COLLECTOR	1744	1	12	4	1700	45	53
1940	1406	1407	SH 113	COLLECTOR	2394	1	12	4	1700	45	53
1941	1407	1408	SH 113	COLLECTOR	703	1	12	4	1700	45	53
1942	1408	1409	SH 113	COLLECTOR	1249	1	12	4	1700	45	53
1943	1409	1410	SH 113	COLLECTOR	848	1	12	4	1700	45	53
1944	1410	1411	SH 113	COLLECTOR	1269	1	12	4	1750	45	53
1945	1411	1413	SH 113	COLLECTOR	1902	1	12	4	1700	40	53
1946	1412	1411	BROAD ST	COLLECTOR	709	1	12	4	1750	45	53

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1947	1413	1418	SH 113	COLLECTOR	847	1	12	4	1700	40	53
1948	1414	1415	KING ST	COLLECTOR	3300	1	12	0	1575	35	53
1949	1414	1428	CENTER ST	COLLECTOR	855	1	12	4	1575	35	53
1950	1415	1416	KING ST	COLLECTOR	576	1	12	0	1575	35	53
1951	1416	1417	KING ST	COLLECTOR	769	1	12	0	1575	35	53
1952	1417	1418	KING ST	COLLECTOR	1462	1	12	0	1575	35	53
1953	1418	1191	SH 113	COLLECTOR	1538	1	12	4	1575	35	53
1954	1419	1412	BYFIELD RD	COLLECTOR	5246	1	12	0	1700	40	53
1955	1419	1420	BYFIELD RD	COLLECTOR	1525	1	12	0	1700	40	53
1956	1419	1424	CENTER ST	COLLECTOR	213	1	12	4	1575	35	53
1957	1420	1421	BYFIELD RD	COLLECTOR	1995	1	12	0	1700	40	53
1958	1421	1422	BYFIELD RD	COLLECTOR	1767	1	12	0	1700	40	53
1959	1422	1423	BYFIELD RD	COLLECTOR	276	1	12	0	1700	40	53
1960	1423	1435	POND ST	COLLECTOR	5526	1	12	4	1575	35	53
1961	1423	1441	THURLOW ST	COLLECTOR	3842	1	12	4	1700	45	53
1962	1424	1425	CENTER ST	COLLECTOR	245	1	12	4	900	20	53
1963	1425	1426	CENTER ST	COLLECTOR	471	1	12	4	1575	35	53
1964	1426	1427	CENTER ST	COLLECTOR	2564	1	12	4	1575	35	53
1965	1427	1414	CENTER ST	COLLECTOR	2223	1	12	4	1575	35	53
1966	1428	1429	CENTER ST	COLLECTOR	1993	1	12	4	1575	35	53
1967	1429	1430	CENTER ST	COLLECTOR	1297	1	12	4	1700	40	53
1968	1429	1456	SH 97	COLLECTOR	944	1	12	4	1700	40	53
1969	1430	1431	CENTER ST	COLLECTOR	1399	1	12	4	1700	40	53
1970	1431	1432	CENTER ST	COLLECTOR	1119	1	12	4	1700	40	53
1971	1432	1080	CENTER ST	COLLECTOR	1985	1	12	4	1700	40	53
1972	1435	1436	POND ST	COLLECTOR	1084	1	12	4	1575	35	53
1973	1436	1437	POND ST	COLLECTOR	2270	1	12	4	1575	35	56
1974	1437	1452	NORTH ST	COLLECTOR	904	1	12	4	1750	45	56
1975	1438	1437	NORTH ST	COLLECTOR	2810	1	12	4	1700	40	56
1976	1439	1438	NORTH ST	COLLECTOR	1907	1	12	4	1700	40	53

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
1977	1440	1439	NORTH ST	COLLECTOR	908	1	12	4	1700	40	53
1978	1441	1442	THURLOW ST	COLLECTOR	1560	1	12	4	1700	45	53
1979	1442	1443	THURLOW ST	COLLECTOR	2587	1	12	4	1700	45	54
1980	1443	1444	THURLOW ST	COLLECTOR	678	1	12	4	1700	45	54
1981	1444	1476	THURLOW ST	COLLECTOR	1090	1	12	4	1700	45	54
1982	1444	1477	NORTH ST	COLLECTOR	2135	1	12	4	1700	45	54
1983	1445	7	I-95 ON RAMP FROM SH 133	FREEWAY RAMP	1714	1	12	4	1700	45	57
1984	1446	1445	SH 133	COLLECTOR	1408	1	12	4	1700	45	57
1985	1447	1445	SH 133	COLLECTOR	2009	1	12	4	1700	40	57
1986	1448	1447	SH 133	COLLECTOR	1458	1	12	4	1700	40	56
1987	1449	1448	SH 133	COLLECTOR	991	1	12	4	1700	40	56
1988	1450	1449	SH 133	COLLECTOR	1607	1	12	4	1700	40	56
1989	1451	1450	SH 133	COLLECTOR	1537	1	12	4	1700	40	56
1990	1452	1457	SH 97	COLLECTOR	568	1	12	4	1700	45	56
1991	1452	1640	SH 133	COLLECTOR	887	1	12	4	1750	45	56
1992	1453	1452	SH 97	COLLECTOR	1159	1	12	4	1750	30	56
1993	1454	1453	SH 97	COLLECTOR	3243	1	12	4	1700	40	56
1994	1455	1454	SH 97	COLLECTOR	2972	1	12	4	1700	40	53
1995	1456	1455	SH 97	COLLECTOR	3639	1	12	4	1700	40	53
1996	1457	1458	SH 133	COLLECTOR	5496	1	12	4	1700	45	56
1997	1457	1638	SH 97	COLLECTOR	207	1	12	4	1750	45	56
1998	1458	1459	SH 133	COLLECTOR	1567	1	12	4	1700	45	56
1999	1459	1460	SH 133	COLLECTOR	2213	1	12	4	1700	45	56
2000	1461	1462	MIDDLE ST	COLLECTOR	1338	1	12	4	1125	25	54
2001	1462	1463	MIDDLE ST	COLLECTOR	2200	1	12	4	1575	35	54
2002	1463	1464	MIDDLE ST	COLLECTOR	539	1	12	4	1575	35	54
2003	1464	1465	MIDDLE ST	COLLECTOR	2195	1	12	4	1575	35	54
2004	1465	1466	MIDDLE ST	COLLECTOR	512	1	12	4	1575	35	54
2005	1466	1467	MIDDLE ST	COLLECTOR	619	1	12	4	1575	35	53
2006	1467	1401	BACHELOR ST	COLLECTOR	3431	1	12	4	1700	45	53

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
2007	1467	1468	MIDDLE ST	COLLECTOR	3733	1	12	4	1700	45	53
2008	1468	1469	MIDDLE ST	COLLECTOR	1794	1	12	4	1700	45	53
2009	1469	1470	MIDDLE ST	COLLECTOR	2926	1	12	0	1575	35	53
2010	1469	1636	CRANE NECK ST	COLLECTOR	1064	1	12	4	1700	40	53
2011	1470	1471	MIDDLE ST	COLLECTOR	1464	1	12	0	1575	35	53
2012	1471	1472	MIDDLE ST	COLLECTOR	250	1	12	0	1125	25	53
2013	1472	1473	MIDDLE ST	COLLECTOR	1277	1	12	0	1575	35	53
2014	1473	1419	MIDDLE ST	COLLECTOR	1935	1	12	0	1575	35	53
2015	1474	1475	NORTH ST	COLLECTOR	3384	1	12	4	1700	45	54
2016	1475	1444	NORTH ST	COLLECTOR	3520	1	12	4	1700	45	54
2017	1476	1477	JEWETT ST	COLLECTOR	2552	1	12	4	1700	45	54
2018	1477	1440	NORTH ST	COLLECTOR	1803	1	12	4	1700	40	53
2019	1478	1448	TENNEY ST	COLLECTOR	2004	1	12	4	1700	45	57
2020	1479	1478	TENNEY ST	COLLECTOR	4813	1	12	4	1700	45	57
2021	1480	1479	TENNEY ST	COLLECTOR	3397	1	12	4	1700	45	57
2022	1481	1480	JEWETT ST	COLLECTOR	2176	1	12	4	1575	35	54
2023	1482	1476	JEWETT ST	COLLECTOR	2926	1	12	4	1700	45	54
2024	1482	1481	JEWETT ST	COLLECTOR	1018	1	12	4	1700	45	54
2025	1483	1482	JACKMAN ST	COLLECTOR	2500	1	12	4	1700	40	54
2026	1483	1485	ORDWAY ST	COLLECTOR	1582	1	12	4	1575	35	54
2027	1484	1483	JACKMAN ST	COLLECTOR	2330	1	12	4	1700	40	54
2028	1484	1485	ELM ST	COLLECTOR	1485	1	12	4	1700	40	54
2029	1485	1486	ELM ST	COLLECTOR	3404	1	12	4	1700	40	54
2030	1486	1480	JEWETT ST	COLLECTOR	1414	1	12	4	1575	35	57
2031	1486	1505	JEWETT ST	COLLECTOR	1958	1	12	4	1575	35	57
2032	1487	1496	BOXFORD RD	COLLECTOR	1409	1	12	4	1700	45	57
2033	1487	1520	SH 133	COLLECTOR	1291	1	12	4	1700	45	57
2034	1488	1489	BOXFORD RD	COLLECTOR	794	1	12	4	1575	35	57
2035	1489	1490	BOXFORD RD	COLLECTOR	1607	1	12	4	1125	25	57
2036	1490	1491	BOXFORD RD	COLLECTOR	1690	1	12	4	1575	35	57

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
2037	1491	1492	BOXFORD RD	COLLECTOR	1069	1	12	4	1575	35	57
2038	1492	1493	BOXFORD RD	COLLECTOR	1903	1	12	4	1575	35	57
2039	1493	1494	SH 97	COLLECTOR	581	1	12	4	1700	45	56
2040	1494	1495	SH 97	COLLECTOR	929	1	12	4	1700	45	56
2041	1495	4	I-95 ON RAMP	FREEWAY RAMP	1244	1	12	4	1700	45	56
2042	1496	1488	BOXFORD RD	COLLECTOR	4413	1	12	4	1575	35	57
2043	1497	1487	SH 133	COLLECTOR	1019	1	12	4	1700	45	57
2044	1498	1497	SH 133	COLLECTOR	3126	1	12	4	1700	45	57
2045	1499	1498	SH 133	COLLECTOR	1698	1	12	4	1700	45	57
2046	1500	1499	SH 133	COLLECTOR	1349	1	12	4	1700	45	57
2047	1501	1499	DANIELS RD	LOCAL ROADWAY	4062	1	12	4	1350	30	57
2048	1501	1521	DODGE RD	COLLECTOR	2701	1	12	4	1700	45	57
2049	1502	1501	DANIELS RD	LOCAL ROADWAY	1651	1	12	4	1350	30	57
2050	1503	1502	DANIELS RD	LOCAL ROADWAY	1323	1	12	4	1350	30	57
2051	1504	1503	DANIELS RD	LOCAL ROADWAY	470	1	12	4	1350	30	57
2052	1505	1504	DANIELS RD	LOCAL ROADWAY	620	1	12	4	1350	30	57
2053	1506	1505	WEATHERSFIELD ST	COLLECTOR	1051	1	12	4	1575	35	57
2054	1507	1506	WEATHERSFIELD ST	COLLECTOR	2679	1	12	4	1575	35	57
2055	1508	1507	WEATHERSFIELD ST	COLLECTOR	1196	1	12	4	1575	35	57
2056	1509	1508	WETHERSFIELD ST	COLLECTOR	1725	1	12	4	1700	45	57
2057	1510	1508	HILLSIDE ST	COLLECTOR	4989	1	12	4	1575	35	57
2058	1510	1512	COLEMAN RD	COLLECTOR	2065	1	12	4	1575	35	54
2059	1511	1510	CENTRAL ST	COLLECTOR	1572	1	12	4	1700	45	54
2060	1512	1513	COLEMAN RD	COLLECTOR	1946	1	12	4	1575	35	54
2061	1513	1515	ELM ST	COLLECTOR	669	1	12	4	1700	40	54
2062	1514	1515	SCHOOL ST	COLLECTOR	2296	1	12	4	1575	35	54
2063	1514	1516	CENTRAL ST	COLLECTOR	2370	1	12	4	1575	35	54
2064	1515	1516	ELM ST	COLLECTOR	2174	1	12	4	1700	40	54
2065	1516	1484	ELM ST	COLLECTOR	1266	1	12	4	1700	40	54
2066	1517	1518	ELM ST	COLLECTOR	2118	1	12	4	1575	35	54

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
2067	1518	1513	ELM ST	COLLECTOR	2233	1	12	4	1575	35	54
2068	1519	1446	SH 133	COLLECTOR	824	1	12	4	1700	45	57
2069	1520	1519	SH 133	COLLECTOR	3321	1	12	4	1700	45	57
2070	1521	1497	DODGE RD	COLLECTOR	1989	1	12	4	1700	45	57
2071	1522	139	I-95 ON RAMP FOM US 1	FREEWAY RAMP	633	1	12	4	1700	45	9
2072	1523	1524	I-95 ON RAMP FROM US 1/SH 236	FREEWAY RAMP	160	1	12	4	1700	40	8
2073	1524	1525	I-95	FREEWAY	684	2	12	4	1900	55	8
2074	1525	48	I-95	FREEWAY RAMP	188	1	12	4	1700	40	8
2075	1526	25	I-95 ON RAMP	FREEWAY RAMP	1217	1	12	4	1350	30	46
2076	1526	970	SH 286	COLLECTOR	627	1	12	4	1700	45	46
2077	1527	22	I-95 ON RAMP FROM SH 110	FREEWAY RAMP	963	1	12	4	1700	45	46
2078	1527	1663	SH 110	COLLECTOR	421	2	12	4	1700	45	46
2079	1528	16	I-95 ON RAMP FROM SH 113	FREEWAY RAMP	697	1	12	4	1700	45	50
2080	1528	1529	SH 113	COLLECTOR	1040	1	12	4	1750	45	50
2081	1529	15	I-95 ON RAMP FROM SH 113	FREEWAY RAMP	624	1	12	4	1700	45	50
2082	1529	1231	SH 113	COLLECTOR	533	1	12	4	1750	45	50
2083	1530	1531	SH 97	COLLECTOR	1273	1	12	4	1700	45	56
2084	1531	1532	SH 97	COLLECTOR	1826	1	12	4	1700	45	56
2085	1532	1533	SH 97	COLLECTOR	2930	1	12	4	1700	45	56
2086	1533	1534	SH 97	COLLECTOR	3363	1	12	4	1700	45	56
2087	1534	1495	SH 97	COLLECTOR	382	1	12	4	1700	45	56
2088	1535	875	US 1	COLLECTOR	3273	1	12	4	1700	45	51
2089	1535	876	US 1	COLLECTOR	1646	1	12	4	1700	45	51
2090	1536	866	FERRY RD	LOCAL ROADWAY	2635	1	12	4	1750	35	51
2091	1537	848	MAIN ST	COLLECTOR	1614	1	12	4	1700	45	46
2092	1537	1538	US 1	COLLECTOR	352	1	12	4	1700	45	37
2093	1538	847	US 1	COLLECTOR	895	1	12	4	1575	35	40
2094	1538	850	US 1	COLLECTOR	1920	1	12	4	1700	45	51
2095	1539	846	GRETCHEN ST	COLLECTOR	351	1	12	4	1750	30	40
2096	1540	845	SHOPPING MALL ACCESS RD	COLLECTOR	388	1	12	4	1750	30	40

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
2097	1541	843	RAILROAD AVE	COLLECTOR	1355	1	12	4	1750	45	40
2098	1542	844	SHOPPING MALL ENTRANCE	COLLECTOR	442	2	12	4	1750	30	40
2099	1543	680	US 1	MINOR ARTERIAL	1081	2	12	4	1750	35	37
2100	1543	681	US 1	COLLECTOR	1469	1	12	4	1750	35	37
2101	1544	686	PLANT ACCESS RD	LOCAL ROADWAY	1036	1	12	4	1700	40	40
2102	1545	1546	TOWLE FARM RD	COLLECTOR	787	1	12	4	1700	45	38
2103	1546	672	TOWLE FARM RD	COLLECTOR	2914	1	12	4	1700	45	38
2104	1547	280	US 1	COLLECTOR	174	1	12	4	1700	40	38
2105	1547	833	US 1	COLLECTOR	761	1	12	4	1700	40	38
2106	1548	1547	STICKNEY TERRACE	COLLECTOR	337	1	12	4	1750	35	38
2107	1549	279	US 1	COLLECTOR	1395	1	12	4	1750	40	38
2108	1549	1550	US 1	COLLECTOR	339	1	12	4	1750	40	38
2109	1550	278	US 1	COLLECTOR	411	1	12	4	1750	40	38
2110	1550	1549	US 1	COLLECTOR	339	1	12	4	1750	40	38
2111	1551	1549	SCOTT RD	COLLECTOR	348	1	12	4	1750	30	38
2112	1552	1550	KERSHAW AVE	COLLECTOR	330	1	12	4	1750	30	38
2113	1553	261	GREENLEAF WOODS DR	COLLECTOR	503	1	12	4	1750	45	21
2114	1554	261	US 1	MINOR ARTERIAL	1673	2	12	4	1750	45	21
2115	1554	262	US 1	MINOR ARTERIAL	1443	2	12	4	1750	45	21
2116	1555	385	MERONA RD	COLLECTOR	724	1	12	4	1750	45	21
2117	1555	1554	MERONA RD	COLLECTOR	1518	1	12	4	1750	45	21
2118	1556	281	ANDREW JARVIS DR	COLLECTOR	896	1	12	4	1750	45	18
2119	1557	223	STATE ST	COLLECTOR	1559	1	12	4	1900	35	18
2120	1557	1582	CABOT	LOCAL ROADWAY	270	1	12	4	1750	30	18
2121	1558	216	STATE ST	COLLECTOR	305	1	12	4	1350	30	18
2122	1559	116	US 1 BYPASS	COLLECTOR	805	1	12	4	1700	45	18
2123	1559	117	US 1 BYPASS	MINOR ARTERIAL	1602	2	12	4	1900	45	18
2124	1559	1560	ALBACORE PARK	COLLECTOR	559	1	12	4	1750	45	18
2125	1560	136	MARKET ST	MINOR ARTERIAL	1805	2	12	4	1900	45	18
2126	1560	1559	ALBACORE PARK	COLLECTOR	541	1	12	4	1750	45	18

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
2127	1561	114	US 1 BYPASS	MINOR ARTERIAL	990	2	12	4	1900	45	8
2128	1561	115	US 1 BYPASS	MINOR ARTERIAL	3976	2	12	4	1900	45	8
2129	1562	1561	GORGES RD	COLLECTOR	818	1	12	4	1750	45	8
2130	1563	1560	MARKET ST	MINOR ARTERIAL	1059	2	12	4	1750	40	18
2131	1564	1563	UNNAMED ROAD	COLLECTOR	203	1	12	4	1750	45	18
2132	1565	224	SH 1A	COLLECTOR	1330	1	12	4	1900	30	18
2133	1566	1565	LINCOLN AVE	LOCAL ROADWAY	1319	1	12	4	1575	35	18
2134	1567	133	MARKET ST	MINOR ARTERIAL	257	2	12	4	1900	45	15
2135	1567	1575	MARKET ST	MINOR ARTERIAL	1075	2	12	4	1900	45	15
2136	1568	1567	KEARSARGE WAY	COLLECTOR	733	1	12	4	1750	40	15
2137	1569	1568	KEARSARGE WAY	COLLECTOR	1370	1	12	4	1700	40	15
2138	1570	1569	KEARSARGE WAY	COLLECTOR	411	1	12	4	1700	40	15
2139	1571	134	PORTSMOUTH BLVD	COLLECTOR	669	1	12	4	1750	45	15
2140	1572	1571	PORTSMOUTH BLVD	COLLECTOR	1725	1	12	4	1700	45	15
2141	1573	1575	SPINNAKER WAY	COLLECTOR	612	1	12	4	1700	45	15
2142	1574	1573	SPINNAKER WAY	COLLECTOR	1117	1	12	4	1700	45	15
2143	1575	134	MARKET ST	MINOR ARTERIAL	1603	2	12	4	1750	45	15
2144	1575	1567	MARKET ST	MINOR ARTERIAL	1075	2	12	4	1750	45	15
2145	1576	203	GRANITE ST	LOCAL ROADWAY	380	1	12	4	1750	30	15
2146	1577	118	US 1 BYPASS ACCESS RD	COLLECTOR	418	1	12	4	1350	30	15
2147	1577	202	WOODBURY AVE	COLLECTOR	3618	1	12	4	1575	35	15
2148	1578	256	COAKLY RD	LOCAL ROADWAY	1733	1	12	4	1750	40	17
2149	1579	1580	BORTHWICK AVE	LOCAL ROADWAY	1207	1	12	4	1700	40	17
2150	1580	257	BORTHWICK AVE	LOCAL ROADWAY	2072	1	12	4	1750	40	17
2151	1581	255	ISLINGTON ST	COLLECTOR	4144	1	12	4	1575	35	17
2152	1581	284	ISLINGTON ST	COLLECTOR	458	1	12	4	1750	35	17
2153	1582	210	ISLINGTON ST	COLLECTOR	1688	1	12	4	1750	45	18
2154	1582	211	ISLINGTON ST	COLLECTOR	1818	1	12	4	1900	30	18
2155	1583	132	ARTHUR F BRADY DR	COLLECTOR	447	1	12	4	1750	45	15
2156	1584	290	DURGIN LN	COLLECTOR	835	1	12	4	1750	45	15

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
2157	1585	289	COMMERCE WAY	COLLECTOR	950	1	12	4	1750	45	15
2158	1586	58	US 4	FREEWAY	1384	3	12	8	2250	70	14
2159	1586	59	US 4	FREEWAY	1864	3	12	8	2250	70	14
2160	1586	302	SPAULDING TURNPIKE RAMP	FREEWAY RAMP	617	2	12	4	1750	45	14
2161	1587	1586	SPAULDING TURNPIKE RAMP	FREEWAY RAMP	396	1	12	4	1700	45	14
2162	1588	58	SPAULDING TURNPIKE RAMP	FREEWAY RAMP	573	1	12	4	1700	45	5
2163	1589	302	GOSLING RD	MINOR ARTERIAL	798	3	12	4	1750	45	14
2164	1590	1589	FOX RUN MALL ACCESS RD	COLLECTOR	477	1	12	4	1750	30	5
2165	1591	292	FOX RUN MALL ACCESS RD	COLLECTOR	326	1	12	4	1750	30	5
2166	1592	293	FOX RUN MALL ACCESS RD	COLLECTOR	384	1	12	4	1750	30	5
2167	1593	57	US ON RAMP FROM FOX RUN MALL	FREEWAY RAMP	1509	1	12	4	1700	45	5
2168	1593	294	FOX RUN MALL ACCESS RD	COLLECTOR	270	1	12	4	1750	30	5
2169	1594	291	GOSLING RD	COLLECTOR	2041	1	12	4	1750	45	5
2170	1595	296	US 4 ON RAMP	FREEWAY RAMP	460	1	12	4	1350	30	4
2171	1596	542	OLD HEDDING RD	COLLECTOR	2631	1	12	4	1750	45	11
2172	1597	615	GREEN HILL RD	COLLECTOR	589	1	12	4	1750	45	26
2173	1598	639	SH 108	COLLECTOR	2362	1	12	3	1700	40	26
2174	1599	1598	ALUMNI DR	COLLECTOR	1112	1	12	4	1750	35	26
2175	1600	469	SHAWS LN	COLLECTOR	647	1	12	4	1575	35	26
2176	1601	469	SH 108	MINOR ARTERIAL	897	2	12	4	1750	45	26
2177	1601	470	SH 108	COLLECTOR	3124	1	12	4	1700	45	26
2178	1602	1601	SHOPPING MALL ACCESS	COLLECTOR	466	1	12	4	1750	35	26
2179	1603	626	SH 85	COLLECTOR	1417	1	12	4	1700	45	26
2180	1604	87	SH 101 OFF RAMP TO US 1	COLLECTOR	2073	1	12	4	1700	50	38
2181	1605	1604	LANDING RD	COLLECTOR	1431	1	12	4	1750	40	38
2182	1606	1604	LANDING RD	COLLECTOR	1125	1	12	4	1750	40	38
2183	1607	279	SH 27	COLLECTOR	2406	1	12	1	1750	30	38
2184	1607	1608	MILL RD	COLLECTOR	1290	1	12	4	1700	40	38
2185	1608	413	MILL RD	COLLECTOR	1247	1	12	4	1700	40	38

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
2186	1608	1607	MILL RD	COLLECTOR	1293	1	12	4	1750	40	38
2187	1609	341	SH 1A	COLLECTOR	1294	1	12	4	1575	35	34
2188	1609	400	CENTRAL RD	COLLECTOR	2076	1	12	4	1700	40	33
2189	1610	610	SH 27	COLLECTOR	2509	1	12	1	1700	40	31
2190	1611	1610	GUINEA RD	LOCAL ROADWAY	2891	1	12	4	1575	35	31
2191	1612	460	SQUAMSCOTT RD	COLLECTOR	760	1	12	4	1750	45	12
2192	1612	484	SQUAMSCOTT RD	COLLECTOR	4015	1	12	4	1700	45	12
2193	1613	287	SH 33	MINOR ARTERIAL	1507	2	12	4	1750	45	16
2194	1614	287	GRAFTON RD	LOCAL ROADWAY	1330	1	12	4	1750	35	16
2195	1614	309	GRAFTON RD	LOCAL ROADWAY	2908	1	12	4	1575	35	16
2196	1615	285	SH 33	MINOR ARTERIAL	626	2	12	4	1750	45	16
2197	1615	286	SH 33	COLLECTOR	623	1	12	4	1750	45	16
2198	1616	1615	SHERBURNE RD	COLLECTOR	199	1	12	4	1750	30	16
2199	1617	285	GREENLAND RD	COLLECTOR	192	1	12	4	1750	30	16
2200	1618	263	US 1	COLLECTOR	898	2	12	4	1750	40	21
2201	1618	264	US 1	COLLECTOR	2167	1	12	4	1700	40	21
2202	1619	1620	SH 1A	COLLECTOR	1006	1	12	4	1575	35	34
2203	1620	346	SH 1A	COLLECTOR	572	1	12	4	1125	25	34
2204	1621	351	SH 1A	COLLECTOR	478	1	12	4	1125	25	22
2205	1622	704	STARD RD	COLLECTOR	2212	1	12	4	1750	30	37
2206	1623	704	BACHELOR RD	COLLECTOR	3227	1	12	4	1750	30	37
2207	1624	762	NEW BOSTON RD	COLLECTOR	2397	1	12	4	1750	30	36
2208	1625	1113	LAWRENCE ST	COLLECTOR	2648	1	12	4	1750	40	52
2209	1626	1627	MILL ST	COLLECTOR	414	1	12	4	1700	40	52
2210	1627	1628	MILL ST	COLLECTOR	1142	1	12	4	1575	35	52
2211	1628	1629	MILL ST	COLLECTOR	2136	1	12	4	1575	35	53
2212	1629	1088	MILL ST	COLLECTOR	598	1	12	4	1750	35	53
2213	1630	1054	SH 110	COLLECTOR	1256	2	14	1	1750	45	52
2214	1631	1630	WEBSTER ST	COLLECTOR	1268	1	12	4	1750	40	52
2215	1632	1056	SUMMER ST	COLLECTOR	1231	1	12	4	1750	35	52

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
2216	1633	859	BROADWAY ST	LOCAL ROADWAY	554	1	12	4	1750	30	51
2217	1634	1065	FERRY RD	LOCAL ROADWAY	265	1	12	4	1750	30	52
2218	1635	1290	EAST ST	LOCAL ROADWAY	841	1	12	4	1750	30	58
2219	1636	1405	CRANE NECK ST	COLLECTOR	5133	1	12	4	1750	40	53
2220	1638	1530	SH 97	COLLECTOR	5943	1	12	4	1700	45	56
2221	1639	1638	LIBRARY ST	COLLECTOR	370	1	12	4	1750	40	56
2222	1640	1451	SH 133	COLLECTOR	914	1	12	4	1700	40	56
2223	1641	1640	WINTER ST	LOCAL ROADWAY	574	1	12	4	1750	35	56
2224	1642	1045	ROSEMONT ST	LOCAL ROADWAY	1159	1	12	4	1750	35	42
2225	1643	1046	HANSCOM AVE	LOCAL ROADWAY	1420	1	12	4	1750	35	42
2226	1644	893	SUNSET DRIVE	LOCAL ROADWAY	2683	1	12	4	1350	30	51
2227	1646	1647	EAST RD	COLLECTOR	2138	1	12	4	1700	40	42
2228	1647	1648	EAST RD	COLLECTOR	944	1	12	4	1700	40	42
2229	1648	1645	EAST RD	COLLECTOR	6659	1	12	4	1750	40	42
2230	1649	1161	NEW BOSTON RD	LOCAL ROADWAY	3044	1	12	4	1575	35	36
2231	1650	857	SH 1A	COLLECTOR	456	1	12	4	1750	35	51
2232	1650	859	SH 1A	COLLECTOR	10397	1	12	4	1750	35	51
2233	1651	36	I-95	FREEWAY	6490	4	12	4	2250	70	28
2234	1651	37	I-95	FREEWAY	18567	4	12	4	2250	70	20
2235	1652	97	I-495	FREEWAY	2647	3	12	8	2250	70	42
2236	1652	98	I-495	FREEWAY	4814	3	12	8	2250	70	47
2237	1653	50	I-95	FREEWAY	3318	3	12	8	2250	65	7
2238	1654	1	US 1	MINOR ARTERIAL	2191	2	12	4	1750	45	7
2239	1655	1656	SH 1A	COLLECTOR	1916	1	12	4	1575	35	34
2240	1656	1657	SH 1A	COLLECTOR	657	1	12	4	1575	35	34
2241	1657	344	SH 1A	COLLECTOR	1479	1	12	4	1575	35	34
2242	1658	1659	SH 1A	MINOR ARTERIAL	638	2	12	4	1900	35	41
2243	1659	89	SH 1A	MINOR ARTERIAL	2932	2	12	4	1900	35	39
2244	1660	1661	SH 1A	MINOR ARTERIAL	517	2	12	4	1750	35	41
2245	1661	857	SH 1A	MINOR ARTERIAL	3322	2	12	4	1750	35	41

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
2246	1662	1267	US 1	COLLECTOR	2570	1	12	4	1750	50	57
2247	1663	904	SH 110	COLLECTOR	637	2	12	4	1700	45	46
2248	1664	1663	I-95 OFF RAMP	FREEWAY RAMP	886	1	12	4	1350	30	46
2249	1665	890	DRIVEWAY	LOCAL ROADWAY	155	1	12	4	1750	30	51
2250	1666	938	DRIVEWAY	LOCAL ROADWAY	218	1	12	4	1750	30	50
2251	1667	543	FRESH RIVER RD	COLLECTOR	974	2	12	4	1750	45	10
2252	1668	63	US 101 ON RAMP	FREEWAY RAMP	638	1	12	4	1700	45	10
2253	1669	1671	SH 101	FREEWAY	2513	2	12	4	2250	70	10
2254	1670	61	SH 101	FREEWAY	5264	2	12	4	2250	70	10
2255	1670	1671	SH 101	FREEWAY	8108	2	12	4	2250	70	10
2256	1671	1669	SH 101	FREEWAY	2490	2	12	4	2250	70	10
2257	1671	1670	SH 101	FREEWAY	8086	2	12	4	2250	70	10
2258	1671	1677	SH 101 RAMP	FREEWAY RAMP	1584	1	12	4	1750	40	10
2259	1672	1678	SH 101 RAMP	FREEWAY RAMP	1048	1	12	4	1700	40	10
2260	1673	1674	SH 102	COLLECTOR	3788	1	12	4	1700	40	24
2261	1673	1677	SH 107	COLLECTOR	4269	1	12	4	1750	40	10
2262	1674	1675	SH 102	COLLECTOR	1794	1	12	4	1700	40	24
2263	1676	1673	SH 107	COLLECTOR	3741	1	12	4	1700	40	24
2264	1677	1672	SH 107	COLLECTOR	1284	1	12	4	1700	40	10
2265	1678	1671	SH 101 RAMP	FREEWAY RAMP	625	1	12	4	1700	40	10
2266	8003	3	I-95	FREEWAY	2278	4	12	8	2250	75	56
2267	8050	1653	I-95	FREEWAY	2286	3	12	8	2250	65	7
2268	8051	51	SPAULDING TURNPIKE	FREEWAY	2438	2	12	8	2250	60	3
2269	8061	1669	SH 101	FREEWAY	2504	2	12	4	2250	70	10
EXIT LINK	1300	8300	SH 1A	COLLECTOR	1260	1	12	4	1700	45	58
EXIT LINK	1662	8267	US 1	COLLECTOR	1855	1	12	4	1700	50	57
EXIT LINK	1083	8083	WASHINGTON ST	COLLECTOR	2940	1	12	4	1575	35	56
EXIT LINK	1460	8460	SH 133	COLLECTOR	3122	1	12	4	1700	45	56
EXIT LINK	3	8003	I-95	FREEWAY	2278	4	12	8	2250	75	56
EXIT LINK	90	8090	I-495	FREEWAY	1461	3	12	8	2250	70	52

Link #	Up-Stream Node	Down-Stream Node	Roadway Name	Roadway Type	Length (ft.)	No. of Lanes	Lane Width (ft.)	Shoulder Width (ft.)	Saturation Flow Rate (pcphpl)	Free Flow Speed (mph)	Grid Number
EXIT LINK	1637	8637	KINGSBURY AVE	COLLECTOR	3793	1	12	4	1700	40	52
EXIT LINK	1064	8064	SH 125	MINOR ARTERIAL	1709	2	12	4	1900	30	52
EXIT LINK	1108	8108	SH 121	COLLECTOR	3901	1	12	4	1700	45	42
EXIT LINK	1645	8821	SH 111	COLLECTOR	2523	1	12	4	1700	45	42
EXIT LINK	1675	8675	SH 102	COLLECTOR	1858	1	12	4	1700	40	24
EXIT LINK	190	8190	SH 103	COLLECTOR	796	1	12	4	1700	40	19
EXIT LINK	509	8509	SH 27	COLLECTOR	3661	1	12	3	1700	50	10
EXIT LINK	1669	8061	SH 101	FREEWAY	2504	2	12	4	2250	70	10
EXIT LINK	1653	8050	I-95	FREEWAY	2285	3	12	8	2250	65	7
EXIT LINK	1654	8001	US 1	MINOR ARTERIAL	2581	2	12	4	1900	45	7
EXIT LINK	140	8140	SH 101	COLLECTOR	968	1	12	4	1700	45	7
EXIT LINK	153	8153	SH 236	MINOR ARTERIAL	2271	2	12	4	1900	45	6
EXIT LINK	198	8198	DENNETT RD	COLLECTOR	2672	1	12	4	1700	45	5
EXIT LINK	51	8051	SPAULDING TURNPIKE	FREEWAY	2437	2	12	8	2250	60	3
EXIT LINK	301	8301	US 4	COLLECTOR	1671	1	12	4	1700	50	3
EXIT LINK	567	8567	SH 108	COLLECTOR	3676	1	12	1	1700	50	2
EXIT LINK	580	8580	BAY RD	COLLECTOR	2442	1	12	4	1350	30	2
EXIT LINK	584	8584	PACKERS FALLS RD	COLLECTOR	2250	1	12	4	1700	45	2
EXIT LINK	552	8552	LEE HOOK RD	COLLECTOR	1832	1	12	4	1700	45	1
EXIT LINK	550	8551	SH 152	COLLECTOR	3414	1	12	4	1700	45	1
EXIT LINK	550	8550	SH 125	COLLECTOR	2673	1	12	4	1700	55	1
EXIT LINK	548	8548	SH 155	COLLECTOR	3834	1	12	4	1700	45	1

Table K-2. Nodes in the Link-Node Analysis Network which are Controlled

Node	X Coordinate (ft)[1]	Y Coordinate (ft)[1]	Control Type	Grid Map Number
1	1232842	223999	Actuated	7
21	1189172	126793	TCP - Uncontrolled	46
88	1211766	153144	TCP - Uncontrolled	39
89	1214459	152655	TCP - Uncontrolled	39
115	1227237	216239	Stop	18
117	1223614	212601	Stop	15
118	1221404	210491	Stop	15
119	1220727	210256	TCP - Uncontrolled	15
120	1220726	209844	TCP - Uncontrolled	17
121	1221153	209836	TCP - Uncontrolled	17
125	1221121	210257	TCP - Uncontrolled	15
132	1218481	215400	Actuated	15
133	1222541	214174	TCP - Actuated	15
134	1219832	214904	Actuated	15
135	1219116	214969	Actuated	15
136	1223177	214195	TCP - Actuated	15
137	1226222	212954	Stop	18
139	1231560	223383	Yield	9
142	1230800	220312	Yield	9
145	1230542	220113	Yield	8
146	1230743	220107	Yield	9
150	1229919	221078	Yield	8
154	1230224	222662	Yield	8
159	1232459	217981	Stop	9
160	1232818	215842	Stop	18
162	1229219	215501	Actuated	18
164	1231413	215842	Stop	18
165	1230995	214977	Actuated	18
166	1230576	214988	Stop	18
168	1229119	214809	Actuated	18
169	1228555	215529	Stop	18
177	1232652	214218	Stop	18
178	1233327	215166	Stop	18
194	1220452	225606	Stop	5
198	1218917	228068	Stop	5
201	1224240	212769	Stop	18
202	1219761	213630	Stop	15
203	1219143	214469	Actuated	15

Node	X Coordinate (ft)[1]	Y Coordinate (ft)[1]	Control Type	Grid Map Number
210	1223508	209125	Actuated	17
211	1226342	211132	TCP - Actuated	18
212	1227200	211641	Stop	18
213	1226798	211355	Actuated	18
214	1227264	211132	Actuated	18
215	1226957	210900	Actuated	18
217	1226003	211906	Actuated	18
218	1226162	211504	Actuated	18
222	1227137	212075	Stop	18
223	1226353	210633	TCP - Actuated	18
224	1225939	209552	TCP - Actuated	18
225	1225987	211391	Stop	18
227	1227697	210688	Stop	18
228	1229074	210044	Stop	18
233	1227084	207573	Actuated	18
247	1229777	202775	TCP - Actuated	22
250	1224312	206145	Actuated	18
251	1224647	207282	Stop	18
255	1222638	207769	Stop	17
256	1221542	208950	Actuated	17
257	1221648	208617	Actuated	17
258	1223652	204513	Actuated	17
261	1223860	202986	Actuated	21
262	1223260	199949	TCP - Actuated	21
263	1223077	199237	Actuated	21
265	1220777	195761	Actuated	21
266	1219691	195049	Actuated	21
267	1218942	194109	Actuated	21
268	1218201	193149	Stop	21
269	1217688	192624	TCP - Actuated	21
270	1214159	185841	TCP - Actuated	29
274	1206776	173730	TCP - Actuated	32
276	1207171	168331	TCP - Actuated	32
277	1207464	166726	Stop	32
278	1207489	163822	Actuated	38
279	1206190	162131	TCP - Actuated	38
280	1206100	159712	TCP - Uncontrolled	38
281	1224027	204819	Actuated	18

Node	X Coordinate (ft)[1]	Y Coordinate (ft)[1]	Control Type	Grid Map Number
283	1220600	204530	TCP - Actuated	17
284	1219684	204389	Actuated	17
285	1216948	204325	Actuated	16
286	1215701	204404	TCP - Actuated	16
287	1214094	204667	Actuated	16
288	1214354	203280	TCP - Uncontrolled	21
289	1218241	215747	Actuated	15
290	1217940	216291	Actuated	15
291	1217305	217682	TCP - Actuated	5
292	1217002	218106	Actuated	5
293	1215972	219038	Actuated	5
294	1214487	219912	Actuated	5
298	1205422	231171	TCP - Uncontrolled	3
299	1203927	230054	Actuated	3
302	1215355	216623	TCP - Actuated	14
303	1214904	216226	TCP - Actuated	14
304	1213511	215485	Actuated	14
306	1213692	214562	Actuated	14
308	1215699	209391	Stop	16
312	1212752	214146	Stop	14
313	1213550	171367	Stop	33
316	1216674	178054	TCP - Actuated	29
318	1217180	183729	Stop	29
319	1218372	184110	Stop	29
320	1223002	187451	Stop	29
323	1227976	192889	Stop	22
326	1230229	200236	TCP - Uncontrolled	22
327	1230286	200313	TCP - Uncontrolled	22
328	1230202	200375	TCP - Uncontrolled	22
330	1217878	161988	TCP - Actuated	39
349	1233837	191607	Stop	22
366	1210410	224300	TCP - Uncontrolled	4
368	1207249	217832	Stop	4
370	1204549	217536	Stop	4
375	1212607	202974	Actuated	21
376	1209655	199321	Stop	20
377	1210815	199543	TCP - Actuated	21
378	1208322	197903	TCP - Actuated	20

Node	X Coordinate (ft)[1]	Y Coordinate (ft)[1]	Control Type	Grid Map Number
379	1207264	196744	Stop	20
380	1205011	196624	Stop	20
385	1221606	201345	Actuated	21
387	1213688	195585	Stop	21
388	1230140	200292	TCP - Uncontrolled	22
389	1216116	197081	Stop	21
394	1223831	180649	Yield	29
395	1223330	179179	Stop	29
400	1223257	174782	Stop	33
403	1210178	179410	Stop	28
409	1216998	170188	Stop	33
412	1219356	177013	TCP - Actuated	33
413	1209236	163544	Stop	38
415	1213901	163589	Stop	39
420	1203500	174662	TCP - Uncontrolled	32
421	1203811	175644	Yield	32
423	1204469	175331	Stop	32
427	1207370	191127	TCP - Actuated	20
428	1202704	196320	Actuated	20
432	1191713	172635	TCP - Uncontrolled	31
436	1203986	179890	TCP - Actuated	28
440	1196327	179708	Stop	27
443	1182403	181027	Actuated	26
451	1196177	187114	Stop	27
454	1202979	182022	TCP - Uncontrolled	28
456	1200554	191311	Stop	20
460	1188611	197022	Actuated	12
461	1186206	192338	Stop	12
463	1185017	191745	Yield	12
465	1185091	191247	Yield	12
468	1184629	187675	Stop	27
469	1182914	181842	Actuated	26
472	1182161	180403	Actuated	26
477	1189534	197910	Stop	12
478	1189658	191436	Stop	12
482	1182970	196543	Stop	12
485	1181015	198592	TCP - Actuated	12
486	1179403	202433	Stop	12

Node	X Coordinate (ft)[1]	Y Coordinate (ft)[1]	Control Type	Grid Map Number
490	1177807	195724	TCP - Uncontrolled	12
494	1176732	183857	TCP - Uncontrolled	26
495	1168790	183846	TCP - Uncontrolled	25
499	1160417	187806	TCP - Uncontrolled	25
501	1154390	189326	Stop	25
504	1168400	184245	Stop	25
505	1154130	188953	TCP - Uncontrolled	25
506	1143935	196034	Actuated	10
510	1154657	200906	TCP - Actuated	11
511	1170700	206095	Stop	11
523	1148436	203843	Stop	11
535	1165670	212044	Stop	11
536	1175138	209924	Stop	12
542	1147217	200355	Actuated	11
543	1142912	193975	Actuated	10
544	1142808	192667	TCP - Uncontrolled	10
548	1156371	217522	Stop	1
550	1150915	218736	Actuated	1
560	1178821	210162	TCP - Actuated	12
563	1179672	212834	Stop	12
568	1178578	211090	Stop	12
570	1176461	212485	Stop	12
572	1179828	213087	Stop	12
599	1200090	167158	Stop	32
611	1184384	175097	TCP - Uncontrolled	30
614	1181580	179630	TCP - Actuated	26
615	1178883	177111	Actuated	30
616	1178266	176024	Actuated	30
617	1184114	174732	TCP - Actuated	30
619	1176953	176129	TCP - Actuated	30
620	1176776	175837	TCP - Uncontrolled	30
629	1173470	177015	Stop	30
637	1181401	175008	Stop	30
654	1199192	152556	TCP - Actuated	38
655	1199314	152762	TCP - Actuated	38
659	1206241	158142	TCP - Uncontrolled	38
664	1205954	159033	TCP - Uncontrolled	38
666	1206403	158559	Yield	38

Node	X Coordinate (ft)[1]	Y Coordinate (ft)[1]	Control Type	Grid Map Number
672	1200611	162286	Stop	38
674	1195921	159020	Stop	37
675	1191919	159606	Stop	37
680	1196966	144378	TCP - Actuated	37
681	1197608	146757	Actuated	37
694	1187460	153988	Stop	37
696	1181792	153296	TCP - Actuated	37
701	1182655	149103	Stop	37
702	1195409	144719	TCP - Uncontrolled	37
703	1194473	144855	TCP - Uncontrolled	37
704	1193453	145518	Actuated	37
711	1172367	151201	Stop	37
714	1165015	154419	TCP - Uncontrolled	36
715	1165096	156413	TCP - Actuated	36
720	1173509	166998	TCP - Actuated	30
722	1177483	158006	Stop	37
724	1173429	164729	Stop	30
737	1176873	154341	Stop	37
740	1183084	160710	TCP - Uncontrolled	37
741	1180525	167916	TCP - Uncontrolled	30
742	1189450	156471	Stop	37
749	1160478	154752	TCP - Uncontrolled	36
753	1151201	157447	TCP - Actuated	36
754	1150831	157470	TCP - Actuated	36
755	1149686	162397	TCP - Actuated	36
761	1158685	149684	Stop	36
762	1148761	152796	TCP - Actuated	36
763	1145962	150251	TCP - Actuated	36
765	1147373	164050	TCP - Actuated	25
793	1142895	174764	TCP - Actuated	24
794	1152169	187485	Stop	25
795	1142292	185744	TCP - Actuated	24
797	1145810	169306	TCP - Actuated	25
799	1138242	170678	Stop	24
801	1130307	174597	Stop	24
803	1124548	179151	Stop	24
805	1122872	171521	Stop	24
807	1130469	157717	Stop	35

Node	X Coordinate (ft)[1]	Y Coordinate (ft)[1]	Control Type	Grid Map Number
808	1131448	164166	Stop	24
814	1141549	150190	Stop	35
819	1129212	144851	TCP - Actuated	35
820	1124756	142878	Actuated	35
822	1145576	150748	TCP - Actuated	36
825	1149100	161942	Stop	36
830	1142761	191936	TCP - Uncontrolled	10
833	1206061	160642	Stop	38
839	1212423	147109	TCP - Uncontrolled	41
842	1216615	156682	TCP - Uncontrolled	39
843	1197378	142636	Actuated	37
844	1197576	142002	Actuated	37
845	1198279	140586	Actuated	40
846	1198467	140098	Actuated	40
847	1197807	138897	TCP - Uncontrolled	40
849	1194350	135663	Pre-timed	46
851	1197841	135612	TCP - Actuated	51
852	1193527	135184	TCP - Actuated	46
853	1194942	135055	Actuated	46
854	1196831	132684	Actuated	46
856	1201668	136370	TCP - Uncontrolled	51
857	1211683	136812	TCP - Actuated	51
859	1211731	125960	TCP - Actuated	51
861	1210386	125856	TCP - Actuated	51
866	1201472	125147	Actuated	51
867	1200513	125551	TCP - Actuated	51
868	1200448	125335	TCP - Actuated	51
869	1200363	124667	TCP - Actuated	51
870	1199968	124818	TCP - Uncontrolled	51
876	1197930	116795	TCP - Uncontrolled	51
879	1196473	115031	TCP - Uncontrolled	50
881	1214409	109944	Stop	55
882	1213344	110047	TCP - Actuated	55
885	1203481	110477	TCP - Actuated	55
890	1198223	114567	Actuated	51
892	1197434	114652	Stop	50
903	1190109	126428	TCP - Actuated	46
904	1188639	126849	TCP - Uncontrolled	46

Node	X Coordinate (ft)[1]	Y Coordinate (ft)[1]	Control Type	Grid Map Number
905	1188074	127024	TCP - Actuated	46
906	1184324	127250	TCP - Uncontrolled	45
907	1181761	127373	TCP - Actuated	45
908	1179863	126449	TCP - Actuated	45
909	1180038	124980	TCP - Uncontrolled	45
913	1182928	125259	Stop	45
915	1186000	125852	Stop	46
917	1187760	123647	Actuated	50
919	1188098	121719	TCP - Actuated	50
920	1187812	119897	Stop	50
921	1190217	118742	TCP - Actuated	50
922	1190683	118519	Stop	50
927	1193651	115532	TCP - Uncontrolled	50
928	1192941	116570	Stop	50
929	1194148	117577	Stop	50
931	1193767	115426	TCP - Uncontrolled	50
932	1192559	113645	Actuated	50
934	1194976	116484	Stop	50
936	1195795	112715	TCP - Actuated	50
937	1197576	112933	Actuated	50
938	1196942	113370	Actuated	50
940	1200810	108868	TCP - Actuated	55
941	1200329	109491	TCP - Uncontrolled	55
942	1196789	110125	Stop	54
943	1196592	110059	TCP - Uncontrolled	54
944	1196516	109863	TCP - Uncontrolled	54
946	1196046	110540	Actuated	54
947	1194768	112878	TCP - Actuated	50
948	1194156	110507	TCP - Actuated	54
953	1195852	110236	Stop	54
954	1196334	110166	Stop	54
956	1181622	140913	TCP - Uncontrolled	37
957	1181842	137448	Stop	45
958	1181988	133280	TCP - Uncontrolled	45
959	1181825	131431	TCP - Uncontrolled	45
960	1181726	131400	TCP - Uncontrolled	45
961	1181742	131309	TCP - Uncontrolled	45
962	1181844	131325	TCP - Uncontrolled	45

Node	X Coordinate (ft)[1]	Y Coordinate (ft)[1]	Control Type	Grid Map Number
965	1183529	131432	Stop	45
967	1184894	129707	Stop	46
970	1191343	134607	TCP - Uncontrolled	46
977	1180306	135858	Stop	45
981	1180745	130675	Yield	45
987	1180936	130092	TCP - Actuated	45
992	1179783	128737	TCP - Actuated	45
994	1179748	130294	Stop	45
995	1178952	131184	Stop	45
999	1169865	129943	Stop	44
1002	1165767	132843	TCP - Uncontrolled	44
1004	1159441	136990	Stop	44
1005	1157448	136268	Stop	43
1009	1174248	125945	Stop	45
1016	1172553	123032	Stop	49
1022	1164633	121015	TCP - Uncontrolled	48
1024	1162939	122422	TCP - Uncontrolled	48
1027	1165530	123530	Stop	48
1028	1168199	123689	TCP - Uncontrolled	48
1032	1141146	139351	TCP - Actuated	35
1035	1136901	129973	TCP - Actuated	42
1036	1134817	127104	Actuated	42
1038	1134148	121225	Actuated	42
1039	1134404	119771	Actuated	42
1040	1134666	119312	Actuated	42
1041	1134990	118277	Actuated	42
1042	1135476	116048	Actuated	42
1043	1135555	115281	Actuated	42
1044	1135375	113595	Actuated	42
1045	1135861	112295	Actuated	42
1046	1137247	110995	Actuated	52
1054	1142539	103087	Actuated	52
1055	1142433	102623	Actuated	52
1056	1142463	101650	Actuated	52
1057	1142539	101276	Actuated	52
1058	1142687	100752	Actuated	52
1060	1142719	98147	Actuated	52
1061	1141595	97518	Actuated	52

Node	X Coordinate (ft)[1]	Y Coordinate (ft)[1]	Control Type	Grid Map Number
1064	1134205	91684	Actuated	52
1065	1133445	92484	Actuated	52
1066	1132474	93848	Actuated	52
1075	1149166	90919	Stop	53
1077	1151362	87731	Stop	53
1080	1151870	89113	Stop	53
1081	1152998	93236	Stop	53
1084	1141221	101723	Stop	52
1086	1141209	100785	Stop	52
1088	1144722	100535	Actuated	52
1089	1141083	100210	Actuated	52
1091	1132081	99785	Actuated	52
1095	1132907	103499	Actuated	52
1098	1138933	101962	Actuated	52
1106	1133669	116048	Stop	42
1112	1137675	123153	Stop	42
1113	1143888	104326	Actuated	52
1115	1145232	107809	TCP - Actuated	53
1120	1147331	118933	TCP - Actuated	47
1124	1140045	124373	TCP - Uncontrolled	42
1136	1129261	144566	Stop	35
1140	1145342	134339	Stop	43
1143	1153807	135262	Stop	43
1144	1156029	137484	Stop	43
1145	1155056	141231	Stop	36
1162	1155516	139572	Stop	36
1165	1150401	127323	TCP - Actuated	43
1174	1138443	128839	TCP - Uncontrolled	42
1177	1151538	124861	Stop	43
1179	1158427	119410	Stop	48
1180	1156582	116626	TCP - Actuated	47
1191	1154464	96532	Stop	53
1192	1153362	97190	Stop	53
1196	1146251	99001	Actuated	53
1197	1150363	98022	Stop	53
1202	1155739	102753	Stop	53
1214	1163127	117952	Stop	48
1219	1161061	113753	TCP - Actuated	48

Node	X Coordinate (ft)[1]	Y Coordinate (ft)[1]	Control Type	Grid Map Number
1220	1161145	113103	Stop	48
1231	1184916	116048	Actuated	50
1232	1183862	110820	Stop	54
1245	1181998	102737	Stop	54
1246	1182685	102889	TCP - Uncontrolled	54
1248	1183484	103080	TCP - Uncontrolled	54
1258	1196730	109898	TCP - Uncontrolled	54
1260	1195792	106530	TCP - Actuated	54
1261	1194122	101285	Stop	54
1263	1190372	87588	TCP - Actuated	54
1264	1187981	76067	Actuated	57
1265	1187883	75698	Actuated	57
1267	1185358	68140	Actuated	57
1278	1201774	90148	TCP - Uncontrolled	55
1283	1196196	79844	Actuated	57
1290	1205459	68541	Stop	58
1333	1195417	82415	Stop	57
1337	1191642	83168	Stop	57
1352	1189517	83571	Stop	57
1354	1195479	80340	Stop	57
1364	1193250	101280	Stop	54
1367	1190840	97155	Stop	54
1371	1182284	92123	Stop	54
1374	1178556	94539	TCP - Uncontrolled	54
1382	1176824	105749	Stop	54
1388	1178249	111518	Stop	49
1395	1167490	111245	TCP - Actuated	48
1398	1162602	113579	TCP - Actuated	48
1403	1166685	110649	Stop	53
1405	1162405	104949	Actuated	53
1411	1157849	98884	TCP - Actuated	53
1412	1158511	99136	Stop	53
1418	1155801	97163	Stop	53
1419	1162779	96084	TCP - Uncontrolled	53
1422	1165813	92371	TCP - Uncontrolled	53
1423	1165970	92144	TCP - Uncontrolled	53
1429	1157253	90000	Stop	53
1437	1166163	83272	Stop	56

Node	X Coordinate (ft)[1]	Y Coordinate (ft)[1]	Control Type	Grid Map Number
1444	1173379	87978	Stop	54
1448	1170328	79802	Stop	56
1452	1165569	82591	Actuated	56
1467	1170545	105923	Stop	53
1469	1167477	101414	Stop	53
1476	1174021	87098	Stop	54
1477	1172003	86347	Stop	54
1485	1180596	86762	Stop	54
1486	1179120	83758	Stop	57
1493	1170832	66800	Stop	56
1497	1179587	74734	Stop	57
1499	1183640	75861	Stop	57
1505	1180600	82515	Stop	57
1508	1185149	83623	Stop	57
1510	1188533	86969	TCP - Uncontrolled	54
1513	1185475	89205	Stop	54
1515	1184806	89205	Stop	54
1516	1182914	88134	Stop	54
1527	1189632	126484	TCP - Uncontrolled	46
1528	1186315	116765	TCP - Uncontrolled	50
1529	1185387	116296	TCP - Actuated	50
1537	1197396	138106	TCP - Uncontrolled	37
1547	1206078	159880	Actuated	38
1549	1207074	163195	Actuated	38
1550	1207311	163438	Actuated	38
1554	1223647	201334	Actuated	21
1559	1224928	213517	Actuated	18
1560	1224966	214028	Actuated	18
1561	1229639	219408	Actuated	8
1563	1225859	213472	Actuated	18
1565	1226680	208455	Stop	18
1567	1222359	214178	Actuated	15
1575	1221289	214246	Stop	15
1582	1224849	210109	Actuated	18
1589	1216054	217008	Actuated	5
1598	1179332	177589	Actuated	26
1601	1183230	182580	Actuated	26
1604	1208273	156570	TCP - Actuated	38

Node	X Coordinate (ft)[1]	Y Coordinate (ft)[1]	Control Type	Grid Map Number
1607	1208384	161207	Actuated	38
1609	1224553	173208	TCP - Uncontrolled	34
1610	1187087	174156	Stop	31
1613	1212956	203730	TCP - Actuated	16
1615	1216324	204414	Actuated	16
1630	1143485	103915	Actuated	52
1636	1166608	102028	TCP - Uncontrolled	53
1638	1165429	81831	Actuated	56
1640	1166198	81966	Actuated	56
1645	1120039	135608	Actuated	42
1663	1189238	126632	Yield	46
1673	1118375	188709	Stop	24
1677	1118221	192926	Actuated	10

[1]Coordinates are in the North American Datum of 1983 New Hampshire State Plane Zone

APPENDIX L

ERPA Boundaries

L. ERPA BOUNDARIES

ERPA A — State: New Hampshire

Comprised of the following Communities: Seabrook and Hampton Falls

ERPA B — State: Massachusetts

Comprised of the following Communities: Amesbury and Salisbury

ERPA C — State: New Hampshire

Comprised of the following Communities: Kensington and South Hampton

ERPA D — State: New Hampshire

Comprised of the following Communities: Hampton and North Hampton

ERPA E — State: Massachusetts

Comprised of the following Communities: Merrimac, Newburyport, Newbury, and West Newbury

ERPA F — State: New Hampshire

Comprised of the following Communities: Brentwood, East Kingston, Exeter, Newfields, Newton, and Kingston

ERPA G — State: New Hampshire

Comprised of the following Communities: Greenland, Stratham, Rye, New Castle, and Portsmouth

APPENDIX M

Evacuation Sensitivity Studies

M. EVACUATION SENSITIVITY STUDIES

This appendix presents the results of a series of sensitivity analyses. These analyses are designed to identify the sensitivity of the ETE to changes in some base evacuation conditions.

M.1 Effect of Changes in Trip Generation Time

A sensitivity study was performed to determine whether changes in the estimated trip generation time have an effect on the ETE for the entire EPZ. Specifically, if the tail of the mobilization distribution were truncated (i.e., if those who responded most slowly to the Advisory to Evacuate, could be persuaded to respond much more rapidly), how would the ETE be affected? The case considered was Scenario 1, Region 3; a summer, midweek, midday, good weather evacuation of the entire EPZ. Table M-1 presents the results of this study.

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

Trip Generation Time	Evacuation Time Estimate for Entire EPZ	
	90th Percentile	100th Percentile
3 Hours	4:25	6:20
4 Hours	4:25	6:20
5 Hours (Base)	4:25	6:20

As discussed in Section 7.3, traffic congestion persists within the EPZ for about 6 hours. As such, the ETE for the 100th percentile are not affected by the trip generation time, but by the time needed to clear the congestion within the EPZ. The 90th percentile ETE are also not sensitive to truncating the tail of the mobilization time distribution.

M.2 Effect of Changes in the Number of People in the Shadow Region Who Relocate

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 case considered was Scenario 1, Region 3; a summer, midweek, midday, good weather evacuation for the entire EPZ. The movement of people in the Shadow Region has the potential to impede vehicles evacuating from an Evacuation Region within the EPZ. Refer to Sections 3.2 and 7.1 for additional information on population within the Shadow Region.

Table M-2 presents the evacuation time estimates for each of the cases considered. Reducing the shadow evacuation to 0% has no effect on the 90th percentile and reduces the 100th percentile by 10 minutes – not a significant change. Tripling the shadow percentage has no effect on either the 90th or 100th percentile ETE. Portsmouth is heavily congested for the first 6 hours after the ATE, thus dictating ETE at both the 90th and 100th percentiles. The city boundaries of Portsmouth extend to about 14 miles from the plant. Thus, there is only a small area of the Shadow Region north of Portsmouth. The number of shadow vehicles evacuating from this small area is not significant enough to delay the evacuation of Portsmouth and prolong ETE.

Note, the telephone survey results presented in Appendix F indicate that 16% of households would elect to evacuate if advised to shelter. A sensitivity study was run using 16% and the ETE were unaffected. Appendix F also indicates that 30% of households would evacuate if advised to shelter now and then evacuate later. A sensitivity study was run using 30% and the ETE were unaffected.

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

Percent Shadow Evacuation	Evacuating Shadow Vehicles	Evacuation Time Estimate for Entire EPZ	
		90th Percentile	100th Percentile
0	0	4:25	6:10
16	10,734	4:25	6:20
20 (Base)	13,417	4:25	6:20
30	20,126	4:25	6:20
60	40,251	4:25	6:20

M.3 Effect of Changes in Resident Population

A sensitivity study was conducted to determine the effect on ETE of changes in the resident population within the study area (EPZ plus Shadow Region). As population in the study area changes over time, the time required to evacuate the public may increase or remain the same. Since the ETE is related to the demand to capacity ratio present within the study area, changes in population will cause the demand side of the equation to change. The sensitivity study was conducted using the following planning assumptions:

1. The percent change in population within the study area was increased by up to 23%. Changes in population were applied to permanent residents only (as per federal guidance), in both the EPZ and in the Shadow Region.
2. The transportation infrastructure remained fixed; the presence of new roads or highway capacity improvements was not considered.
3. The study was performed for the 2-Mile Region (R01), the 5-Mile Region (R02) and the entire EPZ (R03).
4. The good weather scenario which yielded the highest ETE values was selected as the case to be considered in this sensitivity study (Scenario 1).

Table M-3 presents the results of the sensitivity study. Section IV of Appendix E to 10 CFR Part 50, and NUREG/CR-7002, Section 5.4, require licensees to provide an updated ETE analysis to the NRC when a population increase within the EPZ causes ETE values (for the 2-Mile Region, 5-Mile Region or entire EPZ) to increase by 25 percent or 30 minutes, whichever is less. Note that all of the base ETE values are greater than 2 hours except for the 90th percentile ETE for the 2-Mile region which is 1:55; 25 percent of 2 hours is 30 minutes. Therefore, 30 minutes is the lesser and is the criterion for updating for all regions except the 90th percentile ETE of the 2-Mile region which is 29 minutes.

Those percent population changes which result in ETE changes greater than 30 minutes, or 29 minutes for the 90th percentile for the 2-Mile region, are highlighted in red below – a 23% increase in the EPZ population. NextEra will have to estimate the EPZ population on an annual basis. If the EPZ population increases by 23% or more relative to the 2010 Census data, an updated ETE analysis will be needed.

Table M-3. ETE Variation with Population Change

EPZ and Shadow Resident Population	Base	Population Change		
		15%	20%	23%
	183,448	210,965	220,138	225,641
ETE for 90th Percentile				
Region	Base	Population Change		
		15%	20%	23%
2-MILE	1:55	2:00	2:10	2:10
5-MILE	2:55	3:10	3:10	3:15
FULL EPZ	4:25	4:45	4:50	**4:55**
ETE for 100th Percentile				
Region	Base	Population Change		
		15%	20%	23%
2-MILE	5:05	5:05	5:05	5:05
5-MILE	5:05	5:05	5:05	5:10
FULL EPZ	6:20	6:35	6:40	6:45

APPENDIX N

ETE Criteria Checklist

N. ETE CRITERIA CHECKLIST

Table N-1. ETE Review Criteria Checklist

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
1.0 Introduction		
a. The emergency planning zone (EPZ) and surrounding area should be described.	Yes	Section 1
b. A map should be included that identifies primary features of the site, including major roadways, significant topographical features, boundaries of counties, and population centers within the EPZ.	Yes	Figure 1-1
c. A comparison of the current and previous ETE should be provided and includes similar information as identified in Table 1-1, "ETE Comparison," of NUREG/CR-7002.	Yes	Table 1-3
1.1 Approach		
a. A discussion of the approach and level of detail obtained during the field survey of the roadway network should be provided.	Yes	Section 1.3
b. Sources of demographic data for schools, special facilities, large employers, and special events should be identified.	Yes	Section 2.1 Section 3
c. Discussion should be presented on use of traffic control plans in the analysis.	Yes	Section 1.3, Section 2.3, Section 9, Appendix G
d. Traffic simulation models used for the analyses should be identified by name and version.	Yes	Section 1.3, Table 1-3, Appendix B, Appendix C

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
e. Methods used to address data uncertainties should be described.	Yes	Section 3 – avoid double counting Section 5, Appendix F – 4.5% sampling error at 95% confidence interval for telephone survey
1.2 Assumptions		
a. The planning basis for the ETE includes the assumption that the evacuation should be ordered promptly and no early protective actions have been implemented.	Yes	Section 2.3 – Assumption 1 Section 5.1
b. Assumptions consistent with Table 1-2, "General Assumptions," of NUREG/CR-7002 should be provided and include the basis to support their use.	Yes	Sections 2.2, 2.3
1.3 Scenario Development		
a. The ten scenarios in Table 1-3, Evacuation Scenarios, should be developed for the ETE analysis, or a reason should be provided for use of other scenarios.	Yes	Tables 2-1, 6-3
1.3.1 Staged Evacuation		
a. A discussion should be provided on the approach used in development of a staged evacuation.	Yes	Sections 5.4.2, 7.2
1.4 Evacuation Planning Areas		
a. A map of EPZ with emergency response planning areas (ERPAs) should be included.	Yes	Figure 3-1
b. A table should be provided identifying the ERPAs considered for each ETE calculation by downwind direction in each sector.	Yes	Table 6-1 and Table 6-2

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
c. A table similar to Table 1-4, "Evacuation Areas for a Staged Evacuation Keyhole," of NUREG/CR-7002 should be provided and includes the complete evacuation of the 2, 5, and 10 mile areas and for the 2 mile area/5 mile keyhole evacuations.	Yes	Table 7-4 and Table 7-5
2.0 Demand Estimation		
a. Demand estimation should be developed for the four population groups, including permanent residents of the EPZ, transients, special facilities, and schools.	Yes	Permanent residents, employees, transients – Section 3, Appendix E Schools, preschools and licensed daycares, day camps, medical facilities, and correctional facilities – Section 8, Appendix E
2.1 Permanent Residents and Transient Population		
a. The US Census should be the source of the population values, or another credible source should be provided.	Yes	Section 3.1
b. Population values should be adjusted as necessary for growth to reflect population estimates to the year of the ETE.	Yes	2010 used as the base year for analysis. No growth of population necessary.
c. A sector diagram should be included, similar to Figure 2-1, "Population by Sector," of NUREG/CR-7002, showing the population distribution for permanent residents.	Yes	Figure 3-2
2.1.1 Permanent Residents with Vehicles		
a. The persons per vehicle value should be between 1 and 2 or justification should be provided for other values.	Yes	1.92 persons per vehicle – Table 1-3

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
b. Major employers should be listed.	Yes	Used alternate method for employment in NH discussed in Section 3.4 MA major employers listed in Appendix E – Table E-5
2.1.2 Transient Population		
a. A list of facilities which attract transient populations should be included, and peak and average attendance for these facilities should be listed. The source of information used to develop attendance values should be provided.	Yes	Sections 3.3, 3.4, Appendix E
b. The average population during the season should be used, itemized and totaled for each scenario.	Yes	Tables 3-4, 3-5 and Appendix E itemize the transient population and employee estimates. These estimates are multiplied by the scenario specific percentages provided in Table 6-4 to estimate transient population by scenario.
c. The percent of permanent residents assumed to be at facilities should be estimated.	Yes	Sections 3.3, 3.4
d. The number of people per vehicle should be provided. Numbers may vary by scenario, and if so, discussion on why values vary should be provided.	Yes	Sections 3.3, 3.4
e. A sector diagram should be included, similar to Figure 2-1 of NUREG/CR-7002, showing the population distribution for the transient population.	Yes	Figure 3-6 – transients Figure 3-8 – employees

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
2.2 Transit Dependent Permanent Residents		
a. The methodology used to determine the number of transit dependent residents should be discussed.	Yes	Section 8.1, Table 8-1
b. Transportation resources needed to evacuate this group should be quantified.	Yes	Section 8.1, Tables 8-8, 8-13
c. The county/local evacuation plans for transit dependent residents should be used in the analysis.	Yes	Sections 8.1, 8.4
d. The methodology used to determine the number of people with disabilities and those with access and functional needs who may need assistance and do not reside in special facilities should be provided. Data from local/county registration programs should be used in the estimate, but should not be the only set of data.	Yes	Section 8.5
e. Capacities should be provided for all types of transportation resources. Bus seating capacity of 50% should be used or justification should be provided for higher values.	Yes	Section 2.3 – Assumption 10 Sections 3.5, 8.1, 8.2, 8.3
f. An estimate of this population should be provided and information should be provided that the existing registration programs were used in developing the estimate.	Yes	Table 8-1 – transit dependents Section 8.5 – special needs
g. A summary table of the total number of buses, ambulances, or other transport needed to support evacuation should be provided and the quantification of resources should be detailed enough to assure double counting has not occurred.	Yes	Section 8.5 – page 8-10 Table 8-8, Section 8.4

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
2.3 Special Facility Residents		
a. A list of special facilities, including the type of facility, location, and average population should be provided. Special facility staff should be included in the total special facility population.	Yes	Appendix E, Tables E-4 and E-9 – list facilities, type, location, and population
b. A discussion should be provided on how special facility data was obtained.	Yes	Sections 8.2, 8.3
c. The number of wheelchair and bed-bound individuals should be provided.	Yes	Table E-4 Table 8-7
d. An estimate of the number and capacity of vehicles needed to support the evacuation of the facility should be provided.	Yes	Section 8.4 and 8.6 Tables 8-7 and 8-8
e. The logistics for mobilizing specially trained staff (e.g., medical support or security support for prisons, jails, and other correctional facilities) should be discussed when appropriate.	Yes	Section 8.4
2.4 Schools		
a. A list of schools including name, location, student population, and transportation resources required to support the evacuation, should be provided. The source of this information should be provided.	Yes	Schools - Table 8-2 Preschools/Daycares – Table 8-3 Section 8.2
b. Transportation resources for elementary and middle schools should be based on 100% of the school capacity.	Yes	Section 8.2

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
c. The estimate of high school students who will use their personal vehicle to evacuate should be provided and a basis for the values used should be discussed.	Yes	Section 8.2
d. The need for return trips should be identified if necessary.	Yes	There are sufficient resources to evacuate schools in a single wave.
2.5.1 Special Events		
a. A complete list of special events should be provided and includes information on the population, estimated duration, and season of the event.	Yes	Section 3.7
b. The special event that encompasses the peak transient population should be analyzed in the ETE.	Yes	Section 3.7
c. The percent of permanent residents attending the event should be estimated.	Yes	Section 3.7
2.5.2 Shadow Evacuation		
a. A shadow evacuation of 20 percent should be included for areas outside the evacuation area extending to 15 miles from the NPP.	Yes	Section 2.2 – Assumption 5 Figure 2-1 Section 3.2
b. Population estimates for the shadow evacuation in the 10 to 15 mile area beyond the EPZ are provided by sector.	Yes	Section 3.2 Figure 3-4 Table 3-3
c. The loading of the shadow evacuation onto the roadway network should be consistent with the trip generation time generated for the permanent resident population.	Yes	Section 5 – Table 5-9

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
2.5.3 Background and Pass Through Traffic		
a. The volume of background traffic and pass through traffic is based on the average daytime traffic. Values may be reduced for nighttime scenarios.	Yes	Section 3.6 Table 3-6 Section 6 Table 6-4
b. Pass through traffic is assumed to have stopped entering the EPZ about two hours after the initial notification.	Yes	Section 2.3 – Assumption 5 Section 3.6
2.6 Summary of Demand Estimation		
a. A summary table should be provided that identifies the total populations and total vehicles used in analysis for permanent residents, transients, transit dependent residents, special facilities, schools, shadow population, and pass-through demand used in each scenario.	Yes	Tables 3-7, 3-8
3.0 Roadway Capacity		
a. The method(s) used to assess roadway capacity should be discussed.	Yes	Section 4
3.1 Roadway Characteristics		
a. A field survey of key routes within the EPZ has been conducted.	Yes	Section 1.3
b. Information should be provided describing the extent of the survey, and types of information gathered and used in the analysis.	Yes	Section 1.3

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
c. A table similar to that in Appendix A, "Roadway Characteristics," of NUREG/CR-7002 should be provided.	Yes	Appendix K, Table K-1
d. Calculations for a representative roadway segment should be provided.	Yes	Section 4
e. A legible map of the roadway system that identifies node numbers and segments used to develop the ETE should be provided and should be similar to Figure 3-1, "Roadway Network Identifying Nodes and Segments," of NUREG/CR-7002.	Yes	Appendix K, Figures K-1 through K-59 present the entire link-node analysis network at a scale suitable to identify all links and nodes
3.2 Capacity Analysis		
a. The approach used to calculate the roadway capacity for the transportation network should be described in detail and identifies factors that should be expressly used in the modeling.	Yes	Section 4
b. The capacity analysis identifies where field information should be used in the ETE calculation.	Yes	Section 1.3, Section 4
3.3 Intersection Control		
a. A list of intersections should be provided that includes the total number of intersections modeled that are unsignalized, signalized, or manned by response personnel.	Yes	Appendix K, Table K-2
b. Characteristics for the 10 highest volume intersections within the EPZ are provided including the location, signal cycle length, and turn lane queue capacity.	Yes	Table J-1
c. Discussion should be provided on how signal cycle time is used in the calculations.	Yes	Section 4.1, Appendix C.

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
3.4 Adverse Weather		
a. The adverse weather condition should be identified and the effects of adverse weather on mobilization time should be considered.	Yes	Table 2-1, Section 2.3 – Assumption 9 Mobilization time – Table 2-2, Section 5.3 (page 5-10)
b. The speed and capacity reduction factors identified in Table 3-1, "Weather Capacity Factors," of NUREG/CR-7002 should be used or a basis should be provided for other values.	Yes	Table 2-2 – based on HCM 2010. The factors provided in Table 3-1 of NUREG/CR-7002 are from HCM 2000.
c. The study identifies assumptions for snow removal on streets and driveways, when applicable.	Yes	Section 5.3 – page 5-10 Appendix F – Section F.3.3
4.0 Development of Evacuation Times		
4.1 Trip Generation Time		
a. The process used to develop trip generation times should be identified.	Yes	Section 5
b. When telephone surveys are used, the scope of the survey, area of survey, number of participants, and statistical relevance should be provided.	Yes	Appendix F
c. Data obtained from telephone surveys should be summarized.	Yes	Appendix F
d. The trip generation time for each population group should be developed from site specific information.	Yes	Section 5, Appendix F

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
4.1.1 Permanent Residents and Transient Population		
a. Permanent residents are assumed to evacuate from their homes but are not assumed to be at home at all times. Trip generation time includes the assumption that a percentage of residents will need to return home prior to evacuating.	Yes	Section 5 discusses trip generation for households with and without returning commuters. Table 6-4 presents the percentage of households with returning commuters and the percentage of households either without returning commuters or with no commuters. Appendix F presents the percent households who will await the return of commuters.
b. Discussion should be provided on the time and method used to notify transients. The trip generation time discusses any difficulties notifying persons in hard to reach areas such as on lakes or in campgrounds.	Yes	Section 5.4.3
c. The trip generation time accounts for transients potentially returning to hotels prior to evacuating.	Yes	Section 5, Figure 5-1
d. Effect of public transportation resources used during special events where a large number of transients should be expected should be considered.	Yes	Section 3.7
e. The trip generation time for the transient population should be integrated and loaded onto the transportation network with the general public.	Yes	Section 5, Table 5-9

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
4.1.2 Transit Dependent Residents		
a. If available, existing plans and bus routes should be used in the ETE analysis. If new plans should be developed with the ETE, they have been agreed upon by the responsible authorities.	Yes	Section 8.4 – page 8-8. – see Figures 8-2 through 8-6, Table 8-13.
b. Discussion should be included on the means of evacuating ambulatory and non-ambulatory residents.	Yes	Section 8.4 and 8.5
c. The number, location, and availability of buses, and other resources needed to support the demand estimation should be provided.	Yes	Section 8.4 and 8.5
d. Logistical details, such as the time to obtain buses, brief drivers, and initiate the bus route should be provided.	Yes	Section 8.4, Figure 8-1
e. Discussion should identify the time estimated for transit dependent residents to prepare and travel to a bus pickup point, and describes the expected means of travel to the pickup point.	Yes	Section 8.4
f. The number of bus stops and time needed to load passengers should be discussed.	Yes	Section 8.4
g. A map of bus routes should be included.	Yes	Figure 8-2 through 8-6
h. The trip generation time for non-ambulatory persons includes the time to mobilize ambulances or special vehicles, time to drive to the home of residents, loading time, and time to drive out of the EPZ should be provided.	Yes	Section 8.5

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
i. Information should be provided to supports analysis of return trips, if necessary.	Yes	Sections 8.4, 8.5 Figure 8-1 Tables 8-14 through 8-16
4.1.3 Special Facilities		
a. Information on evacuation logistics and mobilization times should be provided.	Yes	Section 8.4 and 8.6, Tables 8-17 through 8-19, and Table 21
b. Discussion should be provided on the inbound and outbound speeds.	Yes	Section 8.4
c. The number of wheelchair and bed-bound individuals should be provided, and the logistics of evacuating these residents should be discussed.	Yes	Tables 8-7 and 8-8 Tables 8-17 through 8-19 and Table 8-21
d. Time for loading of residents should be provided	Yes	Sections 8.3, 8.4, and 8.6
e. Information should be provided that indicates whether the evacuation can be completed in a single trip or if additional trips should be needed.	Yes	Section 8.4, Table 8-8 No return trips needed.
f. If return trips should be needed, the destination of vehicles should be provided.	Yes	Section 8.4 No return trips needed.
g. Discussion should be provided on whether special facility residents are expected to pass through the reception center prior to being evacuated to their final destination.	Yes	Section 8.4 No return trips needed.
h. Supporting information should be provided to quantify the time elements for the return trips.	Yes	Section 8.4. No return trips needed.

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
4.1.4 Schools		
a. Information on evacuation logistics and mobilization time should be provided.	Yes	Section 8.4
b. Discussion should be provided on the inbound and outbound speeds.	Yes	School bus routes are presented in Table 8-10 through 8-12. School bus speeds are presented in Tables 8-10 (good weather), 8-11 (rain), and 8-12 (snow). Outbound speeds are defined as the minimum of the evacuation route speed and the State school bus speed limit. Inbound speeds are limited to the State school bus speed limit.
c. Time for loading of students should be provided.	Yes	Tables 8-10 through 8-12, Discussion in Section 8.4
d. Information should be provided that indicates whether the evacuation can be completed in a single trip or if additional trips are needed.	Yes	Section 8.4 – page 8-8
e. If return trips are needed, the destination of school buses should be provided.	Yes	Return trips are not needed
f. If used, reception centers should be identified. Discussion should be provided on whether students are expected to pass through the reception center prior to being evacuated to their final destination.	Yes	Table 8-6 and 8-7. Students are evacuated to school reception centers/host schools where they will be picked up by parents or guardians.

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
g. Supporting information should be provided to quantify the time elements for the return trips.	Yes	Return trips are not needed. Tables 8-6 and 8-7 provide time needed to arrive at care center, which could be used to compute a second wave evacuation if necessary
4.2 ETE Modeling		
a. General information about the model should be provided and demonstrates its use in ETE studies.	Yes	DYNEV II (Ver. 4.0.15.0). Section 1.3, Table 1-3, Appendix B, Appendix C.
b. If a traffic simulation model is not used to conduct the ETE calculation, sufficient detail should be provided to validate the analytical approach used. All criteria elements should have been met, as appropriate.	No	Not applicable as a traffic simulation model was used.
4.2.1 Traffic Simulation Model Input		
a. Traffic simulation model assumptions and a representative set of model inputs should be provided.	Yes	Appendices B and C describe the simulation model assumptions and algorithms Table J-2
b. A glossary of terms should be provided for the key performance measures and parameters used in the analysis.	Yes	Appendix A Tables C-1, C-2

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
4.2.2 Traffic Simulation Model Output		
a. A discussion regarding whether the traffic simulation model used must be in equilibration prior to calculating the ETE should be provided.	Yes	Appendix B
b. The minimum following model outputs should be provided to support review: 1. Total volume and percent by hour at each EPZ exit node. 2. Network wide average travel time. 3. Longest queue length for the 10 intersections with the highest traffic volume. 4. Total vehicles exiting the network. 5. A plot that provides both the mobilization curve and evacuation curve identifying the cumulative percentage of evacuees who have mobilized and exited the EPZ. 6. Average speed for each major evacuation route that exits the EPZ.	Yes	1. Table J-5. 2. Table J-3. 3. Table J-1. 4. Table J-3. 5. Figures J-1 through J-14 (one plot for each scenario considered). 6. Table J-4. Network wide average speed also provided in Table J-3.
c. Color coded roadway maps should be provided for various times (i.e., at 2, 4, 6 hrs., etc.) during a full EPZ evacuation scenario, identifying areas where long queues exist including level of service (LOS) “E” and LOS “F” conditions, if they occur.	Yes	Figures 7-3 through 7-8
4.3 Evacuation Time Estimates for the General Public		
a. The ETE should include the time to evacuate 90% and 100% of the total permanent resident and transient population	Yes	Tables 7-1, 7-2

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
b. The ETE for 100% of the general public should include all members of the general public. Any reductions or truncated data should be explained.	Yes	Section 5.4 – truncating survey data to eliminate statistical outliers Table 7-2 – 100th percentile ETE for general public
c. Tables should be provided for the 90 and 100 percent ETEs similar to Table 4-3, "ETEs for Staged Evacuation Keyhole," of NUREG/CR-7002.	Yes	Tables 7-3, 7-4
d. ETEs should be provided for the 100 percent evacuation of special facilities, transit dependent, and school populations.	Yes	Sections 8.4 and 8.6 Tables 8-10 through 8-12 Tables 8-14 through 8-16 Tables 8-17 through 8-19 Table 8-21
5.0 Other Considerations		
5.1 Development of Traffic Control Plans		
a. Information that responsible authorities have approved the traffic control plan used in the analysis should be provided.	Yes	Section 9, Appendix G
b. A discussion of adjustments or additions to the traffic control plan that affect the ETE should be provided.	Yes	Appendix G
5.2 Enhancements in Evacuation Time		
a. The results of assessments for improvement of evacuation time should be provided.	Yes	Appendix M

NRC Review Criteria	Criterion Addressed in ETE Analysis	Comments
b. A statement or discussion regarding presentation of enhancements to local authorities should be provided.	Yes	Results of the ETE study were formally presented to local authorities at the final project meeting. Recommended enhancements were discussed.
5.3 State and Local Review		
a. A list of agencies contacted and the extent of interaction with these agencies should be discussed.	Yes	Table 1-1
b. Information should be provided on any unresolved issues that may affect the ETE.	Yes	No unresolved issues remain
5.4 Reviews and Updates		
a. A discussion of when an updated ETE analysis is required to be performed and submitted to the NRC.	Yes	Appendix M, Section M.3
5.5 Reception Centers and Congregate Care Center		
a. A map of congregate care centers and reception centers should be provided.	Yes	Figure 10-1 and 10-2
b. If return trips are required, assumptions used to estimate return times for buses should be provided.	Yes	Section 8.5 discusses a multi-wave evacuation procedure. Figure 8-1
c. It should be clearly stated if it is assumed that passengers are left at the reception center and are taken by separate buses to the congregate care center.	Yes	Section 2.3 – Assumption 7h

Technical Reviewer _____ Date _____

Supervisory Review _____ Date _____