11. SURVEILLANCE OF EVACUATION OPERATIONS

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

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

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

Tow Vehicles

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

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

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

12. CONFIRMATION TIME

It is necessary to confirm that the evacuation process is effective in the sense that the public is complying with the order to evacuate. Although Chatham County, Harnett County, Lee County and Wake County may use their own procedures for confirmation, we suggest an alternative or complementary approach.

The procedure we suggest employs a stratified random sample and a telephone survey. The size of the sample is dependent on the expected number of households that do not comply with the order to evacuate. We believe it is reasonable to assume, for the purpose of estimating sample size that at least 80 percent of the population within the EPZ will comply with the order 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 2½ hours after the Advisory to Evacuate, which is when 90 percent of evacuees have completed their mobilization activities. At this time, virtually all evacuees will have departed on their respective trips and the local telephone system will be largely free of traffic.

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

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

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

Problem Definition

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

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

Given:

No. of households plus other facilities, N, within the EPZ (est.) = 24,000
Est. proportion, F, of households that have not evacuated = 0.20
Allowable error margin, e: 0.05
Confidence level, α: 0.95 (implies A = 1.96)

Applying Table 10 of cited reference,

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

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

Finite population correction:

$$n_F = \frac{nN}{n + N - 1} = 304$$

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 order to evacuate, then the required sample size, n_F = 214.

Est. Person Hours to complete 300 telephone calls

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

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

13. RECOMMENDATIONS

The following recommendations are offered:

1. The traffic management plan should be reviewed by state and county emergency planners with local and state law enforcement agencies (See Section 9 and Appendix G). Specifically…
    - The number and locations of Traffic Control Points (TCP) and Security Road Blocks (SRB) should be reviewed in detail.
    - The indicated resource requirements (personnel, traffic control devices) should be reconciled with current assets.
2. Intelligent Transportation Systems (ITS) such as Dynamic Message Signs (DMS), Highway Advisory Radio (HAR), Automated Traveler Information Systems (ATIS), etc. should be used to facilitate the evacuation process (See Section 9). The placement of additional signage should consider evacuation needs.
3. Counties should implement procedures whereby schools are contacted prior to dispatch of buses from the depots to obtain an accurate count of students needing transportation and the number of buses required (See Section 8).
4. Counties should work with the Department of Transportation to have equipment needed for traffic control duties mobilized in a timely manner should an evacuation be ordered (See Section 9).
5. Counties should establish strategic locations to position tow trucks in the event of a disabled vehicle during the evacuation process (See Section 11) and should encourage gas stations to remain open during the evacuation.
6. Counties should establish a system to confirm that the Order to Evacuate is being adhered to (see the approach suggested by KLD in Section 12). Given the expansive recreation area within the EPZ, one or more helicopters equipped with loudspeakers should fly over these areas to alert all transients of the need to immediately evacuate.
7. Examination of the ETE in Appendix J shows that the ETE for 100 percent of the population is significantly longer than for 95 percent of the population. Specifically, the additional time needed for the last 5 percent of the population to evacuate can be as much as 40 percent longer than the time needed to evacuate 95 percent of the population. This non-linearity reflects the fact that these relatively few stragglers require significantly more time to mobilize (i.e. prepare for the evacuation trip) than their neighbors. This leads to two recommendations:
    - The public outreach (information) program should emphasize the need for evacuees to minimize the time needed to prepare to evacuate (secure the home, assemble needed clothes, medicines, etc.).
    - The decision makers should reference Table J-1C which lists the time needed to evacuate 95 percent of the population, when preparing recommended protective actions.

APPENDIX A

Glossary of Traffic Engineering Terms

APPENDIX A: GLOSSARY OF TRAFFIC ENGINEERING TERMS

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

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

APPENDIX B

Traffic Assignment and Distribution Model

APPENDIX B: TRAFFIC ASSIGNMENT AND DISTRIBUTION MODEL

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

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

Overview of Integrated Assignment and Distribution Model

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

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

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

Specification of TRAD Model Inputs

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

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

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

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

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

The resolution of this problem is as follows:

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

This analysis network is comprised of three sub-networks:

1. The real highway sub-network, which consists of "Class I" Links and Nodes.

2. A sub-network of "Class II" Pseudo-Links which acts as an interface between the highway sub-network and the network augmentation.

3. The sub-network of "Class III" Pseudo-Links and Nodes which comprises the network augmentation described above.

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

Class I Links and Nodes

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

Class II Links

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

Class III Links and Nodes

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

Each Class of links provides a different function:

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

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

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

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

Calculation of Capacities and Impedances

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

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

Specification of the Objective Function

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

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

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

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

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

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

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

$a_1 = 0.8$ $b_1 = 5.0$

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

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

APPENDIX C

Traffic Simulation Model: PC-DYNEV

APPENDIX C: TRAFFIC SIMULATION MODEL: PC-DYNEV

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

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

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

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

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

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

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

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

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

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

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

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

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

GEOMETRICS

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

TRAFFIC VOLUMES

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

TRAFFIC CONTROL SPECIFICATIONS

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

DRIVER'S AND OPERATIONS CHARACTERISTICS

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

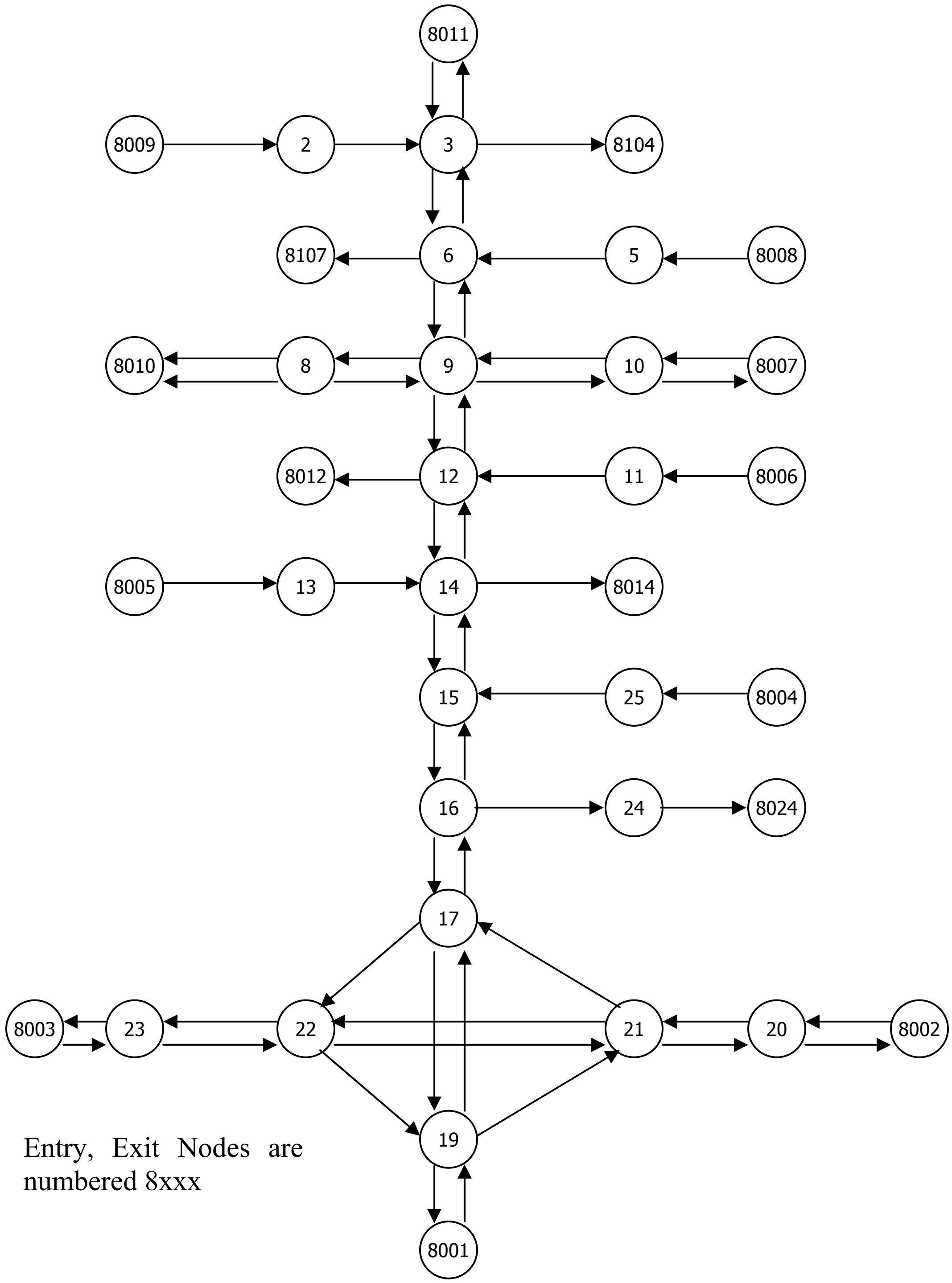

Figure C-1: Representative Analysis Network

APPENDIX D

Detailed Description of Study Procedure

APPENDIX D: DETAILED DESCRIPTION OF STUDY PROCEDURE

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

Step 1.
The first activity is to obtain data defining the spatial distribution and demographic characteristics of the population within the Emergency Planning Zone (EPZ). These data were obtained from U.S. Census files and from results of a telephone survey conducted within the EPZ. Employee population data were estimated by referencing state Journey-to- Work data provided by the U.S. Census. Transient population data were obtained from local sources of information and County Emergency Management Offices.

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

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

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

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

Step 6.
With this information at hand, the data were entered into the computer to create the input stream for the TRaffic Assignment and Distribution (TRAD) model. This model was designed to be compatible with the PC-DYNEV traffic simulation model used later in the project; the input stream required for one model is entirely compatible with the input stream

required by the other. Using a software system developed by KLD named UNITES, the data entry activity is performed interactively directly on the computer.

Step 7.

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

Step 8.

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

Step 9.

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

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

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

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

Step 10.

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

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

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

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

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

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

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

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

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

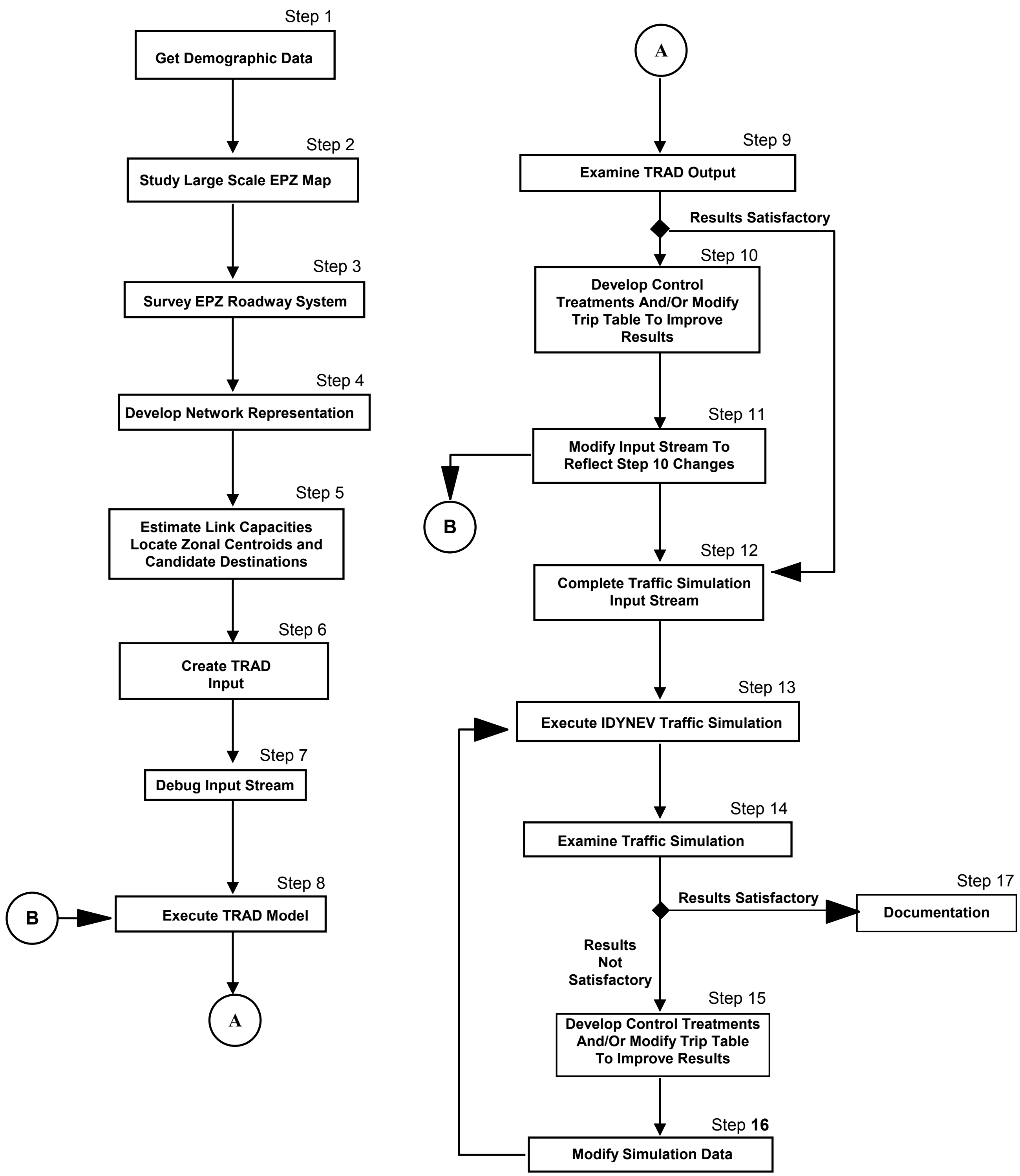

Figure D-1. Flow Diagram of Activities

APPENDIX E

Special Facility Data

APPENDIX E: SPECIAL FACILITY DATA

The following tables list population information, as of June 2007, for special facilities that are contained within the Harris Nuclear Plant EPZ. Special facilities are defined as schools, day care centers, hospitals and other medical care facilities, correctional institutions, and major employers. Transient population data is included in the tables for state parks, county parks, hotels and motels, and other recreational areas. Each table is grouped by county. The location of the facility is defined by its straight-line distance (miles) and direction (magnetic bearing) from the Harris Nuclear Plant.

Harris EPZ: Schools								
Sub - zone	Distance (miles)	Dire- ction	School Name	Street Address	Municipality	Phone	Enroll- ment	Staff
CHATHAM COUNTY								
M	6.9	W	Moncure Elementary School	Moncure School Rd	Moncure	(919) 542-3725	203	42
WAKE COUNTY								
E	8.3	NE	Apex Elementary School	700 Tingen Rd	Apex	(919) 387-2150	639	42
E	8.8	NE	Apex High School	1501 Laura Duncan Rd	Apex	(919) 387-2208	2215	115
E	10.1	NE	Apex Middle School	400 E Moore St	Apex	(919) 387-2181	1166	63
E	9.1	NE	Baucom Elementary School	400 Hunter St	Apex	(919) 387-2168	904	52
E	10.3	NE	Hope Montessori	6175 Old Jenks Rd	Apex	(919) 859-0008	44	4
E	9.3	NE	Lufkin Rd Middle School	1002 Lufkin Rd	Apex	(919) 387-4465	1066	65
E	7.8	NE	Olive Chapel Elementary School	1751 Olive Chapel Rd	Apex	(919) 387-4440	925	62
E	10.3	NE	Salem Elementary School	6116 Old Jenks Rd	Apex	(919) 363-2865	757	45
E	10.3	NE	Salem Middle School	6150 Old Jenks Rd	Apex	(919) 363-1870	656	87
E	7.7	NE	St. Mary Magdalene Catholic School	625 Magdala Pl	Apex	(919) 657-4800	510	45
F	7	E	Community Partners Charter High School	116 Quantam St	Holly Springs	(919) 567-9955	115	12
F	6	E	Holly Grove Elementary School	1451 Avent Ferry Rd	Holly Springs	(919) 858-3166	462	82
F	8	E	Holly Ridge Elementary School	900 Holly Springs Rd	Holly Springs	(919) 577-1300	714	38
F	8	E	Holly Ridge Middle School	950 Holly Springs Rd	Holly Springs	(919) 577-1335	1285	110
F	7.4	E	Holly Springs Elementary School	401 Holly Springs Rd	Holly Springs	(919) 557-2660	818	85
F	6	E	Holly Springs High School	5329 Cass Holt Rd	Holly Springs	(919) 463-8606	805	82
F	7.2	E	Southern Wake Montessori School	925 Avent Ferry Rd	Holly Springs	(919) 577-0081	100	N/A
F	9.6	E	The New School Montessori Center	5617 Sunset Lake Rd	Holly Springs	(919) 303-3636	117	13
G	9.2	E	Fuquay-Varina High School	201 Bengal Blvd	Fuquay-Varina	(919) 557-2511	1730	97
G	9.7	SE	Fuquay-Varina Middle School	109 N Ennis St	Fuquay-Varina	(919) 557-2727	989	51
G	8.8	SE	Lincoln Heights Elementary School	307 Bridge St	Fuquay-Varina	(919) 557-2587	630	50
						Total:	**16,850**	**1,242**

N/A= Data not available

Harris EPZ: Day Care Facilities (Page 1 of 2)								
Sub - zone	**Distance (miles)**	**Dir- ection**	**Name**	**Street Address**	**Municipality**	**Phone**	**Enroll- ment**	**Empl- oyees**
WAKE COUNTY								
E	9.9	NE	All About Kids	3901 Kildaire Farm Rd.	Apex	(919) 303-7767	143	30
E	8.8	NE	Apex Baptist Church Preschool	110 South Salem St.	Apex	(919) 362-8988	170	22
E	8.9	NE	Apex United Methodist Church Preschool	100 South Hughes St.	Apex	(919) 362-7807	124	19
E	9.5	NE	Earth's Angel's Day Care Home	2909 Earth Drive	Apex	(919) 362-5166	8	1
E	10.0	NE	Grace Church Preschool	3725 Kildaire Farm Rd.	Apex	(919) 362-9355	82	13
E	10.0	NE	Jennifer's Small Day Care Home	1213 Apache Lane	Apex	(919) 387-8348	8	1
E	9.9	NE	Judy's Home Care	1300 Laura Duncan Rd.	Apex	(919) 362-5191	5	1
E	7.9	NE	Karin-4-Kidz	201 Ridge Lake Rd.	Apex	(919) 387-4915	8	2
E	8.5	NE	Lewis Child Care	202 Baucom St.	Apex	(919) 552-0706	8	2
E	7.9	NE	Little Friends Home Day Care	110 Spring Dove Ln.	Apex	(919) 363-8817	8	1
E	10.2	NE	Lori's Family Day Care	2610 Haventree Ct.	Apex	(919) 387-1419	8	1
E	9.7	NE	Moravick Family Day Care	1814 Misty Hollow Ln.	Apex	(919) 367-7579	8	1
E	8.8	NE	Noah's Ark	110 South Salem St.	Apex	(919) 367-9898	100	15
E	7.8	NE	Our World Day Care	1216 Shackleton Rd.	Apex	(919) 303-0181	8	1
E	8.7	NE	Playcare	1422 Fairfax Woods Dr.	Apex	(919) 303-9315	5	1
E	9.2	NE	Southwest Wake YMCA Program Center	1660 Center St.	Apex	(919) 657-9622	200	50
E	7.6	NE	St. Mary Magdalene School	625 Magdala Pl.	Apex	(919) 657-4800	625	40
E	7.6	N	T.L.C Home Day Care	101 Checker Ct.	Apex	(919) 303-4680	2	1
E	8.1	ENE	Tender Loving Blessings	222 Hollyhock Ln.	Apex	(919) 363-2166	0	1
E	8.7	NE	The Growing Years	470 West Williams St.	Apex	(919) 387-8189	106	15
E	8.8	NE	Vickie's Day Care Home	410 East Chatham St.	Apex	(919) 362-7702	5	1
E	9.7	NE	Woodhaven Baptist Preschool	4000 Kildare Farm Rd.	Apex	(919) 362-3909	102	18

N/A= Data not available

Harris EPZ: Day Care Facilities (Page 2 of 2)								
Sub - zone	Distance (miles)	Dir- ection	Name	Street Address	Municipality	Phone	Enroll- ment	Empl- oyees
WAKE COUNTY								
F	7.0	E	Holly Springs Head Start	301 Stinson Ave.	Holly Springs	(919) 552-3717	N/A	N/A
F	7.5	NE	Holly Springs School for Early Education	101 Arbor Creek Dr.	Holly Springs	(919) 303-9009	110	21
F	7.5	ENE	Kiddie Academy of Holly Springs	150 Rosewood Centre Dr.	Holly Springs	(919) 367-0088	N/A	N/A
F	7.2	E	Kris' Home Sweet Home Day Care	420 Cayman Ave.	Holly Springs	(919) 552-4002	5	1
F	9.5	E	New School Montessori Center	5617 Sunset Lake Rd.	Holly Springs	(919) 303-3636	N/A	N/A
F	7.3	E	Sisters' Child Care Services	400 Earp St.	Holly Springs	(919) 552-9624	15	4
F	9.3	E	Sunrise United Methodist Church Preschool	5420 Sunset Lake Rd.	Holly Springs	(919) 303-3720	32	9
F	7.7	E	Suzy's Zoo	208 Crossfire Rd.	Holly Springs	(919) 523-6768	4	1
G	9.2	E	A Mother's Love	524 Dogwood Creek Place	Fuquay Varina	(919) 552-5448	5	1
G	9.1	E	Beth's Brightday Day Care	820 Hepplewhite Ct.	Fuquay Varina	(919) 557-6554	5	1
G	9.1	ESE	Child Care Network	350 West Jones St.	Fuquay Varina	(919) 557-1219	199	20
G	9.4	E	For Young Minds	523 N. Main St.	Fuquay Varina	(919) 552-8915	12	4
G	9.6	E	Fuquay-Varina Baptist Wee Care	3010 N. Woodrow St.	Fuquay Varina	(919) 552-9586	140	22
G	9.3	E	Gingerbread Littleversity	211 Railroad St.	Fuquay Varina	(919) 552-9525	99	15
G	8.9	ESE	Home Away from Home Child Care	901 Alderleaf Dr.	Fuquay Varina	(919) 557-1310	N/A	N/A
G	9.7	E	Jack and Jill Day Care	6225 Sunset Lake Rd.	Fuquay Varina	(919) 552-4325	N/A	N/A
G	9.5	ESE	Little Angels	334 S. Main St.	Fuquay Varina	(919) 552-0565	26	6
G	9.4	SE	Little Treasures Preschool	515 Angier Rd.	Fuquay Varina	(919) 557-3251	N/A	N/A
G	9.1	ESE	Sandra's Day Care Home	309 Seaton Dr.	Fuquay Varina	(919) 567-0973	N/A	N/A
G	9.0	SE	Shining Star Child Care Home	516 Nature Walk Rd.	Fuquay Varina	(919) 567-0738	2	1
G	8.3	E	South Wake Preschool and Academy	2275 N. Grassland Dr	Fuquay Varina	(919) 577-1144	N/A	N/A
G	10.2	ESE	Stewart's Academy	513 Creekway Dr.	Fuquay Varina	(919) 552-0257	N/A	N/A
G	8.9	E	Vanessa Bland's Small Day Care Home	829 Alderleaf Dr.	Fuquay Varina	(919) 552-0982	6	1

N/A= Data not available

Harris EPZ: Medical Facilities and Assisted Living Facilties									
ERPA	**Distance (miles)**	**Dir-ection**	**Name**	**Street Address**	**Municipality**	**Phone**	**Capacity**	**Employees (Max Shift)**	**Employees (Total)**
Wake County									
A	2.3	NE	Brown's Family Care Home	8416 James Rest Home Rd	New Hill	(919) 362-6686	6	2	5
A	2.3	NE	James Rest Home	8420 James Rest Home Rd	New Hill	(919) 362-8856	40	6	24
E	9.6	NE	Buck Jones Road Home	2420 Reliance Ave	Apex	(919) 854-1260	6	2	N/A
E	8.8	NE	Mason Street Home	306 N Mason St	Apex	(919) 387-1011	6	2	9
E	8.4	NE	Rex Rehab & Nursing Care	911 South Hughes St	Apex	(919) 363-6011	107	50	N/A
E	7.3	NE	Seagroves Family Home	1052 Irongate Dr	Apex	(919) 362-8556	6	2	3
E	8.7	NE	Spring Arbor of Apex	901 Spring Arbor Ct	Apex	(919) 303-9990	76	6	46
E	8.4	NE	Atwater Rest Home	312 Lynch St	Apex	(919) 362-6266	55	13	N/A
F	9.6	E	Adams Care Home	4825 Optimist Farm Rd	Apex	(919) 387-1600	5	2	N/A
F	10.4	E	Harrison Home	8421 Pierce Olive Rd	Apex	(919) 303-4411	2	1	3
F	7.2	E	Autumn Green Adult Care Home	312 Earp St	Holly Springs	(919) 552-4849	6	2	N/A
F	6.5	E	Avent Ferry House	904 Avent Ferry Rd	Holly Springs	(919) 557-6749	6	2	9
F	6.6	E	Country Lane Group Home	534 Country Ln	Holly Springs	(919) 552-5457	6	2	3
F	8.6	E	Herbert Reid Home	3733 Heritage Meadow Ln	Holly Springs	(919) 363-5311	3	2	N/A
F	6.9	E	Hickory Street Group Home	112 Hickory Avenue	Holly Springs	(919) 552-5407	6	3	12
F	4.7	E	Murchison Adult Family Living	533 Texanna Way	Holly Springs	(919) 557-6712	2	1	2
F	8.6	E	St. Mark's Manor	3735 Heritage Meadow Ln	Holly Springs	(919) 363-5311	9	4	7
F	6.5	E	Trotter's Bluff	912 Avent Ferry Rd	Holly Springs	(919) 557-6337	6	2	9
G	10.1	SE	VOCA Olive Home	717 Olive Street	Apex	(919) 387-1011	6	2	8
G	9.4	SE	Brighton Manor	415 Sunset Dr	Fuquay-Varina	(919) 552-5609	80	20	96
G	9.5	E	Evans-Walston Home	808 Hawks View Court	Fuquay-Varina	(919) 552-1312	3	1	1
G	9.8	SE	Fuquay-Varina Home for the Elderly	1012 S Main St	Fuquay-Varina	(919) 552-3671	60	2	2
G	9.5	SE	Kinton Sunset Ret. Cmty	301 Sunset Dr	Fuquay-Varina	(919) 552-6908	28	N/A	N/A
G	10.2	SE	VOCA Creekway	534 Creekway Dr	Fuquay-Varina	(919) 552-4359	6	3	7
G	9.4	SE	Wake Med Fuquay-Varina Outpatient and Skilled Nursing Facility	400 West Ransom St	Fuquay-Varina	(919) 350-4600	36	10	39
G	8.9	E	Windsor Point	1221 Broad St	Fuquay-Varina	(919) 552-4588	100	16	150
G	6.9	SE	Mims Family Care Home	6337 Mims Rd	Holly Springs	(919) 552-6455	6	1	2
Lee County									
J	10.5	SW	Sanford Health and Rehabilitation	2702 Farrell Rd	Sanford	(919) 776-9602	97	25	72
						Total:	**775**	**184**	**509**

N/A= Data not available

Harris EPZ: Correctional Facilities								
Sub - zone	Distance (miles)	Dir- ection	Name	Street Address	Municipality	Phone	Cap- acity	Current Census
There are no correctional facilties within the Harris EPZ								

Harris EPZ: Major Employers (Page 1 of 2)								
Sub - zone	Distance (miles)	Dir- ection	Facility Name	Street Address	Municipality	Phone	Total Employees	% Non-EPZ
LEE COUNTY								
I	8.6	SW	Sanford Waste Water Treatment Facility	7441 Poplar Springs Church Rd	Sanford	(919) 775-1491	13	92%
CHATHAM COUNTY								
K	5.1	W	ATC Panels	985 Corinth Rd	Moncure	(919) 542-2128	160	75%
K	6	WSW	Cape Fear Power Plant	500 P.E. Rd (SR 1916)	Moncure	(919) 774-5245	61	75%
K	5.5	SW	Dynea USA, Inc	790 Corinth Rd	Moncure	(919) 542-2526	65	80%
K	6.1	SW	General Shale Brick Company	300 Brick Plant Rd	Moncure	(919) 777-6899	210	75%
K	5.5	W	Honeywell	338 Pea Ridge Rd	Moncure	(919) 542-2000	200	N/A
K	5.6	SW	Moncure Plywood	306 Corinth Rd	Moncure	(919) 542-2311	200	N/A
K	5.6	SW	Sierra Pine	985 Corinth rd	Moncure	(919) 542-2128	100	N/A
K	2.9	W	Triangle Brick Company	294 King Rd	Moncure	(919) 624-9176	140	50%
K	5.5	WSW	Performance Fibers	338 Pea Ridge Rd	New Hill	(919) 542-2200	450	80%
WAKE COUNTY								
A	2.1	NE	Carolina Power & Light Company	3932 New Hill Holleman Rd	New Hill	(919) 362-3261	150	N/A
A	0.0	----	Harris Nuclear Plant	5421 Shearon Harris Rd	New Hill	(919) 363-0560	450	N/A
E	8.2	NE	Apex Public Works	105 Upchurch St	Apex	(919) 362-8166	50	N/A
E	9.2	NE	Apex Town Hall	73 Hunter St	Apex	(919) 249-3303	85	N/A
E	8.9	NNE	Borders Bookstore	1541 Beaver Creek Commons Dr	Apex	(919) 363-8446	60	33%
E	8.9	NNE	Carrabbas Restaurant	1201 Hadden Hall Dr	Apex	(919) 387-6336	85	90%
E	8.9	NNE	Chili's Restaurant	1120 Beaver Creek Commons Dr	Apex	(919) 387-7701	65	40%
E	8.9	NNE	Circuit City	1591 Beaver Creek Commons Dr	Apex	(919) 367-8476	60	25%
E	8.7	NE	Cooper Tools Lufkin Division	1000 Lufkin Rd	Apex	(919) 387-0099	450	N/A
E	8.9	NNE	Dick's Sporting Goods	1531 Beaver Creek Commons Dr	Apex	(919) 367-0194	50	25%
E	9.6	NE	Educare of NC	2420 Reliance Ave	Apex	(919) 387-1011	54	N/A
E	7.6	NE	EMC Corp	5800 Technology DR	Apex	(919) 362-4800	375	N/A

N/A= Data not available

Harris EPZ: Major Employers (Page 2 of 2)								
Sub - zone	**Distance (miles)**	**Dir- ection**	**Facility Name**	**Street Address**	**Municipality**	**Phone**	**Total Employees**	**% Non- EPZ**
WAKE COUNTY (Continued)								
E	7.6	NE	EMC Corp	5800 Technology DR	Apex	(919) 362-4800	375	N/A
E	9.4	NE	Food Lion	620 Laura Duncan Rd	Apex	(919) 362-3904	40	N/A
E	8.8	NE	Harris Teeter	750 West Williams St	Apex	(919) 362-3782	95	75%
E	8.6	NE	Henry Wurst Inc	810 Lufkin Rd	Apex	(919) 362-8831	120	N/A
E	9.3	NNE	Home Depot	1100 Vision Drive	Apex	(919) 387-6554	130	N/A
E	8.9	NNE	Homegoods	1571 Beaver Creek Commons Dr	Apex	(919) 363-3233	25	10%
E	8.9	NNE	Longhorn Steakhouse	1411 Beaver Creek Commons Dr	Apex	(919) 303-4889	50	5%
E	8.9	NNE	Lowes	1101 Beaver Creek Commons Dr	Apex	(919) 303-4200	148	70%
E	9.3	NNE	Lowes Foods	1405 W Williams St	Apex	(919) 363-7224	80	N/A
E	8.7	NE	Lowes Foods	5400 Apex Parkway	Apex	(919) 363-5376	84	65%
E	7.8	NE	Morton Metalcraft Co.	2080 E Williams St	Apex	(919) 363-1630	100	N/A
E	8.9	NNE	Red Robin Restaurant	1431 Beaver Creek Commons Dr	Apex	(919) 363-8599	120	N/A
E	9.1	NNE	Southern States Nissan	1405 Vision Drive	Apex	(919) 589-0029	50	50%
E	8.9	NNE	Target	1201 Beaver Creek Commons Dr	Apex	(919) 372-1405	80	65%
E	9.4	NE	Tipper Tie	2000 Lufkin Rd	Apex	(919) 362-8811	150	N/A
E	8.9	NNE	TJ Maxx	1571 Beaver Creek Commons Dr	Apex	(919) 363-3233	36	N/A
E	6.1	E	Warp Technologies Inc	601 Irving Pkwy	Holly Springs	(919) 552-2311	50	N/A
F	7	ENE	Food Lion	517 North Main St	Holly Springs	(919) 557-1175	75	50%
F	7.0	E	Holly Springs Town Hall	128 S Main St	Holly Springs	(919) 552-6221	80	N/A
F	7.5	E	Lowes Foods	550 Holly Springs Rd	Holly Springs	(919) 577-6971	102	80%
G	9.4	SE	Fidelity Bank	100 S Main St	Fuquay Varina	(919) 552-2242	90	N/A
G	8.5	E	Guilford Mills, Inc	200 Dickens Rd	Fuquay Varina	(919) 552-5667	150	N/A
G	8.4	E	Inserv	121 Dickens Rd	Fuquay Varina	(919) 552-6355	195	N/A
G	8.5	E	Berk-Tech Inc Electro-Optics	100 Technology Park Ln	Fuquay-Varina	(919) 552-2061	55	N/A
L	7.3	N	Builders First Source	12816 US Hwy 64 W	Apex	(919) 363-4956	225	N/A
						Total:	**6,238**	

N/A= Data not available

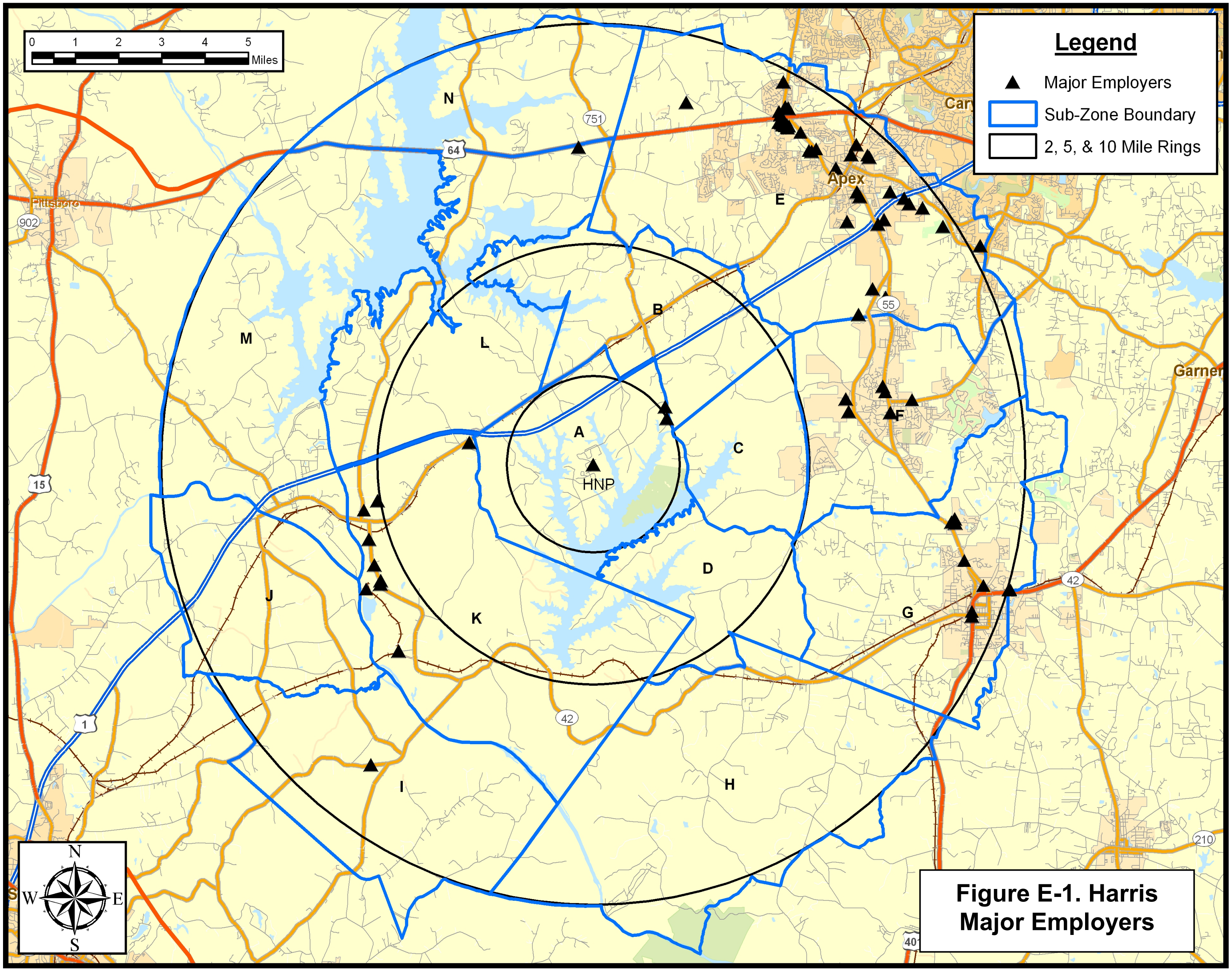

Figure E-1. Harris Major Employers

Harris EPZ: Recreational Areas								
Sub - zone	Distance (miles)	Dir- ection	Facility Name	Street Address	Municipality	Phone	Per- sons	Total Vehicles
CHATHAM COUNTY								
L	6.3	NW	New Hope Overlook Recreation Area (Jordan Lake State Park)	Hidden Field Ln	NC State Parks	(919) 362-0586	624	400
L	6.8	NW	Poplar Point Recreation Area (Jordan Lake State Park)	Poplar Point Rd	NC State Parks	(919) 362-0586	3,474	1,238
L	7.2	NW	Ebenezer Church Recreation Area (Jordan Lake State Park)	SR 1008	NC State Parks	(919) 362-0586	1,326	575
M	7.3	NW	Vista Point Recreation Area (Jordan Lake State Park)	N Pea Ridge Rd	NC State Parks	(919) 362-0586	2,292	860
M	7.3	W	Poe's Ridge Recreation Area (Jordan Lake State Park)	Moncure School Rd	NC State Parks	(919) 362-0586	256	164
M	7.7	NW	Seaforth Recreation Area (Jordan Lake State Park)	U.S. Highway 64	NC State Parks	(919) 362-0586	1,638	700
M	9.5	WNW	Robeson Recreation Area (Jordan Lake State Park)	Hanks Chapel Rd	NC State Parks	(919) 362-0586	218	140
N	7.9	N	Crosswinds Campground & Marina (Jordan Lake State Park)	Campground Rd	NC State Parks	(919) 362-0586	1,272	520
N	8	NNW	(Jordan Lake State Park)	U.S. Highway 64	NC State Parks	(919) 362-0586	406	220
N	8.9	NW	Parkers Creek Recreation Area (Jordan Lake State Park)	Big Woods Rd	NC State Parks	(919) 362-0586	1,500	500
HARNETT COUNTY								
H	11.4	SSE	Group Wilderness Camp	3009 Raven Rock Road	Lillington	(910) 893-4888	100	N/A
H	11.4	SSE	Canoe Camping	3009 Raven Rock Road	Lillington	(910) 893-4888	24	N/A
WAKE COUNTY								
A	2	E	Harris Lake County Park	2112 County Park Dr.	NC State Parks	(919) 387-4342	312	100
K	4.3	SSW	Harris Lake - NC Hwy 42 Boat Access Point	NC Hwy 42	NC State Parks	(919) 387-4342	468	300
D	2.1	SSE	Harris Lake - SR 1130 Boat Access Point	SR 1130	NC State Parks	(919) 387-4342	468	300
						Total:	**14,378**	**6,017**

N/A= Data not available

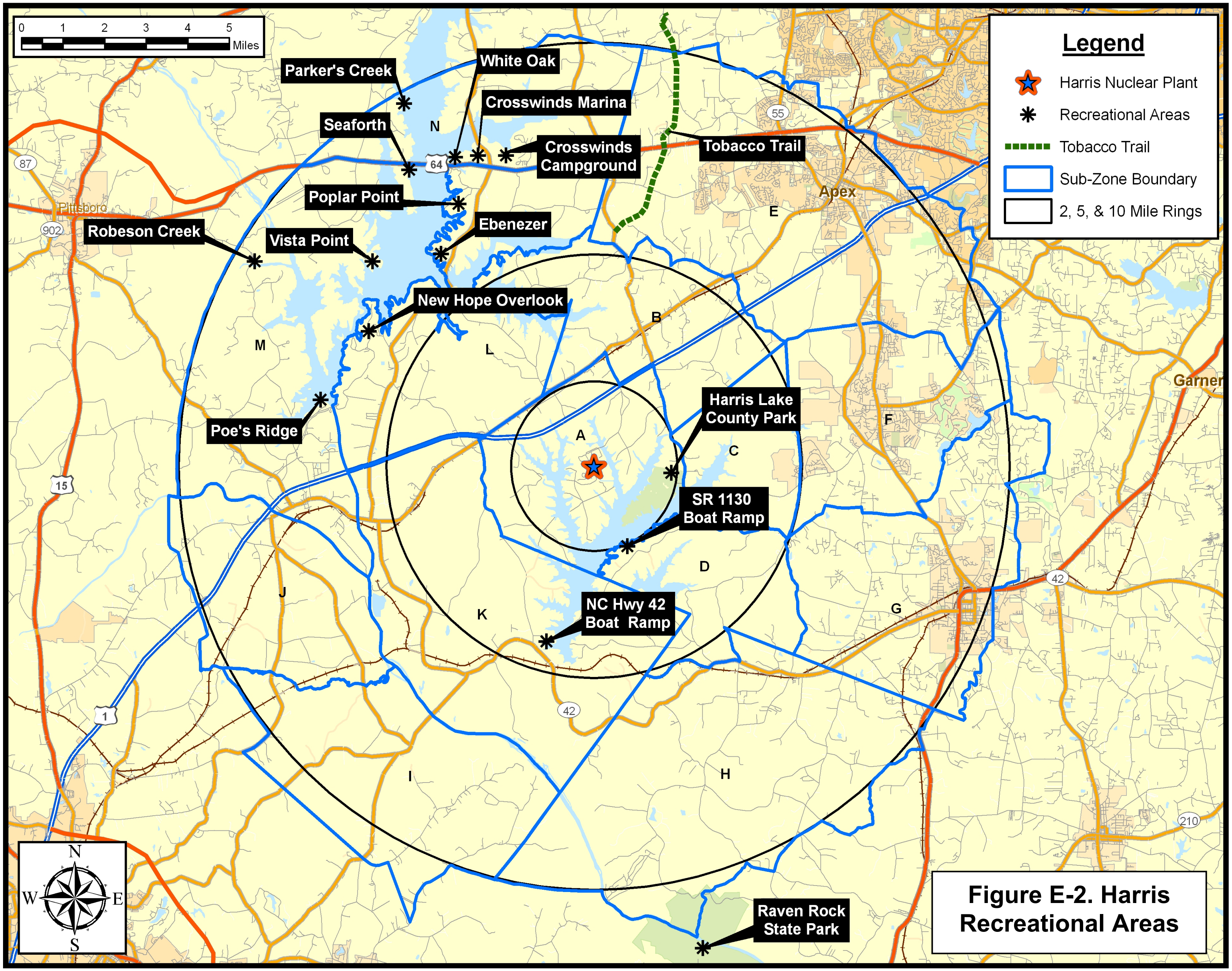

Figure E-2. Harris Recreational Areas

Harris EPZ: Lodging								
Sub - zone	**Distance (miles)**	**Dir- ection**	**Facility Name**	**Street Address**	**Municipality**	**Phone**	**Per- sons**	**Veh- icles**
WAKE COUNTY								
E	8.5	NE	Comfort Inn Apex	1411 E Williams St	Apex	(919) 387-4600	136	68
E	8.5	NE	Days Inn	1400 E Williams St	Apex	(919) 362-8621	184	92
E	8.6	NE	Holiday Inn Express	1006 Marco Dr	Apex	(919) 387-3636	128	64
E	8.9	NE	B & B Country Garden Inn	1041 Kelly Rd	Apex	(919) 303-8033	6	3
G	10.2	E	Carambola Inn	7155 Sunset Lake Rd	Fuquay Varina	(919) 552-3091	8	4
G	9.0	ESE	Fuquay Mineral Spring Inn & Garden	333 S Main St	Fuquay Varina	(919) 552-3782	10	5
						Total:	**472**	**236**

N/A= Data not available

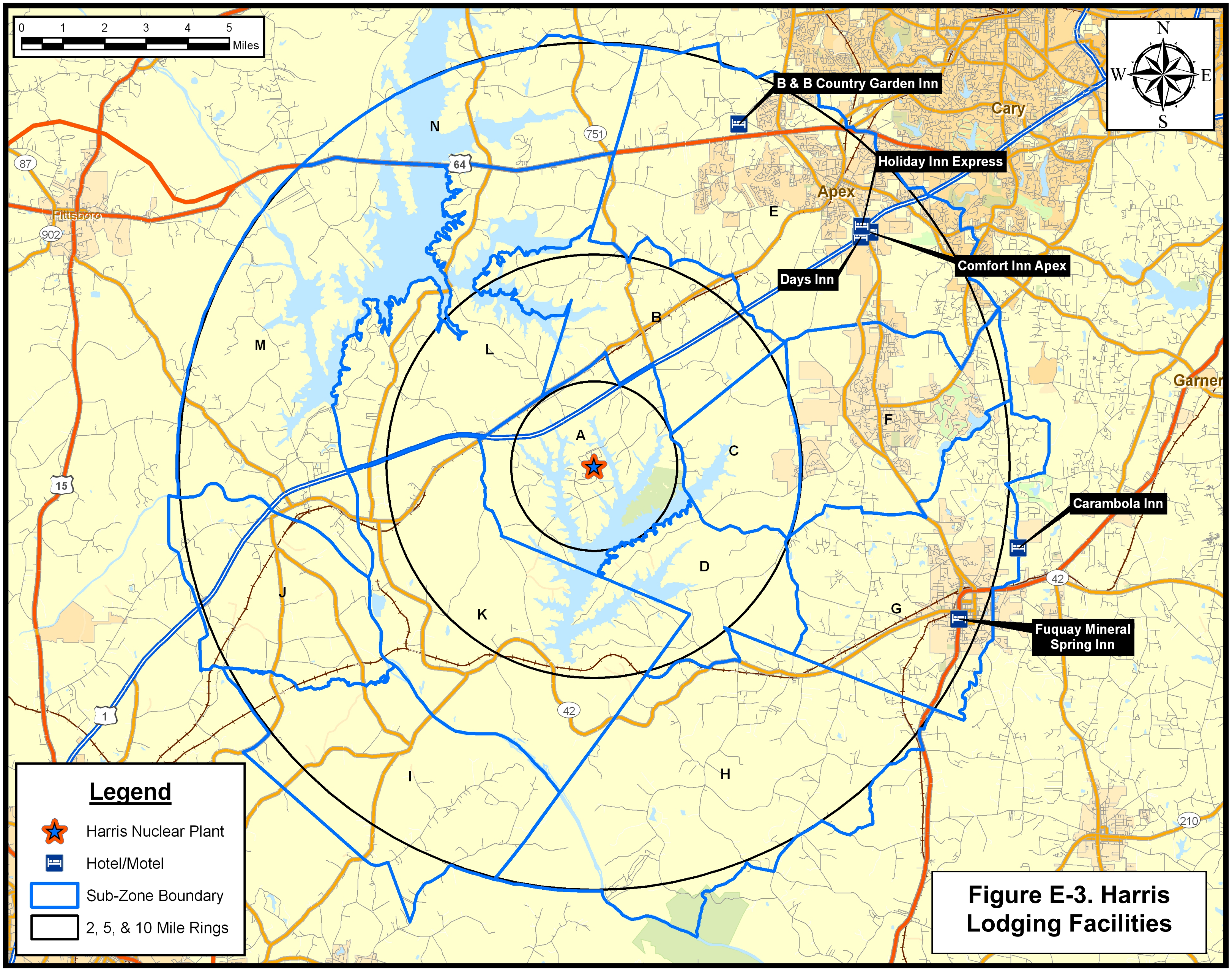

Figure E-3. Harris Lodging Facilities