

APPENDIX F
Telephone Survey

F. TELEPHONE SURVEY

F.1 Introduction

The development of evacuation time estimates for the TMI 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 ...?”)

Attachment A presents the final survey instrument used in this study. A sample size of 383 **completed** survey forms yields results with a sampling error of $\pm 5\%$ at the 95% confidence level. The sample must be drawn from the EPZ population.

The preliminary determination of whether a household was located inside the EPZ was based on “land-line” telephone listings with street addresses. Telephone surveys were then conducted using those numbers, selected in random order, until the target level of surveys was completed, or the entire calling list was exhausted. Rejections or households outside the EPZ were discarded. Numbers with “no answer” were re-cycled for up to ten attempts in different time windows.

F.2 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.2.1 Household Demographic Results

Household Size

Figure F-1 presents the distribution of household size within the EPZ. The average household contains 2.42 people.

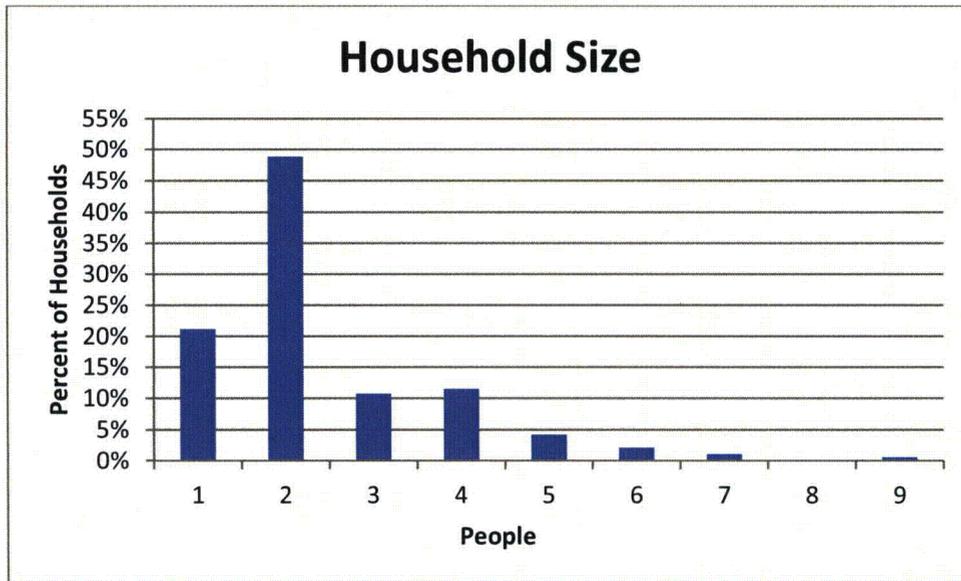


Figure F-1. Household Size in the EPZ

Automobile Ownership

The average number of automobiles available per household in the EPZ is 1.98. Approximately 3.4% of households do not have access to a vehicle.

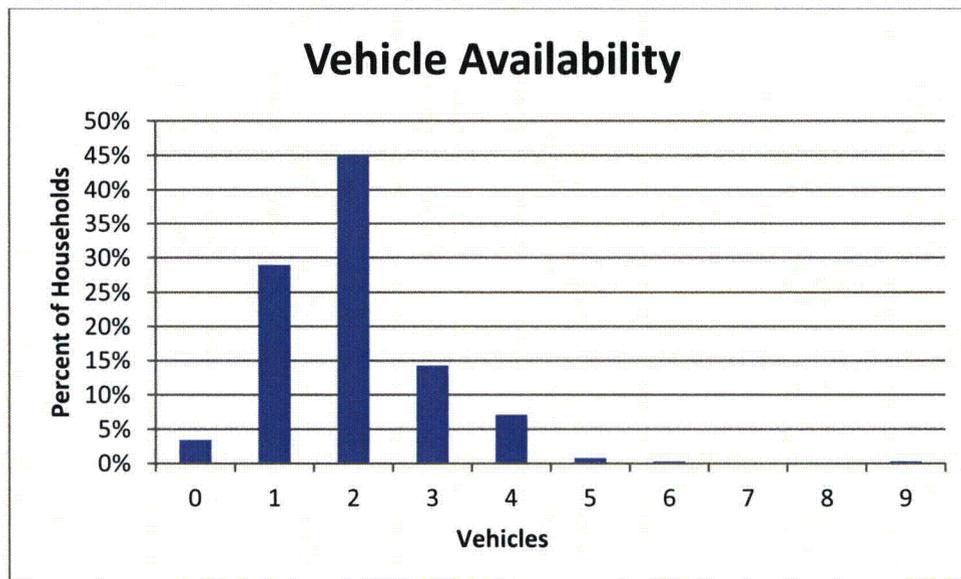


Figure F-2. Household Vehicle Availability

Commuters

Figure F-3 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 0.95 commuters in each household in the EPZ, and 59% of households have at least one commuter.

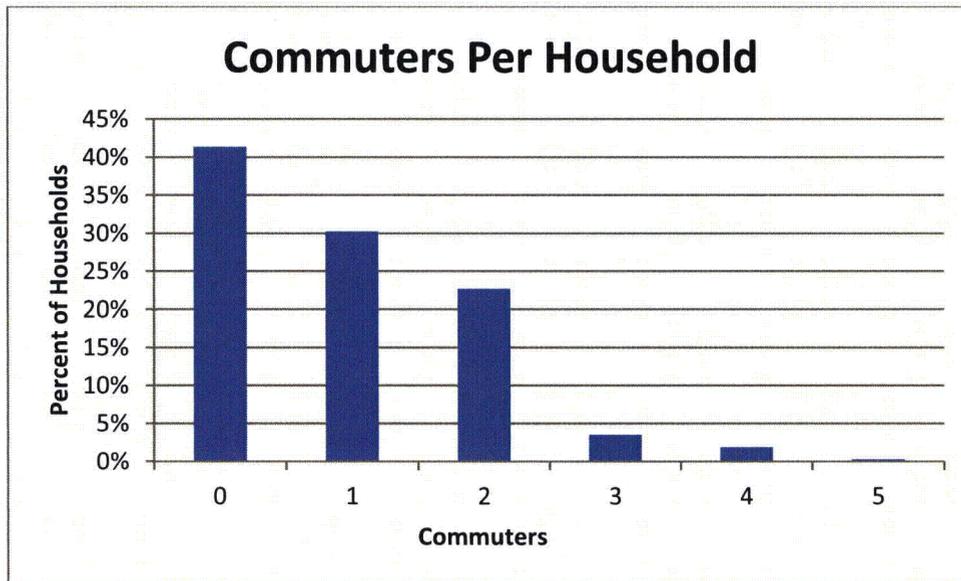


Figure F-3. Commuters in Households in the EPZ

F.2.2 Evacuation Response

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

“How many vehicles would your household take if an evacuation were ordered when all household members were at home??” The response is shown in Figure F-4. On average, evacuating households would use 1.26 vehicles.

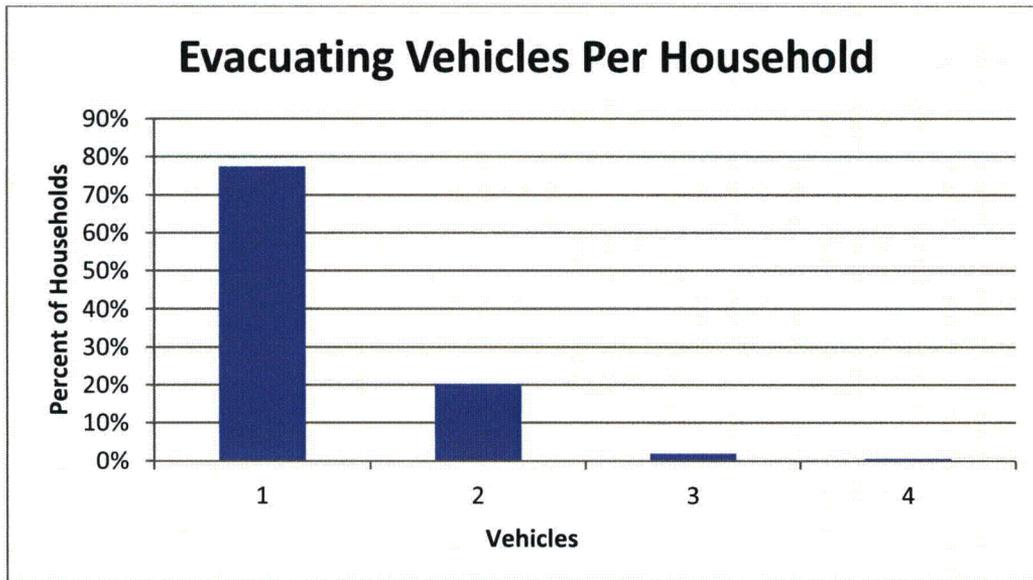


Figure F-4. Number of Vehicles Used for Evacuation

“If an evacuation notice were given while [the primary commuter] was at work, do you think they would most likely...” Of the survey participants who responded, 25 percent indicated they would evacuate from work, 68 percent said they would return home first and then evacuate, and 7 percent indicated that they would stay outside the evacuation zone where they work.

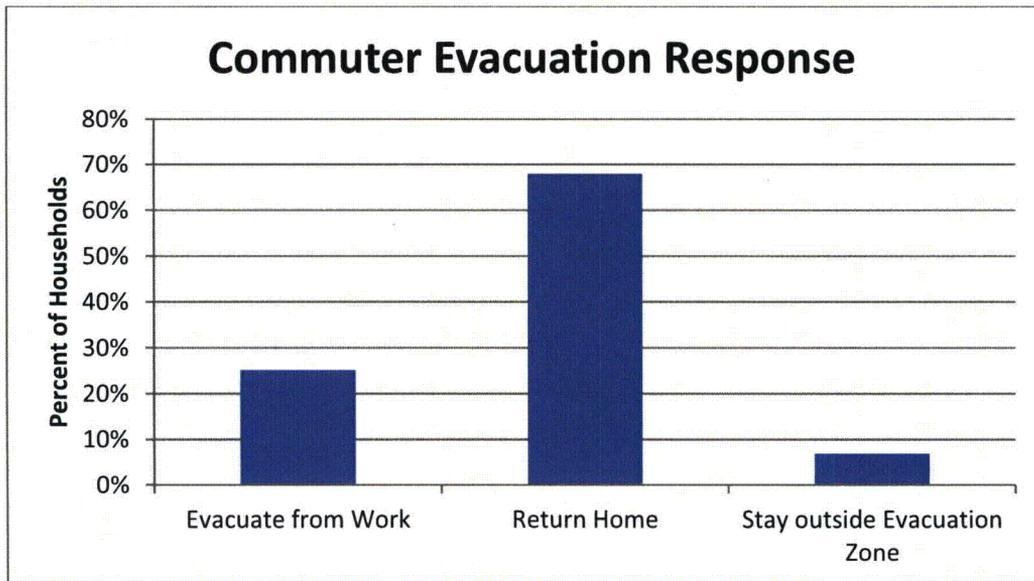


Figure F-5. Commuter Evacuation Response

F.2.3 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 do you think it would take [the primary commuter] to get prepared and actually leave work?” Figure F-6 presents the cumulative distribution; in all cases, the activity is completed within 75 minutes. Eighty-eight percent can leave within 30 minutes.



Figure F-6. Time Required to Prepare to Leave Work

“About how long does it take [the primary commuter] to get from work to home?” Figure F-7 presents the work to home travel time for the EPZ. Approximately 85 percent of commuters can arrive home within about 30 minutes of leaving work; all within 75 minutes.

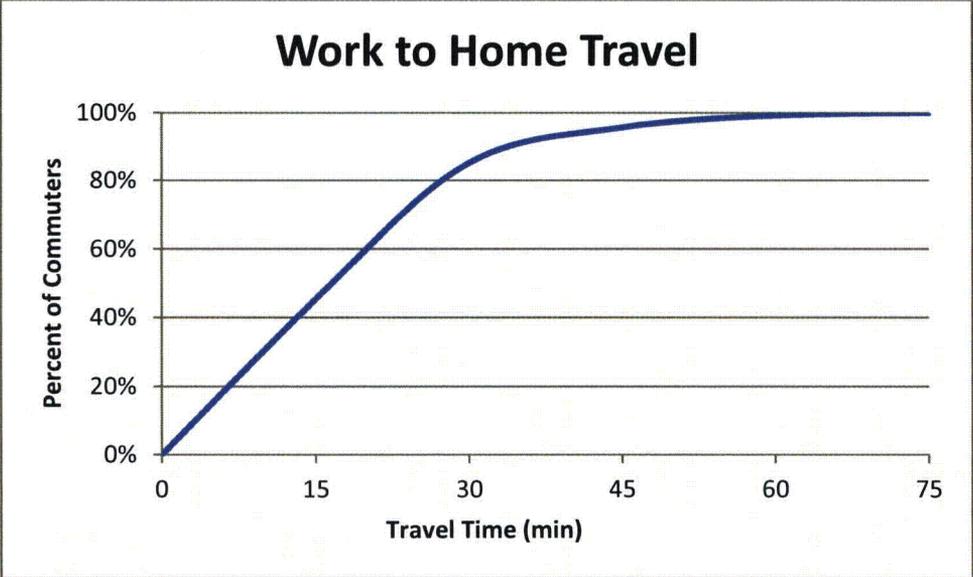


Figure F-7. Work to Home Travel Time

“If an evacuation were ordered when all household members were at home (for example, at night or on a weekend), approximately how long would it take your household to prepare to depart? Please assume that you are advised to plan to be away from your home for 3 days.”

Figure F-8 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. About 64 percent of households can be ready to leave home within 40 minutes; the remaining households require up to an additional 80 minutes.

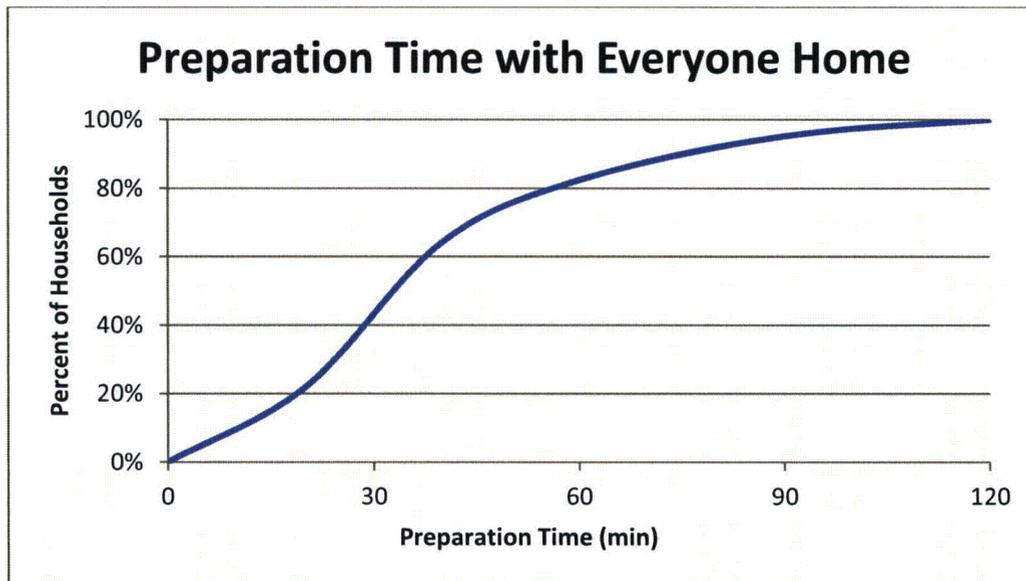


Figure F-8. Time to Prepare Home for Evacuation

The survey conducted in support of this study did not ask residents how long it would take them to remove snow from their driveway if there were snow on the ground when an evacuation was ordered. As discussed in Section 5.3, the response to the snow removal question in a survey conducted in 2008 in support of ETE development for the Susquehanna Steam Electric Station (SSES) is adapted for this study. SSES is also in the Commonwealth of Pennsylvania, only 71 miles north-northwest of TMI. It is assumed that snowfall and snow removal times are similar in both EPZs.

“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-9 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 60 minutes. The last driveway is cleared two hours and 15

minutes after the start of this activity. Forty percent of respondents answered that they would need less than 15 minutes to render the driveway passable (the first data point plotted is at 15 minutes). This group includes those who would not clear the snow at all but would drive through the snow on the driveway to access the roadway and begin their evacuation trip.

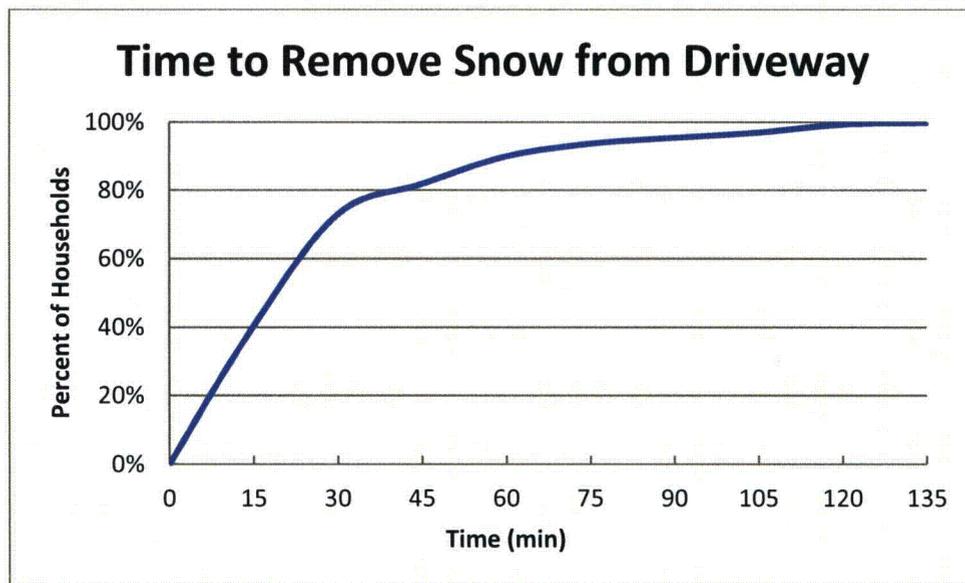


Figure F-9. Time to Clear Driveway of 6"-8" of Snow

F.3 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

Exelon Survey
Final v6 - August 23, 2011

INTRODUCTION

Hello, my name is _____ and I am calling from MDC Research, a public opinion firm. We are conducting a brief survey to gather information from households in your area about emergency response planning, and we'd like to include your opinions. This survey is being conducted on behalf of the (insert facility name) Nuclear Facility, and will take approximately 5 minutes to complete. We are not trying to sell you anything. The information gathered from this survey will help local agencies more effectively provide community assistance should an emergency situation arise.

Can I please speak with an adult member of the household?

SCREENER

S1. What is the zip code of your primary residence? This is the home where you live the majority of the time. **DO NOT READ ZIP CODE LIST**

List of appropriate zip codes will be displayed here

99999 Location outside the EPZ – **THANK & TERMINATE**

S2. Which of the following categories best describes your age?

11 Under 18 yrs of age – **ASK FOR REFERRAL or THANK & TERMINATE**

12 18 to 24

13 25 to 34

14 35 to 44

15 45 to 54

16 55 to 64

17 65 to 74

18 75 or older

98 (DO NOT READ) Refused

QUESTIONNAIRE

Q1 How many people currently reside in your household?

Record: _____ # of residents

98 (DO NOT READ) Refused – **THANK & TERMINATE**

Q2 How many motor vehicles are normally based at your home?

Record: _____ # of vehicles

997 None - **SKIP TO Q14**

998 (DO NOT READ) Refused

Q3 How many members of your household are over the age of 16?

Record: _____ # of residents

998 (DO NOT READ) Refused

Q4 How many members of your household are licensed drivers?

Record: _____ # of drivers

998 (DO NOT READ) Refused

Q5 How many of the adults in your household work outside the home?

Record Skip to Q6A

997 None – Continue to Q5A

998 (DO NOT READ) Refused

If refused, explain; The nature of this project is to estimate traffic volumes and flow in the event of an emergency evacuation, so this data is necessary in order for us to continue with the survey.

If still refused - THANK & TERMINATE

Q5A (ONLY ASK IF Q5=997) Which of the following best describes the non-working adults in your household? MULTIPLE MENTION – IP NOTE: No more mentions than Q3 mentions.

11 Currently unemployed/actively looking for work

12 Retired

13 On Disability or leave of absence

14 Student/continuing education

15 Homemaker

99 Other – please specify

SKIP TO Q11

Repeat the following Q6A-F sequence for each working adult cited in Q5

For each of the working adults you just referenced, I'd like to ask a few questions related to what their likely actions would be in the case of an emergency evacuation. I understand that I will be asking you to speculate on what other members of the household may do in this situation, but your best guesses are just fine for our purposes.

Q6A Who is the first working adult in the household that you are thinking about? What is their relationship to you?

1 Self

2 Spouse or significant other

3 Parent of child

4 Other relative or in-law

5 Roommate

6 Boarder

7 Other

Q6B Which of the following best describes this person's usual work schedule?

- 1 Monday – Friday, 8:00am to 5:00pm
- 2 Swing Shift
- 3 Graveyard
- 4 Evenings and weekends
- 5 Rotating shifts
- 6 Other or irregular schedule
- 7 **(DO NOT READ)** Don't know

Q6C Does this person generally use a personal vehicle to commute back and forth to work?

- 1 Yes
- 2 No
- 7 **(DO NOT READ)** Don't know

Q6D If an evacuation notice were given while this person was at work, do you think they would most likely...

- 1 Evacuate directly from work
- 2 Come home first and then evacuate, or
- 3 Stay outside the evacuation zone where they work **Skip to Q7**
- 7 **(DO NOT READ)** Don't know

Q6E How long do you think it would take this person to get prepared and actually leave work?

(Read list if necessary)

- 1 Less than 15 minutes
 - 2 15 to 30 minutes
 - 3 30 to 45 minutes
 - 4 45 to 60 minutes
 - 5 More than 60 minutes
 - 7 **(DO NOT READ)** Don't know
- If response at 6D is 1, skip from here to Q7

Q6F About how long does it take this household member to get from work to home?

(Read list if necessary)

- 1 Less than 15 minutes
- 2 15 to 30 minutes
- 3 30 to 45 minutes
- 4 45 to 60 minutes
- 5 More than 60 minutes

7 **(DO NOT READ)** Don't know

Q7A-F Repeat Q6 sequence for worker #2

Q8A-F Repeat Q6 sequence for worker #3

Q9A-F Repeat Q6 sequence for worker #4

Q10 And once everyone who is coming home from work has arrived, how long would it take to prepare and depart from home, taking into consideration whether or not someone else is usually home who may be starting these preparation while they are travelling?

- 1 Less than 15 minutes
- 2 15 to 30 minutes
- 3 30 to 45 minutes
- 4 45 to 60 minutes
- 5 More than 60 minutes
- 7 (DO NOT READ) Don't know

Q11 Are any of the licensed drivers in your household restricted to daytime driving only?

- 1 Yes
- 2 No
- 9 (DO NOT READ) Refused

Q12 If an evacuation were ordered when all household members were at home (for example, at night or on a weekend), approximately how long would it take your household to prepare to depart? Please assume that you are advised to plan to be away from your home for 3 days. Would you say that it would take... READ LIST

- 1 Less than 20 minutes to depart
- 2 20 to 40 minutes to depart
- 3 40 to 60 minutes to depart
- 4 60 to 90 minutes to depart; or
- 5 More than 90 minutes to depart

Q13 How many vehicles would your household take if an evacuation were ordered when all household members were at home?

Record: _____ # of vehicles
998 (DO NOT READ) Refused

Q14 Are any members of your household seasonal residents? And by seasonal we mean any people who do not reside in your home the majority of the year.

- 1 Yes
- 2 No - SKIP TO Q15
- 9 (DO NOT READ) Refused

Q14A (ASK IF Q14=1) How many of your <insert Q1 response> household members are seasonal?

Record: _____ # of seasonal household members
998 (DO NOT READ) Refused

Q14B (ASK IF Q14=1) What seasons do they live in another location away from your home?
READ LIST – Multiple Mention

- 1 Spring
- 2 Summer
- 3 Fall

4 Winter

Q15 Would any member of your household require a specialized vehicle, such as a wheelchair, van or ambulance, to evacuate from your home in case of an emergency?

1 Yes

2 No

9 **(DO NOT READ)** Refused

This is all the questions we have for you today/tonight. Thank you for participating in this survey. Your responses will help us to make an accurate prediction of traffic conditions during an emergency situation. If you have any questions about this survey, please feel free to contact <insert contact name, job title, and phone number/email>.

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 county and by the Pennsylvania Emergency Management Agency.

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 TCP, the control type is indicated as "Traffic Control Point" in Table K-2.

The intersection of US 22 and SR-2015, shown in Figure G-1, has been identified as a suggested additional TCP as part of this study. Hershey experiences prolonged congestion due to the large transient population at Hershey Park. Many evacuees from the park and surrounding area use northbound roads such as SR-39, SR-743, and SR-2015 to gain access to US 22 and I-81. SR-39 and SR-743 intersect US 22 at actuated traffic signals; SR-2015 intersects US 22 at a stop sign. As discussed in Section 9, positioning a traffic control officer at this intersection will hasten the evacuation of vehicles evacuating along SR-2015 northbound. Preliminary simulations indicated that implementing this TCP reduced ETE by up to one hour.

As also discussed in Section 9, the Dauphin County traffic management plan currently has TCPs along Paxton Street in Harrisburg at the following locations: SR 230/Cameron Street, 13th Street, 17th Street, and 18th Street. In all instances, northbound traffic flow is facilitated, moving evacuating vehicles away from the EPZ. Depending on manpower and equipment availability, it is recommended that TCPs be added at the intersections with the same roads along both Market Street and Derry Street. The City of Harrisburg is densely populated, and even though only a small portion of the city is within the EPZ, these roads will service both evacuating vehicles from the EPZ and those that voluntarily evacuate from the Shadow Region. Discouraging southbound travel at these additional TCPs would complement those TCPs that are already part of the traffic management plan. Implementing these TCPs does not have a pronounced impact on ETE as each of these intersections is already controlled by an actuated traffic signal). These recommendations are only suggested for consideration by Exelon and Dauphin County to limit the volume of traffic arriving at Paxton Street southbound.

G.2 Roving Patrols

The county and state emergency plans identify roving patrol routes within the EPZ. These routes would be driven by a police officer to observe traffic conditions. The police officer may elect to stop at an intersection along the route and control traffic if warranted. Additionally, any traffic problems (e.g., traffic accident or stalled vehicle) observed could be reported to dispatch and a tow truck could be dispatched for assistance.

G.3 Access Control Points

It is assumed that ACPs will be established within 2 hours of the advisory to evacuate to discourage through travelers from using major through routes which traverse the EPZ. As discussed in Section 3.6, external traffic was considered on the major routes which traverse the study area – I-81, I-76, I-83, and SR-283 – in this analysis. The generation of the external trips ceases at 2 hours after the advisory to evacuate in the simulation due to the ACPs.

Figure G-2 provides an overview of the TCPs, ACPs and roving patrols within the study area. Figure G-3 through Figure G-7 maps the TCPs, ACPs and roving patrols identified in the county and state emergency plans for those risk counties within the EPZ. Figure G-8 through Figure G-10 map the TCPs identified in neighboring support counties to facilitate traffic flow at reception centers.

The TCPs and ACPs identified in the county and state plans are concentrated along major evacuation routes and along roadways giving access to the EPZ. These TCPs and ACPs would be manned during evacuation by traffic guides who would direct evacuees in the proper direction away from the plant and facilitate the flow of traffic through the intersections.

Detailed descriptions of each of the TCPs and ACPs and the actions to be taken by traffic guides at these intersections are provided in the county and state plans. These actions were modeled explicitly in the DYNEV II system. For additional information, refer to the county and state plans.

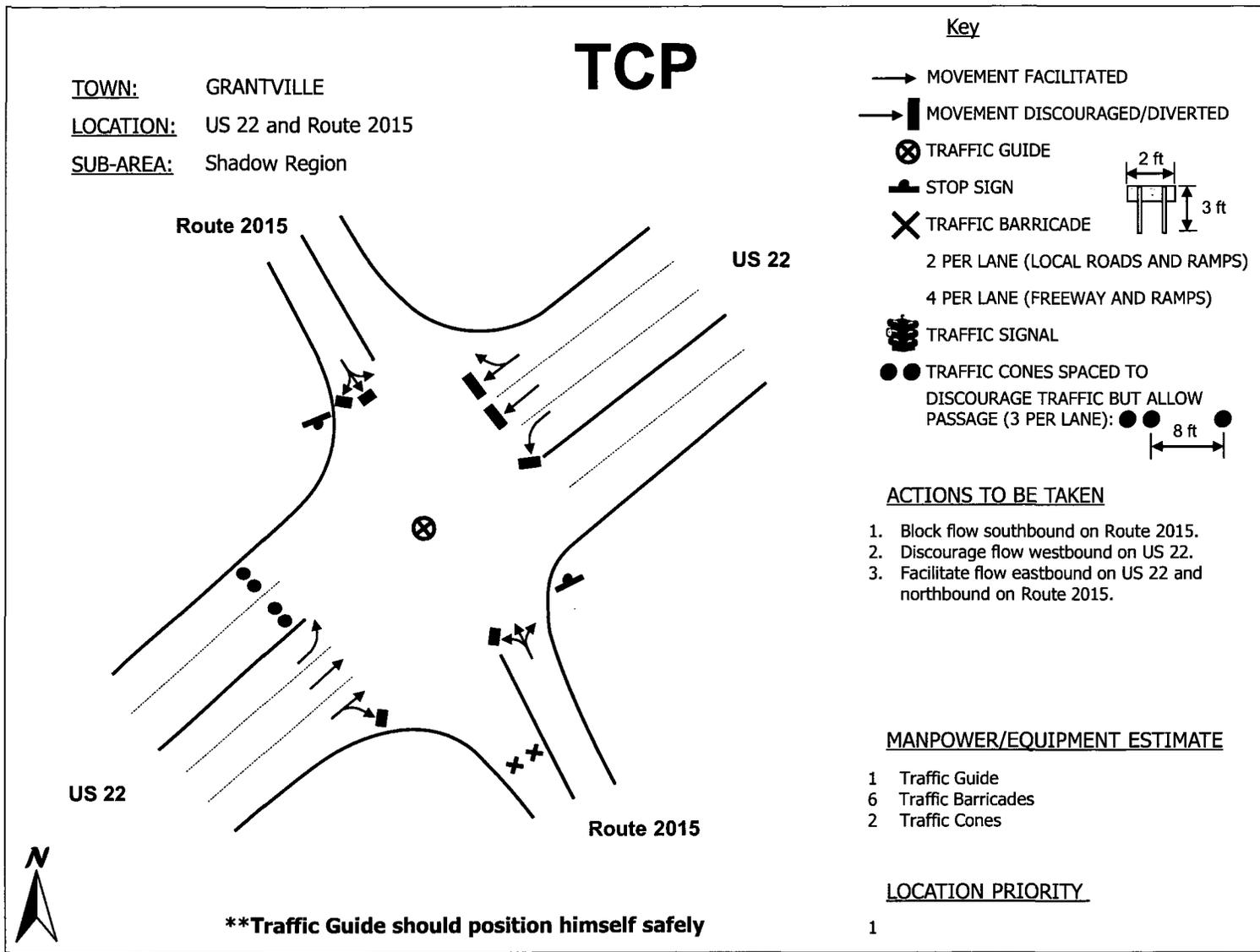


Figure G-1. Recommended Traffic Control Point

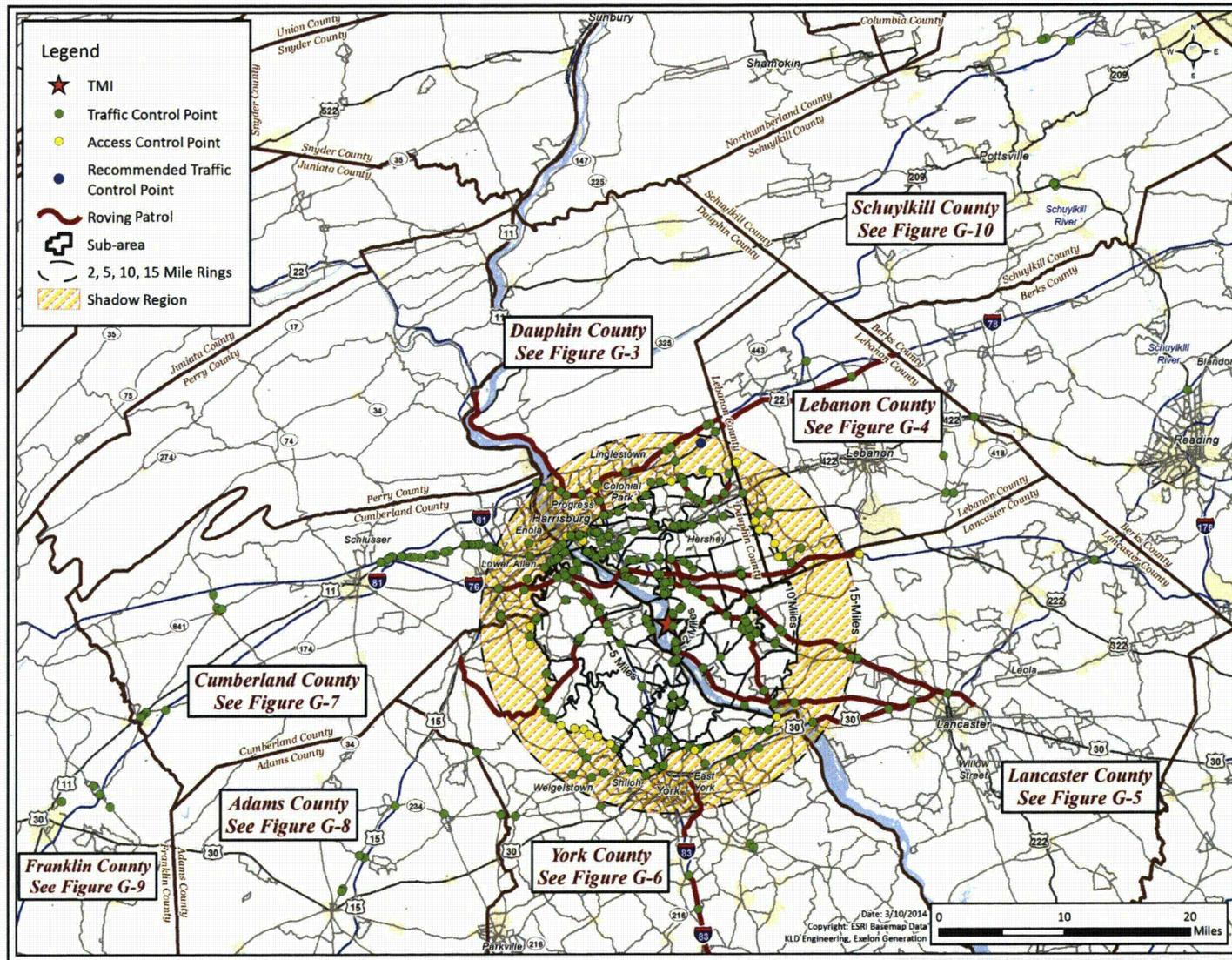


Figure G-2. Traffic and Access Control Points and Roving Patrols for Three Mile Island

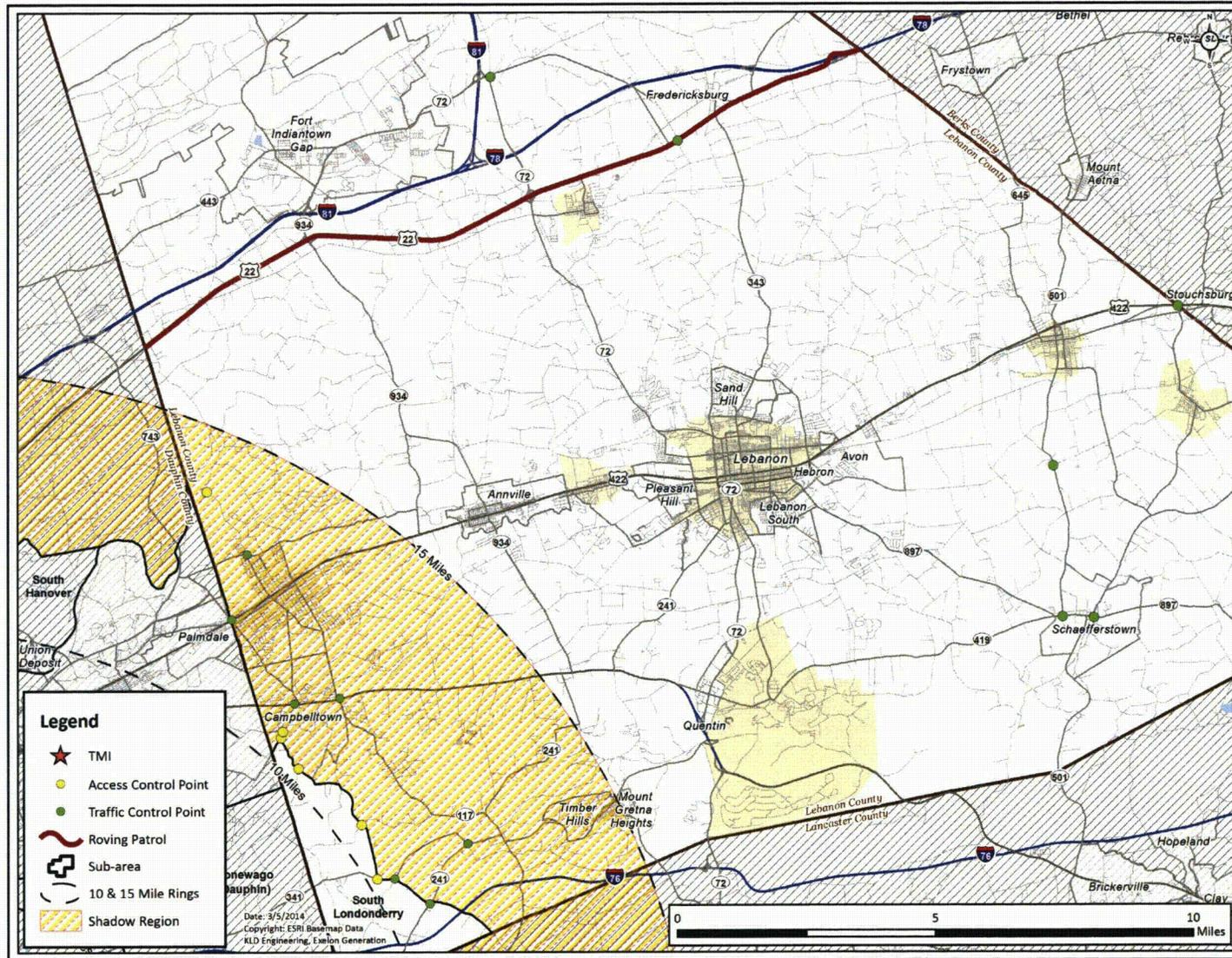


Figure G-4. Traffic and Access Control Points and Roving Patrols - Lebanon County

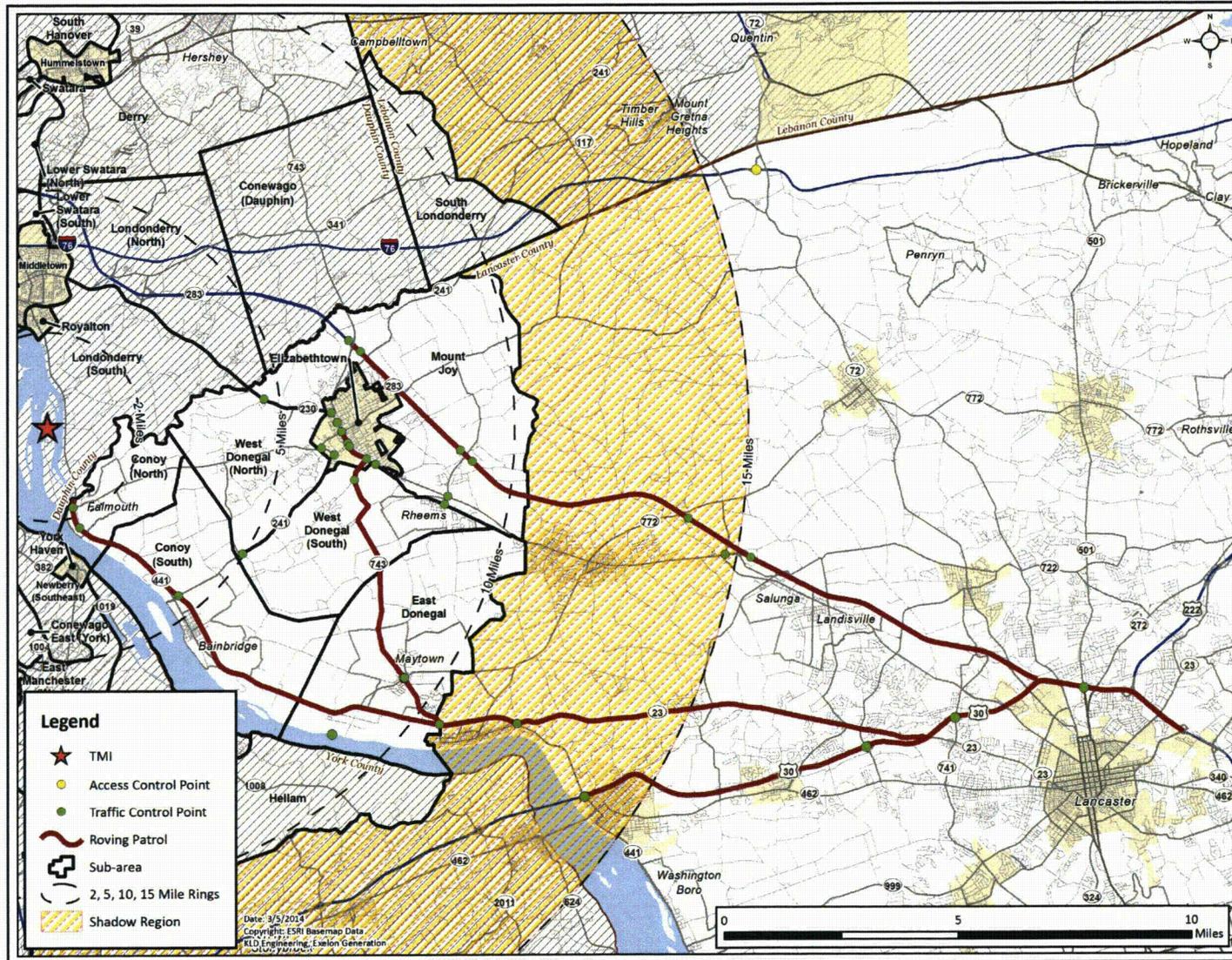


Figure G-5. Traffic and Access Control Points and Roving Patrols – Lancaster County

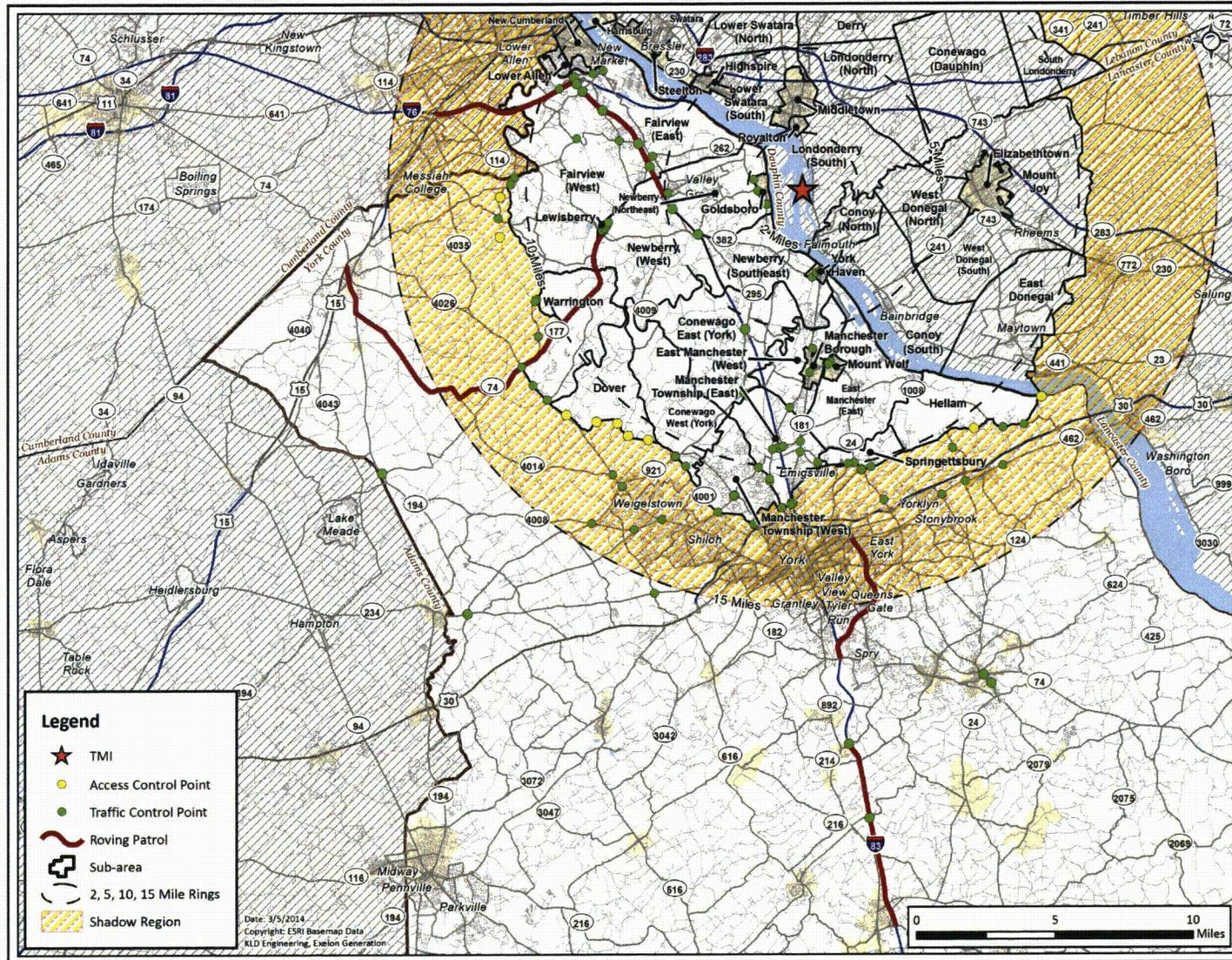


Figure G-6. Traffic and Access Control Points and Roving Patrols - York County

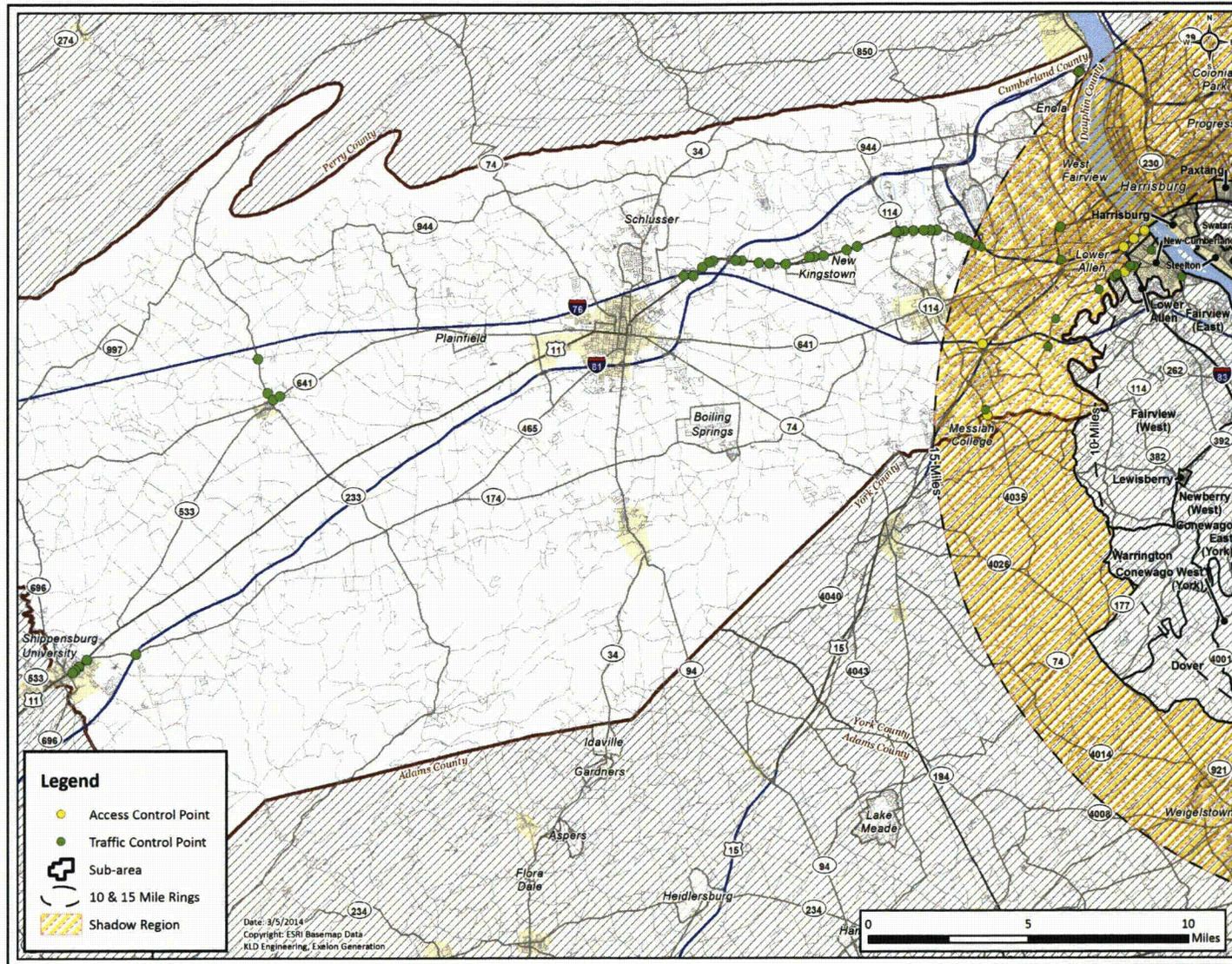


Figure G-7. Traffic and Access Control Points – Cumberland County

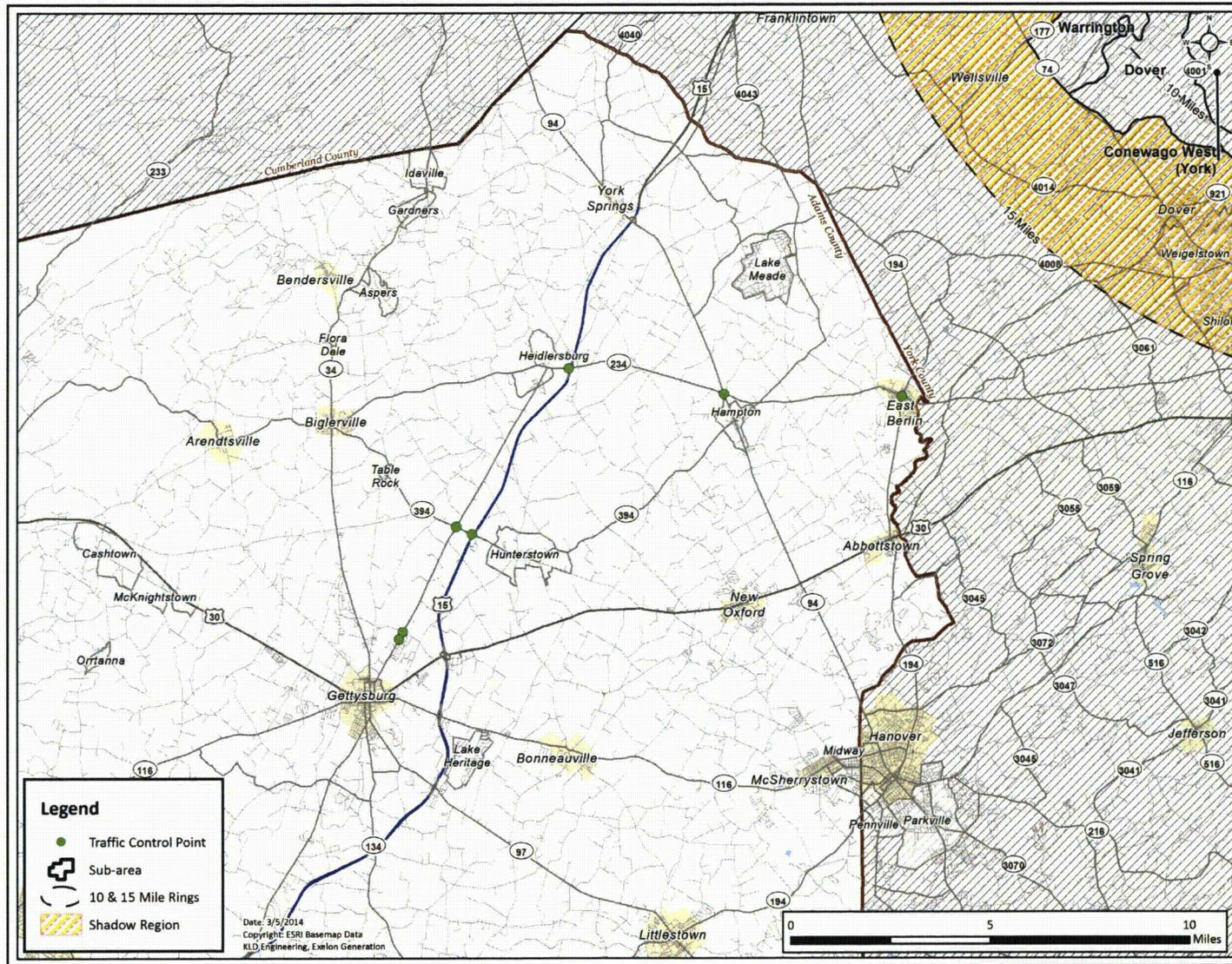


Figure G-8. Traffic Control Points - Adams County

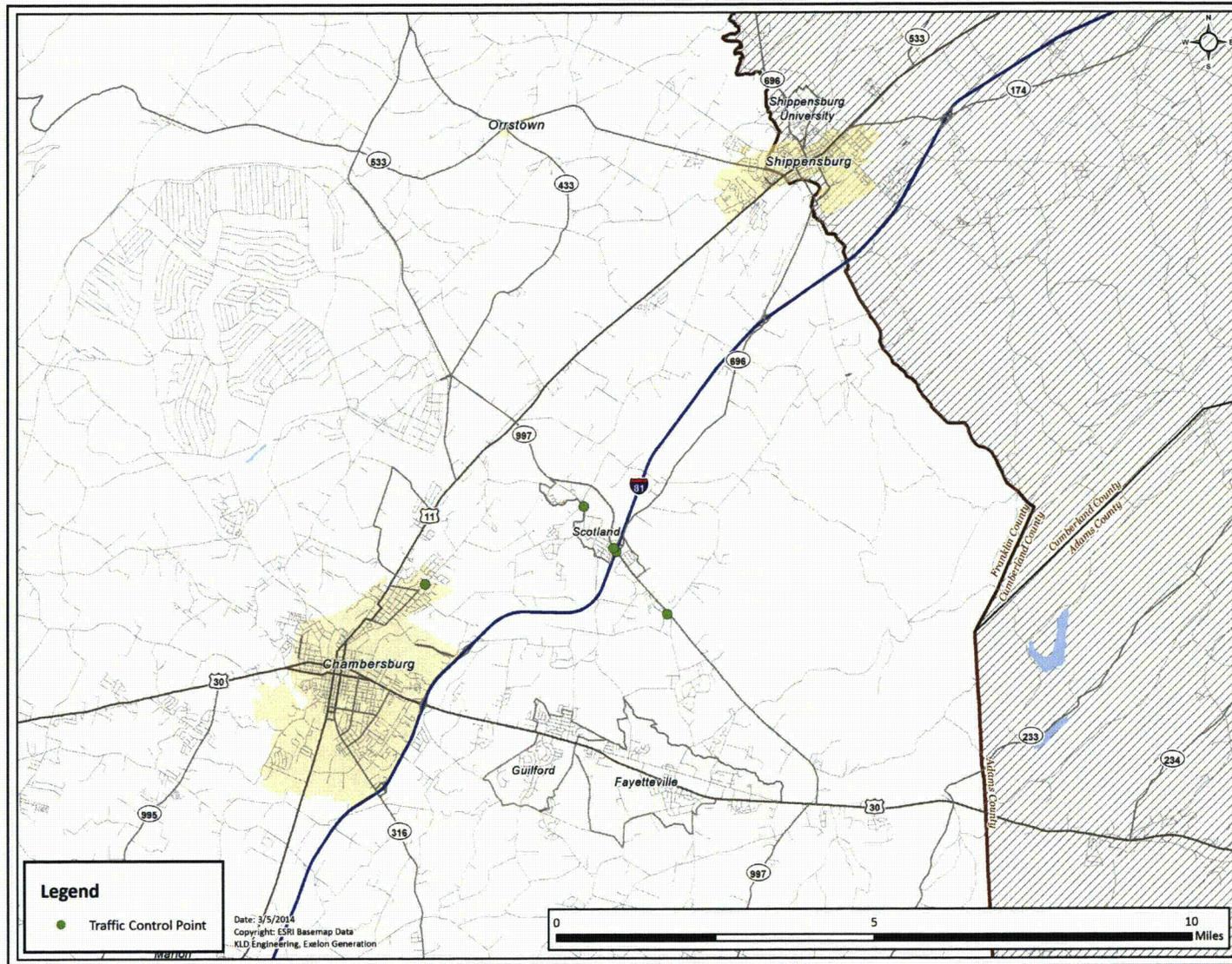


Figure G-9. Traffic Control Points - Franklin County

