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50-485

January 14, 1981

Office of Nuclear Reactor Regulation  
ATTN: Mr. Darrell G. Eisenhut, Director  
Division of Licensing  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Dear Mr. Eisenhut:

In response to your letter of December 9, 1980, we wish to submit the enclosed upgrade of our evacuation time estimates.

This material will be incorporated into the county plans which were submitted December 30, 1980.

It is a result of recalculation of the estimates submitted January 31, 1980 using the revised guidelines of NUREG-0654/FEMA-REP-1, Revision 1.

I believe this fulfills the requirements of 10 CFR 50.54 as noted in your letter.

Very truly yours,

  
J. E. Maier

Enc.

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FREEDOM OF INFORMATION ACT

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## APPENDIX K

### EVACUATION TIME ESTIMATES

#### Introduction

This appendix, Evacuation Time Estimates, has been prepared as part of the evacuation plan for Monroe County. (Because information required for the time estimates is included in other sections of the overall evacuation plan, cross referencing has been employed.)\* The evacuation time estimates are based on a conservative scenario during working hours with children in school. These estimates assume that inner and outer sectors are evacuated simultaneously. For a map of that portion of Monroe County within the plume exposure pathway emergency planning zone (EPZ), refer to Figure A-1 in Annex A of the plan.

The source of population information (Annex A) used in these estimates is preliminary 1980 census data. The number of automobiles used is equal to the number of households. School children are carried by school buses from the schools and are treated as part of the general population.\*\* Roadway capacities at level of service D were either supplied by the New York State Department of Transportation or computed on the basis of county and state highway sufficiency studies. Road capacity computations were done in accordance with principles and techniques described in the Highway Capacity Manual, 1965, Special Report 87, Highway Research Board by the National Research Council of the National Academy of Sciences. Computation techniques were discussed with and approved by officials of the New York Office of Disaster Preparedness, Nuclear Civil Protection Planning Section.

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\*A previous time estimate report NUS-3521, January 1980, was submitted in response to a generic NRC letter (November 29, 1979) before evacuation plans were written.

\*\*In a rural-suburban area such as this where most children ride buses to school, school bus transport would not constitute special problems, according to interviews with local school officials.



The methodology for computing capacities is discussed in detail in the methodology section of this appendix.

### Demand

The Ginna 10-mile EPZ in Monroe County is a rural-suburban setting with a negligible transient population (two motels) and only one nursing home. Special populations and facilities are described in detail in Annex F of the evacuation plan.

Table F-1 is a list of each facility and its population. (Figure F-1 shows their locations.) The population and number of automobiles by Emergency Response Planning Area (ERPA), census tract, and enumeration district, is given in Table A-1 and Figure A-2. (The population by sectors is shown in Appendix J of the overall plan, but as mentioned previously these estimates are made on the basis of ERPAs.)

In an area such as this, which is rural and suburban, the number of households without automobiles in 1980 is probably nil.\* Even so, the plan provides for transportation dependents to be served during an evacuation by the Rochester Regional Transit Service, Inc. The carrying capabilities of this agency are shown in detail in Table F-3 and the evacuation time for transportation dependents is assumed to be the same as for the general population.\*\*

### Traffic Capacity

The complete network of primary evacuation routes is shown in Annex H, which lists and describes the primary routes for each ERPA and includes a map of these routes from the ERPA in which

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\*Specific preliminary 1980 census data on vehicles per household were not available.

\*\*All buses of the Rochester Regional Transit Service, Inc. are radio equipped, and the superintendent of transportation estimates on-duty buses could complete their routes and be in Webster Village within 30 minutes as an example of response time.

they originate to the assigned congregate care center (Figure H-1).

Traffic control points (i.e. potential bottlenecks) and access control points (i.e. police roadblocks regulating entry to the EPZ) have been designated with local officials to ensure orderly and expedient egress.\* The access control points and traffic control points are shown in Figure C-2 and C-3, respectively.

Care was taken to avoid heavy reliance on the high capacity interstate (Route 104) to minimize limitations on traffic flow because of on-ramp or access capacities. Moreover, Route 104 (Evacuation Routes B and G), crosses the entire Monroe County portion of the EPZ. Thus the access points for evacuees assigned to this route are spaced along the entire length of the Monroe County EPZ. The greatest demand on access will occur from vehicles at the Xerox plant and police will monitor that access.

The roadway characteristics for the primary evacuation routes are given in Table K-1.

#### Evacuation Times

Table K-2 is a summary table providing total evacuation time estimates as well as estimates for the time components of the evacuation process: notification, capacity times, and confirmation. Whereas the preliminary evacuation time estimates (NUS-3521) focused on the evacuation of the population by radial sectors, this estimate is keyed to the evacuation of the population by ERPAs, in accordance with the evacuation plan.

Table K-2 also shows evacuation times for fair and foul weather by ERPA. In some cases, an ERPA has more than one evacuation route and the appropriate number of automobiles is shown for

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\*Additional traffic control points will be assigned by local officials for the Xerox plant and Webster Village to ensure that local traffic uses the routes assigned.



TABLE K-1  
ROADWAY CHARACTERISTICS

<u>Route</u>	<u>Limiting Segment</u> <sup>a</sup>	<u>No. Lanes</u> <sup>b</sup>	<u>Type</u> <sup>c</sup>	<u>Limiting Capacity</u>
A	Monroe-Wayne County line to Route 250	2	R	640
B	Webster Village	4	F	2,190
C	Penfield Town line to Route 404	2	R	659
D	Same as Route C	2	R	659
E	Penfield-Webster town line to State Road	2	R	603
F	Route 286 juncture	2	R	780
G	Five Mile Line Road area	2	R	2,610
H	From 10-mile limit to Penfield Town line	2	R	650

<sup>a</sup>Approximate descriptions based on checkpoints noted in Monroe County Highway Sufficiency Study, 1978

<sup>b</sup>Total number of through lanes in both directions at most limiting segment.

<sup>c</sup>R = Rural highway; F = Freeway

TABLE K-2  
SUMMARY EVACUATION TIMES

ERPA	Route	Population	Vehicles	Foul Weather Times (hr-min)				Fair Weather Times (hr-min)			
				Notification & Preparation	Capacity	Confirmation	Total	Notification & Preparation	Capacity	Confirmation	Total
I	A	8,381	2,960	2-40	5-48	12-00	20-28	2-40	4-36	6-00	13-16
II Xerox	B	1,280	1,280	2-40	2-18	12-00	16-58	2-40	1-54	6-00	10-34
Other	C	2,351	820	2-40	2-06	12-00	16-46	2-40	1-42	6-00	10-22
III Other	D	1,102	285	2-40	2-06	12-00	16-46	2-40	1-42	6-00	10-22
Webster Village	E	4,992	2,050	2-40	4-24	12-00	19-04	2-40	3-24	6-00	12-04
IV	F	3,961	1,355	2-40	2-12	12-00	16-52	2-40	1-42	6-00	10-22
V	G	6,301	1,990	2-40	1-36	12-00	16-16	2-40	1-18	6-00	9-58
VI	H	5,086	2,131	2-40	4-06	12-00	18-46	2-40	3-18	6-00	11-58



different areas within the same ERPA. This breakdown was achieved by matching the number of automobiles (households) in the appropriate enumeration districts with the route that residents in those enumeration districts would use.

### Methodology

The notification and confirmation times are based on local officials' estimates for entire EPZ sectors. For instance, the notification and confirmation time estimates for all ERPAs of Monroe County were originally applied to the entire 5 to 10 mile SW sector, with Ginna station as the center point. Therefore, as applied here to each ERPA they are highly conservative.

The Notification time includes a preparation time of 20 minutes. This preparation time is the theoretical elapsed time between notification and initial vehicle movement used in our previous time estimates NUS-3521 submitted to the NRC January 1980. Limiting road capacities that were not available from the New York State Department of Transportation were computed. The Highway Capacity Manual provides the methodology. Table 10.7 of the Manual gives maximum service volumes under ideal conditions for cars travelling in both directions on a two-lane, two-way, rural highway.

At Level of Service E the base capacity for a two-way, two-lane rural highway is 2000 v/h. To convert to Level of Service D, this base capacity is multiplied by 0.58, which was obtained from Table 10.7. This factor corresponds to an average highway speed of 40 miles per hour with no restriction to passing sight distance at Level of Service D. A factor of 80 percent is applied to yield the outbound flow of traffic. The following is the basic formula applied to compute Level of Service D, Base capacity:

$$LOS_D \text{ Base Capacity} = 2000 \times 0.58 \times 0.8 = 928$$



To modify this base capacity to reflect the limiting road width and shoulder width of the particular evacuation route, the base capacity was multiplied by the appropriate width factor. The road widths were obtained from the Monroe County Highway Sufficiency Study, 1978.

The width factor (W) employed for each computation was obtained from Table 10.8 of the Highway Capacity Manual.

Thus,

$$\text{Limiting LOS}_D \text{ Capacity} = 928 \times W$$

Once this limiting capacity for Level of Service D has been obtained the result is reduced again for foul weather. This reduction is achieved by reducing the computed capacity by 20%, according to the National Academy of Sciences Transportation Research Board Circular 212, January 1980. The following is the application of this methodology to Route A as an example.

Computation of Capacity for Route A: Lake Road (Route 18)

Route A was one of those routes that was computed because there was no available data on capacity (v/h). The Monroe County Highway Sufficiency Study (1978) has road widths for the segment from the Monroe-Wayne County Line west to Route 250.\* The width given (21 feet) for the entire length was used to compute capacity (v/h).

The basic formula for calculating capacity is taken from the National Academy of Sciences Highway Capacity Manual, 1965, for a two-lane, two-way rural highway.\*\*

$$\text{LOS}_D \text{ Base Cap} = \text{LOS}_E \text{ Cap} \times \text{LOS}_D \text{ CF} \times \text{CRF}$$

where

$$\text{LOS}_D \text{ Base Cap} = \text{Level of Service D Base Capacity}$$

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\*When width data for the entire evacuation route was not available, the data for the most limiting segment of available segments was used.

\*\*The number of trucks and buses anticipated is not significant.

$LOS_E \text{ Cap}$  = Level of Service E capacity under ideal conditions: 2000 v/h

$LOS_D \text{ CF}$  = Level of Service D conversion factor to convert from  $LOS_E$  to  $LOS_D$ . Conversion factor (0.58) obtained from Table 10.7 of the Highway Capacity Manual, 1965.

CRF = Capacity Reduction Factor; % of capacity assigned to the outbound flow (80%)

Applying this generic formula to Route A (Route 18, or Lake Road), the following values are substituted:

$$LOS_D \text{ Base Cap} = 2000 \times 0.58 \times 0.8$$

$$LOS_D \text{ Base Cap} = 928 \text{ v/h}$$

To adjust this vehicle per hour rate to account for the particular lane width of Route A, the following formula is used:

$$LOS_D \text{ Base Cap} \times W$$

where

$W$  = width factor

To obtain the road width factor, the road width (21 feet) is divided by 2 to provide the width of one lane, thus yielding 10.5 feet.

The adjustment factor is obtained from Table 10.8 of the Highway Capacity Manual. The factor is obtained from the table matrix of lane widths and distances from lane edge to obstruction (shoulder). Applying a shoulder width of 2 feet for both sides of Route A and a lane width of 10 feet,\* the factor 0.69 is

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\*Table 10.8 gives only 11 and 10-foot lane widths to select from; in each case, the more conservative lane width is used to select the width factor.



obtained. Substituting this factor to adjust for width yields:

$$LOS_D \text{ Limiting Cap for Route A} = 928 \times 0.69$$

$$LOS_D \text{ Limiting Cap for Route A} = 640$$

In order to compute the actual capacity time for Route A, the limiting capacity, adjusted for road width, is divided into the vehicle demand:

$$\frac{\text{Vehicle demand}}{\text{Capacity}} = \text{Capacity time}$$

Thus,

$$\frac{2,960}{640} = 4.6 \text{ hours or 4 hours 36 minutes}$$

For foul weather the capacity is reduced by 20% and the same computation is repeated.

$$\frac{2,960}{512} = 5.8 \text{ or 5 hours 48 minutes}$$

Evacuation Routes B and G and C and D are overlapping or shared routes. Routes B (originating in ERPA II) and G (originating in ERPA V) share the same highway (Route 104) for a significant distance. Where Route B enters ERPA V, it is the same as Route G (Route 104 west), which is used by ERPA V vehicles.

The limiting capacity for Route B inside ERPA II is more restrictive than that portion of Route 104 inside ERPA V. Therefore, the capacity time for Route B inside ERPA II was computed separately. This sum (36 minutes) was then added to the capacity time computed for Routes B and G combined in ERPA V. (The total number of vehicles from ERPAs II and V were used to compute the capacity time of the combined routes in ERPA V.) Thus the capacity time for ERPA II, Route B, is 36 minutes greater than for Route B and G combined in ERPA V.



Routes C and D also combine into one route; however, the limiting capacities for both routes are the same, so the capacity times were not added. As an additional check, the capacity time for Route C in ERPA II was calculated, using the total number of ERPA II cars. The result was lower than the capacity time computed for Route C and D combined in ERPA III. Therefore, the capacity time computed on the basis of the total number of cars from both affected ERPAs (i.e. II and III) was used.



## ANNEX K

### EVACUATION TIME ESTIMATES

#### Introduction

This appendix, Evacuation Time Estimates, has been prepared as part of the evacuation plan for Wayne County. (Because information required for the time estimates is included in other sections of the overall evacuation plan, cross referencing has been employed.)\* The evacuation time estimates are based on a conservative scenario during working hours with children in school. These estimates assume that inner and outer sectors are evacuated simultaneously. For a map of that portion of Wayne County within the plume exposure pathway emergency planning zone (EPZ), refer to Figure A-1 in Annex A of the plan.

The source of population information (Annex A) used in these estimates is preliminary 1980 census data. The number of automobiles used is equal to the number of households. School children are carried by school buses from the schools and are treated as part of the general population.\*\* Roadway capacities at Level of Service D were either supplied by the New York State Department of Transportation or computed on the basis of county and state highway sufficiency studies. Road capacity computations were done in accordance with principles and techniques described in the Highway Capacity Manual, 1965, Special Report 87, Highway Research Board by the National Research Council of the National Academy of Sciences. Computation techniques were discussed with and approved by officials of the New York Office of Disaster Preparedness, Nuclear Civil Protection Planning Section.

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\*A previous time estimate report NUS-3521, January 1980, was submitted in response to a generic NRC letter (November 29, 1979) before evacuation plans were written.

\*\*In a rural area such as this where most children ride buses to school, school bus transport would not constitute special problems, according to interviews with local school officials.

The methodology for computing capacities is discussed in detail in the methodology section of this appendix.

#### Demand

The Ginna 10-mile EPZ in Wayne County is a rural setting with a negligible transient population (four motels) and no hospitals or nursing homes. Special populations and facilities are described in Appendix K of the overall emergency response plan.

The population by Emergency Response Planning Area (ERPA), and census enumeration district, is given in Table A-1 and Figure A-2. The number of automobiles and households for each ERPA appears in Tables K-3 and K-4. (The population by sectors is shown in Appendix J of the overall plan, but as mentioned previously these estimates are made on the basis of ERPAs.)

In a rural area such as this, the number of households without automobiles in 1980 is probably nil.\* Even so, the plan provides for transportation dependents to be served during an evacuation by Wayne County Highway Department's "WATTS" buses and supplemented as needed by school buses from districts outside the EPZ. The carrying capabilities of this agency are shown in detail in Table K-1 and the evacuation time for transportation dependents is assumed to be the same as for the general population.\*\*

#### Traffic Capacity

The complete network of primary routes for a full, ten-mile evacuation is shown in Annex H, which lists and describes the primary routes for each ERPA and includes a map of these routes from the ERPA in which they originate to the assigned congregate

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\*Specific preliminary 1980 census data on vehicles per household were not available.

\*\*All buses of the Wayne Area Transit System are radio equipped, and could be dispatched quickly in the event evacuation became necessary.

TABLE K-1  
WAYNE AREA  
TRANSIT SYSTEM  
PASSENGER CAPABILITIES

<u>Type of Vehicle</u>	<u>Number</u>	<u>Seated Capacity/ Vehicle</u>	<u>Total</u>
Van	4*	13*	52*
Bus	1	17	17
Bus	1	20	20
Passenger Car	<u>2</u>	<u>5**</u>	<u>10**</u>
TOTAL	8	--	99

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\*To be replaced by four 20-passenger buses, giving a total fleet capacity of 127.

\*\*Does not include the driver.

care center (Figure H-1). The same information for a three-mile evacuation appears in Annex I.

Traffic control points (i.e. potential bottlenecks) and access control points (i.e. police roadblocks regulating entry to the EPZ) have been designated with local officials to ensure orderly and expedient egress. The access control points for three and ten mile evacuations are shown in Figure C-2 and C-3, respectively.

The roadway characteristics for the primary evacuation routes are given in Table K-2. The table applies to both the three and ten mile evacuations since ERPA I will use the same routes in either case.

#### Evacuation Times

Tables K-3 and K-4 are summary tables providing total evacuation time estimates as well as estimates for the time components of the evacuation process: notification, capacity times, and confirmation. Whereas the preliminary evacuation time estimates (NUS-3521) focused on the evacuation of the population by radial sectors, this estimate is keyed to the evacuation of the population by ERPAs, in accordance with the evacuation plan.

The basic evacuation plan for Wayne County calls for simultaneous evacuation of the full, ten-mile EPZ. Estimates for this movement are shown in Table K-3.

Table K-3 also shows evacuation times for fair and foul weather by ERPA. In some cases, an ERPA has more than one evacuation route and the appropriate number of automobiles is shown for different areas within the same ERPA. This breakdown was achieved by matching the number of automobiles (households) in



TABLE K-2  
ROADWAY CHARACTERISTICS

<u>Route</u> <sup>a</sup>	<u>Limiting Segment</u>	<u>Number of</u> <sup>b</sup> <u>Lanes</u>	<u>Type</u> <sup>c</sup>	<u>Limiting</u> <u>Capacity</u>	<u>Comments</u>
A	County Road 286 to <sup>d</sup> Walworth-Macedon Town Line	2	R	580 <sup>d</sup>	
B	all <sup>e</sup>	2	R	514 <sup>e</sup>	
C	all <sup>e</sup>	2	R	457 <sup>e</sup>	
D	Newark-Marion Road <sup>e</sup> to Marion-Palmyra Town Line	2	R	530 <sup>e</sup>	
E (Pultneyville)	all <sup>e</sup>	2	R	514 <sup>e</sup>	
E (Williamson)	all <sup>d</sup>	2	R	950 <sup>d</sup>	

<sup>a</sup>Route descriptions and map appear in Annex H.

<sup>b</sup>Total number of through lanes in both directions at the most limiting segment.

<sup>c</sup>Rural highway.

<sup>d</sup>New York State Department of Transportation, Data Services Bureau, "1978 New York Highway Sufficiency Ratings."

<sup>e</sup>Derived from: Wayne County Planning Board report no. 9, "County Transportation Study and Plan," 1973; and National Academy of Sciences, "Highway Capacity Manual," 1965.

TABLE K-3  
SUMMARY OF EVACUATION TIMES  
(Simultaneous Evacuation of Full, Ten-Mile Emergency Planning Zone)

ERPA	Route	Households <sup>a</sup>	Vehicles	Foul Weather Times (hr-min)				Fair Weather Times (hr-min)			
				Notification & Preparation	Movement	Confirmation	Total	Notification & Preparation	Movement	Confirmation	Total
I II	A	1,920	1,920	2-40	4-08	4-30	11-18	2-40	3-19	2-15	8-14
I II	B	1,620	1,620	2-40	3-56	4-30	10-06	2-40	3-04	2-15	8-51 7-15
II	C	480	480	2-40	1-19	4-30	8-29	2-40	1-03	2-15	5-58
III	D	1,000	1,000	2-40	2-22	4-30	9-32	2-40	1-53	2-15	6-48
IV	E Pulneyville	620	620	2-40	1-31	4-30	8-41	2-40	1-12	2-15	6-07
IV	E Williamson	1,450	1,450	2-40	4-30	4-30	11-40	2-40	1-30	2-15	6-25

<sup>a</sup>Preliminary unofficial 1980 U. S. Census data.

TABLE K-4  
SUMMARY OF EVACUATION TIMES, ERPA I AND ERPA II  
(Evacuating Separately)

ERPA	Route	Households <sup>a</sup>	Vehicles	Foul Weather Times (hr-min)				Fair Weather Times (hr-min)			
				Notification & Preparation	Movement	Confirmation	Total	Notification & Preparation	Movement	Confirmation	Total
I	A	680	680	2-40	1-28	2-00	6-08	2-40	1-12	1-00	4-52
	B	400	400	2-40	0-58	2-00	5-38	2-40	0-47	1-00	4-27
II	A	1,240	1,240	2-40	2-40	4-30	11-50	2-40	2-06	2-15	7-01
	B	1,220	1,220	2-40	2-58	4-30	12-08	2-40	2-23	2-15	7-18
	C	480	480	2-40	1-19	4-30	8-29	2-40	1-03	2-15	5-58

<sup>a</sup>Preliminary unofficial 1980 U. S. Census data.

the appropriate enumeration districts with the route that residents in those enumeration districts would use.

Limitations of the Wayne County road network and the locations of adequate congregate care space dictate that ERPAs I and II use the same evacuation routes. There are, therefore, two scenarios for evacuation of these areas, one in which ERPA I evacuates first and ERPA II evacuates later or not at all, and the other in which both ERPAs evacuate simultaneously. Table K-4 shows evacuation time estimates for separate evacuation of ERPAs I and II. These estimates would apply to a situation in which a three mile evacuation was implemented first and an extension of the evacuation to ten miles was held in reserve. Times for fair and foul weather evacuation are shown.

#### Methodology

The notification and confirmation times are based on local officials' estimates for entire EPZ sectors. For instance, the notification and confirmation time estimates for all ERPAs of Wayne County were originally applied to the entire 2 and 5 mile rings as well as to the 5 to 10 mile SE sector, with Ginna station as the center point. Therefore, as applied here to each ERPA they are highly conservative.

The Notification time includes a preparation time of 20 minutes. This preparation time is the theoretical elapsed time between notification and initial vehicle movement used in our previous time estimates NUS-3521 submitted to the NRC January 1980. Limiting road capacities that were not available from the New York State Department of Transportation were computed. The Highway Capacity Manual provides the methodology. Table 10.7 of the Manual gives maximum service volumes under ideal conditions for cars travelling in both directions on a two-lane, two-way, rural highway.

At Level of Service E the base capacity for a two-way, two-lane rural highway is 2000 v/h. To convert to Level of Service D, this base capacity is multiplied by 0.51, which was obtained from Table 10.7. This factor corresponds to an average highway speed of 40 miles per hour with a 40 percent restriction to passing sight distance at Level of Service D. A factor of 80 percent is applied to yield the outbound flow of traffic. The following is the basic formula applied to compute Level of Service D, Base capacity:

$$LOS_D \text{ Base Capacity} = 2000 \times 0.51 \times 0.8 = 816$$

To modify this base capacity to reflect the limiting road width and shoulder width of the particular evacuation route, the base capacity was multiplied by the appropriate width factor. The road widths were obtained from the Wayne County County Transportation Study and Plan, 1973.

The width factor (W) employed for each computation was obtained from Table 10.8 of the Highway Capacity Manual.

Thus,

$$\text{Limiting } LOS_D \text{ Capacity} = 816 \times W$$

Once this limiting capacity for Level of Service D has been obtained the result is reduced again for foul weather. This reduction is achieved by reducing the computed capacity by 20%, according to the National Academy of Sciences Transportation Research Board Circular, January 1980.

#### Computation of Capacity for Route B: Walworth-Ontario Road

Route B was one of those routes that were computed because there was no available data on capacity (v/h). The Wayne County Transportation Study and Plan (1973) has road widths for segments of Walworth-Ontario Road north of Ridge Road and south of

Walworth-Marion Road. It is classed as a "collector" route. The width given (18 feet) was used to compute capacity (v/h).

The basic formula for calculating capacity is taken from the National Academy of Sciences Highway Capacity Manual, 1965, for a two-lane, two-way rural highway.\*

$$\text{LOS}_D \text{ Base Cap} = \text{LOS}_E \text{ Cap} \times \text{LOS}_D \text{ CF} \times \text{Capacity Reduction Factor}$$

where

$\text{LOS}_D \text{ Base Cap}$  = Level of Service D Base capacity

$\text{LOS}_E \text{ Cap}$  = Level of Service E capacity under ideal conditions: 2000 v/h

$\text{LOS}_D \text{ CF}$  = Level of Service D conversion factor to convert from  $\text{LOS}_E$  to  $\text{LOS}_D$ . Conversion factor (0.51) obtained from Table 10.7 of the Highway Capacity Manual, 1965.

Cap reduction = % of capacity assigned to the out-bound flow (80%)

Applying this generic formula to Route B (Walworth-Ontario Road), the following values are substituted:

$$\text{LOS}_D \text{ Base Cap} = 2000 \times 0.51 \times 0.8$$

$$\text{LOS}_D \text{ Base Cap} = 816 \text{ v/h}$$

To adjust this vehicle per hour rate to account for the particular lane width of Route B, the following formula is used:

$$\text{LOS}_D \text{ Base Cap} \times W$$

where

$W$  = width factor

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\*The number of trucks and buses anticipated is not significant.

To obtain the road width factor, the road width (18 feet) is divided by 2 to provide the width of one lane, thus yielding 9 feet.

The adjustment factor is obtained from Table 10.8 of the Highway Capacity Manual. The factor is obtained from the table matrix of lane widths and distances from lane edge to obstruction (shoulder). Applying a shoulder width of 2 feet for both sides of Route A and a lane width of 9 feet, the factor 0.63 is obtained. Substituting this factor to adjust for width yields:

$$LOS_D \text{ Limiting Cap for Route B} = 816 \times 0.63$$

$$LOS_D \text{ Limiting Cap for Route B} = 514$$

In order to compute the actual capacity time for Route B, the limiting capacity, adjusted for road width, is divided into the vehicle demand:

$$\frac{\text{Vehicle demand}}{\text{Capacity}} = \text{Capacity time}$$

Assuming that both ERPAs I and II were evacuated at the same time and that persons using Route B were from areas shown in Figure A-2 as Census Enumeration Districts 450, 454, and 455, the number of vehicles (households) would be 1,620.

$$\frac{1,620}{514} = 3.15 \text{ hours or 3 hours 4 minutes}$$

for a Route B Capacity time.

For foul weather the capacity is reduced by 20% and the same computation is repeated. This reduction factor is obtained from

$$\frac{1,620}{411} = 3.94 \text{ hours or 3 hours 56 minutes.}$$

Variations in limiting capacity of evacuation routes as given in Table K-2 arise from several differences in road data.



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Information on the limiting capacity of Route A and Route E (Williamson) are taken directly from New York Highway Sufficiency Ratings.

Route C is composed of town rather than county roads. The route is classed in the Wayne County Transportation Study and Plan as a "primary" road rather than a collector. This means that providing access to abutting property (driveways) is an important, though not primary, consideration in the road's design. As a result, a shoulder width of 0 feet (adjustment factor is .56) was used in computing the limiting capacity for Route C.

Route D's most restricted segment is the portion of Walworth-Marion Road between Marion Village and the Marion-Palmyra town line. Both feeder routes (Cory Corners Road and Eddy Ridge Road) have less capacity than Walworth-Marion Road but each would carry only part of evacuation traffic from ERPA III. The limiting capacity for Walworth-Marion Road, which would carry all evacuation traffic from ERPA III, was computed on the basis of a 9.5 foot lane width and two-foot shoulder width (adjustment factor is .65).

Route E (Pultneyville) has similar characteristics to Route B and, as such, has the same limiting capacity.

