

DATA COLLECTION AND LEVELS OF SERVICE

Observations of traffic flow and driving characteristics were made throughout the corridor during both peak and off-peak periods on several occasions by engineers with both traffic engineering and roadway design expertise. In addition to multiple drive-throughs of CR 520, side road approaches and major traffic generator ingress and egress points were ridden to observe sight line restrictions, as well as other conditions, which could adversely impact either the safety or operation of the location. Key areas of the corridor were observed by walking that area. Where necessary, field measurements were taken. A windshield videotape was made of the entire corridor traveling in each direction and photographs were taken of key locations. Both automatic traffic recorder (ATR) and manual turning movement traffic counts were conducted at all key intersections and sections of roadway throughout the corridor.

Turning movement traffic data was collected from September to November of 2000, from 6:00 AM to 9:00 AM (morning) and 11:00 AM to 1:00 PM (midday), and 3:30 PM to 6:30 PM (evening) at the following locations:

- CR 520 and CR 52 (Crawfords Corner-Everett Road)
- CR 520 and Brookdale Community College Driveway
- CR 520 and Phalanx Road
- CR 520 and CR 50 (Middletown-Lincroft Road/ Swimming River Road)
- CR 520 and Hurleys Lane
- CR 520 and Garden State Parkway southbound ramp (Exit 109)
- CR 520 and Garden State Parkway northbound ramp (Exit 109)/ Half-Mile Road
- CR 520 and One River Center
- CR 520 and Schultz Drive
- CR 520 and CR 51 (Hance Avenue)
- CR 520 and Leighton Avenue
- CR 520 and Shrewsbury Avenue (CR 13)

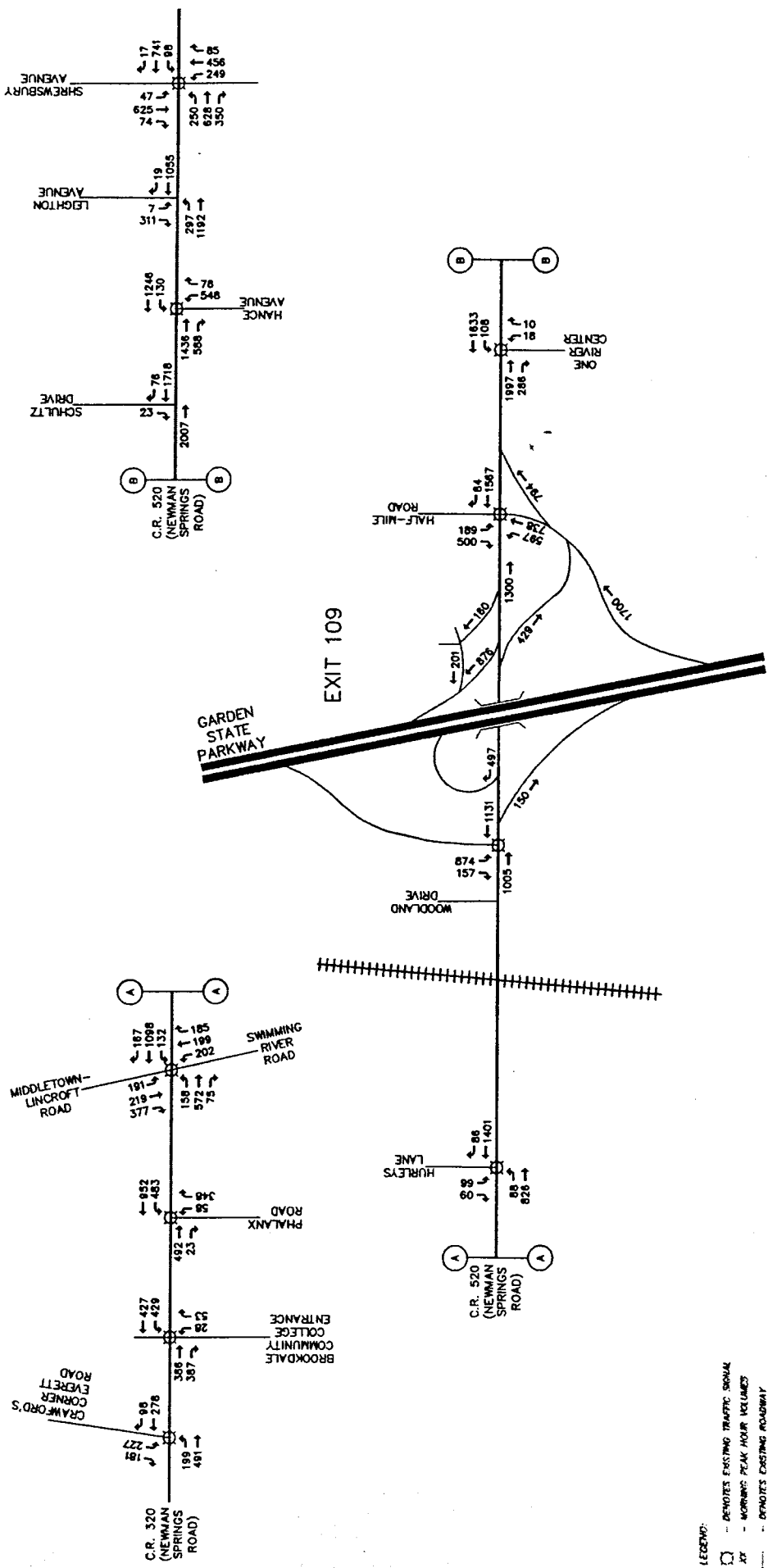
Based on the data collected at these intersections, the weekday peak traffic periods for the corridor was found to be between 7:45 AM and 8:45 AM (morning peak), 12:00 noon to 1:00 PM (midday peak), and 5:00 PM to 6:00 PM (evening peak). Existing 2000 traffic volumes can be found on Figures 2, 3 and 4.

2000 EXISTING MORNING PEAK HOUR VOLUMES

COUNTY ROUTE 520 (NEWMAN SPRINGS ROAD)

MIDDLETOWN TOWNSHIP
MONMOUTH COUNTY, NEW JERSEY

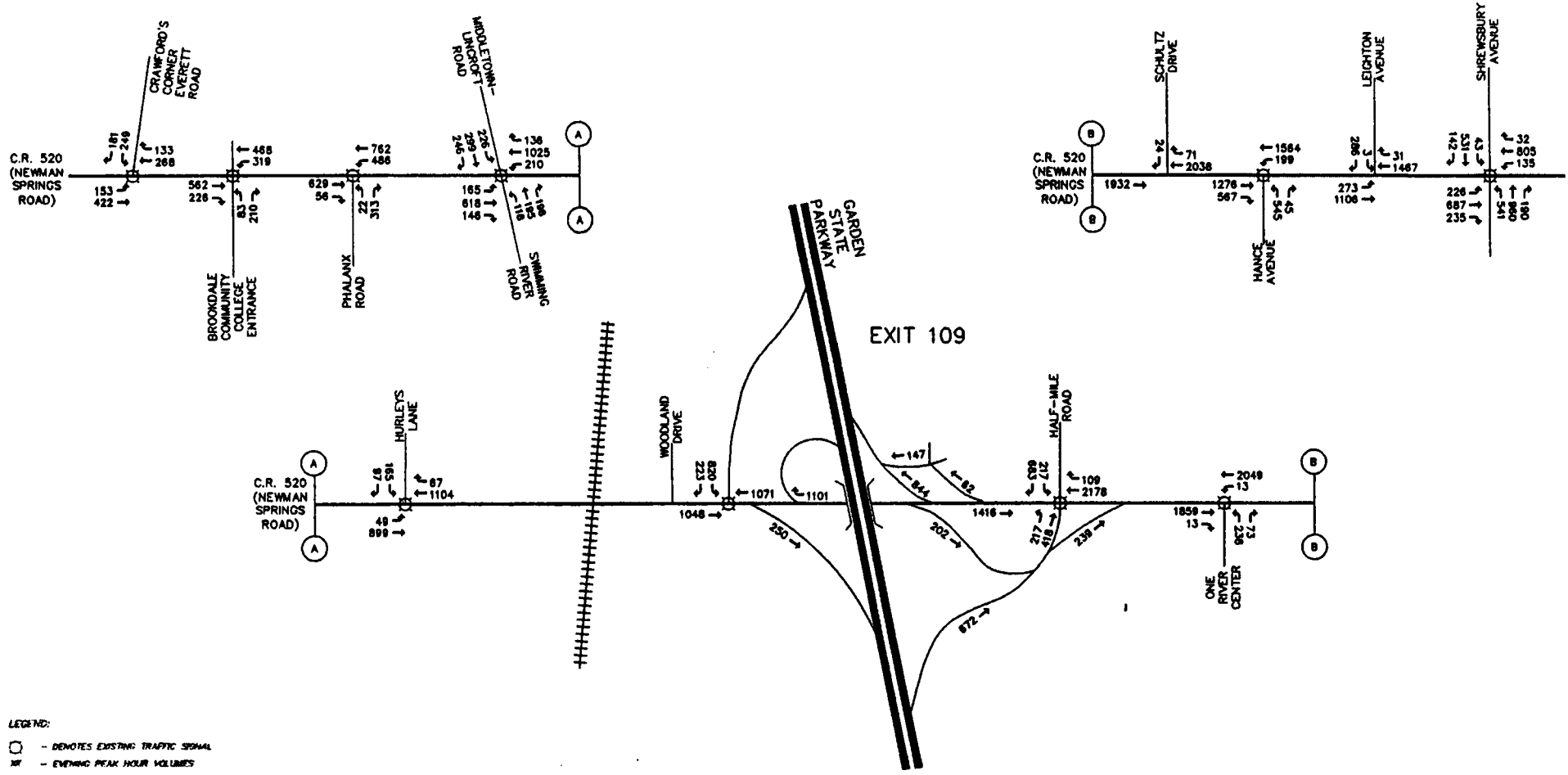
Figure 2



LEGEND:
 □ - DENOTES EXISTING TRAFFIC SIGNAL
 - - - - - MORNING PEAK HOUR VOLUMES
 --- - DENOTES EXISTING ROADWAY

2000 EXISTING EVENING PEAK HOUR VOLUMES

COUNTY ROUTE 520 (NEWMAN SPRINGS ROAD)
 MIDDLETOWN TOWNSHIP
 MONMOUTH COUNTY, NEW JERSEY



LEGEND:
 ○ - DENOTES EXISTING TRAFFIC SIGNAL
 M - EVENING PEAK HOUR VOLUMES
 - - - - - DENOTES EXISTING ROADWAY

As shown in Table I below, the highest volume intersection is at CR 520 with Half-Mile Road/ Garden State Parkway NB off ramp (GSP Exit 109). The signalized intersection with the least amount of traffic is CR 520 at Crawfords Corner-Everett Road (CR 50).

Table I
Total Intersection Peak Hour Traffic Volumes (2000)

Location	Morning Peak Hour	Midday Peak Hour	Evening Peak Hour
Crawfords Corner-Everett Road (CR 50) & CR 520	1474	1238	1406
Brookdale Community College entrance & CR 520	1710	1748	1868
Phalanx Road & CR 520	2356	2008	2268
Middletown-Lincroft Road/ Swimming River Road & CR 520	3555	2861	3582
Hurleys Lane & CR 520	2560	2096	2381
Garden State Parkway southbound ramp & CR 520	3167	2152	3162
Half-Mile Road/ Garden State Parkway northbound ramp & CR 520	5769	3239	5477
One River Center & CR 520	4050	2546	4242
Schultz Drive & CR 520	3824	2438	4065
Hance Avenue (Route 50) & CR 520	4026	2613	4260
Leighton Avenue & CR 520	2881	2173	3164
Shrewsbury Avenue (CR 13) & CR 520	3620	3494	4527

Levels of Service

While traffic volumes provide an important measure of activity on the area road system, evaluating how well that system accommodates those volumes is also important, i.e., a comparison of peak traffic volumes with available roadway capacity. By definition, capacity represents the maximum number of

vehicles that can be accommodated given the constraints of roadway geometry, environment, traffic characteristics and controls.

Primarily, intersections control capacity in road networks, since conflicts exist at these points between through, crossing and turning traffic. Because of these conflicts, congestion is most likely to occur at intersections. Therefore, intersections are studied most often when determining the quality of traffic flow.

Although an unsignalized intersection on a through route is seldom critical to the overall capacity of the through route, it may significantly affect the capacity of the minor cross route and it may influence the quality of traffic flow on both. When analyzing unsignalized intersections, major street through and right turn movements are unimpeded and have the right-of-way over all side street traffic and left turns from the major street. All other turning movements in the intersection cross, merge with, or are otherwise impeded by the major street movements.

Traffic delays at unsignalized intersections are determined by sequentially processing these impeded movements. For each impeded movement in turn, all conflicting flows are summed. It should be noted that the Highway Capacity Manual (HCM) assumes a random arrival for all the movements, which is not always the case (i.e., an adjacent signal will platoon vehicles).

Since operation at capacity is usually unsatisfactory to most drivers, a descriptive concept has been developed for unsignalized intersections called Level of Service. Level of service relates expected traffic delay to critical movement. Unsignalized levels of service range from Level of Service 'a' (indicating average delays of ten seconds or less) to Level of Service 'f' (indicating average delays of greater than 50 seconds). Level of Service 'e' is generally considered as the acceptable limit of delay for most drivers in a suburban setting. A more detailed level of service description for unsignalized intersections is summarized in Table II.

Table II
Level of Service and Expected Delay
for Unsignalized Intersections¹

Level of Service	Average Total Delay per Vehicle (seconds)
a	0 to 10.0
b	10.1 to 15.0
c	15.1 to 25.0
d	25.1 to 35.0
e	35.1 to 50.0
f	Over 50.0

At signalized intersections, factors that affect the various approach capacities include width of approach, number of lanes, signal 'green time', turning percentages, truck volumes, etc. However, operation at capacity can be less than satisfactory since substantial delays or reduced operating speeds are likely. Delays cannot be related to capacity in a simple one-to-one fashion. It is possible to have delays in the Level of Service 'F' range without exceeding roadway capacity. Substantial delays can exist without exceeding capacity if one or more of the following conditions exist:

- Long signal cycle lengths;
- A particular traffic movement experiences a long red time; or,
- Progressive movement for a particular lane group is poor.

¹ Transportation Research Board, Special Report 209, Highway Capacity Manual, Third Edition, updated 1997, published by the Transportation Research Board, Washington, D.C., 1994, 1997.

Table III describes the level of service ranges for signalized intersections.

Table III
Level of Service and Expected Delay
for Signalized Intersections²

Level of Service	Average Stopped Delay per Vehicle (seconds)
A	0 to 10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	Over 80.0

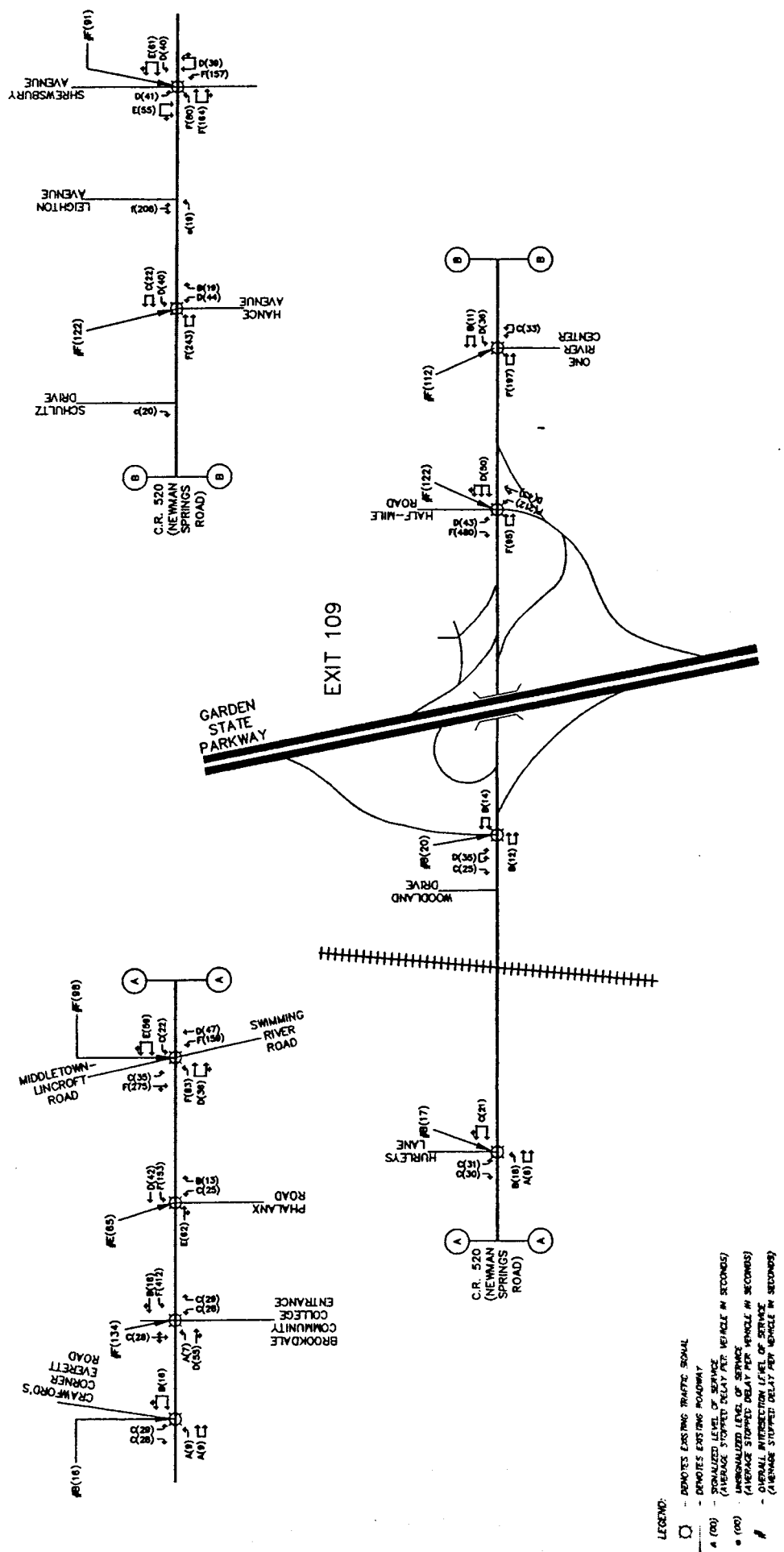
Detailed volume/capacity analyses were performed at each of the study intersections for the peak traffic hours. The levels of service (LOS) for each intersection movement are shown on Figures 5, 6 and 7. The overall intersection LOS are also summarized in Table IV.

² Transportation Research Board, Special Report 209, Highway Capacity Manual, Third Edition, updated 1997 published by the Transportation Research Board, Washington, D.C., 1994, 1997.

Figure 5

2000 EXISTING MORNING LEVELS OF SERVICE

COUNTY ROUTE 520 (NEWMAN SPRINGS ROAD)
 MIDDLETOWN TOWNSHIP
 MONMOUTH COUNTY, NEW JERSEY



- LEGEND:
- ◻ - DENOTES EXISTING TRAFFIC SIGNAL
 - - DENOTES EXISTING ROADWAY
 - A (00) - NORMALIZED LEVEL OF SERVICE (AVERAGE STOPPED DELAY PER VEHICLE IN SECONDS)
 - B (00) - UNNORMALIZED LEVEL OF SERVICE (AVERAGE STOPPED DELAY PER VEHICLE IN SECONDS)
 - C (00) - OVERALL INTERSECTION LEVEL OF SERVICE (AVERAGE STOPPED DELAY PER VEHICLE IN SECONDS)

Table IV
Overall Intersection Existing Levels of Service (2000)

Location	Morning Peak Hour	Midday Peak Hour	Evening Peak Hour
Crawfords Corner-Everett Road (CR 50) & CR 520	B (16)	B (16)	B (18)
Brookdale Community College entrance & CR 520	F (134)	D (36)	E (68)
Phalanx Road & CR 520	E (65)	F (96)	F (94)
Middletown-Lincroft Road/ Swimming River Road & CR 520	F (98)	D (40)	E (74)
Hurleys Lane & CR 520	B (17)	B (12)	B (13)
Garden State Parkway southbound ramp & CR 520	B (20)	B (15)	C (21)
Half-Mile Road/ Garden State Parkway northbound ramp & CR 520	F (122)	D (50)	F (102)
One River Center & CR 520	F (112)	C (24)	C (22)
Schultz Drive & CR 520*	c(20)	b(14)	d(30)
Hance Avenue (Route 50) & CR 520	F (122)	D (38)	E (79)
Leighton Avenue & CR 520*	f(208)	d(30)	f(358)
Shrewsbury Avenue (CR 13) & CR 520	E (56)	E (68)	F (203)

(##) Average delay per vehicle

(*) Critical movements at unsignalized intersections

As shown in the above table, failing (LOS 'F') conditions exist at many intersections throughout the study area.